Diseases of the

COLON & RECTUM

Vol. 31 December 1988 No. 12

Original Contributions

Efficacy of Pelvic Packing in Maintaining Hemostasis After Rectal Excision for Cancer

NCHE ZAMA, M.D., PH.D., VICTOR W. FAZIO, M.D., DAVID G. JAGELMAN, M.D., IAN C. LAVERY, M.D., FRANK L. WEAKLEY, M.D., JAMES M. CHURCH, M.D.

Zama N, Fazio VW, Jagelman DG, Lavery IC, Weakley FL, Church JM. Efficacy of pelvic packing in maintaining hemostasis after rectal excision for cancer. Dis Colon Rectum 1988;31:923-928.

In a retrospective study, the records of 95 patients who underwent rectal resection for carcinoma were reviewed to assess the efficacy and complications of pelvic packing for hemorrhage. Heavier blood loss was noted with fixed tumors, where preoperative radiation had been given, or there had been previous pelvic surgery, compared with situations where these factors were absent. Three patients died from myocardial infarction, pulmonary embolus, and renal failure, respectively. No patients required further hemostatic measures after pack removal. Perineal wound infection or delayed perineal wound healing occurred in 22 percent and abdominal wound infection in 6 percent of the patients. There were no instances of anastomotic leak, abdominal abscess, or pelvic abscess requiring laparotomy for treatment in this series. Pelvic packing is a safe, simple, and effective procedure for patients with problematic pelvic bleeding after rectal resection. [Key words: Pelvic Packing; Hemostasis; Hemorrhage; Rectal cancer]

MOST SURGEONS encounter varying degrees of bleeding during surgical procedures in the pelvis. At times this bleeding, usually venous, can be excessive, and hemostasis is difficult. Various measures to control bleeding in this setting have been proposed. Some of these include ligation of the internal iliac vessels,[1-4] selective arterial embolism,[5] the use of thumb tacks,[6] thrombogenic topical agents, suture ligation, and pelvic packing.

Read at the meeting of The American Society of Colon and Rectal Surgeons, Washington, D.C., April 5 to 10, 1987.

Address reprint requests to Dr. Fazio: A-111, Colorectal Surgery Department, Cleveland Clinic Foundation, 9500 Euclid Avenue, Cleveland, Ohio 44195-5044.

From the Cleveland Clinic Foundation, Cleveland, Ohio

Pelvic packing for bleeding after anterior resection and abdominoperineal resection of the rectum is a time-honored method for the management of pelvic hemorrhage and has been used widely in clinical practice. It is the authors' preferred method of hemostasis for this type of excessive bleeding. No reports on this subject were found in the literature, therefore authors reviewed their experience with pelvic packing after rectal excision for cancer between 1973 and 1985 to evaluate the efficacy and sequelae of this maneuver.

Materials and Methods

A retrospective study was performed in 95 patients with pelvic packing to control bleeding in abdominoperineal resection (63 patients), anterior resection with anastomosis (20 patients), and pull-through coloanal procedures (12 patients) for cancer of the rectum. The following factors were evaluated: age, sex, associated medical condition, previous pelvic surgery, preoperative radiation, nutritional status, size and level of tumor in the rectum, clinical and pathologic stage of tumor, intraoperative fluid balances, duration of operation, postoperative complications, and duration of hospitalization. Excluded from the study were patients taking anticoagulant drugs or those who had coagulation disorders.

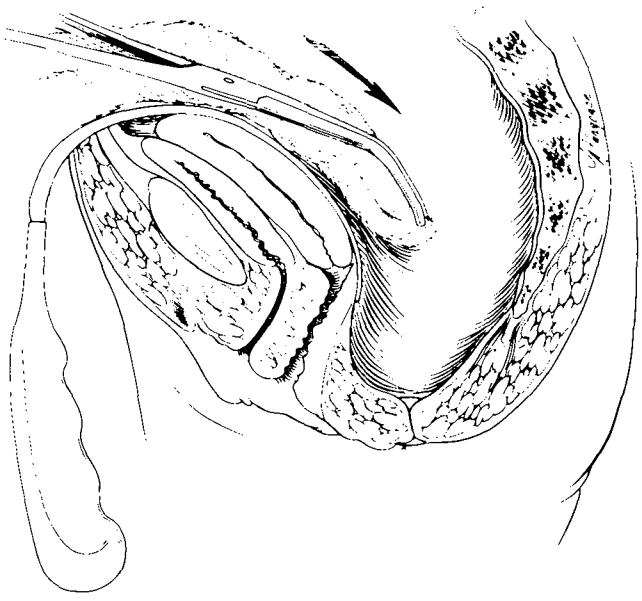

FIG. 1. Placement of packing sponge in pelvis.

