Chapter 19
Prevention and Treatment of Major Complications After Left Colon, Sigmoid, and Rectal Surgery

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Leakage of Anastomosis with Fecal Peritonitis

Anastomotic complications after colorectal surgery are unfortunate. The determinants of anastomotic healing include both general patients and disease-related conditions. Malnutrition (especially albumin <2.0 g/dl or recent weight loss >15 %), DM, radiation, shock, blood loss, and immune deficiency are among the many factors for anastomosis leak. These conditions should be taken into account when deciding whether or not to perform a primary anastomosis or an end colostomy and Hartmann's stump or mucous fistula.

Most leaks become apparent between the 5th and 10th postoperative day. Early leaks present with fever, leukocytosis, localized or generalized tenderness, ileus, and sepsis. If a leak is suspected but not apparent, a water-soluble contrast enema is the initial test of choice to identify it. Abdominal CT can help in the identification of collections which are suggestive of leaks. If there are signs of peritonitis with or

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without septic shock, resuscitation, broad-spectrum antibiotics and urgent laparotomy are indicated. If findings show a small leak (<1 cm) and the bowel is healthy, local repair with proximal fecal diversion might be feasible. If ischemia and necrosis ≥1/3 of the circumference are noted, the anastomosis should be resected and either re-done or exteriorized as an end stoma.

Technical considerations are fundamental to a successful anastomosis. Blood supply should be ensured by transecting the mesentery close to the anastomosis and by preserving the vascular arcade supplying the respective area. Anything less than pulsatile bleeding at the cut edge after bowel transaction is unacceptable, and resection should be proximally extended until bleeding is encountered. Fatty tissue should not be cleared more than 5–6 mm from the edge. Tension is another key factor, as it may compromise blood flow.

Tension-free anastomosis in the left colon can be facilitated by:

1. Complete mobilization of the splenic flexure
2. Separation of the omentum from the distal transverse colon and mesocolon
3. High ligation of the inferior mesenteric artery (IMA)
4. Division of the inferior mesenteric vein (IMV) at the lower edge of the pancreas

The bowel ends must be viable. Inflamed or thickened bowel must be resected until it is soft and thin colon is encountered. Single or double layer, interrupted or continuous sutured, or manual or stapled anastomotic techniques are all acceptable variants. Most anastomotic leaks occur after rectosigmoid surgeries with low anastomosis. The anastomosis can be tested by occluding and submerging the anastomosis under saline while insufflating air through the rectum. The absence of bubbles confirms anastomotic integrity.

A Cochrane data base review [1] of 1,233 patients enrolled in randomized clinical trials (RCTs) compared stapled and handsewn colorectal anastomosis. There was insufficient evidence to demonstrate any superiority of one technique over the other, regardless of the level of the colorectal anastomosis.

Intraoperative flexible sigmoidoscopy is a valuable tool during left colon surgeries to assess the anastomosis for air leaks or anastomotic bleeding. This intraoperative procedure has been studied to assess its usefulness in preventing anastomotic leaks and bleeding after colorectal surgery. In a study of patients undergoing colorectal resection with distal anastomosis [2], 107 patients who underwent routine intraoperative endoscopy (RIOE) were compared to 137 who underwent selective intraoperative endoscopy (SIOE). The results showed more postoperative anastomotic complications including staple line bleeding and anastomotic leakage in the SIOE as compared to the RIOE group.

The long-term oncological impact after anastomotic leaks was recently reviewed by Mirnezami et al. [3]. He performed a meta-analysis of 21,902 patients with anastomotic leakage (AL) after restorative surgery for colorectal cancer. They found an OR (OR) of 2.9 for developing a local recurrence for articles describing rectal anastomoses. Those describing both colon and rectal anastomoses showed an OR of 2.9. Distant recurrence and long-term cancer-specific mortality after AL showed an OR 1.38 and 1.75, respectively.

Intra-abdominal Abscess

Intra-abdominal abscess can result from anastomotic leaks, enterotomies, or spillage from bowel contents at the time of the surgery. Its incidence varies. Eberhardt et al. [4] analyzed the impact of leaks and intra-abdominal abscesses on cancer recurrence and survival in patients undergoing resections for colorectal cancer. Besides concluding that neither leaks nor abscesses are associated with worsened survival or recurrence at 5 years, they showed an incidence of intra-abdominal abscess of 38.9 % for colon cancer patients vs. 14.4 % for the rectal cancer group. Symptoms are highly variable. They may present 5–7 days after surgery with persistent abdominal or pelvic pain, focal tenderness, spiking fever, prolonged ileus, and/or leukocytosis. Intermittent polymicrobial bacteremia suggests an intra-abdominal abscess in patients who have had abdominal surgery. If an abscess is located deep in the pelvis, classic signs and symptoms might be absent. Abdominal CT scan with IV, oral, and possible rectal contrast is the modality of choice as it provides more than a 95 % diagnostic accuracy rate. A fluid collection with a thickened enhancing rim and surrounding inflammatory stranding is diagnostic.

Most intra-abdominal abscesses can be percutaneously drained under CT guidance with an efficacy of 65–90 % depending on size, complexity, etiology, and microbial flora.

