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Predictors for recurrence after urethroplasty in pediatric and adolescent stricture urethra

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Abstract *Objective:* This study aims at evaluating factors predicting recurrence of urethral stricture following urethroplasty in pediatric patients at a tertiary care center.
Patients and methods: Fifty-two patients of up to 18 years of age, who underwent urethroplasty, were reviewed. Duration of symptoms, etiology, previous intervention, and site of stricture, surgical modality, stricture length, and spongiofibrosis at stricture site, recurrence, and ancillary procedures required were recorded.
Results: Forty-two (82.76%) patients (Group I) had recurrence-free course on follow-up. Of the 10 patients with recurrence (Group II), 9 had PTS and 1 had IS ($p = 0.04$). Most of the factors evaluated did not differ statistically between the groups; however, length of stricture (1.8 vs. 4.3 cm, $p < 0.001$) and degree of spongiofibrosis (61% vs. 90%, $p = 0.003$) were significantly different. Seven patients with recurrence were managed with single procedures, but three required multiple procedures because of multiple recurrences. History of incision and drainage for paraurethral abscess was significantly higher (28.6% vs. 100%, $p = 0.002$) in patients who had multiple recurrences.
Conclusions: Etiology, fibrosis at local site, and stricture length have significant impact on recurrence of pediatric urethral stricture disease. Associated paraurethral abscess may further compromise the outcome of urethroplasty.
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Introduction

Pediatric urethral stricture (US) is uncommon, other than following congenital disorders. Traumatic stricture is the most common cause, and it may be secondary to posterior urethral disruption injury associated with pelvic trauma or bulbar urethral stricture secondary to fall astride injury or penile/bulbar urethral stricture following iatrogenic injuries during catheterization or urethral instrumentation [1,2]. Pediatric urethral stricture disease represents a significant surgical challenge because of smaller pelvic confines, small urethral caliber, more tissue fragility with poor or less developed urethra, and spongiosal support. These differences have a major impact on the management, clinical course, and results in management of US. Recurrent strictures after failed urethroplasty are difficult to repair with optimal outcomes [3]. In adults, various factors such as etiology, location, length, type of repair, associated conditions such as spongiofibrosis, or paraurethral abscess/sinuses have been described to affect the surgical outcome [4,5]. No such factors have ever been studied in a pediatric population. In the study, we aim to analyze factors predicting the recurrence of urethral stricture following urethroplasty.

Patients and methods

We retrospectively analyzed medical records of 52 patients who had undergone urethroplasty between July 2004 and June 2011. Patients under 18 years of age having urethral stricture disease were included in the study. Strictures following correction of congenital urethral diseases, that is hypospadias, epispadias, and exstrophy, were excluded. For analysis patients were divided into two groups: Group I, patients who had no recurrence following urethroplasty at our center; and Group II, who had post-operative recurrence. Parameters recorded were age of the patient, etiology (traumatic, inflammatory, and idiopathic), length of stricture, site of stricture, presence or absence of spongiofibrosis at stricture site, history of previous intervention prior to urethroplasty at our center, and any other ancillary procedure required.

All patients were evaluated with examination of external genitalia, serum creatinine, urine culture sensitivity, simultaneous retrograde urethrogram (RGU) and micturating cystogram (MCU), and ultrasonography (USG). Surgical plan was made accordingly.

Stricture length was assessed by length of narrowing on combined film of RGU and MCU. At the time of surgery, presence or absence of spongiofibrosis was recorded. Recurrence was defined as ancillary procedure required following urethroplasty for occurrence of obstructive voiding lower urinary symptoms (LUTS)/any evidence of stricture on follow-up RGU and MCU.

Statistical analysis was done using SPSS 20. Chi-square and Student *t* test were used to compare the mean as indicated. Univariate and multivariate logistic regression analysis was done to assess the factors significantly contributing for recurrence. A subgroup analysis for patients with recurrent stricture was also done to look for the factors governing multiple recurrences.

Surgical technique

Under general anesthesia, antegrade and retrograde endoscopy was performed to determine the site, length of the stricture and the quality of urethra. Perineal dissection was done first through vertical or inverted 'U' incision in the perineum. The urethra was mobilized from the corpora and then transected at the distal end of the obliterative stricture. The intercrural septum was incised. The fibrosis below the pubic symphysis was excised and the proximal dilated posterior urethra identified with the help of a bougie passed through the previously placed suprapubic cystostomy (SPC). A treatment algorithm was followed to ensure a tension-free anastomosis (Fig. 1a). If the prostatic urethra was not reachable, an inferior pubectomy was performed. If it was still not possible to identify the proximal urethra, the abdomen was opened through a lower midline incision to get a transpubic approach by partial pubectomy, as described by Rourke et al. [6]. All the fibrotic tissue behind the pubic bone was excised to reveal the anterior surface of the posterior urethra.

Patients were followed with local examination to look for any evidence of surgical site infection (SSI), any evidence of anastomosis leak, and urine culture sensitivity. Per urethral catheter was kept for 10—21 days. An MCU was done under all aseptic conditions to look for any evidence of anastomotic leak or narrowing. The patients were followed at 3-monthly intervals in the first year and 6-monthly thereafter. The follow-up included examination for stream, uroflowmetry, post void residues by ultrasonography and neourethral patency by calibration with urethral catheter if the maximum flow was less than 12 ml/min, or obvious obstructive LUTS. Patients underwent follow-up radiological investigations (RGU with MCU) only if they had persistent obstructive LUTS along with poor flow on uroflowmetry.

Results

Of the 52 patients, 30 (57.7%) had post-traumatic strictures (PTS), 20 (38.5%) inflammatory strictures (IS), and 2 (3.8%) idiopathic strictures. Mean age at presentation was 10.8 years (range 4—18) and mean follow-up was 42.8 months (range 12—144). Forty-two patients (80.76%) (Group I) had recurrence-free course while the remaining 10 (19.23%) had recurrence (Group II) on follow-up. Of those 10 patients (Group II), 9 had PTS and 1 had IS.

In Group I, 18 (42.8%) patients had history of different surgical procedures before coming to our hospital. Fifteen (35.7%) patients underwent dilatation/railroading or direct vision internal urethrotomy (DVIU), 2 (4.8%) had history of end to end (ETE) urethroplasty, and 1 (2.4%) had history of multiple procedures, which included DVIU/dilatation and ETE urethroplasty. Five patients had history of drainage of paraurethral abscess. All but 2 patients presented with SPC in this group.

In Group II, 5 (50%) patients had history of previous interventions elsewhere. Two (20%) patients underwent dilatation/railroading or DVIU, 2 (20%) had history of ETE urethroplasty, and 1 (10%) had history of multiple procedures, which included DVIU/dilatation and ETE

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