

Management of Surgical and Radiation Induced Rectourethral Fistulas With an Interposition Muscle Flap and Selective Buccal Mucosal Onlay Graft

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Abbreviations and Acronyms

BMG = buccal mucosal graft

EBRT = external beam radiotherapy

HIFU = high intensity focused ultrasound

RRP = radical retropubic prostatectomy

RUF = rectourethral fistula

RUG = retrograde urethrogram

SPT = suprapubic tube

VCUG = voiding cystourethrography

Purpose: Rectourethral fistulas are a rare but devastating complication of pelvic surgery and radiation. We review, analyze and describe the management and outcomes of nonradiated and radiation/ablation induced rectourethral fistulas during a consecutive 12-year period.

Materials and Methods: We performed a retrospective review of patients undergoing rectourethral fistula repair between January 1, 1998 and December 31, 2009. Patient demographics as well as preoperative, operative and postoperative data were obtained. All rectourethral fistulas were repaired using an anterior transperineal approach with a muscle interposition flap and selective use of a buccal mucosal graft urethral patch onlay.

Results: A total of 74 patients with rectourethral fistulas underwent repair with an anterior perineal approach and muscle interposition flap (68 gracilis muscle interposition flaps, 6 other muscle interposition flaps). We compared 35 nonradiated and 39 radiated/ablation induced rectourethral fistulas. Concurrent urethral strictures were present in 11% of nonradiated and 28% of radiated/ablation rectourethral fistulas. At a mean followup of 20 months 100% of nonradiated rectourethral fistulas were closed with 1 procedure while 84% of radiated/ablation rectourethral fistulas were closed in a single stage. Of the patients with nonradiated rectourethral fistulas 97% had the bowel undiverted. Of those undiverted cases 100% were without bowel complication. Of the patients with radiated/ablation rectourethral fistulas 31% required permanent fecal diversion.

Conclusions: Successful rectourethral fistula closure can be achieved for nonradiated (100%) and radiation/ablation (84%) rectourethral fistulas using a standard anterior perineal approach with an interposition muscle flap and selective use of buccal mucosal graft, providing a standard for rectourethral fistula repair. Even the most complex radiation/ablation rectourethral fistula can be repaired avoiding permanent urinary and fecal diversion.

Key Words: fistula, surgical flaps, rectum, radiotherapy

RECTOURETHRAL fistulas have been an uncommon but increasingly occurring complication of RRP and radiation therapy for organ confined prostate cancer, and they represent a unique surgical challenge for the reconstructive urological surgeon. The basis of

this challenge is an inaccessible, fibrotic and adherent space containing anal and urinary sphincter as well as erectile anatomy with the potential of injury to these structures.^{1,2} With the unprecedented volume of primary and salvage radiation occurring in the last

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Editor's Note: This article is the third of 5 published in this issue for which category 1 CME credits can be earned. Instructions for obtaining credits are given with the questions on pages 2596 and 2597.

decade along with the adjuncts of cryotherapy and HIFU, a dramatic change in the complexity of this lesion has developed. Patients treated with radiation have poor tissue quality, impaired wound healing, and more devastating comorbidities of stricture, incontinence and rectal dysfunction. Radiation induced RUFs accounted for only 3.8% of all reported RUFs before 1997, while the incidence of those appearing after 1998 increased to 49.6% of all published series. This commonly discouraged primary repair in favor of cystoprostatectomy or proctectomy with permanent fecal and urinary diversion.^{2,3} The lack of consensus on the optimal surgical option for closure of this fistula has resulted in the description of a myriad of techniques reflecting the uncertainty produced by limited small series without regard for etiology and comorbidities.⁴

We report the largest experience to date of RUF repairs, separating and comparing the outcome of nonradiated surgically induced fistulas with complex ones following radiated/ablative therapy managed by an anterior perineal approach with an interposition gracilis muscle flap and a buccal mucosal patch when the urethral defect was not amenable to primary closure. This exposure offers a wide access and visualization of the rectal and urethral defects with effective and complete separation of the rectal and urethral surfaces, along with adequate rectal mobility for a low tension 2-layer rectal wall closure.⁵ Importantly this exposure allows for the potential availability of several interposition flaps and the ability to repair a concomitant urethral stricture. This report is a 12-year overview of the surgical repair of a series of RUFs with a consistently successful outcome with low morbidity, and the application of a technique to close rectal and urethral defect regardless of size and complexity.

