

Local Tissue Interposition Flaps in the Management of Post-traumatic Rectourethral Fistulae: A Case Series

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Abstract

Introduction: Rectourethral fistula is a relatively rare condition with a worldwide incidence rate of less than 3%, featuring a wide range of clinical presentations. Treatment mostly involves surgical correction via different techniques. Here, we look at a case series of complex rectourethral fistulae and their management involving local tissue flaps.

Case Presentation: Three patients with complex rectourethral fistulae underwent surgical repair with pedicled gracilis muscle flaps. All patients underwent a pelvic magnetic resonance scan and a flexible antegrade and retrograde cystoscopy before their repair. The gracilis muscle flap was harvested from the left thigh in two patients and the right thigh in the third patient.

Conclusion: Trauma and radiation are the two most common causes of rectourethral fistulae. Most of these patients have a poor quality of life and require surgical repair with some form of tissue interposition. The failure of a prior rectourethral fistula repair worsens the patient's quality of life and makes the subsequent surgery more challenging. Diversion of both the urine and feces as the initial treatment results in better outcomes of the final repair and hence should always be included in the management protocol of this rare entity.

Keywords: Quality of life, flaps, surgery, Rectourethral fistula, Gracilis flap, Surgical technique

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Introduction

Rectourethral fistula (RUF) is an abnormal connection between the rectum and the urethra. The incidence rate is 0.4-3%, with the condition imposing a significant detriment to the quality of life (1). As a consequence of pelvic irradiation (for malignancies), ablative therapies, chronic granulomatous infections, and trauma, acquired fistulae have risen in the last few decades. Treatment

mostly involves surgical correction, including urinary and/or fecal diversion (FD) (2). Conservative treatment is sparingly used only in small and non-radiated fistula cases. Various surgical techniques with variable success rates have been reported throughout the literature (3, 4). Many retrospective studies have assessed radiation's impact on surgical outcomes (5). The vascular damage and fibrosis induced in the surrounding tissue by irradiation and energy-ablating devices range from minimal to

extensive, resulting in heterogeneity of RUFs. Hence, no standard treatment protocols are available. Due to the local tissue damage and the difficulties in surgical reconstruction, the potential for recurrence increases greatly. In the present case series, we report outcomes of tissue flaps in the surgical management of males with RUF.

Surgical Technique

All three operations were performed under general anesthesia in a high lithotomy position. A flexible antegrade and retrograde cystoscopy was performed to pinpoint the exact location of the RUF and the placement of a Terumo glide wire. The glide wire was passed from the external urethral meatus through the fistulous tract and made to exit from the anus. A lambda-shaped perineal incision was taken 2 cm from the anus and extended up to the scrotum. The incision was deepened, the urethra was identified, and dissection was carried out until the fistulous tract was encountered. Then, the fistulous tract was excised, and the glide wire passing through it was noted. The fistulous tract and the scarred tissue around the rectum and urethra were debrided. Using absorbable 4-0 Vicryl [Ethicon, Johnson & Johnson,

Somerville, NJ, USA] continuous sutures, the urethra and rectum were closed separately. A silicon per urethral catheter was placed. After adequate mobilization, a long tongue-shaped pedicled gracilis muscle flap from the thigh was designed to allow rotation and interposition between the urethra and rectum. A number 12 silicon closed suction drain (Romovac®) was placed and fixed. The wound was then irrigated and closed with interrupted absorbable sutures (4-0 Vicryl). Finally, a supra-pubic catheter was re-inserted and fixed (Figures 1-4).

Case Presentations

Case 1

A 34-year-old male with no comorbidities presented to the emergency department with a history of penetrating injury to the perineum for which he underwent a loop colostomy + supra-pubic cystostomy (SPC) + posterior bladder wall repair three years ago, after which he developed a rectourethral fistula (RUF). A colonoscopy revealed a fistulous communication 5 cm from the anal verge. Magnetic resonance imaging (MRI) of the pelvis suggested a RUF between the membranous urethra



Figure 1: A long tongue-shaped gracilis muscle flap.



