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Acute Pelvic Pain in a Limited-resource Setting

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INTRODUCTION

Acute pelvic pain is a common presenting complaint in women. The diagnosis of pelvic pain in women can be challenging because many symptoms and signs are insensitive and unspecific¹. Prompt diagnosis and effective management prevent complications and may help preserve fertility².

Definition and epidemiology

The definition of acute pelvic pain is arbitrary; often the duration is only a few hours, but it can be days. It usually presents with a sudden onset, but may be insidious and the pain increasing with time. Generally, any pain in the lower abdomen or pelvis lasting less than 3 months is considered acute pelvic pain^{1,3}.

Incidence

The incidence of the different etiologies varies and is difficult to estimate. It is dependent on several factors, e.g. prevalence of contributory factors of the different etiologies, health-seeking behavior, availability of diagnostic facilities, different medical practice, the distance to medical care, and the age profile of the patient in a certain area³.

Pathophysiology

The pathophysiologies are influenced by the different etiological factors and are mediated via the pain pathway along the pelvic innervations. Distinguishing pain arising from the genital organs from that of gastrointestinal origin is often difficult due to the shared visceral innervations of the uterus, cervix and adnexa and gastrointestinal structures, i.e. ileum, sigmoid colon and rectum, as pain signals travel through the same sympathetic nerves to the

spinal cord segments T10 via L1. Diffuse pain should alert to the possibility of peritonitis⁴.

Acute pain due to ischemia, or viscus injury such as in ovarian torsion or intestinal obstruction, is accompanied by autonomic reflex responses such as nausea, vomiting, restlessness and sweating⁵. The suggested causes of pain in endometriosis include peritoneal inflammation, activation of nociceptors, and tissue damage and nerve irritation from deep infiltration⁶.

CLASSIFICATION

Classification of cases of pelvic pain is necessary as it highlights and provides rational consideration of the different etiological causes of acute pelvic pain. Different classifications of acute pelvic pain have been proposed^{1,4}. A convenient and useful example classifies acute pelvic pain broadly as gynecological or non-gynecological pain (Figure 1; Table 1).

ACUTE PELVIC PAIN IN PREGNANCY

The most common causes of pregnancy-related acute pelvic pain are abortion and ectopic pregnancy (see Chapters 12 and 13). More information on pelvic pain in pregnancy is provided in Chapter 3.

ALGORITHM OF EVALUATION OF PELVIC PAIN

The diagnosis of pelvic pain in women can be challenging because many symptoms and signs are insensitive and non-specific (Table 2). The goal of management is to identify the correct diagnosis and minimize the impact of life-threatening complications. A rapid initial evaluation to exclude life-threatening conditions such as ectopic ovarian

complications, and initial resuscitation with intravenous fluid or blood may be required before a comprehensive evaluation is undertaken.

History taking

Careful history is an important first step towards establishing a diagnosis. This should focus on pain characteristics, review of systems and gynecological, sexual and social history¹.

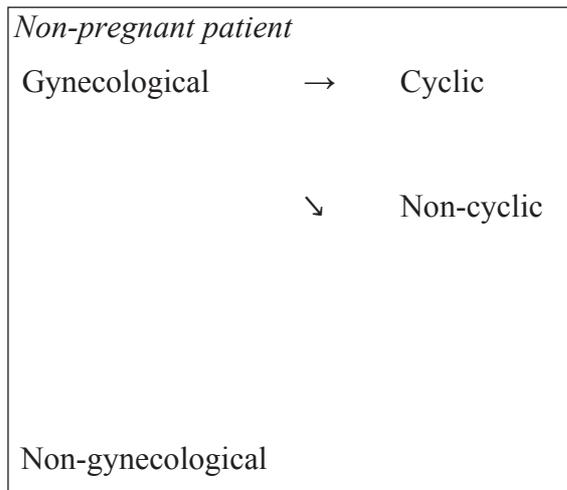


Figure 1 Classification of acute pelvic pain in the non-pregnant patient

Age

The age of the patient may indicate common conditions in certain age groups. In young women the possibility of complication of abortion, ectopic gestation and tubo-ovarian abscess or other sexually transmitted infections (STIs) and pelvic inflammation disease (PID) should be excluded due to risky sexual behavior⁵. Appendicitis is also common in adolescents and young adults aged under 30 years, while diverticulitis is more common above age 40 years^{4,7}.

Pain characteristics

Pain perception varies across cultures and it also influences health-seeking behavior. The duration of pain may be important as sudden onset may suggest acute appendicitis, while a long history before the acute episode may indicate typhoid perforation or intestinal obstruction^{4,7,8}. The type of pain may be indicative. Colicky intermittent pain may be suggestive of intestinal obstruction or ureteric colic^{7,8}. Pain of sudden onset can hint at visceral perforation, and is insidious in inflammation, e.g. acute appendicitis^{4,7}. The frequency of pain or its cyclic nature could also be suggestive of dysmenorrhea which typically presents with pain around the menstrual period. Ovulation pain (Mittelschmerz) is typically felt around the mid cycle^{6,7}.

