16
Rectovaginal Fistula

Jamie A. Cannon

Key Concepts

- Repair of rectovaginal fistulas should be tailored to the individual patient based on the anatomy of the fistula and associated conditions.
- Perianal sepsis must be controlled prior to attempting a definitive repair.
- Patients with RVFs from obstetric trauma should be evaluated for concomitant sphincter defects.
- Patients who have a Crohn's-related RVF should have their disease medically optimized prior to repair of the fistula.
- Introduction of healthy, well-vascularized tissue such as a Martius flap or gracilis interposition should be considered in patients who have attenuated tissues or have undergone multiple previous unsuccessful repairs.
- Fecal diversion should be considered in patients undergoing major repairs.

Rectovaginal fistulas (RVFs) are abnormal communications between the anus or rectum and the vagina. RVFs are uncommon in the general population, but are seen frequently by colorectal surgeons. The condition can be extremely disabling and is associated with significant distress in affected women. Patients may present with stool per vagina resulting in frank incontinence, or gas or drainage per vagina. These symptoms can also cause pelvic pain and interfere with intimacy.

Successful treatment of rectovaginal fistulas offers the opportunity to greatly improve a patient's quality of life. Unfortunately, success rates are not on par with other commonly performed operations. Many patients present after having undergone multiple previous attempted repairs, which can be frustrating for the patient and surgeon. Hoexter et al. reported 33% of their patients with previous attempted repairs were in litigation with their surgeons [1].

A number of different factors may contribute to the poor success rates following repair. Anatomically, there is little muscle in the thin rectovaginal septum, which may make it more difficult for this region to heal. Fistulotomy, the most successful surgery for managing perianal fistulas, is contraindicated as it invariably results in some degree of incontinence, either due to the paucity of sphincteric muscle in women anteriorly or a resulting keyhole defect.

Multiple different approaches have been described to treat rectovaginal fistulas, which reflects the fact that there is not an ideal operation with a uniformly high success rate. Interpreting the literature to determine the best approach can be challenging. Most papers report series with few patients, and the patients are far from uniform. Varied patient presentations make standardizing the multiple different approaches difficult, if not impossible. In addition, surgeons often vary techniques slightly, use different terminologies, or combine approaches, which prohibits a side-to-side comparison. In general, more complicated and extensive repairs are not associated with improved rates of success, which could leave one to believe that a less invasive approach is preferable. However, the complexities of the fistulas selected for a major procedure create a selection bias against these repairs. Preoperative fecal diversion has not been shown consistently to lead to better outcomes, but this again may represent selection bias in those patients chosen for diversion. These compounding factors make the likelihood of a randomized trial comparing different repair types impractical.

Therefore, it is imperative for the surgeon to have a thorough understanding of the patient's anatomy, disease process, and options for repair in order to determine the best approach. In this chapter, we will review the etiologies for rectovaginal fistula, the evaluation of a patient with a rectovaginal fistula, various approaches for repair, and finally discuss the decision making process in choosing the appropriate surgical procedure.

Etiology of Rectovaginal Fistulas

Rectovaginal fistulas can be the result of obstetric injuries, cryptoglandular disease, or Crohn's disease. These etiologies are discussed below. They can also be caused by malignancy,

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radiation therapy, or leaks from a colorectal, coloanal, or ileal pouch-anal anastomosis. These are beyond the scope of this chapter and addressed elsewhere in this book.

Obstetric Injury

Obstetric injury is the most common cause of RVFs. While many published case series have a higher proportion of patients with other etiologies, such as Crohn's disease, this is a reflection of specific referral patterns and the patient populations at different institutions. Rectovaginal fistulas are reported to occur following 0.1–0.5% of all vaginal deliveries [2]. Obstetric fistulas can arise from a fourth-degree tear in which the repair has broken down. This type of fistula will generally become clinically apparent 1–2 weeks after delivery and is most often located at the level of the anal sphincters. Prolonged labor resulting in compression of the rectovaginal septum by the infant's head can lead to necrosis of the RV septum and cause a rectovaginal fistula that presents in a more delayed fashion. These generally occur cephalad to the pelvic floor where the rectovaginal septum is thinnest. Traumatic injury from an instrumented delivery may result in an immediately apparent fistula and also generally occurs in the thin portion of the rectovaginal septum.

Repairs of RVFs caused by obstetric injury tend to be more successful than repairs of fistulas from other causes. Halverson et al. reported on 15 patients with obstetric-related RVFs that had failed previous repairs [3]. All fistulas were eventually able to be repaired for an overall success rate of 100%, but required a total of 23 procedures for a per procedure success rate of 65%. This cohort of patients was compared to patients with recurrent RVF from Crohn's disease that had an overall success rate of only 50% (6 of 12 patients healed with a total of 21 procedures).

Cryptoglandular Disease

Cryptoglandular disease, which is the most common cause of simple anorectal fistulas, can also cause rectovaginal fistulas. This occurs when an anteriorly located anal gland or its associated duct becomes occluded; the resulting abscess may form in the rectovaginal septum and decompress into the vagina. If the communication fails to heal, a rectovaginal fistula results. These are generally located at the level of the dentate line on the rectal side and course through the anal sphincters to the low vagina or introitus.

Crohn's Disease

Rectovaginal fistulas caused by Crohn's disease are variable in their presentation and location. As they are the result of transmural inflammation from the anorectum, they are frequently associated with perianal sepsis, branching fistula tracts, additional rectocutaneous fistulas, and scarring and stricturing of the anorectum. Approximately 10% of women with Crohn's disease will develop a rectovaginal fistula, and they are more common in those who suffer from colonic Crohn's disease [4, 5].

Surgical repair of rectovaginal fistulas caused by Crohn's disease is not as successful as repair of fistulas of obstetric or cryptoglandular origin. Prior to attempting any repair, control of perianal sepsis is required. This may require abscess drainage and seton placement. A discrete, epithelialized tract should be present before attempting repair, which is best achieved with initial seton placement. Multiple fistula tracts, a watering can perineum, or active inflammation of the rectal mucosa are contraindications to repair. Figure 16-1 shows a rectovaginal fistula from Crohn's disease. Multiple external openings with stool present are visible in the perineum. This patient would benefit from placement of a seton to allow the fistula to mature prior to definitive repair.

Repair should not be undertaken in the presence of active inflammation of the rectum as the repair is unlikely to heal. Those with significant Crohn's-related pathology of the anorectum are unlikely to be good candidates for repair and should be managed either medically, with a seton, or with a proctectomy. Athanasiadis et al. found

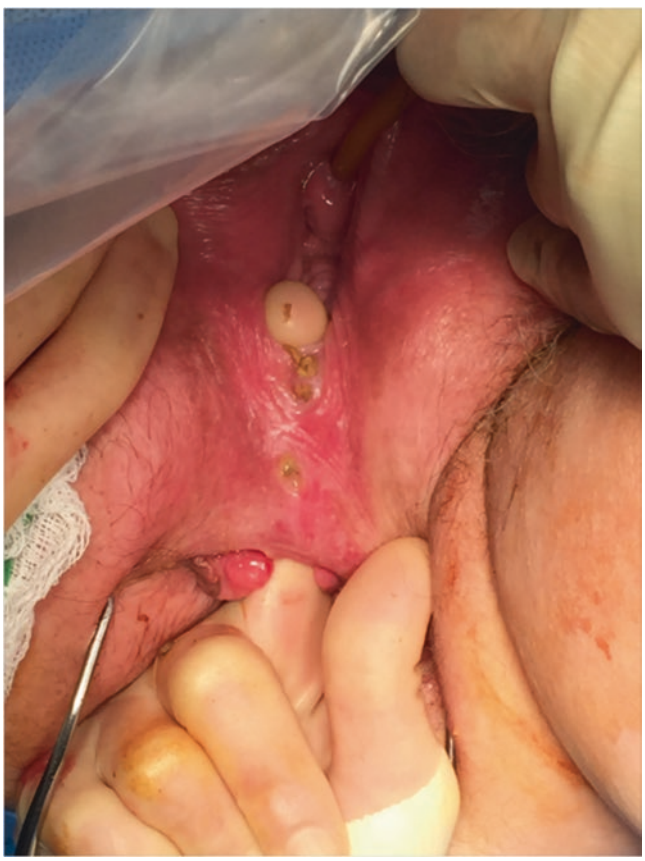

FIGURE 16-1. Large Crohn's-related rectovaginal fistula with multiple external openings in the perineum.

that of patients presenting with Crohn's disease and a rectovaginal fistula, only 51% were deemed appropriate for attempted repair [6]. Overall, 19% of patients eventually underwent a proctectomy for management of their disease.