Leakage of Distal Rectal Anastomosis

The incidence of leaks in left side colorectal anastomosis varies according to the distance of anastomosis from anal verge. Vignali et al. [5] reported an overall leak rate of 2.9 % in a series of 1,014 colorectal anastomosis. Eight percent of low anastomosis <7 cm from anal verge leaked compared to 1 % of anastomosis >7 cm from anal verge. Ileal pouch-anal anastomosis has the greatest risk for leak with a reported incidence of 5–10 %. Other identified risk factors are male gender, increased BMI, previous surgery, distal rectal cancer [6], albumin <3.5 g/dl, operative time >200 min, blood loss >200 cc, transfusion requirement [7], and "after hours" construction of anastomosis [8] . As previously mentioned technical factors included an ample blood supply and tension-free anastomosis. A leak may present in 3 ways:

Dramatic Early Leak

Presents with acute abdominal pain, distension, fever, tachycardia, diffuse peritonitis, oliguria, and shock within several days of surgery. These symptoms usually predict a large uncontained leak.

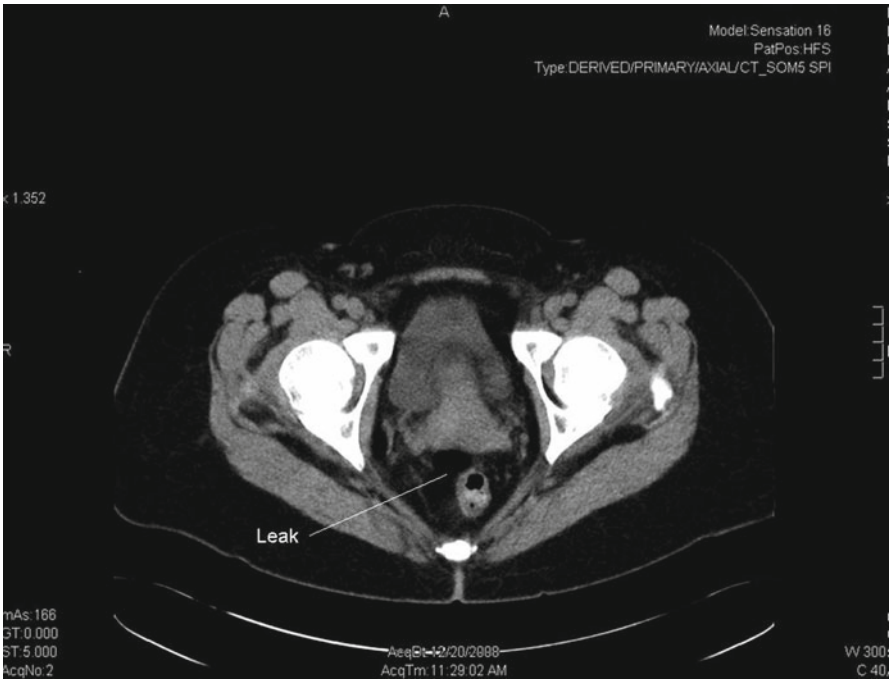

Fig. 19.1 Anastomotic leak following distal colorectal anastomosis

Subtle Insidious Leak

Can present with mild leukocytosis, protracted ileus, and failure to thrive. Such leaks typically present 5–14 days following surgery; by this time adhesions have formed and contain the process. Because of nonspecific signs, detection may be difficult.

Asymptomatic Leak

Is usually harmless, is incidentally discovered by radiologic studies weeks to months after surgery, and consists of a walled-off sinus. Treatment is rarely necessary.

Initial management in patients without signs of peritonitis is aimed to identify and localize the process. Water-soluble enema is usually the first test ordered, although CT scan with triple contrast (oral, intravenous, and rectal) has become the imaging modality of choice (Fig. 19.1). During this period, an infectious process may be difficult to differentiate from acute postoperative inflammation and fluid collection. Collections >4 cm can often be drained via a transabdominal, transgluteal, or transanal image-guided catheter. If the abscess cavity is small

