Perineal Anastomotic Urethroplasty in the Management of Pelvic Fracture Urethral Injury: Our Outcome

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Abstract: Objective: we aimed to assess the surgical and patient-reported outcomes of perineal anastomotic urethroplasty for pelvic fracture urethral injury (PFUI). **Method:** The retrospective study was conducted at a tertiary care hospital. We included 35 male patients who underwent perineal delayed anastomotic urethroplasty for PFUI, and comprised data from March 2023 to November 2025. Clinical data was as well as patient-reported outcomes were noted using a predesigned questionnaire. **Result:** Among the 35 cases, success was observed in 32(91.4%). Spontaneous return of good erection was seen in 21 patients, irrespective of the outcome of anastomotic urethroplasty. Most patients reported high satisfaction with quality of life, surgical results, while sexual performance showed mixed outcomes. **Conclusion:** Delayed anastomotic urethroplasty was found to be effective in providing long-term restoration of urine flow. Improvement in erectile function, and restoration of fertility were seen in long-term restoration of urine flow. Improvement in erectile function were seen in long-term successful cases.

Keywords: Pelvic fracture urethral injury, anastomotic urethroplasty, progressive abdomino-perineal approach, inferior pubectomy, pelvic trauma

1. Introduction

Pelvic fracture urethral injury (PFUI) is a rare injury associated with pelvic fractures caused by blunt force [1,2]. Pelvic fracture urethral injury (PFUI) results in complete or partial disruption of the posterior urethra associated with or without concomitant complexities. In pelvic fractures, 10% cases are associated with urethral injuries [3]. Road traffic accidents (RTA) remain the major cause.PFUI is relatively rare and more common in males since the female urethra is shorter and more mobile than the male urethra; moreover, it is almost completely protected by the pubic bone [4,5].it can cause significant morbidity, including urethral gap, erectile dysfunction (ED), and urinary

incontinence (UI) [1]. Most PFUIs are located at the bulbomembranous junction, a region particularly vulnerable due to its anatomy. The membranous urethra's close relationship with the pubic rami and symphysis, combined with its stabilization by the puboprostatic ligaments and the urogenital diaphragm, makes it particularly vulnerable. This traumatic disruption complicates both the injury and subsequent surgical repair, necessitating specialized surgical expertise and tailored treatment approaches. The standard treatment for the post-PFUI urethral gap is delayed anastomotic urethroplasty (DAU) via a perineal approach [1,6]. DAU has a simple concept; specifically, complete removal of the trauma-induced scar and sequential use of the four ancillary techniques (bulbar urethral mobilization, corporal splitting, inferior partial pubectomy, and supracrural urethral rerouting) as required to achieve tension-free urethral anastomosis [7]. DAU by experienced surgeons has a fairly good success rate,which generally exceeds 90% [8–9]. This article presents a series of 35 patients of DAU for PFUI; moreover, we aimed to evaluate its effectiveness with respect to surgical and patient-reported outcomes.

2. Methods

Patient Selection and Evaluation of Urethral Gap

The retrospective study was conducted at a tertiary care hospital, and comprised data from March, 2023, to November, 2025, related to all patients who had undergone DAU for PFUI and had remained on a minimum of six months of follow-up. The urethral gap was evaluated at 3 months after pelvic trauma [10].All the patients had a suprapubic catheter at the time of referral which was changed at the time of admission. Urethral gap length, urethral injury site (i.e., either at the prostatic apex, within the membranous urethra, or at the bulbomembranous junction), and bladder neck competency were assessed through retrograde and antegrade urethrography, as well as antegrade cystoscopy via SPC tracts. In principle, pelvic contrast-enhanced magnetic resonance imaging was performed to evaluate periurethral information in selected patients and help select the repair type [11].

