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Original Research Article

Our experience with progressive perineal urethroplasty and anastomotic urethroplasty in post-traumatic urethral strictures in pediatric patients

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ABSTRACT

Background: Confined perineum and elevated prostate and bladder in children make management of post-traumatic stricture in children technically difficult.
Methods: A retrospective study of patients from 2007 till September 2016 was conducted. 15 pediatric patients with a mean age of 7.3 years presented with post traumatic urethral stricture or distraction defect. 11 patients had pelvic fracture urethral distraction defect (PFUDD) and underwent PPU. Four had bulbar stricture caused by straddle injury and underwent EEU. Post operatively patients were evaluated using uroflowmetry at 3, 6 and 12 months. Maximum velocity of less than 10 ml/s and symptoms of straining was considered as recurrence and such cases were evaluated further with MCU, RGU and cystoscopy.
Results: Mean stricture length was of 2.3 cm and was at bulbo-membranous junction in 11 and in proximal bulbar urethra in 4. Of the 11 PPUs, crural separation was done in nine and inferior pubectomy in six patients. Transpubic approach was required in one patient. Gracilis flap was placed in one patient as an onlay over anastomotic urethroplasty. Of the 11 PPUs, 2 patients and 1 of 4 EEU patients had recurrence. All recurrent strictures were <1.5 cm long and at the site of the anastomosis. Two patients were managed with anastomotic urethroplasty. The remaining one patient could be managed with laser visual internal urethrotomy.
Conclusions: PPU and EEU are treatment of choice in paediatric patients with PFUDD and proximal bulbar strictures respectively. Both are technically feasible, have good outcome and have an acceptable morbidity.

Keywords: Children, Distraction defect, Pelvic fracture, Straddle injury, Urethroplasty

INTRODUCTION

Pediatric urethral stricture may be congenital or acquired.[1-3] Acquired causes include bulbomembranous distraction caused by pelvic fracture and anterior urethral stricture caused by straddle injuries or previous urethral surgeries like hypospadias repair.[1,2] The surgical techniques for such strictures in children remain same as for adults. However, confined perineum and elevated prostate and bladder in children make surgery technically difficult.[4,5] We present our experience at a tertiary care centre with progressive perineal urethroplasty and anastomotic urethroplasty in children with traumatic urethral stricture.

METHODS

A retrospective study of records of patients from 2007 till September 2016 was conducted. 15 pediatric patients (12 years or younger) with a mean age of 7.3 years (range of

3-12 years) presented with post traumatic urethral stricture or distraction defect. 11 patients had pelvic fracture urethral distraction defect (PFUDD) while four had bulbar stricture caused by straddle injury. Of the 11 PFUDD patients, two were cases of recurrent stricture within 12 months of primary surgery.

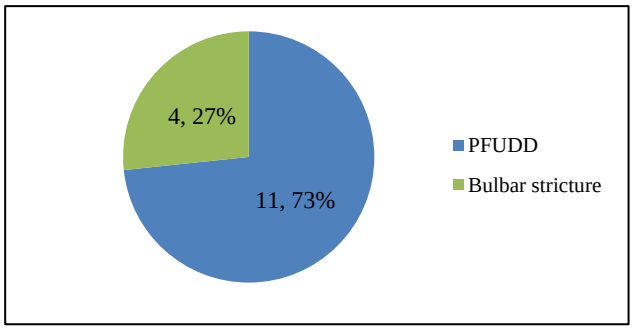

Figure 1: Number of patients.

11 patients with PFUDD underwent progressive perineal anastomotic urethroplasty (PPU). The remaining four patients with bulbar strictures underwent end-to-end anastomotic urethroplasty (EEU). Per urethral silicon catheter (8 to 10 Fr.) was kept along with suprapubic catheter (SPC) for 21 days post operatively and voiding trial was given thereafter. SPC was removed if voiding trial was successful. Post operatively patients were evaluated using uroflowmetry (UFR) at 3, 6 and 12 months. Maximum velocity (Q_{max}) of less than 10 ml/s and symptoms of straining was considered as recurrence and such cases were evaluated further with MCU and RGU (micturating and retrograde cystourethrogram) and cystoscopy.

RESULTS

Mean stricture length was of 2.3 (1.5-2.6) cm and it was at bulbo-membranous junction in 11 patients and in bulbar urethra in 4 of them. Of the 11 PPUs, crural separation was done in nine patients and inferior pubectomy was required in six patients. Transpubic approach was required in one patient.

Figure 2: MCU in a PFUDD patient showing dilated posterior urethra and contrast not seen beyond bulbomembranous junction.

Figure 3: RGU in the same PFUDD patient showing normal anterior urethra and thin jet of contrast entering urethra beyond stricture.

Figure 4: Incision in progressive perineal urethroplasty and anastomotic urethroplasty.

Gracilis flap was placed in one patient as an onlay over anastomotic urethroplasty. He had developed a post-traumatic rectourethral fistula. Diverting colostomy had been done at the time of the injury, which was closed 8 weeks post urethroplasty.

