

# PRACTICAL OBSTETRIC FISTULA SURGERY

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## FOREWORD TO THE SECOND EDITION

Long before I met Dr Andrew Browning in person, I knew his name well through his multiple publications on the subject of obstetric fistula, as well as his unrivalled reputation as one of the most talented and committed fistula surgeons globally.

With our shared goal and avid determination to help women with obstetric fistula, dating back many years—Andrew, as an obstetrician-gynaecologist/expert fistula surgeon/trainer in Ethiopia, Tanzania and across Africa, and myself as a midwife/trainer/specialist advisor for obstetric fistula round the world with various international agencies—it took little time for our two worlds to converge.

Although we've each worked for a series of different institutions, we've continuously been part of the same fistula team, working together across organisations and continents to build national capacity for the prevention and treatment of obstetric fistula in affected countries and advocating tirelessly to help women with the condition.

As a master trainer, Andrew also provides expert guidance to countless other fistula surgeons, including trainee surgeons—Fellows—on the FIGO Fistula Surgery Training Initiative, for which I am Senior Project Manager. Acting as Chair of the FIGO Fistula Committee and the program's Expert Advisory Group, Andrew oversees the development and progression of over 70 FIGO Fellows in more than 20 countries, advising the project team and leading efforts to create much needed educational and training resources for fistula surgeons and care teams globally.

One such critical new resource is this book!

Building on the ground breaking publications of fistula hero, Dr Brian Hancock, Andrew has used his expertise to update and expand the original, extensively used *Practical Obstetric Fistula Surgery* book, written by Brian (with Andrew as contributing author). This new version is directed towards fistula surgeons, with key information for fistula care teams. It contains innovative new surgical techniques for vaginal reconstruction, plus management of ongoing urinary incontinence following vesico-vaginal fistula repair and reflects on progress and challenges, including the concerning rise in iatrogenic fistula cases.

Written in a clear, easy to read style, with multiple informative photos and illustrations, this much awaited second edition of the book will be an outstanding guide and constant companion to fistula surgeons and teams wherever it is used, and will undoubtedly contribute to successful treatment outcomes and recovery for women with obstetric fistula worldwide.

Gillian Slinger RN, RM, BSc, MSc  
Senior Project Manager, *Fistula Surgery Training Initiative*, FIGO; Board Member,  
*Fistula Foundation*, USA; Global Activist for *Fistula* and catalyst of the  
*International Day to End Obstetric Fistula*.



## PREFACE TO THE SECOND EDITION

Our book *Practical Obstetric Fistula Surgery* has proved popular with trainee fistula surgeons. Since publication 12 years ago there have been some significant developments. This is an opportunity to publish a new edition.

It was the lack of training material and a long learning curve that inspired me to write the first book to help others. I aimed for a book that I wished was available when I started. I have been fortunate to operate in some very well equipped conditions such as the Mercy Ships in West Africa and the Addis Ababa Fistula Hospital. In contrast, many rural hospitals where fistula surgery had never been performed had the most basic facilities. I have assisted many at their first operations so I appreciate the difficulties they face.

I was fortunate to meet Dr Andrew Browning at the Addis hospital where he started his fistula surgery, and to have worked with him on several occasions in Ethiopia, Uganda and once in Tanzania. He has been very involved in fistula surgery since 2000. He has extensive experience, first gained working as the medical director of Addis satellite unit at Bahr Dar and subsequently working in Tanzania and travelling in many African countries and to Nepal. He is in great demand as a teacher and for operating on other people's failed cases. He is one of the most skilful surgeons I have seen and committed to personal audit leading to the publication of many significant articles. His training videos are the best I have seen.

I am therefore more than happy to hand over to him as principal author. He has made some improvements to all the original chapters based on his enormous experience but the most significant addition is in the section on prevention and treatment of post-repair incontinence.

This book is above all intended as a user friendly guide for those new to fistula surgery and those who are progressing up the long learning curve.

Fistula surgery does not belong to any one specialty. We believe that anyone with good surgical skills and knowledge of pelvic anatomy, and an ability to adjust to the sub-optimal conditions found in most under resourced countries, can learn to repair the easier ones.

We strongly discourage Western specialists from making one off visits in the hope of contributing to the management of some "challenging cases" or "lending a hand". The people most able to help the fistula patients are those who work full time in Africa or other affected countries, or who make regular sustainable visits. It requires long-term commitment to learn the skills, and money to pay for free treatment, and buy sutures, catheters and good instruments. Above all it needs empathy and compassion for all that the patients have suffered.

It is a privilege to give women a new start in life using surgical skills and this has its own special rewards for the patient and the surgical team.

Brian Hancock



## DEDICATION

To the memory of Doctors Reginald and Catherine Hamlin, whose work inspired so many,  
and of Doctors Maura Lynch and John Kelly who remained in service to the end of their lives  
and  
to the patients we care for.



# INTRODUCTION

There is a growing worldwide awareness of the vast number of untreated childbirth injury patients in low to middle income countries. The United Nations in its Campaign to End Fistula along with many other organisations including the International Continence Society and the International Federation of Gynecology and Obstetrics (FIGO), and many individuals are focussing on the prevention of fistulae through improved access to safe delivery services and obstetric care. These organisations also recognise the need to train more surgeons, especially in fistula affected countries. FIGO has developed an internationally recognised, standardised training program, which is expanding all the time and at the time of writing this over 70 trainees—*FIGO Fellows*—across more than 20 countries.

Nobody knows how many fistula patients there are who have been forgotten and are without hope. Estimates are up to 2,000,000, the majority of whom are in Africa and south-east Asia, but the number is difficult to determine.

Most obstetric fistula cases are still due to prolonged obstructed labour. Twenty years ago, we found that most patients had delivered at home almost always with a dead baby and severe injuries. The pattern is changing as a result of improved access to safe delivery and obstetric services in many countries. More patients get to hospital and are delivered by caesarean section. Some arrive too late to save the baby or to prevent ischaemic damage. Others have a live baby but accidental bladder damage from the operation, a so called iatrogenic injury. These accidents are all too frequent due to delayed referrals resulting in a difficult caesarean, as well as inadequate operating facilities and inexperienced doctors. There is a pressing need to train health care professionals on close monitoring during childbirth and timely referral in the case of obstructed labour, as well as for doctors to operate safely but also to better select those who do not need an operative delivery.

Fistula surgery has a justifiable reputation for being difficult but it is not always appreciated that some cases are straightforward to cure.

The most experienced surgeons say they can close 95% of fistulae (but they may have to operate on up to 10% a second or third time to achieve this figure). However closure of the fistula does not always mean the patient will be dry.

A reasonably experienced surgeon who takes on almost all the cases seen can at best probably only make 80% of cases really dry by using the methods described in this book. Of course the surgeon who turns down the difficult cases will have much better results. This explains the paradox that the better one is at repairing fistulae, the worse will be the results, because the expert rarely turns anyone away.

Without reconstructive procedures described in the book more than 20% will have severe stress incontinence because the urethra and bladder have been so badly damaged. A few may improve

in time, but those who don't will consider that the operation has failed because they continue to leak even though the fistula is closed. Secondary operations for stress are possible but have variable results.

Anyone who watches a master fistula surgeon at work will marvel at the ease with which he or she demonstrates the art of fistula surgery. Even experienced surgeons who come new to fistula surgery will be surprised at how demanding the operations are and how difficult they seem at the start. The distorted anatomy and rigidity of tissues come as a shock. One has not only to know what has to be done, but also have the skill to do it. Accurate suturing in a confined space is difficult and requires more than average manual dexterity. There is a long learning curve due to the complexity of many cases and experience can only be gained by extensive hands on work. The books available to help apprentice fistula surgeons are reviewed in the appendix; these are at present either too complex for some or lacking in specific advice to provide all the help a novice fistula surgeon requires.

Teaching fistula surgery has been a large component of our work. It is rare for us to operate without at least one serious trainee present. Having helped many surgeons perform their first fistula operations, we can see the difficulties they have and understand the advice they need. Many of our operations have been performed in hospitals that have had no prior experience of fistula surgery and this is not a bar to success.

While the text is based on our own practical experience of what works best we have been fortunate to visit or meet most of the world's small band of very experienced fistula surgeons. We are most grateful for all we have learnt from them. Many of their words of wisdom are incorporated in our advice and they are mentioned under acknowledgements.

There is no absolutely right way of repairing fistulae; there may be several routes to success as long as general principles are followed. Fistula surgery is constantly evolving as new evidence becomes available. Who would have predicted that the fat graft that for decades has been accepted as a vital component in fistula repair in the Addis Ababa Fistula Hospital would now rarely be used by many surgeons, or that techniques would be developed to reduce the incidence of post-repair stress incontinence? This has largely been due to increased communication between fistula surgeons through agencies such as the International Society of Obstetric Fistula Surgeons, with its biennial meetings.

The complexity of cases varies enormously. Depending on the context, 25% are relatively simple, whilst 50% present a variety of technical challenges, and the final 25% can be extremely challenging to cure. Specialised centres are few and far between and it is unrealistic to expect that all fistula repairs should only be performed at these centres. The complex cases should certainly be referred to established centres if possible.

We know of many instances where excellent work is done in both independent and government hospitals by interested national, expatriate or regular visiting surgeons, **provided they recognise their limitations and do not attempt cases beyond their capability.**

Nursing care is just as important as the surgery and we show how care can be simplified and adapted to local circumstances. It is the surgeon's responsibility to be familiar with and to supervise all aspects of pre-operative and post-operative care. A new book on *Nursing Care for Fistula Patients* has just been published by UCIF and FIGO, written by Ishbel Campbell and Ian Asiimwe.

We cannot over-emphasise that a fistula patient has more than just a hole in the bladder and/or rectum. The whole person is damaged by the disastrous outcome of obstructed labour. A full understanding of what the patient has suffered, her social background and future are just as important to healing as the surgery. In this manual we concentrate on the physical aspects of management as no amount of empathy for the patient is of use unless she can be relieved of her constant incontinence as a first step. For an account of the holistic approach to the fistula patient the reader is referred to the recent WHO manual described in Appendix A.

For more information go to FIGO's website:

<https://www.figo.org/what-we-do/obstetric-fistula/fistula-surgery-training-initiative>



# 1 OBSTETRIC FISTULAE: CAUSE AND CHARACTER; THE OBSTETRIC FISTULA COMPLEX; CLASSIFICATION

## Understanding the Cause and Nature of Vesico-Vaginal Fistulae

The formal medical definition of a fistula is 'a communication between two epithelial surfaces.'

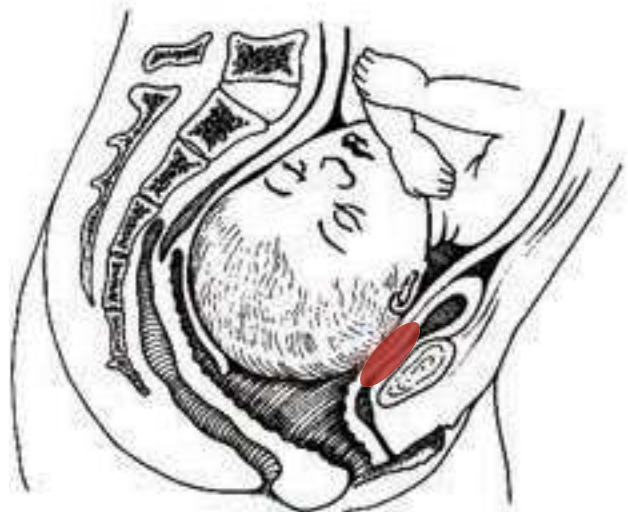
A fistula can arise anywhere in the body and the name for each fistula is purely descriptive, describing the two epithelial surfaces that are joining, for example:

1. Tracheo-oesophageal fistula. The communication here is between the trachea and oesophagus.
2. Enterocutaneous fistula. The communication is between the bowel and skin.

So a VVF is a vesico-vaginal fistula—a communication between the vesicae or bladder and vagina, while an RVF is a recto-vaginal fistula. This is a communication between the rectum and the vagina.

The fistulae in the genital tract are usually obstetric in origin and so they are often broadly referred to as 'obstetric fistulae. Obstetric vesico-vaginal fistulae (VVF) are caused simply by unrelieved obstructed labour. About 5% of all women will get into an obstructed labour, either due to cephalopelvic disproportion, malposition or malpresentation.

During the obstruction, prolonged pressure of the baby's head against the back of the pubic bone produces ischaemic necrosis of the intervening soft tissues, i.e. some part of the genital tract and bladder. (Figure 1.1)

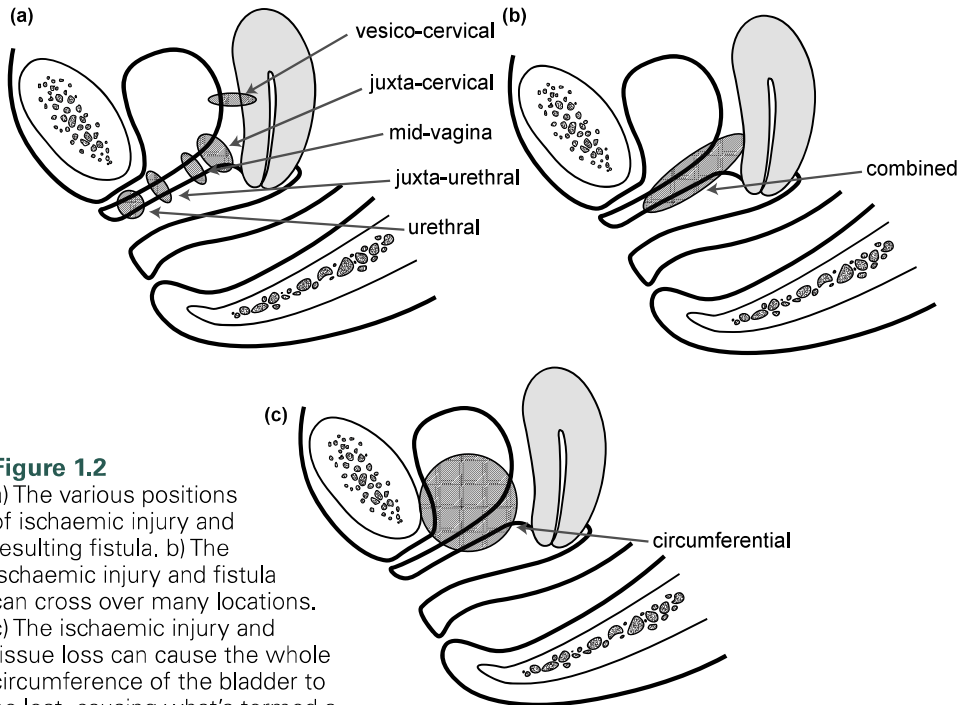


**Figure 1.1**

The area coloured green is often the first to undergo ischaemic necrosis. The posterior compartment (rectum and vagina) often necroses later.

In a labour that is sufficiently prolonged to produce this, the baby almost always dies. After death, intracerebral pressure decreases, the skull collapses and the mother eventually delivers a stillborn infant (if indeed she survives that long, many women of course don't).

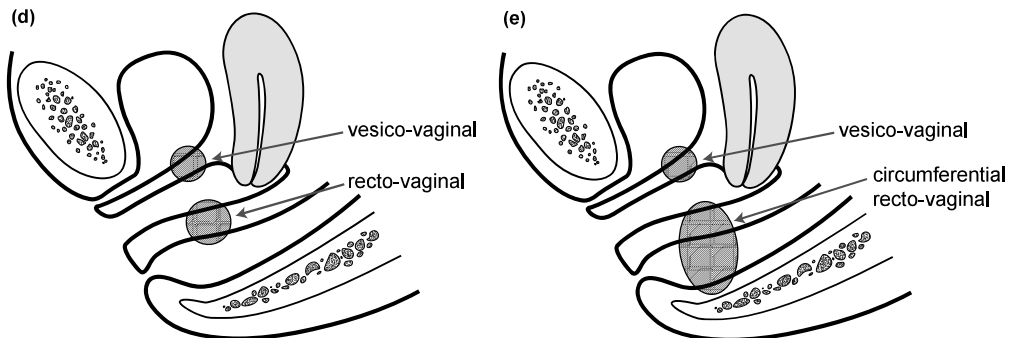
When the baby's head is stuck deep in the pelvis, the most common site for ischaemic injury is the urethro-vesical junction, but injury can also occur in other positions in the genito-urinary tract, either in isolation or together as one massive defect. In more severe cases the anterior part of the bladder is injured and comes away leaving what's called a circumferential fistula. (Figure 1.2 a-c)



**Figure 1.2**

a) The various positions of ischaemic injury and resulting fistula. b) The ischaemic injury and fistula can cross over many locations. c) The ischaemic injury and tissue loss can cause the whole circumference of the bladder to be lost, causing what's termed a circumferential injury.

d) The posterior vagina, rectum and anus can be involved too.  
e) In the worst cases the defect in the rectum can be circumferential.



The extent of the injury depends on the duration of labour, the intensity of the contractions and the strength of the mother to survive this ordeal. In the most severe cases, ischaemia will affect the whole of the anterior wall of the vagina, the bladder base, much of the urethra and sometimes the posterior vaginal wall and rectum as well, leading to massive loss of vagina, urinary tract and rectum. (Figure 1.2 d) The tissues of the rectum can be lost circumferentially, in the same manner as the bladder. (Figure 1.2e) In extreme cases, the bladder and vagina are completely destroyed, and worse case the anus and rectum too. Varying degrees of vaginal stenosis are common. The dead slough comes away over some days to weeks and the tissue left is severely injured. Scar forms and contracts as it heals. In the most extreme cases the vagina is completely lost and solid scar remains obliterating the vaginal orifice.

The exact site, size and amount of scar are functions of the position of the baby's head or presenting part when it becomes stuck, and the duration of the obstruction.

The ischaemic tissues take anywhere from three to ten days to slough away, forming the fistula or fistulae. Incontinence then begins, leaking urine every minute of the day and if there is a rectal fistula, leaking faeces and flatus as well. It is most commonly a fistula to the urinary tract with around 10% of those combined with a recto-vaginal fistula. Only in special circumstances can you see an RVF without a VVF. (See Chapter 7—Recto-Vaginal Fistulae).

The mother will be extremely weak and often unconscious. Some women take a day or two to rouse and one to two weeks to become mobile again.

Many mothers have died of exhaustion or a ruptured uterus in unrelieved obstruction—the fistula patients are the survivors.

## The Obstructed Labour Injury Complex

A fistula patient suffers from much more than a hole in the bladder. Her whole person is damaged. It is critical to understand the full impact of the damage to the physical and mental well being of the patient.

The 'obstructed labour injury complex' is a term for a broad range of injuries that the patient suffering from an obstetric fistula may encounter. Another term used to describe the fistula is 'field injury' because the ischaemic process doesn't just affect the tissues of the bladder and vagina and or rectum and vagina; it can affect all the tissues in the pelvis—so urinary tract, genital tract/terminal alimentary canal, as well as bones, nerves and muscles. The damage and tissue loss to these structures can be labelled primary conditions of the field injury. Then because the patient is incontinent, the injury will lead to various other conditions which we call secondary.

### Primary Conditions

#### **Vesico-Vaginal Fistulae (VVF)**

A Vesico-vaginal fistula (VVF): a communication between the vagina and urinary tract, almost always involving the bladder, often the urethra and more rarely the ureter. Sometimes the

communication or fistula is between the bladder and cervix or even bladder and uterus. We still use VVF although if we are to be strictly correct we'd use UVF for a urethro-vaginal fistula, and CVF for a cervico-vesical fistula.

VVF is the presenting complaint in 79–100% of patients. Iatrogenic fistula after caesareans, hysterectomies and caesarean hysterectomies are on the rise as more women are getting access to health facilities. In some series from East Africa they now account for 20–25% of all fistulae presenting. These are usually higher in the vagina, often small ones at the vault after hysterectomy, or in or adjacent to the cervix after a caesarean.

### **Recto-Vaginal Fistulae (RVF)**

Recto-vaginal fistulae (RVF) may coexist with VVFs in more severe cases of ischaemia. The incidence of combined fistulae ranges from 1% to 21%. Isolated RVFs due to obstructed labour are rare—around 3 in 1,000. Isolated RVFs are more likely due to poorly repaired fourth degree perineal tears and trauma, or even sexual trauma in young underdeveloped girls.

### **Perineal Tear**

Perineal tears occur more commonly after a normal labour, in which they are not caused by obstruction (see Chapter 8), however they can occur with a VVF and on occasion even with a combined VVF and RVF. It's likely that when the stillborn child is eventually delivered the swollen perineum tears rather than stretches leaving the patient with this extra injury too.

### **Ureteric Fistulae**

Ureteric fistulae arise in two ways:

- Involvement of the uretero-vesical junction in the ischaemic process, so that the ureter then drains directly into the vagina away from the margin of the bladder fistula.
- More often, by operative injury during caesarean section or an emergency hysterectomy for a ruptured uterus. Interestingly the injury is almost always on the left. These are increasing in fistula units.

### **Renal Damage**

Some fistula patients develop scarring in the pelvis, causing a stricture of the lower ureter leading to hydronephrosis and loss of renal function. In one series 49% had some upper renal tract damage on intravenous pyelogram (IVP), from hydro-ureter to non-functioning kidney.

### **Genital Tract Injuries**

The ischaemic process may destroy the tissues of the vagina, cervix and even the uterus. Tissues slough and scar forms. This leads to degrees of vaginal stenosis, loss of the anterior cervix and canal, and occasionally severe cervical stenosis leading to haematometra. Exceptionally, the whole uterus sloughs along with the vagina.

## Nerve Damage

Many fistula patients suffer compression damage to the lumbo-sacral plexus. Several patients complain of severe lower limb pain radiating from the lumbar region. This is most likely neurogenic and it is resistant to simple analgesia; time and physiotherapy helps. The most common manifestation of nerve damage is foot drop from involvement of the L5 root. Minor degrees are easily overlooked. About 90% of patients with foot drop slowly recover, unfortunately this can take up to 2 years. In the most severe cases of pelvic ischaemia, the patient may be paraplegic immediately after delivery, but this too recovers (apart from prolonged foot drop). With the loss of anal reflex there may be saddle anaesthesia and the risk of pressure sores.

## Muscle and Fascial Damage

The levator muscles, especially the pubo-coccygeus, and the pelvic fascial support are subject to ischaemic damage when they are crushed against the inferior pubic rami. In severe cases the whole levator complex can slough leaving an 'empty pelvis'.

## Bone Damage

In about 30% of obstetric fistula cases, a pelvic X-ray will reveal damage to the region of the pubic symphysis, either obliteration or separation of the symphysis or sometimes areas of bony erosion or bony spurs.

## Secondary Conditions

### Social Consequences

The social consequences of obstetric fistula can be just as devastating to the patient as the symptoms of incontinence. Many women will be ostracised by their families and communities. Attitudes to fistula patients vary from region to region: in some areas the family can be very supportive; however, the longer a woman has had a fistula, the more likely her husband will divorce her. Many patients will be unable to socialise or go to markets, church, mosque or community gatherings, and will live a life of exclusion.

### Mental Health

Not surprisingly many fistula patients are severely depressed. A stillbirth followed by incontinence and social ostracism is too much to bear. When questioned on arrival at the hospital with a screening test, 100% of patients in Ethiopia test positive for potential psychological disorder. Up to 40% are thinking seriously of suicide or have attempted it. Interestingly, on leaving hospital after treatment 30% screen positive for potential psychological disorder. This is the same rate as the background healthy population. Making the patient dry can certainly go a long way in improving mental health but the immediate euphoria patients feel on being cured can be short lived. Several studies from Kenya have shown that returning home and trying to re-establish their lives, problems and mental health issues return. A patient can display symptoms of post-traumatic stress disorder; she has been through trauma, lost her child, her husband and her standing in society. Often she will have residual physical weakness. There is still a lot of work to do and further programmes need to be devised to help women with ongoing mental health issues.

### **Urine Dermatitis**

Many patients restrict their drinking and end up with very concentrated urine. When the patient is incontinent, the phosphates and nitrates in the urine irritate the skin, causing local hyperkeratosis and secondary ulceration. The cure is to treat the incontinence, but in the meantime the condition will improve if the patient can drink more and dilute her urine. Diluted urine does not irritate the skin, nor smell nearly so much. Barrier substances such as petroleum jelly may help but the sooner her incontinence is resolved the better.

### **Bladder Stones**

Concentrated urine will predispose a patient to deposits in the bladder that may act as a nidus for the formation of stones. These can become large and can cause pain, haematuria and odour from chronic cystitis.

Some women may have had a foreign body introduced into the bladder by a traditional healer or themselves in an effort to stop the flow of urine. Such objects include cloth, plant material and even small stones. Stones may form around these foreign bodies.

### **Contractures**

Up to 2% of fistula patients in Ethiopia suffer severe lower limb contractures, rarely seen in other countries. These contractures occur after delivery, because the patient will often lie curled up in bed with her legs together, trying to stop the flow of urine. Patients may remain in this position for months or even years, resulting in diffuse contractures. It is usually associated with foot drop. Perhaps the patient struggled to mobilise with the foot drop and this helped lead to the contractures.

### **Malnutrition**

In Ethiopia in particular, neglect and depression lead to malnutrition in some patients, with a fall in body mass index (BMI). In an unpublished series by the author, the average BMI amongst fistula patients in northern Ethiopia was 19. This appears to be a less common problem in other fistula affected countries.

### **Infertility**

Many fistula patients (up to 60%) have amenorrhoea after delivery. This has a variety of causes, mostly supratentorial, e.g. the severe mental stress of losing a child and a husband, together with the shame of incontinence, switches off the patients periods. Malnutrition may also be a factor. A small number of patients will have Sheehan's syndrome— anterior pituitary necrosis due to prolonged shock during labour. The resultant decrease in follicle-stimulating hormone (FSH) and luteinising hormone (LH) leads to amenorrhoea. Ashermann's syndrome—scarring of the endometrium by either repeated infections or perhaps urine in the endometrial cavity is another cause. These women may have normal hormone levels, but the endometrium will be unresponsive to them. There may be cryptomenorrhoea, or hidden menses, if the cervical canal and/or vagina is stenosed and occluded leading to haematometra. Finally, don't forget that she might be on progesterone injections for contraception leading to amenorrhoea, or have had a caesarean hysterectomy at the time of delivery. These women are often not told they have had a hysterectomy and so are unaware.

## Reproductive Outcomes

Successful pregnancy in women with obstetric fistulae is quite rare for the above reasons. Only about 20% of post-repair patients will achieve a full term pregnancy. If a patient does become pregnant, she has a high chance of a miscarriage or prematurity. Some patients will have a degree of Ashermanns syndrome where the lining of the uterus has been affected and the basal layers of the endometrium can no longer regenerate each period. It's thought that this could be the result of urine inside the uterus with the fistula or repeated infections. It can lead to poor placentation which in turns leads to early miscarriage.

They may have later pregnancy loss because of an incompetent cervix. The anterior lip of the cervix is frequently torn so badly that it will not be strong enough to hold a pregnancy to term. At times the anterior cervix has even necrosed and is completely absent. Other patients have vaginal stenosis that is severe enough to preclude intercourse.

## Other Causes of Incontinence

### Not Directly Related to Obstructed Labour

In war-torn countries sexual violence is a tragic cause of genital tract injuries, sometimes fistulae. The management principles are the same as for obstetric fistulae.

Anyone working in fistula affected countries will encounter some patients with miscellaneous causes of incontinence. These include:

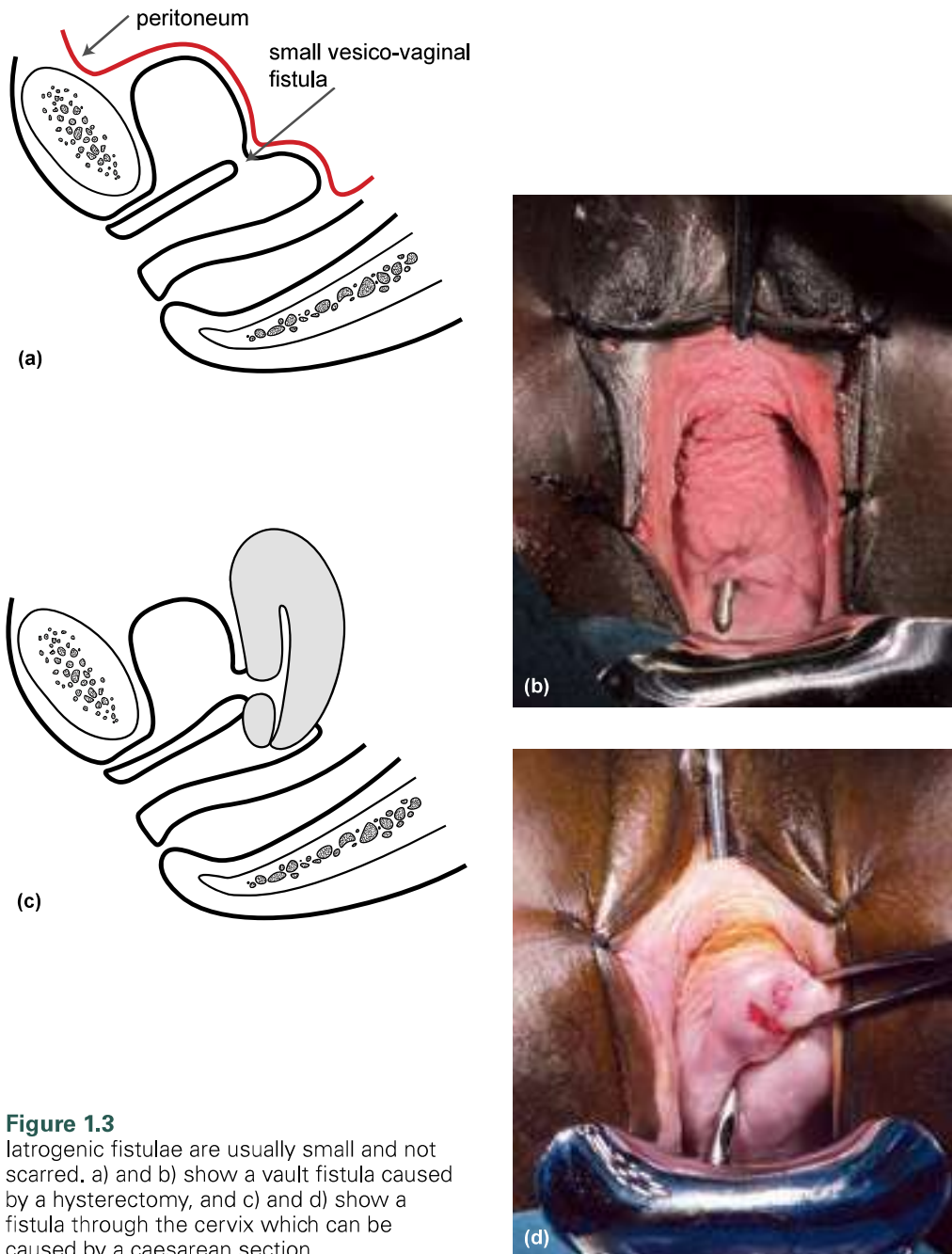
- Congenital abnormalities, including ectopia vesicae, epispadias and ectopic ureters (usually as part of a duplex system)
- Neurological causes, such as spina bifida
- Advanced carcinoma of the cervix causing a fistula
- Ureteric fistulae produced during elective gynaecological operations
- Genital prolapse conditions
- Stress urinary incontinence
- Overactive bladder
- Mixed incontinence
- Urinary retention with overflow.

Management of these (apart from ureteric injuries and the ongoing incontinence after fistula repair) is outside the scope of this book.

## Other Causes of Genital Tract Fistula

The vast majority of genital tract fistulae are caused by a long obstructed labour, but there are many other causes.

Over recent years we are seeing many more fistulae caused by doctors themselves—the iatrogenic fistula. As mentioned previously these represent 20–25% of all fistulae presenting in some places. Many occur after caesarean section and usually after a short labour and delivery of a live baby, and are located in the anterior cervix or just below it. (Fig 1.3a–d)



**Figure 1.3**  
Iatrogenic fistulae are usually small and not scarred. a) and b) show a vault fistula caused by a hysterectomy, and c) and d) show a fistula through the cervix which can be caused by a caesarean section.

Even after an elective caesarean with no labour we see many fistulae. It is understandable when caesareans are often done with poor lighting or broken surgical equipment and the surgeons themselves have no formal training or have been poorly trained. One mistake I frequently see is that the surgeon has not reflected the bladder at caesarean and has then incorporated the bladder into the lower segment during the repair. I've had several patients referred to me after the bladder itself was mistakenly sewn directly into the upper part of the lower segment incision and the lower part of the lower segment was left open. Thus the uterus wasn't repaired at all, just the bladder sewn into the upper part! The patients have presented with ongoing bleeding from the unrepaired lower segment incision.

Iatrogenic fistula can happen at hysterectomy if the bladder is not reflected well and the bladder is sutured into the vaginal vault and/or the ureter is sewn into the vault. I've had a couple of patients with both ureters sewn into the vagina. Such problems occur more commonly after difficult hysterectomies for large fibroids and of course after difficult caesarean hysterectomies.

This is a most worrying trend. We've been educating women that to prevent fistula they must go to a hospital to have a baby. The women are doing the right thing but ending up with a fistula at our hands.

If there is anything positive about these fistulae it is that they are relatively curable. They are usually small, high in the vagina (away from the urethra/ continence mechanisms) and have little if any scarring.

Other causes include infection, e.g. tuberculosis, trauma, cancer and radiotherapy.

## Classification of Obstetric Fistulae

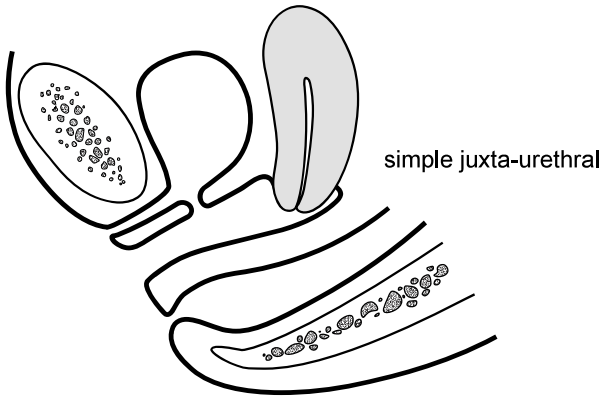
Despite much debate, there is no universally accepted system of classification. This is understandable, because so much of the assessment is subjective. For a classification to be worthwhile, it should be prognostic, be helpful in deciding what is needed in the repair, enable surgeons to communicate with each other and be useful in clinical trials. Most surgeons base their classification on simple descriptive terms involving three factors:

- Site
- Size
- Scarring.

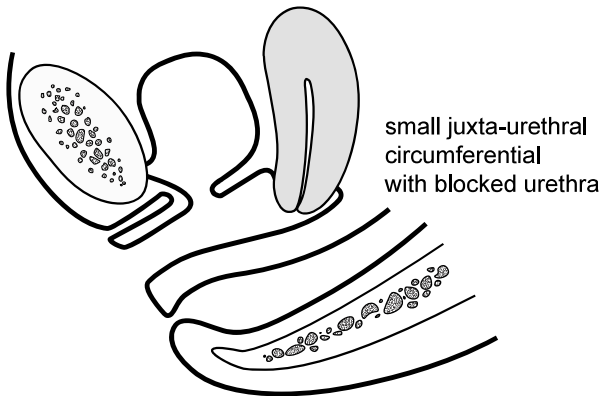
### Fistula Site

#### Juxta-Urethral

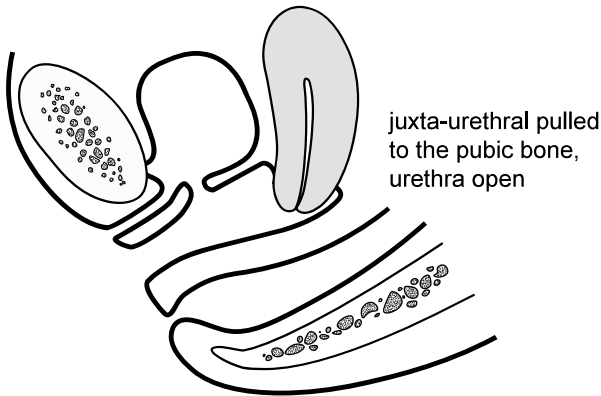
The most common site is juxta-urethral, i.e. at the urethro-vesical junction. (Figures 1.4–1.6) In this situation, there is almost always loss of some proximal urethra. Mild ischaemia will produce just a simple hole, but prolonged ischaemia will cause circumferential tissue loss with the urethra and bladder becoming separated to a variable extent.



**Figure 1.4**  
A simple juxta-urethral fistula.



**Figure 1.5**  
A small circumferential juxta-urethral fistula. There is a gap between the urethra and the bladder all around, anteriorly, posteriorly and laterally on both sides. The urethra is often blocked (as illustrated here) but not always.



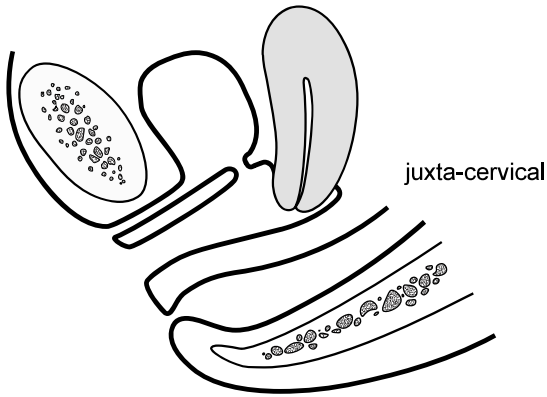
**Figure 1.6**  
Another small juxta-urethral circumferential fistula. This one is pulled up towards the bone which makes it hard to access at operation. In this case the urethra is open; it hasn't been blocked by scar, but they often are.

### Mid-Vaginal

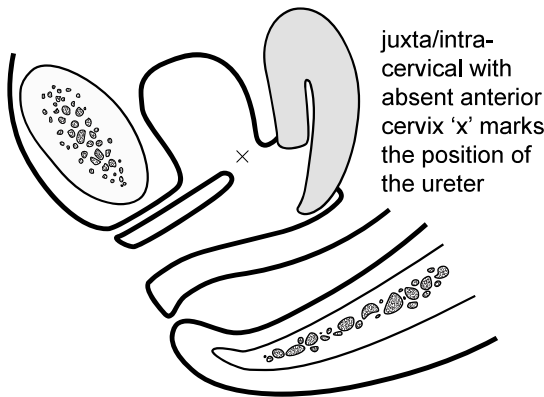
Small defects 4cm or more from the external urethral orifice are not very common, but are very easy to repair. Larger defects may extend back as far as the cervix and laterally to the pubic rami.

### Juxta-cervical

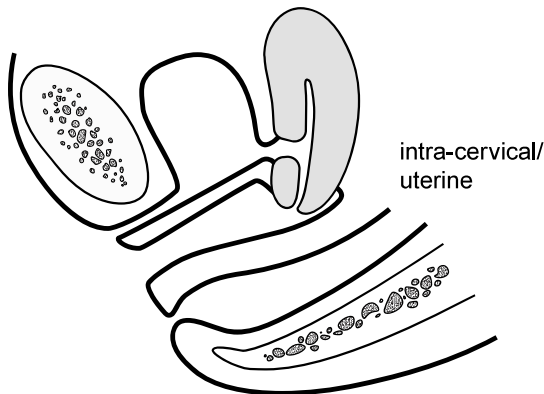
Juxta-cervical fistulae, i.e. fistulae in the region of the cervix (Figure 1.7), are common in multiparous patients and in those delivered by caesarean section. Patients who start to push in labour before the cervix is fully dilated are prone to fistulae in the cervical region. Sometimes,



**Figure 1.7**  
A simple juxta-cervical fistula.



**Figure 1.8**  
A juxta-cervical/intra-cervical fistula. The cross indicates the approximate location of the ureter. The anterior part of the cervix is often torn or absent as illustrated here.



**Figure 1.9**  
An intra-cervical or intra-uterine fistula is termed cervico-vesical or utero-vesical. These are usually above the ureteric orifices.

the defect extends into the cervical canal where the anterior cervical canal is completely missing or torn open. (Figure 1.8) These fistulae are often associated with caesareans, and can result from a vertical tear during caesarean section in the lower segment, with associated bladder injury. They could be iatrogenic as the surgeon may have mistakenly sutured the bladder to the upper part of the lower segment incision and not actually repaired both edges of the incision—the problem described above under “Other Causes of Genital Tract Fistula”.

**Intra-Cervical**

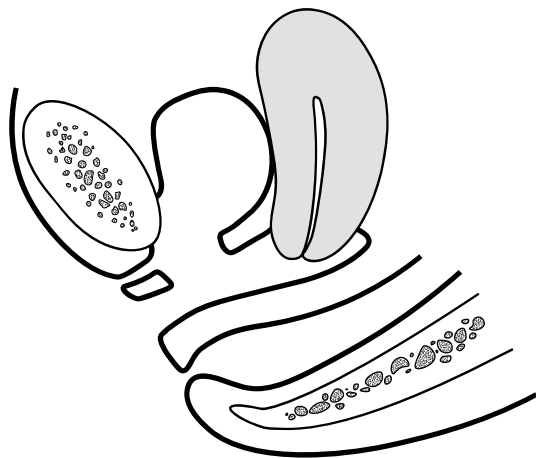
Intra-cervical fistulae, i.e. fistulae between the bladder and cervical canal (Figure 1.9), are not very common. They almost always follow a caesarean section. There may be a history of a relatively short labour and live baby, suggesting an iatrogenic cause.

**Circumferential**

When the bladder has been completely separated from the urethra the term ‘circumferential fistula’ is used. (Figure 1.10) The urethra is almost always involved to some extent, and the extent of detachment varies from minimal with a normal capacity bladder to extreme where the bladder has all but disappeared. The more common intermediate type is recognised clinically by palpation of bare bone at the back of the pubic symphysis. In these cases, much of the anterior vaginal wall and the base of bladder are destroyed.

**Miscellaneous Fistulae**

Vault fistulae are usually iatrogenic and can be produced during emergency hysterectomy for a ruptured uterus or



**Figure 1.10**

Circumferential fistula. The defect can be small as in Figures 1.5 and 1.6 or larger involving most of the urethra and bladder.

elective hysterectomy (Fig 1.3 a and b). Locally advanced carcinoma of the cervix (stage IV cancer) can cause a urinary fistula.

### Fistula Size

Fistulae may be:

- Tiny (admitting only a small probe)
- Small (0.5–1.5cm)
- Medium (1.5–3cm)
- Large (>3cm), usually involving loss of most of the anterior vaginal wall
- Extensive, i.e. involving major loss of bladder and urethra. These are often circumferential with a large gap between the bladder and urethra.

### Scarring

Scarring varies from minimal (fistula margins are soft and mobile) to extreme (fistula margins and surrounding vagina are rigid and fixed). Scarring may also affect the lateral and posterior wall of the vagina, causing complete stenosis in extreme cases. Vaginal stenosis can affect the proximal or distal canal or can extend throughout. The most common site is a rigid band of scar on the posterior vaginal wall at the mid-vaginal level.

Scar is the big enemy—any fistula with significant scarring is not for a beginner.

## Classification Systems

Two recent attempts to standardise classification have been proposed by Judith Goh and Kees Waaldijk.

### Goh's System

Goh's classification is based on three variables:

- The length of the urethra (types 1–4)
- The size of the fistula (a–c)
- The degree of scarring (i–iii).

### Urethral Length

Type 1: Distal edge of fistula >3.5cm from the external urethral orifice (EUO),  
i.e. the urethra is not involved.

Type 2: Distal edge 2.5–3.5cm from the EUO.

Type 3: Distal edge 1.5–<2.5cm from the EUO.

Type 4: Distal edge <1.5cm from the EUO.

### Fistula Size

- (a) Size <1.5cm
- (b) Size 1.5–3cm
- (c) Size >3cm.

### Scarring

- i. No fibrosis or mild fibrosis around fistula/vagina, and/or vagina length >6cm or normal capacity
- ii. Moderate or severe fibrosis around fistula and/or vagina, and/or reduced vaginal length and/or capacity
- iii. Special considerations, e.g. circumferential fistula, repeat case, involvement of ureteric orifices.

## Waaldijk's System

The classification proposed in Waaldijk's book has been valuable in predicting outcomes and planning treatment, and has been vital for his own analysis of outcomes. It focuses on urethral involvement and types of urethral damage.

Type I: Fistulae  $\geq 5$ cm from the EUO and therefore not involving the closing mechanism.  
These have an excellent prognosis, because the all important urethra and bladder neck are intact.

Type II: Fistulae that involve the closing mechanism (<5cm from the EUO):

- A. Without (sub)total involvement of the urethra:
  - (a) Without a circumferential defect
  - (b) With a circumferential defect.
- B. With (sub)total involvement of the urethra:
  - (a) Without a circumferential defect
  - (b) With a circumferential defect.

Type III: Miscellaneous fistulae, e.g. uretero-vaginal and other exceptional fistulae.

Some surgeons have had difficulty in distinguishing between types IIA and IIB, although recently Waaldijk (in personal communication) has clarified this by defining type IIB fistulae as those with a urethral remnant of less than 1.5cm.

There has been one research paper comparing the two systems, which concludes that the Goh system is more predictive of outcome. Although at the moment the Waaldijk system is probably the most widely used around Africa we presently use the Goh classification, as we believe it to be the best attempt to be objective about clinical findings. Like all systems it has its shortcomings, especially if used incorrectly. Some difficulties with it are:

- The length between the EUO and fistula margin is *often estimated pre-operatively*. It is best measured as accurately as possible as it is important in predicting prognosis and management. Correct measurement is usually only possible in the theatre.
- Assessment of the degree of scarring and shortening of the vagina is inevitably subjective.
- There may be lack of agreement as to what constitutes a circumferential fistula. Even small juxta-urethral fistulae may be slightly detached from the bladder, although some surgeons reserve the term 'circumferential' for cases where there is a clearly palpable gap with bare bone between the urethra and the bladder.
- The ureteric orifices may be just inside, at the edge of or outside the fistula, so ureteric involvement is open to subjective interpretation. Strictly ureteric involvement should be reserved for those patients needing the ureter draining outside the bladder and it being reimplanted.

Thus, there may be considerable inter-observer variation; however, if a surgeon applies the same criteria in all cases, this will enable a meaningful audit to be done.

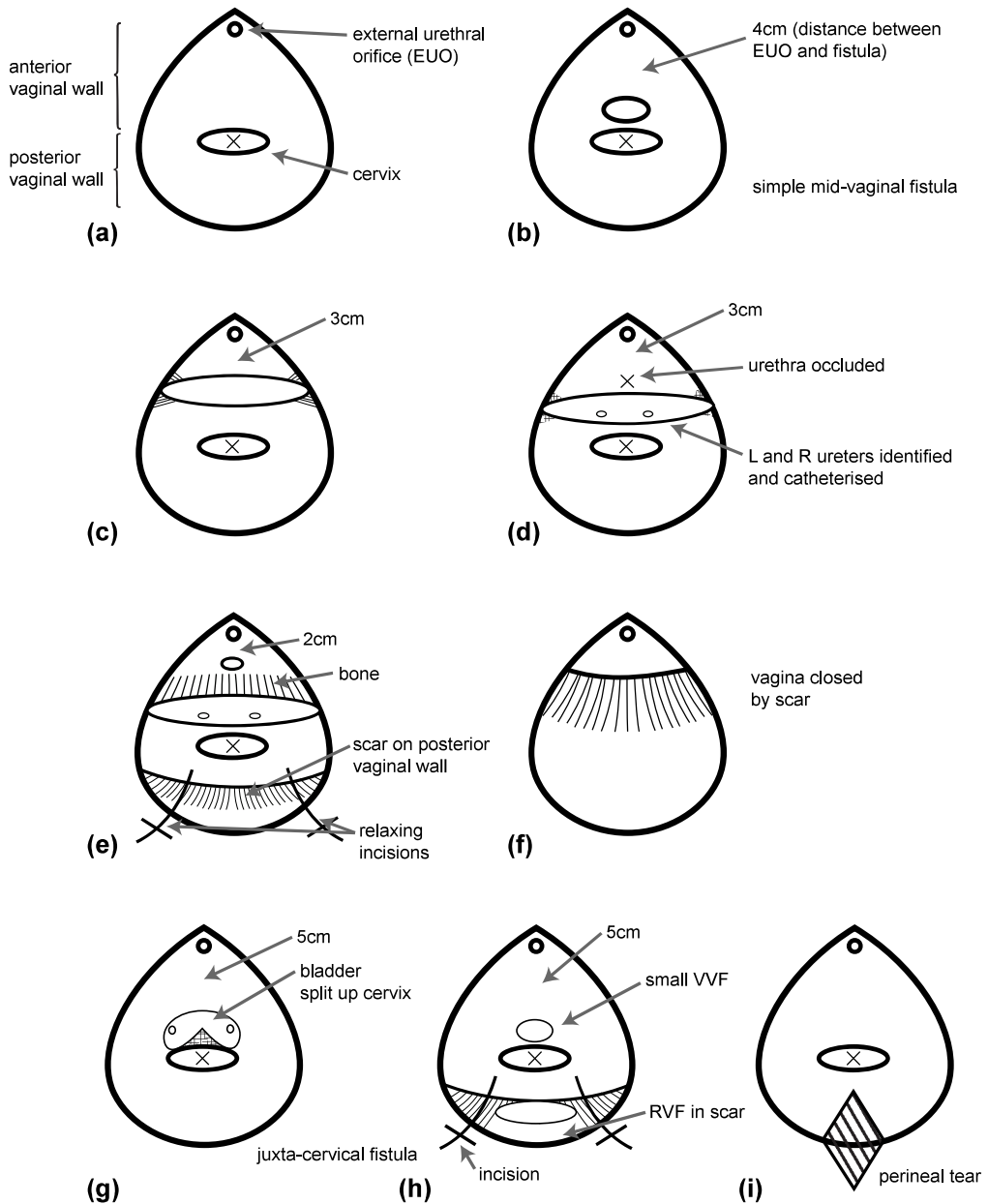
As an example, we have used this classification to confirm our suspicion that the worst fistulae occur in primiparous patients and those having a vaginal delivery.

This system of grading from type 1ai to type 4ciiii does indicate an increasingly poor prognosis, although it's not always an indication of the difficulty of repair. Type 1ai cases have the best prognosis and are often the easiest to repair, but a small inaccessible fistula high in the vagina or cervical canal would have the same classification and might be a great challenge to close.

In addition, the surgeon should make an estimate of the bladder size. This is done with a calibrated sound at the beginning of the operation. An additional refinement is to measure functional bladder capacity during dye testing.

## A Descriptive Template

In reality, each fistula case is unique, and there are so many variables that some surgeons feel a satisfactory classification will never be achieved. To a large extent, the description of fistulae and their repair can only be learned by long apprenticeship. We recommend the use of a simple template for figurative description of clinical findings and operative details. This is very helpful in communication between individual surgeons and for your own records. One such template, commonly taught and used, is illustrated in Figure 1.11, where the fistula is indicated roughly in size and in its position in relation to the urethra and cervix. The amount of shading indicates the degree of scarring in the vagina or around the fistula margins.



**Figure 1.11**

Schematic drawings of different fistulae. a) A normal vagina. b) A simple mid-vaginal fistula recording the site (the distance between the external urethral orifice and the distal margin of the fistula). c) A larger fistula stuck to the lateral walls of the pelvis with scar. d) A similar fistula to c) but the ureters have been identified and the urethra is blocked. e) A large circumferential fistula with the gap of bone between the urethra and bladder. There is a ridge of scar on the posterior vaginal wall and the lines illustrate that there have been two relaxing incisions made, one on either side. f) The vagina has been totally occluded by scar making it impossible to examine the fistula. g) A fistula in the cervix with the bladder split up by the anterior cervix. h) A small VVF with an RVF in a ridge of posterior scar. Two relaxing incisions have been made. i) A fourth degree perineal tear.

## Prognosis

The critical factors affecting the prognosis of an obstetric fistula are the length of the urethra, the sizes of the fistula and the bladder, and the amount of scarring. Almost all defects can be closed (although bladder capacity may be reduced). However, if the urethra has been involved, denervated and partially or completely necrosed, it will not function and the patient may have total stress incontinence. The shorter the urethra and the greater the scarring, the higher the chance of stress incontinence. Urethras can be reconstructed but regaining function is much more difficult, so the prognosis for continence is not good.

## Further Reading

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## 2 DIAGNOSIS

### History Taking

The following details are required:

- **Symptoms.** Confirm that the patient is wet all the time. If she is dry at night she probably does not have a fistula (although there are exceptions—see ‘Dye Test’ later in this chapter). The patient should be asked whether there is any leakage of faeces as well as urine. Unless extremely small, a small hole in the bladder leaks just as much as a large one, but some patients with a rectal fistula may only be aware of soiling when they have diarrhoea or only complain of passing flatus through their vaginas.
- **Age.**
- **Parity.** If the patient is multiparous which delivery caused the fistula?
- **How long has the patient been wet?**
- **Mode of delivery.** Was birth by vaginal delivery or caesarean section?
- **How long was she in labour?** The average is about three days.
- **Where did the delivery take place?** Home, maternity centre or hospital?
- **Did the child survive?** Almost all vaginal deliveries result in a stillbirth, but a few delivered by caesarean section are alive. This strongly suggests an iatrogenic injury.
- **Neurological symptoms.** Complete lower limb paralysis is rare, but minor degrees of foot drop are reasonably common.
- **Does she still menstruate?** Amenorrhoea is quite common after such a traumatic childbirth, but if the patient had a caesarean section one should suspect a hysterectomy for a ruptured uterus. Some patients do not know they have lost their uterus.
- **Have any attempts been made to repair the fistula?** Patients sometimes hide this information for fear they will be turned away and not get another chance of an operation. The more times a patient is operated on, the less likely it is she will be cured.
- **Social history.** Most patients with a long-standing fistula are single and live a very restricted life. The longer they have had the fistula, the more likely it is they will be alone and live a subsistence existence supported by relatives.

History taking does not help very much in selecting the easy cases. There are, however, some clues that should arouse suspicion of a serious injury:

- Neurological weakness (usually foot drop), even if it has recovered, is indicative of this.
- Rectal fistulae are usually associated with a serious bladder injury. This does not apply to

anal sphincter injuries, which often occur in isolation and should not be classified as recto-vaginal fistulae.

- Fistulae following a caesarean section are often in the cervix region, owing to a combination of ischaemia and operative trauma.
- A fistula following hysterectomy for a ruptured uterus or other elective reasons, will usually be in the vault. Always consider a ureteric fistula in these cases too, especially if the patient voids normally but also leaks continually. She will void normally from one ureter entering into an intact, functioning bladder, and leak continually from the other injured ureter leaking directly into her vagina. I was tricked once, a patient had bilateral ureteric injuries so both were leaking into the vagina and nothing was flowing into her intact bladder.

## Examination

### Inspection

#### The Abdomen

Are caesarean or other scars present?

Is any swelling visible?

The patient could be pregnant! In pregnancy repair should generally be avoided, unless it is the patient's only real chance of finding a skilled surgeon. Bleeding can be very troublesome if the repair is done during pregnancy unless it is well down in the vagina. Her delivery must be by caesarean.

#### The Perineum

- Look for obvious wetness and urine dermatitis. (Figure 2.1) The dermatitis is caused by concentrated urine. Ask the patient to drink more if it is not possible to operate immediately. Some people use a simple barrier cream such as vaseline, but the quicker you get the patient continent the better.



**Figure 2.1**  
Urine dermatitis.



**Figure 2.2**  
A severe case with complete loss of the urethra. The bladder fundus is prolapsing through the fistula and filling the vagina.

- Can the urethral orifice be seen? In very bad fistulae, it can be completely destroyed. (Figure 2.2)
- Is there any sign of stenosis in the vagina? (Figures 2.3 and 2.4)
- Are there faeces in the vagina or on the perineum? This will indicate a rectal/anal defect or fistula.
- Is her perineum intact? Are there any perineal tears?



**Figure 2.3**  
Stenosed vagina.



**Figure 2.4**  
Vagina completely closed by dense scar.

## Palpation

Begin with the abdomen in order to exclude an unexpected pregnancy or other swellings. Follow this with a vaginal examination. Use the lubricated index finger gently.

- Is the vagina of normal size and depth? Can the cervix be felt? Is there any vaginal narrowing? Smaller degrees are felt as a band of fibrous tissue around the lateral and posterior circumference at any depth in the vagina. In extreme cases, the whole vagina is stenosed. In the presence of a fistula the anterior wall is frequently shortened. Carefully palpate the posterior wall for a recto-vaginal fistula.
- Can a defect be felt in the anterior vaginal wall? This will range from a large defect where the finger immediately enters the bladder, to smaller defects that just admit a finger, to the smallest ones where you might only feel a dimple even no defect at all. If a defect can be felt, where is it located in relation to the urethra and the cervix? If a defect can be felt, consider the margins carefully. Are they soft and supple, somewhat rigid or (as in the worst cases) stuck to the pubic rami?
- The anterior cervix is often torn in fistula patients. Defects in this region are often difficult to feel unless they are large. The cervix may easily be felt low down in the vagina when a large amount of anterior wall has been lost. Remember that the cervix is often damaged and the external os might be gaping. A common mistake for the novice is to mistake a torn, gaping cervical os for a fistula. Palpate the uterus bimanually. Is it enlarged due to an early pregnancy or perhaps fibroids? The uterus can be fixed by scar to the anterior abdominal wall (common after a caesarean), or it could be absent after a caesarean hysterectomy.