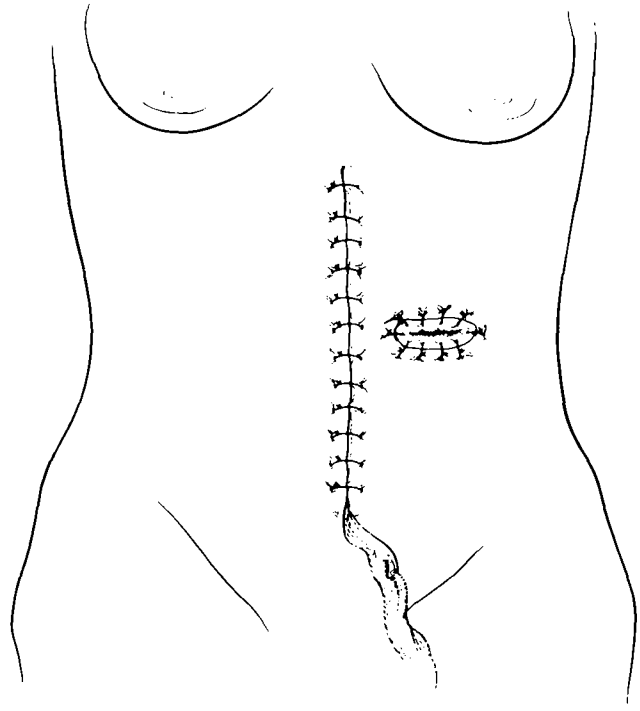

FIG. 3. Anterior view of abdominal wall with packing sponge projecting through the inferior portion of the incision, a colostomy to the left.

Technique of Packing: After abdominoperineal resection, the perineal skin and subcutaneous fat are closed after irrigation of the pelvis with normal saline solution. Using a lighted retractor in the pelvis, bleeding points are ligateded or clipped. When hemostasis is considered unsatisfactory after these measures, pelvic packing is instituted.

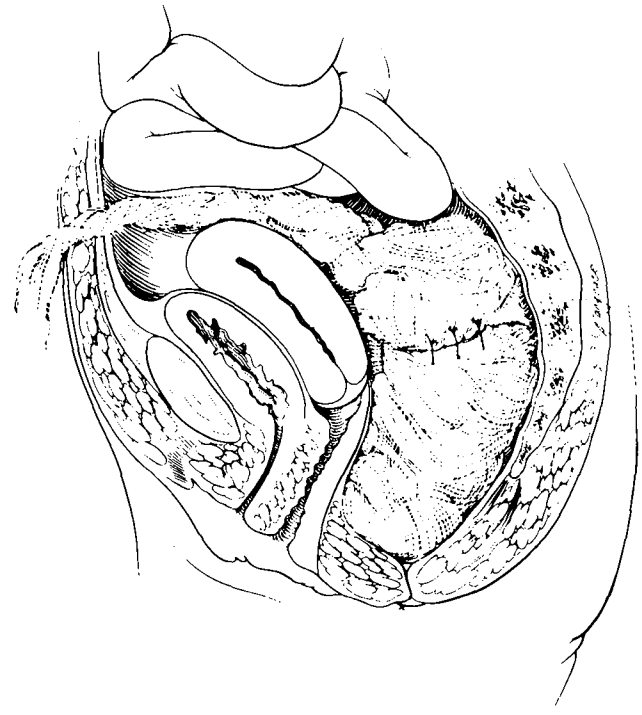

FIG. 2. Packing sponges sewn together in pelvis.

