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Management of low colorectal anastomotic leak: Preserving the anastomosis

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Abstract

Anastomotic leak continues to be a dreaded complication after colorectal surgery, especially in the low colorectal or coloanal anastomosis. However, there has been no consensus on the management of the low colorectal anastomotic leak. Currently operative procedures are reserved for patients with frank purulent or feculent peritonitis and unstable vital signs, and vary from simple fecal diversion with drainage to resection of the anastomosis and closure of the rectal stump with end colostomy (Hartmann's procedure). However, if the patient is stable, and the leak is identified days or even weeks postoperatively, less aggressive therapeutic measures may result in healing of the leak and salvage of the anastomosis. Advances in diagnosis and treatment of pelvic collections with percutaneous treatments, and newer methods of endoscopic therapies for the acutely leaking anastomosis, such as use of the endosponge, stents or clips, have greatly reduced the need for surgical intervention in selected cases. Diverting ileostomy, if not already in place, may be considered to reduce fecal contamination. For subclinical leaks or those that persist after the initial surgery, endoluminal approaches such as injection of fibrin sealant, use of endoscopic clips, or transanal closure of the very low anastomosis may be utilized. These newer techniques have variable success rates and must be individualized to the patient, with the goal of treatment being restoration of gastrointestinal continuity and healing of the anastomosis. A review of the treatment of low colorectal anastomotic leaks is presented.

Key words: Anastomotic leak; Colon and rectal surgery; Colorectal anastomosis; Management anastomotic leak; Endoscopic treatment; Surgical complications

Core tip: The treatment of the leaking colorectal or coloanal anastomosis continues to be challenge for surgeons to manage. This paper presents both older and new techniques in the treatment of low pelvic anastomotic leak, focusing primarily on salvage of the leaking anastomosis.

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INTRODUCTION

Despite advances in modern colorectal surgery, anastomotic leak continues to be a significant cause of morbidity and mortality. Risk of colonic anastomotic leak continues to range between 1.5% and 23%[1-5], with low colorectal and coloanal anastomoses posing the highest risk[6]. Leaks also result in increase in hospital costs and increase length of stay[7,8]. The best treatment for the management of anastomotic leak has not yet been identified, especially in these very low anastomoses[9].

The presentation of anastomotic leak is widely variable, as is its definition. Some patients present with florid sepsis and peritonitis, while others have a more insidious course with fevers, leukocytosis, and abdominal pain. Management is typically guided by the patient's clinical picture, with operative intervention for the sickest patients, and more conservative interventions for those who are clinically stable. The management of the leaking low colorectal anastomosis has changed over the past several decades. Many new techniques are now available, with the goal being preservation of the anastomosis, and restoration of gastrointestinal continuity with good functional outcome.

OPERATIVE INTERVENTION OF ACUTE LEAK

Traditionally, the treatment of choice for a leaking colorectal or coloanal anastomosis had been resection of the anastomosis with exteriorization of the proximal limb as an end colostomy (Hartmann's procedure). This removes the source of sepsis, but in the majority of cases, leaves the patient with a permanent stoma, with less than 50% of patients ultimately undergoing reversal[1,10-13]. Hartmann's procedure may be necessary in the patient with diffuse ischemia or necrosis or large dehiscence of the anastomosis at reoperation[8], but in the recent literature the trend continues to be moving away from resecting the extraperitoneal anastomosis[2,14,15]. Leaks occurring from intraperitoneal anastomoses continue to have higher rates of resection of the anastomosis than those resulting from extraperitoneal leaks[2,16].

Many have advocated the use of a "divert and drain" technique for those patients requiring reoperation for a leaking extraperitoneal anastomosis[2,15-18], consisting of proximal fecal diversion with loop ileostomy, and drain placement into the pelvis, without manipulation of the pelvic anastomosis. This avoids the dangers of reoperation in an acutely inflamed field, and drainage of the pelvis has been shown to be adequate to control the source of sepsis. Healing rates with this strategy have ranged from 54%-100%[2,19], without need for further intervention to the leaking anastomosis. Krarup *et al*[20] found that patients who had anastomotic salvage with proximal diversion had a 3 fold increase likelihood of stoma reversal, compared to those with resection of anastomosis and end stoma creation in intraperitoneal leaks.