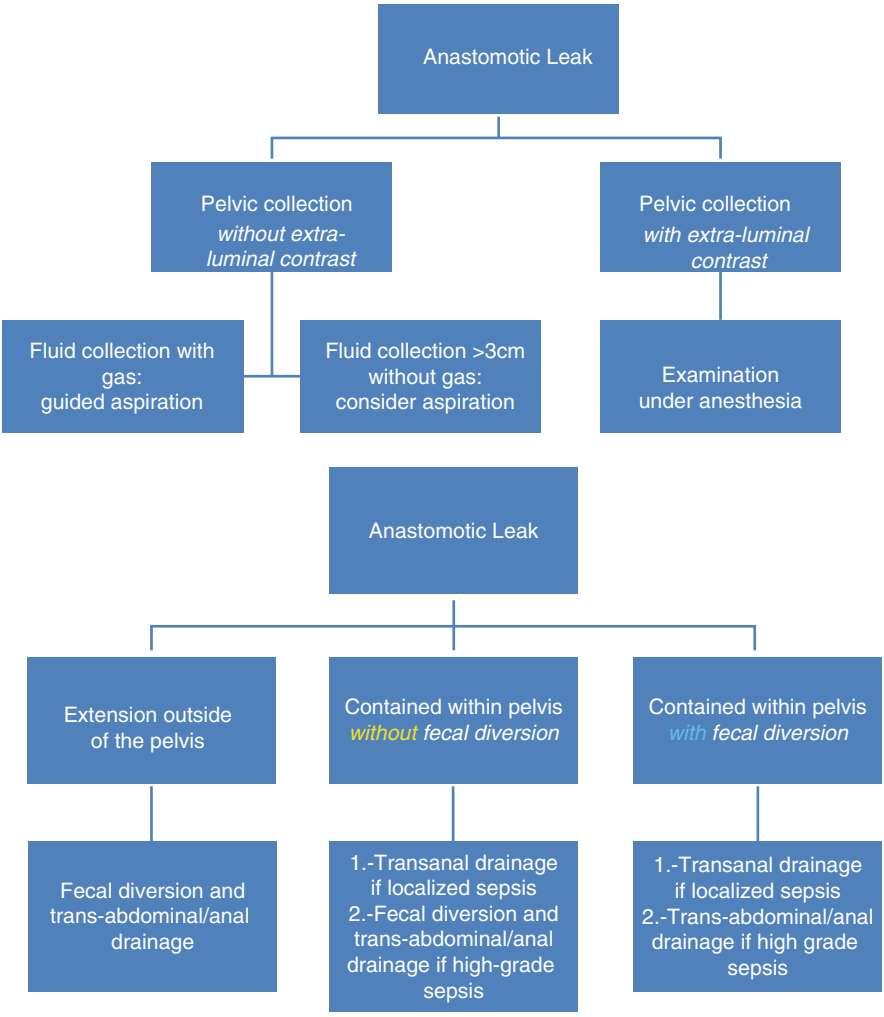

Fig. 19.2 Standardized algorithms for management of anastomotic leaks (Adapted from Phitayakorn et al. [9])

and contrast flows freely back into the lumen, conservative management with intravenous antibiotics and bowel rest may suffice. An algorithm to manage leaks has been proposed [9] Fig. 19.2.

A vacuum-assisted endosponge is a new approach to treat patients with anastomotic dehiscence following anterior resection for rectal cancer. It has been shown useful in treating pelvic sepsis following anastomotic dehiscence or rectal stump insufficiency [10]. Management of persistent sinuses involves observation, sinus unroofing, debridement, and instillation of fibrin glue.

Pelvic Drains

Pelvic drains have not shown to prevent anastomotic leakage. In fact a Cochrane database meta-analysis [11] showed that there is insufficient evidence that routine drainage after colorectal anastomoses prevents anastomotic or any other complications. However, still some controversies exist. Some studies have shown it reduces clinical anastomotic leakage and that if kept in place it may reduce the need of surgery in selected patients [12]. In spite of no agreed benefit, the senior author routinely drains distal colorectal and coloanal anastomosis.

Fecal Diversion

A recent review [13] of diverting stomas after low anterior resection showed that they seemed to be useful in preventing the adverse sequelae of anastomotic leakage and consequent urgent reoperations. However, a proximal diverting stoma does not seem to offer advantage in terms of 30 days or long-term mortality. It is recommended after construction of distal colorectal and coloanal anastomosis following neoadjuvant therapy for rectal carcinoma.

However, diversion should be considered for any high-risk anastomosis including colorectal anastomosis <6 cm from anal verge and coloanal anastomosis. General conditions including malnutrition, immunosuppression, peritonitis, or pelvic sepsis should also be considered a strong indication for diversion.

Presacral Abscess

Presacral abscess is reported to occur after TME (total mesorectal excision) for rectal cancer in 10 % of patients [14]. It might also spontaneously occur secondary to Crohn's disease. The large defect created by the total mesorectal excision (TME) is filled by the neorectum or the colonic J pouch. In case of a leak, this cavity may turn into an abscess. Patients in poor general health, who have received neoadjuvant radiation therapy ($p < 0.003$), or who have large tumors (median 38 mm [$p < 0.04$]) are at risk for developing a presacral abscess [14]. The clinical picture is sometimes insidious; thus, vigilance and clinical suspicion are important as a delay in diagnosis may increase morbidity. Collections can be drained via transgluteal approach by CT guidance, transrectal approach under ultrasonography (US) guidance, or a dorsal transsacral approach. Probably the most promising indication for vacuum-assisted closure is the treatment of para-anastomotic presacral abscesses following anastomotic leakage after total mesorectal excision. In a multicenter [15] study which aimed to evaluate the use and success of the endosponge for treating the presacral cavity due to leakage, the authors concluded that the success of this treatment is not

dependent on the time interval between surgery and treatment. Nine of their 16 patients (56 %) achieved definite resolution. Six of the 8 patients achieved resolution when the sponge was placed within 6 weeks of surgery compared to only 3 out of 8 patients (38 %) in whom it was placed at a later time point.

