ORIGINAL ARTICLE

Surgical management of complicated rectovaginal fistulas and the role of omentoplasty

E. Schloericke[2] · M. Zimmermann[1] · C. Benecke[1] · T. Laubert[1] · R. Meyer[1] · H.-P. Bruch[1] · R. Bouchard[1] · T. Keck[1] · M. Hoffmann[1]

Abstract

Background Patients with rectovaginal fistulas have a significantly reduced quality of life. Therefore, surgical therapy is often needed even in palliative cases. The aim of the present study was to perform an analysis of the results of the different treatment options available today.

Methods We performed a retrospective analysis of patients who underwent treatment for rectovaginal fistulas at the Department of Surgery, University of Schleswig–Holstein, Campus Luebeck and the Department of Surgery, WKK Heide, between January 2000 and September 2016. Complication and recurrence rate were retrospectively evaluated. The median follow-up period was 13 months (range 3–36 months).

Results During the observation period, 58 patients underwent surgery (53 curative, 5 palliative) for rectovaginal fistulas. All patients who underwent curative surgery had an omentoplasty, and 39 of 53 (73.6%) patients underwent a resection. Thirty of 39 (77.0%) resections were low anterior resection, while non-continence-preserving resection included subtotal colectomy ($n = 5$), pelvic exenteration ($n = 2$), and proctectomy ($n = 2$). The fistulas were mainly secondary to inflammatory bowel disease ($n = 18$) or diverticulitis ($n = 13$), while 19 fistulas were a complication of different cancers or precancerous lesions. The median follow-up time was 13 months (range 6–36). Four patients (6.9%) had fistula recurrence (3 recurrences after low anterior resection, 1 after primary fistula closure). The mortality rate was 6.9% ($n = 4$).

Conclusions Non-resecting methods should be used only in uncomplicated fistulas. Rectovaginal fistulas secondary to inflammatory or malignant disease mostly require extensive therapy. Omentoplasty is effective for the treatment of both high and low rectovaginal fistulas.

Keywords Rectovaginal fistula · Therapy options · Omentoplasty · Fistula recurrence · Inflammatory bowel disease

Introduction

Recto- and anovaginal fistulas are rare and develop in 5% of all patients with anorectal fistulas [1]. Because these fistulas are associated with a significantly reduced quality of life (recurrent vaginal/urinary tract infections, psychosocial burden), surgical intervention in these fistulas is almost always indicated. Precise localization of the fistula

and knowledge of the etiology of rectovaginal fistulas are crucial when planning surgical treatment [2]. The diagnosis and assessment of pelvic anatomy is done with pelvic magnetic resonance imaging (MRI) with endorectal contrast media, proctoscopy, and rectal endosonography. In low rectovaginal fistulas, direct identification by means of hydrogen peroxide injection with simultaneous or consecutive endoscopic ultrasound is possible [3]. With regard to the etiology, only very few fistulas are of cryptoglandular origin [4]. Most fistulas are caused by obstetric trauma (postpartum rectovaginal fistula) and are most often related to third- and fourth-degree perineal lacerations [5]. Two percent of all patients with inflammatory bowel disease develop rectovaginal fistulas [1]. Fistula formation after low anterior resection of the rectum is also reported in up to

✉ M. Hoffmann
martin.hoffmann@uksh.de

1 Department of Surgery, University Hospital of Schleswig-Holstein, Campus Luebeck, Ratzeburger Allee 160, 23538 Lübeck, Germany

2 Department of Surgery, WKK Heide, Heide, Germany

10% of all patients [4, 6, 7]. The diagnosis of an uncomplicated fistula or a fistula of unknown origin should both be made by exclusion.

After excision of the fistula, there are several reconstructive options that involve resection or no resection. These encompass simple suture, mucosa advancement flap, low anterior rectum resection, and proctectomy [8]. The reconstruction of the rectovaginal space with biologic tissues is crucial for a successful outcome [9]. Pelvic exenteration should always be regarded as ultima ratio treatment.

The aim of the present study was to evaluate the results of different surgical approaches, most of whom included an omentoplasty, on the fistula healing rate and complications.