At this point, temporary packing is placed in the pelvis using one or more 8 × 36-inch gauze sponges while attention is directed to stoma construction, after which the pack is removed. If hemostasis is still unsatisfactory in the pelvis, a decision is made to place in further packing. The perineal skin and subcutaneous fat are closed with 2-0 prolene sutures. Using a lighted retractor and large packing forceps, the sponge is placed into the pelvis below the level of the levator remnants until some bulging of the perineal skin is seen to avoid a dead space between the perineal skin and the lower end of the pack (Fig. 1). A second and, sometimes, a third pack are sewn or tied to the first pack so that further packing of the occasional capacious pelvis can be achieved (Fig. 2). The upper end of the pack is then left in the inferior portion of the wound, projecting just beyond the skin (Fig. 3). Interrupted No. 1 prolene sutures are used to close the fascia of the inferior third of the incision; the remainder were closed with prolene in an interrupted or continuous fashion.

Removal of the Pack: This usually is done 48 hours after surgery, with the patient under general anesthesia. The patient is placed in Lloyd-Davies stirrups. The abdomen is prepared and draped, and the skin sutures above the level of the pack are removed for a distance of

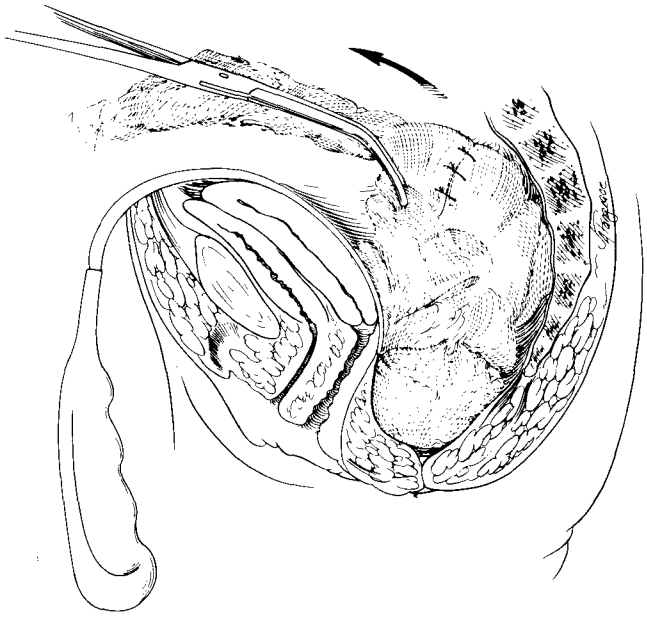

FIG. 4. Pack removal 48 hours after surgery.

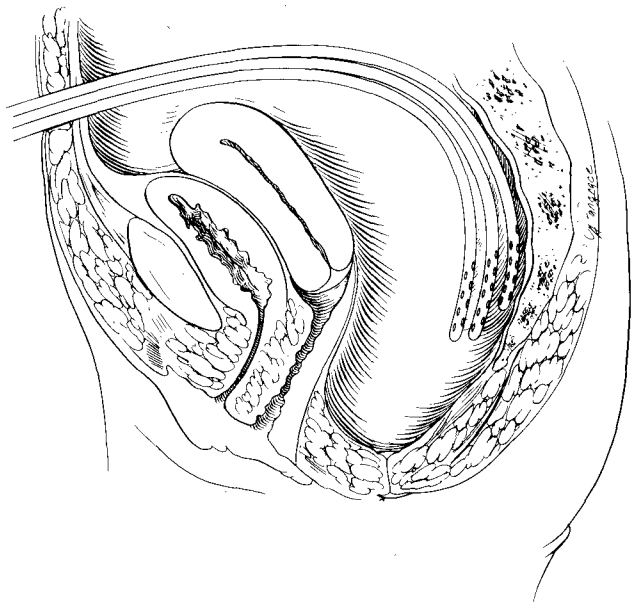

FIG. 5. Shirley sump drains placed into pelvis after pack removal.

about 4 inches. The lower four to five interrupted prolene sutures are removed. The packing is then teased gently out of the pelvis (Fig. 4). At this stage, there is usually little in the way of resistance to pack removal. If resistance is encountered, some saline solution is instilled to further saturate the pack to allow for easy removal.

This procedure is facilitated by retraction of the bladder using a lighted Deaver retractor or a Goligher retractor. After pack removal the pelvis is irrigated copiously with normal saline solution. Four Shirley sump drains are placed into the pelvis and brought out through the lower end of the incision (Fig. 5). Continuous irrigation (about 3 liters normal saline per 24 hours) and suction are then carried out for three days or until the effluent is clear.

