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THE PELVIC PRESSURE PACK

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When pharmacologic and surgical interventions fail to correct postpartum hemorrhage, hysterectomy becomes the option of last resort[1]. The incidence of hysterectomy on the Louisiana State University obstetric service at Charity Hospital of New Orleans during 1975–1981 was 1.21 per 1000 deliveries[2]. Contemporary reports of the incidence of obstetric hysterectomy range between 0.33 and 0.70 per 1000 deliveries[3–6]. Under these circumstances, a moderately busy obstetric unit with 4000 deliveries per year may expect to perform as many as three emergency hysterectomies annually.

The maternal mortality associated with obstetric hysterectomy is significant (4.0–4.5%) for a number of reasons, not the least of which have been outlined elsewhere and much of which relates to the often moribund condition of the patient when the operation commences, the difficulty of the procedure itself, especially in the presence of factors which make the anatomy unclear, and the extent of the bleeding which may accompany the operation[4,5]. Indeed, Clark and colleagues reported an average blood loss of 3.5 liters during emergency obstetric hysterectomy[7]. As recounted in several other chapters in this textbook, severe hemorrhage and emergency hysterectomy are often accompanied by secondary coagulopathy. In the setting of acquired coagulopathy, post-hysterectomy bleeding may continue despite secure surgical pedicles, much to the consternation of the surgeon and the members of the operating team.

Abdominal and pelvic post-surgical packing is an old concept and one that has been used to control hemorrhage from a variety of sources, including liver trauma[8], pre-eclampsia-induced hepatic rupture[9], rectal cancer[10], and gynecologic cancer surgery[11]. Various packing methods have been described, such as the 'bowel bag'[11] or packing with dry laparotomy packs[12]. These methods, however, require re-laparotomy after initial stabilization and volume control to remove the packing materials. Other recently reported methods for packing, not requiring re-laparotomy but with limited cumulative obstetric experience, include transcutaneous placement of an inflated condom over a 22-Fr catheter[13] or ribbon gauze within a Penrose drain[14].

In 1926, Logothetopoulos described a pack for the management of uncontrolled post-hysterectomy pelvic bleeding[15]. This technique has subsequently been called the *mushroom*, *parachute*, *umbrella*, *pelvic pressure*, or *Logothetopoulos* pack. It is important to note that this pelvic pressure pack described is applied *post-hysterectomy*, and it should not be confused, as it often is, with uterine packing[16], or with various intrauterine balloons[17–19] for treatment of postpartum hemorrhage due to uterine atony or placental site bleeding.

The pelvic pressure pack controls hemorrhage from large raw surfaces, venous plexuses and inaccessible areas by exerting well-distributed pressure, compressing bleeding areas against the bony and fascial resistance of the pelvis[20,21]. According to Parente and colleagues[21], several references to the pelvic pressure pack appeared in European medical journals during the decades following the original report. The first reported cases appearing in the English literature were not until the 1960s, and these pertained specifically to gynecologic post-hysterectomy hemorrhage[20,21]. Several case reports and a case series for obstetric post-hysterectomy bleeding have since been published[22–26]. Table 1 summarizes these, 23 cases for control of gynecologic and 13 cases for obstetric post-hysterectomy hemorrhage, with

Table 1 Summary of contemporary reported cases of the pelvic pressure pack for obstetric and gynecologic post-hysterectomy hemorrhage. The success rate is defined as the pelvic pressure pack being the last intervention to control bleeding. Modified from Dildy *et al*.[26]

Series	*Gynecology success rate*	*Obstetric success rate*
Parente, 1962[21]	14/14	–
Burchell, 1968[20]	8/8	–
Cassels, 1985[22]	–	1/1
Robie, 1990[23]	–	1/1
Hallak, 1991[24]	–	1/1
Howard, 2002[25]	–	1/1
Dildy, in press[26]	1/1	7/9
Total	23/23 (100%)	11/13 (85%)

success rates of 100% and 85%, respectively. Admittedly, accurate success rates are difficult to determine based on rare cases collected retrospectively, with possible under-reporting of unfavorable outcomes. Nonetheless, successful control of hemorrhage seems to have been achieved in the majority of cases.

As seen in Figure 1, the pack is constructed by filling a bag (we prefer a sterile X-ray cassette drape, but other materials also have been described) with gauze rolls tied end-to-end (in this case, five 11.4 cm × 2.8 m Kerlix rolls), starting at the 'dome' of the pack (A), with the 'tail' of the gauze protruding from the 'neck' of the pack (B–D). Gauze should be removed, as visually indicated, from the pack before placement, in order to fit the true pelvis. The pack is introduced transabdominally into the pelvis (Figure 2), and the 'neck' is delivered transvaginally through the introitus by passing a surgical clamp from below through the vagina. The surgeon should avoid trapping small bowel behind the pack. Traction and thereby pressure are applied to the pack by tying intravenous (i.v.) tubing to the neck of the pack and suspending a 1-liter i.v. fluid bag off the foot of the bed. A 1-liter glass i.v. bottle and mild

