The use of gracilis muscle flap as a cover of tabularized buccal mucosal graft in the posterior urethral injury

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Abstract
This is a case report of 35-year-old male patient, who underwent abdominoperineal resection for rectal cancer. There was postoperative wound complication which resulted in the formation of sinus in the perineal wound. During excision of the sinus tract, there was injury to the posterior urethra which leads to the formation of urethrocutoaneous fistula presenting as urinary incontinence. These findings were confirmed by ascending urethrogram and cystoscopy. We describe the use of gracilis muscle flap as support and cover for buccal mucosal graft which has been used for the repair of the posterior urethral injury. On removal of Foley’s catheter after 3 weeks of the surgery, there was no leakage of urine from the perineal wound, and the patient was continent. The highly vascularized muscle flap is beneficial in patients with a poor graft bed secondary to prior radiotherapy, avoiding urinary diversion in most patients.

Keywords: Gracilis muscle flap, posterior urethral injury, tubularized buccal mucosal graft

INTRODUCTION
During extirpative surgery for extensive anorectal malignancies, direct injuries to the urethra are rare but can occur. Many of these patients have a history of radiation therapy and are prone to fistula formation. These injuries and the postoperative sequelae such as fistula formation can be a source of significant morbidity and frustration. Management of such urethral injury and consequently formed urethrocutoaneous fistula is difficult. In this case report, we describe the use of gracilis muscle flap as a cover of tubularized buccal mucosal (BM) graft in the posterior urethral injury after abdominoperineal resection (APR) surgery.

CASE REPORT
A 35-year-old male patient had rectal carcinoma near the anal verge, for which he underwent APR. During postoperative period, there was wound complication and a sinus developed at the perineal wound. Meanwhile, he also received adjuvant chemotherapy and radiotherapy. He was managed conservatively over the time for 2 years, and discharge of serous fluid and sometimes pus persisted. For these chronic symptoms, the excision of the sinus tract was done. After 1 month of this surgery, the patient noticed leakage of urine from poorly healed perineal wound despite indwelling Foley’s catheter. He

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presented at our institute with the same complaints after 3 months of this surgery.

On cystoscopy, there was a large fistulous opening in the prostatic urethra. Methylene blue injected from the sinus tract was seen coming into the prostatic urethra suggesting tract between prostatic urethra and perineal wound. Ascending urethrogram (ASU) was done which showed leakage of contrast from the posterior urethra near the bladder neck, tracking towards the perineum [Figure 1].

For surgery, the patient was kept in the lithotomy position and midline perineal incision was given. Dissection of the bulbar urethra was done circumferentially. On further dissection, defect in the dorsal aspect of the prostatic urethra could be visualized. We disconnected the prostatic urethra from the distal urethra. Bulbar urethra had longer ventral rim than the dorsal aspect [Figure 2].

We harvested two BM grafts from each side. One of the two was fixed at the proximal end of the urethra and then tubularized over the Foley’s catheter. Another graft was placed as dorsal on lay at the distal end of the urethra and wrapped around the catheter. Anastomosis was done between the proximal and distal BM grafts, and continuity of the urethra was restored [Figure 3]. Gracilis muscle pedicle flap was brought into the perineum to fill up dead space created and to support BM graft. Incision was closed with drain kept in situ [Figure 4].

Postoperative period was uneventful. The drain was removed after 48 h of surgery and Foley’s catheter on day 21. The patient voided urine without any leakage from the perineum. The patient was continent after the surgery. ASU done after 3 months showed no leak of contrast from the posterior urethra. On cystoscopy at 6 months, there was good take-up of BM graft at the place of previous fistulous site.

**DISCUSSION**

Urethral injuries and strictures can be debilitating and cause significant morbidity. Posterior urethral injury-causing fistulas are often the result of radiation, failure of previous urethral reconstruction, or hypospadias repair or severe trauma.

In this patient, during excision of perineal nonhealing sinus, there was either *de novo* injury to the posterior urethra or healed urethral injury was disturbed. Scarred tissue secondary to the previous surgery as well as radiotherapy may be precipitating factors.

The most common presentation of a urethral injury is with fistula formation in the postoperative period. Cystoscopy and ASU are confirmatory investigations. Examination under anesthesia (EUA) and computed tomography cystogram are used in conjunction to help delineate the location and extent of fistulas.[1] In our case, the patient presented with leakage of urine from the perineal site and this leakage persisted in spite of keeping per urethral indwelling catheter, suggesting large-caliber fistula. We investigated the patient by doing ASU and cystoscopy which were suggestive of fistulous tract from the prostatic urethra dorsally.

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**Figure 1:** Ascending urethrogram showing leakage of contrast from the posterior urethra near the bladder neck

**Figure 2:** (a) Diagrammatic representation of defect in the dorsal aspect of the prostatic urethra. (b) Diagrammatic representation of the disconnected prostatic urethra from the distal urethra
Management of such posterior urethral injury is difficult mainly due to an adverse fibrotic, hypovascular, and inflamed periurethral tissue resulting in partial or total graft loss. This can be overcome by a change in vascularity of graft recipient site to ensure reliable inosculation. This can be achieved by transferring a number of trunk or thigh muscle flaps to buttress the graft subdermal surface or lamina propria surface. Skeletal muscles with or without their skin components have an established place in resolving complex wounds and repairing of tissue defects and fistulas that develop under unfavorable conditions. They provide coverage, obliterate dead space, separate suture lines, improve vascularity, and enhance white cell function.

Among the various options available, the gracilis muscle is apt for urogenital reconstruction because it is an effective and versatile pedicled muscle flap which can be harvested with relative ease and can be mobilized to the perineum without tension or significant donor site morbidity. Therefore, it has been used for covering urethral defects and fistulas.

Gracilis muscle flap can be used in various ways for urethral reconstruction such as a “tubed myocutaneous gracilis flap” or “prefabricated skin and muscle flap.” It can also be transposed to cover a BM graft and anchored to the periurethral tissues, obliterating dead space and providing vascular support to the graft.

Kua et al. have reported a case of post APR posterior urethral injury followed by urethrocutaneous fistula. They repaired the injury by mobilizing the bulbar urethra and resecting the prostatic part of the urethra followed by primary anastomosis of the bulbar urethra to the bladder neck. A gracilis muscle was wrapped around the anastomosis to buttress and support it. In our patient, the defect was longer, and hence, primary anastomosis was not possible. Instead, we used two BM grafts, tubularized them over the Foley’s catheter and re-established continuity of the urethra.

The outcome of surgery was evaluated by ASU and cystoscopy. The patient was continent at 18 months from the surgery. Factors that can lead to incontinence are direct sphincteric damage, bladder neck compromise, and radiation-induced fibrosis. However, no such factors were there in our case, and the patient maintained urinary continence.

In conclusion, the highly vascularized muscle flap is beneficial to support graft and improve its viability in patients with a poor graft bed secondary to previous surgery or prior radiotherapy.
Declaration of patient consent
The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest
There are no conflicts of interest.

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