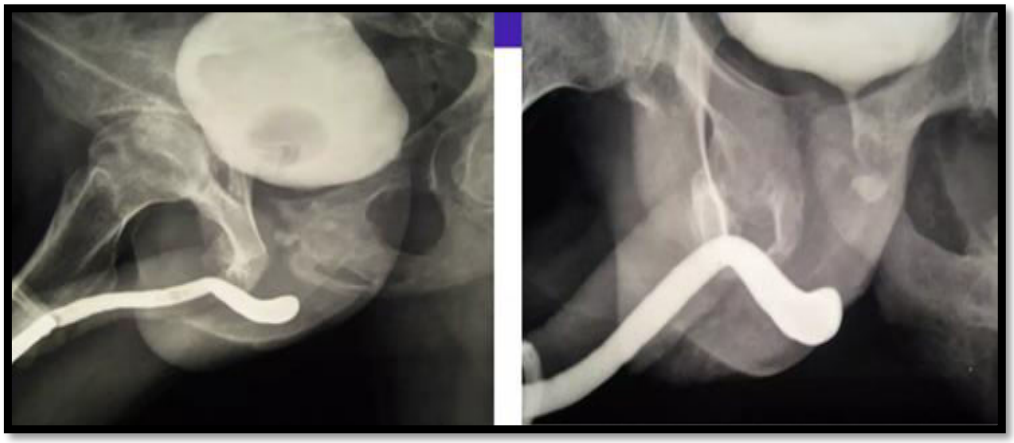

Figure 1: RGU and VCUG - Complete block at the bulbomembranous junction and longer urethral defected length

Operative procedure

Under general anaesthesia, the patients were placed in a lithotomy position with precautions to prevent position-related injury. The infraumbilical abdominal and perineal area was painted and draped in one field. Vertical incision was given in the midline of the perineum. Colles' fascia was cut with the electrocautery. Bulbospongiosus muscle was identified and gently dissected off the corpus spongiosum and opened in the midline. The urethra was circumferentially dissected distally up to the penoscrotal junction and proximally up to the scarred fibrotic tissue and transacted at this level. The dense sclerosed fibrotic tissue was carefully excised completely till the supple tissue was reached. If needed, crural separation and inferior pubectomy were performed. The proximal urethra was opened over a Haygrove staff. This urethra was spatulated at 12 o'clock position. Mucosal everting fixation sutures were taken with 4-0 vicryl interrupted sutures. Hemostasis was achieved meticulously. The bulbar urethra was mobilized up to the penoscrotal junction. It was trimmed back to a visibly normal area and spatulated at 12 o'clock position. The mucosa was fixed with 4–6 interrupted 4-0 vicryl suture. A tension-free bulboprostatic anastomosis was done by 6–8 interrupted 4-0 PDS sutures over a 16 Fr Foley catheter.The wound was closed in layers after obtaining hemostasis and putting suction drain 14 fr. A light compression dressing was applied. Postoperatively, the patients were given intravenous antibiotics for 5 days followed by oral antibiotics till the removal of catheter. The drain was removed on the 2nd postoperative day. The patients were discharged on the 7th postoperative day.