Figure 2: The superior pedicle of the gracilis muscle based on which the flap was harvested.



Figure 3: The gracilis muscle flap (rotated) brought into the perineum for placement between the urethra and rectum.

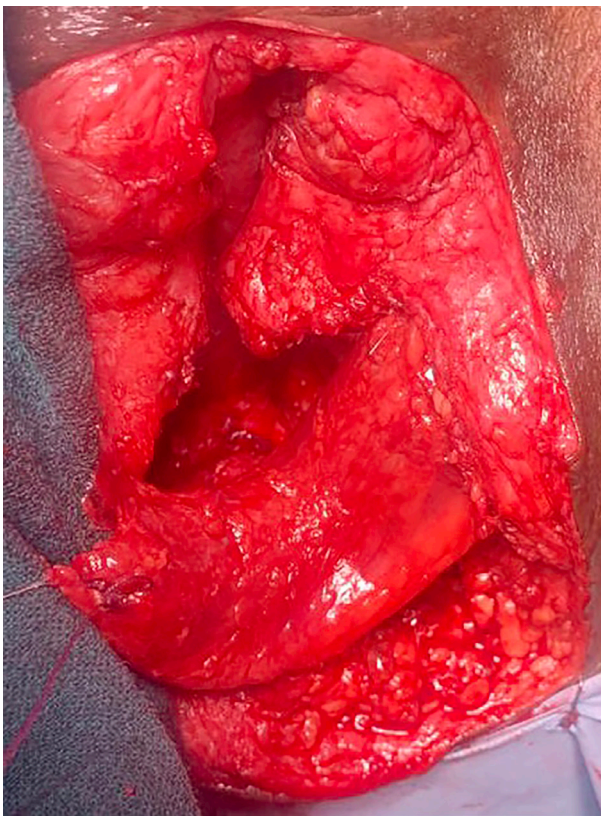


Figure 4: The gracilis flap being interposed.

and the rectum. He then underwent a RUF excision and repair with a tunica vaginalis flap and PPEE urethroplasty. Following the fistula repair, the per-urethral catheter was kept in situ for 30 days, after which he developed a leak. A history of erectile dysfunction, occasional per rectal urine passage, and passage of semen per rectum was elicited. A digital rectal examination revealed scarring near the fistulous opening about 2 cm from the anal verge. A flexible antegrade and retrograde cystoscopy showed a few vesical calculi, a stenosed posterior and bulbar urethra, and a RUF a little lower. After optimization, a percutaneous cystolithotripsy (PCCLT) + RUF repair was performed. The postoperative period was uneventful, and the compression dressing on the

thigh was removed two days following surgery. The patient's subcutaneous drain was removed on the third postoperative day, and he was discharged the following morning. The patient was doing well on his three-week follow-up, and the per urethral catheter was removed. The SPS was removed a week later. No urine leakage was reported after three months, and no fistula recurrence was noted after 18 months (Figure 5).

Case 2

A 43-year-old hypertensive male with a history of penetrating injury to the perineum while working on a tractor developed a RUF with leakage of urine through the rectum, for which he was treated at another center with a urinary diversion by way of an SPC, a fecal diversion through a loop colostomy, and a simple suture closure of the fistula by the trans-anal approach. Eight months after his injury, he was referred to our center for management of the failed RUF repair. His laboratory data were unremarkable. A digital rectal examination revealed a fistulous opening about 1–2 cm from the anal verge. Pelvic MRI suggested a fistulous communication between the posterior membranous urethra and the rectum. A flexible antegrade and retrograde cystoscopy at our center showed partial stenosis of the posterior urethra, with a RUF just below it. The patient underwent a RUF Repair with a proximal pedicle-based gracilis muscle interposition flap from the right thigh. He tolerated the procedure well and had no specific complaints postoperatively, except for mild pain over his right thigh, which subsided with intravenous acetaminophen. The compression dressing over the thigh was removed two days following surgery, while the subcutaneous drain was removed on the fifth postoperative day. Three weeks following the RUF repair, his per urethral catheter was removed, followed by SPC removal five days later. Three months following surgery, the patient reported no urinary leakage. On his 18-month follow-up, no fistula recurrence was noted (Figure 6).