Stenosis of the Anastomosis After Low Anterior Resection

Benign strictures after low anterior resection (LAR) are a common complication with an incidence ranging from 5.8 to 22 %. They can be defined as a narrowing of the anastomosis of less than 12 mm, thus preventing the passage of a 12 mm sigmoidoscope. Symptoms vary according to the degree of stenosis, from asymptomatic to constipation, tenesmus, abdominal pain, and even large bowel obstruction. Risk factors promoting this problem include ischemia, dehiscence, and radiation therapy. In a study of 24 patients [16], symptoms developed at a mean of 6.8 (range3 to 19) months. Diagnosis is clinically suspected and then subsequently confirmed by a water-soluble contrast enema and endoscopy. A variety of modalities of treatment have been reported, although therapy is based on 3 main procedures: (1) dilation with finger, anal dilators, or endoscopy, (2) electroincision, and (3) resection and reanastomosis. A method utilizing a transanal circular stapler has also been reported [17, 18]. The most commonly used method is digital dilation although the most common method reported in the literature is endoscopic dilation. A recent study [19] showed no difference with regarding the number of dilations needed, stenosis-free time intervals, and complications between endoscopic balloon dilation when compared to Eder-Puestow metal olive dilators. An indisputable advantage regarding the cost favors the Eder-Puestow technique (22.30 Euros vs. 680 Euros; $p < 0.001$). Surgical resection with reanastomosis is associated with a more demanding procedure with higher morbidity and mortality than endoscopic procedures and is usually performed after failure of the later.

Denoya et al. [20] reviewed the records of 16 patients who developed an anastomotic stricture after colorectal resection and anastomosis. Results showed that 94 % of patients had incomplete left colonic mobilization. The authors concluded that lack of complete mobilization of the left colon is associated with anastomotic stricture formation.

Stenosis of Anastomosis After Sigmoid Resection

Anastomotic strictures after sigmoid resection are an interesting topic although reported series are heterogeneous due to patient selection. The incidence of symptomatic anastomosis stricture with double-stapling technique has been reported as 18 % [21]. Stenosis can present several months after surgery and may occur after primary resection and anastomosis or after Hartmann's reversal. Fistula, leak, or

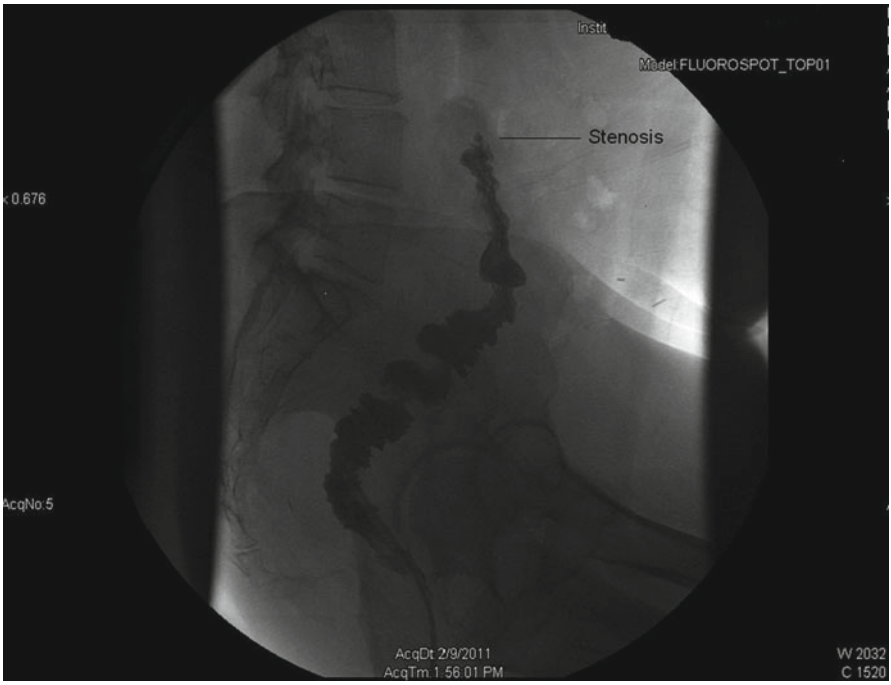

Fig. 19.3 Stenosis after sigmoid resection

inclusion of remnants of sigmoid in the anastomosis might be related to its development. Arterial preservation, double- or single-stapled techniques, and stapler diameter do not seem to influence the risk of anastomotic stenosis. Symptoms include lower abdominal pain when passing gas or stool, abdominal distension, fractional evacuation, constipation, and/or ribbonlike stools. Diagnostic evaluation includes contrast enema (Fig. 19.3) and flexible sigmoidoscopy. Ambrosetti reported a mean diameter of 7 mm (4–10) in 22 patients with stenosis after sigmoid resection for diverticular disease [21]. Management involves endoscopic balloon dilatation as the initial option when the stenosis is short, which is the most common presentation. Success rate ranges between 59 and 88 % after an average of 2.5 sessions (1–13) [22]. If anastomosis is short and needs to be re-done, surgery can be simplified by the use of a circular stapler introducing the anvil through a proximal enterotomy. Anastomosis resection and reanastomosis is reserved for those patients who fail balloon dilation or who have a long stricture. Re-resection is associated with increased morbidity and mortality. Ureteral stents should be placed to help in the identification of the ureters. Although this practice does not decrease the ureteral injury rate, it helps with its identification and management.

