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Transperineal Management for Postoperative and Radiation Rectourethral Fistulas

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Abbreviations and Acronyms

IMF = interposition muscle flap

RUF = rectourethral fistula

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Purpose: The rectal sphincter preserving transperineal approach has been increasingly used successfully. We analyzed our experience with this surgical approach. A secondary aim was to evaluate the surgical outcome of energy ablative rectourethral fistulas without a concomitant interposition muscle flap.

Materials and Methods: We identified all patients with rectourethral fistula who underwent rectal sphincter preserving transperineal repair from 1998 to 2011. Re-approximation of the urethral mucosa, posterior anastomotic urethroplasty or partial/total prostatectomy with urethrovesical anastomosis was performed for urinary closure. The fistula cohort was divided into 2 groups, including postoperative and energy ablative fistulas, respectively. Success after perineal rectourethral fistula repair was defined as resolution after the first attempt at repair.

Results: A total of 23 patients underwent rectal sphincter preserving, transperineal rectourethral fistula repair. In the postoperative fistula cohort the fistula was successfully resolved in all 10 patients. A dartos interposition muscle flap was used in 2 of 10 patients. In the energy ablative cohort the fistula was successfully closed in 8 of 13 patients. An interposition muscle flap was not placed in 8 patients with an energy ablative fistula, of whom success was achieved in 5. Two of the 5 patients with an energy ablative fistula and a successful outcome without a concomitant interposition muscle flap had urinary extravasation, necessitating temporary catheterization.

Conclusions: Rectal sphincter preserving transperineal repair is a successful surgical method to repair postoperative and energy ablative rectourethral fistulas. An interposition muscle flap should be considered in the setting of energy ablative rectourethral fistulas to increase successful outcomes.

Key Words: urethra, rectum, fistula, surgical flaps, reconstructive surgical procedures

Surgical management for RUFs is challenging. Many factors should be considered before reconstruction, such as fistula etiology, size and location, the presence of radiation/energy ablation or a concomitant stricture and patient comorbidity. Surgeons should be comfortable with various reconstructive techniques because tissue integrity and unexpected findings, ie subclinical pelvic cavitation, can affect preoperative plans.

There is no consensus on the optimal method of RUF repair. Due to limited pelvic space and RUF rarity, many approaches have been described, including transanal, perineal, abdominoperineal, perineal transsphincteric and posterior sagittal pararectal approaches.[1] Surgeon familiarity with a particular ap-

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proach often dictates the choice. Because of limited patient numbers, all series to date have had insufficient numbers to allow for meaningful statistical comparisons. In addition, to our knowledge there are no published studies in which patients were randomized to various reconstructive approaches. Since this is a limitation that is difficult to overcome, single institution series are an important education source.

Using an IMF is not a strict requirement. In the absence of pelvic radiation/energy ablation, high success has been achieved when an IMF was applied.[2] As the number of single and combination radiation/energy ablative RUFs increased in recent decades, surgeons began to advocate concomitant IMF use.[3–5]

Our primary aim was to describe outcomes after rectal sphincter preserving perineal repair for RUFs. As a secondary aim, we present the outcome after repair of single and combination radiation/energy ablative RUFs in the absence of a concomitant IMF. We do not advocate strict avoidance of an IMF. However, the presentation of this interesting subcohort will be useful for physician knowledge and patient counseling.

METHODS

Study Cohort Description

A retrospective cohort study was performed of consecutive patients diagnosed with RUF who underwent surgical reconstruction from 1998 to 2011 at University of California-San Francisco Medical Center. RUF was defined as any fistula in the proximal anterior or posterior urethra that communicated with the rectum. At our institution a urethral reconstruction specialist and a colorectal surgeon perform RUF repair. The rectal sphincter preserving perineal approach is the only approach included in this study. Patients were not excluded from analysis based on fistula etiology but colovesical fistulas were excluded. Based on the added complexity of radiation/energy ablative RUFs, we describe 2 categories, including postoperative and radiation/energy ablative fistulas, respectively.

Preoperative Management

Preoperative examination included a history and physical examination. Retrograde urethrogram, voiding cystogram and cystoscopy were performed to assess urethral RUF site and possible concomitant urethral stricture. Digital rectal examination and sigmoidoscopy were done to assess the rectal side of the RUF. Anal manometry was used to assess anal sphincter health, when appropriate.