Materials and methods

We performed a retrospective analysis of the surgical management of the women who underwent treatment for anovaginal or rectovaginal fistulas at the Department of Surgery, University Clinic of Schleswig–Holstein, Campus Luebeck and the Department of Surgery, WKK Heide, in the period from January 2000 to September 2016. Demographic and clinical factors, as well as perioperative data, were stored in an electronic database. The median follow-up period was 13 months (range 3–36 months).

All patients had proctoscopy together with endoscopic ultrasound, anorectal sphincter manometry, and a computed tomography scan or magnetic resonance imaging of the pelvis as routine preoperative diagnostic workup. Patients with inflammatory or malignant disease had additional diagnostic measures.

The treatment of high rectovaginal fistulas (from the peritoneal reflection to ≥ 2 cm from the dentate line) involved the excision of the fistula as the first step in our approach. After this procedure, the rectovaginal space was reconstructed with an interposition of the left-pedicled greater omentum. The mobilization of the greater omentum was carried out via a laparoscopic access (1×10 mm trocar supraumbilical and 2×5 mm trocar in the right mid-clavicular line infraumbilical) respecting the circular arterial perfusion leaving the gastric arcade at the omentum while preserving the right gastroepiploic artery (Fig. 1). This preparation ensured long segmental mobilization. In high rectovaginal fistulas, careful laparoscopic dissection of the rectovaginal space was done. The omentum was sutured to the pelvic floor to keep it in place with interrupted sutures (Fig. 2). In the presence of low rectovaginal fistula (< 2 cm from the dentate line), a transperineal pull-through of the left-pedicled greater omentum was done (Fig. 2). This step of the operation was always combined with transperineal dissection of the rectovaginal space.

In some patients with idiopathic fistulas, a transrectal or transvaginal omentoplasty was carried out. This consisted in pulling the omentum through the fistula defect after debridement as a "natural" plug fixating it with a single figure-of-eight suture to the rectal or vaginal wall to prevent dislocation. The fistula opening was closed with absorbable sutures after local debridement. A combination of an omental flap and a rectal mucosal advancement flap was used in some patients: after interpositioning of the flap between vagina and rectum, the anal opening was closed with a mucosal flap. A vaginoplasty was necessary in some patients with inflammatory destruction of the posterior vaginal wall. The destructed tissue was excised, and the vagina was reconstructed.
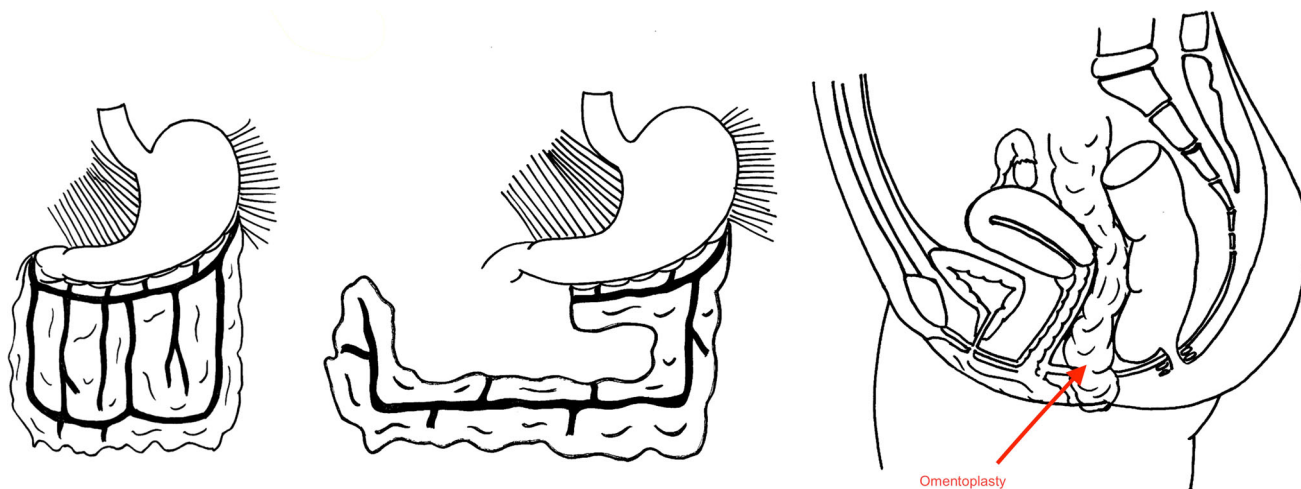

Omentoplasty

Fig. 1 Mobilization of the greater omentum

Fig. 2 Intraoperative picture of a transperineal pull-through of the larger omentum

Demographic and anamnestic data, in particular, specific medical history and previous surgery, therapeutic procedures, and the corresponding peri- and postoperative course of each patient, were analyzed retrospectively. Complications requiring surgical treatment or procedures by interventional radiology were considered as major complications.