For those patients whose initial surgery was performed laparoscopically, a laparoscopic approach to reoperation may be performed safely at the discretion of the operating surgeon[14]. In one study 16/18 patients requiring reoperation for anastomotic leak were able to be managed laparoscopically with ileostomy and operative drainage, suggesting that this approach is safe. Eighty percent of these patients were able to undergo subsequent stoma reversal[14].

Whichever method is utilized for the patient requiring reoperation for anastomotic leak, several points should be taken into consideration. Edden *et al*[21] suggest the following principles: "(1) Minimizing the extent of surgical intervention; (2) Shortening the procedure as much as feasibly possible; (3) Adequate abdominal washout; and (4) Proximal fecal diversion should be favorably considered preoperatively with, the relevant actions such as stoma markings".

NON OPERATIVE AND NEWER INTERVENTIONS OF ACUTE LEAK

Reoperation for control of sepsis is rarely necessary in those patients who already have a diverting stoma present at the time of the leak[2,16,17]. This is likely to be the majority of patients with extraperitoneal anastomoses. In these patients, and those without a stoma who do not require abdominal reoperation for a contained pelvic leak, options for treatment include transanal or percutaneous drainage of the pelvic collection, or newer techniques such as endosponge therapy, endoscopic stenting or endoscopic clip placement.

Transanal drainage through the anastomosis has been a well described technique in management of low anastomotic leaks from low colorectal, coloanal or ileoanal anastomoses. Thorson *et al*[22] described proctoscopic placement of a foley catheter into the leaking anastomosis, which was then kept in place and irrigated every 6 h. Approximately 7-14 d later, the cavity decreases in size to allow removal of the catheter and spontaneous healing. Another technique utilizes an exam under anesthesia with placement of a suction drain *vs* malecot or foley across the anastomosis. The majority of patients (58%) with diverting stomas were able to be managed with transanal drainage, compared with 9% without a diverting stoma. None of these patients required an abdominal intervention for their leak, although 50% required an additional local intervention[23].

Percutaneous drainage using a computed tomography guided approach has become a common method in the management of contained pelvic leaks[5,23]. This can be placed either transgluteally or transabdominally depending on the location of the leak. Fistula development, although rare, is a well described complication of percutaneous drainage[24]. When comparing transanal drainage *vs* percutaneous drainage, one study found no difference in success rates between the two techniques in patients with ileoanal anastomoses[25].

A novel technique in transanal drainage is the use of the Heald Silastic Stent. This was initially designed to protect a low colorectal anastomosis as an alternative to diverting ileostomy[26]. The stent is a 4 cm soft silastic tube with flanges on either end, and is placed within the anal canal below the level of the leak, thus stenting open the anus, and allowing decompression of the anastomotic leak. It can be used alone or in combination with percutaneous drainage[27,28].

Despite control of acute sepsis with drainage of the collection, there are still many patients whose anastomoses will not heal or who will develop a chronic sinus. This is postulated to occur due to accumulation of mucous and fluid in the presence of a closed anus, converting a presacral abscess into a chronic sinus[29]. A percentage of these chronic sinuses will heal with time, however, the scarring and fibrosis may lead to worsened bowel function[30]. Proponents of early intervention and closure of the leaking anastomosis feel that the function of the neorectum will be improved with earlier healing, and less fibrosis. Prevention of the persistent sinus will then lead to better healing, and increase in stoma closure rates[29,31,32].

ENDOSPONGE

One of the newer techniques in management of the colorectal anastomotic leak is a minimally invasive approach involving the use of an endoscopically placed endoscopic vacuum device. The technique, originally described by Weidenhagen *et al*[9], utilizes an open pored, polyurethane sponge (B Braun Medical BV, Melsungen, Germany), with an attached evacuation tube which is then connected to a vacuum drainage system. This sponge is placed *via* an introducer sleeve that is fitted over an endoscope and placed through the anastomotic defect and into the pelvic cavity. Position of the sponge into the cavity is verified endoscopically. The sponge is then exchanged every 48-72 h, downsizing the sponge as the size of the cavity decreases[9,29]. The initial series consisted of 29 patients who underwent endosponge treatment over a median of 34 d, with 28 having healing of the anastomosis[9]. The endosponge therapy was stopped when the cavity was less than 1 cm in size. Adjuncts to closure included fibrin glue in 9 patients.

