Repair of rectourethral fistulas with transperineal buccal mucosa

Our experience

Yunus Çolakoğlu[1], Ali Ayten[2], Deniz Noyan Özlü[3], Emre Şam[4], Abdülmuttalip Şimşek[1]

[1]Başakşehir Çam and Sakura City Hospital, İstanbul, Turkey; [2]Department of Urology, Bakirkoy Dr. Sadi Konuk Training and Research Hospital, İstanbul, Turkey; [3]Bitlis State Hospital, Bitlis, Turkey; [4]Erzurum City Hospital, Erzurum, Turkey

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ABSTRACT

INTRODUCTION: Spontaneous closure of rectourethral fistulas (RUF), often seen after radical prostatectomy (RP), is rare, and most cases require surgical repair. In recent years, the perineal approach has become the preferred technique. This study aimed to retrospectively present the surgical and functional results of transperineal buccal mucosal graft repair of RUFs developed after RP.

METHODS: Twenty-four patients who developed RUF secondary to RP between January 2016 and May 2023 were included in the study. Our study excluded patients who had previous unsuccessful fistula treatment and received radiotherapy (RT). Transperineal RUF repair was performed with buccal mucosa graft in all patients and patient data were evaluated retrospectively.

RESULTS: The mean surgery time was 15.3 (10–22) months after RP. The mean operation time was 110 minutes. The mean hospital stay was seven days. In 22 (91.6%) patients, the suprapubic catheter was removed in the third week. The mean followup period was 28 (4–76) months. The procedure was successful in all patients. No recurrence was observed in any patient during followup. The postoperative satisfaction of the patients was 100%.

CONCLUSIONS: Repair of RUFs secondary to RP with transperineal buccal mucosa is a surgical technique with a low complication and high success rates. This technique can be a good alternative to interposition procedures in non-complex fistulas.

INTRODUCTION

Rectourethral fistula (RUF), a complication frequently observed following radical prostatectomy (RP), represents a rare occurrence (<2%) but poses a significant clinical concern. Advances in surgical techniques have contributed to reducing the incidence of RUF as a complication; however, owing to the growing number of prostate cancer (PCa) diagnoses, there has been an increase in the overall number of patients affected by RUF.[1]

The small number and heterogeneity of cases make RUFs a significant challenge for surgeons. Given the distressing symptoms associated with this condition, it represents a profoundly devastating situation for patients.[2]

The spontaneous closure of RUFs is rare, and the majority of cases necessitate surgical repair. Treatment options encompass a diverse array of techniques, such as transanal, transsphincteric, perineal, and transabdominal approaches, and the application of interpositional flaps using various tissue types. Despite these options, however, a standardized surgical approach remains elusive in the current literature.[3]

In recent years, the perineal approach has emerged as the favored technique. This preference predominantly stems from its ability to afford extensive surgical access to both the urethra and rectum, facilitating various flap interpositions and onlay mucosal graft applications.[4]

Our objective was to retrospectively outline the approach adopted by a reference center for patients presenting with RUF following RP,

as well as to evaluate the surgical and functional outcomes of the transperineal buccal mucosal graft repair.

METHODS

Twenty-four patients diagnosed with RUF secondary to RP between January 2016 and May 2023 were included in the study. Our center is a tertiary institute that is a reference in reconstructive urology and all surgeries are performed by the same team (AŞ, YÇ). We excluded patients who had previously unsuccessful fistula treatment and received radiotherapy (RT) because our clinical approach was to apply a combined graft (buccal mucosa and gracilis graft) in these patients.

All patients underwent cystoscopy, urethrography, and magnetic resonance imaging (MRI) for diagnosis (Figure 1). All patients had undergone RP in other centers and were diagnosed with RUF in the same centers. All patients had tried conservative methods, such as bladder catheterization or suprapubic catheterization, in other centers and failed. They all underwent our routine clinical approach for RUFs, which involves bilateral nephrostomy tube placement and bowel diversion as the first-line treatment. Of those who had already undergone diversion in another center when they applied to us, 14/24 patients had bilateral nephrostomy and 13/24 had bowl diversion.

Subsequently, all patients underwent transperineal RUF repair using a buccal mucosa graft, following the technique described below, and their data were evaluated retrospectively.

The institutional ethics review committee approved this study (2024-132, Date 28.02.2024).