Table 1 Gynecological and non-gynecological causes of acute pelvic pain

<i>Gynecological causes</i>	
Reproductive period/age	Adenomyosis; degenerating fibroid; endometriosis; Mittelschmerz, ovarian torsion; pelvic inflammatory disease; ruptured cyst; tubo-ovarian abscess; dysmenorrhea
Adolescents	Similar to women of reproductive age, with addition of imperforate hymen and transverse vaginal septum
Postmenopausal	Causes similar to that of the reproductive age group except for ectopic pregnancy and menstruation-related causes like dysmenorrhea, endometriosis etc.
<i>Non-gynecological causes</i>	
Gastrointestinal	Appendicitis; bowel obstruction and constipation; diverticulitis; gastroenteritis; inguinal hernia; irritable bowel syndrome; mesenteric venous thrombosis
Urinary	Cystitis; pyelonephritis; ureterolithiasis
Musculoskeletal	Strain tendons/muscles; joint infection/inflammation; hernia
Others	Among the patients of African origin sickle cell crisis could present with acute abdominal-pelvic pain; dissecting aortic aneurysm; lead poisoning; drug abuse; porphyria; somatization disorder

Table 2 Common causes of acute pelvic pain

<i>Diagnosis</i>	<i>Common features</i>
Sexually transmitted infections and pelvic inflammatory disease (Chapter 17)	Lower abdominal pain, cervical excitation tenderness and adnexal tenderness
Tubo-ovarian abscess (Chapter 11)	Minor features include dyspareunia, fever, abnormal discharge
Tubo-ovarian torsion	Acute pain, initially unilateral, often started by rapid turning or twisting movements (e.g. dancing), may be accompanied by diarrhea or constipation and peritoneal signs
Ovarian cysts (ruptured or unruptured) (Chapter 11)	Lower abdominal pain, if ruptured there is significant abdominal tenderness, abdominal distention and hypoperistalsis. Pain, often unilateral, may be associated with gastrointestinal symptoms and may resolve spontaneously after the next period or within several cycles
Dysmenorrhea (Chapter 7)	Cyclic lower abdominal, usually starts before and predominantly during the first 2 days of menses; may be associated with gastrointestinal symptoms such as lower back pain, diarrhea, nausea and vomiting
Mittelschmerz	Mid-cycle pain usually mild; may be associated with bleeding per vagina, severe symptoms mimic ruptured ectopic or acute appendicitis. Resolves spontaneously
Appendicitis	Pain starting at epigastric area later settling at right iliac fossa; pain, anorexia, nausea and vomiting. Fever at later stages
Endometriosis (Chapter 6)	Pelvic pain, dysmenorrhea, dyspareunia, pelvic tenderness, tender sacrouterine ligament. Most of the time it is a chronic disease, but can present with an acute exacerbation
Urinary tract infection	Dysuria, frequency, lower abdominal pain, urgency, suprapubic tenderness, systemic symptom is slight
Pyelonephritis	Sudden pain radiating to suprapubic area; systemic symptom is common fever, chills, nausea and vomiting
Typhoid perforation	General abdominal pain, fever, acute abdomen

Although pain quality and severity are non-specific, they may provide some clue about the etiology. Abrupt and severe pain is typically associated with perforation (ectopic pregnancy), strangulation (ovarian torsion) or hemorrhage (ovarian cyst). Dysmenorrhea and abortion may be associated with cramp-like pain. Colicky pain typifies ovarian torsion or nephrolithiasis. Burning or aching pain often occurs with inflammatory processes such as appendicitis or tubo-ovarian abscess and PID^{4,7}. Progressively worsening pain would suggest visceral inflammation or perforation⁴.

Associated symptoms

Diagnosis is often considered based on the associated symptoms (Table 3). Nausea and vomiting are associated with acute appendicitis, pyelonephritis and ovarian torsion. Anorexia is a common feature

in acute appendicitis^{4,7,8}. Frequency, dysuria, scalding and hematuria are suggestive of urinary tract disorder^{7,9}. Presence of fever in association with pelvic pain is suggestive of infection or inflammatory etiology, such as appendicitis, PID, ovarian torsion or tubo-ovarian abscess (TOA)⁴. Dizziness and syncopal attack could be an associated feature of ruptured ectopic gestation or hemorrhagic ovarian cyst. Inflammatory conditions and hemoperitoneum can sometimes present with non-specific symptoms of nausea, vomiting and anorexia⁴. Headache, malaise and fever before onset of pain are suggestive of typhoid perforation^{7,8}.

Aggravating and alleviating factors

Changes in pain may occur in relation to menses, coitus, activity, diet, bowel movement or voiding. These characteristic may help in narrowing the

Table 3 Symptoms associated with acute pelvic pain

<i>Symptoms</i>	<i>Common causes</i>
Cyclic pain	Dysmenorrhea, Mittelschmerz, endometriosis, cryptomenorrhea
Amenorrhea	Ectopic gestation, abortion and other pregnancy-related complications
Vaginal bleeding	Abortion complications, ectopic gestation, STI
Fever	STI, appendicitis, pyelonephritis, ovarian torsion
Dyspareunia	Endometriosis, slow-leaking or unruptured ectopic, STI, ovarian cysts
Urinary symptoms	UTI, pyelonephritis, STI
GI	Intestinal obstruction, diverticulitis
Previous surgery	Intestinal obstruction, ectopic gestation
Collapse	Ruptured ectopic gestation, hemorrhagic cyst

STI, sexually transmitted infection; UTI, urinary tract infection; GI, gastrointestinal

differential diagnosis. For instance, dyspareunia may be indicative of endometriosis; it could also be present in PID, ectopic pregnancy and ovarian cyst^{4,6,7}.