The use of infliximab has been shown to lead to spontaneous healing of fistulas in Crohn's disease. Kraemer et al. reported healing of symptomatic fistulas in 8 of 19 patients with Crohn's-associated anorectal fistulas treated with infliximab prior to surgery [7]. Its role in the management of rectovaginal fistulas specifically is not well delineated, but multiple reports have shown spontaneous healing of RVFs. These results may not be durable once immunomodulators have been discontinued [8], but are promising enough to warrant a trial of medical therapy prior to surgical intervention. If the fistula does not close spontaneously, reducing the amount of associated inflammation will likely improve the chance of success with surgical repair. Sands et al. reviewed the ACCENT II trial which studied infliximab in patients with fistulizing Crohn's disease [8]. Twenty-nine patients in this trial had rectovaginal fistulas. Patients were evaluated at week 14 of treatment with infliximab, and 13 of those patients (44.8%) were found to have healed fistulas. While this success rate has not been duplicated in other studies, healing with infliximab therapy alone has been demonstrated elsewhere as well. Table 16-1 summarizes these findings.

Successful surgical treatment of Crohn's-related RVF varies in the literature, with success rates ranging from 30 to 70%. Selection bias may be responsible for some of this variation; the more highly selected the candidates the greater the chance of success. Patients most likely to have a successful repair are those with an isolated RVF without other perianal diseases and in whom their Crohn's disease is quiescent. The success rates reported below for repair of Crohn's-related RVFs can be compared to a success rate of 74% in simple fistulas that are not related to Crohn's [9].

Luffler et al. reported on 45 patients with Crohn's-related RVFs [10]. The patients underwent a total of 95 interventions, averaging 2.1 interventions per patient. Their long-term success rate was 53%, but 10 patients (22.2%) required proctectomy. They found levatorplasty and endorectal advancement flaps to have similar rates of success at approximately 50%.

Drs. Hull and Fazio reported on 48 Crohn's patients with RVF. [11] Nine required proctectomy and five were treated with a seton only. Of the 35 who underwent attempted definitive repair, 19 were successful (54%). Five of the failures underwent subsequent successful procedures for an overall success rate of 24/35 (69%). They also found that success was more likely among the patients who had fecal stream diversion, with 8/9 diverted patients having successful repairs.

El-Gazzaz et al. reported on 65 women with Crohn's disease who underwent RVF repair [12]. They had 30 successes (46.2%). They noted that many of the failures were late failures and thus recommended long-term follow-up in order to accurately determine success. It is difficult, however, to discern between actual treatment failures and recurrent disease with the development of new Crohn's-related fistulas.

Table 16-1. Medical therapy for Crohn's-related RVFs

Author	Year of publication	Drug utilized	No. of patients	No. of successful closures (%)
Present [45]	1980	6-MP	6	2 (33.3)
Ricart [46]	2001	Infliximab	15	5 (33.3)
Bodegraven [47]	2002	Infliximab	4	0 (0)
Sands [8]	2004	Infliximab	29	13 (44.8)
Parsi [48]	2004	Infliximab	14	2 (14.2)

Evaluation of a Patient with a Rectovaginal Fistula

The etiology of the fistula can often be determined from the patient's history. History taking should be directed toward the patients obstetric history, previous abdominal and anorectal operations, history of radiation treatment, and signs and symptoms of Crohn's disease or diverticulitis. Physical examination begins with a visual external examination. Care should be taken to search for signs of continuing perianal sepsis, such as undrained abscesses or purulent perineal drainage. Evidence of perianal Crohn's disease should be sought. Cloacal-type defects can be seen following severe obstetric injury.

On digital rectal examination, the condition of the perineal body and rectovaginal septum should be noted. Care should be taken to assess the quality and strength of the anal sphincters. Large rectovaginal fistulas may be readily apparent on rectal examination. Bimanual examination may be required to detect smaller fistulas. Careful palpation of the entire rectovaginal septum between the fingers of each hand may reveal the presence of a small fistula. Note should also be made of any strictures or scarring of the anal canal from previous or active Crohn's disease. The location of the fistula relative to the sphincter muscles and pelvic floor should be determined as this can affect the type of repair chosen.

If the fistula is not palpable, further investigations are needed. Baig et al. found that physical examination was successful in identifying the fistula in 74% of patients [9]. If it cannot be identified on examination, alternate etiologies to explain the patient's symptoms should be considered, such as a colovaginal fistula rather than a rectovaginal fistula. Colovaginal fistulas from diverticulitis are a more common condition, and a contrasted CT scan of the abdomen and pelvis will demonstrate inflammation of the sigmoid colon directly overlying the vagina if this is the case. However, very small or high RVFs may not be palpable on exam.

While other imaging studies are often employed, RVFs can be difficult to detect on routine imaging. Options include

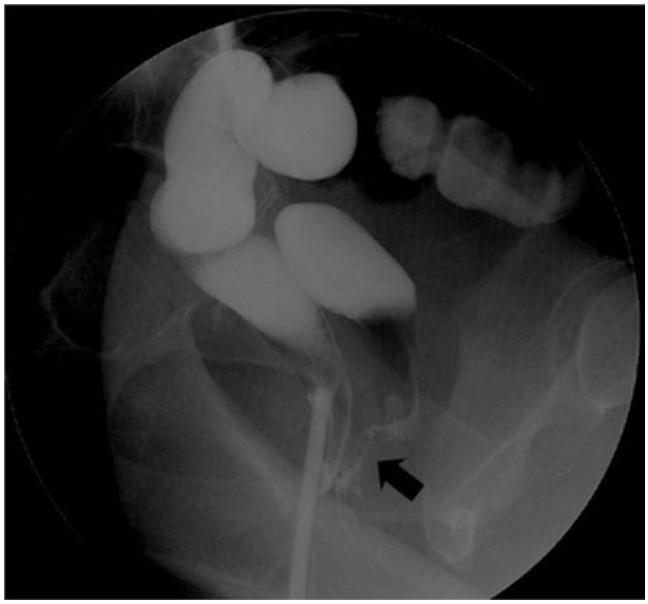

FIGURE 16-2. Gastrografin enema showing contrast passing through a rectovaginal fistula. © 2015 Kobayashi and Sugihara; licensee Springer. This is an Open Access article distributed under the terms of the Creative Commons Attribution License (http://creativecommons.org/licenses/by/4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly credited [53].