Boutros et al. [23] reported 9 ureteral injuries (23 %) out of 3,950 patients who underwent colorectal surgery. In 1,038 patients (26 %) ureteral stent placement (USP) was performed. Laparoscopy and pelvic dissection were more commonly

Table 19.1 Leakage of ileoanal pouch anastomosis

Year	Author	*N* patients enrolled	% Leakage IAA
1995	Fazio	1,005	Early 2 % Late 0.9 %
1997	Bauer	392	10.7 %
1999	Billeveau	239	Early 3.3 %
2003	Fabrizio	391	Early 3.3 %
2003	Michalessi	391	6.4 %
2005	Krausz	174	4.8 %
2007	Manoj	141	[b]With abscess 2 % [b]Without abscess 3.1 %
2007	Von Roon	189	12.6 %
[a]2009	Rink	131	0.76 %

[a]Preserving mesorectal tissue. Follow-up at a median of 85 (14–169) months
[b]All early leaks. Early = within 30 days after surgery

performed in this group of patients ($p<0.002$ and $p<0.001$, respectively). They were also significantly older ($p<0.01$), had an increased BMI ($p<0.02$), a diagnosis of diverticular disease, Crohn's disease, fistula, and a history of radiation therapy ($p<0.001$ each). All ureteral injuries (UI) were recognized intraoperatively. Eight of them occurred in the USP group. The authors concluded that the use of prophylactic USP may aid in the intraoperatively UI identification as well as promptly and successful repair.

The last meta-analysis comparing open sigmoid resection (OPR) vs. laparoscopic sigmoid resection (LSR) [24] showed no differences in incidence of strictures. This type of stricture is avoidable by performing a complete distal sigmoid resection and anastomosis of the proximal colon to the rectum rather than any residual sigmoid colon [25].

Leakage of an Ileoanal Pouch Anastomosis

The ileal pouch-anal anastomosis (IPAA) has become the standard of care for patients with mucosal ulcerative colitis (MUC) and familial adenomatous polyposis (FAP) who require total proctocolectomy (TPC) and do not wish a permanent ileostomy. Leakages at the ileoanal anastomosis (IAA) are associated with the development of pelvic or abdominal sepsis and subsequently with pouch-cutaneous or pouch-vaginal fistulas. Handsewn anastomosis has been reported to be a risk factor for its development; this fact may be due to increased tissue trauma, leading to poor healing or increased tension at the anastomosis resulting in ischemia [26]. Tension in the anastomosis and current steroid use has also been identified as risk factors [27]. The incidence of this complication is shown in Table 19.1.

Ileoanal pouch leaks usually present within 30 days after surgery. Raval at al. [29] showed a median time from pouch construction to the diagnosis of pouch leak

of 19 (1–336) days. In 68 % of patients, the leak was recognized within 30 days of surgery. Symptoms included fever (67 %), abdominoperineal pain (38 %), and abdominal abscess (6 %). The diagnosis is made usually by radiologic studies including pouchogram and pelvic CT, although occasionally, endoscopy is the method of identification. Proximal diversion is a matter of debate since recent data show that it can be safely omitted in selected patients. A recent survey among ASCRS members [28] concluded that the majority of surgeons create a temporary loop ileostomy at the time of ileal pouch-anal anastomosis for ulcerative colitis. Different approaches for treatment have been proposed depending upon whether or not the patient is diverted. Non-diverted patients with peritonitis need immediate diversion. Non-diverted patients who develop a leak might be initially treated without diversion. In a recent study [29] 80 % (33/42) of patients were successfully treated without diversion. A trial of conservative therapy with pouch drainage, antibiotics, and abscess drainage can be attempted before surgery. If leak persists after a week, diversion is undoubtedly needed. Leaks identified in diverted patients can be managed depending on the severity of the leak. Local attempts may include debridement with installation of fibrin glue and pouch advancement. The latter method consists of mobilizing the pouch transperineally or utilizing a combined abdominoperineal approach. Regardless of the technical approach selected at the time of pouch advancement, infected tissue must be excised and granulation tissue curetted. Omentopexy to separate tissues can be performed. Pouch reconstruction or excision may be necessary. An algorithm has been proposed for the management of leak after IPAA Fig. 19.4.

Late Ileoanal Pouch Fistulas

Timewise ileoanal pouch fistulas can be classified according to its appearance after surgery as either early (<12 months) or late (>12 months). The etiology in late developing fistulas although still poorly understood might be related to undiagnosed Crohn's disease. However, leaks, pelvic sepsis, experience, and techniques have been linked to the development of early fistulas. In general the incidence of pouch fistulas varies from 4 to 16 %. Nisar J et al. [30] classified them according to their severity in major and minor fistulas. Major fistulas including complex fistulas which extend to or originate from 2 or more sites: abdominal wall, vagina, peritoneal cavity, or urological structures. Minor fistulas involve the buttocks, perineal or perianal skin, or presacral space. They concluded that the presence of major fistulas is associated with pouch failure. Fistulas can present as external fistulas (most common presentation), with pelvic or abdominal sepsis and/or pelvic or abdominal pain. The diagnosis can be made clinically or with imaging studies. Time and frequency distribution vary and are shown in Fig. 19.5.

