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Preparedness for Postpartum Hemorrhage: an Obstetric Hemorrhage Equipment Tray

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Only in a minority of cases does postpartum hemorrhage (PPH) occur in women who are clearly at increased risk for the condition. In contrast, most women with PPH have no identifiable risk factors. PPH, unlike many other obstetric conditions, is therefore a predictably unpredictable life-threatening emergency. Thus, every maternity unit should know that PPH will be the most common emergency it has to deal with, and that the majority of cases will occur in women without obvious risk factors[1–3].

In the past decade, the principles of medical emergency preparedness[4], education and guidelines[5], and simulation training as pre-emptive responses to obstetric emergencies have been proposed and gained increasing acceptance from the profession[6–9]. Part of this preparation should include clear identification and availability of the equipment and resources needed to deal with the emergency.

Primary PPH is most often as a result of uterine atony which usually responds to the appropriate application of oxytocic agents. In a minority of cases, however, the atonic uterus will not contract with administration of any uterotonic agents, particularly in those cases of prolonged and augmented labor with an exhausted and infected uterus. In such circumstances, a variety of surgical techniques may be necessary, including uterine tamponade with packing[10] or balloon devices[11–13], uterine compression sutures[14–17], major vessel ligation[18,19] and hysterectomy. All such procedures are described in other chapters of this book (see Chapters 46–48 and 51–55).

That said, in addition to uterine atony unresponsive to oxytocic agents, numerous other causes of PPH may require surgical intervention using equipment that is not available in the standard vaginal delivery or cesarean section packs. These include high vaginal or cervical lacerations with poor exposure, placenta previa and/or placenta accreta at the time of cesarean section and uterine rupture. In most obstetric units, and for the individual obstetrician and nursing personnel who work there, the additional equipment and instruments for these surgical techniques are rarely used. Thus, when needed they may not be readily available and valuable time will be lost searching for them. For these reasons, every obstetric unit should have a readily available, sterile 'obstetric hemorrhage equipment tray' upon which is placed all the necessary material for surgical management of PPH. In a sense, the tray becomes the equivalent of a 'crash cart' for cardiopulmonary resuscitation. Experience from a large Canadian maternity unit shows that the tray is used in about 1 in 250 cesarean deliveries and 1 in 1000 vaginal deliveries[20]. The most common surgical techniques used were uterine compression sutures, uterine tamponade, uterine and ovarian artery ligation, and suture of cervical and/or vaginal lacerations. The commonest predisposing causes were placenta previa, with or without partial accreta, and uterine atony refractory to oxytocic agents[20].

The contents of an obstetric hemorrhage tray are shown in Table 1. As individual obstetric units undoubtedly have varying availability of supplies, local conditions may modify these contents. Three vaginal retractors are necessary for access to and exposure of high vaginal and/or cervical lacerations. Heaney or

Table 1 Contents of obstetric hemorrhage equipment tray

Access/exposure
- Three vaginal retractors (Heaney, Breisky-Navratil)
- Four sponge forceps

Eyed needles
- Straight 10 cm
- Curved 70–80 mm, blunt point

Sutures
- No. 1 polyglactin (Vicryl)
- O and No. 2 chromic catgut with curved needle
- Ethiguard curved, blunt point monocryl

Uterine/vaginal/pelvic tamponade
- Vaginal packs
- Kerlix gauze roll
- Uterine balloon (depending on local availability): Sengstaken-Blakemore, Rüsch urological balloon, Bakri balloon, surgical glove and catheter, condom and catheter
- Plastic bag for pelvic pressure pack

Diagrams (Figures 1–4)
Pages with diagrams and instructions
- Uterine and ovarian artery ligation
- Uterine compression suture techniques: B-Lynch, square and vertical

Non-pneumatic anti-shock garment (selected units)

