Complications of Perineal Surgery

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ABSTRACT

Anorectal procedures are associated with significant morbidity and include complications of the perineum, which can cause substantial difficulty for the patient. Prevention of perineal complications is key, but many anorectal procedures are performed in difficult situations such as large bulky tumors or inflammatory bowel diseases. In this review, the authors outline many of the complications encountered following both simple and complex anorectal procedures while highlighting best evidence for treatment.

KEYWORDS: Perineal complication, anorectal surgery, morbidity

Objectives: On completion of this article the reader should be able to list the perineal complications following anorectal surgery and summarize the management of perineal complications.

Surgical incisions on the perineum are often necessary for simple anorectal procedures as well as for more complex procedures such as proctectomy for both benign and malignant indications. Although these procedures are routinely performed, they are associated with a variety of complications. It is therefore important for surgeons to review the complications associated with perineal surgery and understand methods to both prevent and treat these difficult issues. Thus, our review will focus on risk factors of perineal complications, methods to prevent these complications, and management strategies.

WOUND ISSUES

Wound complications are not only very common, but they are also difficult to avoid and sometimes very difficult to correct. These issues can be as simple as mild wound separation to chronically infected cavities or fistulae and sinuses. Not surprisingly, the rates of reported perineal wound complications following proctectomy or other anorectal procedures vary considerably

according to the indication for the procedure, patient selection, and institution. In general, rates of surgical site infection of the perineum, in particular, superficial wound infections vary as much as rates of “major” wound complications, defined as delayed healing for greater than one month or need for reoperation (Table 1).^{1–12}

Risk factors associated with an increased likelihood of perineal wound infections have been well studied. Unfortunately, given the large differences in patient populations and the retrospective nature of these studies, there is relative lack of agreement as to the importance of each risk factor. In terms of patient-related factors, a retrospective review of 153 patients following abdominal perineal resection (APR) demonstrated more wound complications in those patients with increased body mass index and those with diabetes.¹ Others have sought to define the role of inflammatory bowel disease (IBD)^{2,13,14} or rectal cancer^{3,15} on delayed perineal wound healing. In those patients with IBD, one report identified younger age to be a risk factor for poor perineal healing,¹⁶ yet others report no association with age.^{3,4} Two studies demonstrated an association between

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Perioperative Management and Anesthesia; Guest Editor, W. Brian Sweeney, M.D.

Clin Colon Rectal Surg 2009;22:51–59. Copyright © 2009 by Thieme Medical Publishers, Inc., 333 Seventh Avenue, New York, NY 10001, USA. Tel: +1(212) 584-4662.
DOI 10.1055/s-0029-1202887. ISSN 1531-0043.

Table 1 Rates of Wound Complications Following Abdominal Perineal Resection in Selected Studies

Study		% Rectal Cancer	Percentage
Ferrari & DenBesten ⁷	Major	0	14
Manjoney et al ²	Major	67	23
Tompkins & Warshaw ⁸		17	5
Farid & O'Connell ⁹	Major	89	9
Scheidebach et al ¹⁰		100	25
Frye et al ⁵		92	14
Chessin et al ¹¹		100	12
Christian et al ¹	Major	78	14
	Minor	82	24
Murrell et al ⁶	Major	70	5
Bullard et al ³	Major	100	35
	Minor	100	6
Chadwick et al ⁴		100	
	Infection		17
	Dehiscence		27
	Sinus		10
Wu et al ¹² (laparoscopic)	Major	67	14

perineal wound issues and male sex^{13,17}; another study found an association with female sex.¹⁸ A smaller series found no association for wound complications in patients with diabetes, tobacco use, gender, or steroid use, but did find an association with heavy alcohol use,¹⁵ indicating a role for nutritional status.¹⁹

Patients with IBD are considered to be at greatest risk for wound complications following proctectomy. Older reports confirm that successful long-term perineal wound healing was less likely in patients with IBD.^{20–23} As expected, patients with Crohn's disease requiring APR have considerable perianal fibrosis, fistulae, and nonhealing wounds that increase the difficulty of rectal resection and the likelihood of wound contamination. However, in today's era of improved medical management and greater use of ileal pouch anal-anastomosis for IBD, there are fewer reports of APR for intractable IBD. The small series that do exist have found either no increase in complications,^{5,6} or an increase only in minor wound complications.¹ There is less debate in terms of the increased perineal morbidity of APR, specifically when the indication is recurrent squamous cell carcinoma of the anus. Rates of perineal wound complications range from 36 to 80% when wound closure is performed without the use of myocutaneous flaps.^{24–27} Nevertheless, even with the adjunctive use of flaps for reconstruction, the entire spectrum of wound complication rate has been reported (0 to 100%).^{27–29}