- Feel the posterior vaginal wall carefully for a rectal defect. Rectal fistulae are usually associated with severe vaginal scarring and a bad bladder fistula. Occasionally they are small, soft and easily overlooked or just hidden behind a posterior band of scar. If a rectal fistula is suspected, a rectal examination should also be performed, noting any strictures in the rectum. Look at the perineal body and anal sphincters for any tears.

If preferred, the fistula can be inspected. This is best done with the patient in the lithotomy position using a Sims speculum, although some surgeons prefer the left lateral position with the right leg supported.

### If the Patient Says she is Wet but No Wetness or Fistula Can be Observed

In this situation ask the patient to drink plenty (ideally wearing a pad or using a gauze as a pad) and then re-examine her. Keep in mind that many patients drink very little, especially if they know they are going to be examined. If it is then confirmed that the patient is wet but the fistula cannot be felt, proceed as follows:

- With the patient in the left lateral position, expose the anterior vaginal wall with a Sims speculum. (Figure 2.5) Ask the patient to cough. A small fistula may be readily visible or she will leak through her urethra with a cough which indicates stress incontinence. Be wary that she may have both.
- Alternatively, perform a dye test in this position or the position shown in Figure 2.6.



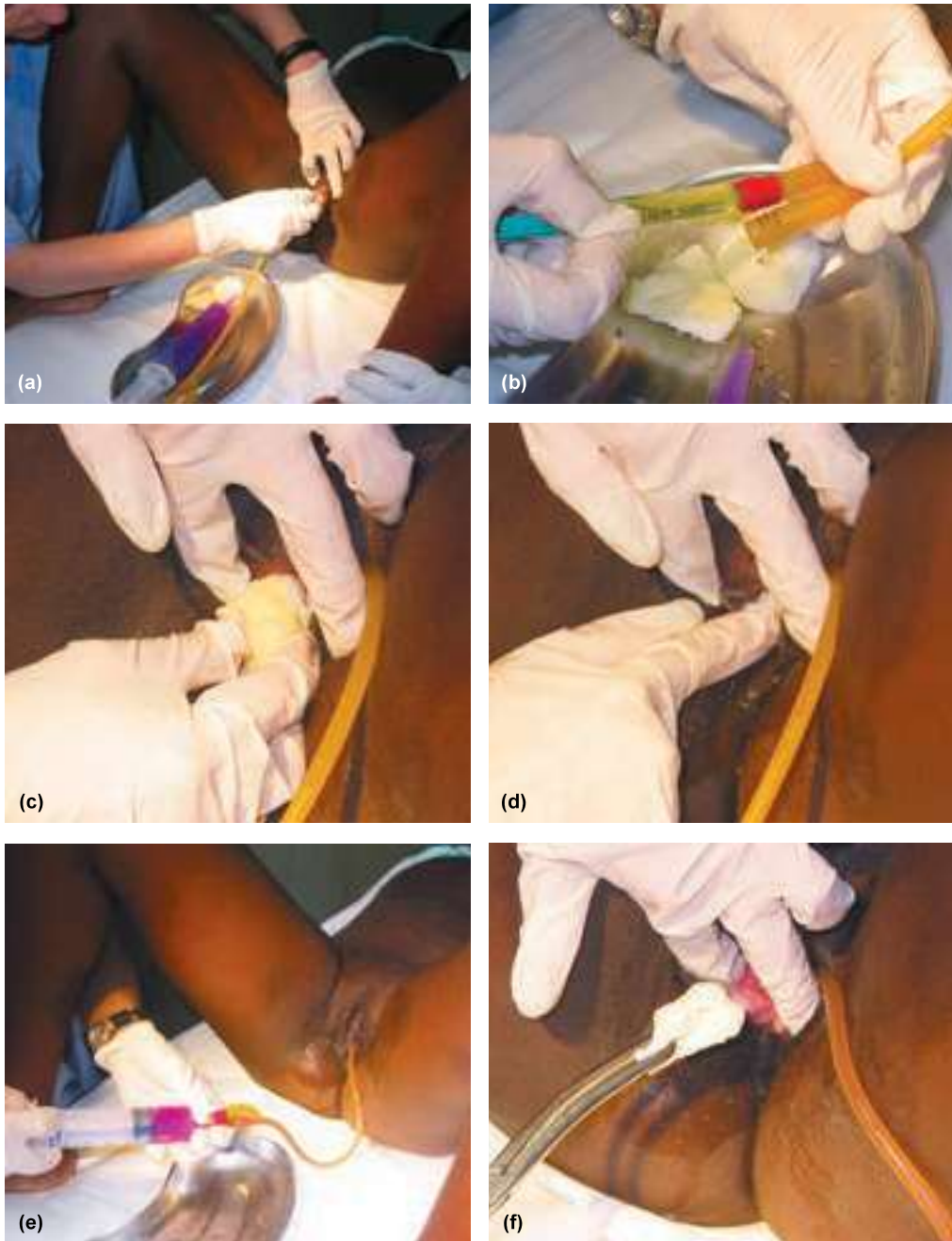
**Figure 2.5**

Exposure of the anterior vaginal wall using a Sims speculum with the patient in the left lateral position.

**Dye Test (Figure 2.6)**

Dilute methylene blue (or gentian violet) should be used—interpreting the test will be difficult, if the dye is too concentrated, as it will stain everything.

1. Insert a catheter.
2. Fill the catheter balloon with 5ml of fluid and have two or three moist swabs ready to put into the vagina.
3. Insert the swabs well into the vagina.
4. Slowly instill about 60cm<sup>3</sup> of dye.
5. After 1 minute, ask the patient to cough.
6. Remove the swabs one by one.
7. If any of the swabs are stained, this indicates the presence of a fistula.
8. If none of the swabs is stained, there could still be a fistula. Repeat the test using up to 200cm<sup>3</sup> of dye. Insert the three swabs into the vagina and remove the catheter. The patient should walk around for 30 minutes or even up to an hour while the dye is in her bladder and the swabs are in her vagina, wearing a pad to catch any leakage from her urethra. Sometimes the hole is very small, especially if it is between the cervix or uterus and the bladder and it takes some time for the dye to work its way out. It is easy to overlook a tiny fistula. After 30–60 minutes examine her again in the lithotomy position, remove the pad and then remove each vaginal swab, checking it for staining by the dye. If there is only leakage on the pad and perhaps the very distal swab then it could indicate urethral (stress) leakage. If the vaginal swabs are stained it reveals the fistula.
9. If this second test is negative but the proximal vaginal swab is wet with clear urine, there is a ureteric fistula.



**Figure 2.6**

Dye test. a) Insertion of the catheter. b) The balloon of the catheter is inflated and three damp swabs are inserted into the vagina (note later—if you are looking for a ureteric fistula you should put dry swabs in the vagina to see if it becomes wet with clear urine—but it is uncomfortable. Putting in moist swabs causes less friction and pain). c) and d) the swabs are inserted well into the vagina, spaced from top to bottom. e) About 60ml of dye is slowly inserted. f) The swabs are removed one by one. The first is not stained but in this case g) the second is, revealing a fistula in the mid-vagina.



(g)

## Ureteric Fistulae

A ureter can be damaged accidentally during a caesarean section, but injury is more likely during an emergency hysterectomy for a ruptured uterus. The ureter may be ligated and included in the lower-segment repair. Later, urine starts leaking through the cervix. After a hysterectomy, urine may leak into the pelvis, and some days later finds a way out between the sutures in the vaginal vault. With the increased availability of caesarean section, we are seeing these injuries more and more. Interestingly, it is almost always the left ureter that is involved. Ureters can be repaired easily by an abdominal operation. (See Chapter 6—Ureteric Fistula)

To exclude a ureteric fistula, instill dye into the bladder and insert a dry swab into the vagina. Ask the patient to drink and walk around. Re-examine her after half an hour. If the swab is wet with clear urine there is a ureteric fistula. If the swab is stained with dye, then the patient has a bladder fistula. On questioning, the patient should admit to being able to pass urine normally, as the other ureter should be functioning normally and draining into the bladder. I was tricked once in a patient who had bilateral ureteric fistulae after a caesarean hysterectomy. She was wet all the time and not voiding, like a VVF, but she was negative to the dye test. At laparotomy it was found that both ureters were dilated and nothing was draining into her bladder. It was a miracle she survived.

## Postpartum Stress and Chronic Retention

Postpartum stress incontinence is occasionally troublesome, and can be mistaken for a fistula. About 30% of women will have some degree of stress urinary incontinence following delivery but nearly all have resolved within six months as their pelvic muscles recover.

Perform a dye test. If it is negative, remove the catheter, leaving the dye inside. Watch to see if it dribbles out of the urethra, and then ask the patient to cough. If there is significant stress, dye will come out, often with a large spurt. In order to exclude retention with overflow check her residual urine after voiding (see the next paragraph). Management of stress urinary incontinence within six months post-partum is primarily conservative with pelvic floor exercises.

Surgery is occasionally needed after at least six months of this conservative management and rarely before that if the leaking is complete, similar to what women experience with a fistula.

Another cause of urinary incontinence is a postpartum atonic bladder leading to overflow incontinence. Bladder function is disturbed by prolonged labour or oedema of the urethra which leads to obstruction, overfilling the bladder which then loses its function. Check for retention with overflow by asking the patient to void and measure the voided volume (sometimes the patient can't void at all), then pass a catheter and measure the volume of urine remaining in her bladder after she voids. This should be less than 50% of the voided volume. Some centres use the value of less than 100ml. This condition should be managed by continuous bladder drainage post delivery for at least 5 to 7 days. If this is not done, chronic retention may result and may not be diagnosed until much later when it is harder to treat. It may settle after a period of continuous catheter drainage, although a better option is to teach the patient intermittent self-catheterisation 4 to 5 times a day or after each void.

## Investigations

Investigations which may be advisable include the following:

- Testing haemoglobin levels.
- HIV screening and counselling in accordance with local policies. If positive, check the CD4 count. If it is <350 it is wise to wait until treatment has started and the CD4 count has increased acceptably. However each country has slightly different protocols of when to start HIV treatment and management has to be tailored to the individual country.
- Screening for diabetes with a random blood sugar level. If high, do a fasting level. I have had a number of patients fail their operation when they shouldn't have. Undiagnosed diabetes was discovered and then stabilised. The patients were operated on again and cured.
- It's prudent to routinely do a pregnancy test (except if the patient has had a hysterectomy or is postmenopausal).
- Ultrasound scanning, if available, should be used more often, especially for bad cases. Being forewarned of a dilated renal tract is useful.
- Intravenous urograms are rarely available, but they can give useful information about the function of the kidneys when ureteric involvement is suspected.

## 3 MANAGEMENT OF EARLY CASES

### Conservative Management

After a caesarean section for prolonged obstructed labour, the catheter should be retained for at least ten days. Earlier removal predisposes the patient to chronic retention. The bladder is often atonic after a prolonged labour. If there is urinary leakage after removal of the catheter, it should be reinserted immediately.

Initially, a defect will probably not be visible, because it will be out of sight in the cervix region or because of sloughing necrotic tissue. The patient should be kept on continuous drainage, providing most of the urine is coming through the catheter. After two or three weeks, it should be possible to assess the size of the defect by palpation and inspection. 20–40% of small defects (<2cm) may still heal with another two to three weeks of bladder drainage. Larger defects and those attached to the pelvic side wall are unlikely to heal with drainage. Indeed, the balloon of the foley catheter is often found in or through a larger fistula, actually keeping it open. Always check the placement and position of the catheter to ensure this hasn't happened as it will keep the fistula open and might make it worse!

After vaginal delivery, a leak of urine may indicate anything from a tiny hole to massive necrosis. The patient should be examined gently with a Sims speculum. If slough is seen, it can be gently pulled out if loose. (Figure 3.1) This should be followed by regular irrigation of the vagina. Palpation and inspection with a Sims speculum will help to judge the size of the fistula. If it is less than 2cm in diameter, the catheter should be kept in at least another four weeks. With larger fistulae it is difficult to keep the catheter in the bladder. Always check by vaginal examination that the catheter has not gone through the fistula into the vagina.

Fistulae that have not healed spontaneously with four weeks of drainage are unlikely to do so.

Note: Antibiotics have no part to play in the healing of fistulae. The cause is ischaemic necrosis, not infection.

### Prevention at Caesarean Section

In some countries where fistulae occur, two thirds of patients have had their obstructed labour relieved by caesarean section—but clearly too late. The remaining one third have eventually delivered vaginally. Incidence of caesarean section is different in other countries. In Ethiopia, only 15% of fistula patients have had a caesarean section, because most people live in remote areas far from hospitals, although this picture is now changing and the statistic quoted here was from 2010. In Tanzania 85% of fistula patients have had a caesarean.

The ischaemic damage may have occurred already by the time of the caesarean section, but the doctor can take steps to minimise further damage. The lower segment will be very stretched and oedematous. Remember that the bladder should be dissected well down off the lower segment. The incision in the lower segment should be on the high side and the lateral ends curved upwards to minimise inaccessible tears and tearing into the lateral vessels. (The left ureter is most at risk when repairing a lower segment, especially if the incision into the lower segment has torn laterally and if the bladder and the ureter have not been reflected inferiorly).

When the baby's head is deeply impacted in the pelvis, it is better to get help to push up the head vaginally than to force a hand down between the head and the lower segment. Forcing your hand may produce large lateral tears and also increase the damage already done to the bladder in the midline. It is best to have someone push the baby up from the vagina and the operators' hand should reach carefully down to disimpact the baby's head. Don't flex your hand when bringing the baby's head out of the pelvis, pull superiorly until you can easily get it through the lower segment incision. Flexing your hand will just push your hand against the inferior lower segment, tearing it more. The alternative is to extract the baby as a breech birth if possible. To do this, reach for the breech superiorly and deliver that through your lower segment incision first.

Tears in the lower segment can be difficult to suture, and sometimes fistulae are produced when the doctor inadvertently picks up the bladder. This produces an intra-cervical fistula that can be quite a challenge to close and is not for a beginner. In trying to repair the angles of these tears ureters are at risk.

Are too many caesarean sections being performed for dead babies? In Uganda, 88% of mothers who develop fistulae after a caesarean section have a stillbirth. In the 12% with live babies, there is a strong suspicion of iatrogenic injury to the ureter or bladder.

A generation ago, it was commonplace to recommend a craniotomy for a dead baby stuck in the pelvis, but this seems to have been abandoned. It is not practised in teaching hospitals; perhaps it is too difficult for many young doctors to develop the skill. A craniotomy performed badly may do more harm than good. Is it time to look again at this procedure? This is something that only obstetricians working in the fistula affected countries can answer.

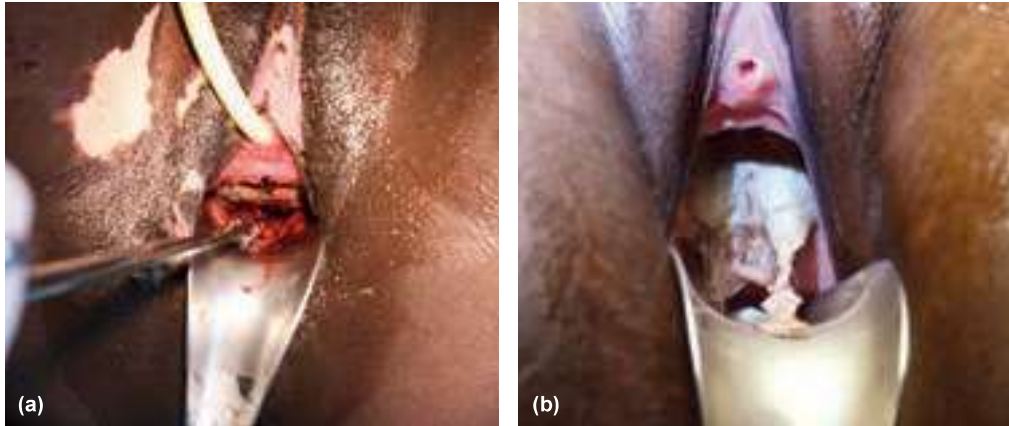
## Early Repair

Naturally, the sooner a patient can be cured the better. The longer she is incontinent, the greater the chance she will be abandoned. This is almost inevitable when she perceives that there is no chance of cure.

Most surgeons advise waiting at least three months from the injury before operating. In the early months, the surrounding tissues are oedematous and hyperaemic, making them friable and difficult to handle. By three months, they should be sufficiently mature.

In spite of this, some surgeons have been very successful in closing *selected* fistulae before three months and have strongly recommended this approach. Excellent results have been published, but the method has not yet been well illustrated. An operation can be attempted as soon as the

slough has come away and the tissues are clean. One experienced doctor will remove the slough and repair a small fistula at the same sitting. It is technically more difficult to operate when the tissues are recovering. The tissue forceps may tear the soft oedematous vagina and bladder and the sutures cut through.



**Figure 3.1**

a) Slough should be removed only if it is really loose. This is not ready. b) This slough is loose and easily debrided.

I have adopted a flexible approach in which each case is judged on its merits. Some fistulae are perfectly clean and healthy at two months, and can be repaired safely (Figure 3.2); on the other hand, some are distinctly friable even at three months. It is the appearance of the fistula that matters more than its age. If in doubt, wait.



**Figure 3.2**

This fistula is only two months old, but it is clean, doesn't bleed on touching and is ready to repair.

We recommend that a beginner follow traditional advice and delay repair for three months. The first repair always has the best chance of success, and this should not be compromised. Exceptions can be made to this rule after some experience has been gained.

### Further Reading

Waldijk K. The immediate management of fresh obstetric fistulas. *Am J Obstet Gynecol* 2004; **191**: 795–9.

## 4 PRE-OPERATIVE PREPARATION

### Is the Patient Fit for Operation?

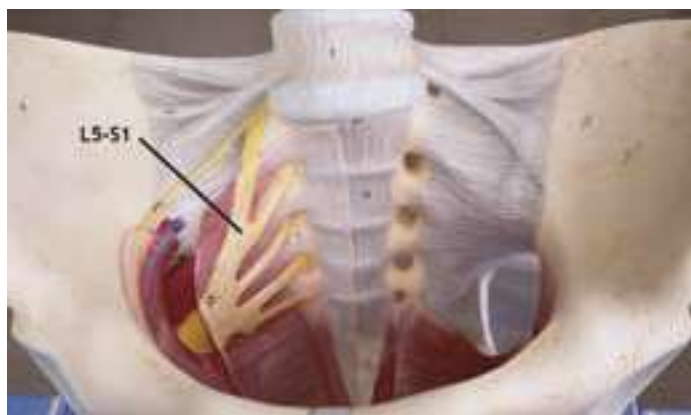
Findings will vary from country to country. In Uganda, most patients are found in good general condition and ready for operation after a day's preparation. In Ethiopia, more patients are weak and malnourished, and a few have contractures. It is always advisable to improve the patient's general condition by improved nutrition, iron and vitamin supplements, de-worming, and treatment of any other diseases first. Contractures should be treated before surgery if possible. I have treated a number of fistula before the contractures have been treated but it is difficult to get the patient into a suitable position to operate and gain adequate access to the fistula.

Haemoglobin should be estimated. It should ideally be above 10gm/dL, but lower levels can be accepted for simple cases, where blood loss should be minimal. For difficult cases, blood should be taken for grouping. Transfusion is occasionally advisable but generally it's simpler and safer to investigate causes of anaemia and treat, and add iron and wait. John Kelly published a paper in 1993 showing that an Hb less than 8gm/dL was associated with a higher breakdown rate.

Not surprisingly several studies have confirmed that many patients suffer from severe depression (see Chapter 1—Mental Health and Further Reading). Sympathetic handling is called for, but no amount of 'counselling' will improve a patient's mental state until she has been cured of constant incontinence.

### Neurological Damage and Physiotherapy

Neurological damage is a marker for a severe injury and it almost always marks the presence of a recto-vaginal fistula as well. At the extreme, the patient may be unable to walk immediately after delivery due to ischaemia to the lumbar-sacral plexus. (Figure 4.1) Immobility may lead to pressure sores, compounded by the presence of saddle anaesthesia.



**Figure 4.1**  
L5–S1 roots are prone to injury from obstructed labour.

With good nursing care, the majority of patients improve. (Figure 4.2) With good nutrition and active and passive movements of all joints, motor power and sensory loss will improve, although foot drop (due to damage to the L5 root) will be the last to recover. At two years 87% have recovered. The provision of splints prevents contractures in plantar flexion. However, they should not be a substitute for putting all affected joints through a full range of movement several times daily. Residual foot drop, especially if a fixed plantar flexion has been allowed to develop, is a serious disability that will impair the patient's ability in daily activities.



**Figure 4.2**

a) This patient presented just two weeks after her delivery and she could only crawl. She had both a vesico-vaginal and recto-vaginal fistula. b) After one week of physiotherapy, exercise and encouragement she could walk with support, although she had bilateral footdrop. The patient was operated on, both fistulae were closed but she had some stress incontinence, she went home walking without support. At six months she had mild footdrop on only one side and her mild stress incontinence remained.

It is easy to understand how, in the absence of any medical help, contractures form, especially if the patient has been rejected and lies in one position for days on end, hoping that the incontinence will stop. (Figure 4.3) This is particularly prone to occur in Ethiopian society, where many of the patients were child brides in remote areas. About 2% of patients presenting at the Addis Ababa Fistula Hospital have severe contractures. These require months of passive stretching exercises before they are fit for repair. A dedicated physiotherapy department enables severe contractures to be considerably improved in time. (Figure 4.4)



**Figure 4.3**

a) Thankfully we rarely see contractures like this any more. They used to be more common. This lady had been lying in a sack for six months. The fistulae were repaired before she could walk, on a camp model of repair.

*Continued*



(b)

**Figure 4.3** (continued)

b) She returned to the next fistula camp, cured of her incontinence but she hadn't continued her physiotherapy and was still unable to walk.

## Explanation

Clearly, the patient must be prepared for what is going to happen in the operating theatre and must give her consent. She must be informed about the length of the post-operative stay, the duration the catheter will be kept in and the restrictions on her activities. She and her attendant must understand that they should not rush off home immediately after the catheter is removed. Those who operate on difficult cases would be wise to warn the patient of the limitations of surgery in achieving a cure, including the risk of ongoing incontinence, so that expectations are not raised too high. This can be difficult to explain. Most fistula patients have had very limited education if any at all. A great deal of patience and empathy is needed.

## Bowel Preparation

It is best to have the rectum empty during the operation in case there is any leakage though the anus. In ideal circumstances, the patient



**Figure 4.4**

Some centres have well equipped physiotherapy departments which are crucial in helping patients become mobile and strong.

would have an enema the day before, but in reality enemas are forgotten or given at the last minute—often leading to contamination during the operation. It is much better to give no enema at all and simply have the patient fast from midnight before the operation and be sure that she has opened her bowels before coming to theatre—this is my policy for bladder injuries.

In recto-vaginal fistula or sphincter repair cases an enema does need to be given the evening before operation and the patient must be kept on a fluid only diet the day before.

In the uncommon event of troublesome anal leakage, I administer an enema in theatre, clean up and insert a temporary anal purse-string suture, and carry on operating. Do ensure you remove this suture at the end of the procedure. The faecal leakage will contaminate the operative site and so for these cases I give a dose of metronidazole with my usual prophylactic antibiotics in theatre and continue it for 24–48 hours after the operation.

Post-operatively check the patient regularly. She may continue to leak faeces in bed after the procedure, that is while the spinal anaesthetic is still working and she can't get up to go to the toilet. The leakage can contaminate the operative field.

## Hydration

Left to her own devices, the patient will come to theatre dehydrated, as she will be trying to reduce her wetness. This is bad for a number of reasons:

- She may be hypotensive under a spinal anaesthetic.
- It increases the difficulty in identifying the ureteric orifices.
- Urine output will be poor after the operation, predisposing the patient to catheter blockage. More intravenous fluids will be required during and after the operation. Which is expensive.

Therefore, as soon as the decision is made to operate, ask the patient to start drinking plenty of mixed fluids, stopping only 4 hours before the operation. If she has been drinking sufficiently, urine should drip when she stands with her legs apart. (Figure 4.5) Before she goes to theatre, set up an intravenous infusion of saline.



Be aware of the very rare but serious condition of hyponatraemia.

(See Chapter 11-Drinking)

**Figure 4.5**

A well hydrated patient. She is dripping urine. (Photograph courtesy of Kees Waaldijk)

## 5 IN THEATRE

### The Anaesthetic

Spinal anaesthesia is the preferred method for all fistula cases. (Figure 5.1) Most fistula surgeons are used to giving the spinal anaesthetic themselves and then performing the operation. More anaesthetic nurses have been trained in most countries and this practice is now rare. Bupivacaine 0.5% in glucose (Marcaïn Heavy) is ideal as the longest acting anaesthetic, although lidocaine 5% in glucose 7.5% can have its duration extended by the addition of adrenaline (epinephrine). The technique favoured by some is to draw up adrenaline 1 in 1000 into the syringe, expel it and then draw up the lidocaine. The wetting of the inside of the syringe provides enough adrenaline. The wetting of the inside of the syringe provides enough adrenaline.



**Figure 5.1**

This is a nice position for administering a spinal anaesthetic although not all patients can bend this far over. (Photograph courtesy of Kees Waalkdijk)



**Figure 5.2**

The patient is left sitting for about 5–10 minutes while the spinal anaesthetic takes, or some lie the patient down after a few minutes making sure her head is slightly raised up. The patient has her head and upper back raised on pillows in this photograph.

The usual dose is 2cm<sup>3</sup> of lidocaine 5% in glucose 7.5% or 2cm<sup>3</sup> of Marcain Heavy. Some surgeons sit the patient up for 5 minutes; others lie the patient down, head up slightly, and wait until she has loss of power and sensation before putting her legs up; yet others lie the patient down and put her legs up in stirrups straight away. Critically there should be no head-down tilt for at least 10 minutes until all the anaesthetic has been fixed—otherwise paralysis of the respiratory centre may be fatal via an ascending spinal anaesthetic. (Figure 5.2) When I give the spinal anaesthetic myself I prefer to sit the patient up until she starts to lose power in her legs, then lie her down and put her in position.

If circumstances force you to give the spinal anaesthetic yourself and operate without any anaesthetic back-up, then make sure you can finish the operation before the anaesthetic wears off. Less experienced surgeons would not feel comfortable operating without anaesthetic help and I would advise against it. Some patients require pethidine or occasionally ketamine to complete the operation, and unexpected emergencies can arise at any time.

There are surgeons who prefer the option of occasionally changing to an abdominal approach after assessment vaginally under spinal anaesthesia. If the patient was lying flat initially for 5 minutes, the spinal anaesthesia should be high enough to allow a lower abdominal approach, but it is essential to have anaesthetic back-up in case of difficulties during an abdominal operation.

## Antibiotics

A few surgeons prescribe antibiotics throughout the post-operative period, while some prefer none.

It is well known that infection usually results from contamination during the operation, so it is common practice in the fistula community to give a single intravenous dose of gentamicin 160mg at the same time as the anaesthetic, before the operation starts. I add 400mg of metronidazole iv for cases of sphincter tears and recto-vaginal fistulae. This practice is largely based on an unpublished series that we did in Addis Ababa about 20 years ago. We swabbed the vaginas of 100 consecutive patients and all of them grew *E. coli* and almost all were resistant to ampicillin but sensitive to gentamycin. Adding Metronidazole for the rectal cases was not studied but it seems prudent.

We would continue with antibiotics for 24–48 hours, only if there has been accidental faecal contamination or if there is another infective indication.

## Instruments

### Basic Instruments

For simple fistulae, the following instruments are needed (Figure 5.3):

- Auvard speculum
- high quality dissecting scissors



**Figure 5.3**

A standard fistula set of instruments.

- toothed dissecting forceps
- Needle holder
- Suture scissors
- Allis tissue forceps
- artery forceps
- metal catheter
- small probe to identify the ureters
- no. 15 blade (not illustrated) and scalpel blade holder
- containers, such as kidney dish and galley pots.

### Additional Instruments

For the full range of fistula surgery, some more specialised instruments are helpful.

#### Retractors

- Sims speculum for exposing the interior of the bladder
- small Langenbeck retractor for access to the vaginal fornices
- Auvarad speculum. Ideally, this should be available with short and long vaginal blades and with different angulations.

#### Scissors

Most surgeons have their favourite scissors; ours are the following (Figure 5.4):

- Boyd-Stillie tonsil scissors for fine dissection
- Thorek scissors, sharply curved at the tip
- Kelly fistula scissors for cutting through scar.



**Figure 5.4**

Surgeons all have their favourite scissors. These are the most popular amongst fistula surgeons. They are extremely sharp, with a fine point in a) and c). a) Boyd Stille. b) Thorek. c) Stille-Matarasso.



**Figure 5.5**

These needles are exceptionally good for working in the difficult spaces of a fistula operation. a) A Monocryl on a 26mm 5/8 needle, b) is a 2-0 Vicryl on a 36mm 5/8 needle. Both are round bodied and very strong. They can be passed through the periosteum when needed.

## Sutures and Needles

(See figure 5.5) Never use non-absorbable sutures because a stone may later form in the bladder.

The choice of suture may be determined by what is available. Some stocks of chromic catgut are unreliable, and we prefer to avoid its use as it dissolves so rapidly. Vicryl 2-0 and 3-0, would be the first choice of most surgeons, if available. Newer monofilament absorbable sutures are very nice to use.

For closure of the bladder, half circle, 26mm, strong, round-bodied needles are best. For more advanced fistula work, eyed J-needles are a great help but are now very hard to come by.

The perfect needle for a suture is a ready-mounted 5/8-circle 26mm needle with a 2-0 Vicryl, but this is expensive. We reserve it for suturing in difficult corners, circumferential repairs and deep situations. Once you have used 5/8-circle needles, you will never want to use anything else!

A larger cutting needle can be used for securing sutures through periosteum when needed, although the 5/8 needle from Ethicon is strong enough to do this.

## Operating Table

An operating table that tilts to at least 50° and has shoulder rests and stirrups is advisable for the full range of surgery. (Figure 5.6) Simpler fistula repairs can be carried out with a more modest tilt and without shoulder rests.



**Figure 5.6**

A good table for fistula surgery. Note the steep tilt, secure shoulder pads and stirrups. The end leg rest is in place here but must come away.

## Lighting

A simple spotlight is sufficient for easy cases. (Figure 5.7) In situations where the electricity supply is erratic, it may be necessary to operate by daylight. (Figure 5.8) Position the table close to a large window. In some hospitals, a full range of lighting equipment is available. (Figure 5.9)

As we operate in a variety of hospitals with unpredictable lighting (Figure 5.10), we prefer to have our own independent lighting source. (Figure 5.11) The clip-on lamp can be used



**Figure 5.7**

A simple spotlight.



**Figure 5.8**  
Kees Waaldijk operating by daylight in Katsina.



**Figure 5.9**  
A very sophisticated lighting system in Addis Ababa, Ethiopia.



**Figure 5.10**  
A broken light—all too common.



**Figure 5.11**

Two examples of headlights: a) a simple light that can clip onto your glasses, b) a very nice, bright light on a headband. Both headlights have a battery that can be held in your shirt pocket and be switched on through your operating gown.

on one's own spectacles or supplied attached to a neutral spectacle frame. The rechargeable battery can be held in a pocket in your scrubs and switched on and off through a sterile gown and provides brilliant spot illumination for 4 hours.

## Position on the Table

The steeper the head-down position, the better. (Figure 5.12) However, very high quality shoulder rests are essential for this, otherwise the patient will slide down the bed as you operate.



**Figure 5.12**

John Kelly demonstrating the correct head down position of a patient.

The patient's buttocks should be well over the end of the table and the thighs well flexed over the abdomen with stirrups. (Figure 5.13) If you want more Trendelenburg tilt you can place extra cushions or pillows beneath the patient's buttocks. (Figure 5.14)



**Figure 5.13**

When there are no shoulder rests, the patient's buttocks must hang over the end of the bed with the sacrum just off the end of the bed. Visibility will be impeded if it is too close to the bed and they will slip down. Note the thighs are well flexed.



**Figure 5.14**

This operating table did not tilt quite enough but you can raise the patient on the end of the bed by placing a pillow under her on the edge of the bed. This patient had her buttocks well off the end of the bed, the stirrups were nice and high lifting her legs out of the way and visibility was good for the surgeon, assistant and scrub.

## Surgeon's Position

The surgeon should be in a comfortable position. (Figures 5.15 and 5.16)



**Figure 5.15**  
The table is too low making the surgeon bend. The surgeon will end up with a bad back.



**Figure 5.16**  
The operating field should be at eye level and the surgeon should maintain a good posture throughout.

# 6 THE OPERATIONS

## BASIC PRINCIPLES

Fistulae come in all different shapes, sizes and sites, but the basic principles of fistula surgery can be applied to all.

Fistula surgery can be very challenging, but one must start by selecting easy cases that have a good chance of being cured, and following the basic principles of fistula repair. The first principle is to close the hole in the bladder and also the vagina. When selecting a simple case you should start with small fistula, less than 2cm, not involving the urethra and with minimal scarring. To cure these you need only to follow the first principles, which involve five basic steps. For more difficult fistulae—that is involving the urethra, circumferential defects, more scarring and those with more tissue loss; you must follow the more advanced principles if you are to have a chance of not only closing the fistula successfully, but restoring continence and restoring sexual and reproductive function. Closing the fistula is straightforward with practice, but restoring continence and sexual function is much more difficult.

Let's explore the principles further. Fistula surgery has three aims:

1. **Close the hole in the bladder and the vagina.** Remember that a fistula is caused by loss of tissue by ischaemic necrosis and there is tissue loss not only in the urinary tract (bladder, urethra and sometimes ureter) but also in the reproductive tract (vagina, cervix and sometimes even the uterus). You will never cure a patient unless you repair the fistula or holes in the urinary tract and the reproductive tract.
2. **Restore continence.** With experience and training it is possible to close a fistula successfully in over 95% of cases at the first operation. However this doesn't mean that the patient will be continent. As a surgeon you might label her as cured as you have closed the fistula, but the patient will be disappointed because she is still leaking. In published series from Addis Ababa, 33% of women had some incontinence after fistula closure, often so severe that they were leaking all the time, just as they did before the operation. Another unpublished series from Addis put the figure at 45%. These series were done in the early 2000's and there have been a lot of surgical advances since then. By applying surgical continence techniques during the repair, the incontinence rate after surgery can be reduced to around 15%. When you repair a fistula you must try and restore normal anatomy as much as possible which means reconstructing the urethra, supporting ligaments and vagina. By performing these more advanced steps you will increase the number of patients who are fully continent and cured.
3. **Restore sexual and reproductive function.** Once a patient is cured of her incontinence she will often get re-married and want to have a child. Some fistula patients have such severe loss of vaginal tissue that after you repair the hole in the vagina, there is nothing left but a

small rigid scarred dimple of a vagina making intercourse impossible. There are some new vaginal reconstructive techniques that have been used recently with good results, enabling intercourse and some patients getting pregnant. (Some patients will remain infertile from other causes like Ashermanns syndrome which is much harder to treat). Interestingly, by restoring normal vaginal anatomy the rate of ongoing incontinence after fistula repair is further improved.

For a simple fistula case, less than 2cm in diameter not involving the urethra and not much scarring, (Goh type 1) generally successful closure of the fistula is all that will be needed to restore continence and sexual function.

## FIVE BASIC STEPS

1. *Close the hole in the bladder and vagina.* To do this, follow the five basic steps of fistula surgery. These are the only principles needed to close a simple fistula, the type that a beginner should start with.
  - a. **Exposure.** Make sure the operative site is adequately exposed with speculae, retractors and sutures retracting the labia.
  - b. **Protect the ureters.** In all but the smallest fistula or very distal ones it is prudent to identify and if need be catheterise the ureters to ensure you don't cut or ligate them. This can be fatal if you tie both ureters and don't recognise it.
  - c. **Mobilise.** You need to mobilise the bladder off from the vagina and cervix adequately, taking care of the ureters of course.
  - d. **Tension free closure.** As with any surgery, if there is tension on the wound it will break apart, so mobilise until you can repair the defect without tension. As the bladder can fill with urine, the bladder needs to be kept empty during the healing phase by a drainage catheter. A full bladder will put tension on the repair and risk rupturing the repair.
  - e. **Check you have it closed with a dye test.** As Kees Waaldijk famously says 'the dye no lie'. Check you have got the bladder watertight by injecting at least 60ml of dye into the bladder. Sometimes you can be surprised by a second fistula that was previously undetected. (Figure 6.32)

## ADVANCED PRINCIPLES

**Aims number 2 and 3 are technically demanding and apply to more difficult cases requiring a more experienced fistula surgeon.**

2. **Restore continence.** Many fistulae involve the urethra and depending on how much urethra has been destroyed this affects the prognosis. The more urethra that has been

lost, the higher the chance on ongoing incontinence. The chances of restoring continence will increase significantly if you apply the following two principles:

- a. **Maintain the urethral length.** A short urethra will almost never be functional. The required length has not been studied in depth. However the impression of several fistula surgeons is that a urethra shorter than 2cm will rarely become continent. You need to repair a urethral defect longitudinally or otherwise make the urethra longer from bladder, usually from a flap of anterior bladder.
  - b. **Support urethral defects with a sling.** In normal anatomy there is a ligament running from the pubic bone to the mid-urethra, imaginatively called the pubo-urethral ligament. This needs to be recreated, as often it has been destroyed in the ischaemic process. This is recreated by the use of a sling. Create a sling using either pubo-coccygeal muscle or scar tissue on the pelvic side walls, or by harvesting some fascia from fascia lata or the rectus sheath.
3. **Restore sexual and reproductive function.**
    - a. **Restore normal vaginal anatomy, depth and elasticity.** There is often great loss to the vagina as well. It is tempting just to pull the vagina together, but this just puts tension on the vaginal repair, increasing the risk of breakdown, and forms scar resulting in dyspareunia or even apareunia. Also it tethers the vagina which results in pulling the urethra open, making a rigid drainpipe urethra. You need a supple elastic vagina covering the urethra. This will not only restore sexual function, it will greatly improve patients' continence rates. There are several ways of doing this, including by rotational labial flaps and vascular island skin flaps (giving the best results in my experience). Some people even use bowel to recreate a vagina. This is a much more invasive procedure with a higher morbidity and even mortality. Only a few centres perform this operation.

When beginning fistula surgery it is important to select the right case for your level of experience. If you select a case that is too demanding, you risk failure of the operation, demoralising the surgeon and a catastrophe for the patient. The best chance of success in any fistula operation is the first time. If the repair breaks and you re-operate, the chance of success significantly decreases.

The following section will guide you to select a suitable case when you are starting out.

## SELECTION OF CASES FOR THE BEGINNER

We shall repeatedly emphasise that selection of cases is the most important aspect of fistula management for a trainee.

Less than one-quarter of new cases presenting will be suitable for a beginner. History taking does not help that much in selecting the easy ones. A small hole may leak just as much as a big one.

There are some clues that should make suspect a serious or difficult fistula:

- Neurological weakness (usually foot drop), even if it has recovered, suggests a difficult case.
- Rectal fistulae usually occur in association with a serious bladder injury. This does not apply to anal sphincter injuries, which often occur in isolation but can occur with a bladder fistula.
- Fistulae following caesarean section are often in the region of the cervix and therefore high and often difficult to access for the beginner.
- A fistula following hysterectomy for a ruptured uterus will usually be in the vault and may have an accidental ureteric injury.

The only clue to a potentially easy case is when a patient gives a history of pregnancies in spite of having a fistula. Clearly, there cannot have been too much damage to the genital tract. Fewer than 10% of cases have had pregnancies while suffering from a fistula.

Examination is the key to selection. The features to look for are:

- a vagina without shortening or stenosis
- a fistula that is easily palpable or visible, and that is small, soft and accessible, but not too close to the cervix or to the external urethral orifice so not involving the urethra.

There is no need to examine such a patient under anaesthesia. If the fistula cannot be seen easily in the conscious patient using a Sims speculum then it is not a simple case.

In summary, novice surgeons should confine themselves to:

- small fistulae not involving the urethra
- those with minimal scar
- those that are easily accessible.

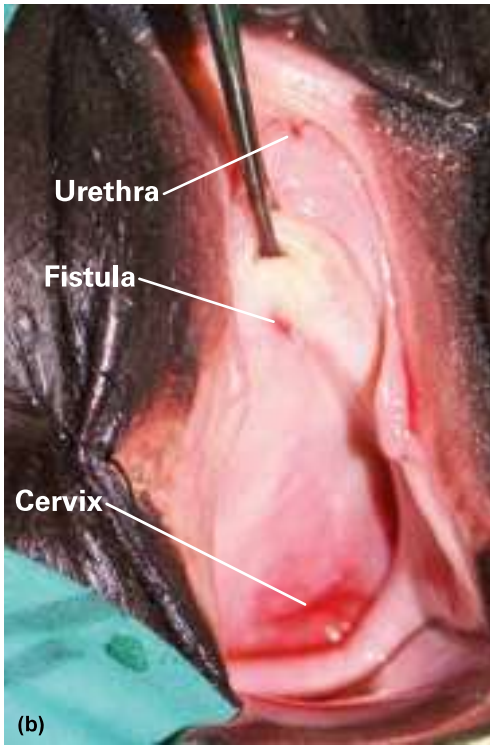
## An Ideal Case

Unfortunately, less than 10% of cases are as easy as the one shown in Figure 6.1 a–e.

### Figure 6.1

a) A simple fistula. It initially looks to be deep in the vagina, b) but when you grasp the distal vagina and retract it, it easily comes into view. Goh classification 1ai. c) Applying the basic principles of exposure, then mobilise. The initial incisions are around the fistula and laterally either side. d) The vaginal flaps are raised and e) after the bladder has been repaired, the vagina is repaired over it.





## Some Relatively Easy Cases

Some other examples of cases suitable for a trainee are shown in Figures 6.2–6.6.



**Figure 6.2**

a) Another simple case, soft, no scarring midline and far from the urethra and cervix, Goh 1ai.



b) It becomes more visible once you retract the distal vagina. The vaginal flaps mobilised off the underlying bladder.



c) The bladder is closed in one layer with interrupted sutures.



**Figure 6.3**

Another simple case but slightly harder than Figure 6.1 and Figure 6.2. It is soft, located about the junction of the bladder and urethra, 2cm in diameter. Goh 2bi.



(a)



(b)

**Figure 6.4**

Two more relatively simple cases. a) Deeper in the vagina, Goh 1ai. b) Another deeper in the vagina closer to the cervix and slightly to the left hand side of the patient.



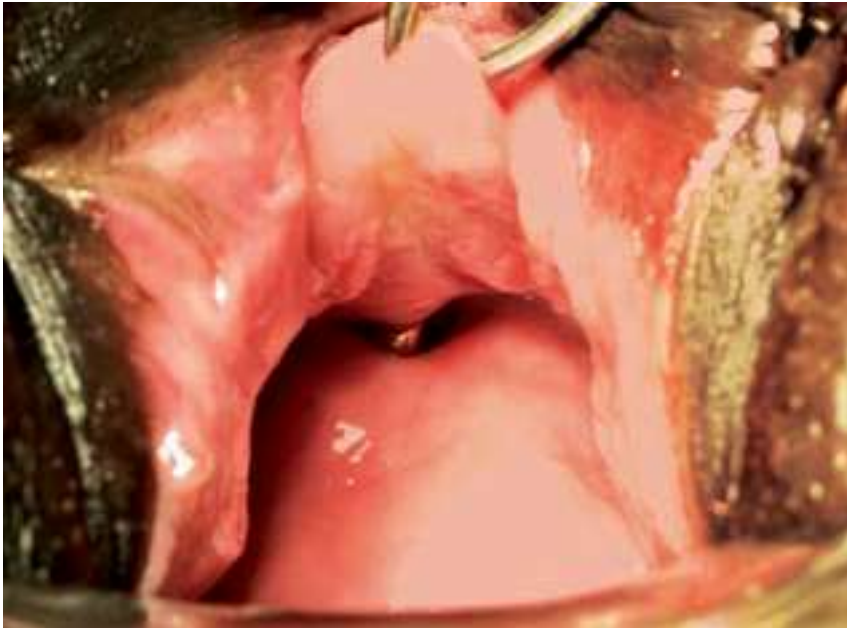
**Figure 6.5**  
This is a pinhole fistula, Goh 1ai. It appears simple but it's very easy to lose it after you mobilise. It's best to try and leave the probe in situ until you have repaired it.



**Figure 6.6**  
Another Goh 1ai but note the tissues appear tight around the fistula margin. This signifies some scarring and tethering. When you release the scar the defect in the bladder can spring open and become much larger.

## Some Difficult Cases

The cases shown in Figures 6.7–6.10 are more difficult, and should not be attempted by a beginner.



**Figure 6.7**  
This is more difficult and not suitable for a beginner. It's at the bladder neck and pulled up to the pubic bone. There's also a defect anteriorly making it circumferential, Goh 2aiii.



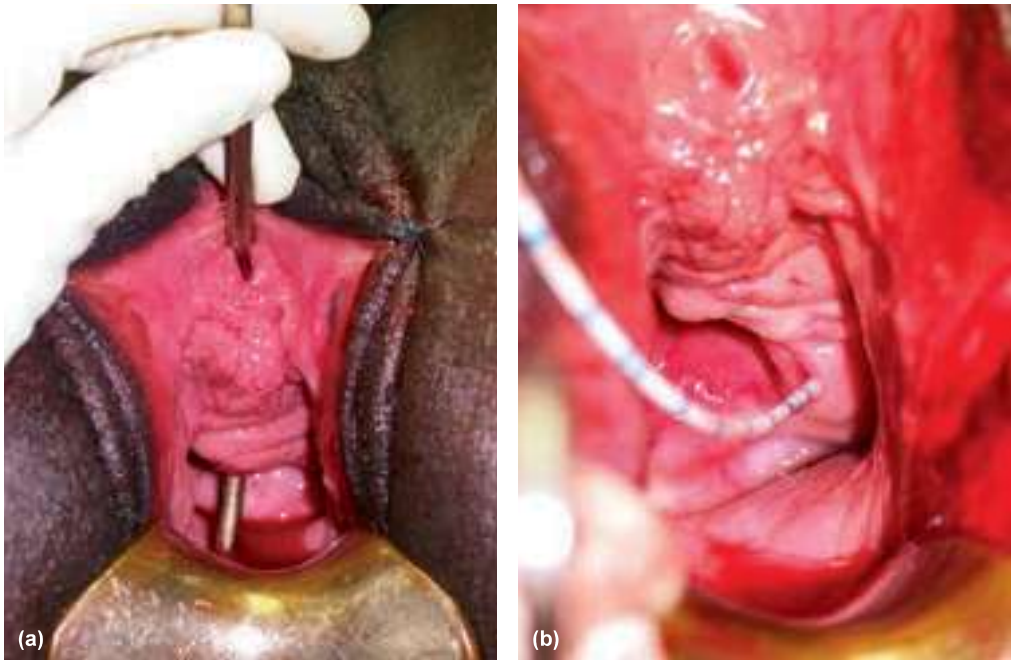
**Figure 6.8**

a) This initially appears to be juxta-cervical. b) When you retract the vagina you can see the anterior cervix is missing and the bladder is split up along the cervix. This is more technically demanding to repair and not suitable for a beginner, although it does have an excellent prognosis. They are almost always cured with no ongoing incontinence as the urethra is not involved. You will also need to repair the cervix.



**Figure 6.9**

The fistula is so large that the dome of the bladder is inverted out through the cervix and out the introitus.



**Figure 6.10**

a) This fistula seems easy initially. b) But when the vagina is retracted you can see it involves the cervix and the left ureter is just on the edge. Goh 1ciii. Not suitable for the beginner.

## Basic Principles Repeated

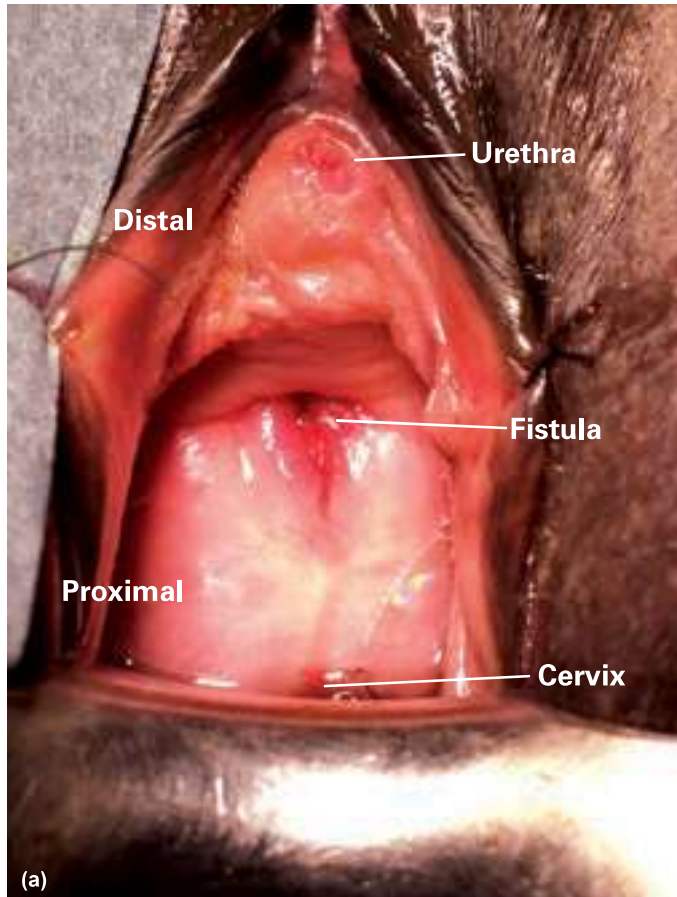
A simple repair always aims to close the hole in the bladder and vagina, to restore normal anatomy. Its essential requirements are:

- adequate exposure
- protection of the ureters
- mobilisation of the bladder from the vagina, cervix and pelvic side walls around the fistula
- mobilisation of enough bladder (after excision of scar if needed) to allow a tension-free closure of the defect that shows no leakage on dye test
- a dye test to confirm that you have closed the hole.

## PROCEDURE IN A SIMPLE CASE

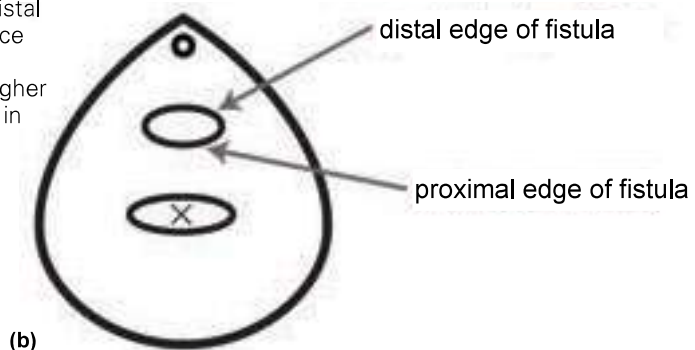
First let's orientate the fistula so you know what parts we are referring to. We use the terms distal and proximal in the true anatomical definition when referring to the patient, but when you view the defect on the operating table those terms can seem confusing. Distal is closer to you, the surgeon, whereas proximal is deeper in the vagina. The proximal edge of the fistula is closer to the vaginal vault or cervix while the distal margin of the fistula is closer to the vaginal introitus. (Figure 6.11)

After positioning and prepping the patient, sew the labia out of the way. Don't stretch them too tightly as you will end up tearing the tissues. Just sew them gently up and out of the way on both sides. Usually one suture at about the level of the urethra is enough but we used two in Figure 6.12. It's good to cover the anus with a gauze or by suturing the drape over the anus.



**Figure 6.11**

a) and b) Orientating proximal and distal terminology. When you look at the fistula at operation the distal part is closest to you (distal actually being used in reference to the patient anatomical orientation) and proximal is higher in the vagina, that is proximal in relation to the patient.





**Figure 6.12**

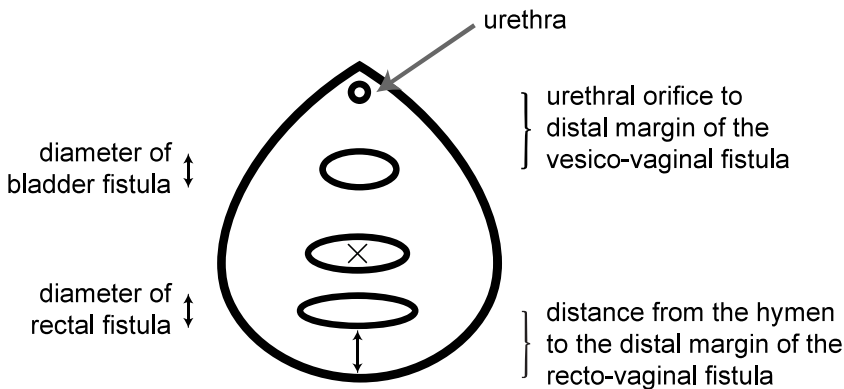
The labia are sutured out of the way (don't pull them too tight and tear them). The anus is covered. Note that urine has pooled in the vagina already.

## Documentation of the Fistula

The fistula must be described. We use Goh's classification (see Chapter 1—Classification Systems).

First, the vagina is assessed for depth and stenosis. The fistula is described by its site, size and surrounding scar. By palpation, an attempt should be made to determine whether the bladder has been separated from the urethra (the circumferential fistula). The cervix should be inspected and palpated for damage, and the posterior wall checked for any missed rectal, anal or sphincter injury.

When you describe and record a fistula, there are certain things you should measure. (Figure 6.13) It's easiest to measure with the metal catheter, especially if you can mark centimetre

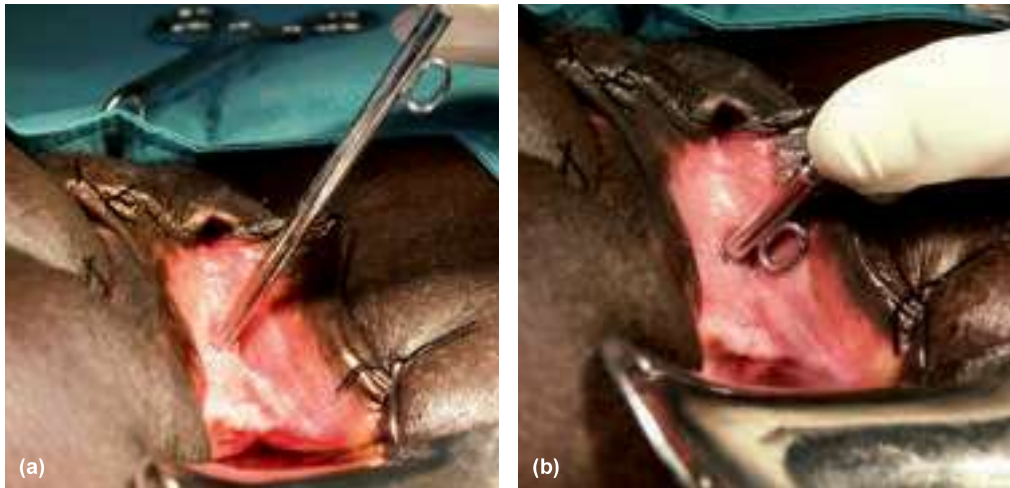


**Figure 6.13**

The important things to measure also help to classify the fistula according to the Goh and Waaldijk systems. Measure the distance between the external urinary meatus and the distal edge of the fistula and also the maximum diameter of the fistula. For recto-vaginal fistulae, measure the distal edge of the fistula to the hymenal remnant and as for the bladder fistula, measure its maximum diameter.

gradations on its side so you can use it as a ruler. Measure the distance of the external urethral meatus to the distal margin of the fistula by inserting the metal catheter through the urethra to the fistula. Sometimes there's a urethral stricture that can be broken with the metal catheter. If it is severe it is best to excise it. If there's no centimetre markings on the metal catheter it's useful to know the length of the tip of your finger to your first and second knuckle to get a good estimate.

Every operation should begin by sounding the bladder. Use the metal catheter to see how big the bladder is—measure the length from the urethral meatus to the dome of the bladder at its maximum. Always check for bladder stones. You feel the metal catheter hit the stone as you sound the bladder. Missing a stone can be a disaster. (Figure 6.14)



**Figure 6.14**

a) and b) Make sure you sound the bladder, primarily to check for stones and also to sound the size of the bladder. Record the depth from the external urinary meatus to the bladder fundus.