Urinary diversion via a suprapubic tube was performed in all patients before surgical repair. Fecal diversion was done 3 to 4 months before surgical repair for all radiation/energy ablative fistulas. In postoperative RUF cases fecal diversion was done preoperatively or at formal RUF repair. A temporary ileostomy was the preferred form of diversion but sigmoid colostomy was performed at surgeon discretion. In the presence of irreversible injury to the anal sphincter permanent colostomy was recommended.

Surgical Management

The prone jackknife position was the preferred choice for patient positioning. In select cases the lithotomy position was used. IMF placement was not uniform in the radiation/energy ablative or postoperative RUF cohort. This decision was made at the discretion of the surgeon (JWM) and not based on a formal protocol. When used, a dartos or gracilis IMF was harvested. If a gracilis IMF was necessary, the flap was harvested with the patient in the lithotomy position. Patients were then moved to the prone position after gracilis IMF harvest when prone RUF repair was desired. The rectal sphincter was preserved in all cases.

Surgical Repair for Urethral Fistula

An incision was made along the perineal raphe. Dissection was initially performed bilaterally into the ischiorectal fossa. This maneuver was vital to allow for a tension-free anastomosis. The rectal and urinary fistula edges were débrided before formal closure of each side.

Various repairs were used for the urinary side of the fistula. A buccal mucosa graft was never used. The decision to proceed with a specific approach was based on tissue integrity, fistula site, size and etiology, and other factors. Reapproximation of the urethral mucosa, posterior anastomotic urethroplasty or partial/total prostatectomy with urethrovesical anastomosis was performed. The bowel edges were reapproximated to close the rectal side of the fistula. Horizontal rectal closure was preferred to maximize luminal circumference. When rectal closure was not possible or the anal sphincter was not functional, permanent colostomy was chosen.

A suprapubic and a urethral catheter were left in place after RUF repair. Voiding cystogram was performed 4 to 6 weeks after repair. In the event of persistent urine leak the suprapubic catheter was left to gravity drainage and the urethral catheter was removed. The suprapubic catheter was not removed until there was no evidence of urine extravasation after voiding cystogram.

A successful outcome was defined as voiding via the urethra without self-catheterization and absent urine via the rectum. Postoperative stress incontinence was not considered a failure. The need for a subsequent anti-incontinence procedure was assessed. We recorded fecal undiversion, when possible. Fecal undiversion was not performed until at least 4 to 6 months after successful RUF repair.

The University of California-San Francisco human subjects division approved the study.

RESULTS

Preoperative Demographics

A total of 33 patients underwent RUF repair between 1998 and 2010. Sphincter preserving perineal RUF repair was performed in 23 patients, who were included in study. Average age at RUF repair was 63 years. The cohort was divided into 2 groups, including postoperative and radiation/energy ablative

RUFs, respectively (table 1). Mean followup of the entire cohort after RUF repair was 13 months (range 3 to 39). However, when stratified by radiation/energy ablation, the radiation/energy ablative cohort had longer mean followup. In the 7 patients who underwent surgery for prostate cancer the approach was open retropubic (3), robotic (3) and open perineal. Most radiation/energy ablation RUFs involved combined radiation and/or energy ablative sources (table 2). The prone rather than the lithotomy position was most commonly used (15 vs 8 patients).

Postoperative RUF Cohort

Eight of the 10 patients underwent fecal diversion before RUF repair (table 1). Three of the 10 patients had a history of a failed abdominoperineal, anterior transsphincteric and transanal/rectal advancement flap procedure, respectively, before referral to University of California-San Francisco for a repeat attempt at RUF repair. Preoperative evaluation for urethral stricture was important for RUF surgical planning since 30% of the men had a concomitant urethral stricture. The urethral stricture was excised and anastomosed when a concomitant posterior urethral stricture was present (3 cases). In the remaining patients excision and anastomosis (5) and tissue reapproximation (2) were performed. An IMF was harvested in 2 patients. In one of these patients transanal repair with rectal mucosa flap advancement had previously failed and the other had a perirectal abscess related to HIV.

