

The Presacral Space as a Collector of Fluid Accumulations Following Rectal Anastomosis

Tolerance of Rectal Anastomosis to Closed Suction Pelvic Drainage*

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The amounts of fluid that collect in the presacral space after rectal anastomosis were measured in 88 such patients (85 one-stage, three two-stage) treated by one surgeon with closed suction presacral space drainage. Fluid accumulations ranged from 0 to 1816 ml (mean 258 ml) and were not influenced by various factors studied. Only one patient developed an anastomotic leak, and one died postoperatively. None of the 82 patients followed one to five years and none of five patients lost to follow-up after five to 24 months experienced anastomotic complications. These data document the presacral space as a significant collector of fluids following such operations and do not support the concern that such a tube might damage or contaminate the anastomosis more than if left undrained when measured by increased rate of anastomotic leakage, by prolonged hospitalization, or by the appearance of anastomotic complications during the follow-up period. [Key words: Intestine, resection, presacral space, fluid accumulations; Rectum, anastomosis, drainage, closed suction, tolerance]

IT IS CONTEDED that infected accumulations of fluid in the presacral space are the most important cause of anastomotic dehiscence of patients undergoing resections of the rectum or recto-sigmoid colon, and that removal of these fluids by closed suction drainage of the presacral space will reduce the incidence of anastomotic leakage in such patients.¹ In a previous study which substantiated the value of this modality in reducing the incidence of anastomotic leakage in patients undergoing enterorectal or colorectal anastomosis, it was noted that prior reports did not include data regarding the amounts of drainage obtained by suction drainage of the presacral space.²

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The purpose of this report is to present the results of a study of a group of such patients treated by closed suction drainage of the presacral space by one surgeon. The study was undertaken in an effort to answer the following questions. (1) To what extent does the presacral space act as a collector of fluid accumulations after resections of the rectum? (2) To what extent do other factors affect the amounts of these fluid accumulations, such as age, sex, pathologic condition of the intestine, amount of intestine removed as determined by the anastomotic portion of intestine anastomosed to the rectum, location of the anastomosis above or below the peritoneal reflection, technique of anastomosis, presence or absence of tube colostomy, or performance of the procedure in one or in two stages? (3) To what extent does the physical presence of the closed suction tubing adjacent to the anastomosis predispose to anastomotic weakness or erosion as measured by prolonged hospitalization or by a longer period of observation for evidence of anastomotic dehiscence beyond the immediate post-operative period of one or two months for evidence of anastomotic dehiscence?

Subjects and Study Methods

The medical records of all private hospital patients operated upon by the author for conditions requiring enterorectal or colorectal anastomoses during the period from January 1, 1974, through August 1, 1980, were gathered. After excluding the records of patients in whom the presacral space was drained by

means other than closed suction (or not drained at all), the data for each patient were compiled from hospital and office records for review regarding the various parameters indicated above to show the composition of the group in order to determine how much the various factors for each patient and for the total group affected the formation of fluid in the presacral space.

The amount of fluid collected from each patient from the presacral space by closed suction drainage and the date each drainage tube was removed were recorded. The postoperative presence of fecal fistula, anastomotic sepsis, or pelvic abscess was determined as based on clinical observation of the drainage of feces or purulent material from the fistula or the drain tube site or of a pelvic abscess that required drainage. The records were examined further to determine the outcome of each procedure.

For all patients who survived the operation, follow-up data concerning later development of anastomotic leakage or anastomotic complications attributable to the suction tube were obtained by letter, telephone, or direct examination. The period of follow-up was reported as of July 1, 1981, in the case of patients operated upon prior to January 1, 1979, or as of August 1, 1981, in the case of those operated upon during the period January 1, 1979, to August 1, 1980.

Clinical Methods

Preoperatively, all patients received a complete physical examination, a proctosigmoidoscopy, and other appropriate endoscopic, roentgenologic, and clinical examinations. When possible, mechanical cleansing of the colon was begun either five days or two and a half days before surgery and was completed upon entry to the hospital, which was usually the day before surgery. A few patients required admission to the hospital two to three days before surgery to stabilize severe diabetic or cardiorespiratory conditions. Antibiotics were used preoperatively and postoperatively for most of the patients.

Anastomoses were performed in the low-anastomosis group occasionally by using the stapler^{3,4} but most often by using a single row of nonabsorbable sutures (4-0 Surgilon[®]) posteriorly to invert all layers and, anteriorly, an inverting Connell closure using an inner row of 2-0 chromic catgut and an outer Lembert row of nonabsorbable sutures (4-0 Surgilon). In the high-anastomosis group, closure was always performed in two layers as mentioned above, even when the inner row was stapled in triangular fashion.³

The anastomosis was placed just above the peritoneal reflection in patients with diverticulitis so

as to be certain of clearing the distal extension of the diverticular disease.⁵ In those patients with cancer of the midrectum or rectosigmoid, the anastomosis was placed, when possible, 5 cm or more below the lower end of the lesion.