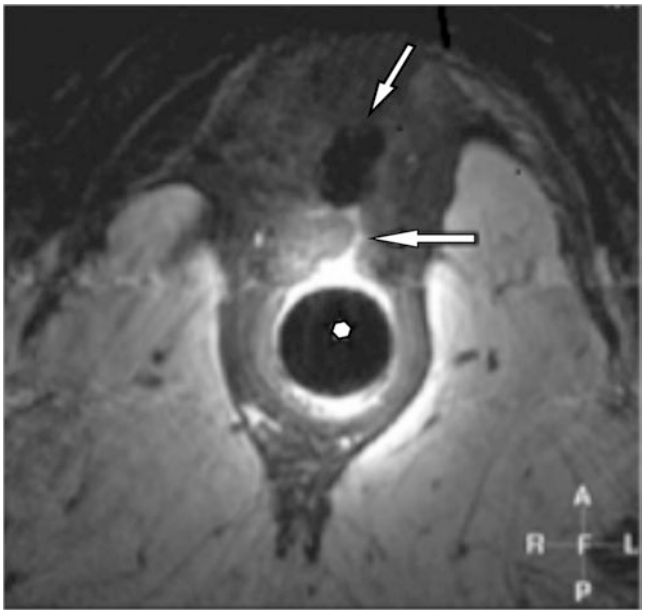

FIGURE 16-3. Rectovaginal fistula as seen on MRI.

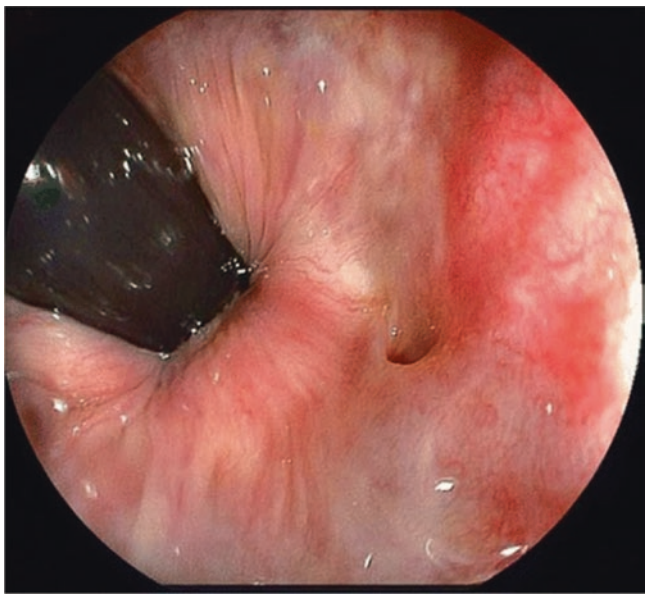

FIGURE 16-4. Rectovaginal fistula on retroflexed view on colonoscopy. © 2015 Kobayashi and Sugihara; licensee Springer. This is an Open Access article distributed under the terms of the Creative Commons Attribution License (http://creativecommons.org/licenses/by/4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly credited [53].

gastrografin enema and vaginography. These have a low yield, however, and are rarely successful in imaging distal fistulas. They rely on occlusion of the anal canal or vaginal introitus in order to generate enough pressure to show passage of contrast through the fistula, and balloon placement may occlude the fistulous opening itself. Figure 16-2 shows an RVF on gastrografin enema. Baig et al. found vaginography did not identify the fistula in any of the five patients in whom it was performed [9]. Defecography may rarely be useful, but may identify other pelvic floor pathologies.

Endoanal ultrasound and MRI are the most useful imaging studies to identify a fistula [13]. MRI also has the advantage of identifying other disease within the pelvis. Figure 16-3 shows the appearance of an RVF on MRI. Endoanal ultrasound has been reported to identify the tract in 73% of patients [9]. Injection of hydrogen peroxide through the tract may aid in identification [14]. Ultrasound is also useful in that it enables assessment of the anal sphincters. It should be performed routinely in patients with an RVF secondary to obstetric trauma as they may have associated sphincter damage. Anal manometry may be considered as well. Patients with Crohn's disease should undergo a complete evaluation of their Crohn's disease, to include colonoscopy and CT or MR enterography. While the fistula itself is rarely seen on colonoscopy, colonoscopy allows for identification of active disease and other Crohn's-related complications. Figure 16-4 demonstrates the appearance of an internal opening on colonoscopy.

The best option for identifying an occult RVF is an examination under anesthesia. This allows for probing of the rectovaginal septum with a fistula probe to elucidate the location (Figure 16-5). It also allows for inspection of the anal canal and rectal and vaginal mucosa to identify areas of inflamma-

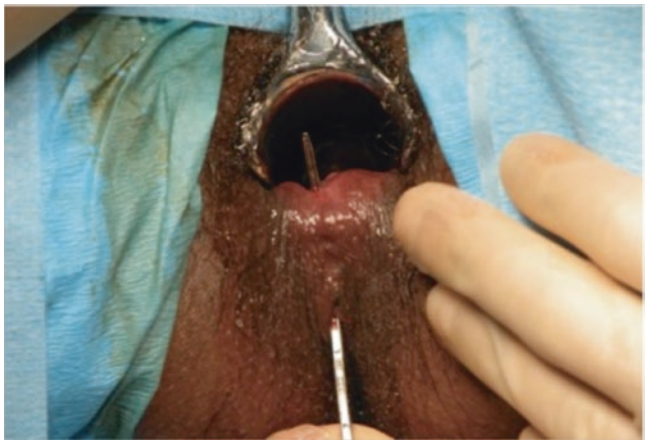

FIGURE 16-5. Fistula probe passing through a rectovaginal fistula.

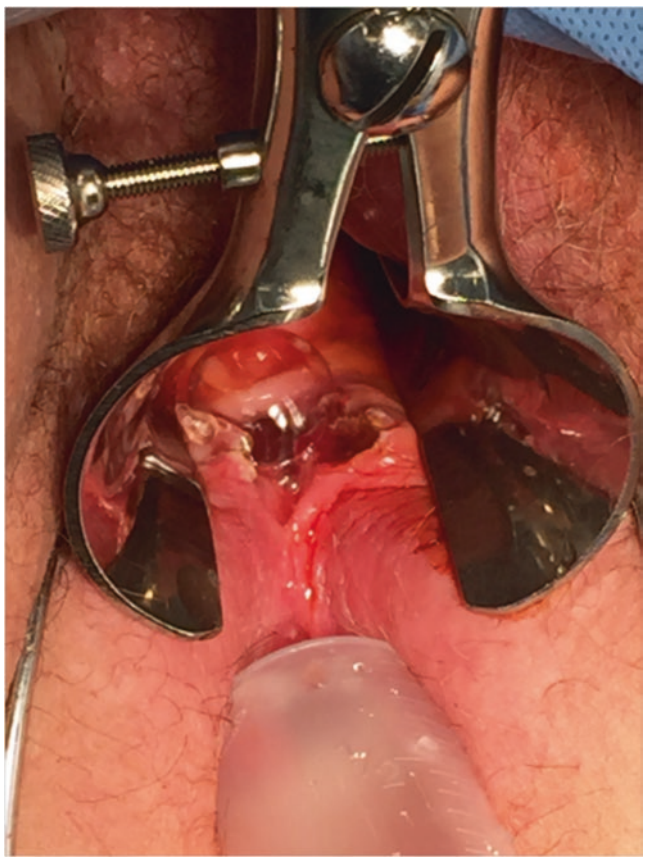

FIGURE 16-6. With the patient in Trendelenburg position, saline is placed in the vagina. An asepto syringe is used to inject air in the rectum. Bubbling in the vagina reveals the location of the rectovaginal fistula.

tion or dimpling for more targeted inspection. If this is not successful, other techniques may be employed. With the patient in Trendelenburg and lithotomy position, the vagina can be filled with saline while the rectum is insufflated with air (Figure 16-6). Air bubbling through the RV septum can elucidate the fistula's location. Alternatively, a tampon or operative sponge may be placed in the vagina. Saline with methylene blue dye can be introduced into the rectum via a flexible sigmoidoscope. Blue staining on the gauze within the vagina confirms that a fistula is present, but may not show the actual location.