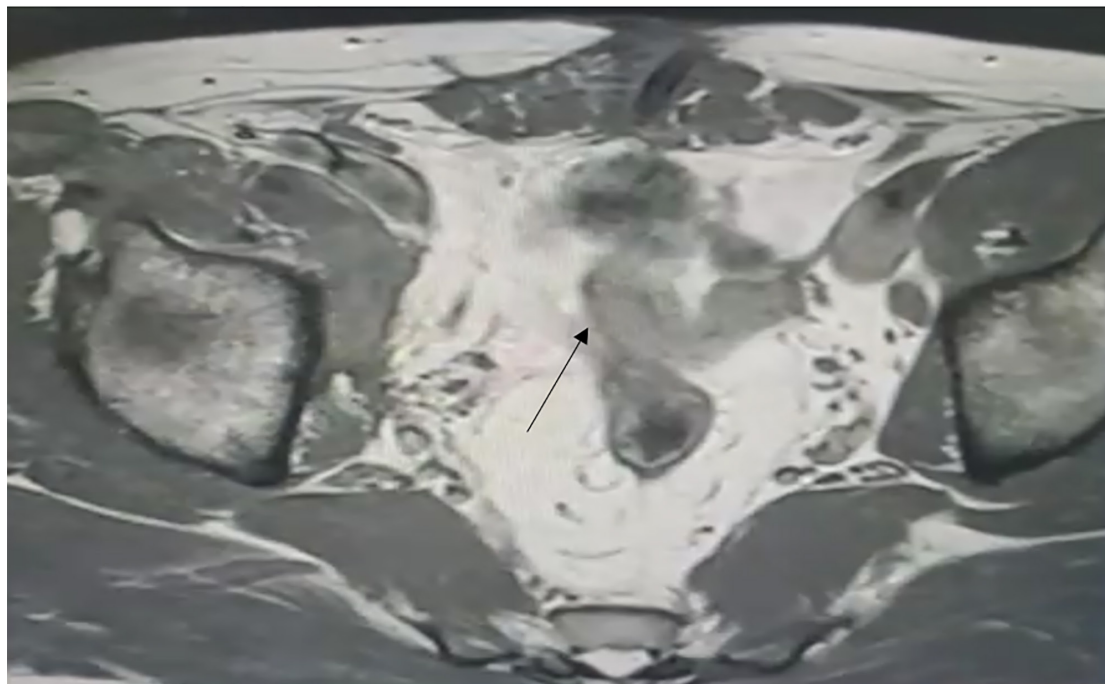


Figure 5: Abnormal communication between the urethra and rectum (Arrow)