Most patients received nasogastric tube decompression for 24 to 72 hours after surgery. In those patients managed in two stages, the colostomy was of the loop type. Some of the patients undergoing total left colectomy received a synchronous midtransverse tube colostomy for proximal decompression, and some undergoing anterior resection or partial left colectomy received a synchronous left-sided colon tube colostomy.

With respect to the technique of closed suction drainage of the presacral space, on completion of the anastomosis and closure of the rent in the right peritoneum, a large (hard) plastic suction tube was introduced into the abdomen through a stab wound placed in the abdominal wall to the left of the paramedian incision. After positioning the tube in the presacral space posterior to the anastomosis and being certain that the distal end of the tube was placed caudad well beyond the anastomosis, the tube was secured to the skin of the abdomen by means of a suture. Closed suction drainage was actuated when the peritoneum was closed by attaching the tube to the compressed closed suction bottle. The rent in the left peritoneum was left unclosed. Removal of the tube was facilitated by first deactivating the suction system and then by gently twisting the tube back and forth between the thumb and the first two fingers of either hand just enough so as to disengage the tube from its tissue surroundings. Once disengaged, the tube was removed easily without discomfort to the patient.

Results

During the period of the study, closed suction drainage of the presacral space was utilized in 89 enterorectal or colorectal anastomoses performed on 89 patients. In three of the 89 patients, the operations were performed in two stages, and in 86 in one-stage. For one patient of the one-stage group, drainage was unrecorded, and this patient was deleted from the study, leaving a total of 88 patients. One patient was included in the two-stage group, though the purpose of the diverting colostomy performed four days after the suction tube had been removed was to avoid placing the anastomosis unnecessarily at risk when barium was demonstrated proximal to the anastomosis by an x-ray.

In the two-stage group of three patients, presacral space drainage ranged from 0 to 310 ml, and in the

TABLE 1. Amount of Presacral-Space Closed Suction Drainage Obtained From 88 Patients With Rectal Anastomosis

Patients	Output (ml)	Patients	Output (ml)
3	< 50	4	400-499
8	50-99	1	500-599
34	100-199	3	600-699
20	200-299	2	700-799
11	300-399	1	1099
		1	1816

one-stage group of 85 patients, presacral space drainage from 10 to 1816 ml, with a mean drainage of 287 ml and 263 ml, respectively.

Fifty-five of the patients were women with presacral space drainage ranging from 10 to 1099 ml and a mean drainage of 304 ml. In the 33 male patients, the range was 0 to 1816 ml, and the mean was 338 ml.

Ages ranged from 44 to 88 years, with a mean age of 63.6 years and a median of 67 years. The mode was the seventh decade (30 patients), and the age range between 55 and 78 years, inclusively, contained 66 per cent of the patients. Thirteen of the patients were 75 years of age or more and five more than 80 years. For patients less than 64 years and less than 67 years of age, the drainage ranged from 0 to 1816 ml, with mean drainage of 234 ml and 408 ml, respectively. Presacral space drainage in patients 64 years old or older and in patients 67 years old or older ranged from 10 to 1099 with a mean of 274 ml for the former and 312 ml for the latter.

With respect to the anatomic portion of the intestine that was joined to the rectum, the mean drainage was as follows: (1) anterior resection with coloproctostomy (69 patients), 257 ml; (2) anterior resection with takedown splenic flexure (nine patients), 162 ml; (3) total left colectomy with right transverse coloproctostomy (five patients), 190 ml; (4) total colectomy with cecoproctostomy (five patients), 504 ml.

With regard to the pathologic condition of the intestine, as found at surgery, the operation was performed for cancer of the colon or rectum for 34 patients (drainage range 0 to 1816 ml, mean 307 ml), for acute or recurrent diverticulitis for 44 patients (drainage range 40 to 640 ml, mean 224 ml), for benign polyps for nine patients (drainage range 63 to 615 ml, mean 250 ml), and for a benign rectal stricture after an anterior resection performed elsewhere for one patient (drainage 74 ml).

A handsewn anastomosis was employed in nine patients (high: two, low: seven), a triangular stapled anastomosis³ in 76 patients (high: 66, low: 10), a circu-

lar anastomosis⁴ with staples in two patients with low anastomoses, and one end-to-side stapled high anastomosis. The mean presacral space drainage in patients with a handsewn anastomosis was 213 ml; with a triangular stapled anastomosis it was 251 ml; with a circular stapled anastomosis it was 495 ml; and in the one end-to-side stapled anastomosis it was 775 ml. For anastomoses located above the peritoneal reflection (69 patients), the mean drainage was 280 ml, and when located below the reflection (19 patients), the mean was 227 ml.