Surgical technique

The patients were positioned in the exaggerated lithotomy position with a 15-degree Trendelenburg tilt. A Foley catheter was then inserted into the bladder, and the bladder was emptied. To facilitate rectal examination during the procedure, a sterile glove was inserted into the rectum and sutured circumferentially around the anus. Subsequently, an inverted U-shaped incision was made, with its apex in the middle of the perineum and its ends terminating 1 cm medially or just superior to the ischial processes (Figure 2).

Continuing with subcutaneous dissection, the central tendon was reached and released via blunt dissection in the ischiorectal fossa on both sides, followed by cutting with cautery. The rectourethral muscles were visualized in the midline after lowering the central tendon, while the levator ani muscles were identified laterally.

Subsequently, after incising the rectourethral muscle, a surgical plane was established between the urinary structures and the rectum. A rectal examination was performed using a glove in the rectum to identify and expose the fistula, followed by sharp dissection. Fibrotic tissues surrounding the fistula were excised until intact mucosa was achieved.

In patients with severe bladder neck stenosis, the urethra was partially released, and lumen width was achieved by performing Y-V plasty before fistula repair. During fistula repair, rectal repair was conducted in two layers: firstly, continuous repair of the rectal mucosa with 5-0 polyglycolic acid suture (Vicryl), followed by interrupted repair of the submucosa and muscle layer with 4-0 Vicryl. The urethral defect was similarly released; continuous mucosa repair was performed using 4-0 Vicryl, followed by uninterrupted submucosa and muscle layer repair with 3-0 Vicryl.

Subsequently, the repaired defects were measured, and an appropriately sized buccal mucosa graft was harvested as previously described.[5] Following separate closure of the rectal and urethral mucosae, the graft was positioned between the two mucosae on the anterior wall of the rectum using a 5-0 monofilament absorbable suture, encircling the defect area (defect coverage after closure). After that, a Jackson-Pratt drain was inserted and secured in alignment with the anatomy. Additionally, a suprapubic cystostomy catheter was inserted into the bladder. Compressive dressing was applied to the perineal region for the initial 24 hours postoperatively.

Followup

The transurethral catheter and suprapubic catheter were retained until the postoperative 21st day. Retrograde pericatheteral urethrography was performed on the patients on the 21st day. If no leakage

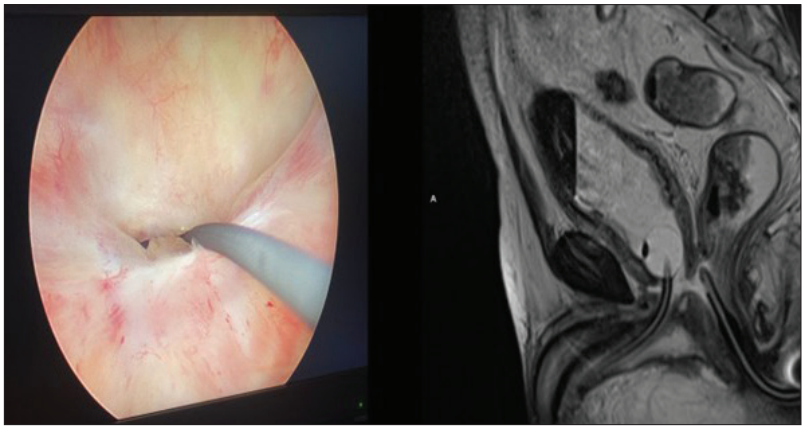

Figure 1. Preoperative urethrocystoscopy and magnetic resonance imaging.

was detected, bilateral nephrostomy and (if applied) suprapubic catheters were closed and the transurethral bladder catheter was removed. One week later, the patient's urination was assessed by uroflowmetry and postvoiding residue measurement, and bilateral nephrostomies and transurethral/suprapubic catheters were removed in appropriate patients.

Long-term followup involved cystoscopy performed from 3–6 months to assess for recurrence. Afterwards, symptom-based followup was continued. Furthermore, patients' satisfaction with the procedure and changes in their quality of life were evaluated using the Health-Related Quality of Life (HRQoL) form and the International Index of Erectile Function 5 (IIEF-5) score during followup after the third postoperative month.[6] The stoma in all patients with bowel diversion was closed within 6–12 months, with the earliest closure occurring six months following the repair.

Statistical analysis

Patient history and operative and postoperative data were collected retrospectively. Data are reported as numbers and percentages for categorical variables and means and standard deviations or medians and interquartile ranges according to the distribution for continuous variables.