Packing from the Perineal Aspect: In cases where the surgeon has packed the pelvis from below, (for example, abdominoperineal resection with posterior vaginectomy), the packing procedure is done entirely via the perineal approach. The presacral space is irrigated through the posterior defect and no drains are left. At initial surgery, when packing from below is used, the pelvic peritoneum is closed from above, or the omentum is used to quarantine the abdominal contents from the pelvis.

Packing After Anterior Resection or Pull-through Operation: In these situations, the pelvic colon (in a pull-through procedure) or the anastomosed segments are retracted gently anteriorly with a lighted Deaver retractor and packing similar to that employed in abdominoperineal resection is used. Particular care is taken to provide a tamponade effect behind the prostate or vagina by placing the pack into this area if it is feasible. Where an omental pedicle can be made, this is interposed between the anastomosis or the pulled-down colon anteriorly, and the packing posteriorly. The technique of pack removal is the same as that after abdominoperineal resection.

Results

The overall incidence of packing in this series is 7 percent. The mean age in these 95 patients was 58 years. There were 50 male and 45 female patients. The duration of hospitalization ranged from 7 to 60 days (Table 1). Eighty percent of the patients were hospitalized between 7 and 11 days.

Thirty percent of the patients had significant cardiovascular disease, 21 percent had previous pelvic irradiation, 6 percent had previously undergone pelvic surgery, and 20 percent of the patients were malnourished. Other associated medical conditions are shown in Table 2.

The mean size of the tumors was 6.2 cm and these were located at a mean level of 5.4 cm from the anal verge. Forty-four percent were fixed, 7 percent were Dukes' A, 53 percent Dukes' B, 28 percent Dukes' C, and 11 percent Dukes' D lesions (Table 3).

TABLE 1. *Results*

Number of patients	95
Mean age	58
Sex	
Male	50
Female	45
Duration of hospitalization (days)	7-60

TABLE 2. *Associated Conditions*

	Percent
Cardiovascular disease	30
Diabetes	4
COPD	4
Renal disease	2
Preoperative radiation	21
Previous pelvic surgery	6
Nutritional status*	
Poor	20
Good	80

*Based on history, physical examination, and blood studies.

Table 4 shows the intraoperative fluid balances. The mean duration of surgery was 4.1 hours and the average estimated blood loss was 1.4 liters. The mean blood transfusion volume was 1.5 liters. Urine output averaged 600 cc and there was a mean positive fluid balance of 2 liters.

Factors influencing the amount of blood loss were assessed (Table 5). Heavier blood loss occurred when the tumor was fixed, preoperative radiation was given, or if previous pelvic surgery had been done. Nutritional status did not appear to influence the amount of bleeding. Figure 6 shows the relationship between the level of the tumor and the amount of blood loss. As one might expect, more pelvic bleeding was encountered with more distal lesions.

Postoperative cardiovascular complications are listed in Table 6. One patient had a deep venous thrombosis. Two patients died from a pulmonary embolism and a myocardial infarction, respectively. Four patients became hypertensive during the postoperative period and required temporary management with antihypertensive agents. None of the patients had to be reoperated on for hemorrhage. The incidence of postoperative hypotension was 2 percent, which was responsive to intravenous fluid resuscitation but without evidence of blood loss or active bleeding. Table 7 shows the genitourinary complications encountered. The third fatality in this series was a patient who had end-stage renal disease, and died of renal failure. Fourteen percent of the patients had urinary tract infection. Table 8 lists the postoperative septic complications. Perineal wound infection was generally treated by insertion of a mushroom catheter and, in some patients, by leaving the wound open for secondary healing.