In terms of treatment-related factors, preoperative radiation is consistently related to the development of wound complications.³⁰ Both retrospective⁴ and randomized clinical trials^{31–35} have demonstrated a two- to threefold increase in perineal complications

compared with treatment without radiotherapy. Other, retrospective studies lacking any adjustment for the method, timing, and dose of radiation therapy have also demonstrated a detrimental effect from preoperative radiation on perineal wound infections.^{3,15,36} Although some studies have failed to show any correlation between radiation and wound outcomes,^{37–39} the reason for these apparent discordant findings is likely due to patient differences and differing specifics of the radiation therapy. For example, in the Dutch Total Mesorectal Excision Trial, those who had the perineum excluded from the field of radiation were less likely to develop problems with perineal wound healing.³³ With respect to timing of radiation, only one trial has specifically randomized patients to either short-course or long-course preoperative radiation and found no statistical difference in perineal wound healing between the two groups.⁴⁰

When preoperative radiation therapy is administered in conjunction with radical operative resection and intraoperative radiation, the rates of perineal wound complications and delayed healing are significant, ranging between 46 to 65%.^{30,41–43} Yet when intraoperative radiation is administered remotely from previous radiation or 4 to 6 weeks after external beam radiotherapy in cases of recurrent rectal cancer, much lower rates of perineal wound complications (7 to 9%) are reported, suggesting a benefit with delayed surgery following radiation.^{44,45} This improvement with waiting may be related to the ability of the tissues to heal after completion of radiation therapy.

Other treatment-related factors such as the administration of chemotherapy do not appear to influence rates of perineal wound healing.⁴⁶ Newer chemotherapeutic agents have not been extensively studied and their effect on wound healing is uncertain. There have been case reports implicating the monoclonal antibody against vascular endothelial growth factor, bevacizumab, in late-onset anastomotic complications and fistulae.^{47–49} However, further data are needed before definitive conclusions can be drawn about these newer chemotherapeutic agents.

Prevention

In terms of prevention of perineal wound complications, surgical technique and limited patient-related factors such as nutritional status and smoking may be the only modifiable factors at the time of proctectomy. However, technique-related factors such as intraoperative contamination with pus or feces are best avoided.^{21,22} Bleeding complications are also importantly avoided to control the local environment of the wound, yet the rate of bleeding-related complications following APR is low enough (2 to 11%)^{50–52} that bleeding has not been directly linked to nonhealing wounds. Some advocate an intersphincteric dissection with proctectomy for benign disease, to spare

the external sphincters, maintain good hemostasis, and allow for a multilayer perineal closure.^{7,53}

The impetus behind drain use in the pelvis is to eliminate a potential dead space after proctectomy where fluid or blood may collect and potentially become infected. Closure of the pelvic peritoneum had been advocated to eliminate this space, but most authors report no additional wound benefits when this technique is employed.^{54,55} However, the use of drains has consistently been associated with improved rates of perineal healing.⁵⁶ A randomized trial comparing closed and passive suction presacral drains revealed significant improvement in healing with the use of closed suction drains at 1 month, but no difference in healing rates at 3, 6, and 12 months.⁵¹

The location of drains (either placed transabdominal or transperineal) is an important consideration. Studies demonstrate that patients with transabdominal drains as compared with perineal drains have fewer perineal infections and better rates of perineal wound healing.^{56,57} Another smaller randomized trial found no difference in complication rates depending on the location of the drain.⁵⁸ Although most would agree that patients prefer abdominal drains over perineal drain for comfort purposes, some argue that the use of drains that exit the perineum more effectively drain the resulting dead space following APR.⁵⁹