Obstetrics and gynecological history

The last menstrual period may indicate the possibility of pregnancy complications such as ectopic gestation or miscarriage. Abnormality of the menstrual cycle could suggest STI/PID, uterine fibroid or cervical pathology. Ovarian torsion is an unlikely finding in postmenopausal women⁴. A patient with PID may present with a history of vaginal discharge. History of recent insertion of an intrauterine device (IUD) may suggest acute pelvic infection.

In post-partum patients with a history of home delivery, pain may indicate acute endometritis. A history of clandestine abortion or vaginal instrumentation should alert to the possibility of complications such as incomplete abortion, sepsis or uterine perforation. Previous abdominal surgery could be a pointer to the possibility of acute intestinal obstruction; suspicion of an ectopic gestation should also be heightened particularly with previous pelvic or tubal surgery and a history of ectopic gestation⁷. A previous history of appendectomy should exclude the possibility of appendicitis; however some degree of caution needs to be exercised, as anecdotal reports of unethical practice of health workers making a skin incision and closing it without actual removal of the appendix have been described.

Physical examination

Physical examination should commence with a general assessment of the patient to assess the severity of the pain and illness, degree of pallor and presence of jaundice. The pulse should be assessed for rate, volume and rhythm. Findings could be suggestive of an infection process or shock, as in ectopic or hemorrhagic cyst. It also provides one of the baselines for management. *Elevated temperature* may point to an inflammatory process. It may indicate acute appendicitis, PID or pyelonephritis. *Blood pressure <90 systolic* is suggestive of hemorrhage which might be internal. Possible causes include rupture, ectopic pregnancy, hemorrhagic cyst and abortion.

Abdominal examination should typically start with inspection. A distended abdomen suggests fluid or gas, i.e. peritonitis, intestinal obstruction or internal bleeding, if there is history of missed period or trauma. The presence of a scar may indicate intestinal obstruction. Hernia orifices should also be inspected to exclude hernia. Be aware that female patients can also have a femoral hernia⁷. Absence of bowel sound during auscultation may be a sign of peritonitis.

The pointing test should next be performed by asking the patient to point to the specific area of present pain or where it started⁷. Palpation should always be started opposite the area where the pain is being experienced; together with *percussion* it can help to identify masses and peritoneal irritation. Presence of *rebound tenderness*, involuntary guarding

and increased pain with motion or cough confirms peritoneal irritation. Inspection and palpation could reveal lesions and presence of inguinal lymph nodes.

Gynecological examination

Pelvic examination is an important part of the evaluation of a patient with pelvic pain. See Chapter 1 on how to do a gynecological examination. Sequential evaluation provides valuable information, although its sensitivity and specificity is poor¹. On speculum examination, the vagina and cervix are visualized; lesions, blood or discharge should be noted. The presence of cervical discharge, erythema or friability should alert the physician to the possibility of cervicitis or PID. If these signs are present, take swabs from the external cervical orifice and the posterior vaginal fornix for wet mount and staining. See how to do a wet mount in Chapter 1.

During bimanual examination cervical excitatory tenderness should be tested for (see Chapter 1). Its presence is non-specific and may indicate PID, ectopic pregnancy, endometriosis, ovarian cysts or appendicitis. Assess the uterus and adnexa as described in Chapter 1. Pain on bimanual examination may occur with endometriosis, degenerating fibroid, PID, ovarian cysts or torsion, ectopic pregnancy or appendicitis. Finally, digital rectal and recto-vaginal examinations should be considered, especially if the diagnosis is unclear and appendicitis is a differential.

Laboratory investigation

Basic laboratory investigations are helpful in providing guidance to a possible diagnosis. Generally, history and physical examination guides the choice of laboratory testing. A pregnancy test is a useful initial test, performed commonly using urine human chorionic gonadotropin (hCG) testing; the urine beta subunit (β hCG) is sensitive to 25 mIU/ml (25 IU/l) depending on the test your laboratory uses, and becomes positive 3–4 days after implantation.

A positive pregnancy test should raise suspicion of associated pregnancy complications such as abortions, ectopic pregnancies and others. Urine or vaginal swab microscopy, culture and sensitivity may be indicated. The presence of red cells, white blood cells and oxalates or phosphate crystals in urine suggest ureteric stones. Presence of white

cells, red cells and albumin suggests infection. A blood film should be taken to assess for malaria and sickle cells in a sickle cell area. Malaria and anti-malarials can trigger a sickle cell crisis and acute lower abdominal pain. Hemoglobin (Hb) level is low in hemorrhage and sickle cell disease; however the possibility of unrelated chronic anemia should be borne in mind. Hb genotype if available may provide clues in cases suggestive of hemoglobinopathies such as sickle cell disease and thalassemia.