Results

There were 58 patients with a median age of 50 years (range 27–87 years) (Table 1). Relevant medical history included diverticulitis ($n = 23$) inflammatory bowel disease ($n = 18$) and carcinoma with a primary localization in the pelvis ($n = 19$). All procedures, including resective procedures, omentoplasty without transanal/transvaginal repair, and colostomies, were accomplished laparoscopically.

Table 2 shows the surgical procedures done and the underlying disease or previous surgical interventions. Five patients had palliative surgery consisting in a loop colostomy. Surgical treatment as a curative approach was carried out in 53 patients. These patients were divided into two groups: resection vs no resection. Procedures not involving resection were preferred in patients who had previous operations because of the need for extensive adhesiolysis

Table 1 General patient characteristics

Patients	$n = 58$
Age (years)	Median 50 (range 27–87)
Body mass index (kg/m^2)	Median 23 (range 14–33)
Comorbidities	
Cardiac disease	20
Endocrine disorders	8
Pulmonary diseases	6
Bechterew's disease	2
Psychiatric disorders	5
Specific preexisting conditions	
Inflammatory disease Crohn's disease	15
Ulcerative colitis	3
Diverticulitis	13
Gastrointestinal carcinomas/precancerous lesions	
Rectal cancer	8
Anal canal cancer	2
Familial polyposis	1
GIST with rectal localization	1
Carcinomas of the female genital tract	
Cervical cancer	3
Vaginal carcinoma	3
Carcinoma of the urinary bladder	1
Post-Hartmann's resection	1
Creation of neovagina	1
No specific preexisting condition	6

GIST gastrointestinal stromal tumors

and in patients without specific preexisting inflammatory and malignant disease as these had a higher chance of healing since tissues were not compromised by either malignancy or active inflammation. All patients with non-resective procedures had an omentoplasty. Eight patients had not only interpositioning of the omentum in the rectovaginal space but additionally transvaginal/transrectal pull-through of the omentum as a biological patch.

The group that underwent resection ($n = 39$) was subclassified into continence-preserving procedures as low anterior resection ($n = 30$; 76.9%) and non-continence-preserving procedures including subtotal colectomy with ileostomy ($n = 5$; 10%), proctectomy ($n = 2$; 4%) and pelvic exenteration ($n = 2$; 4%).

All patients except the 5 who had palliative surgery had an omentoplasty.

All patients that underwent low anterior resection because of rectovaginal fistula secondary to Crohn's disease or ulcerative colitis had a protective loop ileostomy.

Table 2 Surgical treatment in relation to underlying disease

	Non-resective	Resective				
	Transrectal/transvaginal omentoplasty or closure	Low anterior resection	Subtotal colectomy	Proctectomy	Pelvic exenteration	Double-barrel sigmoidostomy
Overall	14	30	5	2	2	5
Specific preexisting conditions						
Chronic inflammatory diseases						
CD	–	6	3	1	1	–
Ulcerative colitis	–	3	–	–	–	–
Diverticulitis	–	12	1	–	–	–
Enteral carcinomas/precancerous lesions						
Rectal cancer	–	4	–	–	–	–
Anal canal cancer	–	–	–	1	–	–
Anal canal cancer and radiation therapy	1 (+plug)	–	–	–	–	–
Familial polyposis	–	–	1	–	–	–
Carcinoma of the female genital tract						
Cervical carcinoma	–	–	–	–	–	1
Vaginal carcinoma	–	1	–	–	–	1
Fistulas after previous surgery						
Local recurrence						
Rectal cancer	–	–	–	–	1	1
Vaginal cancer	–	–	–	–	–	1
Urinary bladder cancer as complication of	–	–	–	–	–	1
LAR for rectal cancer	1	1	–	–	–	–
Transanal rectal resection	1	–	–	–	–	–
Wertheim–Meigs	–	2	–	–	–	–
Hartmann for CD	–	1	–	–	–	–
Creation of loop ileostomy for CD fistulas	1	–	–	–	–	–
Mucosal flap for CD fistula	1	–	–	–	–	–
Transrectal omentoplasty for CD fistula	1	–	–	–	–	–
Hartmann for leak after resection rectopexy	1	–	–	–	–	–
Creation of neovagina	1	–	–	–	–	–
Without specific preexisting conditions	6	–	–	–	–	–