Surgical Approaches to Repair of Rectovaginal Fistulas

A number of different techniques have been employed to repair a rectovaginal fistula, and for many patients more than one attempt at repair is necessary. For simple rectovaginal fistulas, defined as located in the mid or lower vagina and without Crohn's disease, Baig et al. reported successful repair in 14/19 patients (74%) using a variety of techniques. [9] For recurrent fistulas of various etiologies, Halverson and colleagues reported 23/48 procedures successful (48%) in 29 patients, for an overall healing rate of 79% [3]. Pinto and associates looked at 118 patients with RVF and found an overall success rate of 58.8% per procedure, with 103 patients eventually healing completely (87.3%) [15]. Among those with Crohn's, success was only 44.2% per procedure, but 78% of patients were eventually healed. They found recurrence rates were similar after various types of repairs. Tobacco use was identified as a risk factor for recurrence.

A list of the many surgical approaches to rectovaginal fistulas would be quite extensive. While the various approaches can be grouped into categories based on their similarities, each individual series will often describe a slight modification to previous reports. Patients are also frequently managed with more than one type of repair as treatments are customized to the fistula. For example, a rectal advancement flap may be combined with a transperineal repair or sphincteroplasty. This makes direct comparison of the various techniques difficult. The types of repairs are grouped together here for review as endorectal (rectal advancement flaps or sleeve advancements), transperineal (episioproctotomy or sphincteroplasty), tissue transposition (Martius flap or gracilis), transvaginal, and transabdominal.

Endorectal Repairs

Endorectal advancement flaps are the most commonly performed procedure for the management of a rectovaginal fistula. The procedure as described by Rothenberger et al. in 1982 [16] remains similar to what is described in most reports today with only minor variations in technique. The patient is placed in the jackknife prone position. A Pratt bivalve anoscope is used to expose the anterior rectal wall. Distal to the location of the fistula, an incision is made through the mucosa, submucosa, and down to the internal sphincter. A flap is raised in the rectum proximally. While some describe only raising

mucosa and submucosa, fibers of the circular muscle (internal sphincter) are generally included, and this is how Rothenberger described the procedure. The flap is raised for a distance of 4 cm proximal to the location of the fistula in order to allow for a tension-free anastomosis. Once the flap has been raised, the fistula itself is closed by approximating the fibers of the internal sphincter. This may require some lateral mobilization in order to bring the edges of the internal sphincter into approximation. The distal-most portion of the flap that contains the fistula is excised. The healthy flap is brought down to cover the fistula opening and secured in place. Figure 16-7 depicts these steps.

The most common cause for failure is thought to be flap retraction or necrosis. Therefore, it is essential that enough flap be mobilized so there is no tension on the anastomosis. The base of the flap should be at least twice the width of the apex of the flap in order to ensure adequate blood supply. Rothenberger reported overall good success with this technique. Out of 35 patients, 30 were successfully repaired with this approach (86%). This success rate is similar to that reported by Lowry et al. from the same institution with 43/49 (88%) successful [17].

Others, however, have not reported the same high degree of success with this technique. Ellis reported a

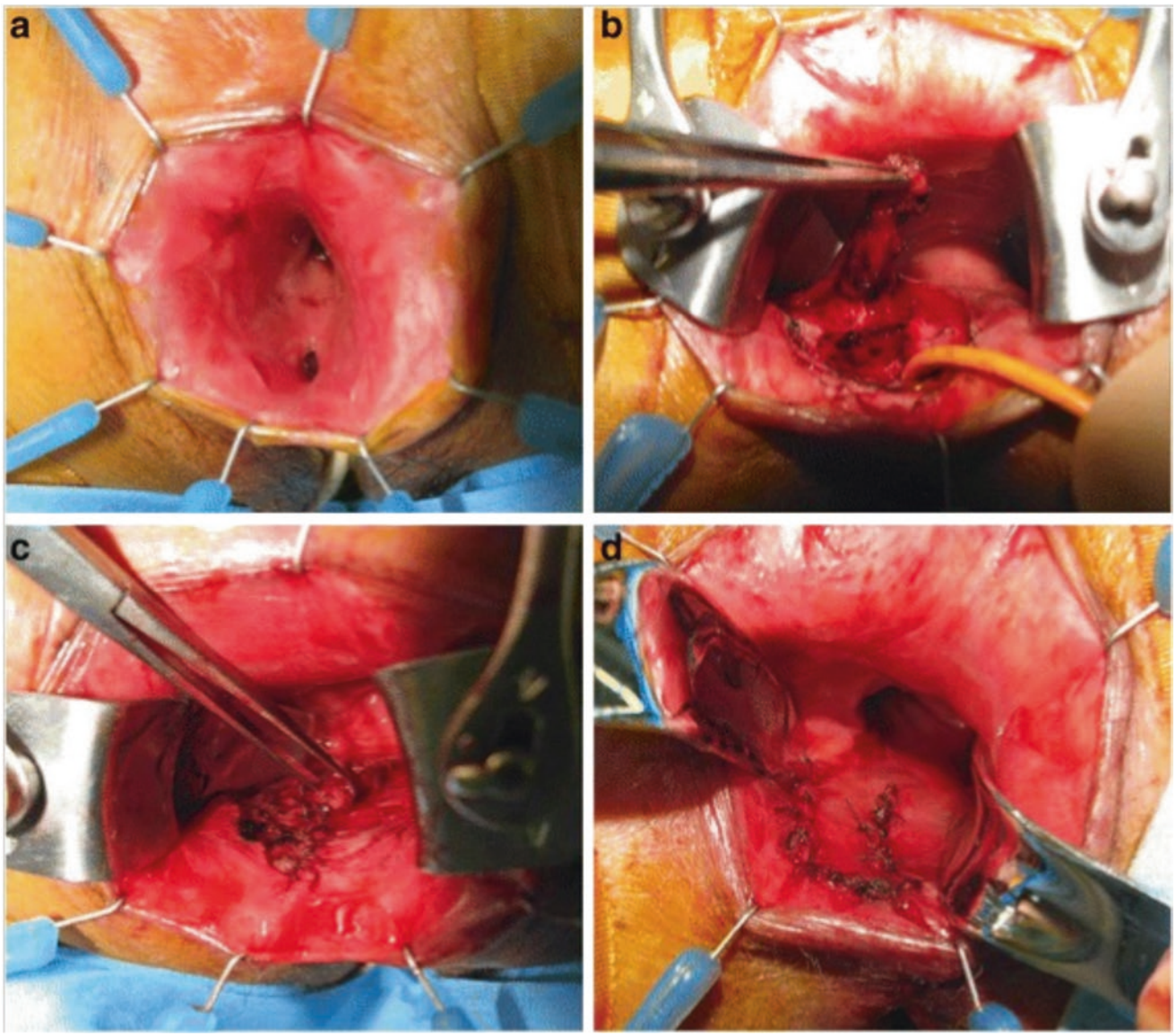

Figure 16-7. Endorectal advancement flap for rectovaginal fistula. Rectovaginal fistula is seen from the anus (**a**). The flap of mucosa, submucosa, and circular muscle is raised (**b**). Circular muscle is sutured by horizontal mattress manner (**c**). The flap is advanced over the repaired area (**d**). The flap is sutured in place at its apex and along its sides.