It is clear that drains should be brought out lateral to the wound because of the higher association with nonhealing when drains exit through the incision.¹⁷ In terms of drain irrigation, a randomized trial demonstrated that continuous irrigation through pelvic drains did not reduce the risk of perineal wound infections when compared with continuous suction drainage.⁶⁰ The total time for pelvic drainage remains relatively unstudied and no specific time course has been proven to decrease wound complications. Although excellent results have been achieved with drain removal after 2 to 5 days,^{8,52} some have advocated drainage for periods as long as 10 days to theoretically minimize the risk of postoperative fluid collections.⁵¹

There is relative agreement that in uncomplicated proctectomy, without gross contamination or diffuse hemorrhage, primary closure of the perineal incision is appropriate and not associated with an increase in wound complications.^{6,22,50,61} Even in the presence of fecal spillage into the operative field, one study suggested that primary closure remains a satisfactory method of closure with relative quick healing.⁶² Although this study has been criticized because of the high rate (25%) of local complications in the primary closure group (e.g., perineal abscess),⁶³ the authors argued that despite the significant local morbidity with primary closure, there is less overall morbidity and no change in outcome at 3 months as compared with a completely open and packed wound. Despite this finding, some

centers have had excellent success with routine open packing of the perineal wound with no decrease in healing times.^{64,65}

There has been much discussion regarding the benefit of transposing healthy tissue into the empty space of the pelvis to prevent perineal complications. Many centers have retrospectively reviewed their results with a variety of muscle flaps or pedicled myocutaneous flaps to the resulting perineal wound. Despite the heterogeneous patient groups in such reports, these studies suggest that concomitant tissue rotation into the pelvis at the time of routine APR provides little benefit to perineal wound healing.^{66,67} Yet, when resection is more extensive or intraoperative radiation is employed, use of rectus abdominis or gracilis muscle has been reported to significantly improve perineal wound healing.^{28,68} An alternative method for filling the pelvic dead space after proctectomy is the use of the greater omentum. By taking the omentum off the transverse colon and using the left gastroepiploic artery as a pedicle, the omentum may be brought down and sutured to the subcutaneous tissues of the pelvis. The most recent report of rectal cancer patients treated with APR and omentoplasty described primary perineal wound healing in 80% with 100% healed by 3 months.⁶⁹ A recent systematic review of all reported series of omentoplasty highlighted the lack of solid evidence supporting this practice despite the favorable results achieved by many groups.⁷⁰

To prevent perineal wound infections and in accordance with national guidelines, perioperative antibiotics should be administered no later than 60 minutes prior to skin incision and discontinued 24 hours postoperatively.⁷¹ Depending on the half-life of the antibiotic given and the length of the procedure, antibiotics should also be redosed intraoperatively such that adequate tissue levels of antibiotics are achieved at the time of skin closure. The ability of parenteral antibiotics to penetrate the tissues of a previously radiated pelvis and thereby decrease wound complications has been questioned and has led some to advocate the use of local antibiotic administration.⁷² Although a randomized trial using gentamycin-impregnated beads placed into the sacral wound of patients who underwent APR did reduce the number of perineal infections, this reduction in infections failed to reach statistical significance.⁷³

Management

As with any unhealed surgical wound, basic principles must be applied if healing is to occur; including drainage of localized infection, debridement of ischemic tissues, removal of foreign bodies, and reduction of wound edema. If wounds have not made progress toward healing over a reasonable time period then further investigation should be conducted. In terms of perineal wounds this may require interrogation of the wound

via fistulography, pelvic imaging, and/or an examination under anesthesia in addition to biopsy of any suspicious areas to rule out recurrent malignancy when appropriate.

In the setting of perineal sinus, treatment is similar to pilonidal disease. A first line of treatment consists of operative curettage of chronic granulation tissue, hair follicles, and unroofing of any overlying skin bridges. Various flap and cleft procedures have been proposed to minimize recovery and patient discomfort with excellent results.^{74,75} If nonhealing persists then more radical excision with primary closure and lateral closed-suction drainage may be used. To facilitate complete sinus unroofing, some authors have reported satisfactory results with removal of the coccyx and caudal sacral bodies.^{7,76} We have had a growing experience with vacuum-assisted closure, which is gaining popularity as an adjunct to minimize surgical debridement and facilitate closure of deep, extensive tracts.^{77,78} In the case of larger cavities debridement and curettage resulting in a large defect necessitates transfer of healthy tissue into the area. A variety of myocutaneous flaps (gracilis, inferior gluteus, gluteus maximus, rectus abdominis) have been used in such cases. The gracilis muscle is most commonly used due to its ease in accessibility and mobilization.^{63,79}