MATERIALS AND METHODS

Patients

Institutional review board approval was obtained to retrospectively examine the outcomes of all patients who underwent RUF repair at our institution from January 1, 1998 to December 31, 2009. The study included 74 patients, 35 with nonradiated surgically induced RUF and 39 with radiation/ablation induced RUF (see table). There were 3 patients excluded from study who presented with RUF but were deemed not to be candidates for repair. A stroke occurred in 1 patient shortly after presentation and 2 had devastated bladders that precluded urethral reconstruction. Patient demographics including clinical presentation, etiology, time to fistula onset, and operative and postoperative data along with prior number and type of attempts at closure were recorded. Preoperative evaluation included examination with the patient under anesthesia, combined cystogram and RUG, cystoscopy and proctoscopy. Patients underwent cystoscopy, RUG, cysto-

RUF repair

	No. Nonradiated RUF (%)	No. Radiated/Ablative RUF (%)
<i>Etiology of RUF</i>		
RRP	25 (71)	
Bowel resection	3 (9)	
Pelvic trauma	3 (9)	
Transurethral bladder tumor resection	1 (2.8)	
Inflammatory bowel disease	2 (5.7)	
Urethrotomy	1 (2.8)	
Microwave therapy		1 (2.5)
EBRT:		2 (5)
+ Low anterior resection		4 (10)
+ Brachytherapy		12 (31)
+ Brachytherapy + salvage cryotherapy		1 (2.5)
+ Transurethral prostate resection		1 (2.5)
+ Salvage HIFU		1 (2.5)
+ Salvage cryotherapy		2 (5)
Brachytherapy:		12 (31)
+ Transurethral prostate resection		1 (2.5)
+ Salvage HIFU		1 (2.5)
RRP + salvage EBRT		1 (2.5)
<i>Failed type of repair</i>		
Transabdominal	2	0
Rectal advancement flap	7	0
Gracilis interposition	2	1
Gluteal flap	0	1

gram and proctoscopy just before fecal undiversion to assess the repair.

In nonradiated surgical fistulas we routinely wait 3 months before surgical repair using urinary and fecal diversion to allow a trial of spontaneous resolution, and to allow the acute inflammatory phase to resolve. Radiation/ablation RUFs are repaired at a minimum of 4 to 6 months and may be deferred longer in the setting of pelvic infection, sepsis or persistent infected radionecrotic material which must be treated before attempts at RUF closure.

Surgical Technique

All patients were placed in the dorsolithotomy position using Yellofin® stirrups for exposure of the anterior perineal space by way of an inverted U-shaped incision. The rectourethral plane is entered under the transverse perineal muscles after dividing the central tendon while dissecting close to the rectal wall all the way to peritoneal surface dividing and exposing the entire fistula tract. The rectum is closed using a 2-layer transverse approximation to prevent anal stenosis. The smaller, less than 2 cm urethral defect is readily closed primarily after adequate urethral mobilization with a single layer of interrupted 4-zero monocril in a tension-free manner, while the larger (2 to 6 cm) urethral defect is repaired by a tailored buccal mucosal graft onlay with interrupted and continuous 5-zero monocril in a watertight seal. An interposition muscle flap is routinely rotated into the perineum to separate suture lines, support the urethral repair where a graft was needed and fill any dead space. The gracilis was our muscle flap of choice and is consistently transferred to the perineal space without tension through a capacious tunnel. This muscle is an expendable adductor of the thigh

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