Guide Wire-Assisted Urethral Dilation in Pediatric Urology

Experience of a Single Surgeon

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Introduction: A simple technique to dilate urethral stricture using guide wire and sheath dilator has been described in pediatric urology. The aim of this study was to report the long-term outcome of the children who underwent dilation of the urethral stricture using guide wire and sheath dilator.

Materials and Methods: From 1999 to 2004, a total of 52 children with documented urethral stricture were managed by urethral dilation using guide wire. Data on the cause of urethral stricture, operation, postoperative recovery, follow-up cystoscopic appearance, and patient's outcome were audited and analyzed.

Results: The mean age of the patients was 5.6 ± 2.3 years (range, 2 to 18 years). The mean period of the follow-up was 4.5 ± 2.4 years (range, 3.8 to 6.5 years). Twenty-two patients (42.3%) did not require any further surgical treatments. However, urethral stricture in 13 patients (25.0%) progressed significantly, and therefore, they needed further surgical interventions. The complications included minor urinary tract infections in 3 and bladder spasm in 2 patients. No case of false passage or sepsis was encountered.

Conclusion: Guide wire-assisted urethral dilation avoids the risks associated with blind dilation techniques and continues to be a safe alternative for urethral strictures in selected cases. However, in our experience, less than half of the patients became "recurrence free" after two dilation attempts. We recommend that urethral dilation be considered only in selected cases and emergency settings.

Keywords: urethra, stricture, guide wire, dilation, pediatrics

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INTRODUCTION

The management of urethral stricture in children is similar to adults in some ways; nevertheless, due to the small size of the urethra and delicacy of pediatric tissue, the tasks can be technically challenging.[1] Although some urethral strictures can be treated with conventional dilation, the "blind" approach can cause false passages and other significant complications.[2,3] Optical urethrotomy and urethroplasty can produce promising results in management of a scarred urethra[4]; however, surgical correction requires hospitalization and a major surgical procedure (or multiple procedures). Thus, it is usually reserved for complicated strictures.[5]

We previously described a technique for safe urethral dilation in pediatric cases and reported the short-term patient's outcomes.[6] This technique basically involved a guide wire placed through the stricture under cystoscopic guidance, and the dilation was subsequently directed appropriately. Consequently, a precise and safe dilation could be achieved. The short-term outcome of this

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technique was impressive, with 84.3% of patients who had a satisfactory result in terms of the urinary stream and the subsequent cystoscopic findings.[6] However, the long-term outcomes of this technique and effectiveness of urethral dilation remained unknown. This retrospective study aimed to investigate the long-term safety and efficacy of this technique on children with urethral stricture based on the experience of a single surgeon.

MATERIALS AND METHODS

Medical records of 52 patients referred to the senior author between 1999 and 2004 for management of the urethral stricture were retrospectively reviewed. All of the children were evaluated preoperatively with a complete history and physical examination, urine culture, and cystoscopy. In addition, urethrography was carried out if clinically indicated, especially when delineation of the anterior urethra was required. Boys with proven urethral strictures were managed by urethrocystoscopy and guide wire-assisted urethral dilation under general and caudal anesthesia.[6] The only exclusion criteria was complete occlusion of the urethra on urethrography. Cystoscopy could be used for diagnosis only, but more often, dilation was performed during the same session. If a different diagnosis was made during cystoscopy or in case of no feasibility to perform urethral dilation, the children would be managed otherwise.

Prophylactic antibiotic was used in all cases and included intravenous injection of gentamicin, 80 mg, unless there was a contraindication. In this case, other antibiotics would be used. General and caudal anesthesia was administered and the procedures were performed by a single surgeon. Lidocaine jelly was instilled into the urethra at the commencement of the procedure.

The patients were followed up at 3, 6, and 9 months postoperatively and then, they were visited annually after the initial procedure. The follow-up procedure was performed in the outpatient clinic by cystoscopy or radiography if recurrence was suggested by symptoms. When urethral strictures recurred over a short period of time during the follow-up, cystoscopy and urethral dilation would be repeated and clean intermittent catheterization (CIC) might be recommended with appropriate sizes of the Foley catheters for stabilization of the urethral dilation. Age of the patient, cause of the urethral stricture, level of difficulty during the previous passage of the dilators, and social situation of the patient were taken into consideration when prescribing CIC.