POSTOPERATIVE PAIN

Pelvic and perineal pain is common following anorectal surgery, but generally resolves completely within 2 to 3 weeks. More chronic periods of perineal pain are infrequently experienced by a small fraction of patients who have undergone anorectal surgery or proctectomy, particularly those with low pelvic anastomoses. In fact, following ultralow anterior resection with anastomosis, a small fraction of patients will experience severe and persistent pain. Often this is due to spasticity of the pelvic floor similar to what is described in the levator ani syndrome. A similar pain syndrome may also develop following hemorrhoidectomy.

Although most patients experience significant pain that persists for a variable amount of time following hemorrhoidectomy or proctectomy, when this pain persists beyond a month, the patient should be evaluated for underlying pathology. Persistent severe pain that is difficult to reconcile with examination findings should lead the clinician to consider a thorough investigation of the pelvic floor. Obviously, the patient who is postproctectomy for carcinoma with low anastomosis must be evaluated for anastomotic leak or recurrent/persistent disease. Similarly, patients who have had hemorrhoidectomy may also harbor occult infection that is not obvious on examination. An exam under anesthesia may help the surgeon resolve the ongoing pain.

Treatment of chronic perineal pain following anorectal surgery must be centered on pain control and

a determination of the underlying etiology. Pain control includes warm sitz baths and nonsteroidals. If this fails, we recommend antispasmodics such as diazepam or cyclobenzaprine, particularly if levator spasm is noted on examination. Others have used electrogalvanic muscle stimulation⁸⁰ with some success in the setting of persistent perineal pain. Those patients with severe spasm tend to do best with this type of muscle stimulation. Others have had good success with botulinum toxin for the treatment of anismus.⁸¹ We have at times had to perform an abdominoperineal resection to relieve the pain of the patient with chronic intractable pain following low pelvic anastomosis. Despite the magnitude of this operation, these patients tend to have good pain relief following resection of their anastomosis.

PERINEAL HERNIA

Perineal hernia is a rare complication of abdominoperineal resection, pelvic exenteration, or cystourethrectomy. In a 30-year review, the incidence of perineal hernia after pelvic surgery was estimated to be 0.62%.⁸² Another large case series of 1200 APRs for rectal cancer and 1100 for IBD⁸³ reported an overall incidence of perineal hernia of 0.2%. Most of the hernias identified were among those who underwent APR for rectal cancer whereas few occurred in the IBD patients. All patients who developed a hernia had used tobacco for at least 15 years.

Other risk factors for perineal hernia include wound infection and failure to close the perineal wound,⁸² whereas the role of chemoradiation and nutrition has also been suggested.^{83,84} Most patients present with a vague "dragging sensation" and discomfort on standing.⁸³ Rarely do patients with perineal hernias present with more specific symptoms such as bowel obstruction, urinary symptoms, perineal skin breakdown, or significant pain.^{85,86} However, patients with this unusual complication will frequently notice a lump or fullness with sitting or standing.

Repair of perineal hernia involves reduction of the hernia, excision of the hernia sac, and closure of the defect using a perineal, abdominal, or combined technique.⁸³ Although some authors have had success with repair through a perineal approach,^{87,88} most advocate use of the abdominal approach because of superior visualization of the hernia sac, ease of mesh placement, and avoidance of injury to bowel and vasculature. The reconstruction requires closure of the defect for which we prefer to use autologous tissue if possible as the potential for fistula or infection with mesh makes synthetic grafts less than ideal. Various tissues have been used with good success and range from simple omental grafts to gracilis flaps. We prefer to perform these complex procedures with the plastic surgery team because of their familiarity with transposing healthy tissues to fill anatomic defects.

FECAL INCONTINENCE

Disturbances of fecal continence are common problems following many anorectal procedures, particularly proctectomy, sphincterotomy, fistulotomy, and hemorrhoidectomy. Although, most patients experience only transient incontinence following any of these procedures, a small proportion will have more chronic and persistent symptoms. If symptoms do persist, evaluation of continence disturbances generally begins with a good understanding of when and how often the patient experiences difficulties. Following a thorough history and physical, anorectal physiology should be performed with anorectal manometry, endoanal ultrasound, and pudendal nerve testing. Despite good testing methods, prevention is critical as surgical treatment options are limited in patients plagued with iatrogenic fecal incontinence.