Treatment should be individualized. The decision to perform a specific procedure is based on the etiology and anatomy of the problem, the surgeon's preference, and patient-related factors. Fistulas, leaks, and strictures are the most common

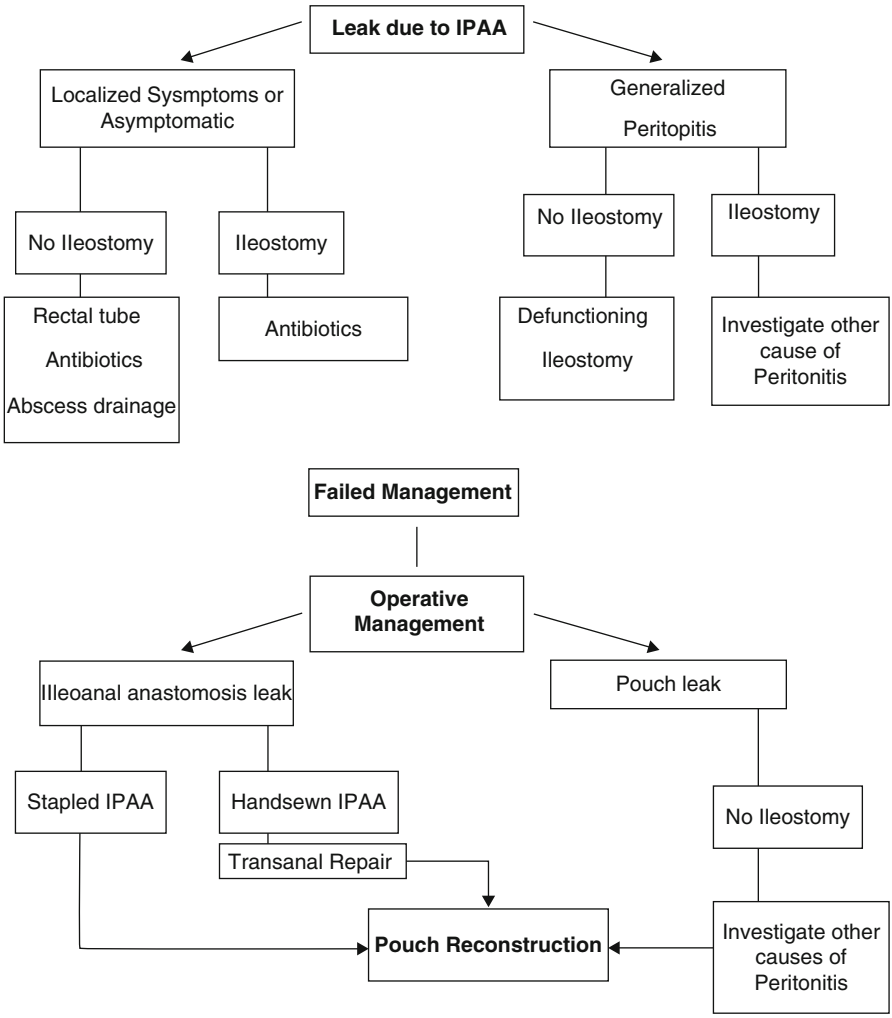

Fig. 19.4 Suggested algorithm for the management of IPAA by Raval et al. [29]

causes for redo abdominal pouch surgery. Drainage, correction of strictures, and loop ileostomy are usually the first steps. Local repair if feasible includes endoanal ileal advancement flap, pouch advancement, and muscle interposition techniques. Salvage pouch surgery can be safe and successful in avoiding pouch excision and permanent ileostomy. Pouch salvage procedures are mostly performed on early appearing fistulas, whereas anoperineal procedures are most common performed on their late counterparts.

In an effort to assess outcomes and predictors of success after re-operative ileo-anal pouch surgery and pouch excision, Shawki et al. [31] reviewed the records of 51 and 17 patients, respectively. The re-operative group consisted of patients with

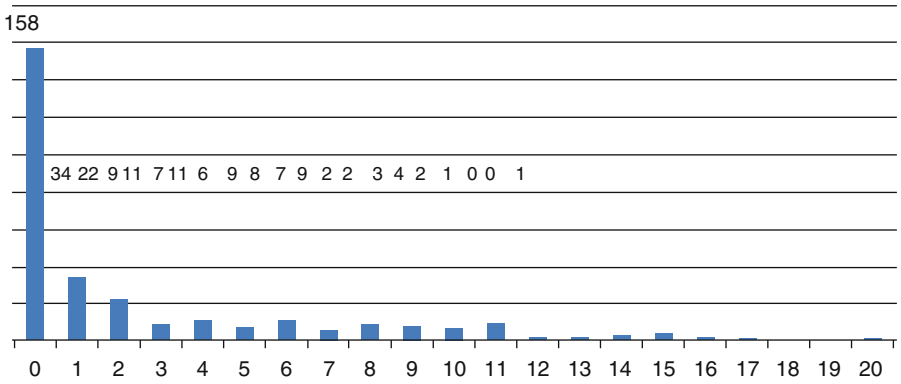

Fig. 19.5 Time of onset of pouch-related fistulas after ileal pouch-anal anastomosis creation. Number of patients and years provided

diagnosis of ulcerative colitis, (44) familial adenomatous polyposis (6), and indeterminate colitis (1). While in this group 38 (74.4 %) of patients had a successful outcome, Crohn's disease was diagnosed in more than half of the patients who underwent primary pouch excision. In general prevention of this complication is aimed to reduce contamination and tension in the pouch.