## Exposure

Suturing the labia laterally to improve access, and suturing a swab or drape to cover the anus are usually to get good exposure. (Figure 6.12) In more complex cases, it is common to find scarring inside the vagina that is sufficiently severe to prevent the insertion of the Auvard speculum. Most commonly, there is a thick band of scar on the posterior vaginal wall. The scar is released by incising the band laterally either side, staying away from the rectum in the midline and the bladder anteriorly. If there is any doubt, a finger can be inserted into the rectum for guidance. Incising the scar in this way may result in a reasonable vaginal capacity. In cases of extensive scarring, the lateral incisions can be brought infero-laterally out into the ischio-rectal fossa, making large episiotomies. An Auvard speculum can then be introduced, exposing the fistula.

More frequently, a simple episiotomy, bilateral on occasions, will improve access greatly. (Figure 6.15) Beginners will need to make episiotomies more frequently than experienced surgeons.

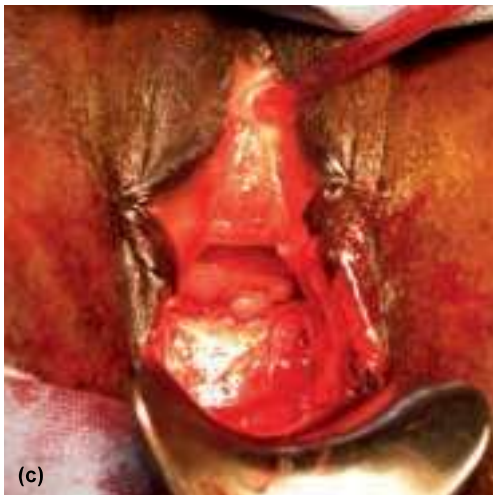
Some surgeons infiltrate the vaginal wall around the fistula margin with a mild haemostatic agent (1:200 000 adrenaline (epinephrine)). This reduces blood loss, thus aiding dissection.



**Figure 6.15**

Improving access with an episiotomy.

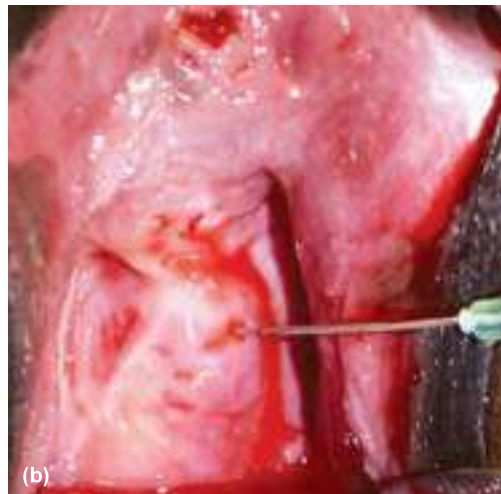
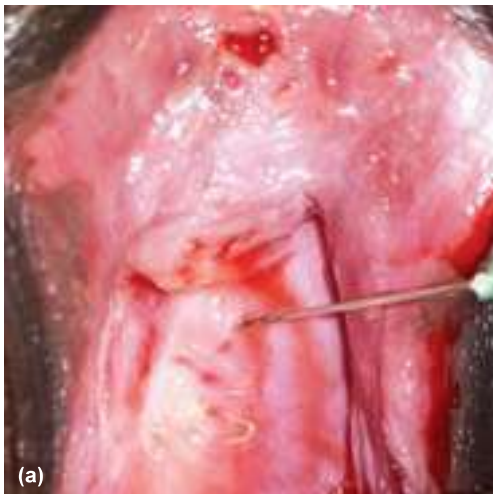
- a) There is a ridge of scar on the posterior vagina holding up the speculum and making access to the fistula difficult. b) Make sure to incise laterally, away from the rectum. c) Bilateral episiotomies have been made. Exposure is greatly improved.



**Figure 6.16 (below)**

Hydrodissection. a) The needle is inserted just under the vagina and above the bladder.

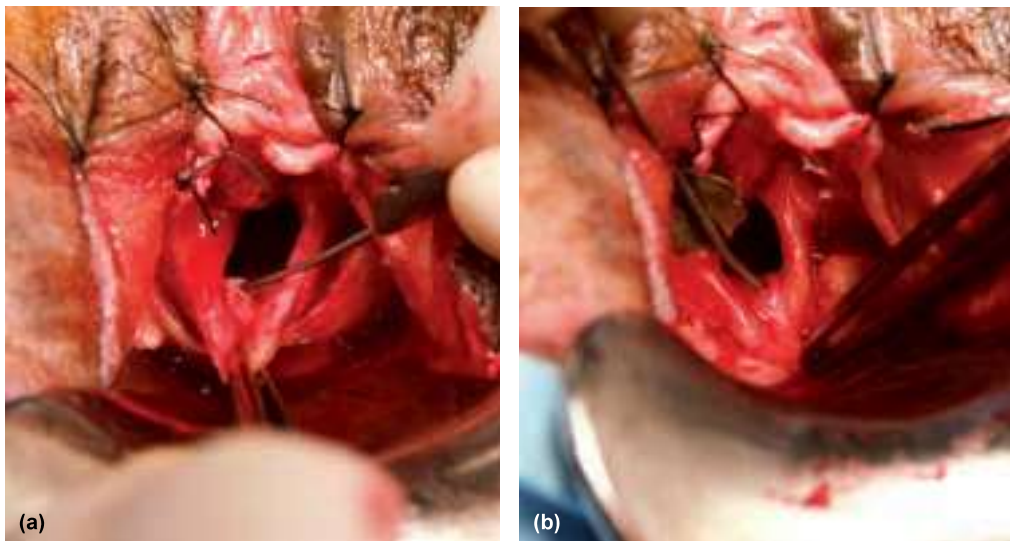
- b) Injection of the fluid dissects the plane, lifting the vagina away from the bladder making the surgical dissection much easier.



There is a small risk of reactionary haemorrhage when the effect wears off. Others prefer isotonic saline just to help with hydrodissection. If the infiltrate is being introduced into the correct tissue plane beneath the vaginal skin, it should be introduced easily (except when there is severe scarring). Although many surgeons do not infiltrate at all, we believe that it is helpful for beginners. Introducing a lot of infiltrate also helps to separate the planes, making dissection easier (hydrodissection). (Figure 6.16)

## Protection of Ureters

It is wise to identify the ureters in all cases except for the very smallest fistulae. The ureters enter the bladder just distal and lateral to the cervix and are identified with a ureteric probe. (Figure 6.17) If the ureters are difficult to identify, 10mg intravenous furosemide and a bolus of intravenous fluid will produce an intermittent spurt of urine from each ureteric orifice, aiding localisation. (Figure 6.18) If the ureters are close to the fistula margin, they should be catheterised, advancing the catheters up to the renal pelvis and then withdrawing them slightly. This is done to avoid incorporating the ureters in the repair. Even with this step, ureters have been injured during dissection. Still take great care (see Chapter 13—An Injured Ureter). Bring the catheters out through the urethra by threading them into a metal catheter or by pulling them through with a small curved artery forceps. (Figure 6.19) Then secure them onto the mons pubis with a simple stitch. Wherever possible, it is best to catheterise the ureters before beginning dissection but sometimes some dissection is needed to make visualisation of the ureters possible.



**Figure 6.17**

a) The right ureter is identified. b) The left ureter is identified.

## Mobilisation, Dissection and Separation of the Layers

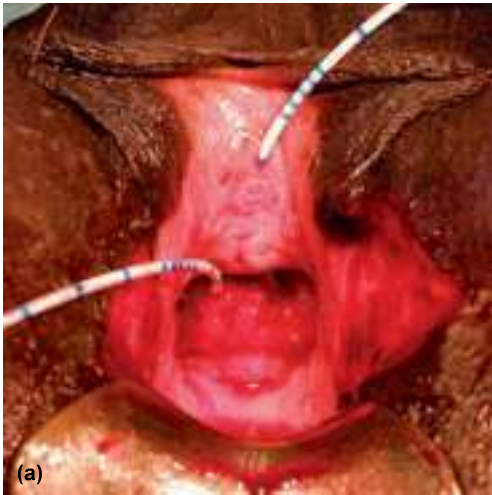
Initially, the vaginal wall distal to the fistula should be held with the Allis forceps. Upward traction brings the fistula into view. (Figure 6.20)



**Figure 6.18**  
Frusemide 10mg has been given intravenously and the left ureter is seen spurting here, aiding identification.

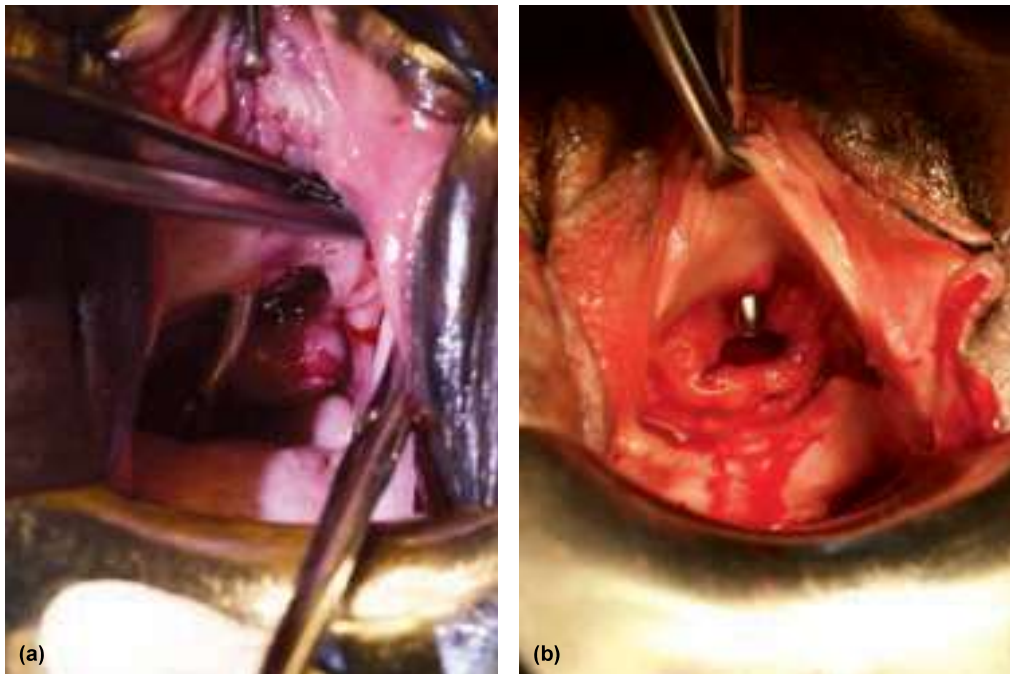
**Figure 6.19 (below)**

a) and b) The ureteric catheters are pulled through the urethra. In this case with a curve mosquito. Another option is to pass a metal catheter through the urethra and out of the fistula and then thread the ureteric catheter through the end of a metal catheter and withdraw it. The catheters are then sewn onto the mons pubis, securing the right ureteric catheter on the patient's right and the left ureteric catheter on the patient's left.



**Figure 6.20**  
The distal vagina is grasped with the Allis forceps and lifted upwards, exposing the fistula very clearly.

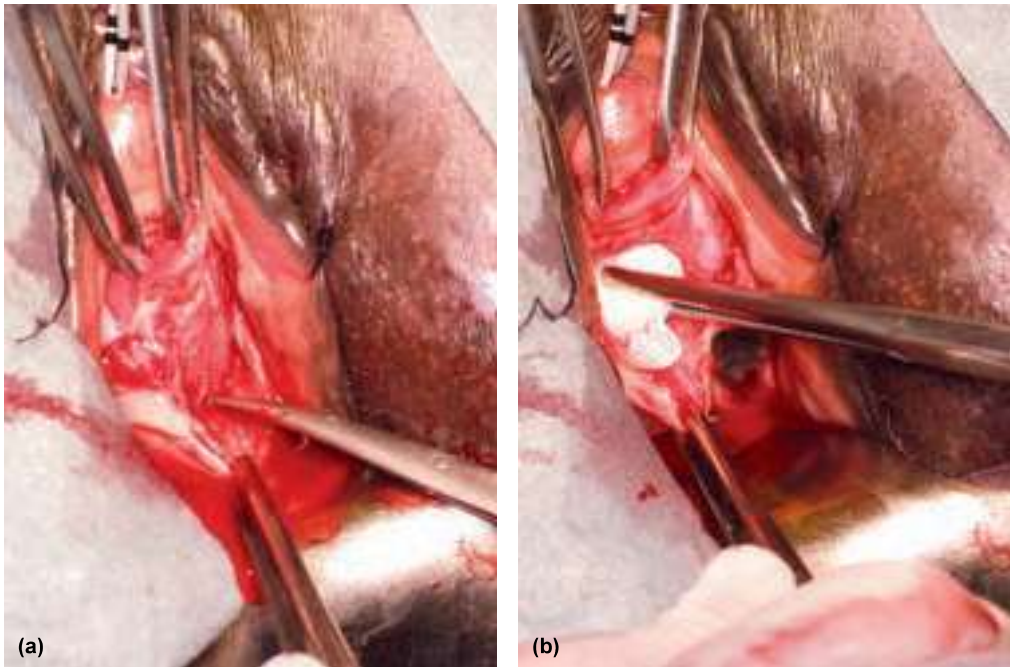
The proximal margin of the fistula is incised, with the incision being made through the full thickness of the vaginal wall, but not into the bladder. The incision is taken around the fistula where the bladder epithelium meets the vagina. The incision is then advanced onto the lateral walls of the vagina from the left and right angles of the fistula. This incision is made horizontally, not going too far towards the introitus. I try and make these incisions parallel with the floor, especially when extending them onto the lateral vaginal walls. This assists with access for the dissection (Figure 6.21) and you can also make a nice flap with this vaginal tissue that could be useful in repairing the vagina at the end of the operation. If you direct your lateral incision too far forward/distally towards the introitus, the vaginal flap will not be large enough to cover the repair later. A size 15 blade is most suitable for this step.



**Figure 6.21**

a) In larger fistulae it's helpful to extend the lateral incision to the lateral vaginal wall, making it parallel to the floor. b) You can now access the fistula very easily.

The proximal bladder wall is grasped with the Allis forceps and held by the assistant. The surgeon holds the vaginal wall with dissecting forceps and gently applies counter-traction to expose the operative plane. A combination of sharp and blunt dissection (Figure 6.22) is used to develop the plane between the bladder and the vagina. Note that the bladder and vagina are held apart with the Allis forceps to show the space between them. Opening the tips of the scissors in this plane helps to develop it. Tension should be maintained on both the bladder and the vaginal walls during dissection. This helps to find the right tissue plane for dissection. It is important to stay just under the vagina. Always make sure the curve of the scissors is pointing away from the bladder towards the vagina. Bleeding is a warning sign that the bladder wall has been entered and you are in the wrong tissue plane.



**Figure 6.22**

a) The bladder is helped up with Allis forceps and the vagina pulled down with tissue forceps. Sharp dissection is used, making sure the curve of the scissor is pointing away from the bladder. b) When you are in the correct plane, gentle blunt dissection can be used with a fingertip or in this case a small gauze in artery forceps.

The dissection is extended laterally until the angles of the fistula are free. Make sure you don't injure the ureters. You can easily feel where the ureters lie after they have been catheterised. The dissection can appear rather extensive to the novice fistula surgeon, but it must be extensive enough to free the bladder off the vagina to enable a completely tension free closure of the bladder. Much more dissection will be done in a proximal direction than in the distal dissection. The mobilisation often extends up to or beyond the cervix. This is where you will get bladder mobility, not distally over the urethra, which is fixed. This is the most crucial lesson for the fistula surgeon. If the bladder is closed under any tension, the operation will fail.

In more severe injuries, the lateral margin of the fistula attaches to the pubic bone, and clearly a different strategy is required. Management of this situation is discussed in 'Operative Steps for Circumferential Fistulae' later in this chapter.

After the proximal margin has been mobilised sufficiently, attention is given to the distal margin. Most surgeons new to fistula surgery find this plane difficult to dissect, especially when the fistula is pulled up behind the symphysis.

The metal catheter is a useful retractor in the urethra, and it also helps the surgeon to gauge the thickness of the tissue planes, which are thin when approaching the urethra. To help with this, a small vertical incision may be made from the distal margin of the fistula in the midline. The incision around the distal fistula margin joins the previous proximal dissection.

A lateral extension is made down the axis of the vagina. This may have already been done from the lateral ends of the proximal dissection. This is particularly important when a fistula is pulled up behind the symphysis.

The distal flap must now be dissected off the proximal urethra and para-urethral region. The elevation of the distal flap should always commence with dissection at its lateral edge (Figure 6.23 a and b), working towards the midline using the curve of your scissors to help get into the plane. If this is not done, the urethra can easily be damaged and the flap can be torn. Keep advancing the mobilisation onto the patient's right. If the fistula is pulled up behind the symphysis, the right-angled tips of the Thorek scissors (see Chapter 5—Additional Instruments) are most helpful. The Allis forceps are again useful in providing traction to bring the upper margin into view and in providing traction and counter-traction to find the correct tissue plane.



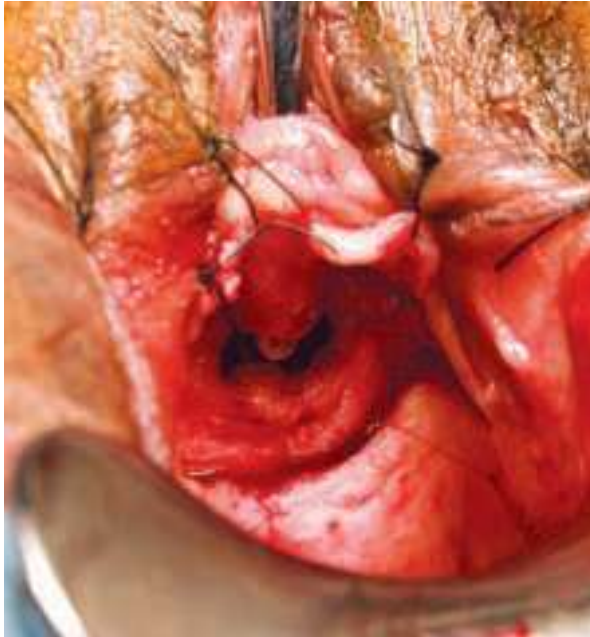
**Figure 6.23**

a) Using the curve of the scissor, start mobilising the vagina off from the lateral vaginal wall and work towards the midline and then to the other side. b) The distal flap is now mobilised.

If you have made a vertical incision in the midline, you can dissect from the midline and develop a right and left flap—but make sure you get the lateral angles of the fistula well mobilised and free.

When the surgeon judges that there has been enough dissection to enable a tension free closure, the reflected tissue is sewn to the labia on each side with a suture. (Figure 6.24)

The fistula edge is trimmed of any scar tissue or residual vaginal skin. The angles are examined again to ensure that they are not tethered to the inferior pubic ramus on either side. If the angles are still tethered then further dissection is needed until they are nice and free and can be repaired with no tension.

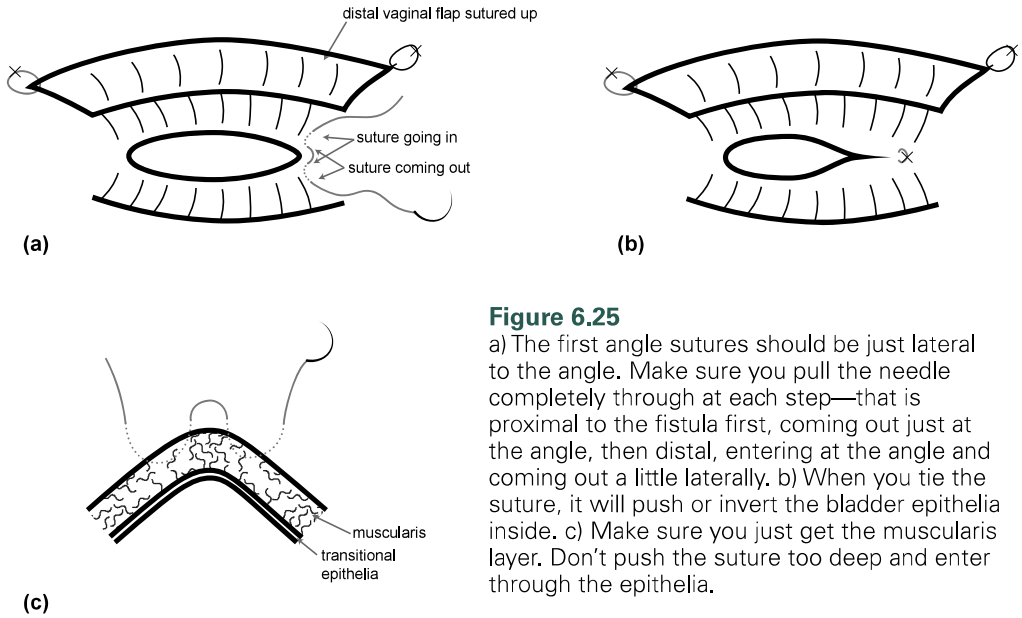


**Figure 6.24**

The distal vagina flap is now sutured out of the way. Don't pull the sutures too tight and tear the tissues, all you want is just to retract it out of the way.

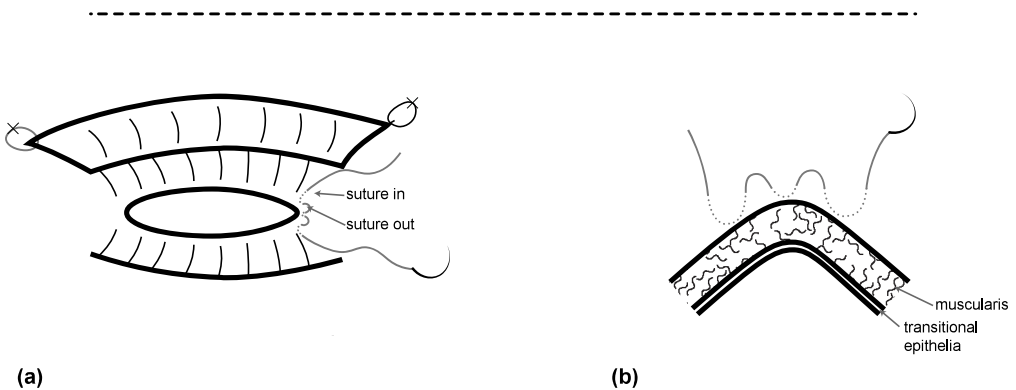
## Tension Free Closure

The fistula is then repaired with interrupted 2–0 absorbable sutures. The vagina is a confined area in which to operate, and suturing can pose a problem. Small, strong needles are needed. The old fish-hook (J) needles are wonderful but are getting harder to find. Recently we started to use the 5/8-circle needles which are just as good as the J-shape needles if not better. The angles are secured first, taking two bites just lateral to the angles, one distal, making sure the needle comes out just in the angle of the fistula, then one proximal, following in the same line of the first bite, starting in the angle and coming out proximally. (Figure 6.25) One experienced fistula surgeon takes this in three bites, one distal, then an extra suture just picking up the angle of the fistula and then the proximal suture. The principle is that the angle should be securely closed with no space behind the suture for urine to track out. (Figure 6.26) These should be good bites of the bladder muscle layer. The corner sutures are clipped after tying for identification. (Figure 6.27) For the central sutures, it may be easier if they are not tied until all have been inserted.



**Figure 6.25**

a) The first angle sutures should be just lateral to the angle. Make sure you pull the needle completely through at each step—that is proximal to the fistula first, coming out just at the angle, then distal, entering at the angle and coming out a little laterally. b) When you tie the suture, it will push or invert the bladder epithelia inside. c) Make sure you just get the muscularis layer. Don't push the suture too deep and enter through the epithelia.



**Figure 6.26**

a) and b) Another technique is to take the suture in three stages, the extra step is to pick up the muscularis right at the angle for the fistula, really making it secure.

It is very important to ensure that there is no protrusion of bladder mucosa at any point along the suture line. This is especially so at the corners. The suture includes only the bladder muscle; the mucosa is excluded from the repair so as to invert it into the bladder. (Figure 6.28)

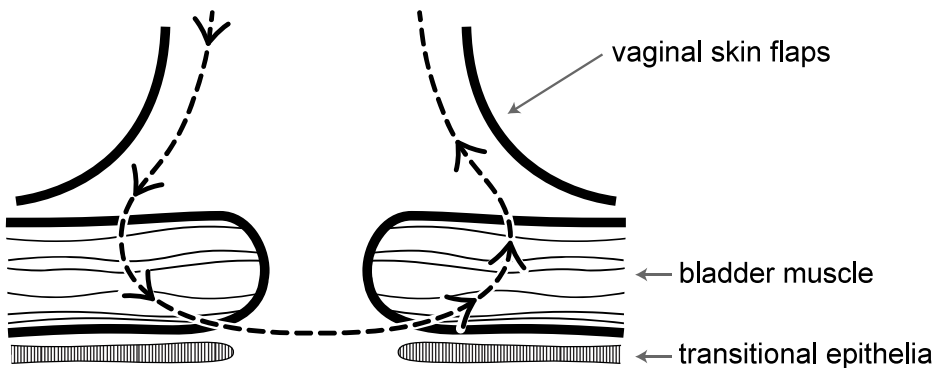
## One Layer or Two?

Traditionally, two layers of sutures to the bladder have been recommended, but most surgeons use only one layer as a general rule. The bites must be accurately and evenly spaced about 4mm apart. One technical tip is never to try to hold forceps and needle holder while tying knots.



**Figure 6.27**

The two angled sutures are now secure and held with artery forceps.



**Figure 6.28**

The suture only includes the muscle layer of the bladder, trying to exclude the transitional epithelium of the bladder.

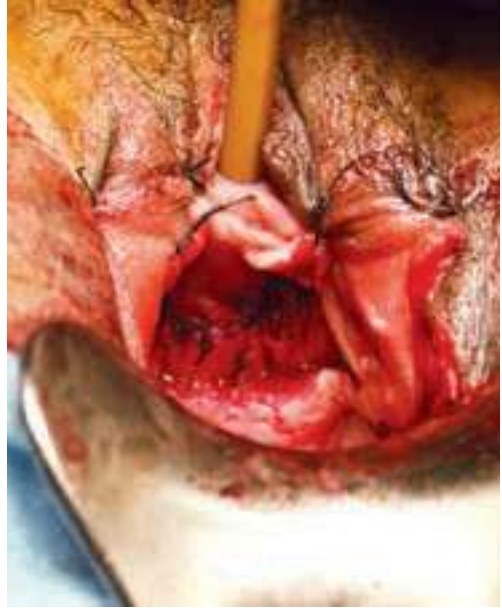
It is much easier to judge tension accurately when both hands are free. (Figure 6.29) A second layer should never be used when suturing to urethra. There is a high chance that this would cut out or effectively shorten the urethra. One mantra that I teach the trainee is that if you get a good bite of healthy tissue under no tension, then there is no reason for it to break down.

## Check the Closure with a Dye Test

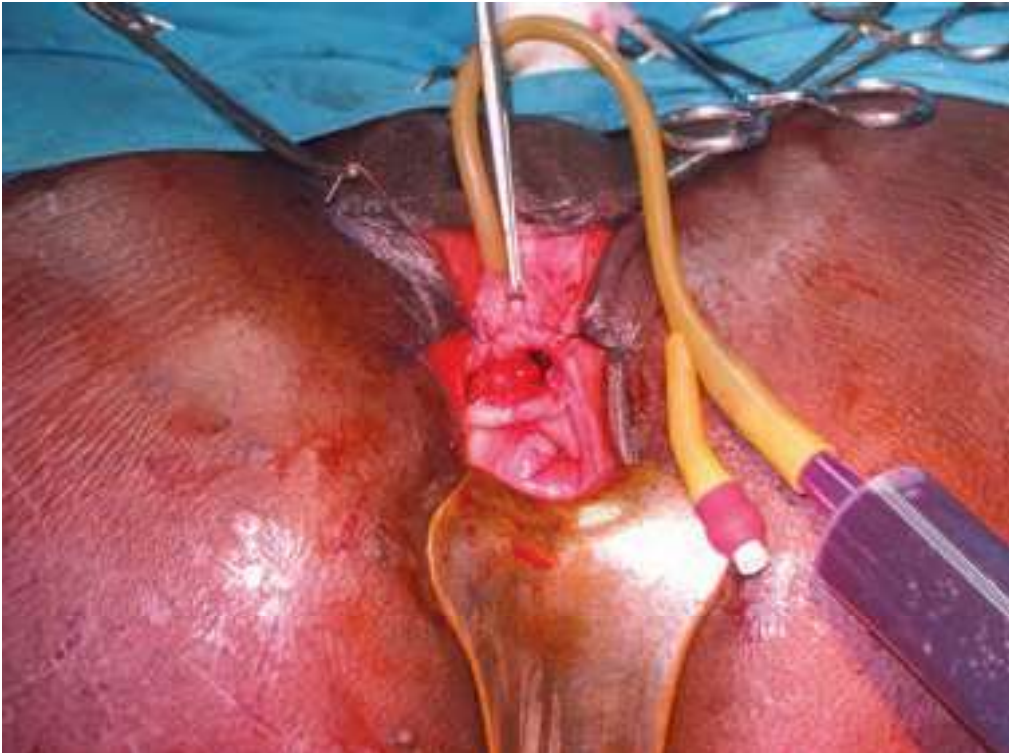
Once the repair has been completed (Figure 6.30), a dye test is performed to ensure sound closure of the bladder. (Figure 6.31) A no. 16 Foley catheter is passed, saline coloured with methylene blue is introduced into the bladder (around 60–100cm<sup>3</sup> should suffice) and the suture line is checked for leaks. A common error is to use the dye too concentrated. Leakage from the repair or urethra will stain everything too much, making identification of the leak difficult.



**Figure 6.29**  
It's best to put your instruments down and tie your knots with both hands free.



**Figure 6.30**  
The bladder is now securely closed.



**Figure 6.31**  
Checking the closure is secure with a dye test.

A more objective method is to fill the bladder via a filter funnel or open syringe, pouring in the dye until the intravesical pressure is about 30cm H<sub>2</sub>O. This is judged by the height of the fluid in the vertically held catheter. The volume instilled gives a measure of the functional capacity of the bladder.

A patient may have more than one fistula, so while the dye is still in the bladder it is important to inspect the rest of the vagina carefully for leaks. (Figure 6.32) It may be necessary to press gently on the urethral meatus with a swab to prevent dye leaking out of the urethra and spilling into the vagina, making interpretation of the test difficult. This is especially common if there are ureteric catheters in the urethra in addition to the Foley catheter, because the dye tracks around, through the spaces between the catheters. If the dye test is satisfactory, pressure over the urethra can be released to look for a urethral leak around the catheter. Whether this predicts stress incontinence remains to be determined.

If a leak is detected in the suture line, an additional suture is required, but, if the leak is not controlled by one or two additional sutures, it is better to take at least part of the repair down and begin again rather than inserting more and more sutures that will only strangulate the tissue, causing ischemia and a breakdown of the repair.



**Figure 6.32**

In this case the fistula repair is sound but the dye test has revealed another previously unnoticed fistula high in the vagina adjacent to the cervix.

## Vaginal Closure

Vaginal closure is performed with interrupted sutures. (Figure 6.33) Where possible it is best to close the vagina completely with everting vertical mattress sutures. Sometimes small gaps are left in the vagina as the edges are difficult to approximate. These gaps will generally heal by granulation and epithelisation, but it can lead to a tight, tethered anterior vagina which in turn can lead to urethral incontinence (see Chapter 6—Operative Steps to Reduce the Incidence of Stress Incontinence). If a large gap is left in the vagina, the bladder invariably breaks down. Kees Waaldijk has the saying 'A ceiling needs a roof to keep the rain out', meaning that the two layers of bladder and vagina keep the urine out of the vagina.

If there is bleeding between the vagina and bladder, an infected haematoma could burst into the bladder and/or the vagina, so make sure there are no active bleeders and use packing to deal with any residual ooze. Note that if the vagina is closed with tension, this often results in the urethral



**Figure 6.33**  
This vaginal skin has been repaired with interrupted everting mattress sutures.



**Figure 6.34**  
The vagina is packed for 24 hours. Protect your repair while you insert the pack by placing a Sims speculum over it.

meatus being pulled into the vagina. This will also pull the urethra open and the patient will almost always end up with stress or urethral incontinence. It may be necessary to close the defect in the vagina by using flaps.

## Haemostasis

Actively bleeding vessels should always be secured by a figure eight suture, but sometimes a degree of continuous oozing has to be accepted. This may be reduced by greater head-down tilt or dilute adrenaline-soaked swabs, and finally controlled by packing.

## Vaginal Packing

It is traditional to finish by packing the vagina with gauze soaked in antiseptic solution. Residual venous oozing is common at the end of large operations and this may increase after the adrenaline injection wears off and the patient is lying flat and no longer in a Trendelenburg position. A firm pack may stop this. It is important to realise, however, that a pack may prevent the recognition of serious bleeding for several hours and post-operatively the patient should be checked regularly. In most simple dry cases there is probably no need to pack, but, to simplify nursing, it is better to have an 'all-or-none' policy, and all patients will have their packs removed the next day except in special circumstances.

When packing, the site of the repair should always be protected with a Sims speculum. (Figure 6.34)

## Securing the Indwelling Catheter

Some surgeons prefer to suture the indwelling catheter onto the labia whereas others just tape the catheter (see Chapter 11—Principles of Catheter Care). The aim is to ensure that the balloon of the catheter does not put pressure on or pull at the repair site, especially when the patient is walking. This should not be a problem for high vaginal fistulae, where the repair site is away from the bladder neck, where the balloon will sit, but it will be a problem for those fistulae involving the urethra or bladder neck. I prefer to secure the catheter in place to prevent any pressure or traction on the repair by the indwelling balloon. It is best to secure it to the abdomen rather than the leg. If it is taped to the leg, the Foley will be pulled when the patient walks, and the balloon will be pulled in the bladder against the repair, which is what we are trying to avoid. When trying to secure with tape, remember that many women in Africa like to use Vaseline on their skin which prevents the tape from sticking. You might need to clean the area where you will place the tape to help it stick better.

The important thing to remember is to keep the bladder empty with the catheter draining well during the 10 days to 2 weeks after the operation.

The next section describes the selection of cases for more advanced surgeons.

## JUXTA-URETHRAL AND CIRCUMFERENTIAL FISTULAE

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The following are discussed in this section:

- Management of juxta-urethral and circumferential fistulae
- Management of ureteric involvement.

Fistulae in the bladder neck area are common. We term them juxta-urethral fistulae. They can be small, just involving the posterior aspect of the bladder neck area. They can be very large where the posterior, lateral and anterior bladder neck and adjacent bladder and urethra are all necrosed making the fistula circumferential. Then there is everything between.

Small juxta-urethral fistulae can be quite simple to repair, but large circumferential cases can be very challenging. Many a trainee fistula surgeon has examined a patient and diagnosed a small juxta-urethral fistula, taken her to theatre and only then realised that there is a circumferential defect that is beyond his or her skills.

Many of the larger circumferential defects have the ureter involved as well.

The key to repairing the more complex fistulae is first to understand the circumferential fistula.

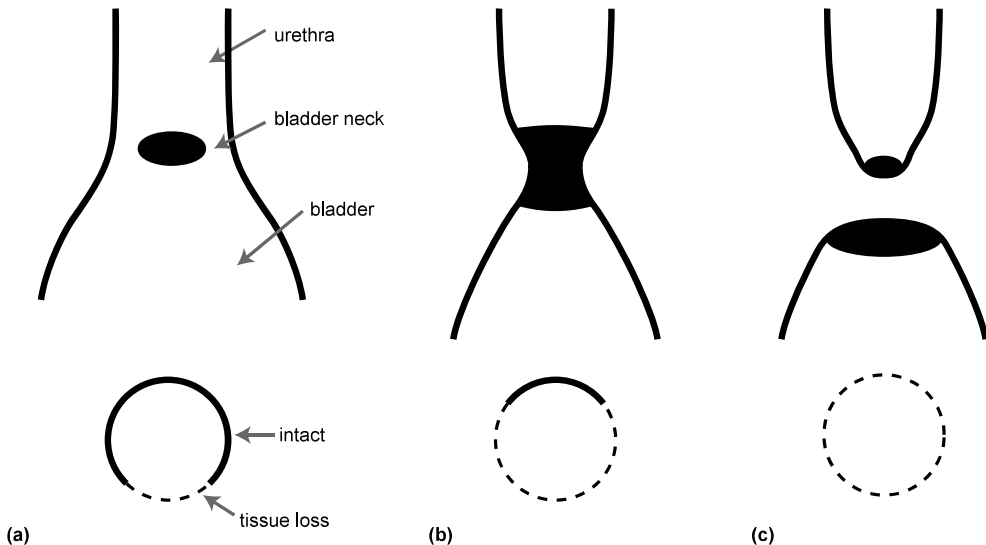
Anyone reading standard textbook accounts of vesico-vaginal fistula repair may get the impression that the fistula is simply a hole in the base of the bladder that needs to be closed transversely in one layer to the bladder with repair of the vagina over the top. The concept of circumferential loss and the strategies for dealing with this are often glossed over.

In the majority of cases, the ischaemic injury occurs at the urethro-vesical junction (bladder neck). If the posterior part of the proximal urethra and bladder neck are affected and it sloughs away, it is called a juxta-urethral fistula. This is quite common. If the ischaemia is more severe and affects all the anterior, lateral and posterior urethra, and bladder neck, and it all sloughs away, the resultant injury is called circumferential. The whole circumference of the urethra/bladder neck sloughs away and the urethra ends up being completely detached from the bladder.

The degrees of circumferential loss are illustrated in Figure 6.35. It must be appreciated that in the larger defects the antero-lateral bladder wall is adherent to the pubic rami. The practical point is to make the distinction between fistulae without an anterior gap, fistulae with a small or negligible gap, and finally those with a significant gap. The management is different. Often the defect extends around just part of the circumference of the bladder neck region and appears as a simple hole on inspection in the clinic and when you start dissecting in theatre you sometimes find an anterior defect as well. The varying degrees of loss are shown in Figure 6.35.

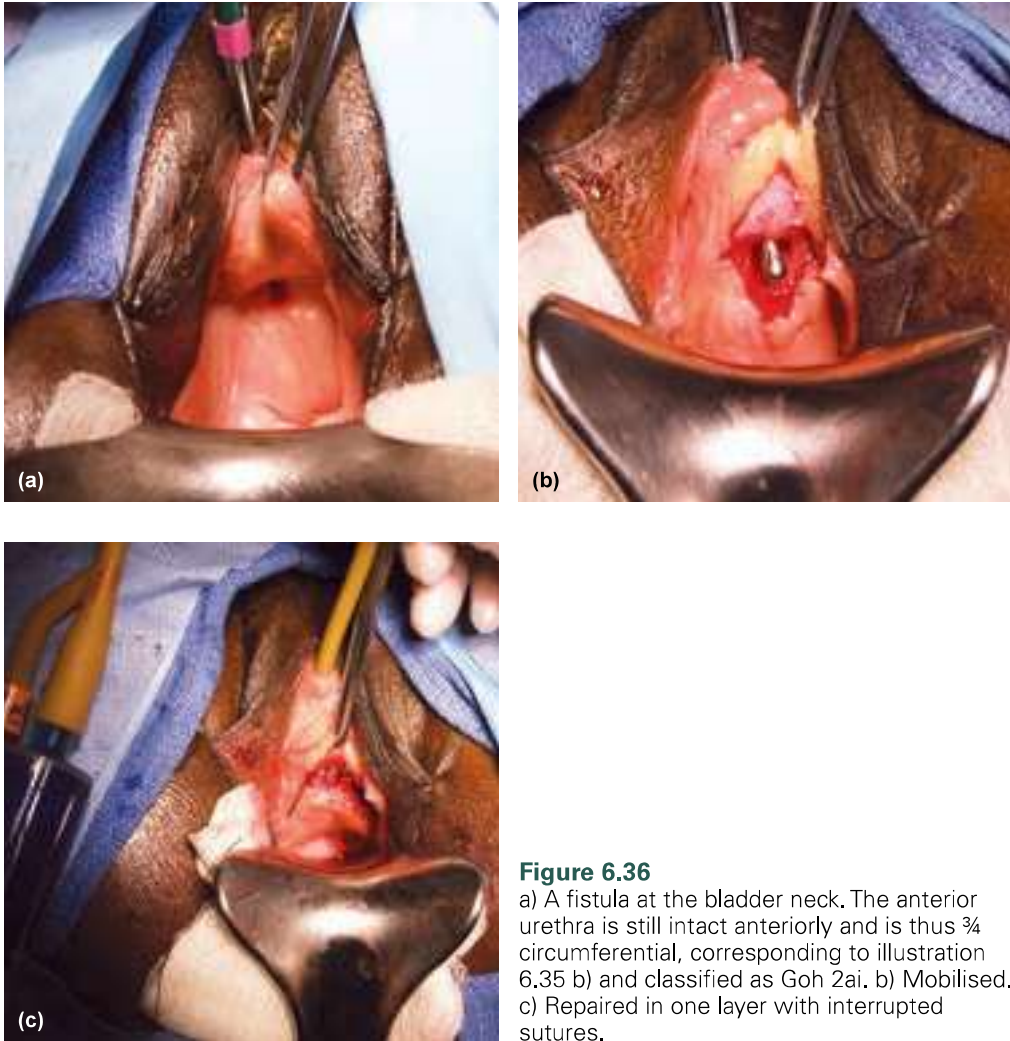
There are several important things to consider:

- Is the fistula just in the posterior urethra/bladder? If so, it is managed as a juxta-urethral fistula.
- Is there also a gap in the anterior urethra and/or bladder? If so it is a circumferential fistula and will be managed differently.
- To what extent is there circumferential tissue loss (i.e. separation of bladder and urethra)?
- How much urethra has been destroyed?



**Figure 6.35**

Different degrees of severity of a urethral fistula. a) Just the posterior urethra is involved, this is not circumferential. b) More of the circumference of the urethra is involved but the anterior part is still intact. We call this  $\frac{3}{4}$  circumferential. c) The whole circumference of the urethra is involved and the distal and proximal segments of the urethra are completely separated. The defect is circumferential.



**Figure 6.36**

a) A fistula at the bladder neck. The anterior urethra is still intact anteriorly and is thus  $\frac{3}{4}$  circumferential, corresponding to illustration 6.35 b) and classified as Goh 2ai. b) Mobilised. c) Repaired in one layer with interrupted sutures.

## Extent of Circumferential Tissue Loss

There is of course a spectrum of conditions. There may be a small discrete defect in the posterior urethra/bladder, the defect may extend around laterally on both sides, but with the anterior urethra still just intact. There may be a small circumferential gap and then the gap between what is left of the urethra and the bladder may be large, even up to 5cm or more. When you examine these more extreme cases you can palpate a small fleshy area of the remaining urethra, then there is just a thin membrane of epithelia over the posterior pubic bone and then usually a larger hole entering into the bladder. Sometimes there is no distal urethra remaining at all and all you can palpate is the back of the symphysis pubis and then into the bladder deep in the vagina. Sometimes the hole into the bladder is difficult to feel as it can be just a tight slit entering the bladder on the top of the pubic bone. I've had a few patients with no urethra at all, with a tight slit into the bladder held with rigid scar on the back of the bone, and they were dry!

## Extent of Urethral Destruction

The normal urethra is about 3.5cm long (range 3–5cm). Circumferential defects almost always affect the urethra, only rarely are they proximal to the urethra and in these cases they are usually stuck right to the top of the symphysis pubis and are very challenging to repair. Generally in circumferential cases the urethra is almost always damaged to some extent. There is frequently a block in the proximal urethra, which needs either to be excised or dilated. We think that it is better to excise the stenosis as the scarring formed after the dilation can lead to the stenosis reforming. Measuring or estimating the distance from the external urethral orifice to the distal fistula margin best records the status of the urethra. (Some people use a marked uterine sound or engrave centimetre markings on a metal catheter to measure the urethral length. If neither is available, it is helpful to know the length of one's own distal phalanx and length from nail tip to first knuckle and use it as a ruler!). Goh's classification from 1 to 4 may then be applied. Urethral length is the major prognostic factor for stress incontinence. When the urethra is short, we recommend a urethral support procedure that is described later in this chapter—Urethral Reconstruction.

## Operative Steps for Non-Circumferential Juxta-Urethral Fistula

### A Non-circumferential Fistula in the Region of the Bladder Neck

Figure 6.36 illustrates a common simple juxta-urethral fistula, with a  $\frac{3}{4}$  circumferential defect. There is tissue loss on the posterior urethra and laterally on both sides, but the anterior urethra is still intact. In effect the urethra is just folded back together.

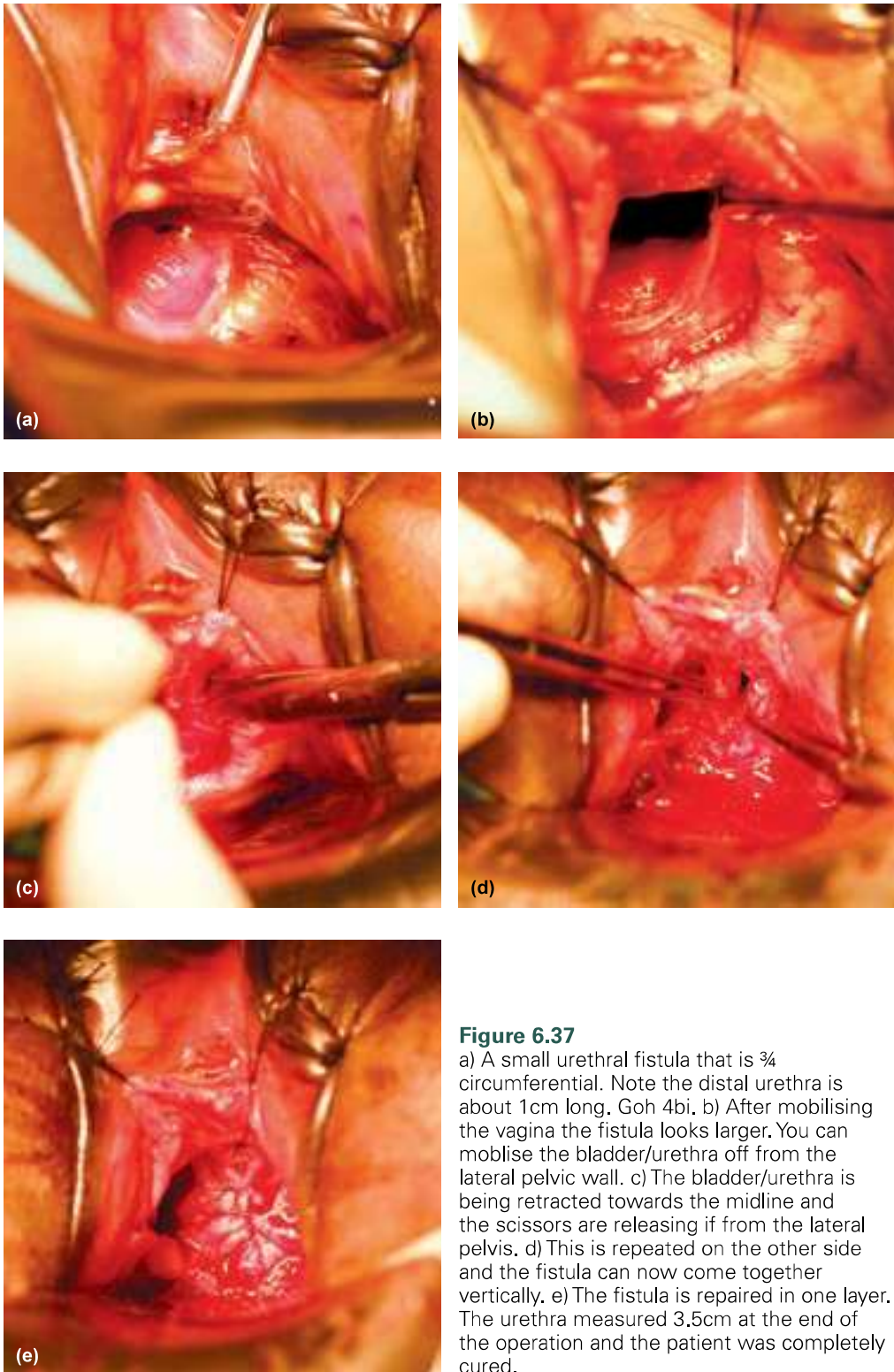
Another strategy for the non-circumferential bladder neck fistula is to consider vertical closure of the defect. (Figure 6.37) This is possible in about 50% of smaller urethral and bladder neck cases. The defect must be soft and mobile, and there must be no tension. Vertical closure will effectively maintain or even increase urethral length, and improves the prospect of continence.

A slightly larger juxta-urethral fistula that is just circumferential is shown in Figure 6.38.

## Operative Steps for Circumferential Fistulae

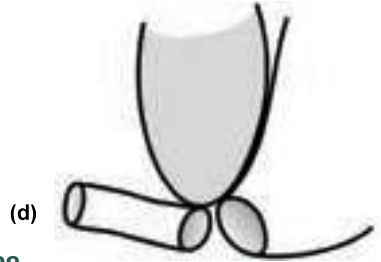
Where there is a clear separation of urethra and bladder, there are two options for repair:

- Incomplete mobilisation and suture of the bladder to the pubic rami and urethra, leaving a gap on the anterior aspect.
- Complete mobilisation of the bladder front, back and sides, followed by circumferential anastomosis to the urethra using a variety of methods. This is to accommodate any discrepancy of size of the two ends, namely a larger diameter on the proximal or bladder end and a small diameter on the distal or urethral end.



**Figure 6.37**

a) A small urethral fistula that is  $\frac{3}{4}$  circumferential. Note the distal urethra is about 1cm long. Goh 4bi. b) After mobilising the vagina the fistula looks larger. You can mobilise the bladder/urethra off from the lateral pelvic wall. c) The bladder/urethra is being retracted towards the midline and the scissors are releasing it from the lateral pelvis. d) This is repeated on the other side and the fistula can now come together vertically. e) The fistula is repaired in one layer. The urethra measured 3.5cm at the end of the operation and the patient was completely cured.



**Figure 6.38**

a) A larger juxta-urethral fistula that is circumferential. b) As is common here, the proximal side of the fistula is stuck high on the posterior symphysis pubic making retraction and access difficult. You can see how tight the proximal attachment is on the public bone when the metal catheter is inserted and trying to retract the fistula. c) Both distal and proximal ends have been mobilised. You can see the tip of the metal catheter just poking through the urethra. The proximal bladder is now fully mobilised off the bone. d) You now need to anastomose the bladder back to the urethra. e) The first sutures go anteriorly through the distal urethra and periosteum then to the proximal anterior bladder at 12 o'clock. It's hard to see here. f) The next two sutures go to 3 and 9 o'clock around the urethra. The urethra is nearly closed (see diagrams k) and m) from Figure 6.40 p93–94 to help). g) The final sutures go around the posterior urethra in evenly spaced placement.



## Incomplete Mobilisation and Repair of a Circumferential Fistula

Incomplete mobilisation has, historically, been the method used to repair circumferential fistulae, and is still practised by a few surgeons. The bladder is mobilised from the vagina and cervix only over its posterior and lateral aspects and not anteriorly. Sufficient mobility needs to be obtained to bring the posterior bladder directly to the postero-lateral boundaries of the defect. This is, in effect, the undersurface of the pubic rami lateral to the urethra. Before this is done, a distal flap of vaginal epithelium will have been reflected off the urethra. Strong, small half-circle needles are needed to fix the bladder to the periosteum laterally on both sides. The urethra is incorporated into this repair in the midline as the last step.

### Advantages of incomplete mobilisation

- The operation may be easier to perform than a complete detachment and anastomosis. This will appeal to the novice surgeon or one working in difficult circumstances.
- A reasonably high rate of closure can be obtained.

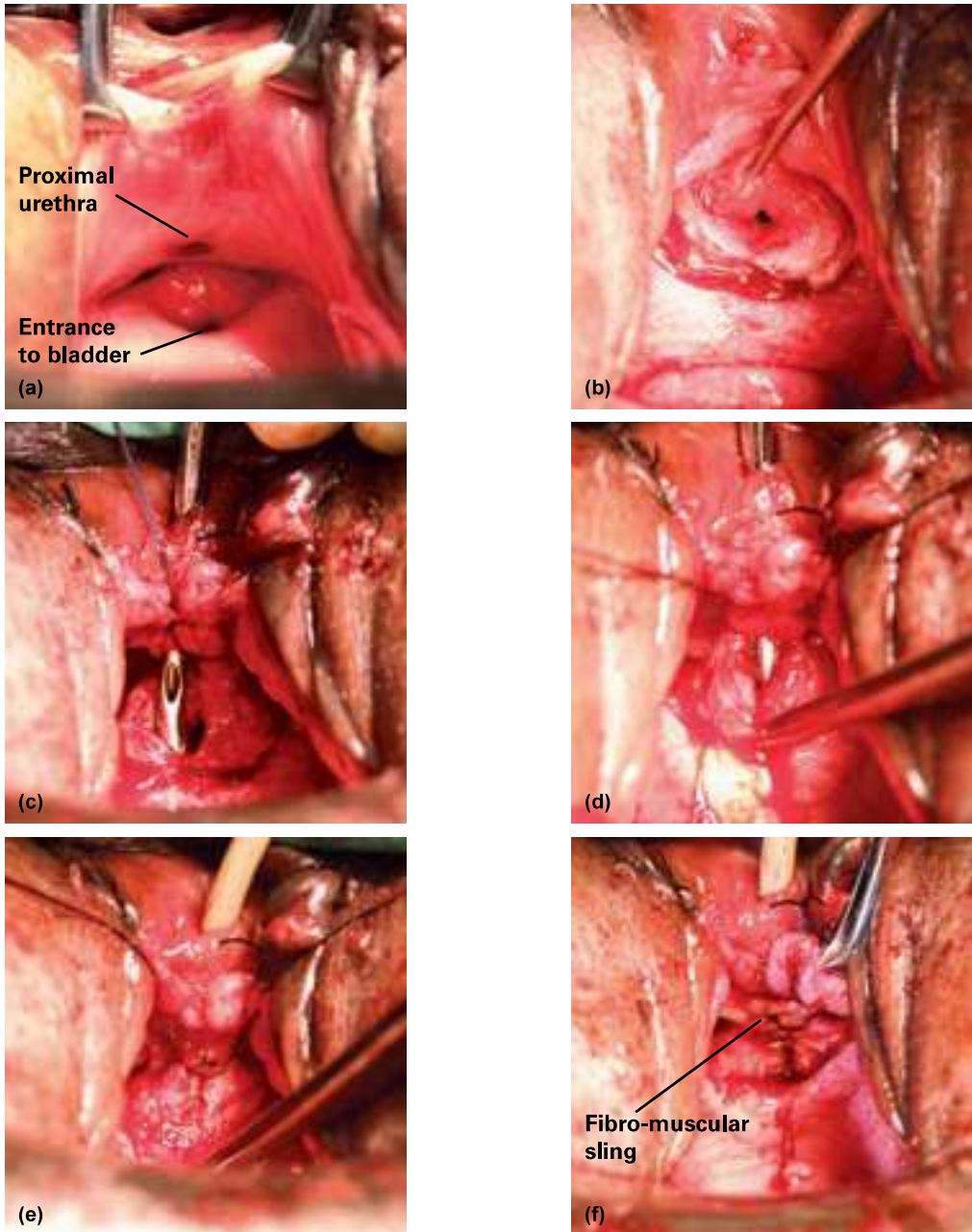
### Disadvantages of incomplete mobilisation

- Post-repair incontinence may be unacceptably high, up to 100% in some unpublished series. The patient may be improved, for example she might be dry at night but wet on walking, or she might not be improved at all despite a closed fistula.
- There is no muscle between the urethra and bladder on the anterior aspect and the urethra remains short (resulting in varying degrees of ongoing urethral incontinence).
- If the fistula breaks down in the corners (the most common place), the margin of the defect will be bone—a very difficult situation to re-repair, sometimes needing the initial repair to be completely taken down and a formal circumferential repair done.
- Secondary operations for the ongoing incontinence are often needed, and may be hazardous. The bladder immediately proximal to the urethra will have its anterior wall as a thin membrane of epithelia directly over the posterior symphysis. There is a risk of producing another fistula with a urethral and bladder base plication or with a rectus fascial sling operation. Opening the para-vesical space is a step used in many operations for stress. I have done many operations for ongoing incontinence for patients like this which failed. When I re-operated, I opened the urethra and found the gap in the anterior urethra. Hence I took the first repair down, redid the fistula repair in the more formal circumferential manner, and which the patient was dry.

## Complete Mobilisation of the Circumferential Fistula

Complete mobilisation and circumferential anastomosis of a circumferential fistula is recommended by most fistula experts.