By default, medical management is the best treatment option for this group of patients. Bulking of the stool with fiber or antidiarrheals is used to reduce the frequency of bowel movements and therefore, incontinence episodes. Biofeedback has some role in patients with incontinence, but limited data support its use following iatrogenic injury to the anal sphincter. Sphincter repair is best suited for external sphincter injuries. Limited data reveal a marginal benefit to internal sphincter repair.⁸⁹ Sacral nerve stimulation has had expanding indications, but further data are needed prior to a recommendation for its use for a patient with an iatrogenic injury to the anal sphincter complex.

Keyhole deformities have been described following full thickness posterior sphincterotomy. This defect in the posterior anal canal (Fig. 1) may result in fecal leakage due to incomplete closure of the anus. The defect is rarely seen now following the identification of posterior sphincterotomy as its risk factor. Today, most surgeons perform sphincterotomy for chronic fissure in the left or right lateral position. When a keyhole is diagnosed, management consists of stool bulking agents

Figure 1 Keyhole deformity of anus.

to reduce symptoms of incontinence. In more difficult cases, rotation flap closure may be performed to correct the posterior defect, although improved continence is not universal.

Another anorectal procedure associated with continence disturbances is the Whitehead operation, which was first described by Walter Whitehead of Manchester, England in 1882. The procedure involved excision of the mucosa of the anal canal and gained popularity in the treatment of large circumferential prolapsed hemorrhoids.⁹⁰ Reports of mucosal ectropion or Whitehead deformity led to the gradual phase-out of this procedure. Ectropion can lead to incontinence, discharge of mucous, itching, and skin changes. Prevention includes limiting the amount of anal lining that is excised and proper anchoring of the rectal mucosa to the anal canal. Several flap procedures such as the S-plasty have been recommended to repair this complication.⁹¹

CONSTIPATION

Constipation or fecal impaction is another common complication following anorectal procedures such as hemorrhoidectomy or excision and fulguration of warts. Generally, fecal impaction occurs because of postoperative pain and excessive narcotic use after traditional hemorrhoidectomy. To prevent this difficult problem, we obtain a mechanical bowel prep for all patients scheduled for elective hemorrhoidectomy to delay time to first bowel movement. In addition, our postoperative regimen for anorectal procedures includes stool softeners, fiber supplementation, nonsteroidal antiinflammatory drugs, and laxatives as needed. When impaction does occur after anorectal procedures, the surgeon will find that the simplest method to relieve pain is manual disimpaction under general anesthesia or conscious sedation.

Persistent constipation and difficult defecation can result from anal stricture formation. Anal strictures and stenosis following anorectal surgery are difficult problems to remedy. Strictures occur most commonly following hemorrhoidectomy, excessive coagulation of anorectal warts, endorectal flaps, or following proctectomy, particularly in the setting of mucosectomy. Prevention is key in reducing the complication of anal stenosis. For example, during hemorrhoidectomy viable tissue bridges should be preserved to assure proper mucosal cover. The surgeon should not attempt to remove all hemorrhoidal vessels, especially in the setting of an acute exacerbation of hemorrhoidal disease. Also, at the completion of the procedure, the surgeon should be able to easily pass the anoscope without difficulty.

Anal stenosis is also common following low pelvic anastomosis with mucosectomy. Because of the indication for colonic pouches in very low anastomoses, this complication seemed more likely to occur after a

pouch-anal anastomosis.⁹² Unfortunately, this complication is difficult to prevent but with good technique and minimal trauma to the anal canal, the surgeon can reduce the likelihood of postoperative anal stenosis.

Treatment of anal stenosis is difficult, but several good options are available to the surgeon. Dietary modification with fiber supplementation may be all that is required for patients with mild stenosis and minimal symptoms. More severe stenosis presenting with severe symptoms generally implies that surgical treatment is almost unavoidable. The simplest operative procedures are anal dilation or lateral internal sphincterotomy. Anal dilation can be performed with balloon dilators or incremental Hagar dilators. Sphincterotomy is identical to the procedure performed for chronic anal fissure and in severe cases of anal stenosis can be performed in multiple locations.