CD Crohn's disease

Three to twelve months after surgery and exclusion of fistula persistence or potential difficulty distinguishing solid stool from liquid stool, the loop ileostomy was reversed.

Toxic megacolon was the indication in all patients that had subtotal colectomy. This developed as complication of antibiotics use in patients with rectovaginal fistulas. Pseudomembranous colitis was observed in four patients of these patients. In one patient, Clostridium difficile antigen and toxin were positive without typical clinical presentation. Four patients, 3 with Crohn's disease and 1 with stenosing diverticulitis, had a complicated postoperative course. The fifth patient, with coloanal polyposis, had an uncomplicated recovery.

Proctectomy ($n = 2$) was performed in case of recurrent fistulas in Crohn's disease that led to severe sepsis and 1 case of anovaginal fistula due to advanced anal canal cancer and destruction of the internal and external anal sphincter.

Pelvic exenteration was unavoidable in two patients. In one patient Crohn's disease had led to destruction of the pelvic organs secondary to multiple fistulas. The other patient had local recurrence of rectal cancer with vaginal infiltration and development of a rectovaginal fistula. In both patients also cystectomy and urinary diversion were necessary.

In proctectomies and exenterations, the posterior vaginal wall was severely affected by scar tissue/tissue defects after resection, and the omentoplasty was placed to allow for uncomplicated wound healing and prevention of ascending infections from the vagina to the small pelvis.

In 9 of the 39 patients who underwent resection, a transperineal omentoplasty was necessary due to low lying fistulas.

In all patients (except patients with pelvic exenteration), the vaginal defect was closed. Patients with the history of a Wertheim–Meigs operation had an additional posterior vaginoplasty.

A non-resecting procedure was possible in 14 of our patients. In six patients who had idiopathic fistulas, a transrectal and transvaginal omentoplasty was done. The other eight patients had developed fistulas after previous surgical interventions. They were treated with primary fistula closure with simple suture of the fistula opening after careful debridement. Additionally, the omentum was placed in the rectovaginal space to allow for uncomplicated

healing of the fistula. In one patient with definitive radiation therapy for anal carcinoma, an additional anal fistula plug (AFP, Cook Surgical) was used because of tissue destruction. In patients with non-resecting procedures, we preferred the creation of a protective loop enterostomy to allow for uncomplicated healing.

An overview of the complications with reference to the particular surgical procedures and the underlying diseases is presented in Table 3. Major complications were documented in 10 patients (20%). Minor complications were observed in 17 patients (29%). The associated minor complication rate was 20% (n = 6) for all low anterior resections (n = 30). On the other hand, subtotal colectomies (n = 5) had an associated minor complication rate of 80% (n = 4).

The recurrence rate of rectovaginal fistulas was 6.9% (n = 4). Three fistulas occurred after low anterior resection and one after transvaginal and transrectal omentoplasty. In two patients with Crohn's disease, recurrence was complicated because of the development of multiple perianal fistulas with severe sepsis which led to emergency abdominoperineal excision of the rectum in one patient. These severe complications occurred during the first 4 months after the initial operation. In one patient, recurrence after low anterior resection for diverticulitis had to be rated as an iatrogenic fistula because of the inclusion of the vagina into the staple line.