Table 16-2. Endorectal advancement flaps

Author	Year of publication	No. of patients	No. of successful closures (%)
Rothenberger [16]	1982	35	30 (86)
Jones [49]	1987	23	16 (70)
Lowry [17]	1988	44	56 (78)
Watson [50]	1995	12	7 (58)
Sonoda [19]	2002	37	16 (43)
Ellis [18]	2008	44	29 (66)
Hull [20]	2011	37	23 (62)

66% success rate in 44 patients [18]. Sonoda et al. reported success in 16/37 (43.2%) [19], while Hull and colleagues in 23/37 (62%) in a population that excluded Crohn's disease [20].

Athanasiadis and associates compared endorectal advancement flaps to multiple other closure techniques in a Crohn's population [6]. While the numbers are few, they reported disappointing success with this technique. Only 2/7 rectal advancement flaps were successful (29%), while the success rate for all other repair types combined was 37/49 (76%). Available data on endorectal advancement flaps is summarized in Table 16-2. There have been other modifications of the described procedure. Schwandner et al. described using a biologic graft as part of this procedure [21, 22]. Once the endorectal flap was raised, a 2 × 2 cm graft from porcine small intestine mucosa was placed in the rectovaginal space, and the flap sutured over the graft. They report successful healing in 15/21 patients (71%).

Of note, the likelihood of a successful repair with an endorectal advancement flap decreases if patients have undergone previous repairs [18, 23–26]. Halverson et al. reported only 9 successes in 30 patients who had undergone previous repairs with this technique (30%) [3]. Similarly, while Lowry had 88% success with a first repair, they found the success rate fell to 55% in those who had had two previous repairs [17].

Transperineal Repairs

A number of variations in technique exist in performing a transperineal repair, and terminology in the literature is diverse. For the purpose of this discussion, we have grouped together a variety of techniques that all share some common key points. Such techniques include episioproctotomy with layered closure, transperineal repair with levatorplasty, the LIFT procedure, and sphincteroplasty. These procedures all begin with an incision in the perineum that may be circumlinear around the anus, transverse, or vertical. Dissection continues cephalad along the rectovaginal septum. The rectum and vagina are separated from one another and the fistula tract divided, as seen in Figure 16-8. The incision is closed in layers. Ideally, some tissue, preferentially muscle, is interposed between the rectum and vagina. This may be done via levatorplasty or sphincteroplasty. The repaired areas of the rectum and vagina can also be imbricated. A rectal advancement flap can be added to the procedure.

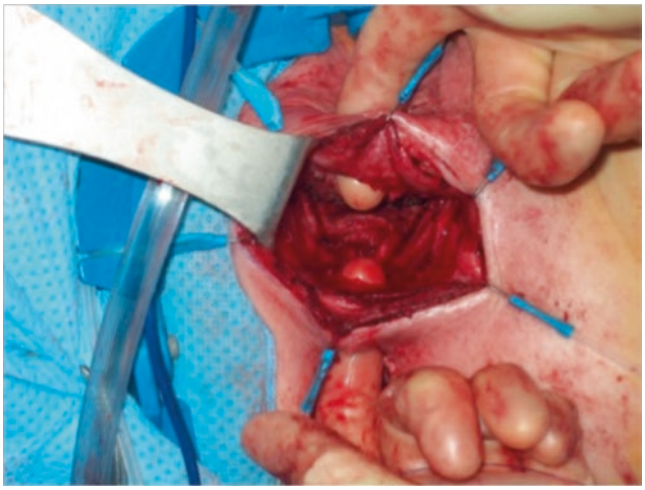

Figure 16-8. Transperineal repair where the rectum and vagina have been separated and the defects in each are visible.

Table 16-3. Transperineal repairs

Author	Year of publication	No. of patients	No. of successful closures (%)
Athanasiadis [6]	2007	20	14 (70)
Hull [20]	2011	50	39 (78)
Wiskind [51]	1992	21	21 (100)

Athanasiadis and colleagues reported good success with this technique in a Crohn's population with 14/20 (70%) undergoing successful repairs [6]. Lowry had success in 22 of 25 patients who underwent a combined sphincteroplasty and endorectal advancement flap (88%), which was an improvement over the 78% success with advancement flap alone [17]. Hull and associates reported success in 39/50 patients who underwent a transperineal repair (78%) [20]. Of note, patients with Crohn's disease were excluded. Important in this study is they found that the rate of post-repair incontinence was only 8%, as compared to 38% in those undergoing endorectal advancement flaps. A transperineal repair with sphincteroplasty is the most appropriate type of repair in women who have a sphincter defect (most often from obstetric injury), as this is addressed simultaneously.

Following repair, some authors advocate placement of a biologic graft to separate the vagina and rectum. Ellis described a transperineal repair with a graft made from porcine intestinal submucosa placed in the rectovaginal septum [18]. He reported an 81% success (22/27). The available data for transperineal repairs is summarized in Table 16-3.

Tissue Transposition Repairs

Tissue transposition repairs offer the advantage of interposing healthy, well-perfused tissue between the rectum and vagina. They add bulk to the rectovaginal septum and physically increase the distance between the rectum and vagina, and by bringing their own blood supply may aid in healing. These types of repairs have the highest success rate of all transperineal repairs; however, these repairs may be accompanied by pain, delayed healing, and unsatisfactory cosmesis at the donor site.

Patients that are appropriate candidates for transposition repairs are those who have failed less invasive techniques or who have inadequate native tissue. Due to the complexity of the operation, fecal diversion is generally performed prior to or at the time of surgery. The operation is most often conducted jointly by the colorectal surgeon and a plastic surgeon. Colorectal surgeons trained in these techniques may perform the entire operation. The labial fat pad with bulbocavernosus muscle (Martius flap) or gracilis muscle transposition are the most commonly used tissues for transposition and are reviewed here. Use of other muscles including the sartorius and gluteal muscle has also been described. The choice of a Martius flap versus gracilis muscle for the donor tissue is based on the desired bulk of tissue and individual surgeon experience.

Martius Flap

The Martius flap was initially described by Dr. Heinrich Martius in 1928 and uses the bulbocavernosus muscle and labial fat pad for transposition [27]. The technical details of the operation are well described by Kniery et al. in 2015 [28]. The initial incision is made in the vaginal introitus distal to the fistula opening in order to expose the rectovaginal septum. Dissection continues in the rectovaginal septum cephalad to the fistula (Figure 16-9). The fistula tract is curetted and closed primarily on the rectal side. The vaginal portion of the fistula is excised from the vaginal flap. In order to harvest the donor tissue, a vertical incision is made in the labia majora (Figure 16-10). The labial fat pad and underlying bulbocavernosus muscle are dissected out from the surrounding tissues. The amount of muscular tissue varies from patient to patient and may not be visible in some. The blood supply to the flap comes in inferiorly and posteriorly from the posterior labial vessels. Dissection ensues in a lateral to medial direction taking care not to injure the blood supply. The flap is transected superiorly and tunneled to the rectovaginal septum. It should be rotated carefully so as not to kink the blood supply (Figures 16-11 and 16-12). The flap is laid within the RV septum and the vaginal flap sutured over the Martius flap (Figure 16-13). Figure 16-14 shows

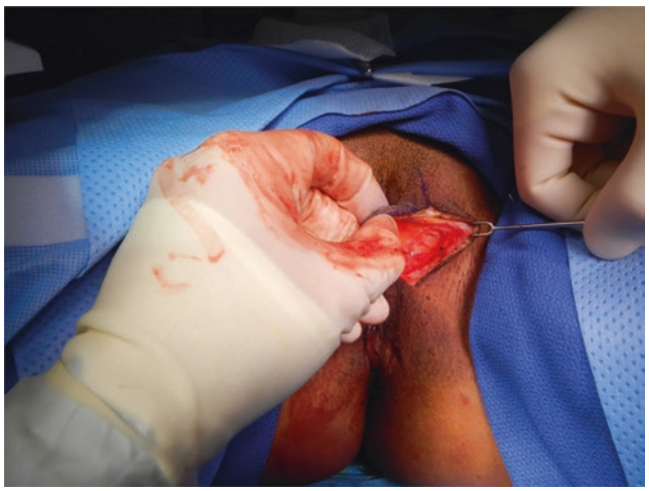

FIGURE 16-10. Martius flap repair. Incision over the left labia majora to expose the fat pad and bulbocavernosus. Courtesy of Drs. Eric Johnson and Scott Steele.