A small circumferential urethral fistula repair is illustrated in Figure 6.39. Note this fistula is in the urethra (Goh 3aiii) and far from the ureters. There was no need to identify and catheterise them here. Both the proximal and distal defects that need to be joined are of similar size so you



**Figure 6.39**

a) A small circumferential fistula in the urethra, Goh 3aiii with a 1.5cm gap along the pubic bone between the distal and proximal urethra. b) The proximal urethra has been mobilised circumferentially and advanced down with sufficient mobility to anastomose it to the distal urethra. c) The first stitch is placed at 12 o'clock, joining the two ends against the pubic bone. d) The side stitches are placed at 3 and 9 o'clock as you work your way around the anastomosis (see Figure 6.40 for helpful diagrams). e) Anastomosis complete. f) a fibro-muscular sling has been developed to support the urethra. This helps reduce the rate of ongoing incontinence that is common in all urethral injuries. (See section on 'Operative Steps to Reduce the Incidence of Stress Incontinence'.)

can do a direct anastomosis. Many circumferential injuries are much larger and there is a small defect in the urethral or distal side and a large hole or defect in the bladder (proximal side). A direct anastomosis in these cases won't work. We will describe and illustrate the steps for this repair. (Figure 6.40)

For the larger circumferential defects you will need to catheterise the ureters first. The proximal vagina is reflected off the bladder.

The initial incisions are around the fistula, distal and proximal edges and then extending the incisions onto the lateral vaginal walls, more or less parallel to the floor.

The vagina is now reflected off the proximal side but the lateral and anterior bladder is still attached to the bones. The anterior aspect of the urethra will be adherent under the symphysis. Scar in this region is excised, but no attempt is made to mobilise the urethra.

So far the mobilisation has been the same as the steps above, but the difference now is that you need to mobilise the bladder laterally and anteriorly to free the bladder from all bony attachments and advance the bladder forward to anastomose it to the urethra.

I find it easier to start the mobilisation from the patient's left (if you are right handed), using the curve of the scissor to dissect under the symphysis pubis. Once you are through the scar attachment of the bladder to the bone you will enter the Cave of Retzius anteriorly, a loose connective tissue layer where you can get a lot of good mobility.

Keep in the same plane as you come anteriorly and then to the patient's right. Now the bladder should be completely free and mobile off posteriorly, laterally and anteriorly.

After mobilising the vagina off the urethra you will need to anastomose the bladder back onto the urethra.

The mismatch between the diameter of the bladder opening and that of the urethra makes a straight end-to-end anastomosis impossible. The underlying principle in closure is to use the anterior and lateral bladder to wrap around the urethra and then to close the excess posterior bladder vertically. This has the effect of making the bladder lumen into a tube as you join it to the urethra. Often in these cases the remaining urethra is short, say less than 2cm. In such cases, unless you attempt to make the urethra longer, the patient will never have a chance of continence, because the short urethra will leak.

To perform this anastomosis, first take a bite at 12 o'clock to the proximal urethra, the same as above, picking up some periosteum. Suture this bite to the anterior bladder in the midline and tie it.

The next suture is taken at 3 o'clock through the urethra/periosteum and to the corresponding bladder, just a few millimetres lateral to the first suture.

Now take a 9 o'clock suture, again through the urethra/periosteum and to the bladder a

few millimetres away from the 12 o'clock suture. The anterior anastomosis is now complete. Pass a Foley or metal catheter to ensure you have patency of the urethra.

There should now be a large mismatch between the size of the posterior urethra and remaining defect in the bladder. Take a small 3–0 Vicryl suture through the proximal urethra at 6 o'clock and to the bladder both left and right side, again close to the previous sutures. This will be a three way suture and it will in effect be bringing what was anterior bladder around posteriorly, tubularising it thus making the urethra longer. This is a weak point and we usually place another suture over the top in a second layer. Fill in the anastomosis with two further sutures at 5 and 7 o'clock as there are sometimes small defects remaining.

You will now have a defect in the bladder in the midline. In the smaller defects a vertical closure of the remaining bladder is possible, which can be done in a few routine sutures. In larger defects the vertical closure will not be possible, because the postero-lateral margin containing the ureteric orifices cannot be mobilised enough to meet in the midline. The finished repair will then resemble an inverted 'V' or inverted 'Y'. (Figure 6.36) Repair proximal to the urethral anastomosis with a few vertical sutures, then advance the bladder flap in the midline to complete the closure with two 'arms' either side. This also has the advantage of keeping the ureteric orifices in a more physiological position in relation to the new urethro-vesical junction.

Always remember one of the first principles to protect the ureter—make sure they are identified, catheterised and safe).

### **Advantages of complete mobilisation**

- The urethro-vesical junction is now completely surrounded by muscle, and in many cases the bladder defect will have been converted to a tube, thus effectively lengthening the urethra. The incidence of post-operative stress incontinence may be reduced by over 50%.
- A secondary stress operation can be more safely performed if required.

### **Disadvantages of complete mobilisation**

- The anastomosis is technically more demanding, and if not well done may be more prone to break down, especially at the three way stitch. Kees Waaldijk has termed this 'the crying corner'.
- 8% of patients will develop a urethral stricture at the site of the anastomosis which can be very difficult to treat.

## **Incomplete Versus Complete Mobilisation**

Unfortunately, there are no hard data to allow a comparison of closure and incontinence rates between the two methods, but the consensus of opinion among the most experienced fistula surgeons is that a complete detachment and anastomosis does give better results. It makes sense to restore muscular continuity between bladder and urethra front and back. There are unpublished data and opinion to the effect that the rate of ongoing urethral incontinence after complete mobilisation is less than half the rate following incomplete mobilisation.

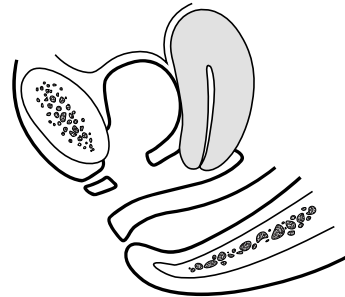
It must be appreciated that, although the anastomosis can easily be performed in some cases as shown in our illustrations, in many others (which are almost impossible to photograph) the operation is quite demanding and requires a high degree of skill and judgment. It is probably only full-time fistula surgeons who have the experience to achieve good results with this group. The problem of ongoing incontinence has improved after applying a sling to support the urethra and flaps to reconstruct the vagina, but results are still not perfect.

For those with less experience, we believe that there is still a place for incomplete detachment, provided that the gap is not too large and there is no expert available to take on the case.



**Figure 6.40**

a) A large circumferential defect with 2cm of urethra remaining. Goh 3ciii.



(b)

b) Diagrammatically you can see the large gap on the anterior bladder against the bone, about 4cm in this case.



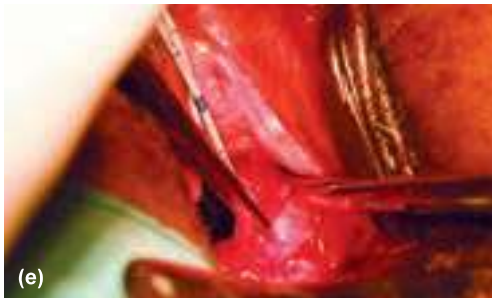
(c)

c) You must protect the ureters in these cases. It would be very easy to cut and/or tie it if you didn't.



(d)

d) The proximal dissection is being done here, the assistant is using Allis forceps to create traction upwards on the bladder bringing the plane into view.



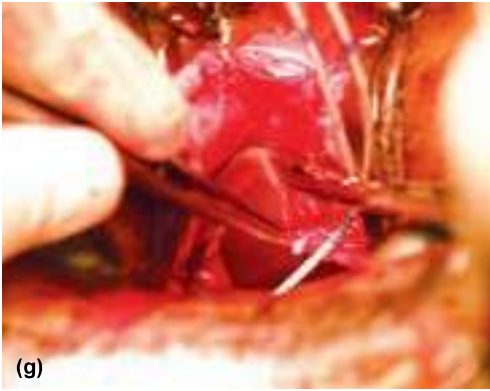
(e)

e) Mobilise the bladder off the lateral pelvic either side.



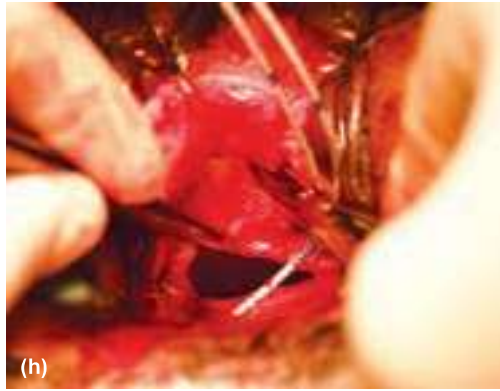
(f)

f) The distal vaginal mobilisation. I start laterally and work my way around using the curve of the scissors.

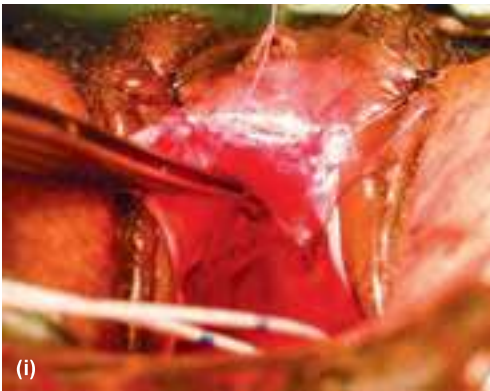


**Figure 6.40** (continued)

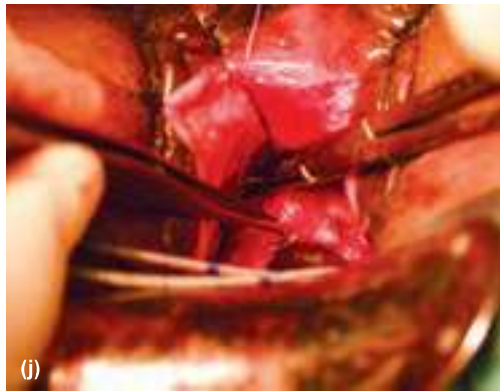
g) I'm now releasing the bladder off the pubic bone anteriorly, entering the Cave of Retzius.



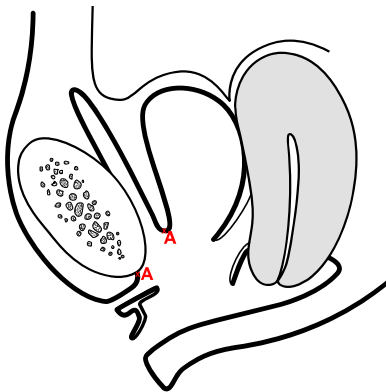
h) Further into the Cave of Retzius. The anterior bladder is coming well forward.



i) The first stitch is placed at 12 o'clock around the anastomosis. The stitch just picks up the periosteum of the posterior symphysis.



j) Through 12 o'clock on the anterior bladder in the midline (the proximal defect).

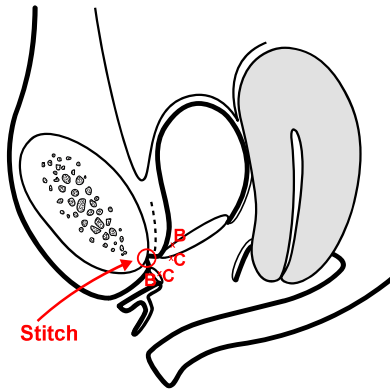


k) Joining 'A' as marked in the diagram. The 12 o'clock stitch securely in place.



l) You now place the sutures at 3 and 9 o'clock making sure not to occlude the urethral lumen, using the metal catheter as a guide.

*Continued*



(m)

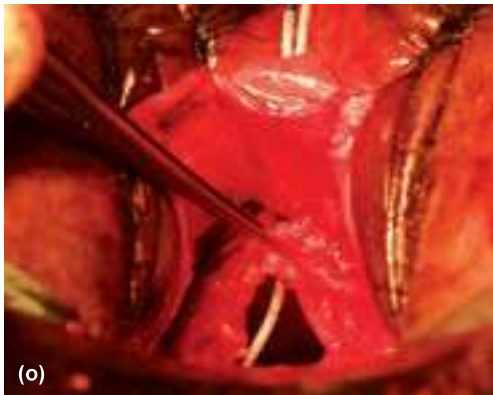
**Figure 6.40 (continued)**

m) This is joining B to B and C to C on the diagram.



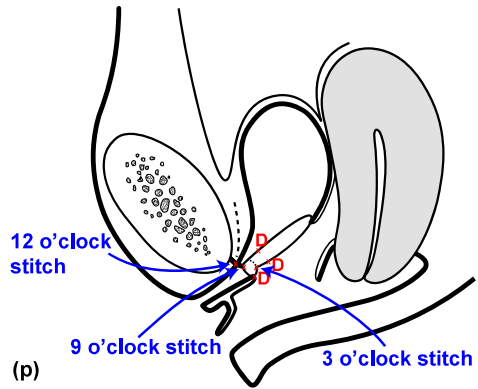
(n)

n) Now is the time to thread the ureteric catheters through the urethra and secure them to the mons pubis.



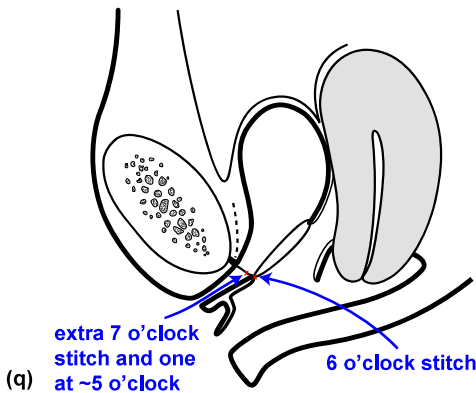
(o)

o) You now need to elongate the urethra by pulling what was the anterior bladder around to the posterior urethra and doing a three way stitch.



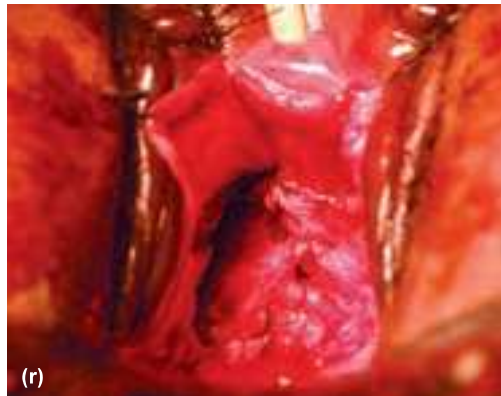
(p)

p) and q) The three way stitch but connecting the 'D's.



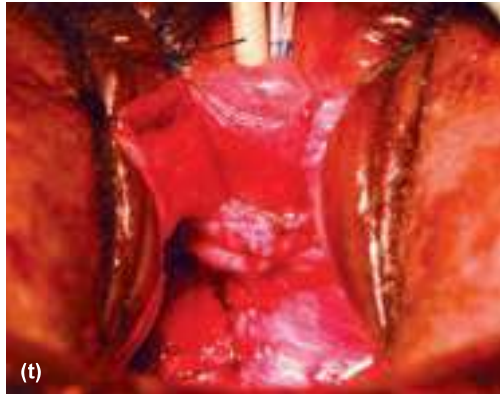
(q)

p) and q) The three way stitch but connecting the 'D's.



(r)

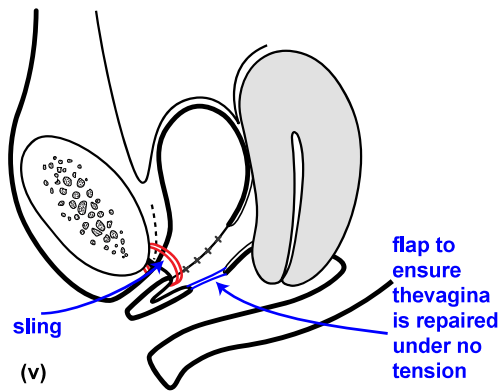
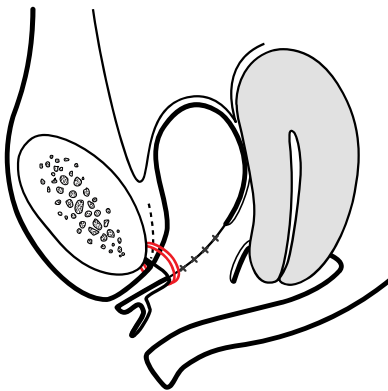
r) Then repair vertically to elongate the urethra. You also need to place small sutures at 5 and 7 o'clock around the anastomosis.



**Figure 6.40** (continued)

s) The rest of the bladder is repaired, however it comes together under the least tension. In this case it was vertical, in other cases it can be horizontal or even in an inverted 'V' or inverted 'Y' shape.

t) and u) Make a sling to support the urethra (see section on 'Operative Steps to Reduce the Incidence of Stress Incontinence').



u) and u) Make a sling to support the urethra (see section on 'Operative Steps to Reduce the Incidence of Stress Incontinence').

v) There's usually a deficit in the vaginal skin in these larger cases needing some sort of flap (see section on 'Attending to Vaginal Skin Defects').

### Ureteric Involvement

The larger the fistula and the closer it is to the cervix, the greater is the chance of ureteric involvement. (Figure 6.41) During every fistula repair, one must keep in mind the position of the ureteric orifices. For small fistulae at the bladder neck or urethra, the orifices should not be close, but it must be borne in mind that what was once a large defect involving most of the anterior vaginal wall and bladder base will have contracted in the first 3 months. Thus, the anterior vaginal wall will be short and the ureteric orifices may be close to the fistula edge, as the defect starts at the urethro-vesical junction and thus involves the trigone. Likewise, a small defect in the region of the cervix may have been much larger at first, subsequent contraction having brought the ureters close to the edge of the defect.

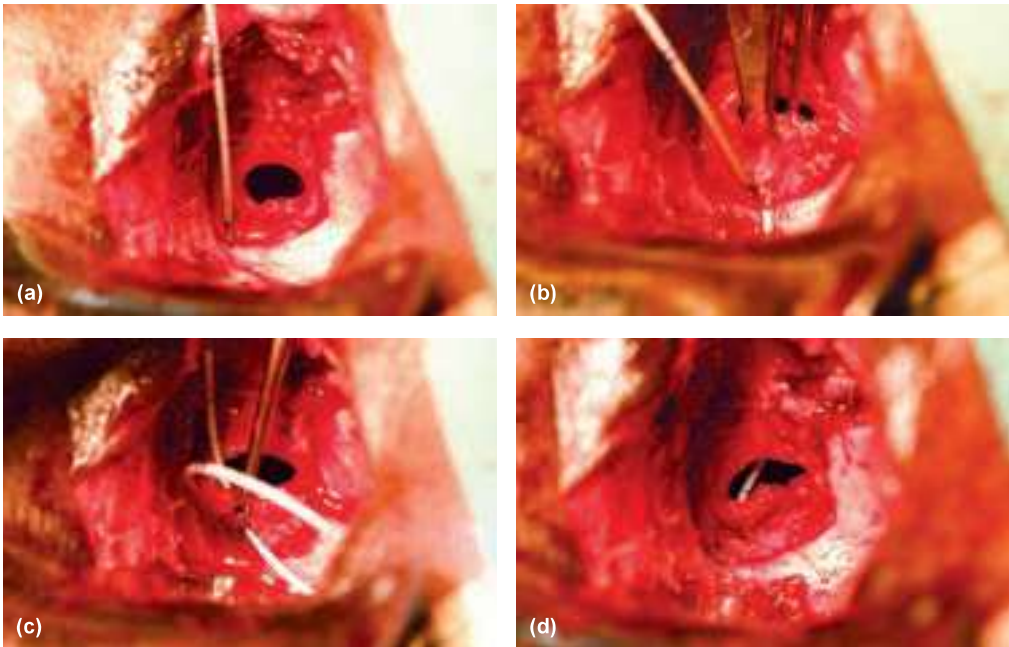


**Figure 6.41**

A fistula with its proximal margin right on the cervix. The anterior cervix is missing in this case so you can just see the posterior cervix and the cervical os is between the bladder and cervix. Note how close the ureter is to the edge of the fistula.

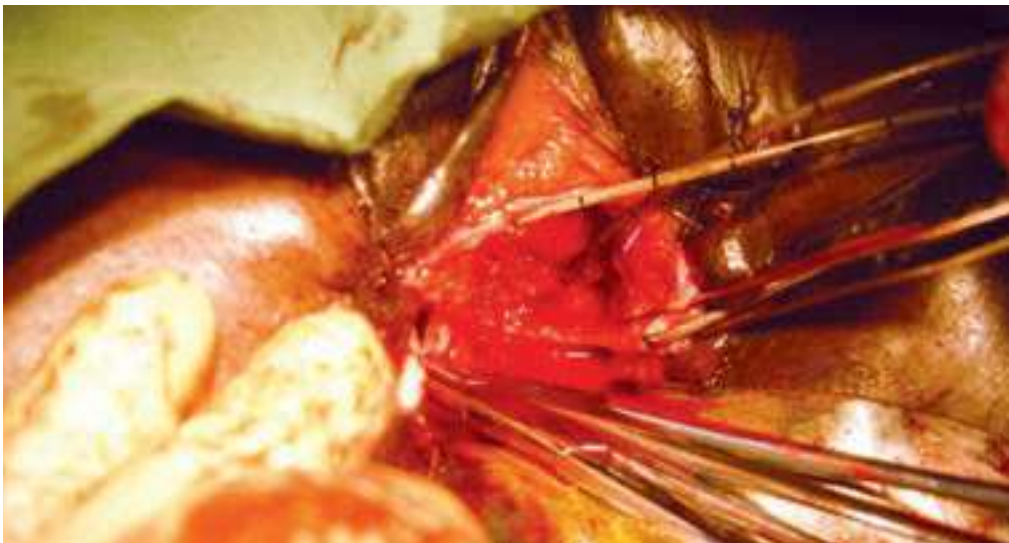
There may be complex ureteric involvement in large circumferential fistulae. The distal end of the ureter may be involved in the ischaemic process and the uretero-vesical junction may have sloughed away as a result, leaving the ureter draining directly into the vagina rather than into the bladder. In this case, there are four options for repair:

- If the ureter is just on or outside the edge of the bladder mucosa then, after catheterisation of the ureter and sufficient mobilisation of the tissues, it is possible merely to fold the ureter (containing a ureteric catheter) into the bladder as part of the repair. The ureteric catheter needs to remain in place to splint open the healing tissues for about 7 days.
- If the ureter is further outside the bladder, then the bladder can be cut down to the ureter and the edges of the bladder wrapped around the ureter to invert it into the bladder.
- Occasionally the ureter is too far from the edge to be merely 'folded' in. In this case, it can be catheterised and then mobilised a little off the pelvic side wall. It can then be brought into the bladder at a higher level than the repair through a separate stab incision with curved artery forceps. (Fig 6.42) The ureteric catheter and distal ureter can then be introduced into the bladder and repaired. The ureter is secured in place by 3/0 sutures through its muscularis and the bladder wall. The ureteric catheter should stay in for 10 to 12 days.
- Exceptionally, the ureter is too far from the bladder to be re-implanted. The options are to implant the ureter into the bladder by an abdominal approach at the same operation, or to catheterise it for 2 weeks and defer the re-implantation. Although it's not unreasonable to implant the ureter abdominally at the same sitting, I prefer to reimplant after a few weeks, because you do mobilise and pull on the bladder from above during the operation, which may interfere with your fistula repair. (Figure 6.43)



**Figure 6.42**

a) The ureter was found about 2cm from the edge of the fistula draining straight into the vagina. The vagina has now been mobilised off from the bladder and the right ureter catheterised. b) A curved artery is passed through the bladder wall. c) The ureteric catheter is introduced into the bladder which in turn will pull the ureter into the bladder. d) The bladder is closed over the ureteric implant site. The fistula and vagina are repaired routinely.



**Figure 6.43**

Look carefully and see the left ureteric catheter in the shadows entering the ureter on the left pelvic side wall. It's stuck in scar and too far from the bladder to be implanted safely from below. We left the ureter draining into the vagina with the catheter in place, repaired the fistula and reimplanted the ureter abdominally at a later date.

If the last three steps are required, there is usually such severe damage that the outcomes are poor. In 1993 when John Kelly studied factors leading to a failure of fistula repair, one factor he found was involvement of the ureters.

Other strategies for dealing with the ureters will be described in the section on juxta- and intra-cervical fistulae below.

As stress incontinence is such a problem after repair of juxta-urethral and circumferential fistulae, some measures that can be taken to reduce its incidence are described later in this chapter (Operative Steps to Reduce the Incidence of Stress Incontinence).

## JUXTA- AND INTRA-CERVICAL FISTULAE

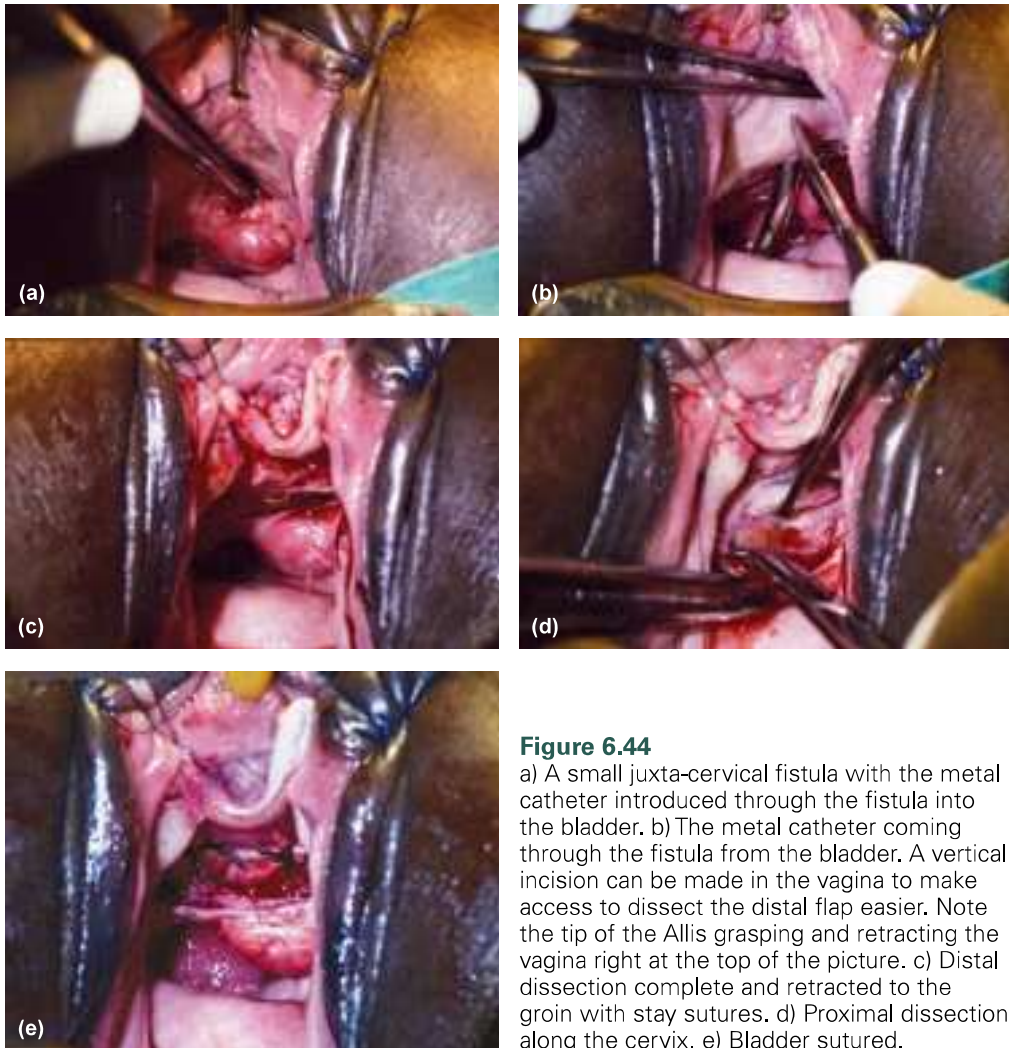
A fistula in the region of the cervix is often called a juxta-cervical fistula. Fistulae in this region can be divided into three main types:

1. The fistula is just distal to the cervix, and both distal and proximal margins are visible. (Figure 1.7)
2. The distal margin can be visualised, but the proximal margin is out of sight in the cervical canal (the anterior lip of which is often split open). (Figure 1.8)
3. The fistula cannot be seen at all, i.e. it is entirely intra-cervical. (Figure 1.9 and Figure 1.3d)

Beginners should attempt only small juxta-cervical fistulae that can be exposed easily. The proximal margin between the fistula and the cervix must be seen clearly. Those that extend into the cervical canal can be challenging to close.

The general principle in repairing fistulae close to the cervix is to begin the dissection on the distal margin. (Figure 6.44a–e) This is exposed by upward traction with two Allis forceps applied close to the distal fistula margin. The bladder wall can be supported by a metal catheter through the urethra and fistula and thus be used as a retractor. A small vertical incision is made through the vagina down to the fistula margin and then taken round the distal margins to the sides, where a small lateral extension may be made. The antero-lateral flaps are developed, keeping just under the vaginal mucosa. It is easy to stray into the bladder wall. These flaps are then sutured up to the labia. This should retract the distal margin of the fistula bringing the proximal margin more into view.

The postero-lateral dissection towards the cervix must be carried out with extreme caution, staying just under the vagina. The ureter is very much at risk where it runs in the wall of the bladder. It should, if possible, already have been catheterised. Sometimes the proximal bladder/fistula can be viewed more easily by inserting a Sims speculum into the bladder and pulling it anteriorly Figure 6.45. Often the ureters come into view with this method as well. At other times the ureters are on the distal margin of the fistula under where the blade of the speculum is lying.



**Figure 6.44**

a) A small juxta-cervical fistula with the metal catheter introduced through the fistula into the bladder. b) The metal catheter coming through the fistula from the bladder. A vertical incision can be made in the vagina to make access to dissect the distal flap easier. Note the tip of the Allis grasping and retracting the vagina right at the top of the picture. c) Distal dissection complete and retracted to the groin with stay sutures. d) Proximal dissection along the cervix. e) Bladder sutured.

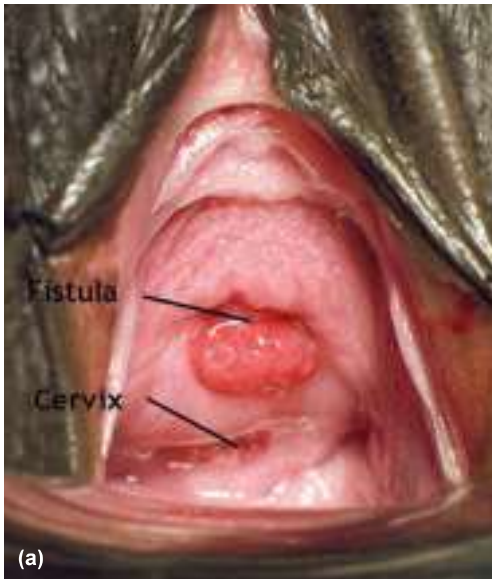
It is always best to err on the side of caution and you should always give 10mg intravenous frusemide to all fistula occurring in this area after a caesarean. Ureteric fistulae are quite common in such cases and it is easy to miss if you don't go looking for them. If you miss one, the patient will be wet in her bed despite you having closed the fistula and got a negative dye test. This is the same for all vault fistulae after a hysterectomy—always check for a concurrent ureteric fistula.

## An Easy Case

A type 1 case is shown in Figure 6.46. As a general rule if the fistula is very small (<0.5cm) and in the midline then the ureters should not be at risk. However, if one can see into the bladder then they should always be identified. Babcock forceps should be used to evert the bladder—toothed forceps cause bleeding. Intravenous furosemide 10mg should be administered if there is still difficulty.



**Figure 6.45**  
An intra-cervical fistula. The Sims speculum is in the bladder retracting the anterior wall to be able to see the posterior wall.



**Figure 6.46**  
a). A small midline juxta-cervical fistula. There is a small gap between it and the cervix.  
b) Be wary of the ureter. Note here how close this one is to the edge of the fistula.

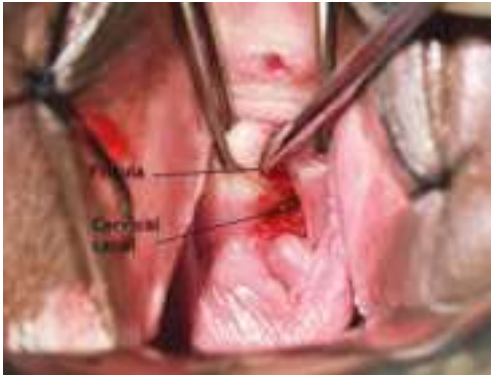
## Intermediate Examples

Figures 6.47 and 6.48 show two examples of cases that are intermediate in difficulty.

## Combined Juxta-/Intra-Cervical Fistulae

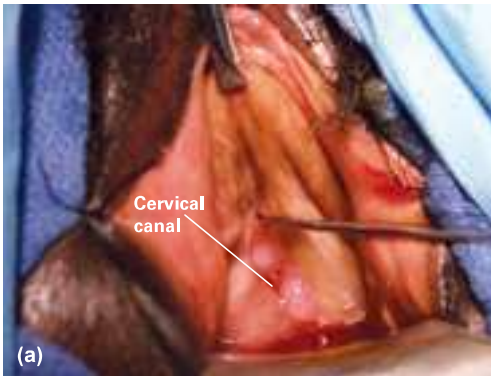
An example of a combined juxta-/intra-cervical fistula is shown in Figure 6.49. If the ureters are not easily found in this sort of case, a Langenbeck or Sims speculum should be used to expose the interior of the bladder.

Figure 6.49e shows a juxta-cervical fistula that extends high up into an open cervical canal. If the cervix does not come down well, cases like this can be very challenging to close and impossible to photograph. They should be left for experienced surgeons.



**Figure 6.47**

The metal catheter is in the fistula. The anterior cervix is split which will also need repairing.



**Figure 6.48**

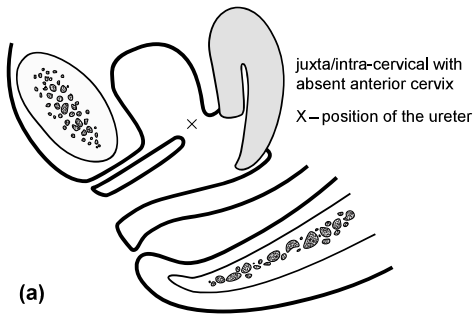
a) A tiny juxta-cervical fistula. Notice that the anterior cervix is split. b) It's reflected off from the cervix and note again that the anterior cervix is split and will need repairing. The fistula is so small that it would be impossible to identify the ureters formally. Check that the ureters are not on or outside the edge of the fistula before repairing it. The repair only needs two or three sutures.

The incidence of this combined juxta-/intra-cervical fistula varies from place to place. In one hospital in Uganda, 75% of fistula patients have been delivered by caesarean section, so this injury is seen quite often. In Ethiopia, where only 15% have had a caesarean section, it is uncommon.

Usually the anterior cervix is damaged in these cases and at times completely splayed open. After repair of the fistula you should try to approximate the edges of the torn cervix and then repair the vagina to it.

## Intra-Cervical Fistulae

A case of intra-cervical fistulae is shown in Figures 6.50. In such cases a fistula will not be seen in the vagina, and a dye test shows a leak coming through the cervix. These fistulae always result from a caesarean section; most are iatrogenic due to accidental incorporation of some bladder when closing the lower segment. Unfortunately many doctors neglect to reflect the bladder inferiorly when doing a caesarean so incorporation of the bladder into the lower segment repair can happen very easily.



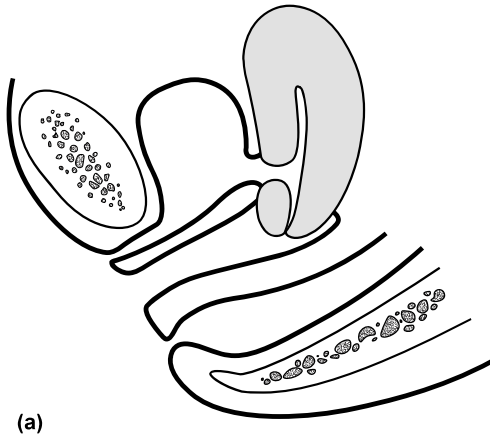
**Figure 6.49**

a) Diagrammatically you can see that the anterior cervix is missing and the bladder split up along the uterus. This is very hard to photograph. b) Identify the ureters. You may need to retract the bladder with a Langenbeck or Sims speculum to be able to visualise it c) although sometimes it is under the distal margin of the fistula. d) A different fistula, but you can see the split cervix clearly here and the proximity of the ureters to the edge. e) It can be very hard to visualise the tear in the bladder going up the cervix. Having a Sims in the bladder can help you see it and you will need to dissect along each side of the bladder/cervix junction, from the right and left side of the torn cervix to meet it at the apex. It's easiest to repair the bladder longitudinally and don't forget to repair the split in the uterus and the cervix.

Provided that the cervix comes down well, they are not difficult to repair from below (as in the case shown in Figure 6.50). Begin the operation by making a horizontal incision over the top of the cervix, reflect the distal vagina as above and then reflect the bladder off the cervix as you would for a vaginal hysterectomy. You will come across the fistula within 1–2cm of the external os and almost always in the midline.

Make sure after repairing the fistula in the bladder, to repair the fistula in the cervix.

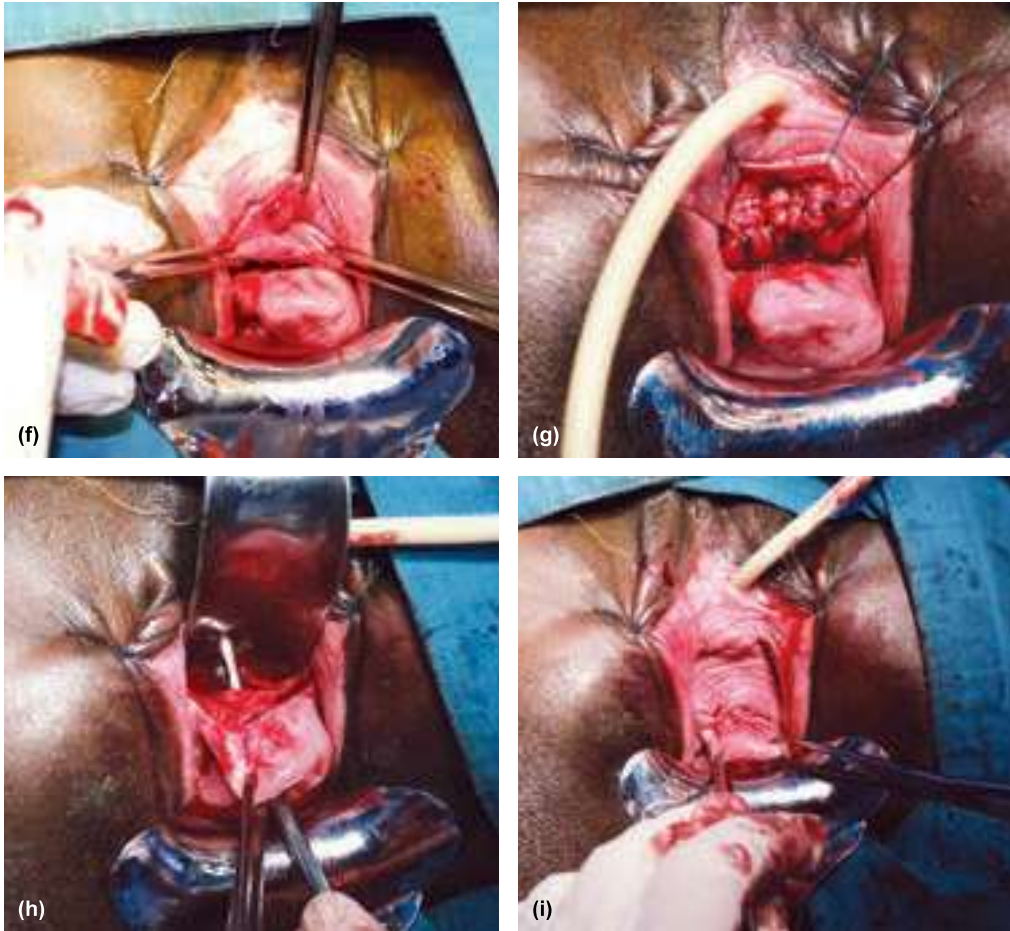
I repair all intra-cervical fistulae from below, but my colleague Brian Hancock elects to repair about one-third via an abdominal trans-vesical approach. Those with less experience of vaginal surgery may find it easier to repair all true intra-cervical fistulae from above, although we advise them to learn the vaginal approach as soon as possible. The abdominal approach is described in the next section.



**Figure 6.50**

a) An intra-cervical fistula. b) The metal catheter is coming through the bladder, and the fistula and out through the cervix. The cervix has a lot of descent so it will be easy to approach it vaginally. c) Start by making an incision over the anterior cervix and dissect as you would for a vaginal hysterectomy. d) Keep going until you reach the fistula which is almost always in the midline. You can see the metal catheter in the fistula start to be exposed here. e) Follow the left and right side of the fistula, releasing it from the cervix.

*Continued*



**Figure 6.50** (continued)

f) Release the apex and the bladder will be free. It usually springs apart and becomes large.  
 g) Bladder repaired. h) Don't forget the hole in the cervix or uterus. This should be repaired too. i) Vagina repaired.

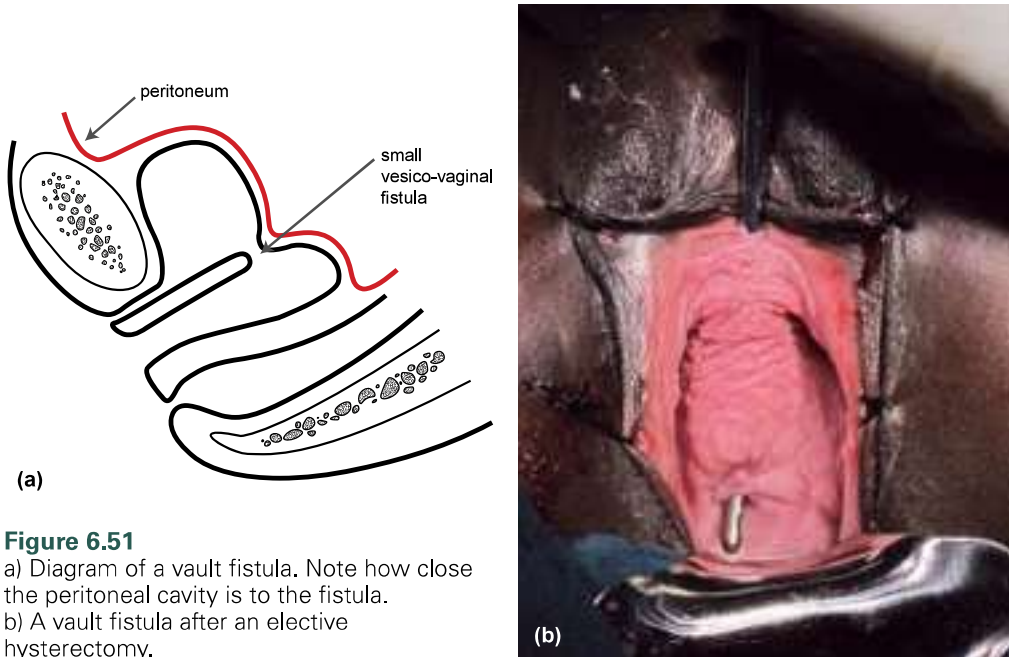
## Vault Fistulae

Vault fistulae occur after a hysterectomy. There may be some remnant cervical tissue incorporated into the vault especially when the operation has been a caesarean hysterectomy. (Figure 6.51)

The principles of all fistula operations still apply. I always give Lasix to exclude a ureteric fistula. The ureter easily could have been incorporated into the vault at the time of operation and it should never be neglected. The ureter can also be found on the edge of a fistula and you should make sure there are no spurts of urine from the edge before you start to repair the bladder.

It is very easy to enter the peritoneal cavity on mobilising, which, is not a major problem. However if it occurs all the blood and urine present during the operation will drain into the abdominal cavity with the patient in steep Trendelenburg, which can lead to an ileus in the post-operative period. To prevent this from happening I close the peritoneum if I have opened it.

Some surgeons also prefer to repair these abdominally although they can readily be repaired vaginally with practice



**Figure 6.51**

a) Diagram of a vault fistula. Note how close the peritoneal cavity is to the fistula.

b) A vault fistula after an elective hysterectomy.

## THE ABDOMINAL APPROACH

### When is an Abdominal Repair Appropriate?

Several full-time fistula surgeons claim that they can repair all fistulae by the vaginal route, however high the fistulae might be. With increasing experience, most find that they can close the majority of high juxta-cervical, intra-cervical or vault fistulae from below.

You may find some cases extremely difficult to close from below and several surgeons strongly believe that some cases are much more easily closed electively by the abdominal route. These are always patients who have sustained their fistula after a caesarean delivery.

An abdominal trans-vesical approach is not an easy opt-out for a fistula that an inexperienced surgeon might find difficult from below. No fistula that is below or likely to be close to the ureteric orifices should be attempted from above, except by a very experienced surgeon. This approach needs good abdominal relaxation, proper retractors, good light, an ability to catheterise the ureters from inside the bladder and, above all, good suction—ideal circumstances that may not be met in many resource-poor hospitals.

The final decision on approach is usually made on the operating table, with or without an anaesthetic. The factors to consider are the visibility of the fistula and the mobility of the uterus and cervix as assessed on bi-manual examination.

## Post-Caesarean Iatrogenic Intra-Cervical Fistulae

A post-caesarean iatrogenic intra-cervical fistula can be suspected when the patient gives the story that she was delivered of a live baby, and yet is shown to have a leak through the cervix. The fistula is almost always caused by accidental suture of the bladder into the lower uterine segment.

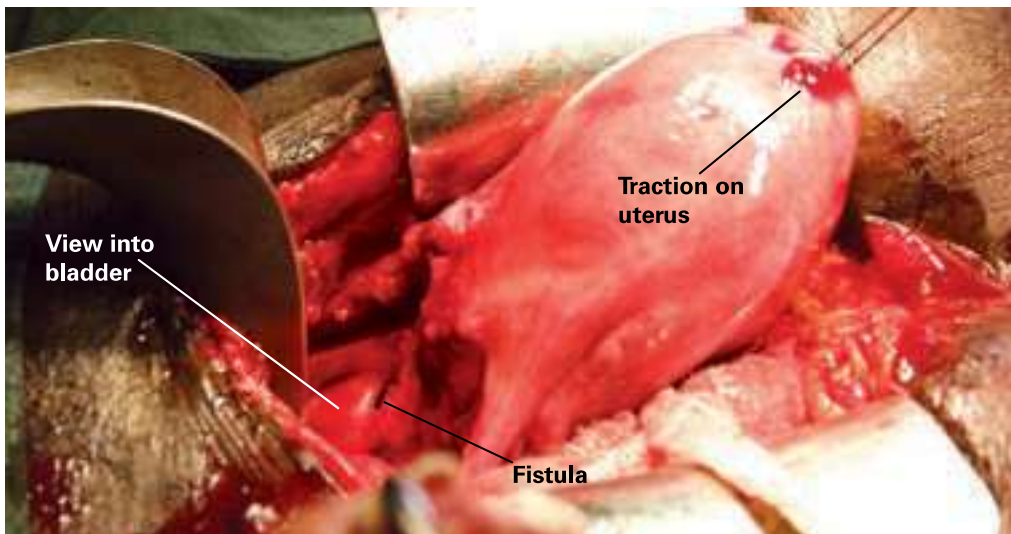
Brian Hancock chooses an abdominal approach in the following cases:

- (a) those that are intra-cervical with a cervix that cannot be pulled down easily (this is more likely in primipara than multipara)
- (b) post-hysterectomy vault fistulae that will not come down easily.

Before selecting an abdominal repair for any patient, it is essential to be absolutely certain by dye test and vaginal inspection under anaesthesia that the leak is coming through the cervix and not through a hole in the vagina. It is quite possible for a small vaginal fistula to coexist with an intra-cervical or post-ruptured uterus vault fistula.

## A Trans-Vesical Repair Illustrated: The O'Connor Technique of Bladder Bisection

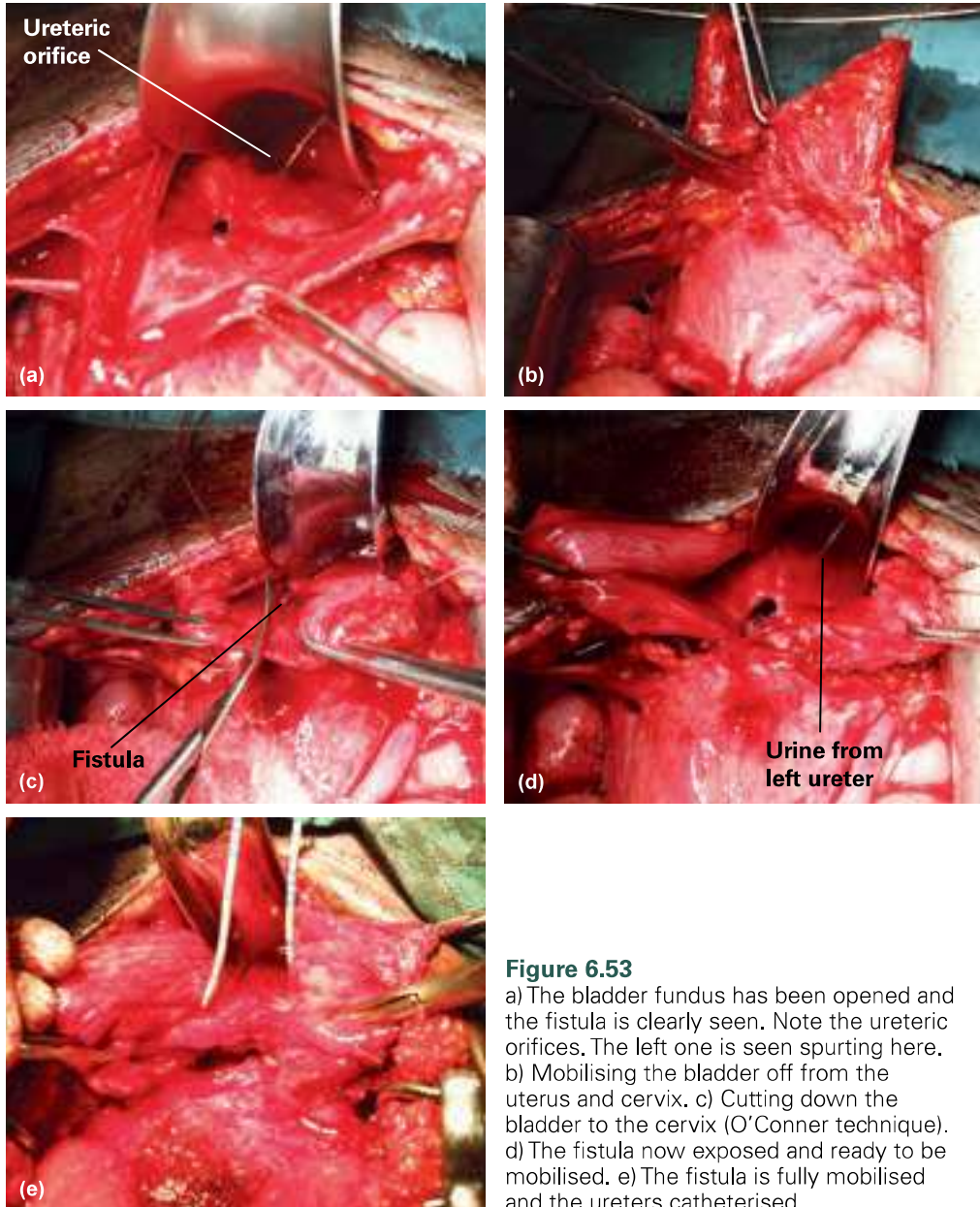
Most urologists would prefer an extra-peritoneal approach to the bladder. While this has the advantage of minimal disturbance to the abdominal contents, most general/fistula surgeons, myself included, prefer a general laparotomy. This allows much better exposure. A helpful trick from Brian Hancock is to put a large suture through the fundus of the uterus to use as a retractor. (Figure 6.52) Strong traction on this towards the head end greatly helps to bring the adherent bladder and cervix into view.



**Figure 6.52**

To aid exposure, a strong suture is placed through the uterine fundus. Using this to retract it towards the patient's head helps to access the bladder and fistula.

The adhesions between the bladder and lower segment are dissected a short distance. If the fistula is not soon found, there should be no hesitation about opening the fundus of the bladder, inspecting the interior and splitting the bladder vertically downwards until the fistula is reached and circumscribed (the O'Connor technique). (Figure 6.53) This, of course, has the added advantage of allowing identification and, if necessary, catheterisation of the ureteric orifices. As mentioned previously, always be alert for a ureteric fistula in such cases. If you can't see a ureter spurting into the bladder, check and see if it is dilated. If it is both dilated and not draining into the bladder, then it must have been ligated. It should be reimplemented.



**Figure 6.53**

a) The bladder fundus has been opened and the fistula is clearly seen. Note the ureteric orifices. The left one is seen spurting here. b) Mobilising the bladder off from the uterus and cervix. c) Cutting down the bladder to the cervix (O'Connor technique). d) The fistula now exposed and ready to be mobilised. e) The fistula is fully mobilised and the ureters catheterised.

## URETHRAL RECONSTRUCTION

About 2% of cases present with complete loss of the urethra. This results from very low obstructed labour in which all the urethra is crushed and sloughs away. It may be a localised injury with a normal-sized bladder, but more commonly occurs with a vesico-vaginal component to the fistula as well which may result in some bladder loss and end up with a small bladder. These defects can be repaired anatomically, but it is difficult to achieve a satisfactory functional result. Currently, two methods are available to help restore these patients:

- creation of a new urethra from existing tissue—vaginal tissue or any remaining urethra tissue
- construction of a new urethra from the anterior wall of the bladder.

### Creation of a New Urethra from Existing Tissue

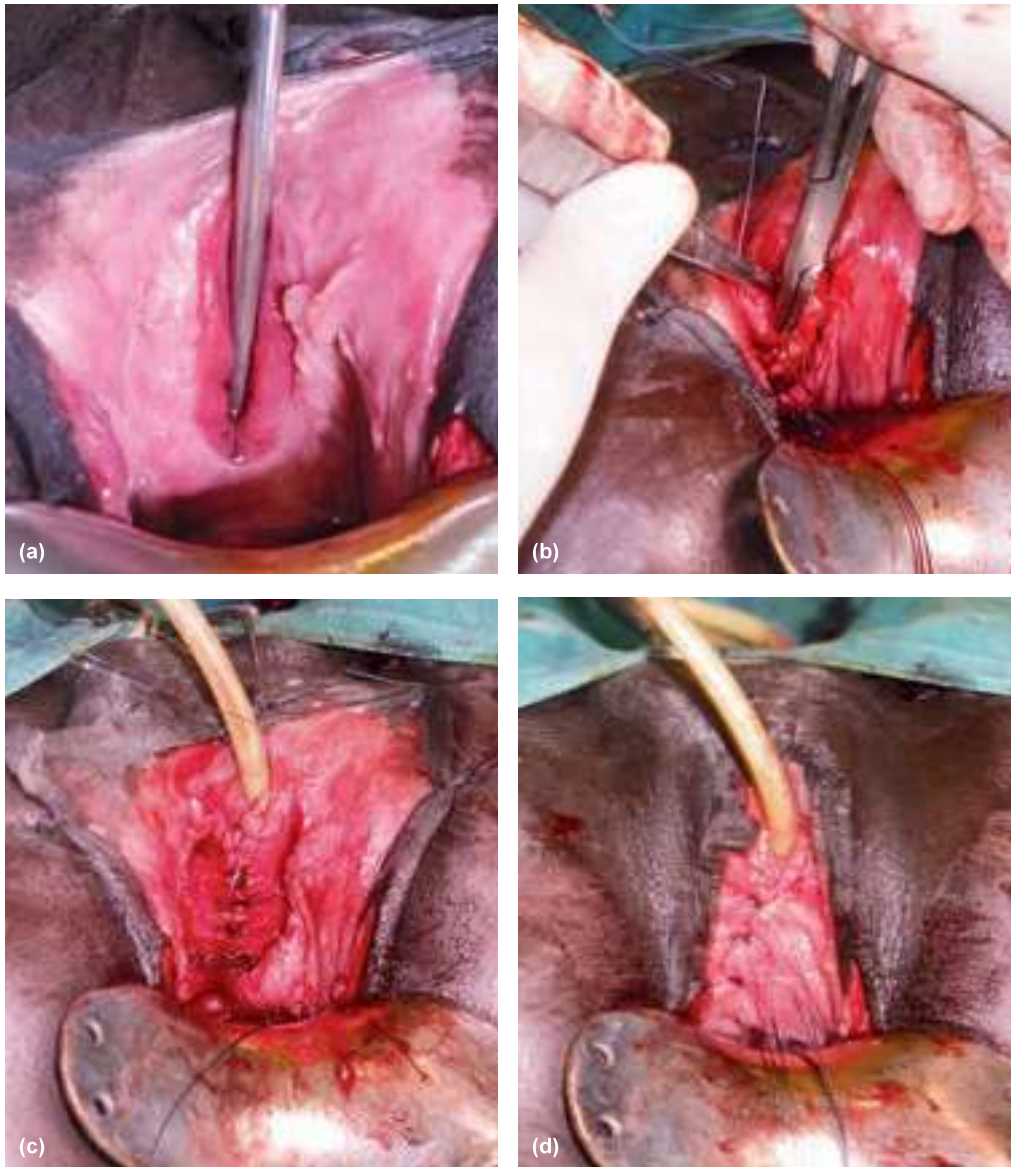
A new urethra is made from remaining urethral and vaginal tissue. If all urethral tissue has gone and there is little normal vaginal tissue, the prospect is more or less hopeless (Figure 6.54) as the only remaining tissue is a thin veil of epithelia over the posterior symphysis bone which is too fragile to work with and provides no substance to create anything functional.