Table 3 Minor and major complications

	No resection	Resection				
	Transrectal/transvaginal omentoplasty or closure	Low anterior resection	Subtotal colectomy	Rectal extirpation	Pelvic exenteration	Double-barrel sigmoidostomy
Overall (n =)	14	30	5	2	2	5
Morbidity						
Minor complications						
Cardiac events	–	2	3	1	–	–
Pneumonia	–	1	–	1	1	2
Prolonged ileus	–	–	1	1	–	–
Urge incontinence	1	3	–	–	–	–
Major complications		–	–	–	–	–
Fistula recurrence	1	3	–	–	–	–
ARDS	–	1	1	1	–	–
Bleeding	–	1	–	–	–	–
Renal failure	–	3	–	1	–	–
Stroke	–	1	–	–	–	–
Anastomotic failure	–	1	–	–	–	–
Small intestinal fistulas and open abdomen	–	–	1	–	–	–
Mortality	–	–	–	1	1	2

The overall mortality rate was 6.8% (*n* = 4). There was a direct correlation between surgery and mortality in two cases, after abdominoperineal excision for locally recurrent cancer and after pelvic exenteration for Crohn's disease. Both patients developed multiple organ failure secondary to severe septic shock after surgery. Two other patients had emergency surgery with very advanced stage of disease at the time of surgery and already fully developed multiple organ failure.

Discussion

Rectovaginal fistulas are not a uniform pathology but a clinical symptom of several diseases of the pelvis. In our study, inflammatory bowel diseases were the most common reason for rectovaginal fistula (*n* = 31). Other study groups [10–13] also showed that patients with Crohn's disease have a higher risk of developing rectovaginal fistulas. For patients with sigmoid diverticulitis, surprisingly few publications are available that address the risk of development of colovaginal fistulas [14]. Besides inflammatory diseases, carcinomas of the small pelvis play a distinct role in fistula development [14].

Fistulas that developed after previous surgical treatment were found in 15 patients to the causes were technical errors, prior tissue damage, progression of the underlying inflammatory disease, and local tumor recurrence in the small pelvis.

The most common technical error described in the international literature is the accidental inclusion of the posterior vaginal wall into the colorectal anastomosis [12] after low anterior resection. Only one rectovaginal fistula in our cohort was attributable to this pathology.

(Neo-) adjuvant therapies and in particular radiotherapy may lead to local destruction or compromise the course of normal wound healing [15]. Whether this was the case in two patients after a Wertheim–Meigs procedure followed by adjuvant therapy and one patient with definitive radiation therapy for anal carcinoma may have induced fistula formation, can neither be exactly evaluated nor excluded.

The diagnosis of spontaneous cryptoglandular rectovaginal fistula is rare and should only be made after the exclusion of other pathologies. The diagnosis of uncomplicated fistula should always be accompanied by the term "of unknown origin." In particular, the diagnosis of inflammatory bowel disease may be difficult with colonoscopy alone and without serial biopsies [16]. A high fistula is very unlikely to be the result of cryptitis or folliculitis and should prompt further investigations. Only in low rectal or anovaginal fistulas may abscesses secondary to folliculitis or cryptitis result in inflammation, destruction, and penetration of the surrounding tissues [17, 18].

Surgical therapy may be further compromised by complications of prior operations or pregnancies. Women who have had vaginal deliveries often experience pelvic floor dyssynergia or impaired anal continence after injury to the anal sphincter [19]. The postoperative impairment of anal continence often observed after prior low anterior resection s secondary to intraoperative damage to the hypogastric plexus [20]. To allow for exact planning of the operation anal sphincter manometry, endorectal ultrasound and a test of anal sphincter function with a quark enema were done in our patient cohort.

There is a need for definitive surgical treatment in almost every patient with a rectovaginal fistula. This almost absolute indication for surgery is not just secondary to the potential complications of the fistulas as, e.g., recurrent septic genitourinary infections but even more because of the diminished self-esteem of the patients and the risk of social isolation [21, 22].

The prognosis of the patient, the cause, and the location of the fistula determine the choice of surgical method. The surgical procedure should allow for a reconstruction of the preexisting anatomy besides the possible cure of the underlying disease.