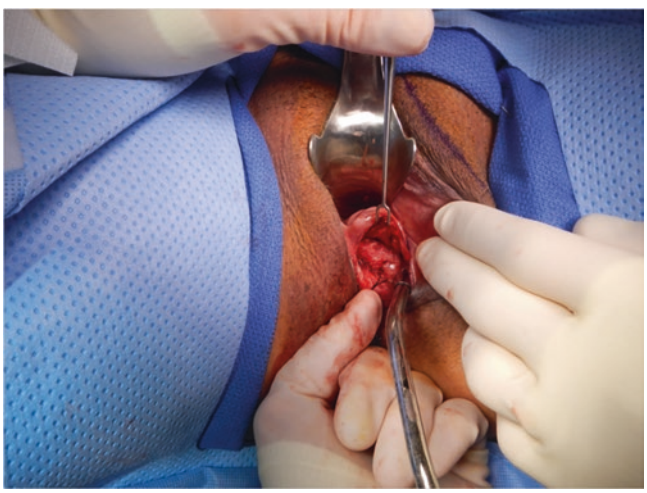

FIGURE 16-9. Martius flap repair. The vaginal flap has been raised revealing the rectovaginal fistula. Courtesy of Drs. Eric Johnson and Scott Steele.

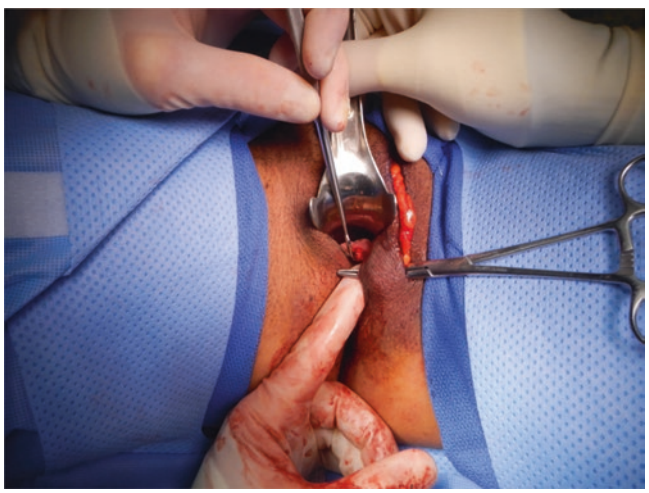

FIGURE 16-11. Martius flap. A tunnel is created from the origin of the bulbocavernosus to the vaginal incision. Courtesy of Drs. Eric Johnson and Scott Steele.

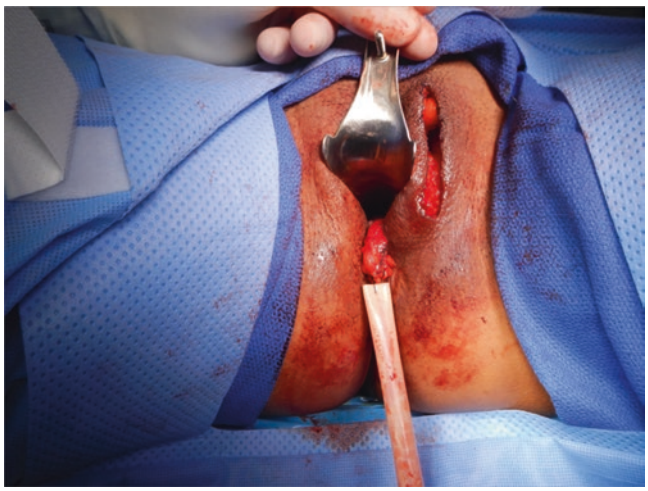

FIGURE 16-12. Martius flap. The donor tissue has been brought into the rectovaginal septum. Courtesy of Drs. Eric Johnson and Scott Steele.

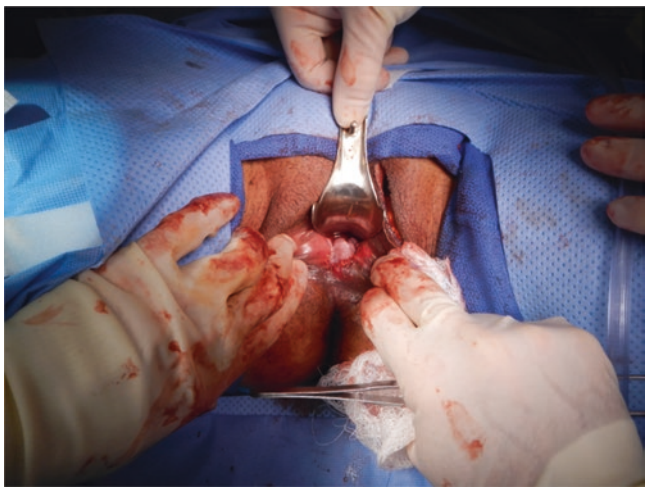

FIGURE 16-13. Martius flap. The vaginal incision has been closed over the Martius flap. Courtesy of Drs. Eric Johnson and Scott Steele.

the postoperative appearance. The authors report successful healing in 3/5 patients, all of whom had failed previous repairs. The largest case series using the Martius flap was published by Pitel et al. in 2011 [29]. They reported a 65% success rate in 23 patients. Other small case studies report success rates ranging from 92 to 100% [27, 30–34]. Complications are rare but include local wound dehiscence and dyspareunia. The available data is summarized in Table 16-4.

Gracilis Muscle Transposition

Repair using a gracilis muscle transposition offers the advantage of providing a large bulk of well-vascularized muscle to separate the vagina and rectum. Its origin is near the perineum, which makes it a convenient donor. It is, however,

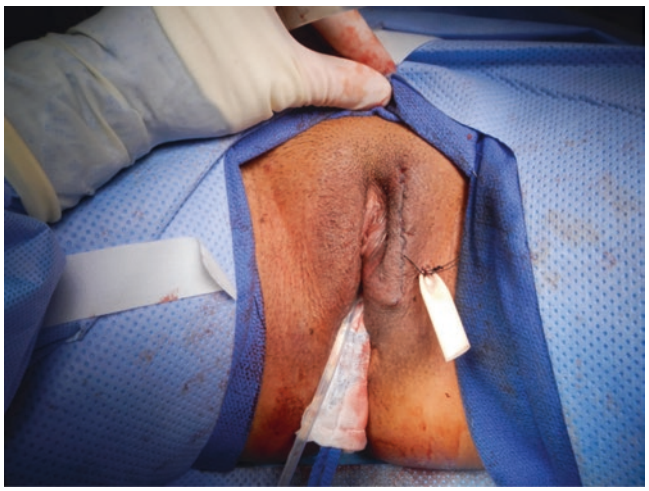

FIGURE 16-14. Appearance after the Martius flap. Courtesy of Drs. Eric Johnson and Scott Steele.