A successful outcome was achieved in all 10 patients. One patient had temporary urine extravasation after 4 weeks of postoperative urethral catheter drainage, which resolved at the next visit. By the last followup date 2 patients had bothersome stress urinary incontinence. Successful transcorporeal artificial urinary sphincter was performed in each patient. We are unsure whether additional patients required urinary sphincter placement by their referring urology providers. Seven of 8 patients (87.5%) underwent fecal undiversion. We could not contact the single patient who did not undergo reversal. He never presented to our clinic for followup after successful urethral catheter removal. In this case RUF was secondary to radical perineal prostatectomy. The patient had a history of right radical colectomy for colon cancer.

Table 1. *Preoperative, operative and postoperative details of 23 patients in RUF cohort*

	Postop Cohort		Radiation/Energy Ablative Cohort	
No. pts	10		13	
Mean/median followup (yrs)	0.67/0.56		1.30/0.96	
Mean age	60.68		64.81	
No. fistula etiology:				
Prostate Ca	7		12	
Rectal Ca	0		1	
Gunshot wound	1		0	
Ulcerative colitis	1		0	
HIV	1		0	
No. prior open RUF attempt (%)	3	(30)	2	(15.4)
No. preop fecal diversion (%)*	8	(80)*	13	(100)*
No. concomitant urethral stricture (%)	3	(30)	4	(30.8)
No. pubectomy (%)	2	(20)	2	(15.4)
No. concomitant prostatectomy (%)	0		3	(23.1)
No. flap (%):	2	(20)	5	(38.5)
Gracilis	0		2	
Rectus	0		1	
Dartos	2		2	
No. temporary urine leak (%)	1	(10)	3	(23.1)
No. success (%)	10	(100)	8	(61.5)
No. later procedure/total No. (%):				
Fecal undiversion	7/8	(87.5)*	4/10	(40)†
Urinary sphincter	2	(20)	2/8	(25)‡

* Postoperative cohort included 2 patients without preoperative fecal diversion, radiation/energy ablative cohort included 1 male with permanent colostomy after rectal cancer treatment and nonirradiated/nonablative cohort included 1 male without preoperative fecal diversion.

† Excluding 2 patients who died postoperatively and 1 with rectal cancer.

‡ Excluding 3 patients who died postoperatively, including 2 at greater than 4 weeks, and 3 with surgical failure.

Table 2. *Surgery in 13 patients with irradiated/energy ablative RUF*

Radiation/Energy Ablative Source	No. IMF/Total No.		No. NonIMF Success/Total No.
	Use	Success	
Brachytherapy	2/4	1/2*	1/2
External beam radiation therapy	0	0	1/1
Cryotherapy	0	0	1/1
External beam radiation therapy, brachytherapy	1/3	0/1*	2/2
Brachytherapy, cryotherapy	1/1	1/1	0
External beam radiation therapy, cryotherapy	1/2	1/1	0/1
Brachytherapy, external beam radiation therapy, prostate salvage	0	0	0/1
Totals	5/13	3/5†	5/8

* One patient died of unknown etiology 3 to 4 weeks postoperatively.

† On intent to treat analysis treatment failed in 2 patients who died.

Radiation/Energy Ablative RUF Cohort

All 13 patients underwent fecal diversion before RUF repair at University of California-San Francisco (table 1). A prone approach was used in 8 patients and the lithotomy position was used in the remainder. Two patients underwent RUF repair before referral to our institution, including 1 in whom a perineal, nonsphincter preserving (ie York-Mason) approach failed and 1 in whom transanal fistula repair with a rectal mucosal advancement flap failed. In the latter patient hyperbaric oxygen therapy and fibrin glue injection had also failed. Hyperbaric therapy was unsuccessfully attempted in an-

other 2 patients, and fibrin glue injection and fistula tract cauterization failed in 2.

A concomitant urethral stricture was present in 4 patients (30%) (table 1). Total perineal prostatectomy and partial prostatectomy were performed in 2 of these patients, while bulbomembranous urethral excision and anastomosis were performed in the other 2. The remaining patients did not have a concomitant urethral stricture. Excision and primary anastomosis were performed in all except 1 remaining patient, who underwent reapproximation of the fistula edges.

Two patients died 3 and 4 weeks, respectively, after RUF reconstruction. The etiology was cardiac and undetermined in 1 patient each. The operative and postoperative course of each patient had been uneventful up to death.