**Figure 6.54**

The urethra has been completely destroyed. The patient had very little bladder tissue remaining, making it impossible to create a new urethra from anterior bladder. She ended up having a diversion procedure.

If a strip of normal urethral tissue remains, there is a chance of making a reasonable tube. The repair is done by making a U-shaped incision, with the arms of the U extending to where the external urethral meatus should be and about 3cm apart. (Figure 6.55) It is better to make the arms wider than appears necessary, as it is easy to end up with too little tissue to make a tube. The base of the U lies over the entrance to the bladder. The sides of the U are undermined a little from either side towards the midline. This raises up the flaps of tissue from which you will create the new urethra. Care has to be taken, as the tissue is often fragile. The vagina lateral to the U-shaped incision is also dissected to create flaps to cover the new urethra, and the bladder is mobilised as much as necessary to enable it to be attached to the new urethra.



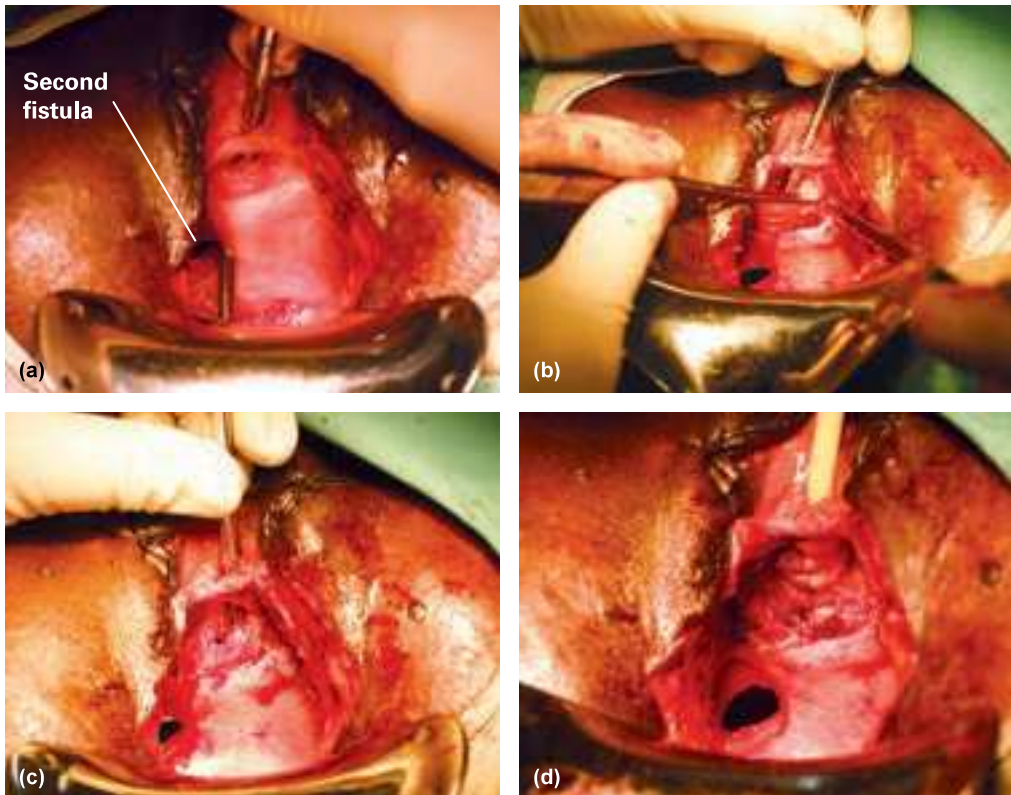
**Figure 6.55**

a) A urethra that has been cut. There is good tissue remaining and this shows the principles of repair. b) Mobilisation of the urethra has been done and the urethra is being sutured. Remember not to make it too tight, or too loose. c) Urethra reconstructed. d) Vagina repaired.

The tissues of the new urethra are sewn over a Foley catheter. An alternative is to suture the urethral tissues without an indwelling catheter and instead to check the diameter of the new urethra after each stitch with a medium Hegar dilator, Foley or metal catheter. Once the construction is complete, a 14 or 16 FG Foley catheter can be passed. The catheter must not be tight within the new urethra. Support the structure with a sling of fibro-muscular tissue from the lateral pelvis (see section on Urethral Support with a Fibro-Muscular Sling). It is good to use a Martius graft also as an extra support if the repair is very fragile.

Occasionally there is insufficient vagina either side of the new urethra to cover it. An alternative is to extend two incisions down the vaginal wall in the direction of the cervix and, having mobilised a flap off the bladder, advance it distally to cover the new urethra. The trouble with this is that it will lead to a short and tight anterior vaginal wall, which when healed will tether the vagina so it is not loose and elastic. This tethering pulls the urethra open and the patient will be wet. A better option to cover the new urethra is to use flaps of tissue from the labia or groin crease. This will maintain the vagina's elasticity and length, and not pull the urethra open (see section on Vaginal Skin Defects).

The case illustrated in Figure 6.55 shows the principle of repair, and has an excellent prognosis as it is not a childbirth injury and there has been little tissue loss. It is a case of traumatic urethral injury from a *Gishiri* cutting (a form of genital mutilation sometimes practised in Northern Nigeria as a traditional treatment for a variety of gynaecological ills). The superficial urethra has been cut as far as the bladder neck. As there is no ischaemic tissue loss this is the most favourable type to repair. Figure 6.56 illustrates a case where there is a small bridge of urethra superficially but good urethra on the deep aspect. The defect in the urethra can be repaired longitudinally to maintain the length of the urethra.



**Figure 6.56**

a) Two fistulae, one proximal and one in the urethra. A tiny bridge of distal urethra remains. b) Mobilise the urethral tissues off laterally from the bones. c) The urethral tissues are now fully mobilised and d) can be repaired longitudinally over a Foley catheter to create a new urethra (the proximal fistula can now be closed).

## Construction of a New Urethra from the Anterior Wall of the Bladder

An alternative operation when there is little remaining urethral tissue is to make a new urethra from a flap of anterior bladder wall. (Figure 6.57) The results aren't great, the procedure is technically difficult and the bladder must be of almost normal size for it to be feasible. This approach is recommended only for advanced fistula surgeons.

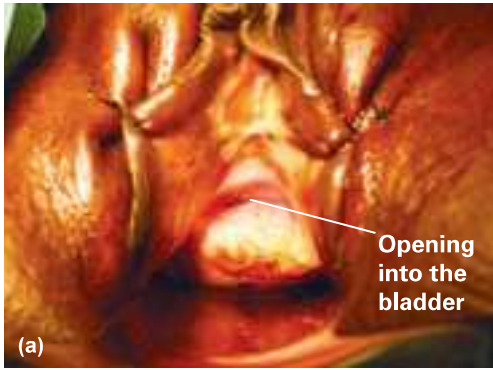
For this operation, the bladder has to be mobilised circumferentially and quite widely to bring the anterior wall of the bladder down to where the external urethral meatus should be. When this has been achieved, two incisions are made in the anterior bladder about 3–4cm apart and about 2–3cm long. This flap will become the new urethra. First, the bed of the old urethra over the symphysis pubis needs to have the epithelia removed to create a raw area where the new urethra will lie. The vagina needs to be reflected laterally from where the urethra will lie to cover it later.

The flap is attached in the midline where the external urinary meatus should lie, and is then sewn from side to side over a Foley catheter. A size 12 may be needed if the flap is small. It is sometime easier to attach the anterior bladder to the site of the external meatus before cutting the flap, and then to start to sew the bladder from side to side over the catheter, making the incisions in the bladder after each suture, proceeding down the length of the urethra. This prevents the serious error of cutting the flap short or narrow. I certainly prefer this method. If you make a mistake in the initial incision of the flap then the operation is ruined, but if you do it step by step as you sew it over a catheter, the risk of error is greatly reduced.

When the urethra is made over the catheter, the remaining defect in the bladder is repaired either vertically or horizontally, a dye test is performed and a fibro-muscular or fascial sling is placed beneath the urethra. A Martius graft is optional and is useful to fill any dead space.

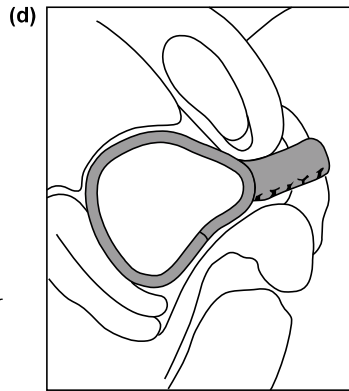
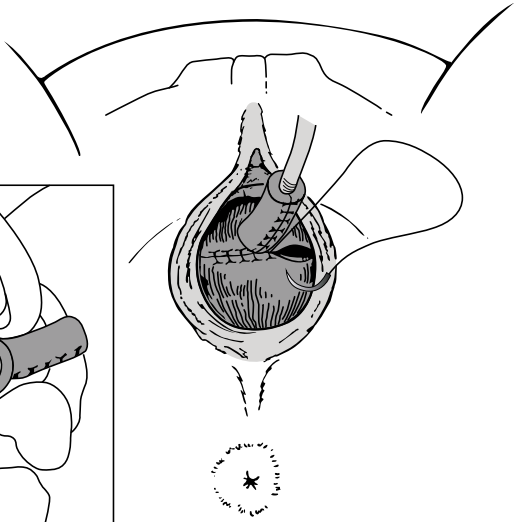
Of a small series of ten operations carried out by the author some years ago, two were completely cured and voiding normally and three had urinary retention but were dry self-catheterising. The remaining five were still incontinent to varying degrees but they were able to hold some urine. They had to have a second operation to try and make the urethra wider and support it better.

This tube of anterior bladder wall can also be used to lengthen a short urethra. This is technically demanding, and is occasionally not possible because the patient has a small bladder, effectively ruling out the procedure. I use this technique routinely in patients with short urethras and a circumferential defect, and it gives better results in my experience. The principle of fistula surgery is to restore normal anatomy—that is to make the urethra a normal length and width (and then support it with a sling to replicate the pubo-urethral ligament).



**Figure 6.57**

a) There is no urethra or remaining urethral tissues. There is a tight opening stuck under the pubic bone into a good sized bladder. b) The bladder has been mobilised circumferentially and advanced down. c) An incision was made on the posterior bladder and a strip created to suture over a Foley catheter.



d) The remaining bladder was repaired as shown in diagrammatic fashion here.



e) The new urethra was supported with a fibro-muscular sling.

## OPERATIVE STEPS TO REDUCE THE INCIDENCE OF STRESS INCONTINENCE

The steps that we have described so far concentrate on closing the fistula. Remember the Basic Principles. The more Advanced Principles are directed at preventing ongoing incontinence. We touched on those briefly in the preceding sections when we talked about making the urethra longer during the repair. We'll discuss more techniques in detail now.

From a multivariate analysis of patients in Ethiopia we know the factors that predispose to ongoing incontinence despite a closed fistula. These are:

- Involvement of the urethra (types 2–4 in Goh's classification) the shorter the urethra, the greater the ongoing incontinence with Goh type 4 having the worst outcomes. This corresponds to Waaldijk type II fistula, or those involving the closing mechanism.
- Larger fistulae.
- Vaginal scarring sufficient to prevent insertion of a speculum without vaginotomy.
- Small bladder volume after repair (<150cm<sup>3</sup>).

Most important is loss of length and quality of urethral tissue, so any measures that can be taken to improve this should be taken. These measures fall into three groups:

- Lengthening procedures to ensure an adequate urethral length. Lengthen the urethra from bladder tissue.
- Urethral support with a fibro-muscular or fascial sling or including repair of the pubo-cervical fascia.
- Attending to vaginal skin defects to ensure there is no tension on the vagina pulling the urethra open.

### Lengthening Procedures

In a series of patients with severe post-repair stress incontinence, the average urethral length was 1.4cm, which is less than half the normal length of 3–4cm. Anything that can be done to lengthen the urethra should help. Although there is no formal proof, Kees Waaldijk and others have the impression that a urethra less than 2cm in length is very unlikely ever to be continent.

As mentioned in the section above on juxta-urethral and circumferential fistulae, it is possible in some cases to fashion the bladder side of the anastomosis into a tube with a diameter approaching that of the urethra. (Figure 6.40) This is done by joining the anterior wall of the bladder to the urethral remnant, wrapping the anterior bladder around to anastomose to the urethra and closing the remaining defect in a vertical direction.

As also mentioned in the previous section, vertical closure of the urethral defect is possible in a few cases.

## Urethral Support

### Repair of the Pubo-Cervical Fascia

The pubo-cervical fascia is a sheet that originates from the arcus tendinus on the pelvic side wall. It is a fascial support for the urethra, the urethro-vesical junction and bladder base. It is disrupted by the ischaemic process, and attempts to repair this damage are worthwhile, even though it may appear insubstantial. Some surgeons make a quite extensive dissection over the bladder base to identify the fascia and pull it together in the midline, thus supporting and elevating the new urethro-vesical junction. This is really just a radical plication of the distal bladder.

Another method is to attach the pubo-cervical fascia to the arcus tendinous if it has been detached during the ischaemic loss.

### Fibro-Muscular Sling (Pubo-Coccygeal Sling)

A review by the author of 318 consecutive patients successfully repaired at the Addis Ababa Fistula Hospital in the year 2002 showed an immediate post-operative incontinence rate of 33% and an independent review examining the patients put the rate at 45%. Repair was by simple closure, with a Martius fat graft added in most cases. This was a much higher figure for incontinence than had previously been recognised, and I started to use a fibro-muscular sling in high-risk cases, i.e. those with a shortened urethra (that is fistula edge <2.5cm from the external urethral orifice, Goh's type 3 and 4). This was an attempt to reconstruct the pubo-urethral ligament. Since this was adopted in routine practice, the rate of post-operative stress incontinence has been reduced to 18%.

The exact nature of the tissues to be used to make the sling is open to debate, but pubo-coccygeal muscle is generally preferred. Sometimes it is just scar tissue, because the muscle having necrosed and sloughed away, scar tissue is all that remains in its place.

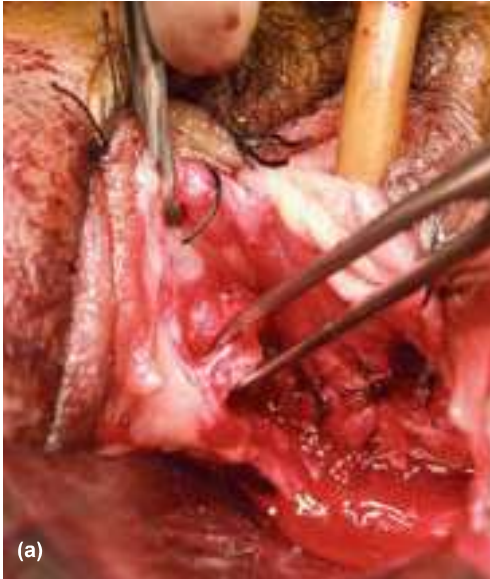
The procedure is best understood by referring to the diagram and photographs shown in Figure 6.58. The lateral ends of the vaginal incision that was made around the fistula are extended a little more laterally onto the lateral vaginal walls each side. The vaginal skin is elevated so as to expose some fibro-muscular tissue under the pubic rami. The belly of fibro-muscular tissue that can be felt in this area is grasped with Allis forceps. A cut is made below with scissors so as to elevate a strip block of tissue still attached anteriorly under the pubic arch. The same procedure is performed on the other side, and then the two sides are sutured together in the midline beneath the urethra with two interrupted sutures. If the dissection has been taken high enough under the pubis, the sling should wrap around the urethra in a gentle U shape. Inadequate mobilisation potentially leaves dead spaces behind which can scar the urethra open in time. (Figure 6.58)

Unfortunately, in many of the worst cases, the pubo-coccygeal muscle has been destroyed and replaced by fibrosis. The sling will then be mostly scar, but may still give some support.

I use this sling in most patients with fistulae that are less than 2.5cm from the external urethral orifice, although on occasion I do use it on adequate urethras that were clearly leaking urine before the operation, that is leaking from a fistula and through the urethra.

The sling also acts as a graft, increasing the closure rate in what is often a fragile repair.

When you repair the vagina over the repair, remember to suture the corners of the vagina to the pubic bones (arcus tendinous). This will close any dead space and also act to support the urethra. (Figure 6.58)

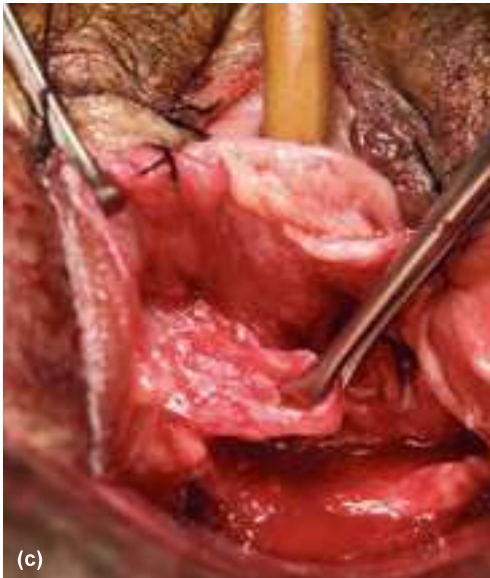


**Figure 6.58**

a) The Allis forceps are grasping the muscle under the pubic arch on the right side of the urethra.



b) Mobilising through the muscle. Don't cut right against the bone, take a strip from the body of the muscle.



c) Right hand side of the sling being developed.



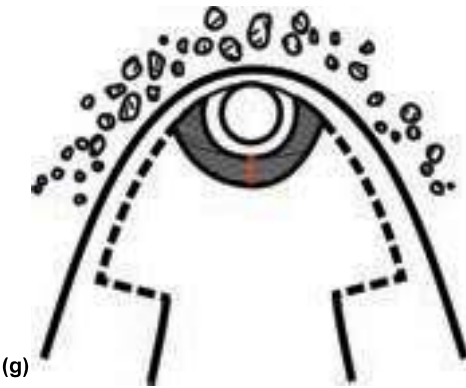
d) The same on the left.



**Figure 6.58** (continued)  
e) Dissecting the strip of muscle.



f) Left side of the sling fully developed and attached anteriorly.



g) Make sure you mobilise high enough under the pubic arch so the sling sits nicely under the urethra.



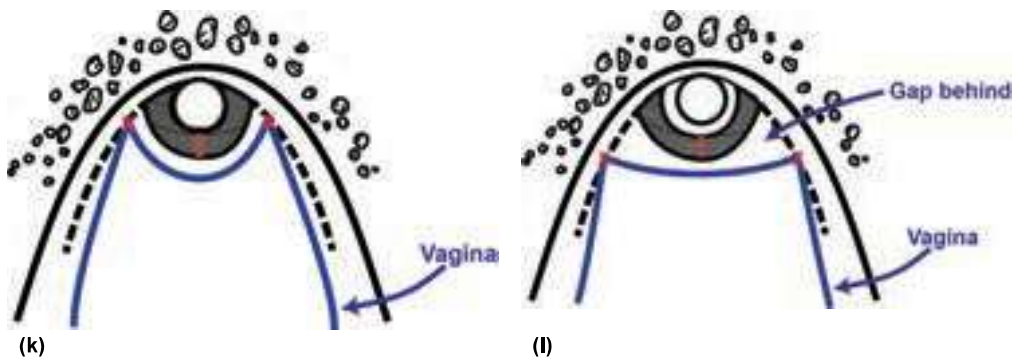
h) If you don't, there will be a dead space between the sling and the urethra.



i) This sling is sewn in the midline but the dissection hasn't been far up under the pubic arch, so the sling is not forming a 'U' under the urethra.



j) This one has been dissected correctly and is a good sling under the urethra.



k) Likewise when you repair the vagina, make sure you repair the vagina against the pubic bones to the base of the sling to close any dead space.

l) If you don't you will get dead space between the vagina and urethra like this.

### Fibrous Sling (Fascia Lata or Rectus Sheath)

Another option for urethral support is to use some fascial tissue. There is a randomised controlled trial underway comparing the use of the muscle or fibrous tissue described above and the fascial sling at primary repair. Preliminary results suggest that the muscle sling has fewer fistula recurrences but the fibrous sling *may* be better at maintaining long term continence.

I tend to use the fascial sling as a secondary procedure when the muscle sling has failed. As these patients generally have little to no physiological function to their urethra the sling acts more in an obstructive manner. You can get much more tension with the fascial sling which is of benefit at times and is perhaps the reason why a fascial sling created at the time of initial repair might be associated with more repair breakdowns. A tight sling under the urethra might put too much pressure on the healing tissues so the fistula breaks down.

The fascial sling is a fairly simple procedure. The first step is to harvest a 5cm by 1.5cm strip of fascia from either the tensor fascia lata or rectus sheath. The incision to harvest the tensor fascia lata is made about 10cm superior to the lateral femoral condyle. After harvesting, the fascial defect can be left open and the subcutaneous tissues and skin closed. If the rectus sheath is used it is done via a min-Pfannenstiel incision and a 5cm by 1.5cm strip is harvested centred on the linea alba. (Figure 6.59)

Tie some PDS or nylon to either end after making a Pfannenstiel incision (already done if you have harvested the rectus fascia sheath). The sling can be passed either side of the urethra from the vaginal side and into the cave of Retzius up to and through the rectus fascia. You use long curved artery forceps for this, holding the ends of the PDS or nylon. With the already attached nylon the sling is then sutured to the rectus sheath either side with a free needle, or if one is unavailable the curved artery forceps can puncture the sheath to thread the suture through. It is tied with mild tension.

This procedure is termed a 'sling on a string'. We have had some good short term results but the long term results are unknown.

**Figure 6.59**

A strip of rectus fascia can be harvested through a low mini-Pfannenstiel incision. It is used to create a sling going around the mid-urethra and sutured to the rectus sheath with nylon.

## Attending to Vaginal Skin Defects

Sometimes, there is no vaginal skin to cover a successful bladder repair. More and more we are realising that it is just as important to close the vagina properly as it is to repair the bladder and the urethra. If the vagina is closed in such a way as to cause tension the patient will almost always have ongoing incontinence from her urethra. She may very well be suffering dyspareunia and even apareunia too from a short, scarred, rigid vagina. In the past surgeons have just pulled the cervix forward and sutured the vagina together under tension, but the tension pulls the urethra into the vagina and pulls the urethra open. So if after repairing the bladder and the urethra the vagina doesn't fall together easily, the gap in the vagina needs to be filled. In such cases, there are five options, the first three of which are simple:

1. Leave it as it is. (Figure 6.60)
2. Cover the bladder repair with a fat graft and leave a vaginal defect. (Figure 6.61)
3. Use a labial flap. (Figure 6.62)
4. Use more complicated flaps, e.g. medial thigh or buttock flaps.
5. Use a vascular island pedicle flap, namely the Singapore flap (and the alternative of the labia minora flap). (Figure 6.64)

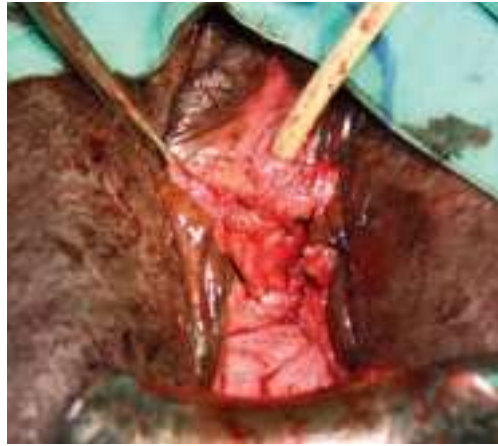
The cases where this is necessary often have significant vaginal stenosis before the repair—the aim of the operation is to release and excise the scar that is causing the stenosis, open up a space to create a vagina and have a vascular flap to cover it. Non-vascular flaps and grafts are okay for small vaginal defects, but if used on larger defects tend to scar and retract in time and do not give good longer term results.

**Options 1 and 2.** My colleague Brian Hancock prefers options 1 and 2, but in my experience, unless the gap left in the vagina is very small there is a high chance of a breakdown of the bladder. I have seen cases where the whole repair had been left uncovered and the whole exposed area of the bladder necrosed and sloughed away, making the next repair even more difficult. It's best to repair the vagina completely and well. Kees Waaldijk has a saying 'to keep a house dry you need a roof and a ceiling', meaning it's best to have two layers; the bladder and the vagina.



**Figure 6.60**

A stenosed vagina. There wasn't enough vagina to cover the repair and the repair was left partially exposed.

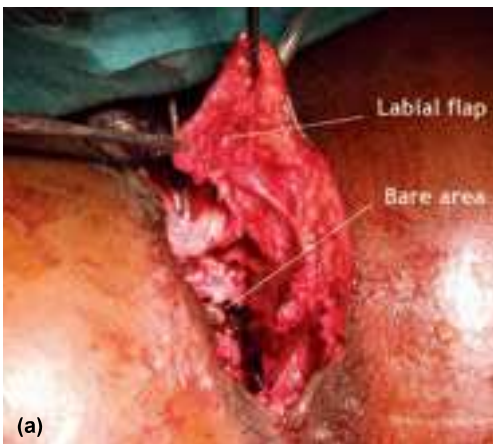


**Figure 6.61**

The same as with Figure 6.60 but the repair was covered with a Martius fat flap which was partially left exposed as there wasn't enough vagina to cover the defect.

**Option 3.** Labial flaps can be used from labia minora and/or majora. The procedure is usually performed by extending the vaginal incision to the introitus and out onto the skin. (Figure 6.62) Then the incision is taken anteriorly between the labia minora and labia majora if the minora is to be used only, or more laterally to include the majora. If a relaxing episiotomy was made during the operation, this incision can just be extended up onto the labia. If a Martius graft has been used the incision can be extended to meet the incision created to harvest the graft (see the section in this chapter on the Martius Graft Procedure).

A flap is raised from posteriorly to anteriorly and rotated into the vagina. It is important to note the basic principle for flap surgery. This means the flap is still attached somewhere, the base of



(a)



(b)

**Figure 6.62**

Labial rotational flaps. a) The labial flap has been developed on the left. Note the large bare area over the repair site and no vagina to cover it. b) The labial flap has been rotated in and there is enough tissue to cover the bare area. The incision sites will be repaired.

the flap. In this case it is the skin where it hasn't been cut. Unless the flap is based on an artery, it will not have its own blood supply. When the flap is raised and moved, the blood supply will be coming indirectly via diffusion from the base of the flap (the skin) and also from the tissues it will lie on, in this case the bladder. A general rule of thumb is that the base of the flap should be as wide as or wider than the length of the flap. If the flap is longer than it is wide, the blood supply to the distal part will be poor and it will probably die, so make sure the flap is wider than its length.

Small flaps work quite well but in my experience, larger ones end up being disfiguring and in time contract up, because they don't have their own blood supply. This slow contraction over time can end up pulling the urethra open with scar, making the patient incontinent. (Figure 6.63) I use this method if the gap in the vagina after repairing the bladder is only about 1–2cm.



**Figure 6.63**

This patient had bilateral labial rotational flap performed. It has scarred with time and there is tension pulling the urethra open. She was wet all the time, the same as when she had the fistula.

**Option 4.** Medial thigh and buttocks flaps are larger flaps based more laterally and distally, but the principles stated above still apply. Again, the flaps are not based on an artery and so should not be longer than they are wide. In my experience they tend to be disfiguring and scar up with time.

**Option 5. Singapore Flap.** In my opinion a vascular pedicle flap with an island of skin produces the best result. The method I use is a slight modification of the Singapore flap that was first developed in Singapore to create a new vagina. This flap is based on an artery, the terminal branch of the external pudendal artery. This comes towards the skin just medial to the ischial tuberosity and then runs up to the inguinal ligament slightly medially to the groin crease. So an island skin flap is created. First mark out your incision with the pedicle being based just medial to the ischial tuberosity. You can estimate the length of the flap that you need by approximating the distance from the tuberosity to the most distal part of the defect in the vagina using either your finger to measure or a piece of gauze. Then use this length to measure from the medial tuberosity along the groin crease. Mark this spot but then add another 2cm or so as you always end up needing more than you expect.

Make your initial incision just medial to the groin crease to your mark at the flaps base (pedicle). This will just include the lateral part of the labia majora. Then make an incision in an arc onto the thigh tapering down to base. (Figure 6.64) The length can be up to 15cm, right up onto the inguinal ligament, and about 6cm wide. Most of the time a smaller one is all that is needed.

Incise anteriorly down to the fascia over the muscle. Take the fascia off the muscle, this make sure the blood supply will be intact. The fascia may also add some strength to the vagina, replacing the defect in the pubo-cervical fascia. Put a small suture through the fascia and attach it to the skin. This will ensure the fascia doesn't shear off the subcutaneous tissue.

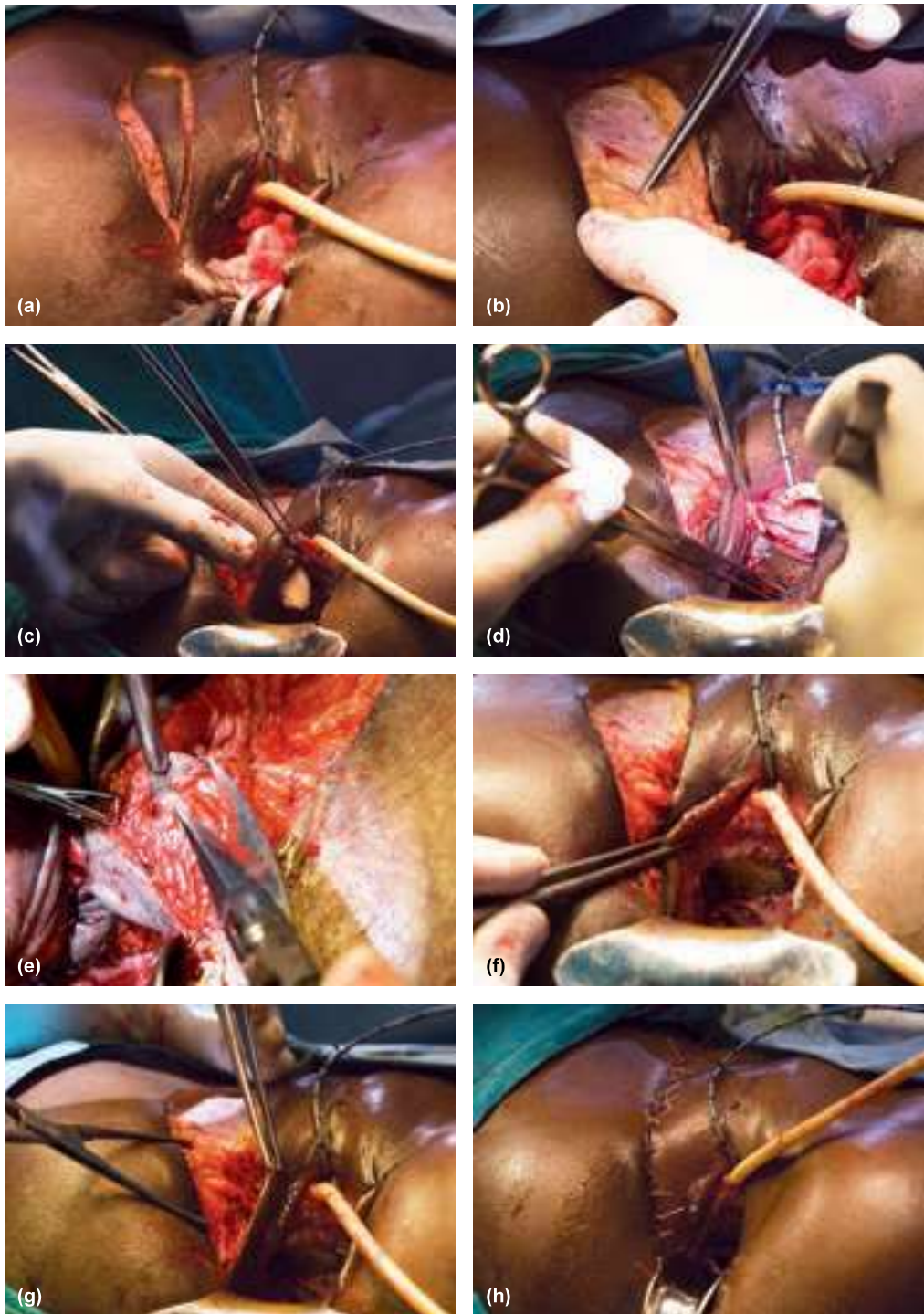
The flap is developed making sure you keep a nice wide pedicle inferiorly that includes the blood supply. Then mobilise the inferior part of the flap just under the skin to get more length from the pedicle. When it is nice and mobile (and hopefully still bleeding distally so you know the blood supply is still intact), make a tunnel just over the inferior ramus, under the bulbocavernosus and into the vagina. Use sharp scissors to do this and then push two fingers through to make sure the tunnel is wide enough not to strangulate the pedicle and thus its blood supply. The flap is passed through the tunnel and laid out in the vagina. Notice how the pedicle passes through the tunnel: there is skin on the flap through the tunnel that needs to be excised. Make a mark on the skin of the pedicle in the vagina to determine how much skin you want to keep then carefully excise the skin from within the tunnel but pulling the labia to the side and exposing the skin within the tunnel. Then repair the proximal end of the flap to the vagina/cervix and side wall, and then anteriorly. Secure the remainder of the flap within the vagina to the vaginal mucosa.

The groin crease defect then needs to be repaired. I repair this in two deep continuous layers in larger women with a lot of subcutaneous tissue or one deep layer to thin women. The deepest layer should aim to repair the fascia over the muscle. I then use interrupted sutures to the skin and tie a gauze as a dressing over the suture line and remove it after two days.

I have a small series of over 200 such grafts with extremely encouraging results. Almost all cases have been patients who have been operated on before—up to nine times—and lost all hope of a cure. Around 70% are now completely dry when the flap has been used to relax the vagina, with a sling to support the urethra. There have been several patients coming with closed vaginas and hopelessly incontinent after fistula surgery and I performed this operation just to make a new vagina. It also made them completely continent. The thought is that it works by taking the scarring and tension off the vagina—the scarring that was holding the urethra open.

The drawback of this is that it uses hair bearing tissue. Fortunately in my population the hair in the groin crease is small to non-existent. Some populations are more hirsute. The longest follow up I have is on one patient in Uganda who was initially growing hair in the vagina, but after 2 years it had almost completely gone and the brown tissue was turning pink! She was completely dry and sexually active. At other times I have seen the patients at six months follow up with some hair in the vagina but interestingly few have complained about it. Whether this be out of politeness I can only imagine, but I usually take them back to theatre and diathermy the hair bearing areas in an attempt to destroy the follicles.

Other surgeons have been using a similar flap but taking skin from the labia majora with the Martius graft. This is far more hair bearing. The cases I have seen at follow up with this operation have worse results. The skin from the labia has started to raise in a mound in the vagina, just like the labia majora whereas the skin from the Singapore flap lies flatter and produces a more anatomical result.



**Figure 6.64**

The Singapore flap. a) The initial incisions, extending from the inguinal ligament to the level of the posterior fourchette. The groin crease is included. b) The flap is developed with the pedicle over the ischial tuberosity. Note a perforating blood vessel which was preserved.

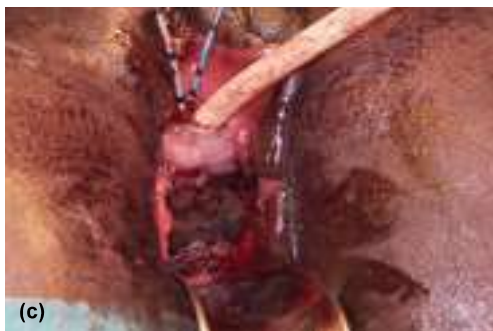
**Figure 6.64** (continued)

- c) The tunnel is developed into the vagina.
- d) The flap is introduced through the tunnel.
- e) Be careful to excise any skin that may lie in the tunnel before suturing the flap in place.
- f) sutured in place
- g) The skin has been excised from the pedicle.
- h) Groin crease donor site repaired.
- i) The vagina is packed and groin crease dressed.



**Labia Minora Flap.** The other option is the labia minora flap. Many fistula patients have been circumcised making this option impossible, while in other cultures such as in Uganda, the practice is to elongate the labia minora by pulling. If there is sufficient labia, it can be incised from anterior to posterior leaving the pedicle posteriorly. Be careful not to make your cut too close to the clitoris and thus cut the arteries in this area. Make a very superficial incision through the skin around the base of the pedicle. The skin is very thin here so be careful. Undermine the skin away from the pedicle to get some mobility, again be very careful here as the tissues are so thin. Open the two leaves of the labia minora to try and lay it flat. Sometimes you need to make a small incision through the skin at the distal end to be able to do this. Tunnel into the vagina beneath any vaginal skin remaining and suture the flap in place. Remember to remove any skin from within the tunnel. (Figure 6.65)

This has the advantage that the skin is soft and non-hair bearing. It is however smaller than a Singapore flap and doesn't have the fatty tissue underlying it which is useful for filling any surgical dead spaces.



**Figure 6.65**

- Labia minora flap. a) The labia minora on the right is mobilised anteriorly to posteriorly. Keep a generous pedicle posteriorly. b) The flap is fully developed with the pedicle intact. c) Sutured in place.

## THE MARTIUS FAT GRAFT

### To Graft or Not to Graft?

For 30 years, a Martius fat graft (in reality a pedicle flap) had been the mainstay of completing a repair for all but the simplest fistulae at the Addis Ababa Fistula Hospital. When introduced, it appeared to produce significantly improved results. However over the last 15 years many experienced fistula surgeons have used it less and less, until it has been all but abandoned, without compromising results.

The idea of the Martius fat graft is to bring good tissue with its blood supply into the area of the repair. The graft appears quite vascular, as it is raised from its bed, but, when pulled into the vagina, there is rarely any sign of bleeding; if an old fat graft is found at a re-repair, it shows little sign of vascularity and resembles a lipoma.

Its proponents claimed that it improved closure rates, and that it filled dead space left on the sides of the bladder and urethra after the fistula repair. It has also been suggested that a pad of fat between the bladder and vagina may offer some protection should the patient be forced by circumstances beyond her control into a vaginal delivery again.

The downside of a fat graft is the extra time and extra use of sutures and slightly increased risk of a haematoma.

Most surgeons rarely use fat grafts. Our possible indications are:

- Some surgeons use it on the rare occasion to cover a repair where there is lack of vaginal skin. (See Vaginal Skin Defects—Options 1 and 2)
- As a last ditch attempt to close a defect that has failed several times. We know of several cases successfully closed at a fifth and greater attempt using a fat graft on the last repair. (Both repairs had been performed on the last occasion by a very experienced surgeon, which could be the reason for the success.)
- On those few occasions where it has been impossible to achieve a watertight closure.
- To support a fragile urethral repair or reconstruction.
- To fill dead space in the lateral spaces around the urethra and bladder after the fistula repair.

As there may still be a place for the use of the Martius fat graft in selected cases, a description will be given here. I currently use a graft in about 1 in 50 repairs.

### The Martius Graft Procedure

After completing the bladder repair, five anchor sutures are placed:

- Two sutures above the fistula—one on each side, high and laterally, usually using the corner sutures, which have been left long.

- Three sutures proximal to the repair—two in the side wall of the vagina and one on the midline either into the cervix, if the dissection has extended this far, or at the top of the reflected vaginal wall.

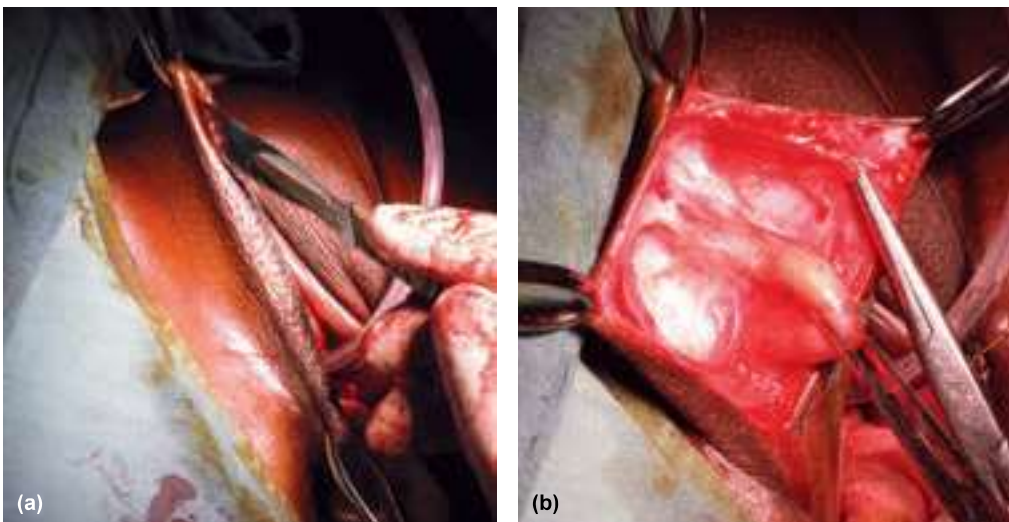
The anchor sutures are not put in the bladder. The sutures are left long, and will be threaded onto eyed needles to pass through the graft.

The operating table is taken out of the Trendelenburg position to bring the labia into comfortable view. The right labia is traditionally used. The sutures that were used to retract the distal vaginal skin on this side are cut.

The labia majora is incised along its length from about the level of the base of the clitoris to the level of the anterior vagina and the fat pad beneath is exposed. (Figure 6.66) The fat pad is grasped with Allis forceps and reflected off the underlying skin laterally and medially. This area is vascular, especially its medial edge, so attention must be paid to securing haemostasis.

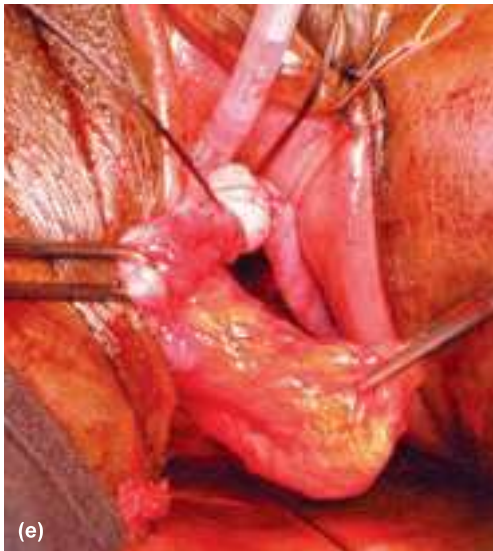
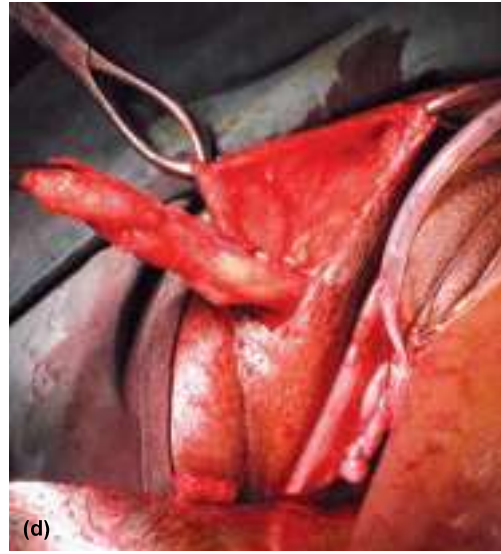
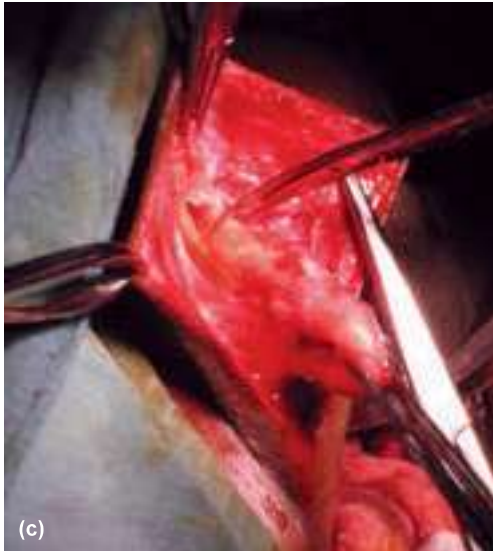
The pedicle of fat is cut level with the top of the incision and dissected downwards off the underlying deep fascia. The dissection continues until the medial margin of the inferior pubic ramus is reached and a tunnel can be formed into the vagina. The raised pedicle is attached inferiorly to maintain its blood supply.

Haemostasis is obtained and then the graft is introduced into the vagina by making a tunnel with the dissecting scissors between the labia and the inferior pubic ramus. It may be necessary to extend the vaginal incision further distally. The vaginal flap is lifted up. The scissors are introduced and the blades are opened a little to enlarge the hole; they are then withdrawn and a finger is pushed through the tunnel. The tunnel must be large enough to accommodate the fat pedicle so that it will not strangulate.



**Figure 6.66**

The Martius flap/Martius graft. a) The incision is made along the labia majora. b) The fat pad is exposed.



**Figure 6.66** (continued)

c) and dissected from anterior to posterior, keeping a generous pedicle posteriorly. d) The flap attached by its pedicle. e) Introduced into the vagina. Note the anchor sutures in place. These can only be used like this if you have empty needles that you can use.

The fat pedicle is introduced into the vagina through this tunnel with the aid of Allis forceps and is sutured into place using the five anchor sutures placed previously. The free ends of the sutures are threaded onto a blank needle and both are brought through the fat and tied. The graft should be spread out and lie neatly over the whole of the repair.

The graft site on the labia must be repaired carefully. The area is prone to haematoma formation. The closure is done in three layers, beginning superiorly by taking a large bite with a 0 chromic or Vicryl suture through the previously cut labial fat. The suture is taken continuously down and then back up, closing all potential dead space. The final layer is of interrupted skin sutures.

## BLADDER STONES

Bladder calculi are found in about 2% of new cases. Their correct management is very important.

### Causes

Bladder stones may be caused by:

- foreign material pushed up the vagina and sometimes through the fistula into the bladder in an attempt to stop the leak
- crystals forming in concentrated urine and growing over time
- non-absorbable sutures used in bladder repair (e.g. damage during caesarean section or previous attempt at fistula repair). This can sometimes cause stones to form in the vagina. (Figure 6.67)



**Figure 6.67**

This is a stone in the vagina that formed around a non-absorbable suture used to repair the vagina at fistula repair. The same can happen in the bladder.

### Detection

Bladder calculi almost always occur with small fistulae, although exceptionally a large calculus may be found half in, half out of a large fistula.

Bladder calculi may cause an enormous amount of discomfort, and can often be suspected pre-operatively when there is tenderness on vaginal examination and an odour more severe than usual. A complaint or an observation of haematuria is another sign. The urine is usually infected and smelly.

A large stone can be felt on gentle bimanual examination, and any stone can be detected by sounding inside the bladder with a metal probe. (Figure 6.68) You can feel the probe hit against the stone.



**Figure 6.68**  
Sounding/probing the bladder with a metal catheter for the presence of stones.

Small stones may be missed on clinical assessment. It is vital to detect and remove all stones before embarking on a repair. A missed stone is a disaster. We have seen patients return some time after a successful repair in great distress from a large stone. It is probable that a small one was missed at the repair. If you are in doubt, you can confirm the presence of stones with an ultrasound examination.

## Management

Repair of a fistula should be delayed until after removal of a stone. In the presence of a stone, the bladder is thick-walled and hyperaemic, and there is almost certainly urinary infection. These conditions are not conducive for a successful repair, although one paper from West Africa showed that repair at the time of stone removal can be successful. At times I have removed a stone through the fistula and tacked the edges of the bladder together while I was there and patients were cured. But it is prudent to err on the side of caution and remove the stone first, treat any infection and then repair the fistula later. The interval between removal and safe repair may only be about 2 weeks, but each case should be assessed on its merits and local circumstances.

If a fistula is present it is preferable to remove the stone vaginally through the fistula. (Figure 6.69) Sometimes you need to crush the stone through the fistula with Allis and Wrampleys forceps, remove the large crushed segments and then flush out the remainder. If there is no fistula, remove stones by a supra-pubic extra-peritoneal approach. (Figure 6.70)

Infection is usual, and it is essential to give pre-operative and peri-operative antibiotic cover. Intravenous ampicillin 1gm and gentamicin 160mg for the operation, followed by gentamycin 80mg, 12-hourly for 48 hours along with ampicillin. Exceptionally, septicaemia has occurred after stone extraction.

The supra-pubic entry can be either via a low midline incision or small Pfannenstiel with a cut large enough into the bladder to extract the stone with sponge forceps. It is best to try not to enter the peritoneal cavity to reduce the chance of contamination from an infected stone and urine into the peritoneal cavity. Fortunately, most stones are solitary and firm, and do not

crumble on extraction. If the stone does break into fragments, it is vital that they all be washed out and removed. Even one small residue will lead to another stone. After removing the stone irrigate the bladder and the wound liberally to wash away any potential source of infection.

The bladder can be closed and drained through a urethral catheter for 10 days.



**Figure 6.69**

This stone was in the bladder and protruding through the fistula into the vagina. Note the central constriction on the stone which indicated the fistula margins. The fistula was successfully closed two weeks later.



**Figure 6.70**

A larger stone in a patient with a closed fistula. It was removed by a supra-pubic incision.

## FAILED REPAIR AND RE-OPERATION

Everyone who operates on obstetric fistula patients regularly will get failures, where the repair breaks down. It is very discouraging for the surgeon and more importantly hugely disappointing for the patient who has her hopes on being cured.

There are many causes. It could be that the operation was not done well and there was too much tension on the suture line, the patient's tissues may have been poor, she could have undiagnosed diabetes causing poor tissue healing. Recently I've diagnosed schistosomiasis in patients who had unexpected failed repairs. After treating the schistosomiasis and waiting some months, I re-operated and they were cured. There could have been difficulties in the post-operative period with an infected haematoma, wound infection or a blocked catheter. The fistula that is more at risk of breakdown is the larger, more scarred, circumferential repair with little vaginal tissue left.

Breakdowns can be early, in the first couple of days after the operation, but most occur from day 7 to day 9 after the operation. It is general practice to leave the bladder on free drainage, thus relaxing the bladder and enabling the edges of the breakdown to oppose and hopefully heal. If the fistula breaks down I generally leave the catheter for another week. If the leakage through the vagina is decreasing I leave the catheter until it is completely dry from the vagina and add another week of catheterisation from the day that the patient becomes dry. If after a week to ten days it is obvious that the leakage is not decreasing, I remove the catheter and label it

a breakdown. Some people operate sooner rather than later, but for the best results it is best to wait 3 months so the tissues are completely recovered, and operate again.

In my personal practice I find that about 50–60% of patients I see for the first time have had a previous repair elsewhere, sometimes up to eight or nine repair attempts. This is mainly because people save these cases for me when I visit. Many of these cases are still quite easy to cure, as they were simple ones inexpertly done, but some are extremely challenging and have a very poor prognosis. Of course, I also have to operate on my own failures. The general rule is that the first operation is the patient's best chance of being cured and the more times you operate, the less chance she has of ever being cured.

Sometimes the patient is wet straight away after theatre. Most commonly this occurs when there is a Foley catheter and ureteric catheters in the urethra. This splints it open slightly and urine can leak around the catheters through the urethra. This calls for reassuring of the patient. It usually resolves when the ureteric catheters are removed. However there are more serious causes which need excluding.

The catheter could be blocked, making the bladder fill up and the urine leak around the catheter. You need to try and draw back with a syringe in the foley or gently flush it. You should also check with a gentle and careful dye test with good exposure and lights—ideally in theatre. The most likely explanation is the presence of an overlooked ureteric fistula or another vesico-vaginal fistula. If a ureteric fistula is confirmed, a ureteric implant can be performed electively at a later date. I prefer to do this after the fistula has healed so you don't risk pulling and pushing on your repair as you reimplant the ureter from above. If you are operating at a fistula camp and the patient won't have the chance to be reoperated on for some time, I would do it in the immediate post-operative period. If, however, the dye test is positive and the repair is thought to be sound, it is tempting to take the patient back to try and stop the leak with additional sutures.

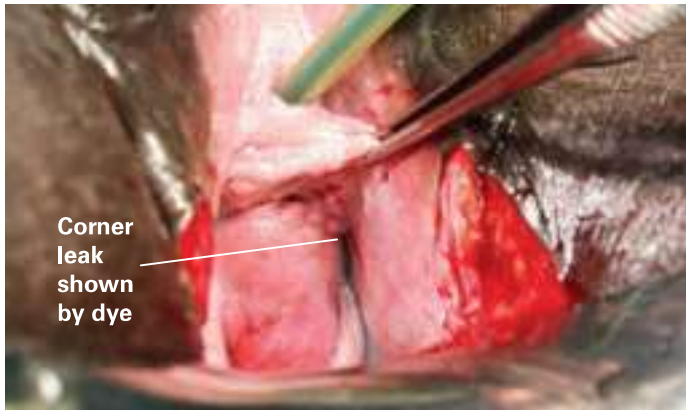
Provided that the re-operation is performed within 48 hours, the bladder will hold additional sutures well, and, on the occasions when this has been tried, the leak was stopped at the repeat operation. I have done this about 20 times with a 70% success rate on discharge. After 48 hours, the tissues become oedematous and further suturing is unlikely to be successful as the sutures just tear through the tissues. Most breakdowns occur from day 7 to day 9. Their immediate conservative management is described above.

If you have tried all of those steps and the patient is diagnosed with a failed repair, then wait 3 months to try again or refer to a more experienced surgeon if there is one available.

The principles of a re-repair are no different to those for a new case. There will, however, be less healthy tissue available, more scar and distorted anatomy, so it will be harder to mobilise and get a tension free closure of healthy tissue. Clearly, the patient needs to be carefully assessed prior to the operation, noting the presence of any of the risk factors, and the surgeon needs to decide if he or she is confident enough to operate. We advise waiting at least 3 months before attempting a re-repair.

A few breakdowns will be in the middle of the old repair and therefore easily accessible,

but the majority are small and inaccessible at the lateral margins of the repair or at the corners of a circumferential anastomosis (Figure 6.71), the fistula being stuck right on the bone. These are challenging to repair. There are several tips for repairing these. First, exposure must be optimal, with episiotomies if necessary. Small corner defects that are high in the anterior vaginal fornix can often be approached directly, but better access may be obtained by mobilising the bladder off the cervix and advancing the sidewall of the bladder up to the defect and actually repairing bladder muscle to the pelvic side wall. You need very accurate suture placement as it is easy to leave a gap under where you have repaired the bladder to the side wall so that urine can still escape from the fistula and under here. Elevation of the vaginal skin off the defect is greatly helped by Thorek scissors. It is impossible to find the ureteric orifice through small holes, and we simply close the defect with two or three sutures—either directly if possible or to the sidewall. As the lateral margin is often close to bone, it is important to take strong bites and then insert all the sutures before tying them. A small J or 5/8-circle needle is a great help here. Wherever possible, swing a small flap of fibro-muscular tissue from under the pubic arch as a reinforcement and bring some healthier tissue to graft over the repair.



**Figure 6.71**

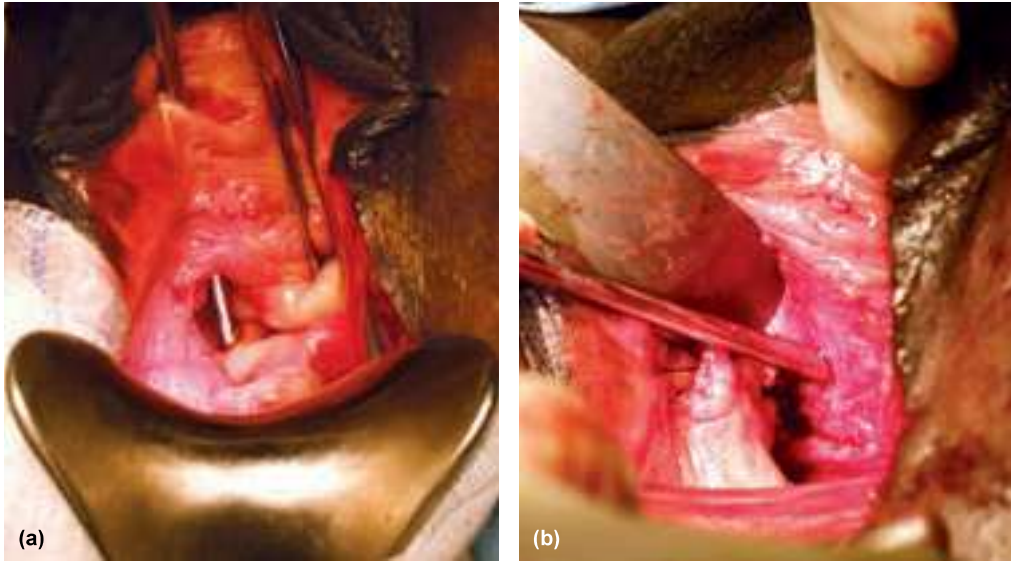
The dye test has revealed a small fistula in the corner of the vagina, right against the bone. The first operation was a circumferential fistula and it broke on the lateral anastomosis. Note a relatively short anterior vaginal wall, the cervix has been pulled towards the repair site.