Rectovaginal Fistula After Low Anterior Resection

Rectovaginal fistulas (RVFs) are suspected with symptoms of flatus and/or malodorous discharge per vagina, incontinence episodes, recurrent, urinary tract infections, and vaginitis. They are not a common complication after rectal surgery for cancer and can present early or late in the postoperative course. RVFs have been reported to occur in 0.9–2.9 % of patients after LAR (low anterior resection). The early variant has been classically associated with the involvement of the posterior vaginal wall in the staple line at the moment of firing the circular stapler and therefore depends on the individual surgeon's experience and skills using the stapler. Recurrent tumor, radiation history, and devascularized vagina in close proximity to the anastomosis have also been proposed as risk factors [32]. The delayed variant as reported by Shin et al. usually presents after 30 days [33]; they studied 1,838 patients who underwent sphincter-preserving surgery for rectal cancer to investigate the characteristics of those who developed delayed anastomotic leaking (DAL). They found 10 delayed anastomotic-vaginal fistulas (0.54 %) which were detected at a median of 37 postoperative days. Female gender, low colorectal anastomosis (<4 cm from anal verge), and a history of preoperative chemoradiation therapy were independent risk factors for the development of DAL. The authors proposed that leakage at the colorectal anastomosis with subsequent tracking to the vaginal wall is a more plausible explanation than incorporating the posterior vaginal wall in the

Table 19.2 Surgical management of RVF after LAR

	Success rate
A. Management with diversion ($n=28$)	
1. Diversion only ($n=17$)	35 %
2. Diversion with staged endoanal repair ($n=8$)	62 %
3. Diversion with reanastomosis (3)	100 %
B. Management without diversion	
1. Endoanal repairs	66 %
2. Reanastomosis	100 %
C. Pull-through operation ($n=2$)	
D. Abdominal perineal resection ($n=3$)	

Adapted from Rex Jr. et al. [32]

anastomosis since no vaginal tissue was found in the doughnut rings from the EEA stapler. Diagnosis is made clinically and by physical examination. In an earlier study by Rex et al. [32], a questionnaire was sent to 990 members of the American Society of Colon and Rectal Surgery of which 300 (30 %) surgeons answered. Of 57 RVFs/year identified, only 4 occurred after handsewn anastomosis. In this study fistulas presented at an average of 20 days after surgery (1–90). The management by the respondents is outlined in Table 19.2.

Overall conservative therapy should be considered first before diversion or surgical repair especially if the fistula is small. Transvaginal approach with simple closure or advancement flap has also been reported by some authors. Prevention of this complication aims to the need of dissecting free the rectum from the posterior wall of the vagina and to angle the stapler so that the vagina is kept out of the staple line. Good visualization of the operative field in the deep pelvis is mandatory, and a simple digital vaginal examination before firing the stapler has been found to prevent this complication.

Infection Perineal Wound After APR

Unhealed wounds typically occur more frequently in the perineal region after APR with an incidence of 11–50 %. Neoadjuvant radiation therapy especially including the perineum, prolonged operative time, intraoperative hypothermia, fecal contamination during perineal dissection [34], DM, and increased BMI [35] have been identified as risk factors. Besides good surgical technique, good blood supply, nutritional status, and smoking may be the only modifiable factors at the time of proctectomy. Avoiding the external sphincter during intersphincteric dissection has been proposed for benign diseases. This maneuver allows better hemostasis and multiple layer closure. The use of drains has been associated with an improved rate of perineal healing, especially transabdominal drains compared to perineal drains; they should be kept 2–5 days. Perineal muscle flaps have provided little improvement in perineal wound healing. If infection occurs, the skin should be opened to allow drainage, and a program of wet to dry packing should be started followed by a

vacuum-assisted closure device. If perineal sinus develops, wound debridement and myocutaneous flap reconstruction with gracilis, inferior gluteus, or rectus abdominis muscle might ultimately be necessary.