Proponents of the endosponge treatment feel that the sponge not only allows for drainage of the cavity, but also stents open the anus to allow unobstructed drainage. The negative pressure of the sponge itself allows contact with the entire surface of the cavity uniformly, leading to a decrease in size of the cavity with time. Early application of the sponge, when the neorectum is more pliable, is an essential component of treatment, as the defect is more likely to close[33]. In one series, healing occurred in 89% of leaks treated within 60 d of the original surgery, and in only 50% of those treated more than 60 d out[34]. Visible vessels in the cavity are a contraindication to treatment[9], and higher anastomoses make placement of the sponge difficult[29]. Most authors feel that patients should undergo fecal diversion prior to treatment as there is concern for stool contamination of the defect, and failures tended to occur in those patients who were not diverted[4,29,34]. This treatment has been applied to patients either with or without preoperative radiation for rectal cancer with success[4,9,29,34,35].

STENTING

Endoscopic stenting has also been utilized in the management of colorectal anastomotic leak. Covered metal, plastic and biodegradable stents have all been utilized with success[3,6,35-37]. The stent can only be placed across an end to end anastomosis and the distal end of the stent must be 5 cm or more from the anal verge, so this technique is not an option for very low anastomoses[35]. Technical success for stent placement has approached 100% in some series, with clinical success 80%-100%[3,6,35,36], although this has only been in small case series. Up to 40% of patients with covered stents will require stent replacement due to migration[6,35]. Partially covered stents appear to have less migration than fully covered stents[37]. They are left in place for up to 50-60 d, and are removed once the anastomosis heals[6,35]. Endoscopic stenting can be utilized in patients both with and without a stoma, and in combination with percutaneous drainage of an associated cavity[3,35]. There are also small case series with the use of biodegradable stents made of polyethylene coated polyp-p-dioxanone. Reabsorption of the stents occur at 11-12 wk after placement. The use of these stents in combination with other treatment modalities such as fibrin glue, cyanoacrylate, endosponge and clips resulted in closure of 5 leaks in one series[37]. The expense of the biodegradable stents and the fact that they require additional anchoring to prevent migration, may limit their use.

ENDOSCOPIC CLIPPING

Another endoscopic therapy is the application of clips to approximate the edges of the leaking anastomosis. Standard clips such as those used to control bleeding or acute perforation, can be used[38], but these have a low closure force and are limited in size, so are not ideal in closing anastomotic leaks, as the tissue is more scarred and fibrotic, and often irradiated. A newer over the scope clip sytem using a nitinol clip loaded at the tip of the endoscope (OTSC, Ovesco, endoscopy, Tubingen,

Germany) has the benefit of a larger clip area and increased compression, which allows for full thickness closure[39]. The wall is anchored with a dedicated grasper and bowel wall is suctioned as the clip is released[39,40]. In a series of 188 patients with gastrointestinal defects, of which 50 involved the colon and rectum, technical and clinical success with OTSC placement 93.8% and 92.7%, respectively[41]. Twelve of 15 lower gastrointestinal tract leaks healed using OTSC. Success was higher for leaks than for fistulae. Given that the leaks were treated earlier in the postoperative course, this suggests that timing of application may play a role in the successful closure of the defect. A smaller series of colorectal anastomoses showed healing in 86% of 14 leaks treated with OTSC. Only 2 patients had a diverting stoma at the time of the clip placement[39]. Indications for the use of the OTSC system are small defects less than 1.5 cm in size and the absence of a pelvic collection[39]. Percutaneous drains may be utilized to drain a pelvic abscess prior to application of the clip[40]. A diverting stoma is not felt to be necessary for successful treatment[40].