The most severe cases of anal stenosis require anoplasty. Anoplasty can be performed by advancing healthy anoderm into the anal canal. Several anorectal advancement flap procedures are available to choose from depending upon the location of the stenosis and amount of viable tissue needed. Choices include V-Y advancement flaps, house flaps, island flaps, and S plasties. House flaps and V-Y flaps are most commonly used and can be performed on either side of the anoderm in severe cases of stenosis, or singularly when stenosis is moderate.⁹³ Despite concern for tissue viability island flaps have been used with reported good success.⁹⁴ S plasties are best for bringing in tissue to fill a circumferential defect in cases of severe stenosis.

GENITOURINARY COMPLICATIONS

Given the anatomical proximity of the rectum to the urinary system, it is not surprising that the most common early postoperative complication following many anorectal procedures is urinary retention. In a retrospective review of 21,000 patients, 20.1% of patients experienced urinary retention following conventional hemorrhoidectomy.⁹⁵ Similarly following APR, retrospective data report rates of urinary retention ranging from 4 to 23%.^{5,9,52} Rates are higher when intraoperative radiation³⁰ is used and lower when the operative indication is refractory IBD.^{2,96} A recent review of over 1200 cases of rectal cancer demonstrated a urinary retention rate of 9.1% when the catheter was removed between postoperative days four and seven.⁹⁷ These authors identified multiple risk factors associated with an increased likelihood of postoperative urinary retention; age > 55, presence of preexisting lung disease, operative duration > 4 hours, a mid to low rectal tumor and an additional pelvic procedure. Although these authors did not routinely perform total mesorectal excision, other groups have demonstrated no increase in urinary complications with routine use of total mesorectal excision.⁹⁸ Given that the predominant

mechanism behind postoperative urinary retention is likely injury to the superior hypogastric plexus or nervi erigentes during pelvic dissection⁹⁹; theoretically, there should be no increased risk of urinary retention when performing a standard APR compared with a low anterior resection. However, there are reports suggesting that in addition to nerve damage, the change in anatomic position of the bladder after complete proctectomy may further disadvantage urinary function.¹⁰⁰

Although some authors have demonstrated no increase in complications with wide pelvic lymphadenectomy,¹⁰¹ it is generally felt that prevention of urinary complications can be minimized by avoidance of the hypogastric plexus of nerves along the pelvic sidewall. Postoperatively, bladder decompression for at least 3 to 5 days is an accepted standard to minimize early urinary retention and catheter reinsertion. More data are needed before nerve mapping techniques can be recommended, but these techniques are under careful investigation and likely to be available soon to help the surgeon avoid nerve injury.

Treatment for urinary retention first requires reinsertion of the urinary catheter to keep the bladder decompressed and restore detrusor tone. After 2 to 3 days, a trial of voiding may be undertaken again; however, if postvoid residuals remain high then the catheter should again be reinserted. These patients will likely be discharged from the hospital with the catheter in place. Urologic consultation with urodynamic studies and pharmacologic intervention to increase detrusor tone is then warranted. A high percentage (> 90%) of patients will recover full urinary function by 6 to 8 months without any further intervention.

QUALITY OF LIFE CONSIDERATIONS

In addition to the specific surgical complications described after anorectal surgery or proctectomy, it is essential to consider the effect of perineal complications on overall quality of life. The association between perineal complications and quality of life has not been closely investigated, yet several studies have sought to understand the impact of various anorectal procedures on overall quality of life. A recent meta-analysis rigorously identified 11 high-quality studies that compare the quality of life following APR versus low anterior resection for low rectal cancers. Compared with anterior resection, patients undergoing APR demonstrated higher levels of emotional and cognitive satisfaction, yet reported worse outcomes in overall physical function.¹⁰ However, taken as a whole the authors found no difference between the two surgical operations in terms of quality of life after one year of follow-up. These findings suggest that the addition of perineal incision to rectal cancer surgery does not seem to adversely affect long-term patient quality of life.

CONCLUSIONS

Complications of the perineum after anorectal procedures are unfortunately frequent and can be difficult for the patient and the treating physician. These perineal complications are often overlooked as being minor concerns, but can cause significant morbidity to the patient. Prevention is key, but many anorectal procedures are performed in difficult situations such as large bulky tumors or inflammatory bowel diseases, posing several problems for the surgeon. Further studies are needed to understand the impact of these perineal complications on patients' quality of life.

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