Perineal Hernia

A perineal hernia is a protrusion of intra-abdominal contents through a pelvic floor defect as a result of surgery. They reportedly occur in 0.1–7 % of patients after APR, although most of them are asymptomatic and <1 % needs repair. Symptomatic herniation is estimated to be <1 %. Coccygectomy, previous hysterectomy, pelvic irradiation, excessive length of small bowel mesentery, large pelvis, failure to close perineal defect, and excision of the levators seem to be risk factors. Bulging feeling, pain when sitting, and discomfort in the perineum are sometimes referred by patients. These symptoms can be controlled with a T bandage or a firm pair of underpants. The diagnosis is usually made clinically and subsequently confirmed with imaging modalities. Surgical management is based on the same principle of other hernias repair. The aim is to reconstruct the pelvic floor using synthetic mesh or autogenous tissue such as grafts or muscle flaps. The operative approach can be perineal, abdominal, or a combination of both. The perineal approach seems to be preferable since the abdominal cavity is not entered although all approaches seem to have similar results. The transabdominal approach is reserved for patients with recurrent hernias or those who need abdominal entry for any reason. This technique allows suturing a mesh to the bony pelvis under direct vision. Recently the laparoscopic transabdominal approach has been described. However, it can be difficult to approach the levators after cancer surgery since the defect may be quite large. Using the perineal approach, a mesh can be secured to the musculofascial tissue or the periosteum of sacrum (Fig. 19.6a, b). Care should be taken to avoid large vessels. Ureteral stents and an obturator in the vagina can be preoperatively inserted to aid in these structures identification. Its main disadvantage is the limited exposure and higher rate of hernia recurrence. So et al. [36] reported an incidence of 0.62 % following APR and a recurrence of 16 % after 12-month follow-up (all had undergone perineal repair). It may be also advisable to work combined with plastic surgery for the transposition of healthy tissue to fill large anatomical defects.

Abscesses After Hartmann Procedure

Hartmann’s procedure may be performed when making a colorectal anastomosis is considered unsafe. Thus, not surprisingly Hartmann's operation is associated with high morbidity and mortality if severe peritonitis of sigmoid diverticular origin occurs. Unfortunately the rectal stump may postoperatively leak.

This complication is not frequently reported in the literature. Symptoms are usually related to intra-abdominal infection. Cherukuri et al. [37] reported 4 leaks

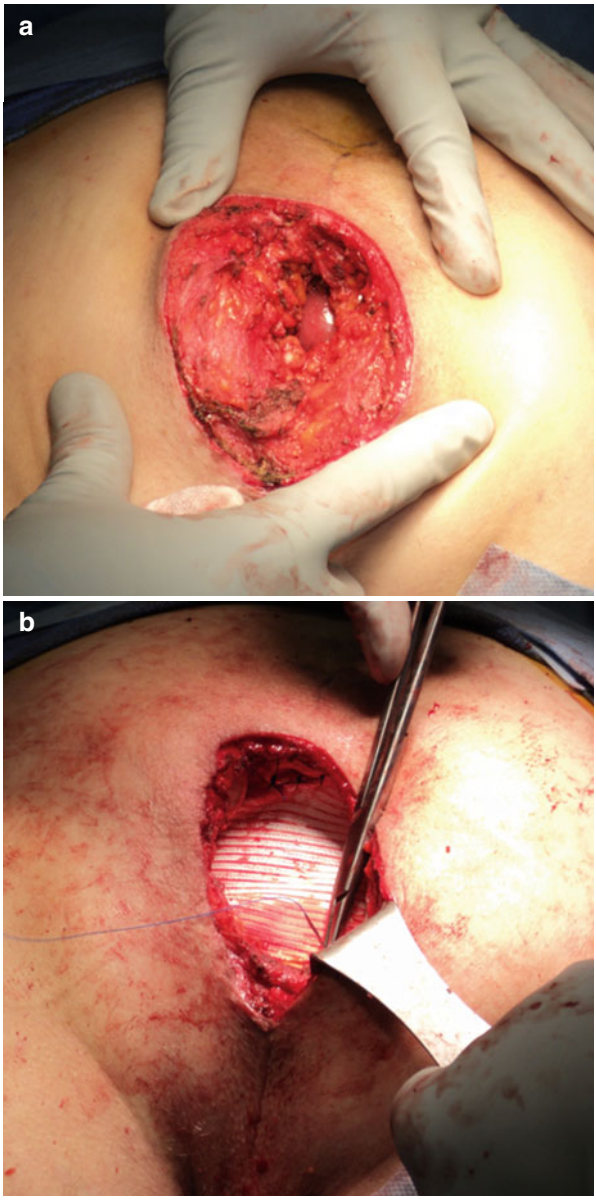

Fig. 19.6 (**a**) Perineal hernia. (**b**) Perineal hernia with mesh in place (Courtesy of Cleveland Clinic Florida)

(2 symptomatic) in 84 patients who underwent contrast-enhanced radiography of the pouch after Hartmann's procedure to evaluate for postoperative abnormalities. Schein et al. [38] have reported so far the biggest series of patients with clinical leak of the rectal stump.

Management basically consists of a washout with or without refashioning of the rectal stump. The washout system is based on 2 observations: leaving the rectal

stump open and irrigate it before the repair, avoiding further contamination of the abdominal cavity.

A recent review [39] of 15 studies to compare primary resection with anastomosis vs. Hartmann's procedure in nonelective surgery for diverticulitis included 963 patients, 57 % following primary resection with anastomoses and 43 % Hartmann's procedures. The overall mortality was significantly reduced with primary resection and anastomosis (4.9 vs. 15.1 %; odds ratio = 0.41). Leaks from the rectal stump were not included in the study, which again may be due to the relative infrequency of this problem.

Some surgeons fashion a mucus fistula instead of Hartmann's procedure in an effort to avoid this theoretical complication.

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