Combinations of endoscopic treatment may also have a role in the treatment of anastomotic leak. Endosponge therapy has been used in combination with clips or transanal suturing to close the defect once the abscess cavity had decreased in size[29]. Fibrin glue injection has also been utilized with endosponge and stenting[9,36]. If one endoscopic modality fails, additional treatment with other modality is an option. An algorithm for endoscopic closure was proposed by Chopra[3]. For those patients with a defect greater than 2 cm, diverting ileostomy with endosponge therapy is preferred. Treatment of choice for defects less than 2 cm in size in the mid rectum is endoscopic stenting. The majority of the stented patients do not require diversion, but may require percutaneous drainage of fluid collections. Fibrin sealant is utilized for tiny (less than 3 mm) defects without abscess. For those with abscess only, percutaneous drainage is preferred[3]. Using this algorithm, 77% of patients had restoration of bowel continuity compared to 57% of surgically managed patients (Hartmann's procedure or diverting ileostomy alone).

Other, newer options for repair of the leaking anastomosis include closure of the defect using a transanal minimally invasive surgery approach and transanal endoscopic microsurgery, but these have been limited to case reports[13,42].

DELAYED TREATMENT OF ANASTOMOTIC LEAK: THE CHRONIC SINUS

Anastomotic sinuses have been shown to develop in up to 36% of anastomotic leaks, resulting in permanent stoma for many patients[43]. A small percentage, up to 8% are asymptomatic and found on contrast enema during workup for ileostomy takedown[2,17]. Up to 63% of patients with chronic anastomotic sinuses will require multiple interventions[5,43]. A "watch and wait" approach has been utilized in the treatment of these chronic sinuses, as some will close with time, including all 10 subclinical leaks in one study over a median of 17 mo[17]. For those that do not heal, there are few options for local treatment, and many will keep their stoma permanently.

Marsupialization of the presacral sinus can be performed utilizing an endoscopic stapler[44], electrocautery, or laparoscopic electrocautery scissors[45]. This allows complete drainage of the cavity with incorporation of the sinus tract into the lumen of the bowel. Enoscopic evaluation of the cavity after marsupialization demonstrates epithelialization of the cavity, and allows for reversal of diverting stomas[44]. This technique has been utilized successfully in colorectal anastomoses as well as ileal pouch anal anastomoses.

Fibrin glue injection, has been utilized successfully in the treatment of chronic presacral sinuses[46] and as a single case report in combination with endoscopic clip placement in the treatment of chronic fistula[38]. This technique may have some value in small, narrow tracts, whereas marsupialization may be utilized in large cavities[43].

Another option is for repair of the chronic sinus through a transanal approach utilizing a flap closure of the defect. Endorectal flap advancement is well described in ileoanal anastomotic sinuses[47,48]. A small series of patients with persistent leaks after surgery for rectal cancer underwent delayed repair using either a flap (4/6 procedures) or direct closure of the defect. Flaps were created after excising and closing the sinus opening, with a broad endorectal flap in 3 cases, and dermal flap in one[49]. Of the 5 patients in the series, 4 had successful local treatment, and were able to have subsequent reversal of their ileostomies, even in the face of prior radiation to the rectum.

For those patients failing conservative or local treatment of the leak, reoperation with resection of the leaking anastomosis and re-anastomosis remains the final treatment option[50]. Patients should be counseled extensively on the risk of reoperation including the possibility of permanent stoma. In one series, all patients were able to have successful reanastomosis. The authors note that this may require full mobilization of the colon, with ligation of the middle colic vessels, and right colon to rectal anastomosis in order to create a tension free anastomosis[50]. Resection and reanastomosis should be considered the treatment of last resort, and patients who fail to respond to more conservative procedures may end up with a permanent stoma as the final "treatment" of their leak.

CONCLUSION

Newer methods that preserve the colorectal anastomosis are being utilized in the treatment of anastomotic leaks, with improvement in restoration of gastrointestinal continuity. Those techniques that involve early closure of

the leak need further investigation on long term outcome and function, but appear to be promising alternatives in the treatment of leak. The use of defunctioning stomas continue to be common, regardless of the method of treatment; dismantling of the anastomosis with Hartmann's procedure is becoming less common, except in the case of complete disruption or ischemic necrosis. Comparison of functional outcome may prompt surgeons towards earlier closure of the leaking anastomosis as opposed to treatment of a chronic leak or sinus, but further prospective and long term studies are needed.

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