TABLE 16-4. Martius flap

Author	Year of publication	No. of patients	No. of successful closures (%)
White [27]	1982	14	13 (93)
Aartsen [30]	1988	14	13 (93)
McNevin [31]	2007	16	15 (94)
Songne [32]	2007	14	13 (93)
Pitel [29]	2011	23	15 (65)
Kniery [28]	2015	5	3 (60)

associated with higher morbidity due to the mobilization and transposition of this large muscle. Success rates are quite promising, and this repair should be considered in patients who have had multiple recurrences or poor native tissue. Fecal diversion is generally performed prior to or at the time of the procedure.

The operation involves a transperineal incision, in which the rectum and vagina are separated. The fistula is divided and both the rectum and vagina are closed primarily. Dissection should continue cephalad to the fistula until healthy tissue is reached. An endorectal advancement flap can be added to the procedure as well. The perineal incision created is seen in Figure 16-15 and does not differ from that in other transperineal approaches. The gracilis muscle is then harvested. This can be performed with a long incision the length of the gracilis, or with separate smaller incisions near the muscle's origin and insertion. The muscle is mobilized with division of the perforating vessels. It is divided just above its insertion. It is tunneled from the proximal-most portion of the incision to the perineal incision, as seen in Figure 16-16. Care must be taken that the flap is not rotated excessively and its blood supply not kinked. The muscle is secured to the apex of the rectovaginal dissection and the transperineal incision closed, as seen in Figure 16-17. Reported success rates range from 47% [35] to 92% [35, 36]. The largest

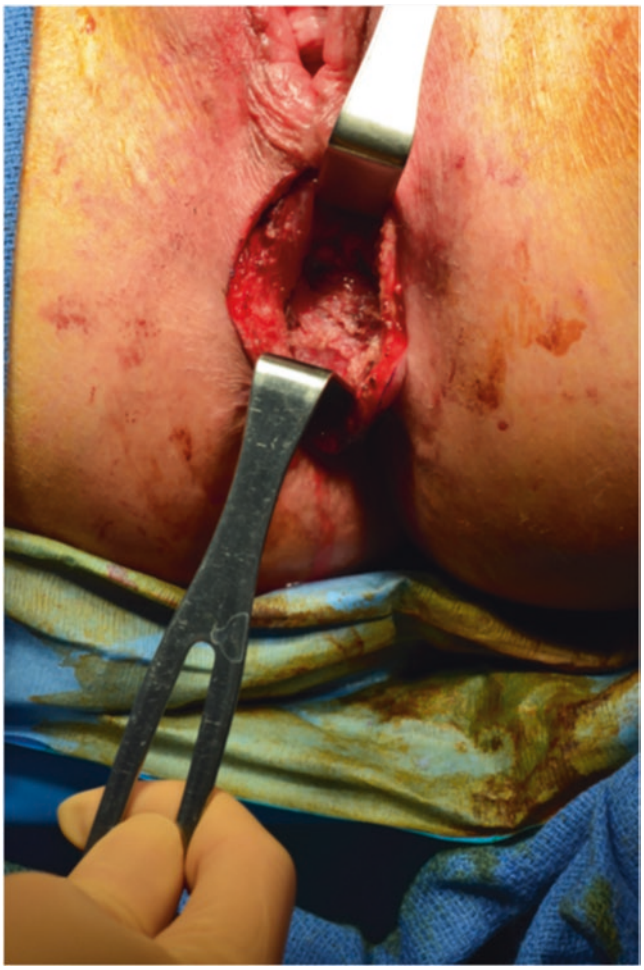

FIGURE 16-15. Gracilis transposition. A transperineal incision is made to separate the rectum and the vagina. Courtesy of Drs. Jamie Cannon, Andre Levesque, and James Long.

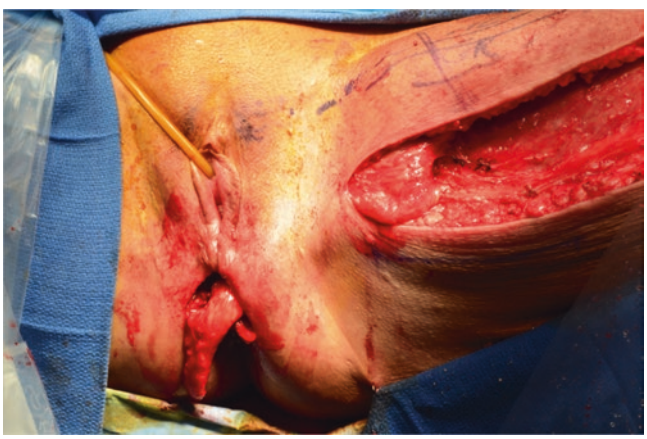

FIGURE 16-16. Gracilis transposition. The gracilis muscle has been tunneled from the left thigh to the transperineal incision. Courtesy of Drs. Jamie Cannon, Andre Levesque, and James Long.

series was published by Pinto et al. [15]. They reported a 79% success in 24 patients. Table 16-5 summarizes the available data.

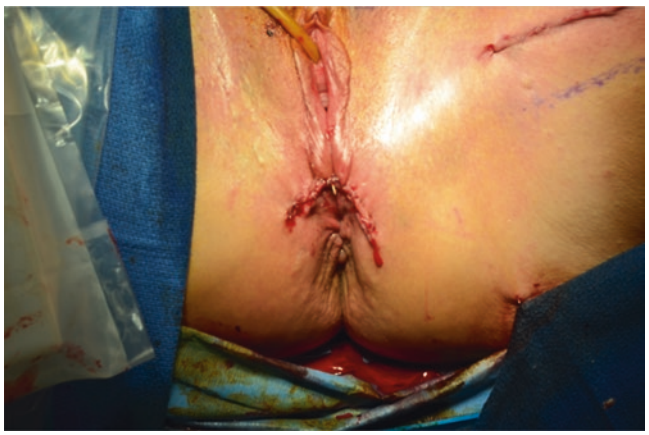

FIGURE 16-17. Gracilis transposition. Postoperative appearance. Courtesy of Drs. Jamie Cannon, Andre Levesque, and James Long.

Transvaginal Repairs

Transvaginal repairs are infrequently reported in the literature and usually found more often in the gynecologic literature than the colorectal literature; however, there is good evidence that repair through the vagina has acceptable success rates. Proponents of a transvaginal repair emphasize the relative ease and better exposure gained through the vagina as compared to the anus. The initial incision is usually made in healthy tissue, as the origin of disease is on the rectal side. However, as the rectum is the higher-pressure side of the fistula, any repair is unlikely to be successful if the rectal side is not addressed. Therefore transvaginal repairs should involve closure of the rectum and not just of the vagina.

Sher et al. report on the use of a transvaginal flap for Crohn's-related RVF [37]. They describe their technique, which is quite similar to an endorectal advancement flap. An incision is made in the vagina distal to the fistula. A flap is raised exposing the rectovaginal septum. Both the rectal and vaginal side are closed. The levators are approximated in the midline in between the repair. The fistula is then excised from the vaginal flap and the flap is sutured in place over the repair. In their study, all patients had fecal diversion and they reported that 13/14 patients healed (93%).

Transabdominal Repair

Transabdominal repairs are generally reserved for fistulas that are located in the mid-rectum with an internal opening at the fornix of the vagina, as these are difficult to access from a perineal or endoluminal approach. Transabdominal repair generally involves a low anterior resection, where the segment of rectum containing the fistula is resected and a colorectal or coloanal anastomosis performed. Depending on the height of the fistula, this may be done transabdominally only, or with a transabdominal transanal (TATA) approach and colonic pull-through. The vaginal side of the defect can be closed primarily.