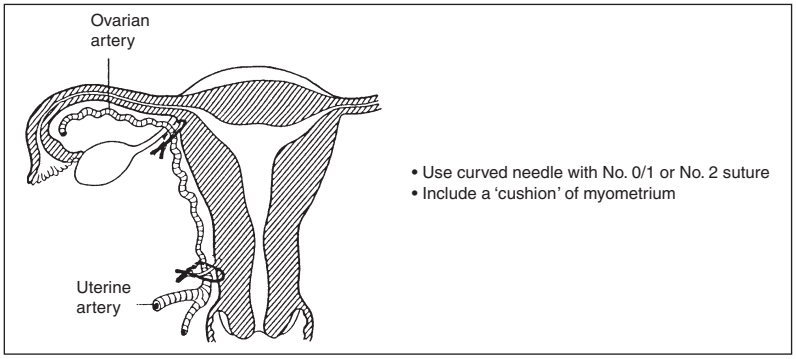

Figure 1 Uterine and ovarian artery ligation

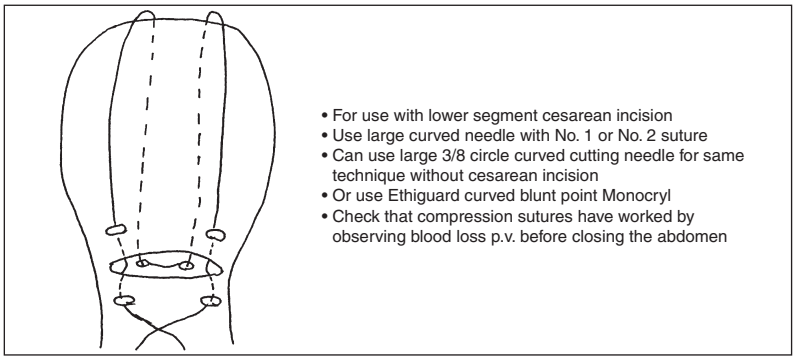

Figure 2 Uterine compression sutures: B-Lynch technique. p.v., per vagina

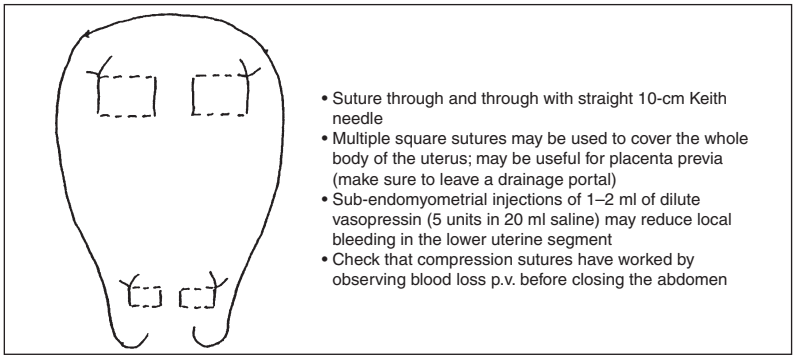

Figure 3 Uterine compression sutures: square. p.v., per vagina

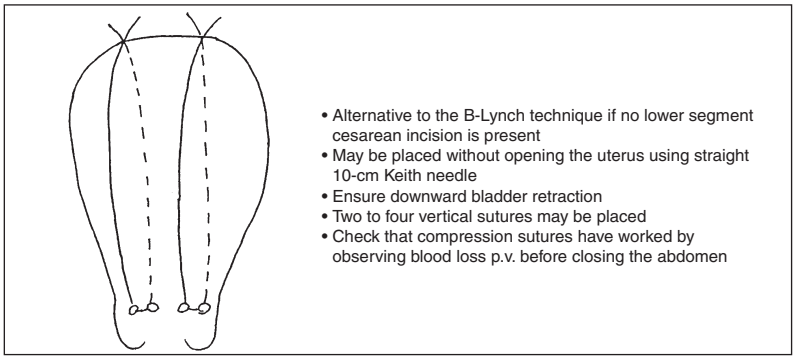

Figure 4 Uterine compression sutures: vertical. p.v., per vagina

Breisky-Navratil vaginal retractors are suitable for this purpose. Four sponge forceps are useful to identify and compress cervical lacerations, to provide compression to the edges of extensive vaginal lacerations, or to uterine edges at the time of laparotomy for uterine rupture. Standard packaged suture material often contains needles that are too small for the placement of uterine compression sutures. Thus, two-eyed needles, preferably blunt point, one straight 10 cm and one 70–80 mm curved, are advisable. A number of standard sutures should be included: No. 1 polyglactin (Vicryl) has a small needle but the Vicryl can be cut off and inserted into the eyed needles. For the full B-Lynch compression suture, two of the standard suture lengths of Vicryl may need to be tied together. If available, Ethiguard poliglecaprone (Monocryl) on a curved blunt point 90 mm needle is ideal for the B-Lynch compression suture[21]. The standard 0 and No. 2 chromic needles are suitable for uterine and ovarian artery ligation. For vertical uterine compression sutures and square uterine compression sutures, the straight 10-cm needle threaded with No. 1 Vicryl is appropriate.

Material and equipment for uterine and vaginal tamponade should be provided. For vaginal tamponade, which may be necessary to prevent hematoma formation following suture of extensive vaginal lacerations, standard vaginal packing should suffice, although it may be necessary to tie more than one of these packs together. For packing the uterine cavity, standard vaginal packing tied together can be adequate, but the ideal is the Kerlix gauze roll which has a thicker six-ply gauze than the four-ply of the usual vaginal pack.

In recent years, balloon tamponade has been used for uterine atony unresponsive to oxytocic drugs following vaginal delivery. Originally, balloon devices that were available for other medical conditions, such as the Sengstaken-Blakemore[11] and Rusch[13] balloons, were adopted for uterine tamponade. In addition, the commercially available custom-made Bakri balloon, which is really