TABLE 3. *Tumor Assessment*

Mean diameter of tumor (cm)	6.2
Mean level of tumor in rectum (cm)	5.4
Clinical stage:	
Fixed	44%
Mobile	56%
Pathologic stage	
Dukes' A	7%
Dukes' B	53%
Dukes' C	28%
Dukes' D	11%

TABLE 4. *Intraoperative Fluid Balance*

Mean duration of surgery (hrs)	4.1
Mean volume of crystalloid used (ccs)	2500
Mean estimated blood loss (cc)	1400
Mean transfusion volume (cc)	1500
Mean urine output (cc)	600
Mean fluid balance (cc)	+2000

TABLE 5. *Factors Influencing Blood Loss*

	Mean EBL (cc)
Clinical stage	
Fixed	1500
Mobile	900
Preoperative radiation	
Yes	1700
No	1200
Nutritional status	
Poor	1470
Good	1200
Previous pelvic surgery	
Yes	1290
No	820

Discussion

The principles of dissection of the rectum involve an intimate kinowledge of the fascial planes that surround it. With the posterior dissection, some surgeons prefer to enter the retrorectal space by sharp dissection followed by

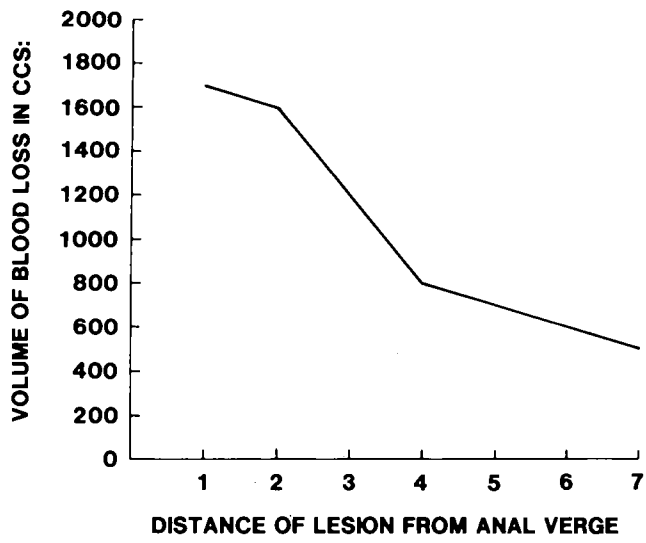

FIG. 6. Relationship between distance of lesion from the anal verge and volume of blood loss.

TABLE 6. *Cardiovascular Complications*

	Percent
Hypotension	2
Hypertension	4
Deep venous thrombosis	1
Pulmonary embolism	1*
Myocardial infarction	1*

*Associated with patient death.

TABLE 7. *Genitourinary Complications*

	Percent
Renal failure	1*
Transient difficulty voiding	10
Urinary tract infection	14

*Associated with patient death.

TABLE 8. *Septic Complications After Pelvic Packing*

	Percent
Anastomotic leak	-
Pelvic abscess	-
Abdominal abscess	-
Perineal wound infection*	22
Abdominal wound infection	6
Pneumonia	2
Generalized sepsis	-

*Treated by mushroom catheter drainage.

blunt dissection at the level of the midsacrum. This practice is associated often with premature breaching of Waldeyer's fascia at that level, causing denuding of the inferior half of the sacrum and bleeding often results.

A preferable method is dissection in the plane between the investing layer of rectal fascia (fascia propria) and Waldeyer's fascia down to the levator ani muscles and the anorectal ring. This preserves an intact fascia plane over the sacrum, leaving the presacral vessels less vulnerable to rupture. In certain cases this is impossible to do. For example, the fixity of a given tumor posteriorly may mandate a need to deliberately breach Waldeyer's fascia at a relatively high level on the sacrum to be assured of a margin of clearance (posteriorly) from the cancer.

Bleeding can occur from a variety of sources during proctectomy. Principal sources of bleeding include the presacral venous plexus formed by the middle sacral, lateral sacral, and communicating veins found on the pelvic surface of the sacrum, as well as sacral basivertebral veins emerging from several large sacral foramina (2 to 5 mm), and located on the third, fourth, and fifth sacral segments. It has been observed that the adventitia of these veins is continuous with the sacral periosteum, thereby increasing their vulnerability, especially when a faulty plane of dissection is struck.[6]

When bleeding is encountered in this region, attempts at ligation, electrocautery, or application of thrombogenic agents are usually futile. Packing can be useful in this setting.

Other important potential sources of bleeding included the vessels behind the prostate or the vagina that may be encountered in the anterior dissection when dissecting anterior to the fascia of Denonvillier. These bleeding vessels may be difficult to visualize and control with sutures. Less often the middle rectal vessels in the lateral stalks along with other vessels in the deep pelvis may pose problems in the control of bleeding, especially in the narrow male pelvis.