In 65 of the 85 one-stage patients, a synchronous colon tube colostomy was used and drainage ranged from 22 to 1816 ml with a mean of 257 ml. In 20 patients of the one-stage group, this modality was not used, and the drainage range was 10 to 1099 ml and the mean 273 ml.

In Table 1 the 88 patients are grouped according to the amounts of presacral space fluid obtained by closed suction drainage. When drainage decreased to less than 5 ml per eight hours, which usually occurred by the second to fourth postoperative day, the closed suction tube was removed. In three patients, significant drainage persisted until the sixth postoperative day, in three patients until the eighth postoperative day, and in one until the tenth postoperative day. The drain tube site healed spontaneously in all patients within several days after removal of the tube.

There was one hospital death in the group of 88 patients. A 55-year-old, obese man died from a massive pulmonary embolus on the fifth postoperative day. At autopsy, there was no evidence of pelvic abscess or leakage from the anastomosis, which was found to be intact and healing as was the drainage tube site.

The postoperative hospital stay ranged from five to 22 days for the 87 patients who survived the surgery; 82.6 per cent of the 87 patients were discharged by the 12th postoperative day.

After excluding the patient who died postoperatively, 87 patients were available for follow-up study, 84 in the one-stage group and three in the two-stage group. None of the 87 patients, including the three whose colostomies were closed subsequently, developed fecal fistula or purulent drainage from the drain tube site during the immediate postoperative period of 60 days. One patient, a 69 year-old man, developed a pelvic abscess on the 69th postoperative day, which required rehospitalization for drainage of the pelvic abscess and a diverting-type ileostomy. The ileostomy was closed four and one-half months later, and the cecoproctostomy has remained closed without problem for over five months.

Of the remaining 86 patients, all were followed for one year or more after surgery. Thirty-six of these

were followed for one year, 14 for two years, ten for three years, 11 for four years, and ten for more than five years. Five of the 86 patients were lost to follow-up, two after five and six months, respectively, and three after one year or more; none of the five had an anastomotic complication when last examined. Eleven of the 86 patients died during the period of follow-up beyond the immediate postoperative period of 60 days. None of the 11 deaths were due to the anastomosis, and none of the remaining 75 of the 86 patients developed complications related to the anastomosis during the period of observation.

Discussion

Though experimental studies have demonstrated bacterial contamination of *in vitro* models drained by sump tube when high volume suction was used,⁶ and complications have been attributed by others to the presence of drains after operations,^{7,8} the case against the use of passive drainage after rectal anastomosis is not clear. For example, Hedberg and Welch⁹ noted that fecal fistulas were very common in their experience when drains were used and reported that only 12 of 200 patients developed a fistula when drains were not used after anterior resection, but five (42 per cent) of the 12 major leaks were fatal. Other surgeons^{10,11} continue to use passive drainage adjacent to colorectal anastomoses and contend that, though drains might predispose to leakage in a few patients, it is better to provide drainage for an anastomotic leak rather than risk catastrophe. They report a higher overall leakage rate, 32 per cent and 24 per cent, respectively, and approximately the same fatality rate (28 in 74 of 1766 patients¹⁰ and three in 46 of 362 patients¹¹) for major leaks, but these rates were for the higher risk low-anastomosis patients, whereas the incidence for the undrained group was for unsegregated high- or low-anastomosis patients. As a consequence, the only consensus that can be gathered from the literature is that most clinical leaks are of little consequence, whether drained or undrained, that they occur in 8 per cent to 30 per cent of rectal-anastomosis patients, and that in patients who experience a major anastomotic dehiscence, a 6 per cent to 87 per cent mortality can be expected.⁹⁻¹⁴

Personal experience regarding the value of passive Penrose drainage or of nondrainage of intestinal anastomoses has likewise been unclear. In a study of 147 patients treated personally with one-stage rectal anastomosis without closed suction drainage of the presacral space, nine developed a leak—a number representing an expected rate of anastomotic leakage of 6.1 per cent.² Though all nine leaks occurred in a group of 99 patients in whom Penrose drains were

used, as compared with no leaks in 48 patients who were undrained, the statistical significance of the leak was uncertain since Penrose drains were not often used in patients with a “good” anastomosis. Of importance was that none of the nine patients died from anastomotic leakage.