A full blood count could provide evidence of infection when white blood cell counts are raised, although they may be normal in a percentage of acute appendicitis or PID; erythrocyte sedimentation rate, which is suggestive of inflammation, may be elevated in PID, ectopic gestation or bowel disease but also in ovarian torsion and degenerating fibroids and it is non-specific. Blood culture and Widal test may be considered. In suspected cases of typhoid perforation, *Salmonella typhi* may be isolated in the blood culture. In septicemia and septic shock, the infecting organism may be isolated, but treatment should be initiated with broad-spectrum antibiotics before the results, as these may take too long.

Imaging

Ultrasound

The goal of imaging is to make the most accurate diagnosis using the least amount of radiation¹⁰. Ultrasound, particularly transvaginal ultrasound, remains the primary diagnostic instrument of choice. Other imaging modalities also may play a key supplemental role where available^{10,11}. See Chapter 1 on how to perform and evaluate ultrasound.

In a low-resource setting, ultrasound may be the only imaging technique available, especially abdominal ultrasound, although in some places even this is not available. Although magnetic resonance imaging (MRI) and computed tomography (CT) scans are a useful adjunct, they are mostly unavailable or restricted to a few specialized centers and teaching hospitals.

High-resolution ultrasound provides specific features of acute appendicitis. The inflamed appendix is widened and may be detected (diameter >6mm). It is useful in doubtful cases especially when gynecological problems are to be excluded¹⁰. Ultrasound is also helpful to exclude renal and tubo-ovarian pathology.

Fluid in the peritoneal cavity can be a sign of a ruptured ectopic pregnancy, a ruptured cyst or infection while dilated bowel loops are features of intestinal obstruction or peritonitis on ultrasound^{10,12}. Ultrasound is useful in evaluating patients at risk for ectopic pregnancy, namely by documenting the presence or absence of an intrauterine pregnancy. Furthermore, ultrasound can help distinguish a normal intrauterine pregnancy from a blighted ovum, incomplete abortion or complete abortion¹². A firm diagnosis of ectopic pregnancy, with the gestational sac or fetal pole positively identified in the adnexal region, is rarely made by sonography alone. However, identifying an empty uterus in conjunction with an adnexal mass that is not of ovarian origin (e.g. tubal ring or 'bagel sign'), and/or pelvic free fluid, is highly predictive (85–95%) of ectopic pregnancy¹².

Transvaginal ultrasound, although not universally available in all hospitals, offers a viable alternative to laparoscopy to diagnose and exclude ovarian endometriomas, but it has no value for peritoneal disease⁶. Sonographic markers for acute and chronic PID can be differentiated. Incomplete septation of the tubal wall ('cogwheel sign') is a marker for acute disease, and a thin wall ('beaded string') indicates chronic disease. Thickening is noted in the pelvic areas during the inflammatory process. Ultrasound diagnosis is approximately 90% accurate compared with laparoscopic diagnosis¹³. Ultrasonography is most valuable in following the progression or regression of an abscess after it has been diagnosed¹³.

Abdominal X-ray

Air under the diaphragm in the erect position is in most cases a sign of perforation. In intestinal obstruction the gut is dilated and fluid levels in the bowel are evident^{8,9}.

Laparoscopy

Laparoscopy is commonly unavailable in most low-resource settings. Where available, laparoscopy may help to establish a diagnosis, especially in cases of an unruptured ectopic, or if diagnosis is in doubt. It also plays a significant role in the diagnosis of peritoneal endometriosis where it is superior to transvaginal ultrasound. On direct visualization, implants are seen; however the skill and experience of the surgeon are important¹². The cardinal feature

of PID during laparoscopy includes hyperemia, dilated tubes and exudates from the frimbriated end of the tube.

Laparoscopy is an invasive procedure, associated with patient mortality and morbidity¹². The equipment needed is very sensitive and expensive. The method depends on the availability of carbon dioxide gas although there are some ongoing trials with low-tech equipment including gasless laparoscopy.

Laparotomy or mini-laparotomy is indicated where laparoscopy is not available, when the presumptive diagnosis of acute abdomen, for example ectopic pregnancy, in an unstable patient necessitates immediate surgery, or when definitive therapy is not possible by medical management or laparoscopy. The findings mentioned above for laparoscopy are the same in laparotomy.

DIAGNOSIS AND TREATMENT OF COMMON CAUSES OF ACUTE PELVIC PAIN

Pelvic inflammatory disease

Ascending infection involving the endometrium, fallopian tubes, ovaries and pelvic peritoneum constitute PID¹³. Infection could be sexually transmitted or could be caused by the introduction of foreign bodies into the uterus such as during IUD insertion, hysterosalpingography, tubal insufflations, and dilation and curettage. It could follow deliveries, abortion and major and minor gynecological surgery^{13,14}. A high index of suspicion is required to establish a diagnosis of PID because its presentation is variable and prevalence is high^{13–15}.

