

Review Article

Management of massive presacral pelvic bleeding in patients with gynecological malignancies: Review of the literature

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Summary

Hemorrhage has always been a significant potential complication in the field of gynecological oncology. Throughout the years, a variety of medical and surgical modalities aimed at controlling pelvic hemorrhage have been developed. Most recently, these have focused on attempting to decrease the morbidity associated with pelvic bleeding.

The effectiveness of and the complications involved in controlling massive hemorrhage by the preemptive method of vascular clamping of the aorta, intraoperative methods, such as the local application of procoagulants and of prolonged compression (pelvic gauze packing, plastic wrapped gauze packing, autograft tissue compression and balloon compression) have all been reviewed. Surgeons are able to acquaint themselves with the choice of methods that can be employed during massive pelvic bleeding resulting from procedures on gynecological malignancies.

Key words: Presacral bleeding; Gynecological malignancies; Pelvic packing; Balloon compression.

Introduction

Massive pelvic hemorrhage during surgery for gynecological malignancies is unusual but potentially fatal [1]. Multiple reoperations and radiotherapy make tissue friable and fragile thus predisposing patients to massive intraoperative hemorrhage.

The presacral fascia is the protective covering for the underlying plexus of thin-walled veins which freely communicate with each other. The sacral venous plexus is formed by the lateral and medial sacral veins and drains into the internal iliac veins [2]. The fascia and the underlying vessels, easily damaged during surgery, are responsible for extensive bleeding problems. It is imperative to enter the space anterior to the presacral fascia in the proper avascular plane. Improper manipulation may damage the presacral fascia and the underlying vessels causing troublesome bleeding which is difficult to control and at times life threatening [3]. The use of vascular clips, ligatures and coagulation is not recommended since these methods aggravate prior damage to the plexiform and fragile vein. The result is increased bleeding [3, 4].

Some of the most effective methods for achieving homeostasis following massive pelvic bleeding during gynecological procedures are presented below.

Methods

Preemptive method

According to Eisenkop *et al.* elective vascular clamping of the aorta may potentially diminish blood loss, operative time and the incidence of transfusion-related morbidity associated with extensive pelvic operations. Intraoperative aortic clamping merits further investigations.

In his study 13 women with ovarian cancer, one with cervical cancer and one with extensive pelvic sarcoma, had their aortas completely occluded with a vascular clamp before the pelvic phases of their operations. Heparine and protamine reversal were used. Patients requiring an en bloc excision of the internal reproductive organs, pelvic peritoneum and recto-sigmoid colon for a cytoreductive operation had a median estimated total blood loss of 650 ml (range 200 to 3500) and a median of two units (range 0 to 8) of blood transfused. There were no complications due to the aortic clamping [5].

Intraoperative methods

Local application of procoagulant chemicals

Civelek *et al.* describe a technique for managing massive presacral bleeding during retroperitoneal resection whereby bone wax is pushed through the presacral fascia and periosteum directly into the bleeding point in the sacrum, followed by abdominal packing. This maneuver proved successful in achieving hemostasis when we recently encountered this intraoperative complication [6].

Prolonged compression

Gauze pack-pelvic packing.

Only a few reports are available in the literature regarding the effectiveness of packing during gynecological operations - prolonged compression by Gauze pack.

The control of significant hemorrhage from the presacral venous plexus or distal internal iliac artery branches can be rapidly and reliably achieved through the use of pelvic packing.

The technique of packing with planned re-exploration for hepatic trauma was introduced by Pringle in 1908 and modified by Halsted in 1913 [7, 8]. Logothtopulos described pelvic packing for massive hemorrhage in 1926 [9]. Logothtopulos' method was modified by Parente in 1962 with replacement of the gauze veil with a polyethylene sheet for fewer adhesions resulting in easier removal and less bleeding at removal [10].

The procedure fell into disuse until the 1980s when several authors repopularized this technique [4, 11-13]. Pack tamponade and re-exploration has more recently been used for control of expanding retroperitoneal hematomas, massive pelvic hemorrhage and intraabdominal vascular injuries associated with coagulopathy.

Modern techniques of pelvic packing employ dry laparotomy pads placed directly over the injury with the abdomen closed under tension to provide tamponade to bleeding sites in the pelvis. Packs are carefully removed at a planned second laparotomy once the patient has stabilized hemodynamically, become normothermic and an appropriate correction of coagulopathy has occurred [14]. Planned re-exploration has been suggested as early relaparotomy from 12 to 24 hours or as a delayed relaparotomy at five days [11, 12].

Closure of the abdomen leaving in situ several laparotomy pads for hemostatic tamponade has been considered in extremely desperate situations as a life-saving measure. Provided that the patient has survived this critical episode the packing is removed with a subsequent operation five to seven days later but the risk of a second anesthetic, multiple vascular adhesions, sepsis and secondary wound complications make this option far less ideal [14-18].

With early re-exploration there is no evidence that packing increases the morbidity rate in these patients. Specifically, the infection rate is not increased even if the packs are left in for seven to ten days [15].

According to Finan *et al.* intrabdominal packing was used to control massive hemorrhage during surgery for gynecological malignancy in six patients. Five patients had undergone total pelvic exenteration and one total abdominal hysterectomy with bilateral salpingo-oophorectomy for endometrial cancer. Massive hemorrhage was defined as infusion of more than ten units of blood and replacement of more than one total blood volume. Tamponade was performed using continuous Kerlex rolls in a bowel bag with directed pressure over the hemorrhaging site with abdominal closure. The packs were removed in 48 to 72 hours in the operating room, transabdominally in five patients and transvaginally in one. One postoperative death occurred within eight hours of surgery. The packing was ultimately successful in the five remaining patients. In five of six patients, tumors were removed before the packing, whereas in one, the tumor was removed concurrently with the pack. In one patient, immediate repacking was required after pack removal, with ultimate hemostasis. Morbidity included "empty pelvis syndrome" in four patients, neuropathy in three and small bowel obstruction in one. In patients with severe intraoperative hemorrhage, intraabdominal packing has been successful as a mode of treatment [1].