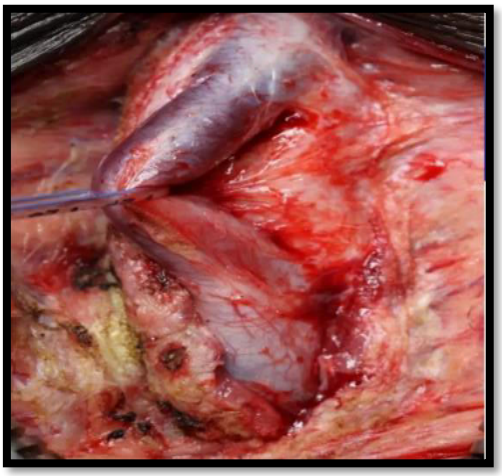

Figure 2: Bulbar urethral mobilization

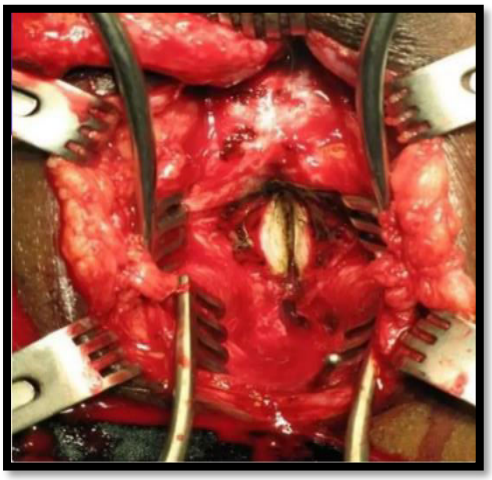

Figure 3: Crural separation

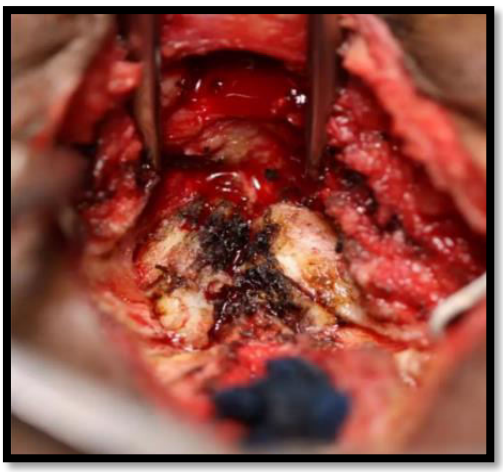

Figure 4: Inferiorpubectomy

Figure 5: Post anastomotic image

Postoperative Follow-Up

MCUG was done at 3 weeks, and if no extravasation was observed, the urethral catheter was removed and voiding trial was given. Suprapubic catheter was removed subsequently after 48 h. These patients were followed up 3 monthly in the 1st year and 6 monthly in subsequent years with uroflowmetry andmeasurement of the postvoid residual urine volume (PVR).Success was defined as a patient who, after a minimum of one-year of follow-up post-DAU for PFUI, had a UFM >15ml/sec and PVRU <50ml and who had undergone no

further urethral surgery except for a single diagnostic cystoscopy in equivocal case. They were questioned on their erectile dysfunction (ED) status (if married) as per the International Index of Erectile Function (IIEF), and whether they had had a child after the surgery. Questions were directed towards the degree of satisfaction after surgery in relation to the quality of life, result of surgery, sexual performance, ejaculation, appearance of genitalia, and the presence of chordee and painful erections.

3. Results

Mean age of the patients was 36.7 years with the range of18 to 56 years. Complete loss of urethral continuity was observed in all the cases during the antegrade and RGU. MCUG showed a complete block distal to verumontanum in all the cases. RGU showed a complete block at the level of the proximal end of bulbar urethra in all the cases. Mean stricture length was of 2.9 +/- 1.4 cm and it was at bulbo-membranous junction in all 35 patients. Antegrade cystourethroscopy revealed a normal bladder neck with mucosal coaptation in all the cases. Verumontanum was visualized in all the cases. There was no evidence of scarring or false passage at or distal to the level of the bladder neck. Retrograde urethroscopy revealed normal penile and bulbar urethra with complete block at the level of proximal bulbar urethra. Of the 35 DAUs, crural separation was done in all patients and inferior pubectomy was required in ten patients. Transpubic approach was required in two patients. Mean operating time was 298 (range 180–400)

min. Mean blood loss was 174 (range 100–500) ml. Intraoperative blood transfusion was given in three patients. None of the patients had any wound infection.

Five patients had minimal extravasation at the anastomotic site after catheter removal which was treated by re-catheterization for further 1 week. All the patients were continent after surgery except one. This patient had transient incontinence with the passage of few drops of urine two to three times a day. It resolved over a period of 6 months with conservative management.

Of the 35 DAUs, 3 developed recurrences. Symptoms developed immediately after catheter removal in all three patients. All recurrent strictures were of short length (<1.5 cm) and

at the site of the anastomosis. Of the three recurrences, two were having a recurrence after a redo urethroplasty and were managed with anastomotic urethroplasty after interval of 3 months. The remaining one patient who was having recurrence for the first time could be managed with anastomotic urethroplasty. No other major complication was seen during the follow up.