Diagnosis of PID is often clinical, although sensitivity and specificity is limited. The positive predictive value of laparoscopy diagnosis is 65–90%¹². Major features include lower abdominal pain and tenderness, cervical excitation and adnexal tenderness, often bilateral. Other symptoms include deep dyspareunia, abnormal vaginal and cervical discharge, intermenstrual or post-coital bleeding, and fever $>38^{\circ}\text{C}$ ¹².

Gynecological examination and imaging may reveal uterine tenderness, cervical excitation and unilateral or bilateral adnexa tenderness and pus in the peritoneal cavity. Laboratory findings may show leukocytosis $>10,000/\text{ml}$, Gram-negative intracellular diplococci or *Chlamydia trachomatis* by rapid diagnostic test in the cervical exudates or pus in the peritoneal cavity¹². Although not commonly

available in developing countries, the gold standard for diagnosis remains laparoscopy when pelvic inflammation can be confirmed and microbiological study of free fluid made. About 15–30% of clinical cases could be false negative¹².

The antibiotic regimen is variable for treatment of PID according to national guidelines. Broad-spectrum antibiotics are recommended to cover common pathological agents including *Neisseria gonorrhoeae*, *C. trachomatis*, *Ureaplasma urealyticum* and anaerobes^{12,13}. Local sensitivity patterns of organisms should dictate antibiotics. In low-resource countries irrational drug use, affordability, availability and lack of laboratory support are key challenges¹⁶. For mild to moderate disease, out-patient treatment is recommended in non-pregnant patients. Indications for in-patient management are shown in Table 4.

Women with PID which may be sexually acquired need to have their partners screened for gonorrhoea and *Chlamydia*; empirical treatment could be offered where this not possible. Surgical management may be required in cases with pelvic abscess (see Chapters 11 and 17 for more information on PID treatment).

Ectopic pregnancy

In Nigeria, the prevalence of ectopic pregnancy is 1 in 20 pregnancies in the southern cities and 1 in 50 in the northern cities¹⁷. Abdominal pain is a cardinal feature of ectopic gestation, present in close to 100% of cases^{17,18}. No specific symptoms or signs are indicative of ectopic pregnancy; a high index of suspicion is needed to establish the diagnosis. The triad of abdominal pain, amenorrhoea and bleeding in a woman of reproductive age should alert to the possibility of ectopic gestation¹⁷.

In low-resource settings about a third of patients present as acute surgical emergencies¹⁹. Late presentation and delay in diagnosis contributes to the

resultant massive intraperitoneal bleeding from a ruptured or slow-leaking ectopic in such patients. They present with dizziness, lightheadedness and syncope attacks. In some cases intraperitoneal bleeding results in pelvic collection (pelvic hematocele). This could manifest with 'toilet signs' which include urinary frequency, dysuria and tenesmus, and there are reported cases of patients fainting in the toilet or following sexual intercourse.

On general examination there may be pallor, low blood pressure, elevated pulse rate and cold clammy extremities in cases of ruptured ectopic with significant intraperitoneal bleeding. Findings on pelvic examination include bleeding, pouch of Douglas may be bulging, and adnexal masses may be felt. There may be cervical excitation tenderness and bleeding per vagina. Diffuse or localized abdominal tenderness may be present in >80% of cases; similarly, adnexal and/or cervical motion tenderness is present in >75% of cases. In one-third to one-half of patients there is presence of an adnexal mass¹². Occasionally, a cul-de-sac mass is present. The patient's discomfort may preclude an adequate examination, and effort should be made to avoid an iatrogenic tubal rupture from an overzealous assessment. The diagnosis and management of ectopic pregnancy is described in Chapter 12.

Dysmenorrhoea

Painful menstruation interfering with normal activity and requiring medication is referred to as dysmenorrhoea. It occurs in 30–50% of post-pubertal females and 10% are incapacitated for 1–3 days¹⁹. Symptoms of primary dysmenorrhoea usually start after menarche as initial cycles are usually anovular. Cyclic lower abdominal pain starting before and predominantly during the first 2 days of the menses is the key feature. It is usually not severe enough to warrant admission. The pain usually consists of

Table 4 Indications for in-patient management of pelvic inflammatory disease

Severely ill (nausea, vomiting and high fever >38.5°C)
Poor compliance
Teenager to preserve fertility
Unresponsiveness to treatment within 72 h
Uncertainty in diagnosis
Pregnancy
Intolerance to oral medication

lower abdominal cramps and backache and may be associated with gastrointestinal disturbances such as diarrhea and vomiting. It is an important cause of school absenteeism¹⁹.

Diagnosis is achieved by excluding pathological entities such as PID and endometriosis. A full history and examination is therefore required, auxiliary investigation such as ultrasound and laparoscopy, and MRI where available, are considered only if there is suspicion of an underlying disease. For management of dysmenorrhea see Chapter 7.