Table 16-5. Gracilis muscle transposition

Author	Year of publication	No. of patients	No. of successful closures (%)
Furst [36]	2008	12	11 (92)
Wexner [35]	2008	17	9 (53)
Lefevre [52]	2009	8	6 (75)
Pinto [15]	2010	24	19 (79)

Van der Hagen and colleagues reported their experience with a transabdominal approach where a formal resection was not undertaken [38]. They laparoscopically separated the rectum and vagina and repaired each primarily. The omentum was mobilized and laid in between the rectum and the vagina. They reported successful repair in 38/40 patients. The same approach was described by Chu and associates who reported success in 6/6 patients [39]. Mukwege reported similar successful results using a laparoscopic transabdominal approach in ten patients [40]. While techniques differed from patient to patient and included traditional LAR, TATA, and fistula excision with omentum interposition, overall 9/10 repairs were successful.

Alternate Repairs

A variety of alternate techniques exist as well. The use of a fistula plug has been described but should be limited to those with a long-tract RVF. Ellis reported their protocol, which is to use a plug as first-line treatment if the length of the RVF is 1 cm or greater [18]. The plug is brought from the rectal to vaginal side, excess length on the plug is trimmed, and it is sutured in place with absorbable suture. He noted success in 6/7 patients with this technique (86%). Gajsek et al. also reported on plug use with 4/9 repairs being successful (44%) [41]. Failures were treated with repeat plug placement, but none of the repeat procedures were successful. Weerd et al. described the successful injection of fat into the tissue surrounding the fistula in a very small case series [42]. D'Ambrosio performed the repair via a transanal endoscopic microsurgical (TEMS) approach and reported success in 12/13 patients undergoing this procedure [43].

Choice of Technique for Repair

The number of types of repairs discussed above demonstrates that a one-size-fits-all approach is not practical. It is also reflective of the fact that this is a difficult condition to treat.

In deciding on a surgical approach, the surgeon should evaluate the patient for continuing inflammation or ongoing pelvic sepsis. These must be controlled prior to surgical repair or the chance of success is dismal. Ongoing pelvic sepsis should be managed with abscess drainage, antibiotics, and seton placement until resolved. The patient is reassessed 6 weeks after seton placement to confirm the sepsis has resolved. If there is evidence of residual abscess or branching fistula tracts, these must be addressed. Once a mature isolated fistula tract is present, definitive repair can be considered.

Treatment with anti-TNF agents should be considered preoperatively in all patients with Crohn's disease. If active Crohn's disease persists, the patient should undergo medical management and possible temporizing measures rather than attempting to cure the fistula. Seton placement is ideally suited. Not all patients with Crohn's disease and RVF will be candidates for repair. Repair should be considered for those who develop a mature isolated tract without branching, without other draining areas, and with healthy rectal mucosa. If this is not possible, non-cutting seton placement can be a long-term method of controlling symptoms. Proctectomy is considered for those with severe disease refractory to seton placement and maximized medical therapy. The presence of an anal stricture with quiescent disease is not a contraindication for repair, as the stricture can be addressed simultaneously with the fistula with endorectal techniques such as flap construction or sleeve advancement [44–65]. A portion of the circumference of the stricture can be removed along with the fistula when an endorectal advancement flap is performed. If this does not result in correction of the stricture, a sleeve advancement with circumferential resection of the stricture is an alternative option.

The surgeon must also decide whether preoperative diversion is indicated. As discussed above, diversion has not been shown to decrease the rate of fistula recurrence, although this may well be because the patients that undergo fecal diversion have more complicated disease. The surgeon should estimate the likelihood of success with the repair chosen, as well as the magnitude of the operation. When low rates of success are anticipated (e.g., multiple prior repairs, poor tissue compliance), preoperative fecal diversion should be considered. This is not generally necessary in the repair of simple rectovaginal fistulas. Patients undergoing major transabdominal resections, or muscle transposition procedures, should have fecal diversion.

The anatomic location of the fistula will dictate a local repair versus a transabdominal approach. Fistulas located in the mid-rectum and upper vagina will not be accessible via a local approach and should therefore be managed with a transabdominal approach.

For local repairs, the quality of the patient's tissue should be assessed. If the patient's tissues are healthy, have normal compliance, and lack scarring, an endorectal advancement flap is an appropriate first approach. If the RVF is secondary to obstetric injury, endorectal ultrasound is used to determine if a sphincter defect is also present. If a sphincter defect is identified, a transperineal repair with sphincteroplasty is performed simultaneously. The chance of success with an advancement flap decreases with each attempt at repair;

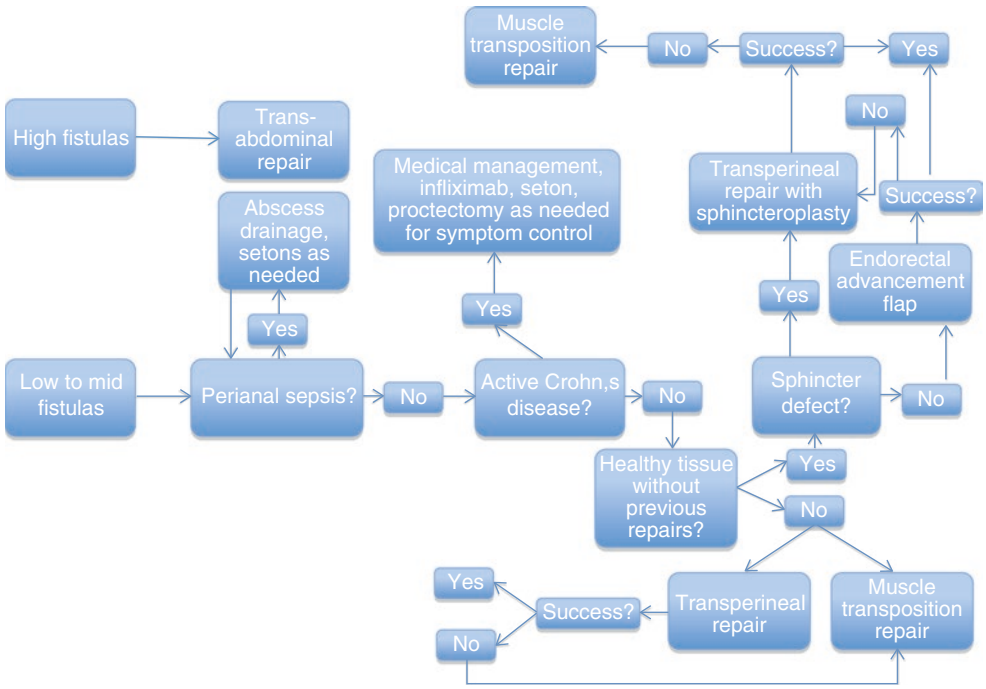

FIGURE 16-18. Algorithm for management of rectovaginal fistulas.

therefore a transperineal approach should be considered in those who have failed previous endoanal advancement flaps. For either endoanal advancement flaps or transperineal repairs, the surgeon may also consider the use of biologic grafts to reinforce the repair. If the local tissues are not adequate for repair, then transposition of healthy tissue should be considered. The most common tissues used for transposition are the Martius flap or gracilis muscle. Figure 16-18 provides an algorithm that summarizes the above recommendations.

Conclusions

Rectovaginal fistulas are distressing conditions to patients and present a therapeutic challenge to surgeons. Whether the etiology of the fistula is obstetric, Crohn's related, or cryptoglandular, a thorough evaluation of the patient's anatomy is required in order to select the right repair. While not all patients will be candidates for surgical repair, the majority of patients will eventually undergo successful treatment of their RVF. Familiarity with the various surgical techniques described and the ability to apply the appropriate surgery to the right patient will increase the chance of a successful intervention.

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