An initial success of 91.4% was achieved whereas an overall success of 100% was achieved.Data on erectile function before and after surgery none of these patients developed erectile dysfunction due to surgery. None of the patients who had erectile dysfunction before surgery improved after urethroplasty.

Baseline characteristics of patients

Parameter	**value**
Mean age (Years)	36.7 years (range 18 – 56)
Sex	Male
Number of patients	35
Mechanism of trauma	RTA-33 FFH-2
Mean time to failure after previous surgery	6 months (3-9 months)
Patients with SPC in situ	35
Patients referred from elsewhere(n=2) urethroplasty-33 Patients operated at our centre (n=33) urethroplasty-2	Single Recurrent
Defect site	BMU-32 PMU-3

Figure 6: opst-op VCUG

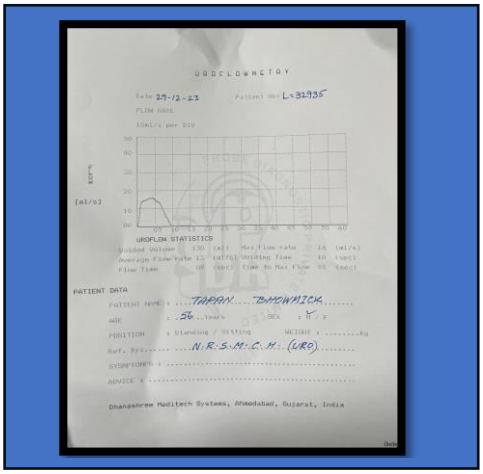

Figure 7: post-op Uroflowmetry

4. Discussion

Posterior urethral trauma can be catastrophic, the commonest cause of PFUI being RTA. The incidence of urethral injuries following pelvic fracture is around 10%. Urethral injury is usually present with acute retention of urine. These patients are managed by suprabupic cystostomy and interval urethroplasty is done after 3 months.The pelvic trauma leads to snapping off of the bulbomembranous junction which is the weakest and unsupported area. In our study, verumontanum was visualized in all the cases during antegrade scopy. The defect is longer because of the proximal migration of prostate due to shearing off of the delicate puboprostatic ligament. The aim of the surgery in such cases is to have a patent, continent, and durable repair of the urethra with least number of urethral instrumentations.DAU is considered the gold standard for PFUI in men and has become a familiar procedure among reconstructive urologists worldwide.The DAU for PFUI is among the most challenging procedures in urology [1,12]. DAU seeks to achieve tension-free urethral anastomosis after adequate mobilization of the bulbar urethra and sequential use of ancillary techniques, including corporal splitting, inferior partial pubectomy, and urethral rerouting, as required [7]. Indications for assistive techniques are dependent on the severity of the PFUI. The most difficult point in DAU is identifying the urethral end and accurate anastomosis in the narrow field of view from the pelvic perineum, where the anatomy has been disrupted by pelvic trauma. Reconstructive urologists should be familiar with all ancillary techniques and should handle them whenever necessary [13]. Various clinical parameters, including the long urethral gap length, history of angioembolization, bulbar urethral status, lateral prostatic displacement, and incomplete scar excision, are associated with post-DAU anastomotic stenosis [14].

This evaluated both surgical and patient-reported outcomes of DAU for PFUI and could provide useful information for PFUI management by reconstructive urologists, prostatic apex and the external sphincter function is lost [15,16]. However, it was subsequently

found that urethral injury most often occurs at the bulbomembranous junction, with the external sphincter function being often preserved to some extent [17–20]. The incidence of UI in patients with PFUI ranges from 2% to 25%, which widely varies across reports, possibly due to the inconsistent definitions of UI [21–24]. Excessive dissection of the remaining membranous urethra and excessive use of energy devices should be avoided to preserve urinary continence. This series evaluated both surgical and patient-reported outcomes of DAU for PFUI and could provide useful information for PFUI management by reconstructive urologists.

5. **Conclusion:** Management of PFUI can be successfully managed by suprapubic cystostomy and the delayed anastomotic urethroplasty for PFUI after 3 months can yield excellent results with minimal complications.

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