Occasionally you will find two lateral fistulae, one on each side stuck firmly against the bone. This is always after a circumferential repair. After total reflection of the vagina I connect the two fistulae and invariably find that the anterior repair of a circumferential case has not been done, so I close the defect as a formal circumferential case. The results are good.

In the case of slightly larger defects from a breakdown, I occasionally enlarge them to see inside the bladder to check the ureters. More often I just check that the ureteric orifice it is not on the margin of the defect by probing, always with the help of 10mg intravenous furosemide. Using this minimalist approach, we have not knowingly had any problems with ligated ureters, but always beware as the ureter could be anywhere after a previous fistula repair.

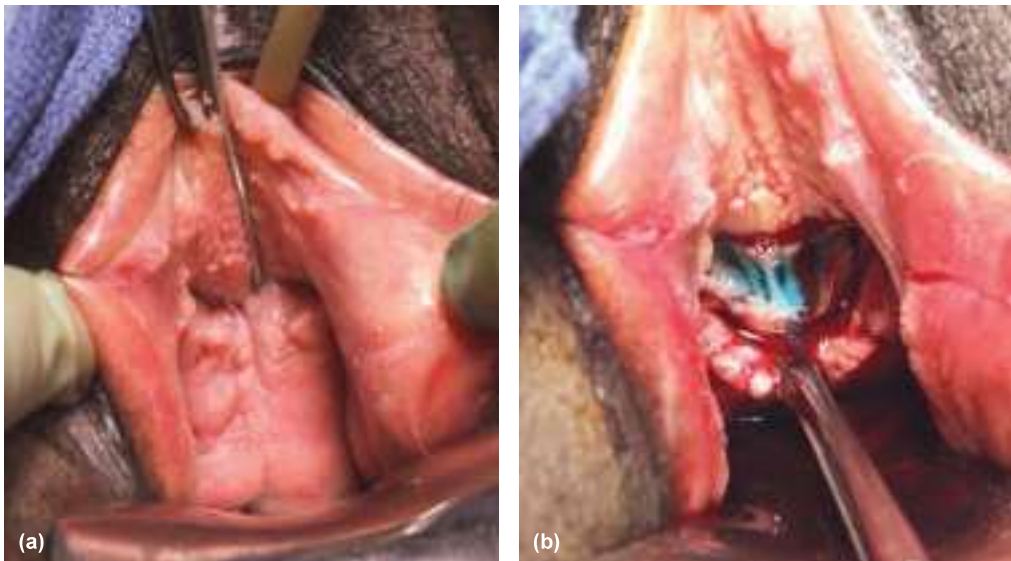
Residual fistulae high in the region of the cervix following a failed intra-cervical repair provide a special challenge that depends largely on how much the cervix can be pulled down. Brian Hancock had two patients both of whom had two failures by the vaginal approach. They were quite easily cured on their third operation through an abdominal trans-vesical approach.

Figures 6.72–6.74 show some examples of re-repairs.



**Figure 6.72**

a) A small recurrent fistula at another common site, at the top of the vagina on the side, this time on the right hand side. Access to these can be difficult and an episiotomy might be helpful. b) The fistula has been mobilised and released off from the lateral pelvis and now repair is easy. Be careful of the ureter. I always give lasix to see if it is close to the margin or outside the bladder.



**Figure 6.73**

a) This appeared to be a small corner fistula at about the level of the bladder neck. b) However at the dye test there were multiple small fistulae. The whole area was excised to get back to good healthy tissue which was repaired under no tension. The patient was then cured.

## How Many Times Can One Go on Attempting a Repair?

The chance of successful repair diminishes with each attempt, but, as long as there is some reasonable tissue and enough bladder and urethra to function, it is worth going on. I have seen a repair succeed and the patient cured after 12 attempts by various surgeons. In many patients, however, it will unfortunately be obvious from the degree of scarring, size of bladder and poor urethra that multiple attempts are not appropriate. I stop attempting to repair when the bladder is too small ever to be continent, although I must admit that I have had a handful of patients with tiny bladders who begged for another attempt and did get cured and became dry. Voiding small amounts frequently, they were happy.

## Does HIV Status affect Success?

This is a big unanswered question. Clearly, it would not be sensible to operate on someone who is sick with AIDS, but one sometimes wonders if an unexpected breakdown might be due to a reduced immune status. Brian Hancock has had four patients who had repeated unexplained breakdowns after relatively simple repairs. Two were HIV positive and two were not. I've had a few simple recto-vaginal fistula cases break down unexpectedly and then tested them for HIV. They were all positive with a low CD4 count. It is now recommended that HIV be tested before every repair (depending on the government policy in your country). Test the CD4 counts if they are positive and operate when the CD4 is above 300. Occasionally I have operated with a low CD4 count, and the chance of breakdown is higher; more so with more difficult cases and rectal cases. The lowest CD4 count I have operated on is 70. The patient was cured, but it was a small, midline, non-scarred bladder fistula.

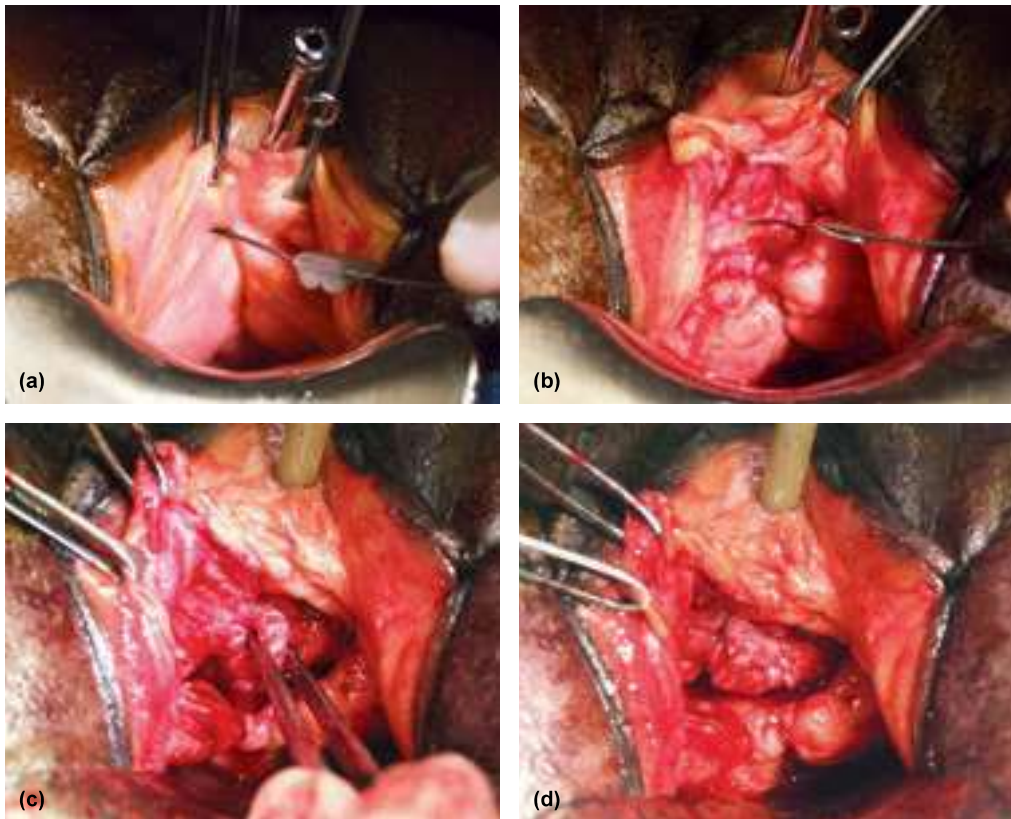
## Other Infections?

Occasionally I see tuberculosis of the bladder causing a fistula. Patients usually give a history of spontaneous onset of continuous leakage of urine, not preceded by a long labour. On examination there is no cancer causing the fistula and the tissues feel supple. A biopsy reveals the granulomas of bladder tuberculosis. Sometimes we see breakdowns over multiple sites, usually clustered pin hole breakdowns making a watering can appearance of the old repair site. This is almost always a breakdown due to an infection such as tuberculosis.

More recently I have been screening patients for schistosomiasis. I have found several patients with unexplained breakdowns, that is patients with small midline fistulae, seemingly good tissues, HIV negative but who kept breaking. They tested positive for schistosomiasis and after treatment were cured with the next operation!

## Results of Re-Repair

With repeat operations, results do decrease. In an unpublished series from Ethiopia I did in the early 2000s I found a 75% closure rate but a 52% ongoing incontinence rate at the second operation. If that failed, the closure rate reduced to 50% and ongoing incontinence rate to 75% with the third operation. However with the new surgical principles and the utilisation of flaps and slings the success rate has increased.



**Figure 6.74**

a) Another small corner fistula at the bladder neck, situated against the bone. b) It's now mobilised and released from its attachment to the pelvic bones. The margins were trimmed slightly and repaired. c) A fibro-muscular sling was placed over the repair to act as a graft and to help prevent post-repair incontinence. d) Fibro-muscular sling in place.

## URETERIC FISTULAE

Ureteric fistulae are increasingly common. In Brian Hancock's series from Uganda, about 5% of fistula patients had a ureteric fistula and correspondence with Addis Ababa Fistula Hospital indicates that they are seeing more and more. In my practice around East Africa I am certainly seeing more as the years pass.

Ureteric fistulae almost always follow a caesarean section. Fortunately more women are getting medical help in labour now compared to say 20 years ago, but unfortunately the doctors or health officers performing caesareans have not been trained adequately and many of these ureteric injuries could have been avoided. Many people doing a caesarean do not reflect the bladder at all or reflect it inadequately before incising the lower segment; when they repair the lower segment they incorporate the bladder and/or ureter in the suture line which results in a vesico-cervical fistula and/or a uretero-vaginal fistula. Sometimes this is hard to avoid with a difficult caesarean after a long obstructed labour, poor instruments, no assistant, no lighting and extension of the lower segment incision laterally to the blood vessels and ureter.

However you can reduce the risk by reflecting the bladder before incising the lower segment. It takes only a matter of seconds to do.

Other cases of ureteric fistula occur after emergency hysterectomy for a ruptured uterus. Considering the difficult conditions and the inexperience of many doctors called upon to treat ruptured uterus in rural areas, these injuries are understandable. Any urine leaking into the pelvis will soon find its way out between the sutured vaginal vault and the cervical remnant.

A ureteric fistula can similarly be caused at elective hysterectomy, usually for large fibroids where the normal anatomy is distorted and the ureters have been pushed into all sorts of unexpected positions. A hysterectomy for a large cervical cancer can cause similar problems and a ureteric fistula may occur.

The fourth cause of ureteric fistula is unrecognised injury to a ureter at the time of a vesicovaginal fistula repair. In this situation, it may be possible at a later date to catheterise the ureter from the vagina and implant it into the bladder transvaginally. If you can't catheterise the ureter vaginally you will need to reimplant it abdominally as there will be a stricture in the ureter that needs to be relieved.

If the patient has several living children, and an abdominal operation is planned, the option of tubal ligation should be discussed. It is easy to do this at the same time as the ureteric implantation.

Diagnosis of ureteric fistulae is discussed at the end of Chapter 2. An ultrasound scan showing a distended ureter on one side is helpful confirmation. However, it is essential to confirm again on the table that the dye test is really negative and that clear urine appears in the vagina after giving furosemide. In partial injuries, the leak can be very small. If there is dye in the vagina then there is a fistula to the bladder, if the urine in the vagina is clear, it is from the ureter.

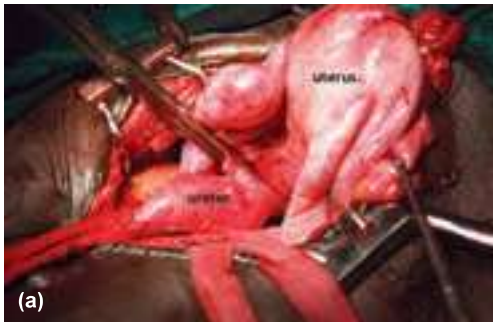
The affected ureter must be identified in the pelvic side wall and traced down to the point of injury. Four times out of five the affected ureter is found to be dilated, and thickening and can usually be felt at the site of injury. If the ureter is draining very freely into the vagina, it will not be dilated but this is more rare, there is usually some scar causing a stricture which in turns causes hydronephrosis. The most reliable method of confirming the site of injury is to open the bladder and look inside at the ureteric orifices. Intravenous furosemide 10mg should be given and the non-functioning side identified. Exceptionally, a partial ureteric injury (e.g. after a previous repair) may still produce urine into the bladder and leakage from a tract into the vagina—but it won't leak nearly so much as the uninjured side.

If the diagnosis and the side that the ureteric fistula is on are certain, some surgeons prefer an extraperitoneal approach, but I prefer a midline incision. The abdominal approach is usually quite easy, and the results are uniformly successful.

I sometimes have difficulty implanting the ureter into the bladder with no tension. This is because the ureter is stiff and scarred from the longstanding hydronephrosis and the bladder can be small and stuck due to adhesions. Twice I've had to call on a urologist friend to make

a new ureter out of small bowel to enable it to reach. On two other occasions we've tunnelled the ureter to the other side and implanted its end to the side of the contralateral ureter (end to side anastomosis). To reimplant it into the bladder without tension you can follow the following principles:

1. Fully mobilise the contralateral side of the bladder and support the anastomosis with a psoas hitch stitch.
2. Make a tube out of the dome of the bladder (Boari's flap) or incise the bladder transversely but repair it longitudinally.



**Figure 6.75**

a) A very dilated ureter. It has been clamped as close to the cervix as is safely possible. b) The ureter has been cut, and note has been passed through the broad ligament to get to the bladder. The bladder has been opened and the forceps had punctured a hole in the bladder at an appropriate place to implant the ureter. c) The ureter has been introduced into the bladder. d) The ureter is sutured into the bladder. This one is dilated, but if it is not you can spatulate it (make a small longitudinal incision) to make the anastomosis wider and reduce the chance of stricture. e) The bladder is closed.

The steps of the operation are shown in Figure 6.75. I always stent the implanted ureter with a ureteric catheter, but some urologists don't, especially if the ureter is dilated and implanted with no tension. The distal end of the ureteric catheter can be brought out alongside a urethral catheter or through a separate stab incision in the anterior bladder wall. The ureteric catheter, if used, can be removed on days 7–10 and the urinary catheter removed on day 10–12.

## Further Reading

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## 7 RECTO-VAGINAL FISTULAE

A recto-vaginal fistula (RVF) is produced only in the most prolonged episodes of obstruction, and so is usually associated with a severe vesico-vaginal fistula (VVF) which is more likely to be circumferential and more scarred. It is more likely the patient has foot drop or other neurological damage. Isolated RVFs due to obstructed labour are extremely rare, around four per thousand obstetric fistula cases. Isolated RVF cases are more likely to be caused by sexual violence in war situations or in under-age marriage and rape, or a fourth degree perineal tear that was repaired incorrectly or broke down.

Anal sphincter tear (perineal tears extending through the sphincter and anal mucosa—grade 4 perineal tear) usually occur in isolation unrelated to obstructed labour, and should not be classified as RVFs. They sometimes do occur in association with a VVF but more often than not they occur after a precipitous labour, not an obstructed one. Remember that the anal canal is about 5cm long so the tear needs to be quite extensive before it enters the rectum. Tears are dealt with in Chapter 7—Recto-Vaginal Fistulae.

### Incidence

The exact incidence of RVF is difficult to determine, because some surgeons classify sphincter injuries as RVFs, where strictly the term should be reserved for a recto-vaginal communication causing a fistula, not a tear. However, a few rectal injuries do involve the lower rectum and sphincter complex to some extent. Also, if surgeons have been selective in avoiding the most difficult VVFs, the excluded cases will have a higher incidence of RVF, and so the true incidence will be underestimated.

The highest incidence is reported from the Addis Ababa Fistula Hospital, where 15% of VVF patients operated upon had an RVF as well. This was back in 1993 and the picture has since changed. An unusual incidence of isolated traumatic RVF in under-age brides has been reported from Ethiopia. In Bahr Dar, northern Ethiopia, the incidence of combined fistulae is 8.4%. The figure for Uganda is lower, at 3.3%. The difference between Ethiopia and Uganda can be explained partly by the much lower incidence of caesarean section in the Ethiopian fistula patients (15% v. 65% in the late 1990s).

Those patients who eventually deliver vaginally suffer more ischaemia than those whose obstruction is relieved by caesarean section. The average length of labour in women who sustain an RVF with a VVF is a full day longer than those who just sustain a VVF. Thus, the incidence of RVF in those delivered by caesarean section is similar in Ethiopia and Uganda at about 2%, whereas for those with fistula injury who delivered vaginally, the RVF percentage is higher, at 5.2% in Uganda and 9.3% in Ethiopia. ( $p = 0.001$ ).

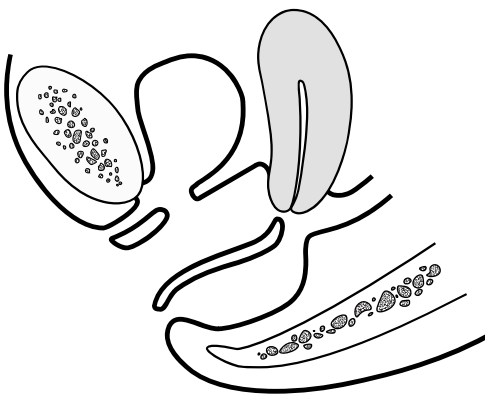
## Classification

An objective classification of RVFs is based on the distance from the site of the hymen to the distal margin of the fistula, as described by Judith Goh (see Chapter 1—Classification of Obstetric Fistulae). An estimate is made of the size and the amount of scar surrounding the defect. Although type 1 RVF sounds as if it should be easier to repair, these are often the most challenging as they are high in the vagina and often stuck to the sacral promontory. They often have tight stricture making mobilisation difficult and the risk of bleeding high, whereas the low ones are much more accessible. The only concern with low ones is the patency of the anal sphincter and whether you need to repair that as well.

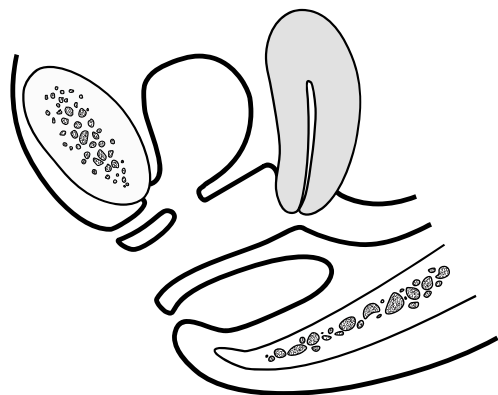
## Assessment

It is important to recognise that scarring will distort the anatomy of the rectum. A careful assessment by rectal examination is just as important as a vaginal assessment, paying attention to the site, size and degree of scarring. It is common for a fistula felt in the mid-vagina to feel higher than expected on rectal examination. If there is difficulty, a probe should be passed through the vaginal opening to feel where it comes into the rectum. What appears to be a small hole on digital examination may be found at operation to involve almost half the circumference of the rectum. The lumen of the rectum at the level of the fistula must be assessed carefully. Narrowing may well be present often at the proximal margin of the fistula, (Figure 7.1) and this will influence the method of closure so as not to occlude the lumen. Exceptionally, the rectum is completely blocked just distal to the fistula. (Figure 7.2)

The status of the anal sphincter should be recorded. The resting tone, the squeeze pressure and the quality of the pubo-rectalis sling should be estimated.



**Figure 7.1**  
A high RVF with a band of scar on the posterior rectum, creating a stricture in the lumen.



**Figure 7.2**  
Rarely the bowel distal to a scarred fistula can be completely closed off.

## Does Every RVF Need to be Closed?

Not all RVFs need to be closed. The symptoms of RVF vary from complete faecal and flatal incontinence to none. It is often surprising that some patients with a moderate-sized RVF report very little leakage unless they have diarrhoea. Some with tiny fistulae may deny any symptoms at all. There is no point embarking on a potentially difficult repair if the patient has no symptoms. These 'asymptomatic' RVFs are usually pulled tight in a band of scar on the posterior vagina. When you release the scar to gain access to repair a VVF, the RVF may spring open and the patient will be incontinent unless you repair it. If this does not happen and it is not a concern for the patient, don't repair it and run the risk of making her worse.

In spite of every care, a small RVF may be discovered unexpectedly while repairing a bladder fistula, by the appearance of bubbles from the rectum into the vagina, flatus bubbling through the urine pooled in the vagina. If the RVF is easily accessible, it can be repaired after the VVF. I have missed a high RVF a couple of times while doing a VVF repair, the symptoms only coming about after releasing the scar intra-operatively. The patient became incontinent after the operation. In both cases the VVF healed well and I repaired the RVF at a later date.

The discovery of a larger RVF during an operation is an embarrassing error of pre-operative assessment, and its management depends on its site and size and the experience of the operator. As the RVF was missed the bowel would not have been prepared properly before the operation so faecal contamination of the operation site is high. You need to stop the operation and perform an enema before proceeding.

## Which Rectal Fistulae Require a Colostomy?

Colostomies are used far too often for RVFs—a decision about a colostomy should be made only by the surgeon who is going to do the repair, and they are rarely required. I often find patients who have had a colostomy in the peripheral hospitals for a very small RVF or even perineal tears. It definitely wasn't needed and just puts the patients through unnecessary operations and potential morbidity. To live with a colostomy is probably of equal misery to the patient as living with the rectal fistula, for no ultimate gain. We have all seen far too many badly made colostomies that have prolapsed, adding even more to the patient's distress.

Provided that the surgeon believes that the fistula can be closed securely with healthy mobile margins, preferably in two layers, there is no need for a colostomy.

Experienced surgeons recognise that some RVFs that are high, large and surrounded by scar are going to be very difficult to close securely, and feel happier if a colostomy has been made. Colostomies do not increase the chance of healing—they simply lessen post-operative complications of sepsis or peritonitis should a major breakdown occur. I have only performed two colostomies for RVF patients in the last 10 to 12 years. Both were for very high injuries stuck to the sacral promontory and with tight strictures.

A strategy that Brian Hancock found to work for the high difficult fistula is to do as much as possible of the mobilisation trans-vaginally and then to open the abdomen and complete the repair from above. It is then much easier to perform an accurate two-layer closure, for which it is no longer necessary to perform a colostomy. I do these repairs from below and prefer to have a colostomy to prevent faecal spillage into the peritoneal cavity during the operation. As the injury is so high, the peritoneum is routinely entered and if there is a leak in the suture line, faecal matter would then enter the peritoneal cavity directly.

On the rare occasions when a colostomy is considered, it should be performed about 2 weeks before planned closure, but may exceptionally be done at the time of the repair if unexpected difficulties occur. (See Chapter 13—An Injured Rectum)

Sometimes, a patient is seen very soon after her birth trauma, and examination reveals a large sloughing VVF and rectal defect. These patients are often unable to walk because of nerve damage. It is controversial whether a colostomy is advisable in this situation. It has been traditional to perform one in the hope that this will make it easier to care for the patient. However, as colostomy bags are usually not available, it will not make any difference. When the time comes to perform the repair, the rectal fistula may be much smaller—and thus it turns out that a colostomy would not have been necessary. Many colostomies performed in these circumstances in the rural areas may never be closed and as colostomy bags are often not available it makes the woman even more miserable. Unpleasant as it is to leak faeces from the vagina, leaking from the abdomen without proper colostomy bags is not that much better. The patient just needs to clean regularly and have the RVF closed as soon as possible.

## Performing a Colostomy

If a colostomy is necessary, the preference is that it be made with the sigmoid colon. Make a small oblique incision left of the umbilicus on a line made between the anterior superior iliac crest and the umbilicus. Make the incision on that line just on the lateral margin of the rectus sheath and muscle. This minimises the risk of colostomy prolapse. In the cases that we have seen, the main reasons for prolapse are that the transverse colon has been used or that the stoma has been brought out through too large a hole lateral in the rectus muscle.

To minimise the risk of prolapse, we recommend the following steps:

1. Use the sigmoid colon.
2. Choose the proximal sigmoid colon where it is not too mobile.
3. Bring a loop out through a small defect that comes through the lateral rectus muscle. The defect in the skin and rectus sheath (the rectus fibres are split) should be just enough to admit two thumbs comfortably.
4. The bowel loop should be secured in position incising about 5cm longitudinally through the teania coli and everting the edge of the bowel to itself and securing it to the skin.

A massive prolapsed colostomy is a disaster. (Figure 7.3)



**Figure 7.3**  
a) and b). Two examples of massively prolapsed colostomies causing the patients much distress.

## Strategy for Repair of a Double Fistula

Most of the time the RVF and VVF should be repaired at the same sitting in the operation theatre. It doesn't really matter which you repair first, the VVF or RVF. Most surgeons start with the VVF and then do the RVF. If you repair the RVF first then you will probably be retracting on the RVF with an Auvards or Sims speculum while you repair the VVF, which may damage it.

Most double fistulae have significant scarring and vaginal stenosis which needs relaxing incisions and/or episiotomies to gain access to the repair. In the more severe double case there is often a deficiency of vaginal skin making covering the vagina, either anteriorly, posteriorly or both, difficult. When the cases are this severe I am now leaning towards staging the operation, doing the RVF and a posterior vaginal reconstruction first and then doing the VVF some weeks or months later. I do get better success doing it like this than doing too many flaps to get the bladder, bowel, anterior and posterior vagina closed in one sitting. Many flaps can put a strain on the blood supply and perhaps lead to sloughing of the distal margins of the flaps. This of course leads to a repair breakdown, so I err on the side of caution and do it in two stages. If I do stage the operation I always do the RVF first to make the patient continent of faeces and thus keep potentially infective faecal matter away from the healing VVF.

## Preoperative Preparation

It is desirable that both the rectum and left colon be empty. My practice is to allow fluids only on the day before operation and to give an enema morning and night the day before. An oral purgative such as sodium picosulphate (picolax) or mannitol is very helpful but not always available so a simple soap and water rectal enema is commonly used. Before the anaesthetic is administered, a check should be made that the rectum is empty. If it is not the operation should be deferred or the patient asked to go and empty her bowels or perform an enema in theatre. It is not uncommon to find faecal spillage when you start the operation. Always stop and

perform a good enema on the operation table, scrub again and proceed if there has been faecal contamination. It is a good idea to continue the antibiotics for 24–48 hours in addition to the intra-operative doses.

## Technique

As for VVF repair, the first essential is very good exposure. (Figure 7.4)



**Figure 7.4**

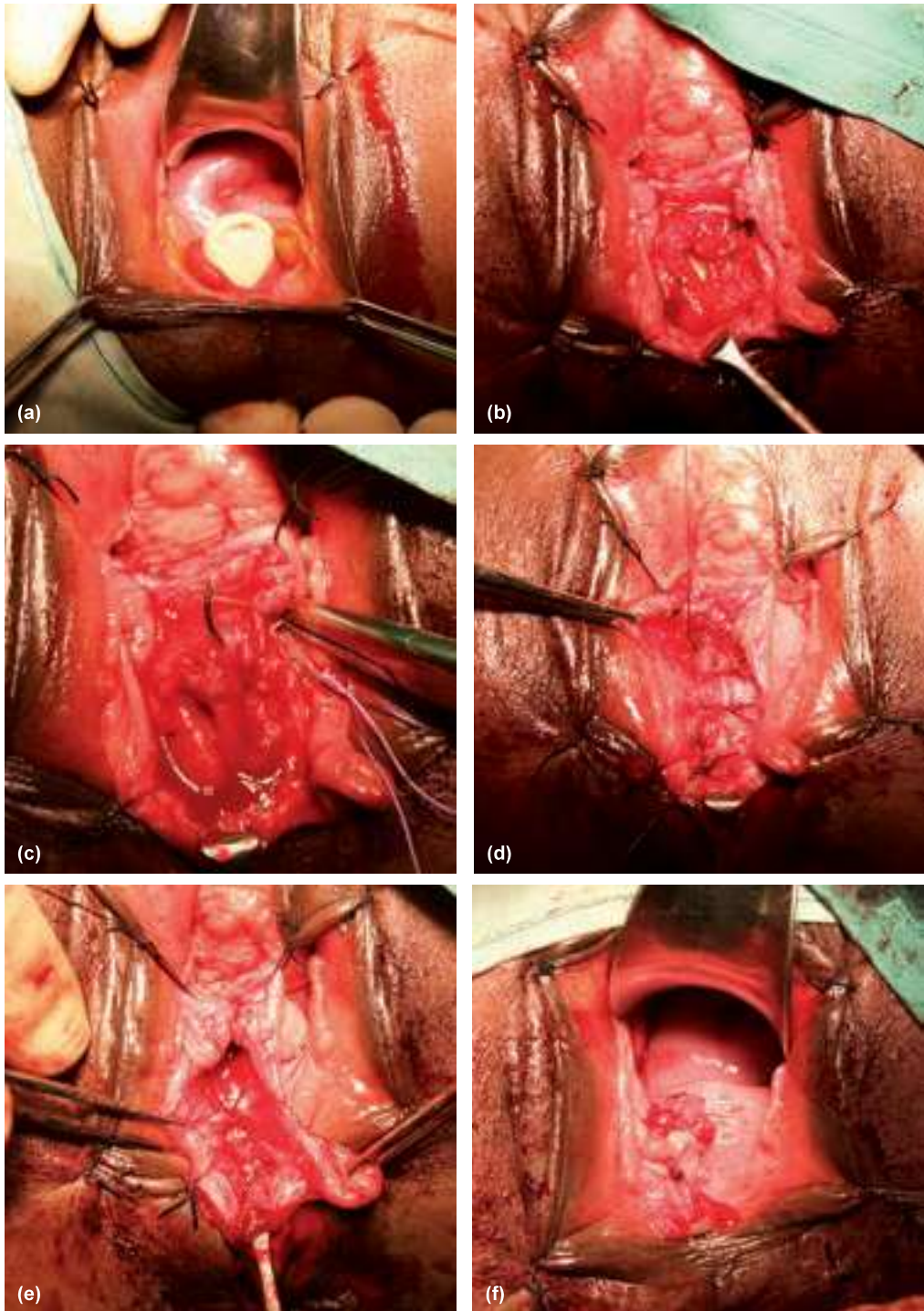
A bilateral episiotomy was needed to gain access. The vagina was almost completely occluded by scar making access very difficult. The episiotomies bring the RVF into clear view.

The repair of a simple low RVF is illustrated in Figure 7.5. This was caused by trauma in an under-age marriage.

If available, suction is helpful, as blood (and urine) accumulates in the operative field. It also helps to reduce the Trendelenberg tilt for RVE, to bring the posterior vagina into view.

When adequate exposure has been achieved, an incision is made around the fistula and laterally from each angle, similar to the incisions made for a VVF. As with a VVF, the mobility is obtained from the proximal dissection rather than distally.

Not all RVFs are as simple as the one in Figure 7.5. Most are involved with thick scar. The lateral margins are the most difficult to mobilise, as they are frequently bound by scar. (Figure 7.6) Generous cutting through scar lateral to the fistula and aiming posteriorly may lead one into the para-rectal space just lateral to the fistula. Bold cutting with strong scissors is required to free up scar, and it helps to insert a finger frequently into the lumen of the rectum through the anus to guide the dissection and ensure you are not entering the rectum. Often there is thick scar around the fistula. Excise this to free the soft rectal and anal muscle and mucosa beneath. More mobility is obtained once the scar is removed.



**Figure 7.5**

a) Low RVF just above the sphincter. b) The RVF has been mobilised. c) Repair with interrupted sutures taking full thickness bites of the muscularis, excluding the mucosa. d) The first layer is completed. e) The second layer. f) The vagina is repaired.



**Figure 7.6**

Note the bilateral episiotomies to gain access (and note absent urethra). The RVF is seen stretched to each side of the pelvis where it is adherent in dense scar. This needs to be freed adequately and the thick scar excised to repair healthy tissue in two layers.

As the posterior vaginal wall is shortened, the pouch of Douglas is often opened during the superior dissection. This is an advantage, as the rectum becomes more mobile and assessable. Significant bleeding during a rectal dissection indicates that one has strayed into the rectal wall. If the peritoneum is entered I tend to close it as soon as enough mobility is obtained. The patient is often in slight Trendelenburg tilt and the blood and urine draining into the vagina then drain into the peritoneal cavity where they can cause a prolonged ileus after the operation. Worse still is if there is faecal spillage into the peritoneal cavity.

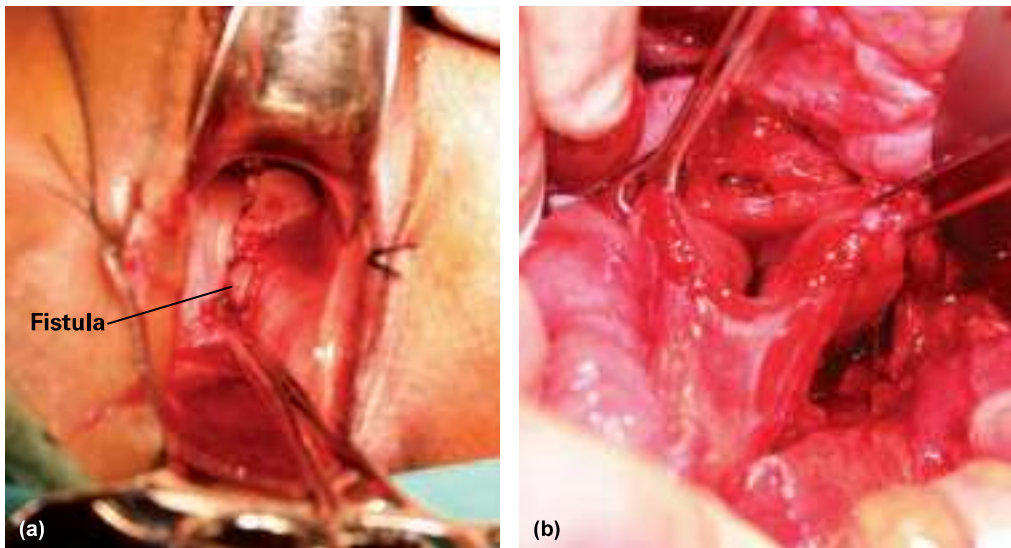
It is usually appropriate to close the rectal defect transversely, and it is probably best to aim for two layers. Placing sutures accurately in a difficult RVF is not easy, so the second layer will give extra security (5/8-circle needles are most helpful). If a colostomy is present then a good single layer is sufficient.

After the repair has been completed, it is essential to check that the lumen is adequate by palpation per rectum. As the rectum is a capacious organ, a degree of narrowing is acceptable, provided that it will admit two fingers. Exceptionally, the rectum is so stenosed on initial assessment that it requires a complete resection and end-to-end anastomosis. (Figure 7.2) A few surgeons have developed the skill of performing this resection entirely trans-vaginally. This is very demanding, and few can do it confidently.

Some surgeons would consider a purely abdominal approach. For an experienced colorectal surgeon working in ideal conditions, a resection and end-to-end anastomosis is not difficult. However, in the average rural operating theatre with suboptimal lighting and instruments, this is quite another matter. It is important to appreciate that the usual bloodless fascial plane that is used to dissect the rectum and mesorectum out of the pelvis will be obliterated by scar at the site of the fistula. There is a real risk of opening the rectum where it is densely adherent to the sacrum, or of entering the presacral veins during this dissection. (The emergency management of presacral bleeding is to use a sterile drawing pin. It is pushed through the bleeder into the sacrum—it will do no harm. Failing this, one has to pack and come out.)

There are occasions where the combined vaginal and abdominal approach is very helpful. In spite of persistent mobilisation from below, it is sometimes not possible to close a very high defect in the rectum securely. After opening the abdomen, it is often easy to complete the repair from above, most of the mobilisation already having been done. (Figure 7.7)

Recto-vaginal fistulae are usually involved with more vaginal scarring and after releasing and sometimes excising the scar tissue there might be very little vaginal tissue to reconstruct the posterior vaginal wall. Flaps such as rotational gluteal and Singapore flaps can be used. If not well covered the scar tissue will contract up again, stenosing the vagina causing dyspareunia or even apareunia.



**Figure 7.7**

a) A high RVF. The distal end could be mobilised vaginally but the proximal end was difficult to reach. b) It was readily exposed by the abdominal route. This was easier because the distal margin had already been mobilised vaginally.

## Results of Rectal Repairs

It is most surgeons' experience that the results of repair are good, although it is not known how many cases are turned down because of severe injury. In a series of over 100 RVF patients (found in over 1,000 consecutive obstetric fistula patients), 98% successful closure and continence was recorded at the first operation.

The success rate for the concomitant bladder repair with the RVF is much worse. Less than 50% are discharged dry from the associated VVF as an RVF is usually associated with a scarred, circumferential VVF involving the urethra, which has a poor prognosis. It is rare to find a juxtacervical fistula in association with an RVF.

Finally, it must be emphasised that surgery for high RVF is demanding, and should not be undertaken lightly by inexperienced surgeons. Only the low fistulae are relatively easy.

## Further Reading

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## 8 REPAIR OF ANAL SPHINCTER INJURIES

### Immediate Repair

Anal sphincter tears seen within 24 hours of delivery should be repaired at once. This is not a minor operation. The patient's future continence depends on the skill of the repair.

It is important when carrying out the repair to realise that torn anal sphincters retract to the 3 and 9 o'clock positions.

The repair must be carried out in an operating theatre with good lighting, instruments and assistance. Repair under local anaesthesia is possible, but it is better to have the patient under a spinal or general anaesthetic. The patient should come to theatre with an empty rectum.

The ano-rectal mucosa are closed first; then the torn ends of the external sphincter are identified (the internal sphincter cannot be identified as a separate layer). These ends have to be sutured accurately, taking quite big bites using a slowly absorbable suture (preferably 2-0 PDS; if PDS is not available then a heavy vicryl or dexon). Two to three sutures are needed. The perineal body is then repaired followed by the vagina and perineal skin.

### Secondary Repair

If the repair cannot be performed immediately, it is best to wait several weeks but most patients present some years after their injury. Sometimes, patients with an old complete tear say that they have no symptoms, so it is important to be sure that a patient really does have troublesome faecal leakage before recommending repair. In the best hands, over 90% of repairs restore complete continence. There is a one year follow up study underway at the moment and the interim results actually show a 95% complete continence rate.

Because the torn ends of the sphincter will have retracted round half the anal circumference, simply freshening the margins of the tear and suturing them is unlikely to give a good result. The correct procedure is illustrated in Figure 8.1.

First identify where the ends of the anal sphincter are likely to be. This is not difficult as the torn ends of the sphincter pull on the overlying skin and cause a dimple. There are also creases in the skin, radiating out from the anus where the underlying anal sphincter is contracting. Where these lines end is where the torn ends of the sphincter lie.

It is helpful to use a liberal amount of 'jungle juice' (a dilute mix of lidocaine with adrenaline) to help with dissection and bleeding. It is a vascular area and the adrenalin in the jungle juice certainly helps to maintain haemostasis and it also helps to find the tissue planes by hydrodissection.

Place Allis forceps on the vaginal verge at the level of where the posterior forchette will be—usually just over the level of the torn sphincter. Pull the Allis forceps together to ensure that the perineal and forchette look normal at that level. A common mistake is to make the perineum far too long, causing pain and dyspareunia. Make your incision along the junction of the anal and/or rectal mucosa and then along the junction of the perineal skin and anal mucosa to the level where the ends of the anal sphincter lie.

Mobilise the vagina off from the anus, free the perineal body from the skin and free the anal mucosa slightly. Then undermine the skin over the anal sphincter and grab the anal sphincter with Allis forceps. Make sure it is nicely mobile but remember that the nerve supply to the anal sphincter comes in at 5 and 7 o'clock, so do not mobilise beyond here.

Once both ends of the sphincter are mobile you are ready to suture. It is useful to keep one Allis forcep on either end of the torn sphincter and hold it out of the way by using an artery forcep to secure the Allis to the drapes laterally. This will ensure that you don't lose the sphincter while you repair the anus/rectum.

First repair the anus with 2–0 vicryl in two interrupted layers taking good bites of the muscularis. The sphincter can be repaired end to end, or by an overlapping repair, or some people even mobilise the internal and external sphincter separately and repair them separately. Sometimes you can define the internal and external sphincters well as the internal sphincter is more white, being smooth muscle, and the external sphincter is more red being striated muscle. I just repair the sphincter end to end with a slowly dissolving 2–0 PDS suture and get good results at one year follow up. Others argue that the overlapping technique is superior. For patients with chronic injuries the question hasn't been settled.

Then rebuild the perineal body with the remaining PDS and lastly repair the vagina and perineal skin. I use a continuous locking suture to the vagina as the locking suture helps maintain the vaginal length, and I use interrupted sutures to the perineum. On the rare occasion an infection will occur in the wound site and if there are interrupted sutures it is easy to remove one suture and let the pus drain. But if a continuous sub-cuticular suture is used, then this can't be done.

Gently pack the site and leave a Foley catheter in place. The pack and catheter can be removed the following day. I ask patients once they are mobile to have gentle washes twice a day and pat dry, just to keep the wound clean.

The patient is usually kept on fluids only for the first post-operative day, then a light diet on day two. A full diet with a mild laxative can be given on the third day. I discharge them when they are eating well, passing stool normally and are comfortable.

## Ongoing Problems

Some patients will return to you still complaining of incontinence after they've had a perineal tear repair. When you examine them the perineum is intact, but if you look closely, you will see that the skin over the anterior anus is smooth and it doesn't have the radiating lines which signal a contracting sphincter underneath. Either the sphincter has torn apart again or the sphincter wasn't identified and repaired properly at the first operation.



**Figure 8.1**

a) A fourth degree perineal tear. The Allis forceps are showing the location of the end of the torn sphincter on the left.

b) Grasping where the two ends of the sphincter are, bring them to meet in the midline. The perineum and posterior fourchette looks normal.



c) Incised along the junction of the vaginal and anal mucosa to the site of the torn ends of the sphincter.

d) Mobilise.



e) Grasp the end of the torn sphincter. It's located just adjacent to the distal anal mucosa. Mobilise both ends, left and right.

f) Repair the anal mucosa with interrupted sutures from the apex to the anal verge.



g) Anus repaired in two layers.



h) The anal sphincter is repaired with 2-0 PDS.



i) Vagina and perineum closed.



**Figure 8.2** (above)

The patient originally had a fourth degree tear that was repaired at delivery and only the perineal skin was sutured. The sphincter remained torn, the apex of the tear wasn't repaired and she had a small skin bridge over the perineum.

A small operation is needed to mobilise the sphincter again, preferably with a slowly absorbing 2-0 PDS suture. To do this, infiltrate the perineum and around the anus with saline or jungle juice, incise in the midline along the perineum and undermine the skin laterally off the perineal body and down over the anal sphincter. Grasp the muscle tissue just laterally to the anal canal either side and repair this. You sometimes find that after mobilisation there is a defect on the anal verge, just into the mucosa. Repair this before you repair the sphincter. After repairing the sphincter, rebuild the perineal body over the top and then the skin. Post-operative management should be the same as for a fourth degree tear. (See the final paragraphs of Secondary Repair above)

You will also find many patients having had a tear repaired incorrectly. The apex of the ano-rectal defect might not have been secured and a recto-vaginal fistula (RVF) results. I often see cases where only the skin over of the perineum has been repaired so all that remains is a skin bridge over the perineum, an RVF behind and the sphincter still avulsed. It is best to cut the skin bridge open to recreate the fourth degree tear and do a formal repair. (Figure 8.2)

## 9 MANAGEMENT OF POST-REPAIR INCONTINENCE

It is one thing to be able to close a vesico-vaginal fistula, but another matter to make a patient continent. We can close over 90% of cases and experienced surgeons approach 98%, but at least another 15–20% will have some incontinence. For half of these it is so bad that they are still totally wet. This has been under-reported as is evident from independent assessments of results from places quoting very low ongoing incontinence rates. When the patients are examined properly and independently some centres actually have up to 45% of patients going home still leaking to some degree. The harder you look for this problem, the more you will see. This 'incontinence gap' is a source of great frustration to fistula surgeons. Its cause is not hard to see.

The most important part of the urethra for maintaining continence is the middle section of the urethra. Here the urethra generates most pressure to keep the urine inside the bladder. The pubo-urethral ligament inserts here and there is also a thickening of muscle called the rhabdosphincter. If this has been damaged or destroyed in the long labour, then maintaining continence is troublesome if not impossible even after the fistula is closed. You can recreate an anatomically correct urethra and bladder neck but without the ligaments and muscles, it will have no physiological function.

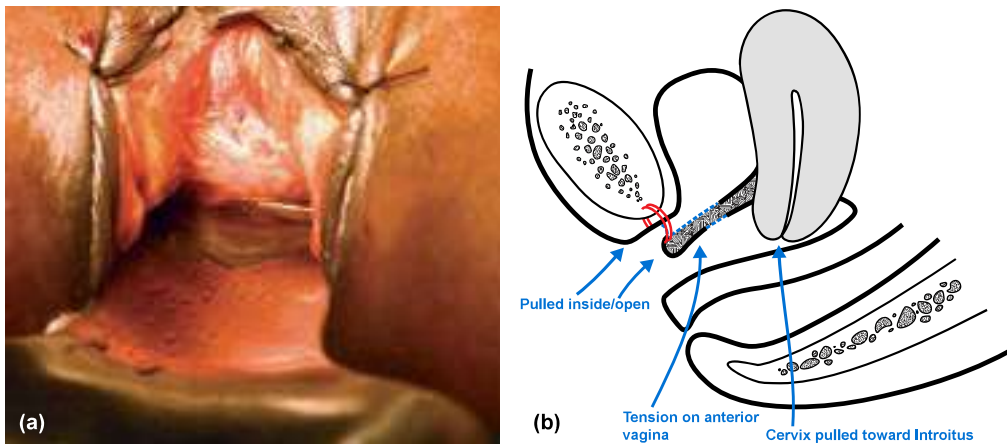
The normal length of a female urethra is 3–5cm, the average being 4cm. In my series, 35% of patients have the fistula less than 2.5cm from the external urethral orifice (Goh types 3 and 4). These have the worst prognosis for ongoing incontinence after repair. Indeed 60% of patients have their distal fistula within 3.5cm from the urethral orifice (Goh types 2, 3 and 4). All of these patients will have the continence mechanism of the urethra either completely or at least partially destroyed. Scarring around the fistula often keeps the urethra rigid and open. It is often denervated as well.

Bladder function may be disturbed in several ways. The bladder size can range from normal to severely reduced. Its compliance can vary, ranging from being atonic with chronic retention and overflow to unstable with frequent abnormal pressure waves causing detrusor instability (now called overactive bladder), leading to sensations of urgency and to urge incontinence. Other patients have a small rigid, non-compliant bladder secondary to scarring and substantial loss of bladder tissue.

Patients with ongoing incontinence have been studied urodynamically. Roughly 40% will have genuine stress incontinence (GSI), 40% will have GSI combined with overactive bladder, 14% will leak from a small, stiff non-compliant bladder and the remaining 6% will have retention with overflow.

I have developed a special interest in the management of this ongoing incontinence, and this chapter will focus on my preferred operative procedures and management. The techniques have

evolved over the years. Previously the operation focussed on the urethra and trying to make it as anatomically normal as possible, creating a normal length and width. Then we introduced a supportive sling of autologous material, trying to recreate the pubo-urethral ligament. Combining these two principles I would get a 70% dry rate for fistula patients with ongoing incontinence. Recently my thinking has changed to not only include the urethra and sling, but also to focus on the vagina. This thinking is based on the integral theory of female urinary incontinence. If at repair the vagina is pulled together under tension, the result is a short, stiff and scarred vagina. This will pull and hold the urethra open and the patient will leak continually through the fixed open urethra. (Figure 9.1) By making sure the vagina is lax and supple, my success rate has increased. At the moment I only have a series of around 200 patients, but these women were the most severe of all cases, leaking all the time, with dreadful short, scarred vaginas, and urethras retracted into the vagina. All of the 200 patients had been operated on in other centres up to nine times before and many times the operation was for ongoing incontinence. Everything else had failed. If I had just followed the first two principles—making the urethra a normal length and width and creating a suburethral sling, only 26% of such severe cases would have been cured. By doing the same but making sure the vagina is reconstructed under no tension, 70% are completely dry and nearly all of the remaining cases improved.



**Figure 9.1**

a) A patient with complete incontinence after fistula repair. Note the urine pouring through her urethra and pooling in the vagina. Her urethra was less than 1cm long and she had a very short anterior vaginal wall, less than 3cm. b) In diagrammatic form.

In summary the surgical management of ongoing incontinence follows these three main principles. You'll find that at least one principle will need to be applied to any specific patient and in some, all three will have to be addressed if the patient is to have a chance of being cured. These principles are:

1. Reconstruction of the urethra to be a normal length and width.
2. Reconstruction of the pubo-urethral ligament.
3. Reconstruction of the vagina so there is no tension on the anterior vagina.

Other surgeons have different approaches and they will be briefly discussed later in the chapter.

The management of post-repair stress incontinence falls under four headings:

- Immediate Assessment
- Conservative Measures
- Surgical Management
- Management with a Urethral Plug.

## Immediate Assessment

Frequency and poor control are common just after removing the catheter after the fistula repair, but they often improve rapidly. If the patient is still wet after 48 hours, and assuming that a dye test has excluded a breakdown and that she is not in urinary retention, she needs to be categorised into one of five degrees of severity:

- 1/5. *Completely dry on strain, walk, rest and sleep and voiding normally.*
- 2/5. *Wet with exertion (coughing or effort).* This often improves over time with pelvic floor exercises.
- 3/5. *Wet on walking, dry on sitting and lying, but can void well.* Again, this can often improve with time and pelvic floor exercises. At 6 months follow up, 50% of these patients will be completely dry just with conservative management.
- 4/5. *Wet on walking, sitting and lying, but still able to void to some extent.* This seldom improves with time, and the patient will need assistance and probably a secondary stress operation. We usually do this after 3–6 months of trial of pelvic floor exercises, as some do improve with time.
- 5/5. *Wet all the time, not voiding.* The patient feels as if she still has a fistula. This rarely improves with time. It is often due to a functionless urethra and will need further management.

The best way to measure objectively how incontinent a patient is is to do a 'one hour pad test'. The full description is in Appendix B but in short, a simple kitchen scale is needed and a pad. Weigh the pad, ask the patient to empty her bladder and wear the pad. She needs to drink 500ml of water and then go through a series of exercises. You then weigh the pad at the end and subtract the original weight of the pad. This will give an estimate of how much she has leaked in the hour. It's very useful before and after an operation for stress incontinence, but results may vary somewhat depending on how hydrated she is before you start the test. To try and make it uniform it is best to do it early in the morning after she gets up, soon after having her breakfast.

## Conservative Management - Pelvic Floor Exercises

In developed countries, there is objective evidence that pelvic floor exercises are of value in the management of stress incontinence. But the benefit has only been shown in motivated patients who have had proper instruction from a professional.

Great importance has been placed in the instruction of fistula patients in pelvic floor exercises. Unfortunately, the women with the worst stress incontinence are those who have ischaemic damage to the pelvic floor muscles as well. One has only to put two fingers in the vagina, and feel the fibrosis in the vagina and levator muscles and ask the patient to squeeze, to realise how little contraction there is. The most severe injuries have had all their pelvic muscles destroyed by the long labour and there are no muscles to rehabilitate at all. Kees Waaldijk terms this the 'empty pelvis syndrome'.

Other patients with stress but with less damage will benefit from instruction—but only if this is done properly. (Figure 9.2) It is essential to put two fingers in the vagina to help the patient to understand what to do and to check on progress. Simple verbal instruction is doomed to failure. The patient should also be taught to examine herself for feedback.

The routine is for the patient to tighten her pelvic floor as strongly as possible for 5–10 seconds then relax. She should continue to breathe normally. The squeeze is then repeated 10–20 times, with gaps of 10 seconds between. The patient should repeat this routine three times a day.

It is difficult to know how many patients are compliant with this regime, but whether they do these exercises or not, many with mild incontinence improve with time. A happy event is that we sometimes see patients going home with moderate stress, but returning later to tell us that the incontinence cleared up spontaneously after a few weeks.



**Figure 9.2**  
Nurses teaching pelvic floor exercises.

## Surgical Management

At least 3–6 months should pass to allow time for spontaneous improvement. A secondary stress incontinence procedure can then be considered. First, the diagnosis must be confirmed by checking that the patient is not in retention and also by doing a dye test. It is very easy to overlook a tiny residual fistula. It may be possible that she has both, a residual fistula and leakage through the urethra. Both need attention. If a dye test is negative, incontinence can be demonstrated by removing the catheter with the dye still inside it: often, the dye then gushes out—if it does not, the patient should be asked to cough, whereupon incontinence is usually readily appreciated.

Examining a patient for stress incontinence should be done without an anesthetic whilst she is standing or lying, and asking her to cough with a full or near full bladder or after a dye test as above. There are many women who leak with cough under a spinal anaesthetic in the lithotomy position who are dry under normal conditions and vice versa. You must confirm urethral leakage before you put the patient under anaesthetic. And you should always repeat a dye test in theatre at the start of any proposed stress operation just to make sure you haven't missed a small fistula.

Having said that, placing cold dye into a bladder and asking patients to cough is not particularly physiological. It is better to examine them when they have a full bladder.

Until recently a simple cystometry was performed to aid selection. The bladder was filled with water through an open bladder syringe held vertically while compressing the urethra. If the bladder pressure was estimated to be more than 20cm H<sub>2</sub>O with only 100cm<sup>3</sup> in the bladder, operation was not recommended. This excluded about one third of patients. Now, all patients are given a chance with the plication and sling, and the success rate (around 70%) has actually increased. Now with the added step of vaginal reconstructions, the success rate is increasing even further.

### Urethral Plication and a Fibromuscular Sling

The aim of the surgery is to lengthen and narrow the urethra and then provide support with a fibro-muscular sling. (the sling is described and illustrated in Chapter 6—Urethral Support with a Fibro-Muscular Sling)

Position the patient as for a fistula repair, and use an episiotomy if necessary. Measure the length of the urethra as follows: insert a Foley catheter; inflate the balloon; pull the catheter until the balloon abuts the bladder neck; pinch the catheter at the level of the external urethral meatus; deflate the balloon; remove the Foley while still pinching it; re-inflate the balloon. The urethral length is from where the Foley is pinched to the balloon. (Figure 9.3a) In Ethiopia, the average length before operation is 1.4cm, which is less than half the normal length. Almost all patients will have a shortened urethra.

After infiltration reflect the vaginal mucosa. Make a horizontal incision through the vagina about 2cm below the external urethral meatus. Extend the incision to the lateral vagina walls. Reflect the vagina distally off the urethra almost to the meatus and either side off the lateral vaginal walls, and suture them out of the way to the labia majora. (Figure 9.2) Dissect a little proximally under the horizontal incision to mobilise the distal bladder. With scissors, dissect the urethra and bladder off from the lateral attachments, opening the para-vesical and para-vesical space on either side.

Great care should be taken, as it is easy to open the bladder here and create another fistula. If this happens, it is usually because the first operation was for a circumferential fistula that was not repaired in a circumferential manner. Re-repair is extremely difficult, but must be attempted.

The next step is to plicate the urethra and distal bladder with three interrupted sutures in the midline. These aim to pick up the pubo-cervical fascia, or at least its remnants, and to narrow the

urethra and pull the walls of the distal bladder together. (Figure 9.3) It is important to plicate the correct tissues. Pick up the urethral muscle medial to where you have mobilised it off from the lateral vagina wall, don't pick up the tissue from the lateral vagina wall, this will not have the desired effect. If done properly it will narrow the lumen inside so its diameter will be similar to the urethra's.

Make a sling by grasping the fibro-muscular tissue on each side, developing a block of tissue to be sutured together in the midline. Of course, a sling may have been made at the primary operation, but additional tissue can usually be found to make another. Note that there may be brisk bleeding as the pedicle is elevated. This can be a source of post-operative bleeding if it is not carefully attended to.

Measure the length of the urethra again to see if it has lengthened. The average length of the urethra was doubled to 3cm in the Ethiopia series of 72 consecutive cases. (Figure 9.3i—3.5cm in this case)

Perform a dye test to ensure that the bladder has not been opened accidentally.

The vagina is now repaired. Ensure that you have repaired the corners of the vagina to the lateral wall, at the base of the pedicle. (compare Figure 6.58k) This reduces any dead space and bleeding.