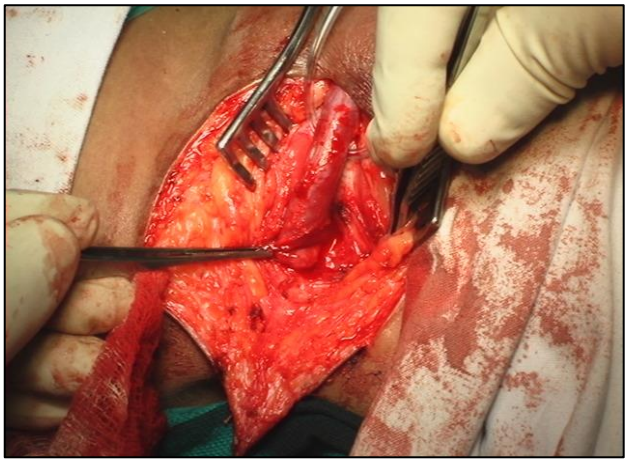

Figure 5: Mobilised anterior urethra.

Of the 11 PPUs, 2 developed recurrence and 1 of 4 EEU patients had recurrence. 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. The remaining one patient who was having recurrence for the first time could be managed with Laser Visual Internal Urethrotomy (VIU). No other major complication was seen during the mean follow up of 30 months (24-36 months).

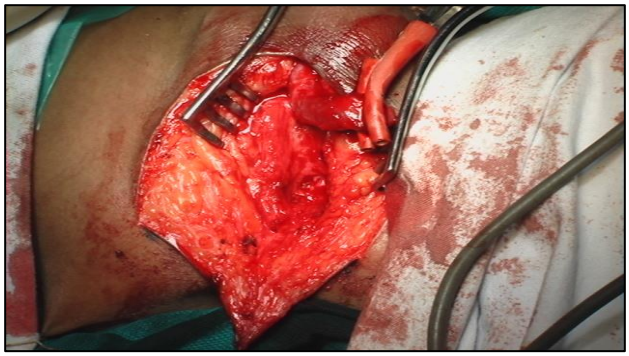

Figure 6: Urethra cut at the level of stricture.

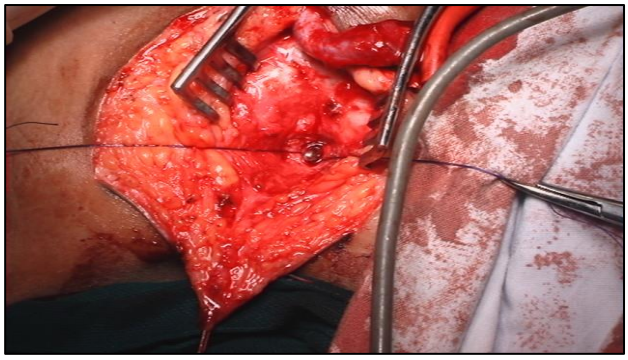

Figure 7: Scar tissue excised and yip of Haygrove's dilator, introduced through SPC tract, seen coming from posterior urethra.

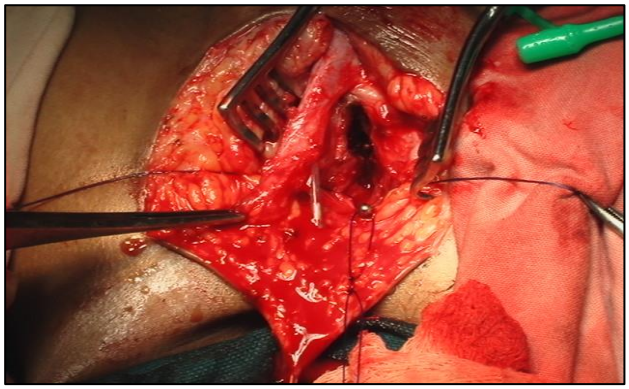

Figure 8: Inferior pubectomy done in PPU for tension free anastomosis.

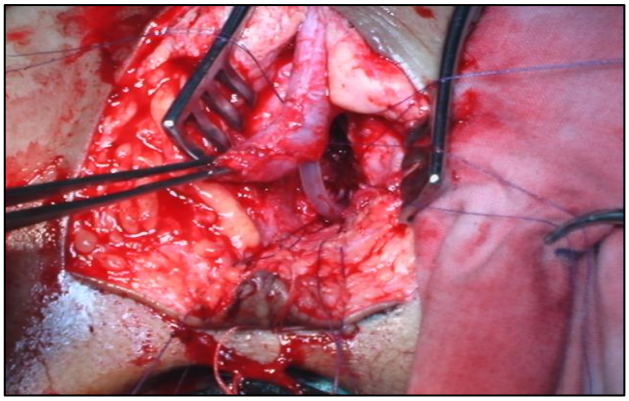

Figure 9: Anastomosis being done with interrupted polyglactin 40 sutures.