Admittedly, therefore, it may be that in some patients drains can produce anastomotic dehiscence when placed adjacent to or against an anastomosis. Likewise, a strong case can be made for nondrainage of colocolic anastomoses since both ends to be joined are covered by the protective serosa which, along with the protective peritoneum, should be capable of overcoming a localized peritonitis and absorbing the small amount of fluid that may collect in the area of the anastomosis. Such is not the case, however, in patients with enterorectal or colorectal anastomosis, whose posterior surface lies in a contaminated space almost completely lacking in the protective and absorptive capabilities of the peritoneum, except for the posterior surface of the proximal limb of the anastomosed intestine.

Whether closed off intentionally by reapproximation of the peritoneal defect, or spontaneously soon after surgery by the sealing action of the peritoneum or by the serosa of the intestinal surfaces (such walling off is advanced to support that drainage of the peritoneal cavity is ineffectual⁷), if the dead space thus formed filled with fluid which was absorbed slowly, as in some fluid-filled postoperative spaces, an excellent medium would be provided for bacterial overgrowth which might jeopardize an otherwise healthy anastomosis in a patient whose defenses were unable to handle the presacral infection for some reason. It did not appear unreasonable to attempt removal of these fluids if they did collect from a space where such fluid collections could serve as a medium for bacteria, especially in the patient whose defenses were unable to handle the presacral infection, provided such elimination would not damage or externally infect the anastomosis and compound the problem. Though the reported experience⁹⁻¹⁴ supports the assumption that, even if the presacral space does indeed become infected after rectal anastomosis, the clinical consequence for most patients is of no significance, the experience does not enable the surgeon to determine which anastomosis will leak. However, the reported experience does indicate that several factors, such as diabetes and prior radiation in the area of the anastomosis, predispose to anastomotic sepsis or fistula.^{12,14} It was important, therefore, to determine not only whether significant amounts of fluid collected in the presacral spaces of such patients, but also that the tube used to remove the fluids did not, by its presence, damage or infect the other 70 to 92

per cent of anastomoses that do not develop a clinical leak under any circumstances,⁹⁻¹⁴ in case the modality was to be employed almost routinely.

The present study shows clearly that these fluids are not absorbed and that they can be removed by closed suction drainage. For none of the patients in the present study was there objective evidence to substantiate that the presence of the tube may have weakened the anastomosis, as measured by a need for prolonged hospitalization, and in only one of the 87 surviving patients did an anastomotic dehiscence or sepsis develop during a follow-up period of one year or more from the date of surgery; 82.6 per cent of the 87 surviving patients in the present study were discharged by the 13th postsurgical day, as compared with 104 (71 per cent) of 146 surviving patients² who were discharged by the 12th postsurgical day. Whether the pelvic abscess, which developed in one of the patients who underwent total colectomy and cecoproctostomy, occurred as a result of a weakened anastomosis because of the tube (which had already been removed) or because this patient's general condition had been weakened, as evidenced by the need for blood transfusion prior to closure of a wound dehiscence performed on the seventh postoperative day, is conjectural. Schrock *et al.*¹⁴ found an increased incidence of anastomotic leakage in patients requiring blood transfusions during anterior resection.

The point is that only one (1.1 per cent) of these 87 patients treated by closed suction presacral space drainage developed an anastomotic leakage, whereas a leak occurred in 6.1 per cent of 146 similar patients treated without active drainage by the same surgeon. A prior study² showed that the proportion of patients with active drainage who had leaks was significantly lower than the proportion of patients without active drainage who had leaks ($P < .01$).

In conclusion, these data document the presacral space as a significant collector of fluids in patients after intestinal resections involving the rectum or rectosigmoid colon with reanastomosis to the rectum. The study shows further that accumulations of these fluids are unaffected by the age or sex of the patient, the pathologic state of the intestine that was removed, the amount of intestine that was removed, the location of the anastomosis above or below the peritoneal reflection, the technique of anastomosis, the use of tube colostomy, or by doing the procedure in one or two stages. Finally the study shows no predisposition to anastomotic weakness or erosion caused by the

physical presence of the "hard" plastic tube placed posterior to, adjacent to, and against the anastomosis, as evidenced by prolonged hospitalization or by an increased incidence of fecal fistula or pelvic abscess, when compared with similar patients operated upon personally² and by others when the anastomosis was not drained by closed suction¹⁰⁻¹⁴ or was left undrained.⁹ Among the 88 patients studied, there were no deaths or complications due to use of the closed suction tube, and only one patient developed an anastomotic leak.

By inference, therefore, the theoretical concern⁶ that the closed suction tube might serve as a conduit for bacteria from skin to anastomosis does not appear to be a substantial one from the practical standpoint. The clinical data from the present study establish that, even if the theoretical concern is valid, there is no objective clinical evidence to contraindicate removal of these presacral-space fluid accumulations by closed suction drainage.

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