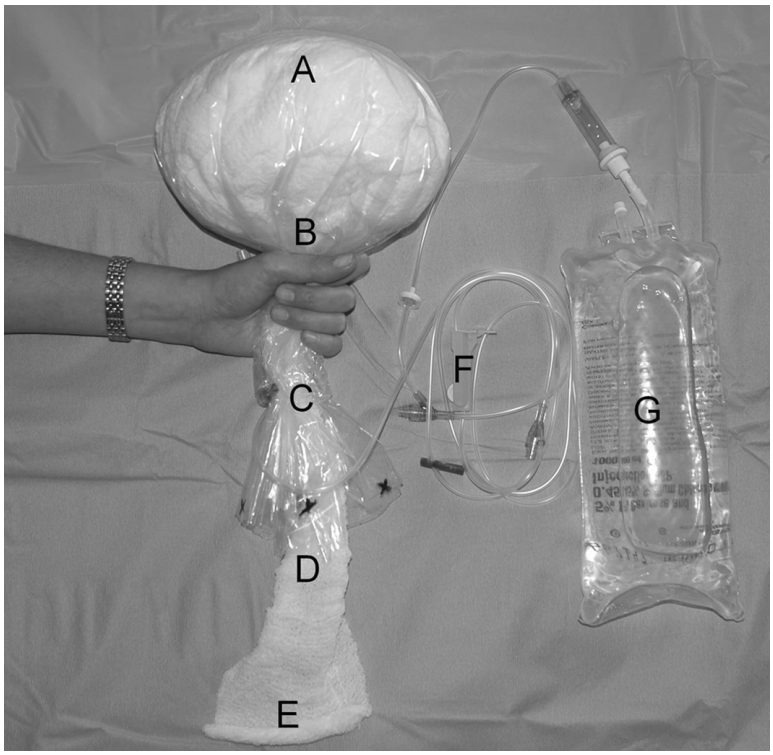

Figure 1 Photograph of a pelvic pressure pack, as constructed from an X-ray cassette drape, sterile gauze rolls, and an intravenous infusion set-up. Please see text for further explanation

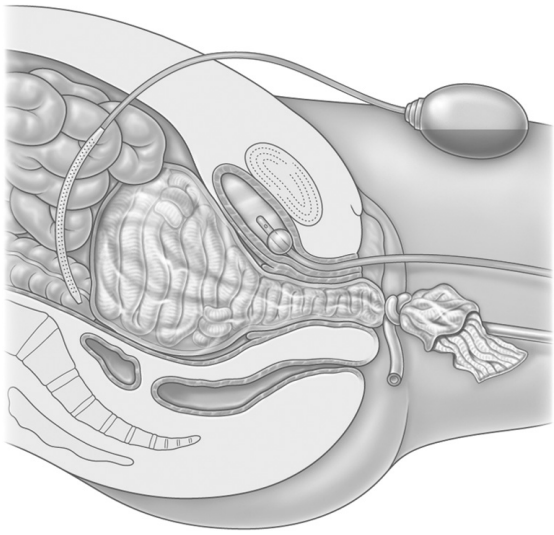

Figure 2 Diagram of the pelvic pressure pack *in situ*. Please see text for further explanation

Trendelenburg position provide additional weight and traction if needed. The i.v. tubing or a cord can simply be hung over the foot of the bed, or over an orthopedic pulley attached to the foot of the bed. Compression of the pack can also be maintained by placing the 'neck' of the pack through a #80 doughnut pessary (not shown), applied flush against the perineum with a surgical clamp. However, caution must be taken to avoid perineal pressure necrosis.

We advise placement of an intraperitoneal large-gauge closed-system (e.g. Jackson-Pratt) drain to monitor for postoperative bleeding. An indwelling urinary catheter allows monitoring of urine output and avoidance of urinary outflow obstruction. After stabilization of the patient, an attempt to remove the pack transvaginally is made by slowly removing the gauze rolls under intravenous sedation, to allow gradual decompression without inciting bleeding. The optimal time to leave the pack *in situ* will vary, but extended placement has certain risks (see below). Usually transvaginal pack removal is successful, but in some cases the pack will have to be removed by re-laparotomy or with laparoscopic assistance.

In one study of trauma patients suffering intra-abdominal hemorrhage, Garrison and colleagues found that patients who experienced hypothermia, refractory hypotension, coagulopathy, and acidosis required *early packing* if they were to survive[27]. Thus, packing should be considered early on when homeostasis is significantly altered. Febrile morbidity is very common in these critically ill postoperative patients who have already received massive blood component therapy and have a foreign body placed into a contaminated operative field[26]. Prophylactic broad-spectrum antibiotics should be administered whenever a pelvic pressure pack is placed, and this regimen should be continued after pack removal until the patient is afebrile at least 24–48 h. Another study of abdominal trauma patients showed those packed for ≤ 72 h had lower abscess, sepsis, and mortality rates than those packed for > 72 h[28]. Thus pack removal should be accomplished as soon possible following stabilization.

In summary, the pelvic pressure pack is simple to construct from commonly available medical materials, and control of hemorrhage is successfully achieved in the majority of cases. If the pelvic pressure pack fails to control bleeding, other medical[29], surgical[30], or interventional radiology[31] approaches will be necessary to ultimately control bleeding. The pelvic pressure pack should be particularly useful in developing countries where more advanced surgical skills for pelvic vascular ligation and technologies, such as selective arterial embolization, are not readily available. In developed countries, however, the pelvic pressure pack may serve as a temporizing measure pending transport to a tertiary-care facility. In the majority of instances, the pelvic pressure pack will afford transfer of the critically ill patient to a post-surgical recovery setting, where restoration of hemodynamic, temperature, hematologic, and acid-base homeostasis can be accomplished.

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