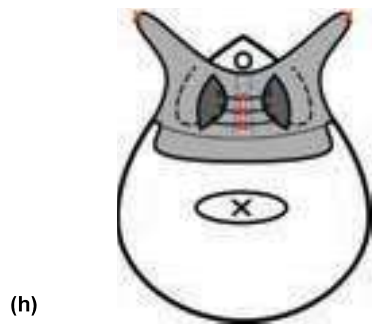
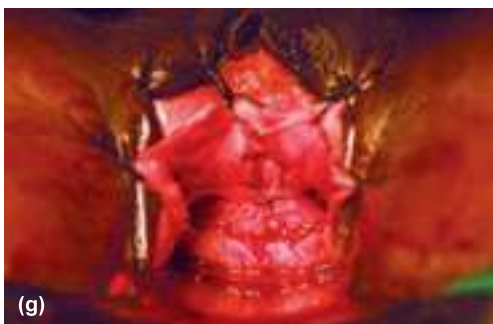
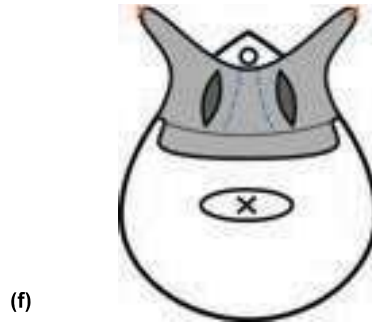
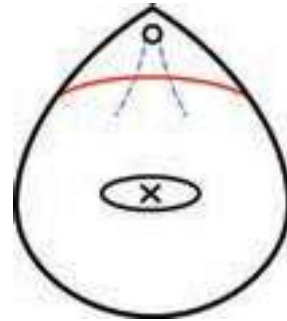
If the vagina cannot be repaired without tension then a flap has to be done. It is easy to check this. If when you suture the vagina together the urethral meatus is dragged into the vaginal canal you know immediately that the urethra is being pulled open by too much tension. Undo the sutures and place a tissue flap as described in Chapter 6—Vaginal Skin Defects.

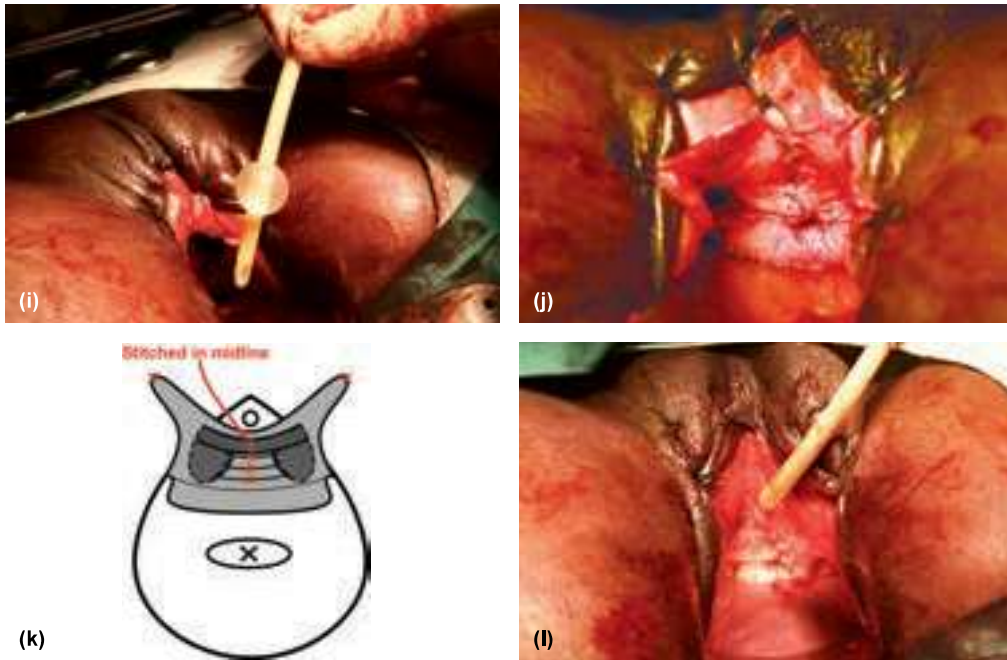
When repairing the vagina it is important to suture the vaginal skin to the lateral pelvic wall. Try to anchor it to where you have reflected the fibromuscular sling. This will help to support the urethra (like doing a colpo-suspension) and close any potential dead space where a haematoma might collect. (refer to Figure 6.58 k and l)

The Foley catheter is left on free drainage for 3–5 days, and the patient encouraged to drink as usual. After removal of the catheter, the patient is encouraged to drink normally and void. Her residual volume needs to be checked. It should be less than 100cm<sup>3</sup>. A more accurate assessment is to measure the amount she voids and then measure the residuum. If the residual volume is >50% of the voided volume you should define this as retention. So if she voids 100ml but she has a residuum of 60ml, this is retention. It is important to check it this way as fistula patients have varying degrees of bladder loss and may have very small bladders with a capacity even less than 100ml, sometimes even only 20ml. If the patient has urinary retention she needs treatment—see Management of Retention below.

If there is no retention, the patient is also shown how to perform pelvic floor exercises. The patient is assessed, and any remaining stress is quantified into the scale referred to previously to see if there has been any improvement from before the operation. Some centres are now doing a standardised 'pad test' before and after the operation. It is nice to be able to quantify any improvement with an objective measure and is a very useful tool for research but probably out

of the capacity of most units to use it routinely. It is demanding on time and personnel. I have a urinary physiotherapist dedicated to teaching pelvic floor exercises, bladder training and doing pad tests, but this would be a luxury in most units.





**Figure 9.3**

a) A patient with incontinence after fistula repair. When measured the urethra is only 1.5cm long. b) Diagrammatically the blue dotted lines outline the gaping short urethra beneath. The red line indicates the initial incision. c) The vagina has been reflected. d) Para-urethral space opened on the left and e) the right. f) Diagrammatically you can see the para-urethral spaces released from the side walls. g) The urethra has been mobilised and now it is plicated. h) Diagrammatically you can see the plication has narrowed the urethra, making it longer. i) When remeasured with 2ml in the balloon it is now 3.5cm long. j) A good fibro-muscular sling is placed (see Chapter 6—Urethral Support with a Fibro-Muscular Sling [Pubo-Coccygeal Sling]). You can also place a fascial 'sling on a string'. k) Diagrammatically. l) The vagina is repaired.

## Complications

Complications of this procedure include:

- Accidental re-opening of the fistula in less than 5% of cases. This is closed at the operation, but it's important not to miss it.
- Ligation of ureters if the sutures have been placed too deep. (This has not been recognised in our experience but be mindful that these patients have distorted anatomy from the injury and repair. The ureters can be in unexpected places.)
- Retention of urine in 15% of cases.

## Management of Retention

A few patients cannot pass urine at all and must have the catheter re-inserted; others have a degree of retention that, if undetected, could lead to overflow incontinence, urinary stasis, urinary tract infection and even stone formation.

All patients should have their residual urine measured before being allowed home. If it is more than 100cm<sup>3</sup>, or if the residual volume is > 50% of the voided volume proceed as follows:

- Replace the catheter, and spigot the catheter, that is block it with something. Some places use a vial of gentamycin, others the plunger of a 5ml syringe. Let the bladder fill and then release the spigot every two hours to empty the bladder. This will help 'retrain' the bladder by filling it, relaxing it. It is an old fashioned treatment for urinary problems, rarely if ever used in the West anymore, but it seems to work for fistula patients. For most fistula patients, the bladder has been empty for years and I can't see that keeping it on free drainage (empty) for a few more days would change anything. Do this bladder 'training' for 48 hours, but be careful that the spigot is released 2 hourly to avoid over distension. It's probably safer to leave it on free drainage overnight to prevent overdistension. It takes a cooperative patient and dedicated nurses. When done properly 70% will be voiding normally when you remove the catheter and check again for retention again. Make sure you check three times.
- If the residual urine is still more than 100cm<sup>3</sup> or more than 50% of the voided volume, teach the patient double voiding. In this, the patient voids as normal, perhaps with supra-pubic pressure—pushing over her bladder with her hand. She then stands up and walks around for a few moments while the bladder 'readjusts' to having a smaller volume of urine in it, and then she tries to void again.
- If this does not fix the problem and she is still unable to empty her bladder adequately, teach her clean intermittent self-catheterisation. She should try to void as much as she can and then pass a short stiff catheter into her bladder to drain the remaining urine. She washes the catheter and keeps it clean to use the next time and she will need to do this after each void, or three to four times a day to make sure the bladder completely empties regularly throughout the day. The patient should be reassured that she is likely to improve with time and be sent home with instructions to self catheterise, and only stop when she is emptying her bladder properly so that when she passes the catheter no urine, or only a few drops, comes out. She should be sent home with about five short stiff catheters. She should wash the catheter before and after each use and reuse it for about a month. There may be a small group in whom the bladder never regains the capacity to empty, so self catheterisation may be for life. In this case, the patient should be provided with a metal catheter.

We have heard from one surgeon that the incidence of retention will be reduced if the catheter is left in for 10 days post-operation rather than 3 days as we practise. This requires further investigation but it may have some merit if there is still swelling and pain from the operation.

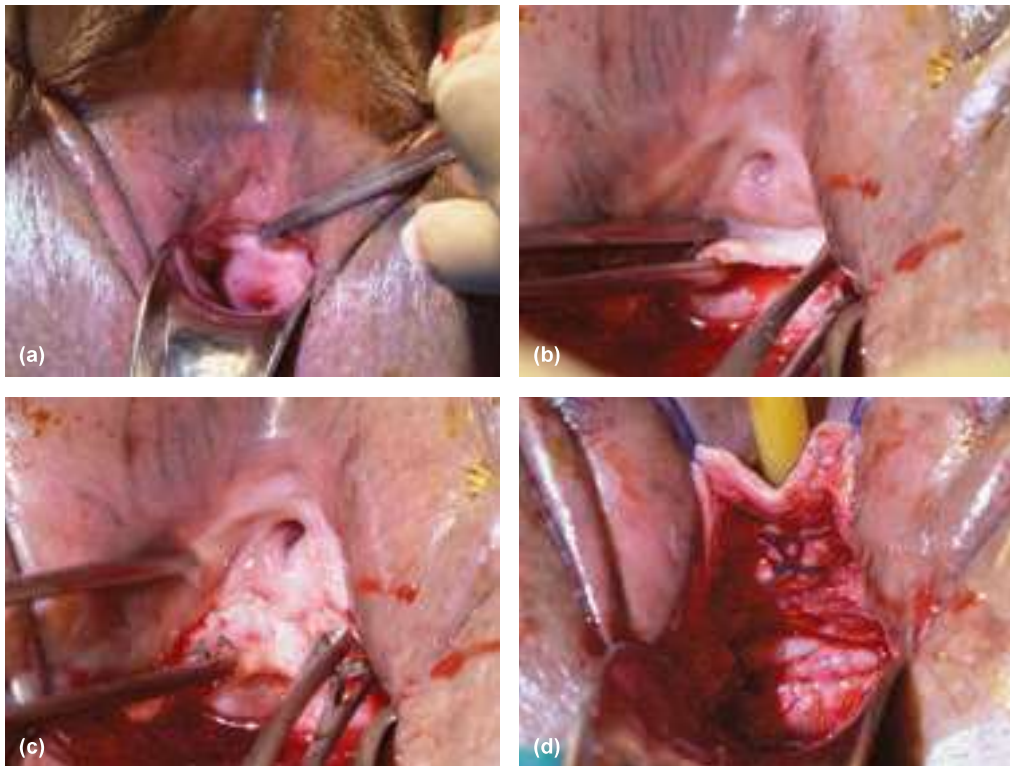
Some have anecdotally reported that they are unable to replicate the results that I get with these principles and procedures. On observing surgeons and teaching them, one mistake commonly found is they are not plicating the urethra properly. Instead of picking up the urethral tissue medial to where they have mobilised the urethra off from the pubic ramus, they are suturing the tissues along the pubic ramus. This doesn't lengthen and narrow the urethra as well as intended. It also makes it difficult to create a good muscle sling and impossible to place a fascial sling correctly. When they are alerted to this mistake, their results often improve.

## If this Fails

If a stress operation has failed in the past, I prefer to use a tight fascial sling at the second attempt.

As described above, I harvest this from the rectus sheath through a mini-Pfannenstiel entry before starting the vaginal procedure. It is kept in sterile saline while the vagina is prepared.

The urethral meatus is often pulled inside the vagina in these patients and it is not in its correct anatomical position. Often the anterior vaginal wall is very short and the cervix has been pulled forward after many operations and is sometimes sitting really at the urethral meatus! This is the result of previous fistula repairs where the surgeon has pulled the vagina together to cover the bladder and urethra. A tight, short, distorted anterior vaginal wall results and it needs to be repaired to resemble normal anatomy. (Figure 9.1a) Mobilise the vaginal wall off from the urethra as above and if the meatus has been pulled into the vagina from previous repairs, this mobilisation and freeing of scar tissue often makes the meatus spring back to its normal position. (Figure 9.4) If the cervix is pulled forward, mobilise it as well and then suture it to the lateral vagina walls deep in the vagina to make it site in its natural position. Plicate the urethra to ensure the urethra is a good length and width. Then place a fascial sling.



**Figure 9.4**

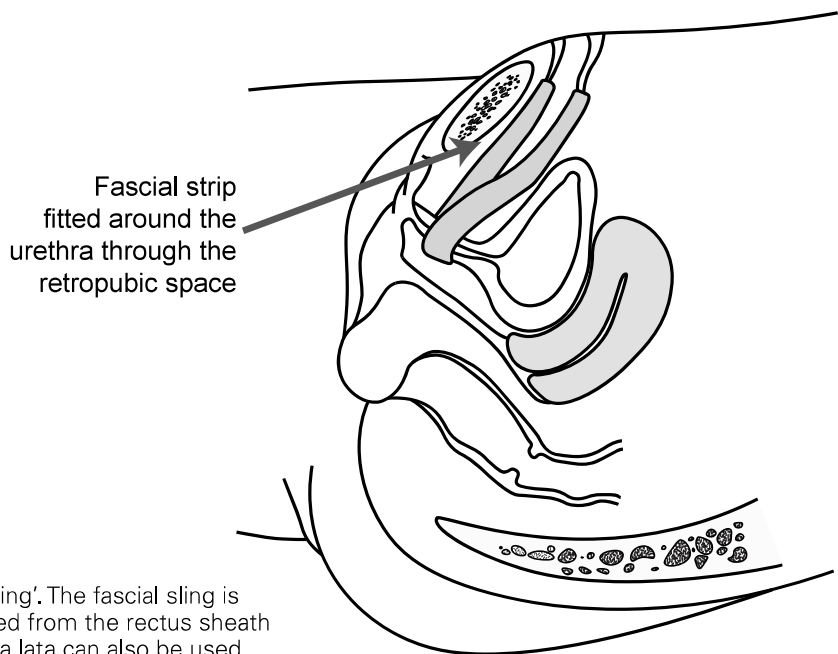
a) A patient with post-repair incontinence. Her urethra is tethered into the vagina and cervix pulled forward. The metal catheter is against the cervix and the anterior vaginal wall is only 1.5cm long. b) The vagina is mobilised off from the urethra and c) it springs forward. d) The cervix had been mobilised and pushed back to its normal position, the urethra plicated and a fibro-muscular sling placed.



**Figure 9.4** (continued)

e) The gap in the anterior vagina is filled with a Singapore flap.

As described in Chapter 6—Urethral Support with a Fibrous Sling, harvest a 5–7cm by 1–1.5cm strip of rectus fascia but leave the abdominal wound open for the time being. I like to place an iodine gauze over the wound while I perform the urethral side of the operation, just to keep it clean. Do the same mobilisation and plication of the urethra as above, but then, with some nylon or PDS attached to either end of the strip of fascia, tunnel the fascial sling up laterally on one side of the urethra through the cave of Retzius and then the other side as described in Chapter 6. This can be done with long curved artery forceps, firmly holding each end of the suture in the tip of the artery forceps as you tunnel either side, one side after another. Pass the two ends of the suture through the rectus sheath with the artery forceps or a free needle. Tie the ends together, one loop going up either side of the urethra. Exert some tension on the urethra and be careful not to make the sutures slip as you tie it so that the strip of fascia doesn't go up either side of the tunnel and leave the nylon or PDS suture around the urethra. This can be helped by placing a superficial 3–0 vicryl suture from the sling to the urethra in the midline. (Figure 9.5)



**Figure 9.5**

A 'sling on a string'. The fascial sling is usually harvested from the rectus sheath but tensor fascia lata can also be used.

This approach seems very sound and I use it regularly with good success, but there is a risk of perforating the bladder during the tunnelling. I have removed bladder stones that have formed around the nylon suture. When the sling was tunnelled the surgeon must have entered the bladder without noticing. When you tunnel the suture up, make sure you are creeping just along the posterior pubic symphysis, feeling where you are coming through the abdominal wall with your other hand. Then do a dye test to make sure you haven't perforated. These steps should decrease the risk of perforation.

As always, closing the vagina is just as important as the urethralisation and sling. I like to see an anterior vaginal wall at least 6cm long from the urethral meatus to the cervix. If the vaginal wall was very short and the meatus had been pulled inside the vagina and cervix forward, and you have mobilised it as above, you will have a larger gap to be filled on the anterior vaginal wall. You need to fill this with some sort of flap. My preferred option is the vascular pedicle flap, that is the Singapore flap (Figure 9.4 and see chapter 6—Vaginal Skin Defects). Not based on a blood supply, rotational flaps may contract up with time. So a vascular flap is preferable. You can also get a larger flap when doing the Singapore flap which, if the blood supply is maintained, won't contract with time, unless you compromise its blood supply somehow. However if the gap to be filled is only small, <1cm, then a rotational flap is fine.

When this has been done and sutured in place, anatomically it should start to look more normal, that is a more normal vaginal capacity, anterior vaginal length, a more normal position of the cervix and external urethral meatus. I like to re-fill the bladder with dye at this stage, then remove the catheter and see if the patient is wet either with posterior pressure on the vagina or suprapubic pressure, or by asking the patient to cough. I do like to see that there is no urine leakage but it really has no prognostic value. Plenty of my patients who leaked at the end of the operation whilst still under anaesthetic and in lithotomy position were not completely continent afterwards and others who leaked during this test were later completely dry!

Pack the vagina for 1 day. Leave the catheter for 5–7 days and always check the residual volume.

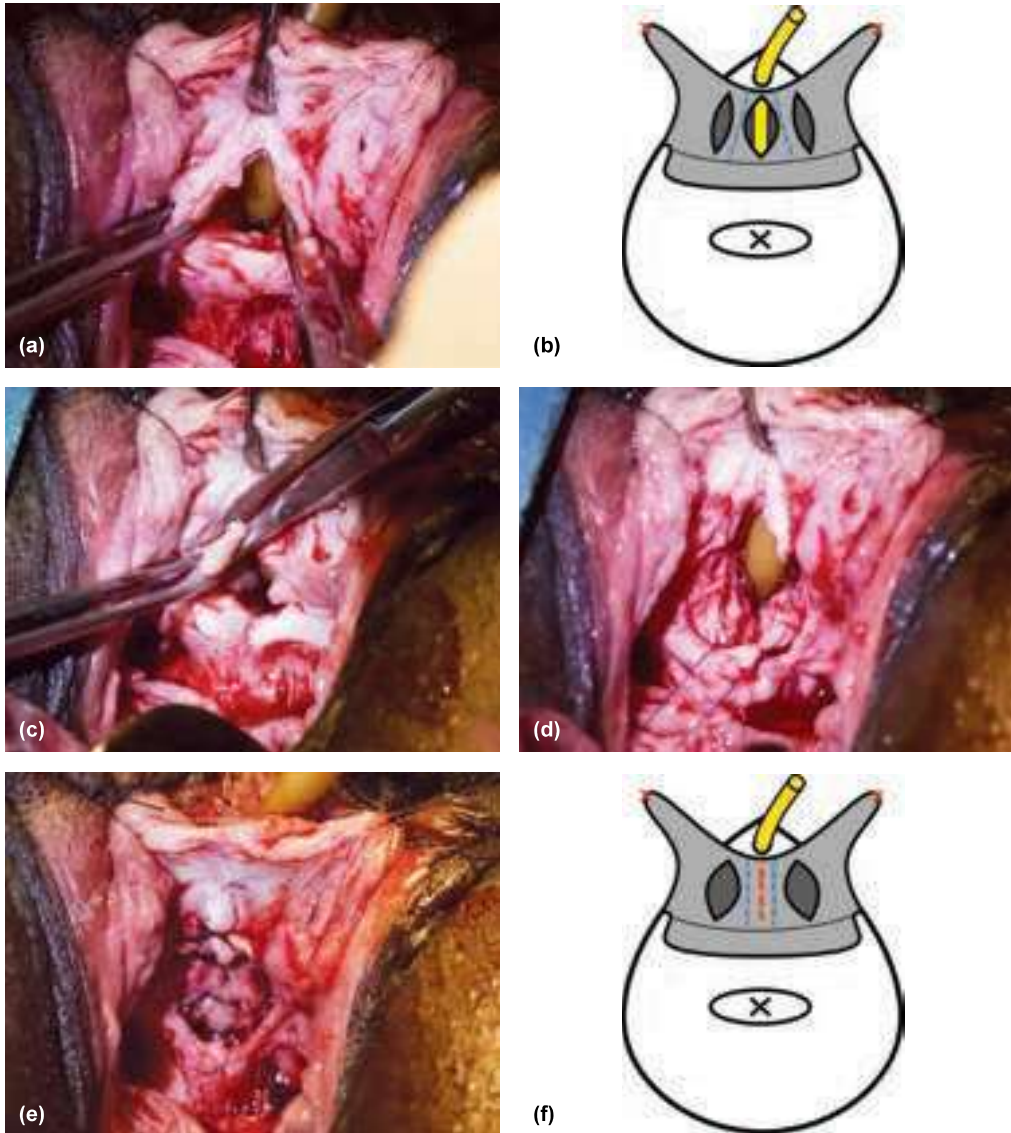
### If the Urethra is Wide and Patulous

There is one final operation that I use to completely refashion a urethra. I use this operation when the urethral plug did not work because the urethra was wide and gaping, but I found that around 50% of patients become completely dry with it. (Figure 9.6)

It's based on an old operation described by Richard Turner Warwick in the 1960s. Some people unfairly call it TIT-BAPIBTA standing for Take it to Bits and Put it Back Together Again.

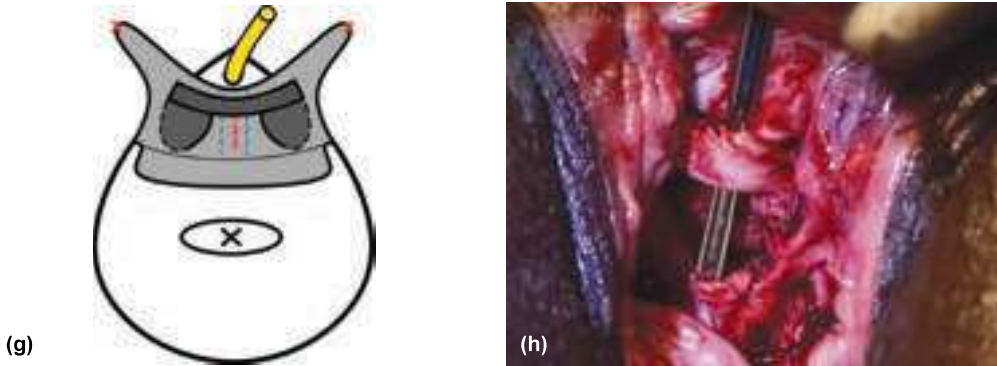
In this operation you mobilise the vagina off from the urethra in the standard way, then incise the whole length of the urethra posteriorly. Now you can see directly into the urethra and it is quite amazing and educational to see how abnormal these urethrae really are. They are often badly scarred and attached to the bones laterally, or dilated and patulous. Mobilise the urethral flaps and excise a strip of posterior urethra. Place a number 14 or 16 Foley catheter inside the open urethra and repair it over the catheter with interrupted 3-0 or 2-0 sutures.

You should now have a nice 3cm urethra fitting nicely and evenly around the Foley catheter. Check that it is closed properly by doing a dye test. I always add a sling, either muscle or fascia, but the next part again, is closing the vagina. It shouldn't be closed under tension and it is good to fill the dead space to either side of the urethra with some tissue to prevent it scarring out to the bones again in time. If there is plenty of vaginal skin I often use a Martius graft to fill that dead space; if not, then the Singapore flap again.



**Figure 9.6**

The Richard Turner Warwick procedure. a) The vagina has been mobilised off the urethra, the urethra mobilised laterally on each side and the posterior urethra incised to expose the foley catheter. Note the redundant tissue. b) In diagrammatic form. c) A small strip of posterior urethra is excised, right and left. Make sure you don't take too much—that would be a disaster. d) Repair the urethra with interrupted sutures. e) Fully repaired.



**Figure 9.6** (continued)

f) Diagrammatically you can see that the once side urethra, outlined with blue dashes, is now narrow. g) I always place a sub-urethral sling, h) in this case a fascial sling from the rectus sheath. i) As is often the case, there was a gap in the anterior vagina that I filled with a Singapore flap.

### A Slight Modification

I have recently started using a slight modification to the Singapore flap with some very good results. When you set the Singapore flap in place, put some PDS sutures through the flap on one side, then through the arcus tendinous lateral to the urethra on one side, then back through the flap near the entry point of the first suture. Don't tie it, and then do the same on the other side. Put the sutures through the flap about midway along the width of the flap in a position where you would want the flap to sit firmly (not too firmly) beneath the urethra to reinforce a sling type mechanism. When both sutures are in place, tie them and then suture the remaining edges of the flap in place. This will elevate the Singapore flap to the arcus tendinous on either side, in effect making a sling to support the urethra. I term it the Singapore sling.

In a recent series of ten patients deemed hopeless, that is with their fistulae closed but incontinence continuing despite several attempts at stress incontinence procedures, this simple step has made them dry. However, as with most things in obstetric fistula surgery, we don't have long term follow up.

### Other Stress Procedures and Investigations

#### (e.g. Urodynamics)

Ideally, urodynamic assessment should help us both to understand the cause and selection of surgery. It was available at the Addis Ababa Fistula Hospital to Carey and colleagues when they

first introduced the rectus facial sling there. They harvested the sling via a low mini-Pfannenstiel incision and mobilised the urethra off the posterior symphysis pubis, placed the sling as above and also placed a strip of omentum into the space between the urethra and posterior symphysis pubic.

A random group of incontinent patients was assessed urodynamically before doing this operation. Only 41% were found to have genuine stress incontinence with a compliant bladder. A similar percentage were found to have detrusor instability as well, which was thought to be a contraindication to surgery; the remainder had either a very small bladder or retention with overflow. Only the first group had the operation. Of these, 78% were dry on discharge, although some relapses were seen later.

In the past in Addis Ababa urodynamic testing was used to select patients for a stress procedure. Only patients with a bladder capacity of 200cm<sup>3</sup> or more were accepted. About 70% of patients with serious stress fulfilled these criteria. Small capacity of the bladder rather than bladder wall instability appears the main contraindication in the other 30%; they are managed with urethral plugs where possible. In the hands of one surgeon who specialised in this procedure, at least 40% of these selected cases appear cured and another 40% considerably improved. This was the preferred operative method in Addis during the early 2000s but has since been abandoned. It was successful to some degree. I tend to think that if they also focussed on making the urethra more anatomically correct in addition to the sling and repairing the vagina, the success would have been better, but this has not been studied.

It raises the question of the role of urodynamic patients in fistula surgery. More recently 176 patients with ongoing incontinence after fistula repair underwent urodynamic testing in Addis Ababa. The majority had mixed incontinence, that is stress and over-active bladder, 29 had overflow, only two had isolated over-active bladder. One hundred and fifty five of them tried oxybutynin for two months but only nine were helped with regards to incontinence, although 65 had symptoms of urgency improved, but importantly not their symptoms of incontinence. By ignoring the results of urodynamic testing and performing the above operations, our success rates have been maintained or even improved. Because of the expense and lack of evidence to show the value of urodynamics in our setting, we recommend that urodynamics be kept as a research tool until there is evidence of its benefit.

There are many ways of performing the operations that are described in standard operative textbooks of urology or gynaecology, but it should be appreciated that in countries where these textbooks were written, the urethras they see are intact, whereas in a fistula patient the urethra is damaged, surrounded by fibrosis and functionless tissue. Methods used to help women with incontinence who are without a history of fistula cannot immediately be transferred to our patients. Methods applicable to fistula patients are described by Judith Goh and Hannah Krause in their book, by Michael Breen in his lecture notes and of course by Kees Waaldijk.

Kees Waaldijk, who has vast experience of fistula surgery in Northern Nigeria, has evolved his own operation for stress incontinence, which has been used in over 500 cases. This involves a radical plication of urethra and bladder base—even more so than in my operation. A form of

colpo-suspension is then performed in which the bladder base is hitched up, using the remaining pubo-cervical fascia, to the arcus tendinus region on the pelvic side wall. All this is done from below through the widely opened para-vesical space, using an aneurysm needle for access. This has worked well for Waaldijk, with up to 60% of patients being completely dry. However, this method has not been widely used by others and, as with my approach others have had trouble replicating his results.

Finally, it should be mentioned that some enthusiastic visiting surgeons have performed tension-free synthetic tape operations on selected patients. The trans-obturator method has been favoured because such good results are reported in non-fistula patients. However, our fistula patients are young, usually with scarred, rigid, shortened urethras and vaginas—quite different from patients in developed countries. It is not surprising that several unsatisfactory results have occurred, with a serious risk of later erosion of the tape. We see no place for its use on a casual basis. In my practice I have had to remove every tape that I have seen put in due to erosions and there is a paper from Niger showing a higher complication rate using the synthetic slings in fistula patients as compared to using native tissue slings and with no added curative benefit.

Only a few surgeons are regularly operating on patients with ongoing incontinence. Clearly the problem of ongoing incontinence is a major one and overall it is being poorly addressed. There is an urgent need for those surgeons involved full time in fistula surgery to develop the techniques described in this book, study the results, report them with clarity and then together work on ways to improve the outcomes for these, the most unfortunate of fistula patients.

## Urethral Plug

This is put in for historical reasons as the urethral plug is now no longer made, but it may become available again, and some use permanent catheterisation with a spigot or a blockage to try and replicate it.

The urethral plug is a small, simple device that, as the name suggests, merely plugs the urethra to stop urine draining out. (Figure 9.7) It can be used for any patient who is still severely bothered by her incontinence.

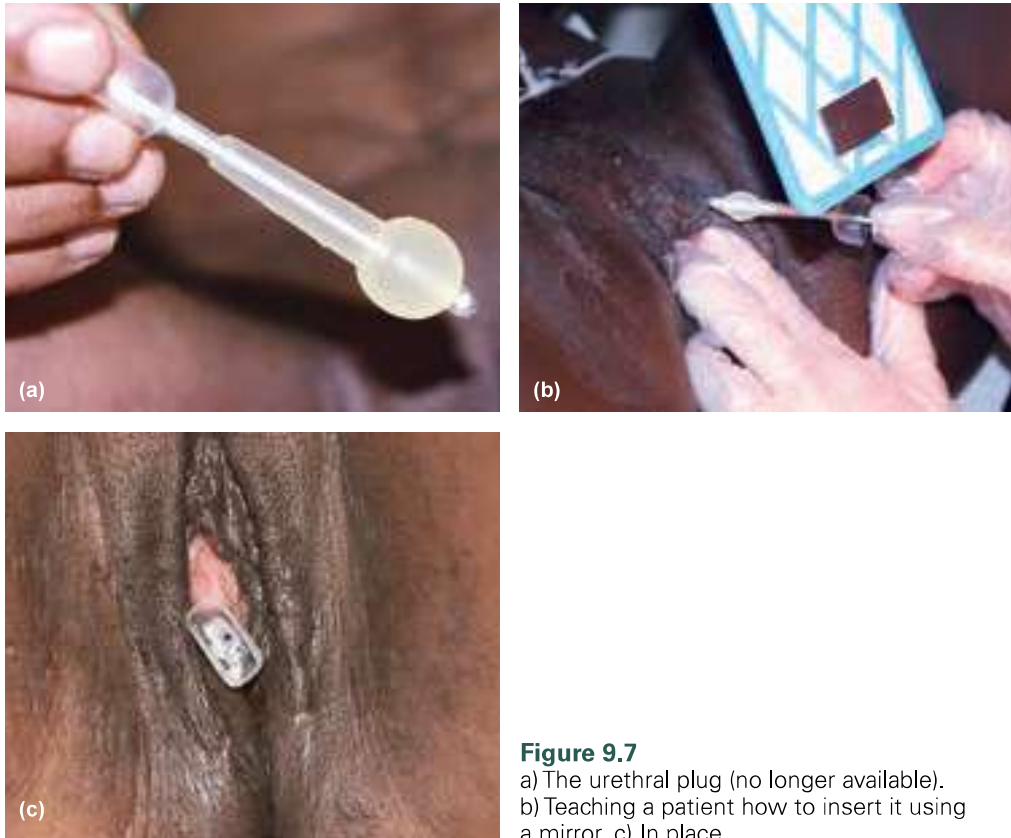
There are a few patients in whom plugs will not work. These are usually patients with very small bladders or very wide urethras.

The plug is inserted into the urethra with the aid of an introducer. The patient should be able to do this quite easily herself after a few lessons. She may be helped by using a small hand-held mirror. The introducer is removed after insertion and kept in a safe place. When she feels urine in the bladder or urine starts to leak around the plug, often signalling a full bladder, the plug is simply pulled out of the urethra. The urine will run out. When that is finished, replace the introducer and reinsert the plug into the urethra.

I have seen some patients in whom there has been a demonstrable increase in bladder size over time, discharged with a bladder capacity of 100ml and completely wet, and later return with a capacity of 300ml and no longer using the plug because they are continent.

Some risks are involved with use of urethral plugs, namely infection and trauma to the urethra causing bleeding and pain. To minimise these, the patient is told to use the plug for only 12 hours a day—either all night or all day, but not both.

There have also been reports of plugs being lost in the bladder. Where an operating cystoscope was not available, the plug had to be removed by open cystotomy.



**Figure 9.7**  
 a) The urethral plug (no longer available).  
 b) Teaching a patient how to insert it using a mirror. c) In place.

The plug is meant to be a single use device, but, owing to its cost, this is clearly not possible in the developing world. The patient is taught to clean it with soap once a day and to rinse it after each application, along with increasing the amount of fluid that she drinks. This reduces the chance of infection, and one plug can last up to about a month with this regime. The patient can return for follow up and assessment if she needs more plugs.

Because of the shortage of supply I have a few patients permanently on Foley indwelling catheters as an alternative. They have them spigotted (blocked) and they need to be sent home with a supply of catheters, syringes for the balloon and good instructions on cleanliness, drinking and catheter care. They need to go to a nearby health centre to have their catheter changed every month to try and prevent increasing colonisation of the foreign body (with some days 'rest' between removing the catheter and replacing it). They should return back to the fistula unit for checks every six months or so. Not every patient can manage this safely, nor do many patients want it.

There is anecdotal evidence from Addis Ababa where plugs were used for some years. They found that after some time the patients' kidneys showed significant hydronephrosis. It's not known whether this was present before the patients started using the plugs but it's not unreasonable to think that obstructing the urethra might lead to it. If the patient is using the plug for just 12 hours a day you would think this might not happen. If the plugs are used again or if you use a semi-permanent catheter with a spigot then it would be a good idea to perform an ultrasound before you start using it and then regularly at follow up to see if a hydronephrosis is appearing or worsening.

## Further Reading

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Carey MP, Goh J, Fynes MM, Murray CJ. Stress urinary incontinence after delayed primary closure of genitourinary fistulae: a technique for surgical management. *Am J Obstet Gynecol* 2002; **186**: 948–53.

Goh J, Krause H. *Female Genital Tract Fistula*. Brisbane: University of Queensland Press, 2004.

Petros PEP, Williams G, Browning A. Post Vesico-vaginal Fistula Repair Incontinence - a new hypotheses and classification potentially guide prevention and cure. *Pelviperrineology* 2015; **34**: 48–50.

## 10 MANAGEMENT OF THE INOPERABLE CASE

Inevitably, there are cases where the injuries are so extreme that no surgeon, however skillful, can make the patient continent. The most common of these situations is virtually complete loss of bladder tissue. (Figure 10.1) Occasionally, a patient presents with severe generalised illness (e.g. a low immune state) that makes repair futile. In recent times we've seen more fistulae due to radiotherapy which creates a different set of problems.

In the majority of cases, inoperability is caused by multiple factors, the most important being failed previous repair in combination with a damaged urethra, a small bladder and severe fibrosis. Other patients have total incontinence following repeated failed operations for stress.

What can be offered to these patients? There are only two options: do nothing or perform some form of urinary diversion.

Before considering any of the possible procedures, there are some serious questions to be considered. Any form of diversion is a major procedure, with significant immediate and long-term morbidity. It is also irreversible. There may be enormous pressure on a fistula surgeon to 'do something for the poor woman'—not only from the patient herself, but also from the other members of the team who hate having to turn away a patient and say that nothing more can be done. Visiting surgeons who are skilled in pelvic surgery in their home setting may believe that they can contribute their technical skill to perform complex operations. For all their good intentions, some have done more harm than good. I have seen multiple patients around Africa upon whom well meaning surgeons from the West who have done ileal conduits, not realising that there are no ileal conduit bags available in the patient's country and in effect the surgeon has just moved the fistula from the vagina to the abdomen. The patients are often even more unhappy and desperate. A urological colleague and I have reduced these conduits to the Mainz II pouch, making the patients happy and dry. Clearly the operation wasn't discussed with the patients adequately beforehand nor the supply of bags properly researched and secured.

Before a diversion is performed, many criteria have to be satisfied:

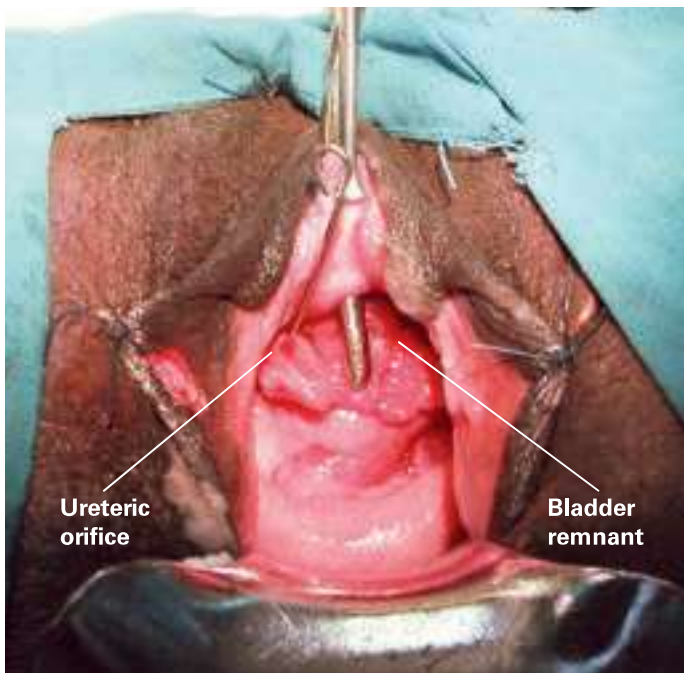
- Is the case truly inoperable? Only a skilled fistula surgeon working regularly with fistula patients can make that judgment. Of course, there are so few of these that it may be impossible for the patient to be assessed by one. Unfortunately I have seen many patients with a diversion who really had a simple very curable fistula.
- Do the patient and her family understand what is proposed, and have the possible benefits and risks been understood? Often, the surgeon and patient are separated by culture and language. Their social conditions, beliefs, customs and knowledge of the functioning of the human body may be incomprehensible to each other. The best counsellor is a patient who has had a

diversion operation done before. She can explain what it is to live with a diversion within the patients' context.

- If these hurdles are overcome and the patient consents, are the conditions in the theatre and for aftercare sufficient to conduct major surgery safely? Who will care for the few patients who will inevitably develop some life-threatening complications if a surgeon is not available? Who will be responsible for long-term follow up?

Brian Hancock and I believe that there are circumstances where diversion procedures are appropriate, but they should be performed only by surgeons who are working long term in a fistula affected country and who can be responsible for aftercare and follow up. We believe that they have an obligation to maintain follow up and report their results honestly, as we know so little about the quality of life after diversion procedures. It is very tempting for surgeons to report only their successes—but those working with fistula patients need to know about the failures as well.

The possibilities for diversion are briefly discussed here.



**Figure 10.1**

An incurable patient. There is only a small stiff plate of bladder tissue remaining. Even if you were able to close the fistula she would never be dry and her bladder capacity would be close to zero. She would never be continent.

## The Ileal Conduit

This involves wearing a urostomy bag for life. This may be the procedure of choice in Western countries, where the diversion can be performed with low morbidity and where urostomy bags are freely available. In the less resourced countries this is really out of the question. The exception is in the Addis Ababa Fistula Hospital, which has had the services of several skilled visiting urologists for many years. Many ileal conduits have been constructed, with a very low morbidity.

The patients are completely dry, but because bags can be provided only from the hospital, these patients cannot return to their homes in remote areas. This problem has been partly overcome by providing a separate village not far from the hospital where they can live. This is not ideal and there are still some social problems to address. Some patients have been able to go home with a supply of bags but they still need to return to the hospital to renew their supply. Even when they are in their villages they are unable to dispose of the bags for fear of them being seen and the stigma of being 'abnormal'.

## The Continent Ileal Bladder

This is a major 5 to 6 hour operation requiring a high degree of skill. The attractiveness is the prospect that a continent pouch of small intestine is emptied by intermittent self catheterisation via a small tube of appendix or bowel brought out to the skin. This may have an acceptable place in the Western world, but it is out of the question in Africa in view of its complexity and very significant morbidity, which would require highly skilled surgical attention. As one urologist said, even with these continent bladders you still have a patient for life due to the complications that can occur in the future, especially strictures in the tube to the skin.

## The Mitrofanoff Procedure

This involves diverting the ureters into a pouch made of isolated caecum and ascending colon. The appendix is reversed and implanted into the pouch, and is brought out in the right iliac fossa or through the umbilicus. The patient empties the pouch by self catheterisation through the appendix.

An alternative approach may be possible if the urethra is irreparable but the bladder is of good size. The bladder neck is closed and the reversed appendix is implanted into the bladder vault.

We know of patients who have had a good quality of life after these procedures, but there is a significant incidence of problems of stenosis and difficult catheterisation. If the patient is far away from skilled help, this is a disaster. Again, you still have a patient for life with this operation.

## The Mainz II Pouch

Diversion of urine into the large intestine has some merits. It is the most frequently performed diversion procedure, but there are only anecdotal reports of follow up in Africa to guide us as to the quality of life. The operation can make the patient dry by day and often at night—but it's not without risks of morbidity and even mortality.

Traditionally, the procedure involved anastomosing the ureters to the sigmoid colon. Over the last two to three decades, this has been modified by creating a pouch of sigmoid colon by anastomosing two loops together (the Mainz II pouch). This has the effect of creating a low pressure reservoir, thus decreasing the frequency of passing urine per rectum and probably reducing the amount of reflux up the ureters. It also seems to decrease the complication of

adeno-carcinoma that we used to see in the direct uretero-sigmoidostomy. Superseded now by the Mainz II pouch, the direct implantation should no longer be done.

Clearly, the patient is going to pass urine through the rectum for the rest of her life, and must have a near-perfect ano-rectal continence mechanism. She should also have reasonably functioning kidneys. Check her urea and creatinine prior to the operation to make sure they are normal. To check the ano-rectal continence mechanisms, you need to ascertain four components are necessary for complete anal continence: two motor and two sensory.

On the motor side, there must be an intact internal sphincter. Its function is to keep the anal canal closed at rest. More important is a functioning external sphincter complex. It is well known in developed countries that occult injury (detected by ultrasound and electromyographic studies) occurs quite often after normal delivery, and this may be related to the length of the second stage and the size of the baby. This is usually asymptomatic, although in later life it may predispose to faecal incontinence or rectal prolapse. It is not known if this occurs in the African setting but it would be reasonable to assume that it does. More obvious are overt sphincter tears and, even after skilled repair, there are symptomatic defects in continence in about 20% of patients. A previous repair may preclude this diversion option.

On the sensory side, somatic sensation from the epithelium of the lower two thirds of the anal canal provides fine discrimination of the nature of rectal contents (gas, liquid or solid), while stretch receptors in the levator ani complex provide information about the extent of distension in the rectum. Both components can be damaged by prolonged labour, either from a traction neuropathy of the pudendal nerve or ischaemia to the sacral plexus and fibrosis in the levator complex.

A degree of saddle anaesthesia and absent anal reflex may be found more often than expected if specifically looked for soon after a prolonged labour in fistula patients. There has been one report of defects in anal continence that were detected unexpectedly during a study of post-operative urinary incontinence.

This subject needs more objective study. In practice, it is possible to assess the quality of sphincter function by assessing the resting anal tone (mostly contributed by the internal sphincter) and the squeeze pressure (contributed by the external anal sphincter) on digital rectal examination. But in practice it is best to test its function before doing a diversion operation. You can test the anal sphincter by filling the rectum with about 300cm<sup>3</sup> of saline with dye to make sure that the patient can hold it for some hours. Don't just use saline with no dye as the patient will be wet from the fistula or urethra and you won't know if the wetness on her pad or clothes is from her bladder or from the fluid in her rectum. Get her to walk about for two hours whilst wearing a pad. She should be dry for at least 2 hours with this test. If not and she leaks some blue dye on the pad, it is likely she will leak through her anus once the operation has been performed. In that case she is not a candidate for the operation. Even if she passes this test, she should be warned that she might leak through her anus at night when the sphincter relaxes. It should also be noted that we have several patients returning some 10–20 years after a Mainz II pouch now wet through the anus at night and sometimes during the day as well. As age creeps up, so does

tissue laxity and weakness. Patients should be warned about this, but often their comprehension of something that might happen in 20 years' time is poor.

To perform a colonic diversion in a patient with a missed recto-vaginal fistula or defective continence mechanism is a disaster (Figure 10.2), making her now leak urine and faeces together. Always check for a rectal fistula before considering this operation.

The best long-term review of results from Europe and America highlights a number of downsides, which may not be amenable to detection or treatment in Africa:

- This is **major surgery**, with a small but significant immediate morbidity and mortality.
- **Acid-base disturbances.** Chloride and hydrogen ions destined for excretion in the urine are reabsorbed to some extent by the colonic mucosa. Provided that renal function is normal, the patient may come to no harm, although some will develop a hyperchloraemic acidosis, which may be asymptomatic for a time, but ultimately leads to thinning of bones and renal failure. Any pre-existing renal failure or repeated renal infection will speed up this deterioration. Early detection of electrolyte imbalance is important, as further deterioration can be mitigated by regular taking of sodium bicarbonate. This means measurement of acid-base balance, as changes in sodium and potassium are late indicators of the problem. Facilities for measurement of bicarbonate levels are rare in Africa. From studies in the Europe and America, it is thought that at least 50% of patients have evidence of mild acidosis on testing 1 year after operation, and these patients are advised to take regular alkalisating agents (sodium bicarbonate). In a few patients, there may be pre-existing renal impairment due to chronic ureteric obstruction. A raised creatinine or bilateral hydronephrosis would be a contraindication to diversion. Hence it is important to screen the patient's renal function before considering a diversion operation. She must have a normal renal function. Hydronephrosis in itself isn't a contraindication as long as the renal function is normal.
- **Renal infection.** Recurrent urinary infection is possible. Its incidence was higher in the direct implantation of the ureters into the sigmoid, but it is reduced by creation of a low-pressure pouch, but it is predisposed to by any stenosis at the uretero-colonic anastomosis. Thus, a good technique at surgery is critical to the subsequent outcome. Yet stenosis bad enough to require revision surgery may occur in up to 5% of cases, even in expert hands (detected by progressive dilatation of the renal tract on ultrasound scanning, note that dilation might have been present at the time of the diversion operation. It is useful to get a baseline ultrasound before the operation measuring any hydroureter and/ or hydronephrosis).
- Diversion of urine to the colon predisposes to **development of carcinoma of the colon.** This reaches significant levels (around 20%) at 20 years after a conventional direct uretero-sigmoidostomy. It is thought that a Mainz II pouch reduces the risk. In developed countries, a patient would have a regular colonoscopy after 10 years.

There are several surgeons working full time in Africa who perform the Mainz diversion for selected patients. They are available to deal with any complications and follow up, and are satisfied that quality of life has been improved at least in the short term. Two encouraging reports of the use of the Mainz diversion have come from Tanzania.



**Figure 10.2**

This patient was being prepared for a Mainz II pouch diversion operation as she had an incurable fistula. The rectal dye test revealed an unsuspected small recto-vaginal fistula in some scar. This is an absolute contraindication to a Mainz II Pouch. You must repair and cure an RVF first before considering a diversion.

We recommend a cautious approach to diversion, giving full weight to the complete physical evaluation as to suitability and a thorough discussion of all the benefits and risks. The patient must never be pressured into an operation—she must make an informed decision and her decision respected. The operation may be acceptable to the surgeon, but is it acceptable to the patient? Interestingly in Tanzania I have only done five Mainz II diversions in the last eight years, although more have been suitable. When the operation has been explained to the potential candidates many replied 'I don't want to be like a chicken passing urine and faeces together!' and refused to have the operation. Good point!

So some patients choose to remain as they are after full discussion of the situation. Others may prefer to take a chance of a better quality of life at the price of later morbidity and reduced life expectancy. I have seen several patients who on short-term follow up are very pleased that they accepted the diversion. I see some patients in Uganda who have lived with the Mainz II pouch for 10 to 15 years and are still happy, although as they age, the amount of leakage they experience at night has increased. I have performed a simple anal sphincter plication which has helped them for some years, but then it recurs.

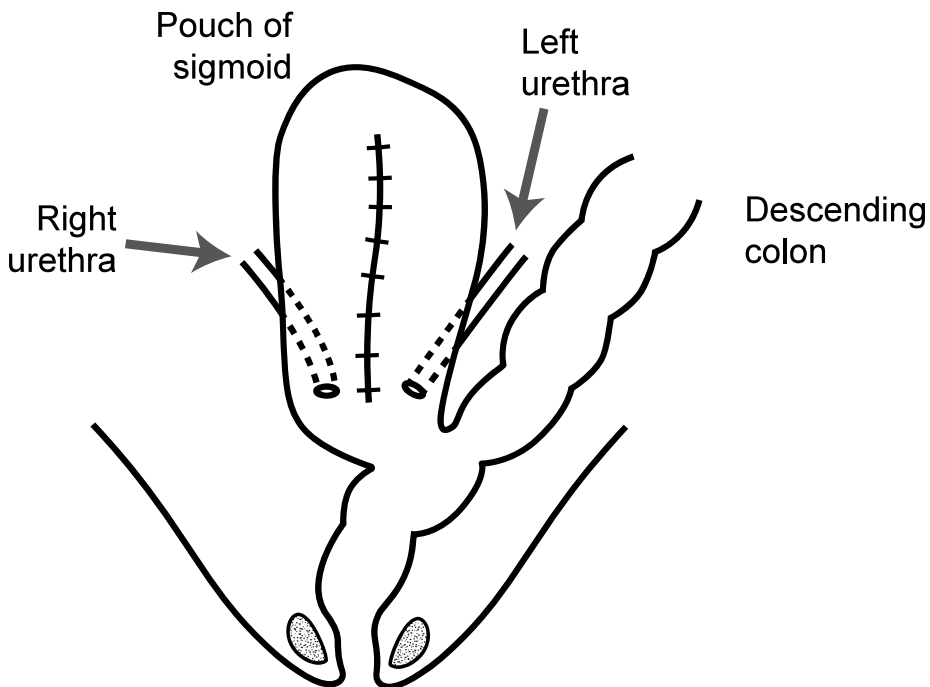
Permanent incontinence is not a happy situation, but perhaps the picture has been coloured by reports of the total rejection that occurs in some communities. In others, we are aware that the incontinent patient is not always treated as an outcast—many are cared for by loving families and even their husbands, and they can still live with some dignity.

## The Mainz II Pouch Procedure

The procedure as performed by the surgeons in Mainz<sup>5</sup> involves anastomosis of three limbs of sigmoid colon in an 'S' fashion, but most surgeons in Africa have opted for a simpler two-limb anastomosis. (Figure 10.3) The simpler Mainz II pouch version is now described and illustrated in Figure 10.4. We recommend that anyone contemplating this procedure should first assist a regular pouch surgeon.

The patient must come to theatre with an empty colon. This is achieved by pre-operative fluid diet, enemas or, best of all, an osmotic laxative such as sodium picosulphate (Picolax) or mannitol. Single doses of gentamicin 160mg and metronidazole 500mg are given intravenously at the start of the operation.

Some surgeons prefer to bring the ureteric catheters out of the anus though a previously inserted rectal tube. We prefer just to use a large Foley catheter placed in the rectum at the beginning of the operation and to thread the ureteric catheters through it during the operation, making sure the ureteric catheters are seen outside the anus before closing the pouch. To do this someone needs to go under the drapes during the operation to pull the Foley out with the ureterics, then replace the Foley through the anus and rectum and into the pouch so the ureterics are both now in place all the way from the kidney to outside the anus. The Foley remains for a few days until the patient is ambulant and can pass urine herself per rectum. Most of the urine drains through the ureteric catheters until they are removed at around the seventh postoperative day.



**Figure 10.3**

The concept of the Mainz II pouch is to create a pouch of sigmoid and introduce the ureters into the pouch. She will pass urine through her anus.



(a)

**Figure 10.4**

Mainz II pouch. a) The first step is to locate the ureters and ensure that you can identify and mobilise them. Before you cut the ureters, make sure you can develop an adequate sigmoid pouch. The loop is formed and a 10cm strip is sutured along the taeniae coli on either side. This will make the posterior wall of the pouch. Make sure you suture on the edge of the taeniae, as you will need to cut along the middle of it.



(b)

b) Cut along the middle of the taeniae each side of the suture line, around the top and down to where the suture line starts. Leave enough bowel wall to put a second layer into the suture line you've just made. Clearly this patient's bowel wasn't prepared well.



(c)

c) The second suture layer is now complete on the posterior wall of the pouch.



(d)

d) A hole is made in the posterior wall to introduce the right ureter.

*Continued*



**Figure 10.4** (continued)

e) Introducing the right ureter into the pouch (I prefer not to grasp and crush the end of the ureter like this, but rather place a fine suture through the wall of the ureter and manipulate the ureter by grasping the suture).



f) The ureter is spatulated and secured inside the pouch.



g) The same is done for the left ureter. Make sure the ureter lies on the medial side of the sigmoid mesocolon before implanting it. It may need to be tunnelled through.



h) Thread the ureteric catheters through the rectal tube that was introduced into the high rectum/sigmoid before the operation started. Take the ureterics out through the anus before you suture the rest of the pouch. Make sure they are not dislodged.



**Figure 10.4** (continued)

i) The anterior wall of the pouch is now ready to suture.



j) It is repaired in two layers.

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# 11 POST-OPERATIVE NURSING CARE OF THE FISTULA PATIENT

A good operation can be ruined by neglectful aftercare. It is the surgeon's responsibility to ensure that nurses and carers know what is required. In reality, nurses will be in short supply and may be unfamiliar with fistula repair, so post-operative care must be made as simple as possible.

The patient must at all times be:

- Dry
- Drinking
- Draining

## Being Dry

There are several possible causes of wetness:

- The catheter is blocked.
- The repair has failed.
- There is urethral leakage.
- A second fistula has been missed, either vesical or ureteric.

## Blocked Catheter

This is serious, but is easily remedied (see below under Draining). It should be uncommon if the patient has a high fluid intake unless the catheter is merely kinked.

## Failed Repair

This should be very unlikely if the surgeon has selected a simple case and repaired it well. If there is any doubt, a dye test should be performed.

## Urethral Leakage

As well as draining via the catheter, urine will sometimes leak alongside the catheter. This is more common if ureteric catheters are in place in addition to the Foley catheter as there are three tubes in the urethra, stenting it open. This usually resolves when the ureteric catheters are removed. If the patient leaks around the catheter with only the Foley in place, it may suggest that the urethra has poor function. The typical symptom is that the patient feels wet when standing

and walking but not on lying. Careful inspection of the urethra while doing bladder irrigation will identify the problem. Unfortunately, not much can be done and it is usually an indication that she will have urethral or stress incontinence when the catheter is removed.

Sometimes, patients may complain of lower abdominal cramps accompanied by wetness. This suggests bladder spasms producing a leak around the catheter. Reassure the patient, as these always resolve spontaneously. Hyoscine butylbromide (buscopan) may help although its action on the bladder is weak. Oxybutinin works much better if it is available. Amitriptyline as an anticholinergic is a good alternative to oxybutinin if that is not available.