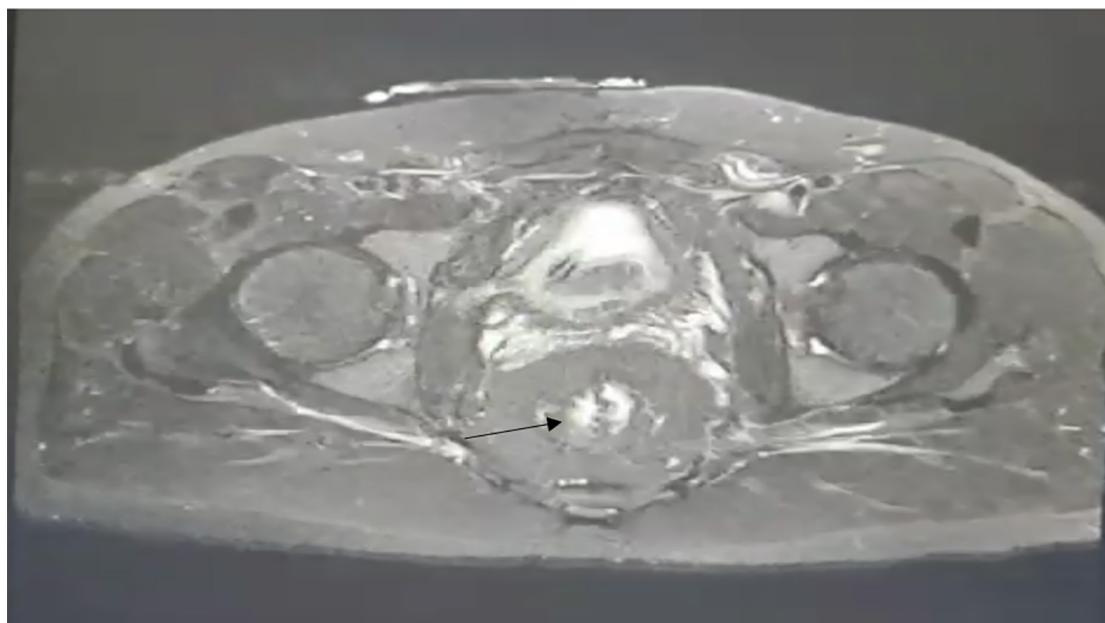


Figure 6: Contrast seen in the rectum, suggestive of a rectourethral fistula (pointed arrow)

Case 3

A 54-year-old diabetic male sustained penetrating trauma to the perineum while on his morning jog and developed a RUF with the passage of urine through the rectum, following which he underwent a urinary and fecal diversion at another hospital. Three months following his diversion, he presented to our center for further management. The pelvic MRI indicated a RUF between the posterior urethra and the rectum. A digital rectal examination revealed a fistulous opening just above the anal verge. A flexible antegrade and retrograde cystoscopy showed a narrowed, pale posterior urethra with a RUF just distal to it. He underwent RUF repair with a proximal pedicle-based gracilis muscle interposition flap. His postoperative period was unremarkable,

and his subcutaneous drain was removed on the second postoperative day. Three weeks following the RUF repair, his per urethral catheter was removed, followed by SPC removal five days later. The patient is still on regular follow-up at our center one year and a half after his surgery with no complaints of urinary leakage.

Ethics

Written consents for all patients have been obtained prior to the surgery.

Discussion

From May 2020 to August 2022, we treated three complex RUFs using a trans-perineal gracilis

interposition flap at our center, with no recurrence after 18 months. None of the three patients had complaints of motor dysfunction. One out of the three patients had sexual dysfunction, which was present pre-operatively.

Pelvic malignancies requiring radiation therapy are among the most common causes of an acquired RUF (6). Trauma, inflammatory bowel disease, and post-surgery RUF are other risk factors for an acquired RUF (7). Around 10% of small fistulae respond to conservative management involving a urinary and/or fecal diversion (8). For complex RUFs, surgical repair is the treatment of choice, and the aim is to achieve fistula closure and restore bowel and bladder function (9). Various surgical techniques have been described over the last 100 years; the most common approaches today are the York-Mason trans-sphincteric, trans-anal, trans-abdominal, and trans-perineal approaches. Based on the surgeon's expertise, these can be performed in the open, laparoscopic, or robotic fashion. The common principle in all these approaches involves debridement and excision of the fistulous tract, separation of the urethra and rectum, and tissue interposition between the two (10).