Endometriosis

Endometriosis is defined as the occurrence of endometrial glands and stroma outside the uterine cavity and in the myometrium. It occurs almost exclusively during the reproductive years, most commonly between the ages of 30 and 45 years. It most commonly presents as chronic abdominal pain (see Chapter 6), but sometimes patients present with acute abdominal pain. The true incidence is difficult to ascertain in the general population as laparoscopy is necessary to make the definitive diagnosis; however a prevalence of 10% is established. It is generally thought to be uncommon among Africans; however, in Nigeria, an incidence of 8.2% was reported from Zaria and 4.3% during pelvic operations in Enugu²⁰. Earlier reported variation in incidence has been attributed to failure to control for confounding variables such as availability of healthcare, access to contraceptives, cultural differences, attitude towards menses and pain and incidences of STI²⁰. Identified risk factors include lower body mass index, increased exposure to female hormones through early menarche and late menopause. Reduced risk is associated with use of contraceptives.

Making a diagnosis is often difficult even in places where all facilities are available. This is because the patient presents with a variety of symptoms and may have no physical signs at all. This inevitably leads to delay; a high index of suspicion is therefore required. Endometriosis should be considered in any patient of childbearing age with the following features: dysmenorrhea, dyspareunia and pelvic pain. Possible examination findings include pelvic tenderness, fixed retroverted uterus, tender uterosacral ligaments and enlarged ovaries⁶. In many patients diagnosis is made during surgery,

where findings of lesions on ovaries, peritoneum and uterus should raise suspicion.

The gold standard for diagnosis remains histology with samples obtained through laparoscopy in high-resource settings and mini-laparotomy in low-resource settings. The accuracy of the method depends on the surgeon identifying the various lesions. In most low-resource settings, the availability of laparoscopy is often a luxury limited only to very few teaching/specialist hospitals and private hospitals, but (mini-)laparotomy may yield the same results albeit with a longer recovery from surgery.

Transvaginal ultrasound, although not universally available in all hospitals, offers a viable alternative to diagnose and exclude ovarian endometriomas, but it has no value for peritoneal disease⁶.

Treatment is influenced by a number of factors such as: severity, age, parity, desire for future, fertility etc. Treatment of endometriosis should be in conjunction with the patient and could be medical or surgical^{6,13} depending on the patient's needs, although recurrence is higher without surgical treatment. The goal of medical treatment is to reach anovulation. Most suitable for this are combined oral contraceptive pills or the progesterone-alone pill. Combined pills are given one pill per day continuously (no placebo) (see Chapter 6).

Indication for surgical management includes severe symptoms, failed medical treatment, and women who do not wish to conserve fertility. The surgical treatment option includes excision of peritoneal lesions combined with total abdominal hysterectomy in women who do not want to bear children anymore^{6,12}.

Ovulation pain (Mittelschmerz)

This occurs typically in the middle of the menstrual cycle and produces lower abdominal and pelvic pain which is usually not severe. There may be associated intra-abdominal bleeding which is usually slight although it may be severe enough to give rise to peritoneal irritation and needs to be distinguished from ruptured ectopic pregnancy or acute appendicitis.

Ovarian complications

Pain from ovarian complications could result from rupture, hemorrhage into a cyst, venous congestion or torsion and may be of sudden onset, or of a more chronic nature:

Hemorrhage from a cyst for example, corpus luteum, may be dramatic and cause hypovolemia in association with the resulting hemoperitoneum²¹. Peritoneal irritation due to leakage of the cyst can lead to significant tenderness, abdominal distention and hypoperistalsis mimicking an acute abdomen.

In *torsion of the ovary* the lower abdominal pain is often colicky in nature with pain referred to the sacroiliac joint or onto the upper medial thigh. Pain is initially localized and then becomes more generalized with peritonism. Systemic signs of pyrexia and tachycardia may develop along with nausea, vomiting and bowel upset, and may be confused with acute pyelonephritis or appendicitis⁹. Abdominal palpation may reveal signs of peritonism such as guarding and rebound tenderness with abdominal distention. Gynecological examination may reveal a tender smooth swelling next to the uterus, often associated with cervical motion tenderness.

On transvaginal ultrasound a tubo-ovarian mass may be seen with cystic lesions and mixed echogenicity. Free fluid may be seen in the pouch of Douglas. If duplex Doppler is available, reduced blood flow in the ovarian artery and vein may be demonstrated¹².

At surgery the tube may also be involved, and there may be no viable ovarian tissue to salvage depending on the time elapsed between torsion and surgery. You should however try to untwist the ovary and allow some time for re-establishment of circulation. An adnexectomy should be performed as described in Chapter 11 if necrosis of the tissue is already established.

Cryptomenorrhea (hidden menstrual flow)

In a non-pregnant patient presenting with lower abdominal pain and absence of menstruation, a number of conditions are considered that include imperforate hymen, vaginal septum and acquired gynatresia. Cryptomenorrhea is more common in women after female genital mutilation. The pain characteristically is cyclic, occurring at around the time of the expected menses and is due to progressive accumulation of blood resulting in distention of the vagina. Dyspareunia and urinary signs such as urinary retention are possible associated complications¹⁷. Abdominal examination may reveal a pelvic mass. A bluish membrane may be found on inspection in the vulva and a mass bulging into the vagina

on pelvic examination. Rectal exam may reveal compression of the rectum through the distended vagina.

Management includes hymenal incision and drainage, excision of the transverse septum and vaginoplasty depending on the cause. Bear in mind that the bladder and rectum have a close anatomic relationship to the vagina when you perform any of those operations. A vaginoplasty is an operation that should only be carried out by expert surgeons.