Various IMFs were used, including dartos in 2, gracilis in 2 and rectus in 1 (table 2). The determination of using an IMF was based on surgeon preference. The sole rectus muscle harvest was successfully used as a paddle flap to fill a perineal defect after total colectomy. This patient sustained a RUF after brachytherapy but he also had a poorly functioning rectal sphincter and severe diverticulosis. The surgical outcome after RUF repair with IMFs was successful in the immediate postoperative period. However, the 2 patients with a gracilis IMF died of an undetermined etiology in the first 3 to 4 weeks.

At last followup 5 patients had evidence of stress incontinence, of whom 2 underwent artificial urinary sphincter placement using a transcorporeal approach in 1. Three patients with a radiation/energy ablative RUF without a concomitant IMF had a temporary urine leak after voiding cystogram 4 to 6 weeks after RUF repair. All 3 patients eventually healed with conservative treatment, although 70, 87 and 132 days of conservative management were needed, respectively.

The overall success rate in the radiation/energy ablative cohort was 61.5%. This was based on intent to treat analysis since the 2 deaths were included. If the outcome in these 2 patients had been successful, the success rate would have been 76.9%. Two of the 3 survivors with surgical failure received an ileal conduit and the other was treated with a suprapubic catheter.

DISCUSSION

A perineal, rectal sphincter preserving approach was used in all patients. In the postoperative RUF cohort the success rate was 100%. Only 2 patients had an IMF, which was obtained from scrotal dartos tissue. The success rate in the radiation/energy ablation cohort was lower at 61.5% and an IMF was used in 5 of the 13 patients. There was no formal treatment algorithm to guide muscle flap placement in this more challenging cohort. A buccal mucosa graft was not used during urinary repair, which differs from a recent publication.[3] While we support the use of buccal grafts, we do not believe that they are absolutely necessary.

An IMF is not an absolute necessity in the setting of postoperative RUFs. In the absence of radiation/energy ablation RUF cure can be achieved. Two recent studies attest to this fact.[2,4] Mundy and Andrich reported 23 postoperative RUFs.[4] In 1 patient bladder neck contracture developed, while the remainder fared well. A muscle flap was not used in the last 11 patients since the investigators thought that nonoverlapping suture lines would suffice. Durable outcomes in the strict absence of an IMF were reported in a separate series of postoperative RUFs.[6] The anterior transsphincteric approach (ie York-Mason) was successfully used in 43 of 44 postoperative RUF cases.

The presence of energy ablation adds complexity to RUF repair. Radiation and/or energy ablation (cryotherapy or high intensity focused ultrasound) can result in added morbidity, such as impaired tissue healing, pubic osteomyelitis, urethral or rectal stricture, pelvic abscess, cavitation defects and severe genital/rectal/pelvic pain. These added morbidities are a primary reason for advocating a concomitant IMF. In the setting of radiation/energy ablation fecal diversion before formal RUF repair is also recommended to decrease inflammation. Furthermore, magnetic resonance imaging should be considered to assist with preoperative surgical planning and patient counseling.[4]

We did not follow an algorithm for IMF placement during radiation/energy ablative RUF repair. A mixture of muscle flaps were used, including the dartos, rectus and gracilis muscles. Approximately 39% of our patients underwent repair while in the lithotomy position, which provides easy access to the gracilis muscle. However, this muscle was only harvested using the lithotomy position in the 2 patients in whom a gracilis IMF was harvested. A dartos flap was harvested in the only other patient in the lithotomy cohort.

The prone position was used in 15 of 23 RUF repairs. This position provides excellent surgical exposure since the pubic bone is not present to limit upward retraction. The improved visibility afforded by prone positioning aids in decreasing operative time. Since we used the prone position during 15 of 23 RUF repairs, we were cognizant of avoiding overlapping suture lines. When this was not possible, a dartos IMF was harvested using the prone position. While we previously reported our success with the dartos flap,[7] we have since stopped using the dartos flap due to the poor reliability of its pedicle.