RESULTS

Laparoscopic RP was performed in 11 (45.8%) of the patients, open retropubic RP in eight (33.3%), robot-assisted in four (16.6%), and open perineal RP in one (4.2%). The mean age was 64.2 (51–74) years. Ten (41.6%) patients had a history of smoking, six (25%) patients had diabetes mellitus, and four (16.6%) had a history of bladder neck stenosis. The mean time of fistula diagnosis was 36.4 (18–89) days. The mean fistula length was 15.2 (8–19) mm. The preoperative characteristics of the patients and the fistulas are given in Tables 1 and 2.

Operative data and surgical results

Operative data and postoperative complications are shown in Table 3. The mean interval between RP and RUF surgery was 15.3 months. The average duration of the operation was 110 minutes, and the mean length of hospital stay was seven days. Suprapubic catheter removal was performed in 22 patients (91.6%) during the third week postoperatively, while in two patients (8.3%), removal was deferred to the fourth week due to minimal urinary leakage detected during routine imaging before scheduled removal.

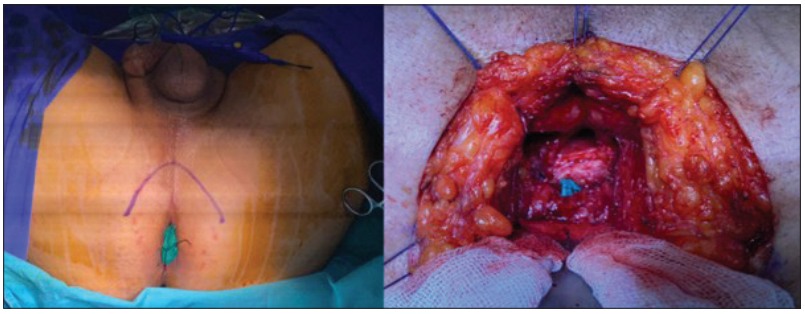

Figure 2. Incision and identification of fistula.

Table 1. Preoperative characteristics of patients (N=24)

Age (years)*	64.2 (51–74)
BMI, kg/m²*	29.3
Medical history, n (%)	
DM	6 (25)
Smoking	8 (33.3)
Bladder neck stenosis	2 (8.3)
Radical prostatectomy method, n (%)	
Laparoscopic	11 (45.8)
Retropubic	8 (33.3)
Robot-assisted	4 (16.6)
Perineal	1 (4.2)
Prostate volume (cc)*	42.3
Preoperative IIEF-5*	
Moderate ED**	8.9
Severe ED#	16 (66.7)
Stress urinary incontinence	6 (25)
Fecal incontinence	0 (0)

*Mean. **IEFF-5 score 8–11. #IEFF-5 score 5–7. BMI: body mass index, DM: diabetes mellitus; ED: erectile dysfunction; IIEF-5: International Index of Erectile Function.

Table 2. Preoperative characteristics of the fistulas

Fistula diagnosis time (days)*	36.4 (18–89)
Fistula length (mm)*	15.2 (8–19)
Fistula locations	
Bladder neck	14 (58.3)
Membranous urethra	10 (41.7)
Symptoms, n (%)	
Fecaluria/pneumoturia	14 (58.3)
Rectal wetting	10 (41.6)
Infection/abscess	16 (66.6)

*Mean.

Table 3. Operative data and postoperative complications	
Operative time (min)*	110 (139–230)
Estimated blood loss (mL)*	170 (80–310)
Length of stay (day)*	7 (4–12)
Postoperative complications	
Scrotal and perineal hematoma	8 (33.3)
Epididymal-orchitis	4 (16.6)
Endoscopic surgical intervention	4 (16.6)

*Mean.

Table 4. Postoperative functional results	
Postoperative followup (months)*	28 (4-76)
Postoperative recurrence	0 (0)
Stress urinary incontinence	8 (33.3)
Fecal incontinence	2 (8.3)
Postoperative IIEF-5	
Moderate ED**	9
Severe ED#	16 (66.7)
HRQoL assessment results	
Significant improvement	22 (91.6)
Minimal improvement	1 (4.2)
No change	1 (4.2)
Postoperative satisfaction	24 (100)

*Mean. **IEFF-5 score 8–11. #IEFF-5 score 5–7. ED: erectile dysfunction; HRQoL: health-related quality of life; IIEF-5: International Index of Erectile Function.