Low anterior resection of the rectum is often the procedure of choice in patients with inflammatory disease or diverticulitis as well as in cancers of the gastrointestinal tract [12]. In Crohn's disease with rectal involvement or in patients with ulcerative colitis, we performed low anterior resection and reconstruction of the rectovaginal space using a pedicled left omentoplasty. For the closure of the vagina, a simple suture seems to be sufficient according to the currently available data [12]. Fistulas that persist for a long time often lead to perineal destruction [23]. In nine of our patients with destruction of the perineum, we did a perineal reconstruction using left-pedicled omentoplasty. The possible cure or attenuation of the underlying disease or modifications in drug treatment were discussed by the multidisciplinary team prior to any surgical therapy [24, 25].

There is the possibility of surgical cure not just in Crohn's disease but also of ulcerative colitis with restaurative procto-colectomy [26]. However, in our own approach, primary reconstruction was not done as the patients were of very advanced age. Low anterior resection was almost always successful in the treatment of complicated diverticulitis with fistula formation. In one case only, there was a more complicated postoperative course with fistula recurrence. Closure of the fistula was achieved with transvaginal and transanal sutures combined with a protective ileostomy.

In patients with rectovaginal fistula due to rectal cancer, low anterior resection is also the method of choice if the cancer is located above the dentate line. Because of

advanced stages of disease and diffuse organ infiltration, there is often an indication for multivisceral resection of neighboring organs [27]. Proctectomy is sometimes unavoidable in patients with Crohn's disease and complete loss of continence because of multiple fistulas.

Pelvic exenteration should only be considered as a last resort. In our patient population, it was performed two times. Other study groups also described pelvic exenteration but as an integral part of the therapeutic armentarium, but necessary only in exceptional cases [28]. Apart from the high perioperative morbidity and mortality associated with the procedure, the loss of the pelvic floor muscles with only limited reconstructive options, and the need to create a urostomy and enterostomy may cause further complications. Pelvic exenteration is therefore justified only if a chance of cure exists. Rare indications for palliative resections are large necrotizing tumors with a high bleeding risk or impending development of a cloaca.

Reconstruction of the rectovaginal space is the decisive factor in prevention of recurrence. In patients with high fistulas, left-pedicled omentoplasty is the only method possible. In low rectovaginal or anovaginal fistulas, some authors advocate for plastic reconstruction with a gracilis muscle flap [29–31]. Because of the excellent results of our treatment approach, we did not use additional flaps. The basic idea was not to compromise other regions of the body without urgent need. The data on reconstructions with muscle interposition or omentoplasty are very limited. It has been reported that interposition with vital structures (omentum or muscle) was comparable and superior to closure of the fistula alone [32, 33].

Our experience in patients with low anterior resection for cancer has shown that any low colorectal anastomosis must be protected with a double-barrel ileostomy [34]. We believe that our low fistula recurrence rate was also secondary to the fact that almost all patients had a protective stoma.

To keep short- and long-term complications at bay, exclusion of disease persistence or recurrence prior to hospital discharge and, in patients with inflammatory disease, especially, close follow-up are required. The follow-up intervals depend on disease activity. In our opinion, careful surveillance is essential during the first 3 postoperative months.

The recurrence rate in our study was 6.9%. Only four patients had fistula recurrence, which is comparable to or even lower than the results of other series (up to 30% recurrence rate) [17, 29, 30]. In contrast to other studies, we used the interposition of the omentum for the reconstruction of the rectovaginal space. Thus it is possible that our superior results were associated with this approach. Our results are comparable to those of other studies that also used omentum interposition [33]. Notably the existing

guidelines [12] leave out the management of fistulas secondary to inflammatory disease. We showed that the management of these fistulas is also possible with omentoplasty and the surgical methods described.

A comparison or matched pair analysis of our data was not possible because of a selection bias with the presentation of an absolute majority of patients with complicated rectovaginal fistulas. None of the patients developed a fistula after obstetric trauma. The multitude of underlying pathologies and their influence on the emergence and persistence of rectovaginal fistulas underline the need for an interdisciplinary collaboration in diagnosis and therapy. The choice of any surgical procedure is highly dependent not only on comorbidities but also on the underlying disease.

All published studies until now including the present one dealt with retrospective cohorts and a multitude of different therapeutic approaches. A standardized multicenter trial is urgently needed; because of the small numbers of patients even in specialized centers the accomplishment of such a trial seems doubtful [35].

Compliance with ethical standards

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