### Missed Second Fistula; Ureteric or Bladder

You may have missed a second fistula during the operation. A simple low vesico-vaginal fistula may coexist with an intra-cervical or ureteric fistula (the latter could be iatrogenic from the time of a caesarean section or a hysterectomy for a ruptured uterus). Note that a dye test at the end of the repair should reveal the cervical fistula (unless it is tiny), (Figure 11.1) but would not show a ureteric leak. If the patient is definitely wet from her vagina and the dye test was negative it is best to take her back to theatre and examine her under light sedation for another dye test and to exclude a ureteric fistula. A ureteric fistula is easily cured by a second operation to implant the affected ureter into the bladder.



**Figure 11.1**

The dye test in theatre has revealed a second high intra-cervical fistula after a distal fistula was closed. This could easily have been missed and the patient found to be wet in the ward later.

### Drinking

A high fluid intake is recommended. This should be started before the operation and continued until after removal of the catheter. Many patients may be reluctant to drink. They have been accustomed to drinking little to reduce their wetness. They may be afraid that drinking too much will spoil the repair. They should be reassured that this is not so.

Concentrated urine predisposes to urinary infection and to accumulation of debris, which predisposes to blockage.

Drinking can commence as soon as the patient returns from theatre if she had a spinal anaesthetic, and the intravenous line can be discontinued the same evening as long as she is drinking adequately. The patient should be kept lying flat for 24 hours to reduce the risk of post-spinal headache. (Figure 11.2)

There is no need to record urine output except for the immediate post-operative period. With the open drainage method, it is easy to see at a glance whether the patient is drinking enough. Look for the drips and look at the colour. (Figures 11.3) I usually educate the patients to drink enough water to make the urine coming out the same colour as the water going in.



**Figure 11.2**

The patient is encouraged to lie flat in bed until the day after the operation. This helps reduce the chance of spinal headaches.

## A Word of Warning

Occasionally, a patient will take this advice to excess and drink far too much. This can lead to water intoxication with hyponatraemia. This presents as confusion and coma, even leading to death. If this is ever suspected, the patient should be treated with 0.9% saline (hypertonic if available) and furosemide to promote diuresis.

## Draining

Free drainage of urine depends on adequate catheter care. If a catheter blocks, urine may pass alongside it or, much worse, the bladder will fill, pressure will increase and the urine will find a way through the repair. The scene is then set for failure.

## Principles of Catheter Care

- Nothing must pull on the catheter.
- The catheter must not become blocked or fall out.

The catheter may be secured in the operating theatre with either a suture to the mons pubis or with tapes to the abdomen. The site of the suture to the Foley gets painful after a few days so I prefer to tape. Good quality tape is hard to find and it needs to be replaced regularly. Remember that many women use vaseline on their skin which makes securing the tape impossible. It needs to be cleaned off first.



**Figure 11.3**

a) Patient sitting up in bed drinking. You can immediately see the clear colour of the urine in the drainage tube and urine dripping into the basin. b) Concentrated urine filled with post-op debris which is a risk for blocking the catheter. These should easily be flushed out with plenty of drinking. c) This urine is too concentrated and the patient should be encouraged to drink more. d) I usually tell the patient to drink enough water to make the urine the same colour as the water she is drinking.

The principle of securing the catheter is to prevent accidental traction on the catheter as the patient is moved from the theatre to the ward and at other times when she is mobile in bed and walking about. The traction can pull the balloon of the catheter against the bladder neck and fistula repair. Some people like to tape it to the thigh. Strapping to the thigh often comes off, and the catheter may be kinked when the patient turns. Also if the catheter is strapped to the thigh, it will be pulled and move with every step when the patient walks, pulling balloon of the catheter against the fistula repair inside the bladder and potentially causing it damage. Another alternative is to secure the catheter to the abdomen in the midline. (Figure 11.4) Note that there must be slack in the catheter between the urethral orifice and the strapping. Make sure that the urine bag is below the level of the bladder to ensure that the catheter is draining into the bag. If the urine bag is higher than the bladder, the urine will just run back from the bag into the bladder, filling it.



**Figure 11.4**

The catheter strapped in the midline. Note the tape is pinched between the catheter and the skin and there is some slack on the catheter between the tape and bladder to ensure it doesn't pull.

### Drainage Bags or Not?

Closed drainage is ideal, but does require vigilant nursing care and good quality bags. (Figure 11.5a). In our experience, the main problem is that the bags may become over-full, especially at night (Figure 11.5b) when nurses are scarce and hampered by frequent power failures. Another common problem is the catheter bag will lie on the floor next to the bed at night. The tube connecting the bag to the Foley is often short and the weight of the urine bag on the floor pulls the Foley.

Unless it is certain that staff can look after a drainable bag, we recommend a simple alternative.



(a)



(b)

**Figure 11.5**

a) An expensive catheter bag with a long tube. These are rarely available. b) The commonly available urine bag. Note the short tube and the bag is now full. It will be pulling on the catheter and may overflow.

The simplest and safest option is open catheter drainage. The catheter is connected to plastic tubing and drains directly into a basin under the bed (Figure 11.6). The patient can move freely in the bed, and nothing will pull on her catheter. It is easy to see that urine is draining by watching the drips, and little can go wrong at night. This is a major consideration when looking after up to 60 patients at once, as on some of our workshops.

Infection does not appear to be a problem if urine output is high.



**Figure 11.6**

a) and b) Open drainage system. Little can go wrong at night.

### Blocked Catheter

This is an emergency as it can lead to a breakdown of your repair! The symptoms and signs of a blocked catheter are:

- The patient feels a full bladder.
- She is wet (due to leakage round the catheter or through the repair if it has already broken).
- Urine stops dripping into the basin. This would not be noticed for some time when closed drainage is used.

#### **Action must be taken immediately.**

- Examine the catheter. (Figure 11.7) In our experience, a twisted or kinked catheter is the most common cause of cessation of drainage. Constant vigilance by the patient and staff is required.
- Examine the patient. Is the bladder palpable? If so, unblock the catheter at once by gentle saline irrigation with a bladder syringe. Only a maximum of 20cm<sup>3</sup> is needed. If the bladder is small, there is a danger of overdoing it. If this does not work, change the catheter, often you

find it is blocked. (Figure 11.8)

- If there is any doubt about drainage, always irrigate or even change the catheter.



**Figure 11.7**

a) A twisted catheter causing blockage. b) and c) A kinked catheter, again causing blockage. Note in c) the urine is concentrated and contains some debris. This in itself can block a catheter. The patient has to drink more.

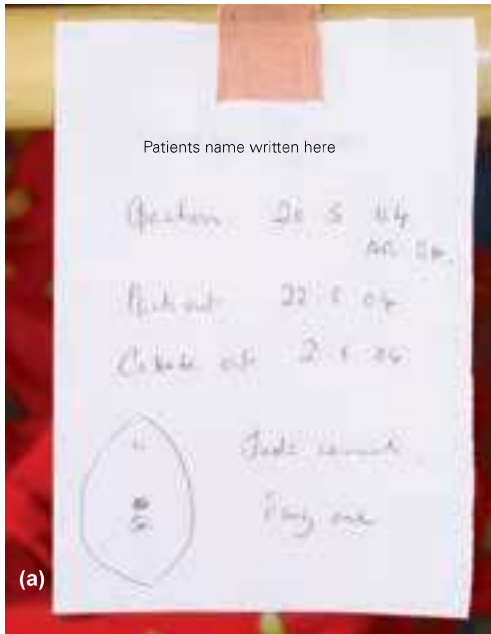


**Figure 11.8**

A blood clot was blocking this catheter. We could push the irrigation fluid in but couldn't draw any out. The clot was acting like a valve in the catheter. The catheter needed to be changed.

## Record Keeping

Keep a simple record of the patient's operation and a post-operative care plan at the foot of the bed or on the wall where it can easily be seen by all. (Figure 11.9) When there are many patients in the ward it's impossible to remember what operation you did for each one of them without ploughing through the notes. This simple end of bed chart which includes a diagram of the operation enables you to be familiar with the patients at a glance.



**Figure 11.9**

a) and b) This system has been used for years in Kitovu, Uganda. These records are placed at the end of the bed and are easily seen. When there are many patients on the ward you can tell at a glance what operation the patient had, what needs to be done from a nursing standpoint on that day and the patient's 'DDD' status.

## Other Aspects of Post-Operative Care

### Vaginal Packing

Vaginal packing should be removed on day 1 (the day of operation is day 0). There is probably no need to use a pack if the operative field is really dry, but in practice there is often some oozing right to the end of the operation and it can become more pronounced once the spinal anaesthetic (causing low blood pressure) and any adrenaline infiltration wear off and the patient is out of Trendelenburg. Most surgeons feel happier to use a pack as a gentle pressure dressing—but it is important to be aware that a vaginal pack can delay the recognition of bleeding deep in the vagina, so I always pack reasonably firmly. Make sure it has some vaseline or something on it to prevent it from sticking when you remove it.

### Perineal Hygiene

Twice daily perineal washing is encouraged, beginning when the pack is removed on the first post-operative day. The patient is encouraged to keep her perineum clean and dry.

### Ureteric Catheters

Most catheters used to protect the ureters will be removed at the conclusion of the operation. If, however, the repair has been very close to a ureteric orifice or the ureter has been re-implanted into the bladder there may be significant swelling around the ureter. The surgeon may require the ureteric catheter to be left in to prevent obstruction to the kidney by swelling around the operative site while healing takes place. It is removed on the surgeon's instructions, usually

around the fifth to seventh postoperative day, but sometimes after as many as 10 days. Roughly speaking I take the ureteric catheters out at the end of the operation if more than 2cm from the edge of the fistula. If 1–2cm away, then I remove them on day 3, if less than 1cm, day 5–7. If on the edge, day 7. If the ureter has been reimplanted day 7–10. Remember to remove the suture that is securing the ureteric catheter before you remove it.

The catheter(s) may be left to drain into a separate bottle (Figure 11.10a), but this hampers early mobility. Two other more convenient methods are illustrated in Figure 11.10(b, c).



**Figure 11.10**

a) One method of draining the ureteric catheters—straight into a bottle. b) Another method is to stab a hole in the foley catheter with a scalpel and push the ureteric catheter through there and drain all catheters together. c) Another method is to make a hole in the cap of the drainage tube—I use the sharp point of a towel clip—and thread the ureteric catheter through here and into the urine bag. You need to secure this with tape. Most methods usually end up with some leakage which can upset the patient. She needs to be reassured.

## Mobilisation

The patient is allowed out of bed after removal of the vaginal pack the morning after the operation. If she has open drainage, she can use a bucket to collect urine and can carry this around with her. (Figure 11.11) This works perfectly well, but it is essential that the patient continues to drink plenty of fluid. If she has a urine bag, she must be instructed to keep the bag below the level of the bladder while walking otherwise the urine will just drain back into the bladder and overfill it.

## Removal of the Catheter

A few studies have been performed to determine the optimum time for removal of the bladder catheter. Traditionally, most surgeons leave the catheter in for 14 days after all fistula repairs, but two studies showed that 10 days is sufficient. One larger study showed that removing on



**Figure 11.11**

Patients up and about with their buckets.

day seven after the operation might be safe, but interestingly many patients got their breakdown between days 7 and 10 and the treatment for this is to replace the catheter, so patients should still be kept in the hospital to pass through this 'danger time'. Most centres still leave the Foley catheter in place for 10–14 days and for most I leave it for 10 days. If it is a repeat case and/or a very large fistula I leave it for 12–14 days.

Some people advocate bladder training, by which they mean intermittent clamping and unclamping for 48 hours before the catheter is due to be removed. With low levels of nursing care, this can easily go wrong if instructions are misunderstood, and we are not convinced that there is any benefit in this regime. It does run the risk of a catheter being blocked for too long, filling and breaking the repair. To me it seems too risky for no demonstrable gain.

Some advocate doing a dye test before removing the catheter. This enables the surgeon to determine his or her closure rates and also to note any tendency to urethral leakage. If by chance a small leak from the repair is detected, the bladder must be drained for up to another 2 or even 3 weeks. The usual teaching is, if she is wet through a small hole, to leave the catheter in place until the patient is dry and then leave it for another week from the day she became dry. If after 1–2 weeks the amount of urine coming through the catheter is not increasing and the amount in the bed is not decreasing, then it is unlikely to close, Remove the catheter and plan for a repeat procedure in 2–3 months. Small late breakdowns in the midline of the vagina, away from the urethra often heal with prolonged catheterisation, but small breakdowns in the urethra or on the pelvic side wall rarely heal with prolonged catheterisation.

It is best to remove the catheter early in the morning and to ask the patient to pass urine frequently. The next day, she can try to hold on longer. If outputs are measured, voiding volumes of 25–50cm<sup>3</sup> are usual on the first day, but they rapidly increase to 100–200cm<sup>3</sup> in most patients.

It is important that all patients have two to three residual volumes of urine checked **on the day the catheter is removed**. This means that the patient drinks, passes urine and then has her residual volume checked. It is ascertained by passing a catheter to drain the bladder completely and measuring how much urine was left. This is called the residual volume. Normally a woman can empty her bladder completely, but arbitrarily a residual volume of **100ml and above** is considered abnormal. It becomes more difficult in fistula patients as often their bladder capacity is very small after having had much of their bladder destroyed. A better way of finding whether a patient has retention is to measure the voided volume and then check the residual volume. If the residual volume is more than 50% of the voided volume she is in retention (e.g. if she voids 100ml and the residual is 60ml then she has retention). But still treat anything above 100ml as meaning she has retention (e.g. if she voids 300ml and has 110ml residual, treat the case as retention). You should repeat the measurement 2–3 times as the patient often improves the residual volume after a couple of voids. I get 8% having retention, these patients would otherwise go home wet and in retention if missed.

For treatment of urinary retention see Chapter 9—Management of Retention.

## Problems

### **The Patient is Wet all the Time After Removal of the Catheter**

In this case, the patient has either a totally incompetent urethra or a failed repair; or retention with overflow incontinence. A dye test is essential to differentiate the first two, and measuring residual urine will detect the latter. A late breakdown must be managed by more catheter drainage, preferably with rest in bed lying prone (Figure 11.12—see below). If this does not work, the patient must return in 3 months for another attempt at repair. Total urethral incompetence should be treated by teaching pelvic floor exercises (these should ideally be taught before the operation and continued throughout the post-operative period). The patient should be asked to return in 6 months for further assessment and consideration of a secondary operation for stress incontinence. If the ongoing incontinence is severe, leaking day and night, the patient can be discharged with a urethral plug if it is available but with pads to help for the journey home, but patients need great reassurance that they should come back for another operation. You must collect their details and be in contact with them or their family members to make sure they don't give up hope, and do come back.

### **The Patient Can Void, but is Wet on Standing Though Dry in Bed**

This suggests a lesser degree of stress incontinence that may improve spontaneously with the help of pelvic floor exercises. We have seen a number of patients who were discharged wet and yet returned for review completely dry. In one follow up study, **50% of these patients were completely dry** at 6 months follow up.

### **The Patient is Dry, but Voids Frequent Small Volumes**

This is very common immediately after catheter removal and can be due to urinary retention, an irritated bladder or a small bladder. All patients should have 2–3 residual volumes measured after removing the catheter. If a high residual volume is undetected and untreated, the patient

will develop overflow incontinence and be predisposed to chronic urine infections. The condition usually resolves spontaneously if the bladder is regularly emptied with clean intermittent self catheterisation (see Chapter 9—Management of Retention). An irritated bladder will hopefully settle with time. Often it's the urethra that is irritated after having a catheter in place for 10 or more days. Check for an infection but most of the time this will settle. Do encourage the patients to drink plenty to keep the urine clean and flowing. The most difficult to manage are those patients with a small bladder. We have seen some bladders stretch remarkably with time, but more often than not they don't unless as they are often incapable of holding larger volumes of urine.

## Failure of Repair

A leak requires a dye test unless gentle irrigation demonstrates leakage around the catheter. A leak from the vagina on dye test indicates a failure, but all is not necessarily lost.

### Early Leak - in the First Week

This is bad news, and usually means the repair has failed. Early leakage should be rare after easy repairs, but is more of a problem in difficult cases. If more urine is draining through the catheter than through the vagina, it is worth keeping the catheter in for as long as this is the case, in the hope that healing might occur.

### Late Leak - in the Second Week or Later

Occasionally, even simple repairs develop a leak during the second week. This may be a secondary breakdown due to infection. In these cases, as the fistula margins are not under tension and have good blood supply, there is every chance that the defect will close with prolonged bladder drainage. The catheter should be kept in for up to 3–4 weeks in total, as long as the leak is diminishing. If the patient does become dry with prolonged catheterisation, then leave the catheter on free drainage for another week before removing it.

### The Later the Leak, the Better the Prognosis

It may help to keep the patient in bed, lying and sleeping face down. (Figure 11.12) In this position, the hole in the base of the bladder will be uppermost and the catheter tip will be below it, i.e. there is sump drainage. This makes sense but we have no evidence that it's beneficial. I leave the catheter in until she is completely dry again then leave the catheter on free drainage for one more week (as above). If the leakage is not decreasing after an additional 7–10 days of catheter drainage I remove the catheter, as it is very unlikely to heal.

## Timing of Discharge Home

Although, in most cases, the catheter is removed on day 10, we strongly recommend that the patient does not leave the hospital for at least another three to four days. We have seen several

patients who were said to be dry after catheter removal, and have gone home the next day or two and become wet within days, usually saying that they were going home on a long, rough bus journey with a full bladder. They felt a 'pop' and became wet. If they had been able to return immediately and have further catheter drainage, they would probably be healed. They were subsequently found to have very localised breakdown that was easily amenable to a second repair.

Is it advisable to let patients who have had major surgery go home over long distances in crowded taxis, on the back of a bike or by a long walk? It is not surprising that some secondary breakdowns occur. The other advantage of retaining the patient for a week or longer is that one can often see early stress incontinence improving over a matter of days. Also, those with incomplete emptying (urinary retention) or urine infections requiring treatment may be recognised.

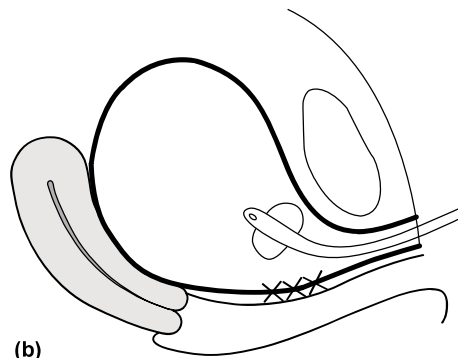
All patients must be told to return at once if they become wet after going home, and they should be encouraged that the bus fare will be reimbursed if they do so. Many places now have 'mobile money' making transfer of money for bus fares over the mobile phone network possible for such cases.

They should also be advised to avoid strenuous activity and sexual intercourse for three months. Patients need to be taught to come to hospital for a delivery by caesarean if they become pregnant.

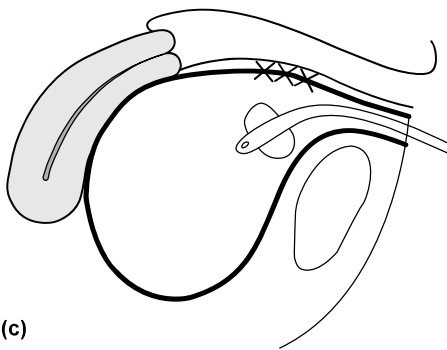
The patient should be given a card describing her treatment and giving the operation date to aid later identification and to advise caesarean section should she present pregnant to another hospital.



(a)



(b)



(c)

**Figure 11.12**

(a) One alternative to care for a patient with a breakdown of repair is to nurse the patient in a prone position while draining the bladder. In theory the urine should be draining more easily through a broken fistula in the supine position (b). In the prone position, the urine will now collect in the anterior bladder, be drained by the catheter, and hence not leak through the broken fistula, enabling it to heal (c). Like with most things in fistula surgery, this is dictated by common sense but the evidence that it works is lacking.

## A Cautionary Tale

A patient set off on a 200 mile journey home 3 days after removal of a catheter. She claimed to be voiding well. She had a 5 hour ride in a crowded taxi, which did not stop on its way. She felt a full bladder, but was too embarrassed to ask the driver to stop. She became wet and, hoping that it was a temporary problem, continued home. Finding herself wet all the time, she was too far to return immediately, and anyway had no money. She later returned. A small, high, very difficult intra-cervical fistula was repaired successfully. If only this patient could have delayed setting off home or returned immediately for further catheter drainage, this situation could have been prevented.

## Pre-Discharge Advice

### Counselling

Before discharge, the patient and her family must receive advice so that they understand why the fistula occurred and how it can be prevented in future. Many patients come with traditional beliefs about the cause of the fistula—for example, that it was a punishment for adultery or that someone has cast a spell or that they were cursed. These and other false ideas must be gently corrected. Once home, she must become an advocate in her community for prevention. It does take a while for the message to sink in and regular education is needed and built upon.

### Abstinence from Sexual Activity and Heavy Work

Occasionally, we see patients who went home dry but report a leak developing after a few weeks. Several have admitted to having intercourse or doing heavy work in the fields, feeling a 'pop' and then becoming wet. To prevent this it is essential that they abstain for at least three months.

### Caesarean Section for all Future Pregnancies

It is essential to discuss family planning issues, including tubal ligation where relevant. The surest way to maintain a cure is to have no more deliveries! Future pregnancies must be delivered by caesarean section. If the obstructed labour was due to a malpresentation, the patient could possibly deliver vaginally in future, but, as skilled obstetric care is rarely available, it is best to insist on a caesarean section for all subsequent deliveries. From time to time, we do see patients with recurrence of fistulae because they have not been able to get to hospital in time, or because they were given a trial of labour instead of an elective caesarean section.

Over some years working in northern Ethiopia, we had over 200 women return to us pregnant after a fistula repair. All of them had a caesarean at term. We lost one baby due to a congenital abnormality and one due to prematurity. There was no recurrence of fistula. During the same time period we had 53 women come back having tried to deliver at home; maybe they didn't tell their new husbands they had had fistulae before, or their community didn't allow them to come to hospital for their delivery. All of them had a stillbirth and all had a fistula recurrence.

We also heard of some women who died trying to have another baby at home. We don't know how many women did deliver at home successfully, but the number and severity of complications certainly doesn't justify the risk. All women should return for a caesarean at term.

## Return for Follow-Up Consultation

Because it is so important for surgeons to know their results, patients should be given every encouragement to return. One surgeon forbids resumption of sex until the patient has been seen for follow up. He gets a high return!

## Possible Late Problems

### Urinary Infections

With our regime of a single dose of gentamicin 160mg in theatre and a high urine flow, infected urine is uncommon. A late post-operative infection could be caused by a stricture with retention or even a missed bladder stone. Where limited laboratory facilities exist, inspection of the urine should be enough to make the diagnosis. It is very difficult to diagnose a urinary tract infection with a dipstick when a patient has a fistula or soon after the operation. The urine sample will always be contaminated when she has a fistula and after the operation there will always be contamination from the operative site.

### Ongoing Incontinence Despite a Closed Fistula

This frequent and troublesome problem is discussed in Chapter 9. If the patient remains wet there is still a high chance of depression and even suicide. These patients need special attention, counselling and reassurance and each one should stay at the hospital until well educated, with a plan and hope for further management.

### Stricture

Any patient who had a stricture of the proximal urethra at the time of repair is at risk of post-operative stenosis. You should excise the stricture at the operation to minimise the chance of this. Circumferential fistula repairs have the highest chance of stricture formation. I get an 8% stricture rate at 6 months follow up. Treating strictures is difficult as they invariably recur. Some dilate them, for example with Hegar dilators. I prefer to cut them at 5 and 7 o'clock by inserting a fine pair of scissors through the urethra, rolling the scissor off the stricture, opening the blades, advancing gently and cutting the stricture. To prevent recurrence, the patient should be taught how to self dilate the stricture with a stiff short catheter every day or two. She will insert it into her bladder, leave it there 10 minutes then remove it. If she is wet after cutting of the stricture, the urethral plug (if available) will work both to keep the patient dry and to prevent the stricture recurring.

## Sexual Difficulties

In spite of a good repair without any vaginal stenosis, some women are reluctant to resume sexual relations. There may be a number of reasons, and sensitive enquiry and examination are required to reassure them. Others with genuine dyspareunia due to vaginal stenosis may be helped by a vaginotomy or vaginoplasty especially if the narrowing is localised.

## Re-Integration

Much has been written about counselling and helping to re-integrate fistula patients into the community. Many patients are very poor and certainly appreciate financial help; however, in practice, if the patient is dry, she will re-integrate and, if she is wet, she may not.

As already mentioned, patients who are cured must be educated about the cause of their fistula and understand how fistulae should be prevented. They can become educators for their own community.

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## 12 ASSESSMENT OF RESULTS

Any surgeon wants to know his or her results, but accurate documentation is beset with a number of difficulties:

- **Inoperable cases.** Specialists vary in their estimates of the percentage that they see as inoperable from the start, ranging from less than 1% to around 5%. Even experienced surgeons can occasionally start a case and find it impossible to finish. Clearly, if these are not included in an analysis, then comparison between centres or individuals is not valid.
- **Area of work.** Anyone starting fistula repairs in a new location will have the benefit of virgin territory, with a good proportion of easier cases. As visits or work continue, the percentage of easy cases drops dramatically as re-repairs and cases of stress incontinence dominate the picture. Also, after surgeons become established in their localities, they will be referred more and more difficult and failed cases, while surgeons whom they have trained handle the easy cases. So the results for the same surgeon may change with time.
- **Incomplete follow-up.** It is ideal practice to perform a dye test before removing a catheter to assess the closure rate. If this is not done for all patients, a dye test can be performed just on those who are wet after catheter removal, in order to distinguish between breakdown and stress (after excluding urinary retention). Some late breakdowns occur after the patient has gone home and some cases of stress cure with time. A follow up appointment is necessary to be sure of the outcome, however, this is often difficult in resource-poor areas.

### Recording Results

A key step for any surgeon, whatever his or her experience, is to record results for all new cases and re-repairs separately. Cases that are not done because of difficulty or impossibility or that are referred on elsewhere, should also be recorded diligently.

We record details of our patients on Excel databases. A balance has to be struck between, collecting every scrap of data just because it might be of future interest and, missing data that will be useful for prospective analysis. In setting questions, it is important to have 'yes' or 'no' answers or numerical data as in the Goh and Waaldijk classifications. The use of purely descriptive terms for each patient's fistula will not help in the analysis of results. However, there must be a place for describing the operation or other unusual features, as each patient and her fistula are unique.

In assessing results, there are many variables, and one must be clear about definitions:

- **Complete cure.** To be completely cured, the patient must be totally continent and be able to bear children. There are only a handful of studies on fertility after fistula repair. When combining the data it was found that only 20% had successful pregnancies after fistula repair. Reproductive capacity is reduced, the leading causes being amenorrhoea, vaginal stenosis (leading to aphaerunia and/ or closure of the vagina or cervical os), and cervical incompetence

as many patients have damaged cervixes. There are of course many patients who have had a caesarean hysterectomy at the time of fistula occurrence and weren't informed.

- **Acceptable cure.** This is to be dry, not leaking on coughing or strain and dry through the night, voiding normally.
- **Urinary retention with overflow incontinence,** in which the patient is invariably dry with self catheterising.
- **Failure.** This is a breakdown of the repair, confirmed by the dye test or stress incontinence, which is so bad that the patient feels no improvement on the pre-operative state.
- **Stress incontinence and other urethral incontinence.** This occurs in varying degrees and has to be quantified descriptively—an objective assessment is not easy in a resource-poor location. (See Chapter 9)

Surgeons working in permanent fistula centres can be much more objective about their results, as they are there to see the early post-operative results themselves, or at least have them accurately assessed by experienced staff.

Throughout Africa, many fistulae are repaired by surgeons who visit regularly to attend fistula camps. They often have to leave by the time the patient is discharged, and therefore have to rely on later reports from remaining staff, who may for various reasons omit a dye test. A practical method of documentation in this situation is as follows:

- **Cured.** The patient has been seen at least 3 months after her operation and is completely continent.
- **Presumed cured.** The patient was said by the staff to be dry on discharge and has not returned for follow up.
- **Failure:**
  - ✦ The patient became wet in the post-operative period, and a breakdown was confirmed by a dye test.
  - ✦ The patient was wet on discharge, although it was not known if this was a breakdown or due to stress incontinence. A few of the latter cases may improve and not return for follow up. In our practice, we suspect that the majority who are seriously wet do return. We are then able to decide if they have stress or a broken repair. If they are wet on discharge from the hospital they need to be encouraged to return for further management. Without this, some patients may think that they can't be cured and nothing more can be done for them. Some seek health care elsewhere and are lost to follow up.
- **Stress incontinence.** The patient has a negative dye test, but is clearly wet. Further follow up is needed to decide if this rates as:
  - ✦ *Total stress incontinence.* The patient feels that she is no better, and she does not void any urine.
  - ✦ *Partial stress incontinence.* She can be dry at times, for example she is dry sleeping at night and on sitting, but becomes wet on walking or standing and does void urine spontaneously. (See Chapter 9—Immediate Assessment for a simple grading system)

- **Urinary retention.** These patients are usually dry self catheterising.

There will be a few results that do not comfortably fit these categories, for example patients who have strictures requiring dilatation.

We have emphasised that every effort should be made to follow up with patients after repair. In addition to enquiring about continence, one should record any changes in menstrual function, sexual function and social integration.

## Mortality Rates

Fistula repair is major surgery, and it is not surprising that there will be cases of morbidity and mortality. Mortality of the order of 1 in 500 may be expected. The majority of these deaths will be due to unrelated medical problems. Causes specific to the surgery include anaesthetic mishaps, water intoxication and pulmonary embolism. Occasionally, deaths occur for which no clear explanation can be given.

Brian Hancock has so far lost one case from an overwhelming chest infection, and I have lost two patients in the post-operative period, one from cerebral malaria and one from a suspected cardiac cause.

# 13 PROBLEMS, COMPLICATIONS AND HOW TO GET OUT OF TROUBLE

A number of complications may occur during the course of repair, and some of these will be described as lessons in learning how to cope.

## Are Things Not Going Well?

- Could exposure be improved by larger episiotomies or vaginotomies? Or by more head-down tilt?
- Is the lighting the best that it could be?
- Is the patient slipping down the table? Shoulder rests are essential for a very steep Trendelenberg position, but many operating theatres do not have them. Provided that the patient is placed with her buttocks well over the table with her thighs well flexed, it is possible to obtain 20% of head-down tilt without the patient moving down. If she has slipped down, the Auvards speculum will not be sitting in the vagina easily, butting against the operating table making access difficult to impossible. Put the head of the table up again, push the patient down the bed, secure the shoulder pads and then place her head down.
- Are you using an assistant well? An unfamiliar assistant should not do anything until asked, and then keep doing what you ask until asked to change. If you have a regular assistant, he or she will be able to anticipate your needs. The most useful skill is to be able to pick up the tip of a needle for the surgeon deep in the vagina (5/8-circle needles make it much easier for surgeons to do this themselves).
- Try to use your assistant as little as possible, and keep the vagina clear of suction devices and instruments. We prefer mostly swabbing ourselves to clear blood and do not use suction as a routine. If the reflected vaginal flaps are sutured up, there is much less for someone to hold. The vagina is a narrow operative field and the fewer instruments there the better.

## An Injured Ureter

One of the most embarrassing mishaps is the accidental injury of a ureter at surgery. This has occurred to almost every fistula surgeon—not just beginners. This accident usually happens when mobilising the bladder in the region of the cervix. Sometimes, the injury is recognised immediately, or it may be noticed at the end of the repair when clear urine is seen escaping.

This accident can be prevented by identifying and catheterising the ureters at the earliest opportunity during a repair. This is usually done before making any incisions, other than relaxing episiotomies or incising vaginal scar, but sometimes it is necessary to begin mobilisation before

there is any chance of visualising the orifices. Here, the ureters are at risk, so it is important to avoid straying into the bladder wall and always to keep close to the cervix or stay under the vaginal skin.

It is still possible to cut the ureter with the ureteric catheter in place. If the catheter has a metal stylet, it is advisable to keep it in place during dissection so that it can be felt and so that, if the ureter is cut, it will not be transected. Most catheters do not come with a metal stylet, and on a few occasions surgeons have cut through the ureter and catheter.

Ureteric catheters are often difficult to obtain and many surgeons have to operate without them. If this is the case, the important thing to do is identify the ureter and if it is possible to hold a ureteric probe in the ureter while doing the dissection and suturing, have your assistant hold the probe tightly. I know of at least one surgeon who lost a ureteric probe in the ureter and couldn't get it out. An alternative to a ureteric catheter is an infant nasogastric feeding tube. (Figure 13.1) These are thin and soft and often difficult to insert. You will need to thread them through the urethra first and then make sure they are secured in the ureter with a stitch, as they easily fall out.

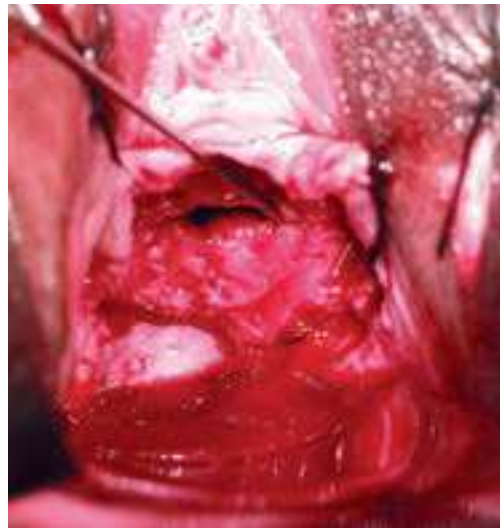
If a ureter is identified as being at risk, it may be possible to protect it without the use of a catheter, but be careful not to drop the probe. (Figure 13.2)

### How to Cope with an Injured Ureter

There are 3 approaches:



**Figure 13.1**  
Nasogastric feeding tubes used as ureteric catheters.



**Figure 13.2**  
A ureter has been identified with a probe, but there was nothing to catheterise it with. The sutures were placed with the probe carefully held in the ureter. Urine was still coming when the probe was removed after the corner was secured.

1. Try to pass the catheter up the real ureteric orifice and 'railroad' it across the gap, then repair the gap, end to end with a fine 3-0 or 4-0 suture.
2. Pass a catheter up the cut ureter and fold it into the repair. A cut ureter is more difficult to catheterise in the bladder wall. The lumen may retract. Use the smallest ureteric catheter available.
3. Suture over the cut ureter, finish the repair and implant the ureter into the bladder through a separate abdominal approach.

## The Ureter and the Ureteric Catheter Are Cut

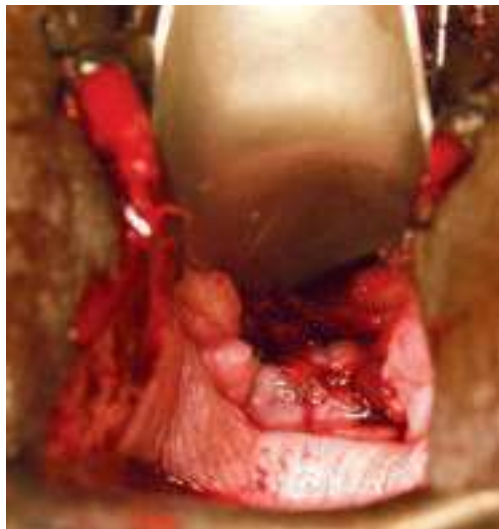
I have observed this twice in the hands of very experienced surgeons. The proximal catheter was impossible to extract. The repair was finished and the abdomen opened, the catheter was retrieved and the ureter was implanted into the vault of the bladder. Once I was given an expired ureteric catheter and it snapped in half in the ureter so half was left inside. That ureter was actually draining outside the bladder, I left it and after a week the tip passed into the vagina and was then easily retrieved.

## A Trap for the Unwary

A double ureter is not that uncommon. (Figure 13.3) I was once caught with double ureters on both sides, so a duplex duplex system. The patient needed four ureters catheterised!



**Figure 13.3**  
A double ureter



**Figure 13.4**  
A high fistula running up a split uterus. A deliberate decision was made to repair the bladder without catheterising the ureters as it was not technically possible. The ureters ended up being ligated and needed to be implanted abdominally.

## Two Instructive Stories

A surgeon had completed a difficult vault fistula repair without the availability of ureteric catheters. That evening, no urine came through the bladder catheter, but urine was draining down the vagina. Next morning, the patient was taken to theatre. A dye test revealed that the repair was sound. It appeared that one ureter had been ligated and the other damaged in the bladder wall. Ideally, the repair should have been taken down and both ureters identified, but this was impractical. The practical step was to perform a laparotomy and implant both ureters. This was done, with a successful outcome confirmed by a 6 month follow up.

I once had a moderate-sized fistula to repair and only two ureteric catheters left in the hospital. The ureters were close to the edge of the fistula, but I decided to close the fistula carefully, doing my best to avoid suturing close to the ureters and in order to save the ureteric catheters for a more difficult case. The patient was dye test negative and dry, but in the recovery area she passed no urine. The catheter wasn't blocked. The patient was hydrated and became very restless with frusemide—and still no urine. I took her back to theatre and when I undid the bladder sutures there were huge gushes of urine. I used the last two ureteric catheters, repaired again and she went home cured.

## A Desperate Situation

A patient presented with a recurrent high intra-cervical fistula visible through a split open cervix. The defect extended below the level of the cervix and was judged unsuitable for a trans-vesical repair. (Figure 13.4) The ureters were seen squirting on the edge of the ragged defect, but after 45 minutes could not be catheterised. The bladder was mobilised off the cervix remnant and the uterus, and the defect was closed with a running suture. The ureters were clearly at risk, but there seemed to be no other option. The dye test was negative, but the patient produced no urine on the table. The abdomen was opened, and both dilated ureters were divided and anastomosed to the bladder. The patient had made a complete recovery when she was seen 3 months later.

## Miscellaneous Mishaps

### Intra-Vesical Bleeding

Bleeding into the bladder should be an exceedingly rare event if you pick up the edges of the bladder with your sutures correctly, incorporating the full thickness of the muscularis. I have seen it occur once in the immediate post-operative period. A surgeon had unknowingly entered the plane between bladder mucosa and muscle. When the patient returned to the ward it was obvious that heavy bleeding was occurring into the bladder by the appearance of haematuria with clots. The repair had to be taken down to secure the bleeder in the bladder wall. Although a re-repair was performed, it broke down and was repeated 4 months later.

Another patient bled into her bladder after a repair of a small simple fistula from an undiagnosed bladder tumour. She had to be transfused and after the bleeding settled she was referred to a urologist.

## An Injured Rectum

At the end of a long day of operating, a surgeon embarked on a difficult repair. In performing vaginotomies to obtain access, he inadvertently opened the rectum. This proved very difficult to repair through all the scar tissue that was present. A colostomy was performed in view of the difficulty. The fistula repair was deferred—it was repaired successfully and the colostomy closed 4 months later.

### Lessons

- Do not start a demanding case late in the day.
- If it is a challenging case, never be afraid to make vaginotomies just below the 3 and 9 o'clock positions.
- If in doubt, insert a finger into the rectum to act as a guide.

## A Missed Rectal Stenosis

Brian Hancock was presented with a patient who had a small circumferential vesico-vaginal (VVF) and a high recto-vaginal (RVF) felt on vaginal examination. The RVF was not palpable on rectal examination. Brian repaired the VVF and, before starting the RVF repair, he examined the patient per rectum. To his horror, he found that high up there was a complete stricture below the RVE. It would have been impossible to carry out the repair transvaginally. A colostomy was performed, followed later by a resection of the rectal stricture. In spite of considerable faecal contamination, the VVF healed and later the RVF as well.

### Lesson

- It is essential to assess any potential rectal injury fully before embarking on a bladder repair.

# APPENDIX A:

## BOOKS, TRAINING MATERIAL AND SUPPLIERS

### Books

Moir JC. *The Vesico-Vaginal Fistula*. London: Baillière, Tindall & Cox, 1961 (2nd edn. London: Baillière, Tindall & Cassell, 1967).

This classic monograph is an excellent introduction to fistula surgery.

Waaldijk K. *Step by Step Surgery of Vesico-Vaginal Fistulas*. Edinburgh: Campion Press, 1994. Available from Teaching Aids at Low Cost (TALC) Box 49, St Albans, Hertfordshire AL1 5TX, UK (info@talcuk.org).

This is valuable reading for any serious fistula surgeon. It is based on Kees Waaldijk's personal experience in Northern Nigeria, which is the largest in the world. It is very detailed and well illustrated, but the beginner might find some parts hard to follow. Dr Waaldijk's experience is constantly evolving and he is embarking on a new series of publications. The first, *Obstetric Fistula Surgery Art and Science: The Basics*, has just been released as a private publication printed by Printmarkt.eu (You can email them on info@printmarkt.eu), or they are obtainable from Dr Waaldijk in the Netherlands (kees.waaldijk@yahoo.com). The series now contains many titles from hypotonic bladders to classification and is growing all the time.

Breen M. *Manual of Obstetric Fistula Surgery*. The Foundation for the Global Library of Women's Medicine, 2019.

Michael Breen's new book can be found at GLOWM (Global Library of Women's Medicine) [http://www.glowm.com/recommended\\_textbooks](http://www.glowm.com/recommended_textbooks)

This is an amazing resource, consisting of detailed notes of the operative steps for all the major procedures in fistula surgery. In many ways, it is complementary to and much more detailed than the present book. It is based on Michael Breen's extensive experience at Monze Hospital, Zambia and now in Madagascar.

Goh J, Krause H. *Female Genital Tract Fistula*. Brisbane: University of Queensland Press, 2004. Available from the Medical Bookshop, University of Queensland. Herston Road, Herston, Queensland 4006, Australia (medicalbookshop@uq.net.au).

This is a comprehensive account of the whole range of obstetric and gynaecological fistulae.

Zacharin R.F. *Obstetric Fistula*. New York: Springer-Verlag, 1987.

This is an excellent account of the historical aspects of fistula repair, but is of little help to a beginner. It contains a chapter about the early days of the Addis Ababa Fistula Hospital.

Hancock B. "Introduction to Obstetric Fistula Surgery", a chapter in *Gynaecology for Resource Poor Locations*. Sapiens Publishing, 32 Meadowbank, London NW3 3AY, UK (info@sapienspublishing.com) (www.sapienspublishing.com). It can also be found on the GLOWM website (www.glowm.com).

Campbell IM, Asiiimwe IS. *Nursing Care for Women with Childbirth Injuries*. Global Library of Women's Medicine. 2021.

Hamlin C (with Little J). *The Hospital by the River*. Sydney: Pan Macmillan Australia, 2001/Oxford: Monarch Books, 2004.

This is a very enjoyable account of Catherine and Reg Hamlin's life and work at the Addis Ababa Fistula Hospital. There is also a sequel called 'Catherine's Gift', also published by Pan Macmillan.

## Training Material

Andrew Browning's training videos are available through GLOWM, the Global Library of Women's Medicine (www.glowm.com)

Lewis G, de Bernis L, eds. *Obstetric Fistula: Guiding Principles for Clinical Management and Programme Development*. Geneva: World Health Organization, 2006. Available online at [www.who.int/reproductive-health/docs/obstetric\\_fistula](http://www.who.int/reproductive-health/docs/obstetric_fistula). Hard copy available from World Health Organization, Department of Reproductive Health and Research, Documentation Centre, 1211 Geneva 27, Switzerland (rhrpublications@who.int).

This manual contains chapters on social integration and rehabilitation, nursing care, physiotherapy and operative principles. A summary of the manual is given by de Bernis L. *Int J Gynaecol Obstet* 2007; **99**(suppl 1): S117–21.

Hancock B. *First Steps in Vesico-Vaginal Fistula Repair*. London: Royal Society of Medicine Press, 2005.

This is a practical account for doctors and nurses new to fistula surgery.

Hancock B. *Practical Obstetric Fistula Surgery*. London: Royal Society of Medicine Press, 2008.

This is the first edition of the present book and is available free online.

## Suppliers

- FIGO Fistula Sets - please contact [figo@figo.org](mailto:figo@figo.org)

## Instruments

- Boyd-Stille tonsil scissors (ART No. 101-8420 17cm)
- Sharp-pointed special Stille  
both from Stille Surgical AB, Sundbybergsvägen 1A, SE-171 73 SOLNA, Sweden ([www.stille.se](http://www.stille.se)).
- Curved Kelly's fistula scissors from Vubu Medical in Germany. Product no. VUBU-03-10616 (<https://www.vubu-medical.de/en/Surgical-Instruments/KELLY-FISTULA-SCISSORS-CURVED-16-0CM::1071.html>)
- Thorek scissors  
from Aesculap ([www.surgical-instruments.info](http://www.surgical-instruments.info)).

## Clip-on Headlight

- Voroscope LED Illumination and Magnification System  
from Nuview Ltd, Unit 26, Daniels Industrial Estate, Bath Rd, Stroud, Gloucestershire GL5 3TJ, UK ([www.voroscopes.co.uk](http://www.voroscopes.co.uk)).
- DC-1 LED Light  
from Lemonchase, The Brewery, Bells Yew Green, Tunbridge Wells, Kent TN3 9BD, UK ([www.lemonchase.com](http://www.lemonchase.com)).  
In other countries, similar headlights can be found in resources for dental surgeons.
- FIGO Head Torch: please contact [figo@figo.org](mailto:figo@figo.org)

## Needles and Sutures

### Needles

- J-shaped fish-hook needles  
from Surgicraft Ltd, 11 The Oaks, Clews Road, Redditch, Worcestershire B98 7ST, UK ([www.surgicraft.co.uk](http://www.surgicraft.co.uk) or [info@surgicraft.co.uk](mailto:info@surgicraft.co.uk)).

### Ethicon sutures

- Monocryl 3-0, W3625: 5/8-circle 26mm round bodied
- Vicryl 2-0, W9160: 5/8-circle 36mm round bodied
- Vicryl 2-0, W9020: Ligapack dispenser reel 2.5m.

### **Polysorb Sutures**

- Polysorb 2–0: Product code UL878 (5/8-circle 27mm needle)

An excellent suture on a strong, small 5/8-circle needle from Covidien Syneture ([www.syneture.com](http://www.syneture.com)); available in UK from Squadron Medical Ltd (tel: +44(0)1246 470999).

### **Urethral Plugs**

Are currently unavailable but we are hopeful that they may come back into production again.

## APPENDIX B:

### PROTOCOL FOR THE ONE HOUR PAD TEST

1. Weigh a new pad in a sealed plastic or ziplock bag on a kitchen scale (or a scale that can measure grams).
2. Ask the patient to void.
3. Ask patient to wear the pad (with underpants to hold it in place).
4. Get the patient to perform the following activities:
  - a. 0–15 minutes: Sit and drink 500ml of water.
  - b. 15–45 mins: Walk gently around the ward and/or hospital.
  - c. 45–60 mins:
    - i. Stand up from sitting 10 times.
    - ii. Cough vigorously 10 times.
    - iii. Run on the spot for one minute.
    - iv. Bend to pick up an object from the floor five times.
5. Remove the pad, place it in the same plastic or ziplock bag.
6. Weigh the pad again, in the bag.
7. Subtract the initial weight from the end weight to record the weight of urine leaked.

<u>WEIGHT OF DRY PAD AND PLASTIC BAG</u>	<u>WEIGHT OF WET PAD (ONE HOUR) AND PLASTIC BAG</u>	<u>DIFFERENCE</u>

## APPENDIX C:

# DEMOGRAPHIC AND FISTULA CHARACTERISTICS

Table C.1 lists some demographic data from our three main hospitals in Uganda (Kitovu, Kamuli and Lira) and the Bahr Dar Fistula Centre in northern Ethiopia. The outstanding difference between the two countries is the frequency of caesarean sections in Uganda—indicating that many people can get to hospital, but arrive too late. In Ethiopia, few people have access to a hospital.

Table C.2 compares primipara with multipara. By all three criteria for a bad fistula—i.e. urethral involvement, circumferential detachment and presence of a recto-vaginal fistula (RVF)—primiparous patients score higher than multiparous patients. This is so for both countries.

Table C.3 compares vaginal delivery with caesarean delivery. Again, by all three criteria, the patients delivering vaginally have significantly more serious injuries than those having their labour relieved by caesarean section. This applies to both countries.

In making comparisons between the two countries, the most striking difference occurred in the primipara (Table C.4), where there was a higher incidence of urethral and circumferential involvement and of recto-vaginal fistula in the Ethiopian patients ( $p = 0.001$ ). Although the difference in urethral and circumferential involvement could be explained partly by inter-observer variation, a recto-vaginal fistula is always a marker of a severe injury, so it is probable that injuries are more severe in Ethiopia compared with Ugandan patients, at least among the primipara. Note that these series were collected and analysed in the 2000s and although the pattern of access to health facilities has now changed and more when get to caesarean, but often too late, it is still interesting and valuable to learn of the differences in patient presentation across geographical areas.

**Table C.1** Demographic data

	Uganda	Ethiopia
Series	790	606
Not done: considered inoperable (%)	2.4 (19/790)	1.5 (estimate)
For analysis	771	606
Mean age (years)	27	28.8
Mean duration (months)	59	48
Mean time in labour (days)	Not available	3
No. of deliveries per patient	2.9	2.8
Primipara (%)	60	50
Vaginal delivery (%)	34.7	84.5
Caesarean section (%)	65.3	15.5
RVF + VVF (%)	3.3	8.4

**Table C.2** Primipara compared with multipara

	Uganda	Ethiopia
Primipara		
Number	342	279
Urethral involvement (%)	70	82
(<3.5 cm from external urethral ori-fice)		
Circumferential (%)	15	41
RVF + VVF (%)	5.3	13.6
Multipara		
Number	417	320
Urethral involvement (%)	51	44
Circumferential (%)	7.7	20
RVF + VVF (%)	1.9	4.3

**Table C.3** Vaginal compared with caesarean delivery

	Uganda	Ethiopia
Vaginal deliveries		
Number	265	471
Primipara (%)	59.3	50.7
Urethral involvement (%)	77.3	67.8
Circumferential (%)	18.6	32
RVF + VVF (%)	5.2	9.3
Caesarean deliveries		
Number	503	92
Primipara (%)	34	19.5
Urethral involvement (%)	45	30
RVF + VVF (%)	2.4	1

**Table C.4** Primipara

	Uganda	Ethiopia	p value
Urethral involvement (%)	70.1	81.7	0.009
Circumferential (%)	15.2	40.9	<0.001
RVF + VVF (%)	5.3	13.6	0.001

# ACKNOWLEDGEMENTS

Many people have helped and inspired us to take up fistula surgery, most of all the staff of the Addis Ababa Fistula Hospital.

We would like to dedicate this publication to the late Dr Catherine Hamlin (1924–2020) and her late husband Reg Hamlin, and also to Mamitu Gashe, a patient turned surgeon. Mamitu's skill is legendary, and she assisted and taught us at many of our early repairs, as she has done for so many surgeons who come to learn at the Addis Ababa Fistula Hospital.

We would also like to acknowledge the teaching and example of Dr Kees Waaldijk in Northern Nigeria, who has done so much to train fistula surgeons, contributing to the literature and demonstrating how fistula surgery can be performed with the bare minimum of facilities.

We are extremely grateful for all the stimulating discussions and advice that we have had from so many fistula surgeons. In particular Dr Fekade Ayenachew from Ethiopia, Dr Hillary Mabeya from Kenya and Dr Peter Majinge and Dr James Chapa from Tanzania who are busy fistula surgeons and trainers and with others make up the Expert Advisory Group of fistula surgeons for FIGO (International Federation of Gynecology and Obstetrics). We also thank Dr Jeff Wilkinson in Malawi, who has pioneered many advances in management and been influential in developing protocols.

We acknowledge help from the late John Kelly—a veteran fistula surgeon who worked in more African countries than anyone else; from Tom Raassen—the fistula surgeon to the Flying Doctor Service (AMREF), who has dedicated his skill to training so many national surgeons in East Africa; from Steven Arrowsmith—VVF coordinator for Mercy Ships; from Judith Goh—a regular contributor to the literature and visiting surgeon to Uganda and Mercy Ships; from Michael Breen from Mozambique—a great teacher; from Jerry Putman—who got the Aberdeen Fistula Centre in Sierra Leone off to a good start; and the late Dr Maura Lynch—who founded the first training centre at Kitovu Hospital, Uganda.

We are most grateful to the following hospitals that have so willingly allowed us to operate and take photographs for use in this book:

- **Uganda:** Kamuli Mission Hospital, Busoga, Eastern Uganda; Kitovu Mission Hospital, Masaka District; Nsambya Mission Hospital, Kampala; Lira Government Hospital, Northern Uganda; Kagando Mission Hospital, Kasese, Western Uganda; Kalongo Mission Hospital, Northern Uganda
- **Nigeria:** Katsina Hospital
- **Ethiopia:** the Bahr Dar Fistula Centre
- **Sierra Leone:** Kambia District Government Hospital; Princess Christian Maternity Hospital, Freetown; the Aberdeen Clinic and Fistula Centre

- **Liberia:** Ganta Methodist Hospital, Nimba District
- **Mercy Ships:** in Gambia, Sierra Leone, Benin, Ghana and Liberia ([www.mercyships.org](http://www.mercyships.org)).
- **Tanzania:** Selian Mission Hospital, Arusha
- **Tanzania:** Kivulini Maternity Centre, Arusha

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Dr Reg and Catherine Hamlin in Addis Ababa, Ethiopia in the 1980s.



Dr Catherine Hamlin with Mamitu Gashe (to the left of Dr Hamlin), Dr Ambaye Woldemichael and Lete Kidane (seated).



Dr Kees Waaldijk in Katsina, North Nigeria. No one has helped more fistula patients.



The Expert Advisory Group of expert fistula surgeons. Prof Sayeba Akhter, Dr Hillary Mabeya, Dr Yeshineh Demrew, Dr Jame Chapa, Dr Vindhya Pathirana, Dr Fekade Ayenachew, Dr Tom Raassen, Gillian Slinger (Senior Project Manager), Dr Andrew Browning, Lilli Trautvetter (Senior Project Coordinator M&E for the FFSTI) and Dr Peter Majinge.



Dr Sr Maura Lynch who pioneered fistula work in Uganda.



Andrew Browning and Brian Hancock, Ethiopia, 2005.

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**SAVE THE MOTHER. SAVE THE WORLD.**

The Barbara May Foundation is an Australian based charity, founded in 2009 specifically for both the treatment and prevention of obstetric fistula.

It builds and runs charity maternity hospitals and funds rural maternal health programs as well as facilitating obstetric fistula patient treatment and the training of surgeons.

For more information go to Barbara May Foundation PO Box 2371 Bowral NSW 2576.

[www.barbaramayfoundation.com](http://www.barbaramayfoundation.com)



FIGO is a professional organisation that brings together more than 130 obstetric and gynaecological associations from all over the world. FIGO's vision is that women of the world achieve the highest possible standards of physical, mental, reproductive and sexual health and wellbeing throughout their lives. FIGO leads on global program activities, with a particular focus on sub-Saharan Africa and South East Asia, and one such program is the Fistula Surgery Training Initiative, a pioneering project to train more fistula surgeons and multidisciplinary teams from fistula affected countries so that significantly more women receive high quality fistula care.

For more information go to FIGO's website:

<https://www.figo.org/what-we-do/obstetric-fistula/fistula-surgery-training-initiative>

Andrew Browning AM FRCOG FRANZCOG(Hon)

*Andrew Browning is an Australian-trained obstetrician who has spent his professional career as a medical missionary volunteering in Africa, specialising in obstetric fistula surgery. He has been involved in the care of over 12,000 fistula patients in Africa and Southeast Asia. He took part in establishing charities in Ethiopia and Tanzania to build and run free maternity hospitals, for prevention of fistula. These charities and hospitals have overseen the safe delivery of over 80,000 women to date and trained nearly a thousand midwives in clinical skills. In Australia he co-founded the Barbara May Foundation to fund the hospitals.*

*He assists the FIGO (International Federation of Gynecology and Obstetrics) global fistula surgery training program as chair of the FIGO Fistula and Genital Trauma Committee and of the FIGO Expert Advisory Group on Obstetric Fistula. He advises the UN and WHO on fistula and related issues and is a frequent keynote speaker at international medical conferences.*

*He has written over 60 scientific publications, books and chapters on obstetric fistula. For his services to international maternal health he was appointed a Member of the Order of Australia.*

Brian Hancock MD FRCS FRCOG(Hon)

*Brian Hancock has performed about 1,500 operations for fistula repair and related conditions in twelve African countries, mostly from 2000 to 2013. He first encountered a patient with a vesico-vaginal fistula whilst working as a general surgeon in the late 60s at Kamuli Mission Hospital and was fortunate to find a copy of the classic textbook on the vesical vaginal fistula by Chassar Moir written in the 1950s. Following Moir's guidance he operated successfully on a dozen patients. That inspired him to visit the famous Hamlin Fistula Hospital in Addis Ababa. With the encouragement of Reg and Catherine Hamlin he was welcomed as a regular visitor, initially to learn from their wealth of experience. Later he helped there with problem cases, taking advantage of experience as a colorectal surgeon in the UK. After retiring from practice in the UK in 2000, he was able to spend about three months a year visiting his old hospital, and others in Uganda. While keeping up his practice in Ethiopia, he was invited to work in ten other African countries, and had the opportunity to improve his understanding by observing and working with many established world experts.*