just a large Foley-type catheter, has been widely adopted for this purpose. If it is not available, because of expense or other reasons, one can improvize using a surgical glove tied at the wrist around a plain urethral catheter which, when filled with water or saline, will mould to the contour of the uterus[20]. A condom has also been adapted for this purpose, using the same technique as the surgical glove[22]. Depending on local availability, one or more of these balloon tamponade kits should be provided on the tray.

Another worthwhile addition to the tray is the material to make the pelvic pressure pack[23]. This only requires a sterile plastic bag and a lot of Kerlix gauze roll. (You really can't have too much Kerlix gauze roll on the obstetric hemorrhage tray!) The details of how to use this pack and its application to provide tamponade to the bleeding pelvic basin following hysterectomy for obstetric hemorrhage is covered in Chapter 54.

Because uterine compression sutures and major vessel ligation will rarely be used by an individual obstetrician the techniques may be forgotten, it is therefore useful to have laminated diagrams which can be easily sterilized and included in the tray (Figures 1–4)[20].

In maternity units where only limited surgical procedures are available to stem the bleeding, transfer of the woman to a hospital with more sophisticated surgical and interventional radiological resources may be necessary. In such cases the non-pneumatic anti-shock garment (NASG) can have life-saving application[24] and, as such, it should be kept beside the obstetric hemorrhage tray in selected units. The application of the NASG is covered in Chapter 39.

For PPH due to uterine atony refractory to oxytocic agents, or secondary to trauma of the genital tract, the rapid application of surgical techniques for hemostasis is essential to reduce or mitigate the need for blood transfusion, with its inherent potential morbidity. Often, hysterectomy is the final definitive treatment and may be necessary as a life-saving maneuver (see Chapter 55). However, in one hospital using an obstetric hemorrhage tray on nine occasions in 1 year, hysterectomy was avoided in all cases[20]. Thus, if the instruments and equipment are readily available for the prompt application of alternative surgical methods, one is less likely to have to resort to hysterectomy with its attendant morbidity and fertility-ending implications.

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