Complications occurred in eight patients (33.3%) during the postoperative period. Among these, one (4.2%) patient using anticoagulants developed scrotal and perineal hematoma, which resolved with scrotal elevation and cold application. Antibiotic therapy was administered to four patients (16.6%) due to the occurrence of epididymal orchitis. Additionally, endoscopic surgical intervention was required for four patients (16.6%) who developed postoperative urethral and/or bladder neck stenosis.

The mean followup duration of the patients was 28 (4–76) months. The procedure demonstrated success in all patients, yielding a 100% success rate. Remarkably, no instances of recurrence were detected throughout the entire followup period.

Functional results

Postoperative functional results are shown in Table 4. Fecal incontinence was reported in two patients (8.3%), while stress urinary incontinence was observed in two new patients following fistula repair, compared to six patients (25%) identified preoperatively. Including patients who newly developed incontinence, a total of eight (33.3%) patients with stress urinary incontinence received pelvic physiotherapy and medical treatment in the postoperative period. Among patients with a preoperative mean IIEF-5 score of 8.9, the mean postoperative IIEF-5 score was 9. According to the HRQoL assessments, 22 patients reported a significant improvement in their quality of life, one patient noted a minimal improvement, and one patient reported no change. None of the patients reported a decrease in quality of life postoperatively. Overall, postoperative satisfaction among patients reached 100%.

DISCUSSION

Despite advancements in medical technology, managing iatrogenic RUFs remains a complex and demanding task for surgeons due to limited surgical experience and insufficient literature.[7,8] The initial interventions for patients with RUFs can vary significantly from diagnosis to surgical repair. In many centers, a conservative approach involving fecal diversion and placement of a suprapubic catheter is commonly employed as part of the initial treatment strategy.[9,10]

While Vanni et al concluded in their study that urinary and fecal diversion may not be necessary even for the most complex fistulas,[11] all patients in our study underwent urinary and fecal diversion as part of our routine preoperative approach. We contend that transurethral/suprapubic catheter fecal diversion and nephrostomy tube placement should be employed in all patients with a complicated condition such as RUF, regardless of the etiology of the fistula or its complexity. The benefits of bowel diversion and nephrostomy tube placement include hastening postoperative wound healing; shielding the fistula site from chronic irritation, inflammation, and infection; and enhancing the viability of vascularized tissue surrounding the fistula.[12]

Repairing RUF after the initial approach typically involves two stages: initially, the fistula tract is exposed, fibrotic tissues are excised, and subsequently, the defect is repaired. The fistula tract can be accessed through the abdominal or perineal route to expose the operating area.[13] Our standard procedure for all RUF cases involves accessing the fistula through the perineal region. The perineal approach offers several advan-

tages: it uses an area untouched by previous abdominal surgeries, affords broad anatomical visibility and access to urethral and rectal structures, and allows surgeons to work within a familiar anatomical context. Notably, the perineal approach is gaining popularity in RUF repair within the literature.[2-4]

There are various methods for defect repair, including different graft or flap applications aimed at providing post-repair support.[11] The literature extensively covers the use of multiple types of interposition techniques. Among them, the gracilis interposition stands out for its notably high success rate in addressing complex fistulas;[11,14] however, this technique faces an increased risk of ischemic complications, especially in obese patients with short gracilis.[15,16] Other types of interposition are tunica vaginalis[17] and dartos,[18] bulbocavernous flap,[19] and biological material[13] interpositions.

The surgical approach employed in this study solely involved using the buccal mucosa graft method for treating recurrent, complicated, and previously failed fistula repair RUFs, resulting in a notably high success rate.[7] We opted not to employ this surgical approach in patients with a history of recurrent, complicated, and unsuccessful fistula repair, as well as those who underwent RT. Hence, they were not included in our study cohort.

Drawing from our clinical experience, we advocate for a combined approach using both buccal mucosa and gracilis interposition grafts in patients with a history of RT-associated, recurrent, and unsuccessful RUF surgery. This preference stems from the observed decrease in success rates when solely using buccal mucosa grafts, without a concomitant increase in fibrotic/avascular tissue density. Given the vascular-rich nature of the gracilis flap, incorporating it alongside buccal mucosa grafts has enhanced success rates, aligning with existing literature suggesting the supportive role of gracilis flaps in buccal mucosa graft procedures.[9,11] Consequently, our patient selection was oriented in this direction.

