Do Transurethral Treatments Increase the Complexity of Urethral Strictures?

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Abbreviations and Acronyms

BMI = body mass index

BMU = buccal mucosa urethroplasty

DVIU = direct vision internal urethrotomy

EPA = excision and primary anastomosis

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Purpose: We examined the impact on urethral stricture complexity at urethroplasty of previous transurethral treatments such as dilation, urethrotomy and stenting, which are most commonly performed when treating male urethral stricture.

Materials and Methods: We retrospectively reviewed the records of 45 males who had undergone transurethral treatments before urethroplasty. We compared urethrography findings at initial diagnosis with those at urethroplasty. Males with failed hypospadias repair, lichen sclerosis or a history of prior urethroplasty were excluded from analysis. We considered stricture complexity increased if the number and/or length of strictures on urethrography at urethroplasty was greater than that at initial diagnosis or false passage was newly identified.

Results: Of the patients 39 (87%), 32 (71%) and 13 (29%) had undergone urethral dilation, urethrotomy and urethral stenting, respectively, and 39 (87%) had undergone repeat or multiple kinds of transurethral treatments. Stricture complexity was increased in 22 men (49%) while 7 (16%) required urethroplasty more complex than that anticipated from urethrography findings at initial diagnosis. Increased stricture complexity was significantly associated with a history of urethrotomy ($p = 0.03$), urethral stenting ($p = 0.0002$) and repeat transurethral treatments ($p = 0.01$). Multivariate analysis revealed that urethral stenting ($p = 0.01$) and repeat transurethral treatments ($p = 0.01$) were independent predictors of increased stricture complexity.

Conclusions: Repeat transurethral treatments increase stricture complexity and are potentially counterproductive. Even a single application of temporary urethral stenting carries a high risk of complicating the stricture and requiring complex urethroplasty.

Key Words: urethral stricture, dilatation, postoperative complications, stents, risk assessment

Urethral stricture is typically due to fibrosis or inflammation of the epithelial tissue and corpus spongiosum, which results in stenosis of the urethral lumen. This causes men to experience a host of problems, including not only lower urinary tract symptoms but also urinary tract infection or renal insufficiency in severe cases.[1] Options to manage urethral strictures are mainly categorized into 2 groups, including 1) open surgical management (formal urethroplasty) and 2) transurethral

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treatment such as dilation, DVIU and urethral stenting. Transurethral treatments can be performed using local anesthesia in an outpatient setting with a low complication rate but they are effective only for strictures with favorable characteristics and are regarded as neither cost-effective nor efficacious as long-term strategies.[2,3]

Urethroplasty has become the gold standard urethral stricture management in the last several decades. However, transurethral treatments are being used excessively and inappropriately because of simplicity and ease of repetition, and because urologists are insufficiently familiar with urethroplasty, which is more technically demanding.[4–7]

Transurethral treatments for strictures with unfavorable characteristics are futile and can complicate stricture characteristics by increasing tissue damage if they are repeated.[8] Previous repeat transurethral treatment has also been suggested to be associated with a higher failure rate of urethroplasty.[9,10] To our knowledge no study has examined the negative impact of transurethral treatment on stricture complexity by comparing urethrography results at initial diagnosis with those at definitive urethroplasty after transurethral treatments. Because this information could help urologists recognize the futility of those treatments and stop the cycle of repetitive futile transurethral management, we examined the association of previous transurethral treatment with urethral stricture complexity at urethroplasty.

PATIENTS AND METHODS

Inclusion Criteria

After receiving National Defense Medical College ethical committee approval we retrospectively reviewed the records of 249 patients with urethral stricture disease who underwent urethroplasty done by a single surgeon (AH) at National Defense Medical College between August 2004 and July 2015. Patients with a history of lichen sclerosus, failed hypospadias repair, phalloplasty or prior urethroplasty were excluded from analysis. Among the remaining 197 patients were 66 with a history of transurethral treatments, including self-dilation or office dilation, cold knife or laser DVIU, or urethral stenting with a temporary thermo-expandable stent at least once. In addition, in these patients the urethrograms at initial stricture diagnosis (ie before transurethral treatment) and at urethroplasty (ie after transurethral treatment) were available. Of those men 21 were excluded because urethrograms at initial stricture diagnosis were not digital images or were of poor quality (ie improper position or failed penile stretching during imaging), making stricture evaluation difficult. Finally, 45 patients with acceptable imaging quality were included in this analysis (fig. 1). All of them underwent urethrographic examination before transurethral treatment and were referred to our institution for definitive urethroplasty.

Increased Stricture Complexity Definition

In patients presenting with an indwelling catheter and patients presenting following recent urethral manipulation the catheter was removed and manipulation was ceased to achieve urethral rest[11] immediately after referral to our institution. If the patient went into urinary retention or required frequent intermittent self-catheterization, a suprapubic tube was placed.

After the cessation of urethral instrumentation for at least 3 months for stricture maturation, combined retrograde and antegrade urethrography was performed with the patient in a position appropriate for definitive urethroplasty. Findings were compared by 2 urologists experienced with urethral reconstruction (AH and MS) in terms of stricture length, number and location, urethral patency and false passage using the patient urethrogram at initial diagnosis, which was sent to us by the referring physician.

After all digital urethrogram images were imported into Osirix X (Pixmeo, Geneva, Switzerland) stricture length and patency (lumen diameter) were measured and the changes in stricture number and the presence of false passage were evaluated. We considered stricture complexity to be increased if the number of strictures and/or stricture length on urethrography at urethroplasty was greater than that at initial diagnosis, if urethral patency was decreased, and/or if false passage was newly identified on urethrography at urethroplasty. The factors associated with increased stricture complexity were analyzed.

Urethroplasty Procedure Selection

The operative procedure used for definitive urethroplasty was selected according to urethrography findings at urethroplasty. EPA was selected for a short (less than 1 to 2 cm) proximal bulbar stricture or membranous stenosis while BMU was selected in other cases. For lengthy bulbar stricture and penobulbar or penile stricture with urethral patency 1-stage BMU (onlay or inlay procedure[12]) was selected. For a pan-anterior stricture, or a lengthy penile or penobulbar stricture with complete urethral obliteration staged BMU was selected. The definitive procedure was also anticipated from findings on urethrography at initial diagnosis and compared with the procedure actually selected. Factors associated with the change of the type of repair were also analyzed.

Statistical Analyses

All statistical analyses were performed with JMP®, version 11. Data are presented as the mean ± SD. The Student t-test was used to evaluate the relations between continuous data and the chi-square test was used to assess the association between clinical parameters and stricture complexity. Univariate and multivariate logistic regression analyses were applied to assess independent predictors of increased stricture complexity. Statistical significance was considered at $p < 0.05$.