Hymenectomy is performed under general anesthesia with the patient in the lithotomy position and the bladder emptied. Clean and disinfect the vulva before incision. A vertical incision is made on the bulging membrane and the accumulated blood is allowed to drain. Once drainage has ceased, another incision at right angles is made to form a cross (cruciate incision); the edges of the skin flaps are removed and any bleeding points are secured by clipping and ligation²². Postoperatively, vulval hygiene is important and vaginal douches must be avoided. Broad-spectrum antibiotics are administered as prophylaxis.

Septum excision Transverse vaginal septae are much more difficult to deal with and require specialist reconstruction to create a vagina which is subsequently a functional²³ septum:

- Put the patient in the lithotomy position after applying general or spinal anesthesia and drape and disinfect as for vaginal hysterectomy.
- Insert broad specula and hand them over to your assistant after visualizing the septum.
- Grasp the septum with small non-toothed forceps (e.g. Allis forceps) and make a vertical incision.
- Pick up the loose end of one half and dissect the septum from vaginal mucosa using a knife.
- Continue in the same way with the other half.
- Close the defect of the vaginal mucosa with interrupted stitches of 3-0 Vicryl or another synthetic suture if available. You may use catgut as well if no other material is available, but keep in mind that the stitches will become firm with time and may hurt your patient. Do NOT apply a running stitch as this will distort the vagina and cause pain.

Urinary tract infection

Characteristic clinical features of urinary tract infection include urgency, dysuria, frequency and

suprapubic pain and tenderness⁹. Systemic symptoms are usually slight or absent and the gynecological examination will be normal. Urine microscopy, culture and sensitivity testing demonstrating significant bacteriuria help establish diagnosis. Oral antibiotics of choice include co-trimoxazole (Septrin[®]), ciprofloxacin and amoxiclav⁹.

Nephrolithiasis (ureteric stone)

Ureteric stones lead to pain due to distention and muscular contraction of the urinary tract against obstruction. Patients present with severe and colicky pain that may radiate from the loin to the pubic region or labium down the flank and into the pelvis; there may be associated vomiting, but no fever^{7,9}. There may be sweating, restlessness and a frequent urge to micturate with only a small amount of urine passed^{7,9}.

Examination of urine may reveal red blood cells, pus cells and calcium oxalate crystals.

A stone is evident on renal ultrasound or plain X-ray of the abdomen. Intravenous urography is diagnostic if the plain films are negative for stones.

Pyelonephritis

In a patient with pyelonephritis, onset of pain is usually sudden starting from one or both loins, radiating to the iliac fossae and suprapubic area. Dysuria is only present in 30% of cases. There is manifestation of systemic symptoms: fever, chills, nausea and vomiting. Tenderness and guarding are localized to the lumbar region^{7,9}.

Urine examination may show pus cells and organisms. The gynecological examination is normal.

Appendicitis

Appendicitis is the most common cause of non-gynecological pain. Vague pain on the right side of the abdomen is a common characteristic of appendicitis, although atypical pain patterns abound. Nausea, vomiting and anorexia are usually present; during early appendicitis, the temperature and pulse rate are relatively normal. High fever is not characteristic of the disease. On abdominal examination there could be muscle guarding and rebound tenderness marked at McBurney's point, but it may be in the lumbar hypogastric or right fossa depending on the position of the appendix. Rectal and vaginal tenderness are present in 80% of patients⁷.

Speculum examination will most likely be normal, but bimanual palpitation may show cervical motion tenderness and a tender adnexal region and uterus as the right adnexa may be involved in the inflammation as well. Similarity of symptoms with other conditions such as PID, and ectopic gestation makes diagnosis sometimes difficult; however, nausea and vomiting are much more common in appendicitis than in PID (50%). On physical and gynecological examination findings are usually localized to the right lower quadrant but tend to be bilateral in PID or adnexitis. Ultrasound may rule out tubo-ovarian mass but the differential diagnosis can often only be made during operation.

Typhoid perforation

The patient has usually been ill for some days with generalized malaise, headache, fever and diarrhea and is occasionally already on treatment for typhoid fever. The abdomen is usually moderately distended with generalized tenderness and guarding or rigidity which may be most marked in the lower abdomen.

A plain X-ray may show gas under the diaphragm but often diagnosis is only confirmed at surgery. The four quadrant peritoneal wash may yield bile-stained peritoneal fluid in doubtful cases. Management involves correction of fluid and electrolyte balance, broad-spectrum antibiotics, adequate parenteral nutrition and other supportive measures. Judicious surgical intervention is now the standard therapy⁷.

Acute intestinal obstruction

The main symptoms are colicky abdominal pain, constipation, vomiting and/or abdominal distention. A strangulated hernia or a previous scar may be evident on examination. The patient may show signs of peritonism and gynecological examination will be normal⁷. A straight radiograph reveals fluid levels and distended bowel loops. Therapy will depend on the cause of obstruction, e.g. surgery in malignancy or diverticular abscess.