The literature suggests that the trans-perineal approach is most commonly used in complex RUFs (11). This approach allows for adequate exposure of both the rectum and urethra, thereby providing access for the interposition of various flaps. Several pedicled muscle flaps have been described, derived from the levator ani, dartos, or gracilis muscle. The pedicled gracilis muscle flap is often used due to its mobility, vascularity, and reduced donor site complications. The most common complication following a gracilis interposition flap is stress urinary incontinence, possibly due to the involvement of either one or both of the sphincters, with an incidence rate of 58% to 70% (12). A study with 23 RUF patients reported successful outcomes using a trans-perineal interposition flap for RUFs caused by energy ablation (13). Another study with 74 RUF patients, comparing radiated vs. non-radiated fistulae, reported 84% and 100% closure rates using the trans-perineal approach (14). Ghoniem et al. achieved a 100% closure rate in 25 RUF patients using the same approach (15). More recently, a multi-institutional study reported a success rate of 93% using a trans-perineal muscle flap and omentum for avoiding permanent urinary diversion in 210 RUF patients secondary to prostate cancer treatment (16). Unlike adults, in children, more than 80% of RUFs are trauma-related, providing us with options other than the gracilis muscle for tissue interposition (17).

According to the lower gastrointestinal toxicity scale proposed by the radiation therapy oncology group, a RUF is a dreaded grade IV complication of radiotherapy (18). In another review of more than 3000 radical prostatectomies, a rectal injury had a 0.7% incidence rate, despite the surgical approach (19).

Although a fecal diversion before the fistula repair is recommended, its use remains controversial. The hypothesis for a staged fistula repair is that it may allow a fistula to heal without manipulation of the urinary tract. However, when performed successfully, single-stage repairs may reduce the cost and morbidity involved with staging the surgery. The literature suggests staged repairs have higher success rates in fistulae caused by infections, radiation, or energy-ablative therapies (20). The most important step in fistulae associated with radiation is a fecal diversion. Here, patients may present with rectal ulceration or pain; hence, a colostomy is preferred. The general consensus is that a permanent colostomy be performed in radiation-induced fistulae, as these rates range between 20%-40% (21). Linder et al. noted that the primary repair was less successful in irradiated patients, suggesting that a permanent urinary and fecal diversion may be essential in managing post-radiotherapy RUFs (22).

A major concern for both the treating surgeon and the patients is that, while the focus on oncologic therapeutic outcomes has improved significantly, the impact of treatment on quality of life has often been overlooked. Cancer survival rates over the past few decades have significantly increased, but data on how to manage complications related to radiation therapy is sparse. Hence, managing these RUF patients should not only focus on reducing morbidity but also on improving quality of life.

From May 2020 to August 2022, we treated three complex RUFs using a trans-perineal gracilis interposition flap at our center; at their 18-month follow-up, all three patients were recurrence-free. None of the three patients had complaints of motor dysfunction. One out of the three patients had sexual dysfunction, which was present pre-operatively. Based on our experience, a trans-perineal approach with a pedicled gracilis flap is a feasible option in the treatment of complex RUFs.

Conclusion

Using a local tissue flap from the thigh via the trans-perineal approach is a great surgical option in treating traumatic or non-irradiated RUFs. However, for fistulae due to radiation, a single-stage repair may not be successful and can cause significant morbidity to the patient. Thus, a history of energy-ablative devices or radiotherapy will guide the choice regarding the surgical technique. The quality of life can be significantly impacted based on the treatment provided; hence, the treating surgeon should use their knowledge judiciously.

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Authorship Contribution

Professor Swarnendu Mandal had full access to all the data in the study and was responsible for the integrity of the data and accuracy of the data analysis. Study concept and design: Prasanna Ram; Acquisition of data: Prasanna Ram; Analysis and

interpretation of data: Prasanna Ram; Drafting of the manuscript: Prasanna Ram; Critical revision of the manuscript for important intellectual content: Swarnendu Mandal, Prasanna Ram, Manoj K Das, Sambit Tripathy; Statistical analysis: Prasanna Ram; Supervision: Swarnendu Mandal.

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