An obvious limitation of this study is the small number and heterogeneous nature of the patients in the cohort. However, a series of 23 patients is respectable, given the low incidence of RUFs. A purpose of this study was to highlight the success of radiation/energy ablative RUF repair in the absence of an IMF. While we do not advocate avoiding a flap in this circumstance, our results will assist with physician knowledge and patient counseling. Unfortunately, the 2 patients in whom a gracilis IMF was harvested died in the first month after surgery, precluding our ability to assess the impact of this muscle flap. Despite this, we still advocate using gracilis IMFs. Another limitation is followup duration. We aim to continue to follow our patients to assess whether the absence of an IMF will impair the durability of RUF repair. Lastly, we acknowledge that the prevalence of stress incontinence after RUF repair is likely higher. Given the improved quality of life after RUF repair, patients may be less likely to proceed with additional surgical care, ie stress urinary incontinence surgery, especially if surgery was the original reason for RUF development.

CONCLUSIONS

Surgical repair for postoperative and energy ablative RUFs is challenging. IMF placement is not an absolute necessity in the surgical cohort. However, for postoperative RUFs we advocate strong consideration of an IMF in the setting of a previously failed attempt at open RUF repair or a large RUF. Given the higher degree of tissue/vascular destruction after radiation/energy ablation, an IMF should be strongly considered. The prone position provides excellent exposure but it may not be feasible if a gracilis or rectus IMF is required. In this case the perineal approach should be considered.

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EDITORIAL COMMENT

RUF is a decidedly complex, challenging, devastating complication of surgical and radiation therapy for prostate cancer. Ideally, it should be firmly resolved at the first attempt to correct it. The surgical demands of a reoperative procedure in this inaccessible space to repair the lesion has the continued potential of injury to the urinary and rectal sphincters, and erectile neurovascular anatomy along with a significant recurrence rate. What resonates clearly in this report is the significant morbidity and recurrence of the fistula that developed according to the surgical approach used and the implication that a muscle flap or mucosal patch graft does not contribute to a more consistent success rate.

These authors provide an in-depth review of a small but well studied group of surgical and energy ablative induced RUFs. In the retrospective review of their data they indicate strong consideration for interposing a muscle flap in the setting of a previously failed attempt at open RUF repair. The role of a muscle flap as the key adjunct to manage refractory perineal defects and fistula closure has now been recognized for decades. It not only acts as an interposition barrier but also prevents the development of noncollapsible and tissue loss dead space, significantly changes the wound healing potential of this hypovascular, fibrotic space and impacts graft take when used as a buttress for the mucosal patch graft of the urethral defect.

There is considerable evidence that anterior perineal anatomical exposure with wide separation of the recto-urethroprostatic space using the dorsolithotomy position, use of a buccal mucosal urethral graft patch and consistent use of graciloplasty with unilateral or bilateral gracilis muscle flaps is the most reliable technique to close an ablative energy induced RUF. The role of fecal diversion to protect the repair until fistula closure is secure is controversial. However, our personal bias is that for high risk, complex fistulas there should be the best possible conditions for closing the defects and avoiding the previously reported high incidence of fecal and urinary diversion in

the event that closure of this lesion fails. Compulsive adherence to this surgical strategy, including a low threshold for temporary laparoscopic ileostomy or permanent colostomy, graciloplasty and a graft mucosal patch used since 1974 in 103 patients with RUF, led to the successful closure of 96% of 56 surgically induced fistulas and 83% of 47 energy ablative fistulas, confirming the merit of this approach to this high risk injury.

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REPLY BY AUTHORS

The experience of Dr. Zinman with RUF repair is extensive, as evidenced by the high success achieved in the last 30 years (reference 3 in article). Based on our findings, we agree that there should be strong consideration for placing an IMF after radiation/energy ablation for RUFs. Regarding surgically induced RUFs, we also agree that an IMF should be considered when dead space surrounds the RUF due to poor vascularity or tissue loss.

Transperineal RUF repair using the lithotomy position is a reliable approach for RUF surgical repair. However, we found that the prone, transperineal sphincter preserving approach is also useful. Cephalad retraction is not inhibited by the pubic bone, thus, enhancing surgical visibility and decreasing operative time. Harvest of the gracilis interposition muscle flap is challenging using the prone position. Since completing this study, we have successfully harvested the gracilis muscle using the prone position at University of California-San Francisco. The gracilis muscle is marked while the patient is supine, which has allowed successful localization of the correct incision line after prone positioning. Using this approach, we have adopted a protocol of harvest and application of the gracilis interposition muscle flap for these fistulas in an effort to improve successful repair of radiation/energy ablative RUFs.