Cirese *et al.* have reported a case of gynecologic hemorrhage after a Piver type-3 procedure treated by a packing technique. The postoperative course was uneventful and the packs were removed after six days. Intraabdominal packing should be familiar to both obstetricians and gynecologists because when any other attempt to provide hemostasis fails, it can be the last successful way to control a life-threatening hemorrhage [19].

Temporary packing has been described for controlling presacral bleeding during excision of carcinomas of the rectum or during pelvic exenteration in patients with gynecological cancer without adding morbidity [1, 3, 20].

Potential complications from using an excessive number of packs and an excessive amount of pressure include inferior vena cava compression and resulting acute renal failure. The risk must be balanced against the risk of continued hemorrhage and inadequate packing [1].

Intraabdominal packing for control of exsanguinating hemorrhage, temporary closure and planned reoperation is a life-saving maneuver in highly selected patients in whom coagulopathy, hypothermia and acidosis render further surgical procedures unduly hazardous [12, 17, 18].

According to Sharp *et al.* pelvic packing helped achieve hemostasis in 77% of injured patients. Complications developed in six of 22 survivors (27%): five abdominal abscesses (23%), two wound dehiscences (9%), and two enterocutaneous fistulae (9%) [14].

According to Sharp and Finan the complications of packing are thought to increase septic complications after pack removal. The occurrence of intraabdominal abscesses seems quite high and is likely attributable to the unfortunate combination of operative field contamination, multiple system injury and massive blood transfusion [1, 14].

Closure of the abdomen tightly after placement of multiple laparotomy pads directly on the wound has the potential side-effect of causing undesirable rises in intraabdominal pressure after surgery [14].

The major advantages of pelvic packing over other methods of packing are that it is simple and easy to perform; the entire packing procedure can be carried out through an abdominal approach. Removal of the packs from an abdominal approach also allows one to rapidly and affectively repack the pelvis [1].

The packing for intraabdominal bleeding is a valuable adjunct in a small subset of patients that cannot be controlled by conventional surgical methods [18]. It can be the last successful way to control a life-threatening hemorrhage [19].

Multiple reoperations and radiotherapy in patients with gynecological cancer make tissue friable and fragile thus predisposing patients to massive intraoperative hemorrhage. We conclude that pelvic packing associated with acceptable morbidity is effective in controlling massive pelvic hemorrhage.

Plastic wrapped gauze pack

Logothetopoulos' method was modified by Parente in 1962 with replacement of the gauze veil with a polyethylene sheet for fewer adhesions, resulting in easier removal and less bleeding at removal [10].

Massive pelvic bleeding may persist even after hysterectomy and despite normal coagulation parameters in obstetric practice. In a case report described by Howard *et al.* a proximal vaginal laceration was at the source of hemorrhage [21]. Conventional means to control bleeding, including additional sutures, electrocautery, pressure, and local application of prothrombotic agents were unsuccessful. A sterile plastic bag was filled with three rolls of gauze that had been knotted together. The neck of the pack was pulled through the vagina and tightened with drawstrings. Traction with a free hanging 11 IV fluid bag at the end of the bed provided constant force, to generating pressure on the operative field via the umbrella pack. On postoperative day 2 the gauze was withdrawn from the pack over a period of four hours with preparations for uterine artery embolization standing by. The plastic bag was also removed vaginally with no further hemorrhage.

Autograft tissue compression

According to Ayuste *et al.* hemostasis can be difficult to achieve using conventional methods because of the complex interlacing of the venous network at the sacral periosteum. Historically, pelvic packing and metallic thumbtacks have been the more commonly used methods. However, the need for repeat surgery to remove the packs and the difficulties encountered in tack application have forced us to explore other methods. In 1994, the procedure termed muscle fragment welding, which uses electrocautery through a rectum muscle fragment, was introduced to control presacral bleeding. From January 1999 to February 2002, six of 416 patients undergoing pelvic surgery developed massive presacral hemorrhage and therefore, this technique was used. Hemostasis was immediate and permanent. No major untoward postoperative events such as re-bleeding or infection were noted. One case developed a second-degree burn in the right elbow due to a misplaced ground conduction plate. Rectus muscle fragment welding is an effective and practical method of controlling presacral hemorrhage [22].

Remzi *et al.* used a segment of free rectus abdominis muscle to provide tamponade to the presacral bleeding point in two patients with severe bleeding. Muscle fragment welding is a safe, readily available, and highly effective method of controlling massive presacral bleeding [23].

Balloon compression

The highly successful use of a commercially available fluid-filled balloon catheter was reported in patients with massive presacral hemorrhage by Basso [24] and McCourtney *et al.* [25]. A silicone, fluid-filled balloon was designed for tamponade function with a filling capacity of 500 cc of sterile saline and strength to withstand a maximum internal and external pressure of 300 mmHg. The balloon was effective in controlling presacral hemorrhage.

Conclusions

Hemostasis frequently poses a challenge during surgery for gynecological malignancies because of indistinct tissue planes and the blunt dissection that is often required for debulking a tumor. There are several different techniques described to achieve hemostasis in the event of massive pelvic bleeding which are effective procedures.

Knowledge of how to deal with massive pelvic bleeding is a crucial factor in reducing intraoperative mortality in gynecological oncology.

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