In this series, the decision to pack the pelvis depended not so much on the amount of blood loss but rather on the surgeon's assessment that the degree of persistent bleeding was unacceptable in a given patient. This series reveals correlation between the proximity of a lesion to the anal verge, fixation or tethering of the lesion, and the extent of intraoperative blood loss. With fixed, and especially distal tumors, wider resection is required compared with mobile, proximal lesions; hence the likelihood of encountering increasing bleeding.

As stated previously, blood loss was heavier in patients with preoperative pelvic radiation treatment as well as in those who had undergone previous pelvic surgery. In this group of patients, there were significant adhesions and fibrosis, thereby rendering dissection planes less easily defined, which might have resulted in increased blood loss when a faulty plane was pursued. Packing was found to be effective in this situation.

Despite positive fluid balances as shown in Table 4, there was no instance of congestive heart failure. Fluid was likely sequestered in "third space" and patients showed acceptable diuresis postoperatively. It should be noted that an estimation of blood loss was done by the anesthesiologist. This estimate was generally about 30 percent greater than the actual blood loss. The volume of irrigation solution may have been included in the total volume. The figures were abstracted from the anesthesia records.

Complications have been documented in association with ligation of internal iliac vessels to control bleeding. Some of these include perineal and bladder necrosis[7] and paresis.[8] This method has not been uniformly effective.

Of significance is the fact that the pelvis provides a static space with the pelvic walls constituting rigid borders that facilitate adequate control of diffuse bleeding by careful packing.

The disadvantages of packing are the need for reoperation and the risk of pelvic sepsis. The packs are removed after 48 to 72 hours, a procedure that may carry a certain risk, especially in patients with significant medical prob-

lems. No patients had significant intraoperative or postoperative complications resulting from this second anesthetic, however. In this study, there were no instances of anastomotic leak, pelvic abscess necessitating abdominal drainage, abdominal abscess or bacteremia, as shown in Table 8. Delayed perineal healing was included under perineal wound infection. This amounted to 22 percent of the patients.

No operations were aborted due to continuing hemorrhage and there were no unacceptable delays in patient recovery due to packing. None of the patients underwent reoperation for rebleeding. There were no cases of cardiovascular instability due to bleeding after pack removal.

This study therefore demonstrates the value of pelvic packing under certain circumstances where pelvic bleeding is encountered during rectal excision for cancer. The authors have found this procedure to be quick, simple, and convenient for problematic pelvic bleeding. These findings support its effectiveness in minimizing postoperative hemorrhage without an increase in the number of postoperative complications.

References

1. Engel GC, Sigmaster L. Ligation of internal iliac arteries to facilitate abdominoperineal resection for malignancy of the rectum. Surgery 1962;52:867-70.
2. Bacon HE, Gutierrez RR. Cancer of the rectum and colon: review of 2,402 personal cases. Dis Colon Rectum 1967;10:61-4.
3. Seavers R, Lynch J, Ballard R, Jernigan S, Johnson J. Hypogastric artery ligation for uncontrollable hemorrhage in acute pelvic trauma. Surgery 1964;55:516-9.
4. Steinhart L, Halva A, Navratil P, et al. Indications for obliteration of pelvic arteries in bleeding lesions of pelvic organs. In: Veiga-Pires JA, ed. Intervention radiology. Amsterdam: Excerpta Medica, 1980;111-67.
5. Miller FJ Jr, Mortel R, Mann WJ, Jahshan AE. Selective arterial embolization for control of hemorrhage in pelvic malignancy: femoral and brachial catheter approaches. AJR 1976;126:1028-32.
6. Qinyuao W, Weijin S, Youren Z, Wenqing Z, Zhengrui H. New concepts in severe presacral hemorrhage during proctectomy. Arch Surg 1985;12:1013-20.
7. Andriole GL, Sugarbaker PH. Perineal and bladder necrosis following bilateral internal iliac artery ligation. Dis Colon Rectum 1985;28:183-4.
8. Hare WS, Holland CJ. Paresis following internal iliac artery embolization. Radiology 1983;146:47-51.