Acute diverticulitis

The patient usually presents with nausea, vomiting and lower abdominal pain which is more on the left side, unlike appendicitis. Abdominal examination may reveal signs of peritonism. The temperature

may be elevated. Speculum examination will most likely be normal but a diverticular abscess may mimic a left tubo-ovarian mass or even an ectopic pregnancy, and bimanual examination may reveal a cervical motion tenderness and a mass in the left adnexal region^{4,7}.

Transvaginal ultrasound and hCG will rule out ectopic pregnancy. Tubo-ovarian mass can be ruled out if a normal ovary can be demonstrated. Treatment is medical with broad-spectrum antibiotics and surgical if the conservative attempt is unsuccessful.

Ameboma

Amebiasis of the cecum or ascending colon is an uncommon complication. Abdominal pain is associated with passage of frequent mucoid, bloody stools with pyrexia and malaise⁷. The mass is tender and firm like an appendiceal mass. Irregularity of the rectum may be felt on rectal examination. Stool microscopy may reveal the presence of cysts of ameba in the feces. Therapeutic trial with metronidazole or tinidazole is followed by rapid resolution.

Amebic perforation of large bowel

This should be considered in endemic areas particularly with poor sanitary conditions. There may be history of fever and dysentery with sudden onset of abdominal pain, tenderness and rigidity. The patient is usually very ill⁷. Amebae may be isolated in the stool but often no parasites are found. Diagnosis may often only be made during emergency surgery.

Acute Crohn's disease

It may manifest with right-sided abdominal pain nausea and vomiting. There may be a history of diarrhea for some weeks and a lump may be felt near the midline. Fecal occult blood may be positive⁷. Speculum examination will be normal but bimanual palpation may show cervical motion tenderness and right adnexal tenderness if the inflamed part of the bowel is in the adnexal region. Diagnosis is sometimes made at laparotomy for suspected acute appendicitis. Barium meal may show marked narrowing of the terminal ileum.

Gastroenteritis

There is abdominal pain associated with diarrhea and vomiting. The pain is most severe just before,

and subsides after, bowel movement. It does not settle in the right iliac fossa. Tenderness is diffuse and deep and not localized in the right iliac fossa. Gynecological examination will be normal and symptoms usually suggestive of the correct diagnosis.

Pyomyositis

An abscess in the muscle of the anterior abdominal wall in the early stages may be difficult to differentiate from ectopic gestation, ovarian torsion or an appendix abscess. Pain is severe and more persistent. High fever, malaise and other systemic symptoms tend to be greater⁷. Clinical examination will show the abscess is superficial to the abdomen; at later stages edema and discoloration of the skin are observed. Gynecological examination and ultrasound will be normal.

Musculoskeletal

Acute pelvic pain can result from muscle or tendon strain and joint infections or inflammation. Diagnosis can usually be made with history and physical examination alone. On examination tenderness tends to be superficial and most of the pain is experienced in the lower back rather than in the pelvis. Management is usually medical with muscle relaxants or non-steroidal anti-inflammatory drugs (NSAIDs)^{4,7}.

Hemoglobinopathies

Hemoglobinopathies are genetically inherited. There are several varieties and the distribution is worldwide with clusters of different regional genotypes. The most important are sickle cell disease and β -thalassemia. The greatest prevalence of hemoglobinopathies occurs in tropical Africa, where heterozygous prevalence is >20%. In West Africa, it varies from 10% in northern Ghana to 30% in northern Nigeria, and in East Africa from 2 to 45%^{7,24}.

Sickle cell crisis is precipitated by hypoxia, acidosis, dehydration, certain drugs and infection. Irreversibly sickled cells have a shortened survival and plug microcirculation in capillaries. Vascular occlusion is followed by tissue infarction which can affect any part of the body. This may manifest as an acute abdomen and a surgical emergency. Premature decision for laparotomy in such cases could

result in poor outcome as perioperative hypoxia and acidosis will worsen the condition²⁴. Muscle tenderness due to ensuing ischemia adds to the patient's discomfort. Of importance is the sudden enlargement of the liver and spleen; the abdomen may become tender with guarding and rigidity mimicking surgical emergencies such as perforated typhoid, ruptured appendicitis, renal colic or ruptured ectopic gestation. A previous history of sickle cell crisis, characterized by excruciating pain in the backs and limbs, and tender, hot painful swollen limbs are usually suggestive.

Hb genotype or blood film with sickle and target cells will confirm the diagnosis. The gynecological examination will be normal and ultrasound will exclude other pathologies. Management consists of rehydration with intravenous fluid, oxygen therapy, antimalarials and antibiotics and NSAID analgesia^{7,24}.

Malaria

In regions where malaria is endemic, abdominal pain may be malarial in origin caused by the blockage of splanchnic capillaries. It is not severe and there may be rigor with high fever headache and whole body ache⁷. Tenderness is not marked and the abdomen is soft. Gynecological examination will usually be normal. In doubtful cases anti-malarial treatment is advisable and a positive film does not rule out other causes of acute pelvic pain⁷.

CONCLUSIONS

The diagnosis of acute pelvic pain in women especially of reproductive age may be a diagnostic dilemma. Consideration must be given to the possibility of life-threatening complications. The correct diagnosis requires a rational and systemic approach to history and examination with appropriate investigations

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