Nonetheless, given that our study cohort comprised uncomplicated patients, we surmised that employing solely buccal mucosal grafting would suffice without introducing additional morbidity. Furthermore, the increasing popularity of buccal mucosa grafts can be attributed to their favorable tissue compatibility and swift tissue bed healing.[7]

Another crucial consideration regarding graft placement involves positioning the buccal graft between two tissues after the separate closure of the rectal and urethral mucosa rather than directly over the fistula area, akin to a bridge. Placing grafts without closing the two tissue mucosae significantly heightens the risk of recurrence.[4]

Beyond the primary symptoms of the disease, numerous factors contribute to a decline in the quality of life among patients diagnosed with RUF. Delays in RUF repair treatment, stemming from factors such as conservative patient monitoring over a period of time, pre-treatments like urinary and fecal diversion, and frequent referrals to reference centers, significantly diminish patient quality of life. In our study, the mean time to surgery was determined as 15.3 (10–22) months after RP. The interval between diagnosis and fistula surgery is comparably prolonged, consistent with findings in the literature. This protracted duration can be attributed to all patients being referred to our center for assessment, necessitating prior conservative management and, in some cases, preoperative urinary or fecal diversion. Therefore, ensuring a high success rate in repair surgery and minimizing potential complications becomes paramount.

Our study evaluated patients' satisfaction after RUF repair with the HRQoL form and found the postoperative satisfaction of the patients to be 100%. No decrease in quality of life was observed in any patient.

Complications arising from RUF repair also significantly affect patient quality of life. Common complications documented in the literature following perineal repair include delayed wound healing, epididymoorchitis, and stress urinary incontinence. These complications can further exacerbate the physical and emotional burden on patients, underscoring the importance of careful postoperative management and surveillance.[8] While reported at variable rates, complications such as fecal incontinence and urethral stricture stemming from anal sphincter damage are also documented in the literature. These complications, albeit less frequent, represent significant challenges in the postoperative management of patients undergoing RUF repair.[20]

Urinary incontinence has been documented in the literature, but it is important to note that urinary incontinence may be linked to PCa surgery performed on patients and could manifest de novo following RUF repair.[14] In our study, it was noted that six patients already exhibited urinary incontinence before RUF repair. Additionally, stress incontinence, believed to stem from RUF repair, was observed in two patients. We posit that to mitigate incontinence arising from RUF repair, meticulous dissection of the urethral structures and avoiding unnecessary energy usage are imperative to safeguard the sphincteric structures.

Fecal incontinence is a relatively uncommon complication, particularly in the perineal approach, and when it does occur, its severity is typically mild.[14]

Urethral strictures are another complication seen after repair and are usually managed endoscopically.[2] We presented open, robotic, and endoscopic treatment options to four (16.6%) patients diagnosed with urethral and bladder neck stenosis, ultimately proceeding with endoscopic surgical intervention based on the patients' preferences.

The followup protocols followed after RUF repair vary according to clinics. The followup protocol employed for our patients included retrograde urethrography on the postoperative 21st day. If no urinary leakage was detected, the transurethral catheter was removed, the suprapubic catheter and bilateral nephrostomies were closed and removed seven days later. The closure of bowel diversions was performed within a timeframe ranging from 6–12 months postoperatively, aiming to mitigate late recurrence and enhance surgical success.

To our knowledge, this study represents the largest cohort evaluating the surgical efficacy and functional outcomes of transperineal buccal mucosal grafting in RUF repair. We achieved a 100% fistula closure rate and high patient satisfaction levels.

Limitations

The primary limitations of this study include its retrospective nature, the relatively small sample size, and the lack of comparison with alternative surgical techniques regarding surgical efficacy and functional outcomes. Furthermore, our methodology was implemented by a team specialized in functional urologic surgery, thus potentially limiting the generalizability of our findings to less experienced centers. Another limitation is that the mean time from diversion to RUF repair could not be recorded for the entire patient group, as some patients had urinary and intestinal diversions at other centers; however, we believe this time had minimal impact on the success of the surgery.

Future research should investigate our technique compared to other surgical approaches, ideally with larger patient cohorts, to provide more comprehensive insights into the optimal management of RUFs.

CONCLUSIONS

The repair of RUFs secondary to RP using transperineal buccal mucosa grafting is a surgical approach characterized by a low complication rate and high success rate. The transperineal approach enhances surgical accessibility to the fistula site and facilitates optimal fistula management. This technique has the potential to be a good alternative to interposition procedures in non-complex fistulas.

COMPETING INTERESTS: The authors do not report any competing personal or financial interests related to this work.

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CORRESPONDENCE: Yunus Colakoglu, Başakşehir Çam and Sakura City Hospital, İstanbul, Turkey; dr.yunusc@gmail.com