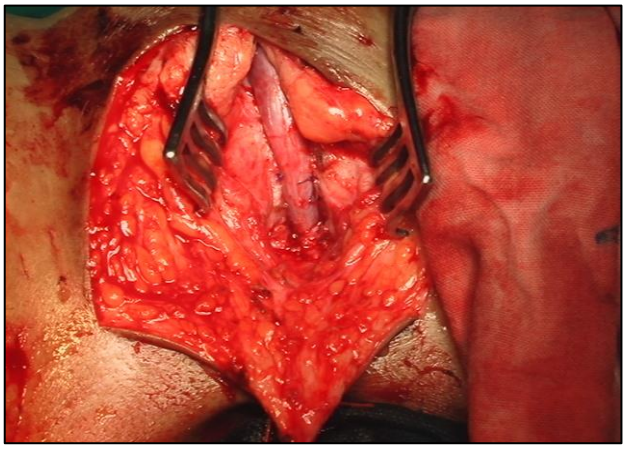

Figure 10: Tension-free anastomosis.

DISCUSSION

Paediatric post-traumatic urethral defects and narrowing, present as a challenge for the operating surgeon. It is seen most commonly after pelvic fractures secondary to major trauma like road traffic accidents, fall from height or perineal trauma.

The posterior urethral injuries which involve complete disruption of the continuity of urethra are now called pelvic fracture urethral distraction defect (PFUDD).[6] The incidence of PFUDD varies from <1% in study by Tarman et al. to as high as 30% in the study by Koraitim et al.[7,8] It is also more common in boys than girls as the latter have shorter and more mobile urethra compared to boys.[9]

Site of stricture

In our study site of stricture was bulbo-membranous in 73% patients and proximal bulbar in 27% patients. The difference was statistically not significant on comparing with Hafez et al study (P value > 0.05).

Table 1: Site of stricture.

Study	Bulbo-membranous junction	Proximal Bulbar	Penile
Our study	11 (73%)	4 (27%)	0
Hafez et al	24 (69%)	10 (29%)	1 (2%)

However, paediatric urethral injuries differ from adult injuries in certain aspects. Unstable pelvic fractures are more common in paediatric patients because of delicate tissues of an immature pelvis and hence PFUDD are also more common in them.[10-12] Urethral disruption is more likely to be complete in them (69% vs. 42% in adults).[10,13] This is due to underdeveloped prostatic tissue in children. Besides this, limited perineal space makes the surgery all the more difficult.[14] Hence, Pediatric urethroplasty requires magnification of 2.5 achieved with the help of surgical loupes.

Important steps to avoid recurrence include maintaining the vascularity of urethra, complete excision of the fibrous scar tissue and tension free anastomosis.[6] After removal of scarred portion, in order to achieve tension free anastomosis, adequate mobilization of distal urethra, crural separation, and inferior pubectomy is done sequentially (Figure 11). If still under tension, abdomino-perineal approach is used for trans-pubic anastomosis, by cutting entire length of pubic symphysis and pubic bone. One patient in our study had undergone successful transpubic urethroplasty.

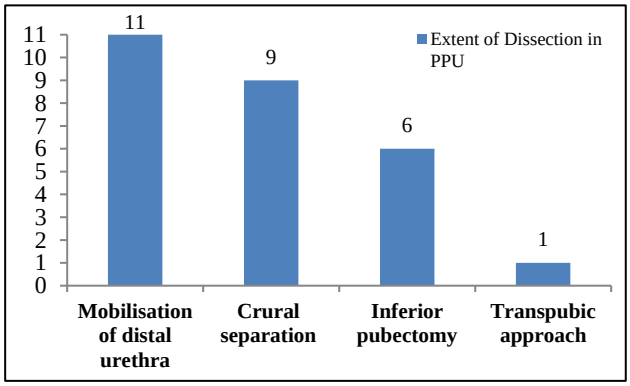

Figure 11: Extent of dissection in 11 patients who underwent PPU.

When primary repair is not possible, staged scrotal inlay procedure or substitution urethroplasty using tubularised skin island flaps or buccal mucosal graft for augmented anastomotic urethroplasty can be done. However, these options were not required in our series.[15] Studies show that associated injuries found in such patients include bladder injury (20%) and concomitant rectal injury (15%). In our study one had rectal injury (rectourethral fistula at presentation) (7%). Gracilis flap onlay over urethral stricture is used primarily in cases of rectourethral fistula as a vascularised tissue barrier between rectum and urethra.[16,17] We placed it in one patient who had a rectourethral fistula. Overall, Failure of primary repair was seen in 3 (20%) patients. That is 1 (25%) of the 4 anastomotic urethroplasty patients and 2 (18%) of progressive perineal urethroplasty patients. Symptoms developed immediately after catheter removal in all three cases. Failure is more likely with redo cases and is more likely to require open surgical repair.

Table 2: Overall success rate.

	Overall success	Failed	Total
Our study	12 (80%)	3 (20%)	15
Hafez et al[4]	31 (88.6%)	4 (11.4%)	35
Sunay et al[18]	51 (70%)	23 (30%)	74

CONCLUSION

Progressive perineal urethroplasty and anastomotic urethroplasty surgeries are treatment of choice in paediatric patients with PFUDD and proximal bulbar strictures respectively. Both are technically feasible, have good outcome and have an acceptable morbidity.

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Conflict of interest: None declared
Ethical approval: The study was approved by the institutional ethics committee

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