RESULTS

Fifty-two consecutive patients with urethral stricture were managed by this technique. Table 1 shows the patients' demographic characteristics and causes of the stricture. The mean age of the patients was 5.6 ± 2.3 years (range, 2 to 18 years). The mean period of the follow-up was 4.5 ± 2.4 years (range, 3.8 to 6.5 years). Four patients were lost to follow up.

Table 2 outlines the outcomes and complications. Overall, 235 guide wire-assisted urethral dilation attempts were performed by the same surgeon. Twenty-two patients had 1 or 2 dilations with no

Table 1. Urethral Stricture Characteristics

Urethral Stricture	Patients (%)
Location	
Anterior urethra	32 (61.5)
Posterior urethra	20 (38.5)
Etiology*	
Hypospadias repair	38 (73.1)
Idiopathic	4 (7.7)
Cobb's collar	4 (7.7)
Trauma	2 (3.8)
Urethritis	2 (3.8)
Posturethral membrane	2 (3.8)

*Percents do not total 100% due to rounding.

Table 2. Urethral Dilation Outcomes and Complications

Urethral Dilation	Patients (%)
Outcome	
Recurrence-free	22 (42.3)
After 1 dilation	20 (38.5)
After 2 dilations	2 (3.8)
Requiring CIC	13 (25.0)
Unable to complete CIC	4 (7.7)
Requiring alternative surgeries	
Urethrotomy	4 (7.7)
Urethroplasty	9 (17.3)
Complications	
Aborted attempt*	11 (4.7)
Tight stricture	6 (2.6)
Hemorrhage	5 (2.1)
Cystitis	3 (5.8)
Bladder spasm	2 (3.8)

*Percentages of aborted dilation attempts are calculated in proportion to 235 attempts. CIC indicates clean intermittent catheterization.

recurrence (suggested by symptoms and endoscopy in selected cases) after 2 years and were considered to be recurrence free (42.3%). Eighteen patients required 3 sessions of dilation and 12 required more than 3. None of the patients needed more than 2 dilations in any 12-month period. In 13 children (25.0%), the stricture had significantly progressed according to the symptoms and cystoscopic and/or urethrographic results. Four of them underwent urethrotomy and 9 required urethroplasty.

Dilation attempts were unsuccessful in 11 occasions (4.7%) because of tight strictures or bleeding. In 5 cases, bleeding precluded the attempts of dilation; in 2, cystoscopic vision was not optimal due to urethral bleeding and the urethral lumen was not visualized. Therefore, we inserted suprapubic catheters by ultrasonographic guidance, and urethral bleeding was spontaneously resolved. In the other 3 cases of bleeding, we did not perform urethral dilation, but we were still able to see the urethral lumen. Thus, we inserted the guide wires and passed small urinary catheters through the wires. Again, the urethral bleeding was resolved without further intervention. Although bleeding was to an extent that precluded the dilations, the patients did not require transfusion of any blood products. False passage or significant sepsis did not happen. Complications of the procedure included cystitis in 3 and bladder spasm in 2 patients.

DISCUSSION

The management of the pediatric urethral stricture is controversial and there is considerable debate regarding the long-term outcome of all approaches. While urethroplasty offers the best long-term outcome, the procedure should be performed by experienced pediatric urologists with expertise in reconstructive urology.[4,5] However, even in the experienced hands, the postoperative complications are not minor.[7] This paper reported a safe and minimally invasive procedure that offered 42.3% of the patients with recurrence-free outcome after 1 or 2 dilations.

Complications associated with conventional "blind" dilation techniques are common, including recurrence with scarring tissue, creation of a false passage, impotence, incontinence, and rupture of the rectum and other neighboring organs. These complications can be made worse when a narrow tunnel is located eccentrically in the urethral cross section and the urethra does not taper gradually onto the stricture.[8-10] Therefore, if a guide wire is placed through the stricture endoscopically, dilation can be subsequently directed in an appropriate, precise, and safe way. We did not experience any false passage or significant sepsis in 235 urethral dilations that we performed.

To some urologists, dilation is not a cure. Bleeding from the urethra during dilation means that the scar is torn and further mucosal and spongy injury has occurred. The stricture will soon recur and result in worsened stricture length and density. In this study, 13 patients (25.0%) with urethral stricture had multiple recurrences with worsened cystoscopic and/or radiological appearance. These patients eventually required more definitive surgical alternatives, such as urethrotomy and urethroplasty. Although urethrotomy, overall, yields more definitive recurrence-free rate than urethral dilation,[11] the recurrence rate and associated morbidity should not be underestimated.[5,12] Even with insertion of a Foley catheter after dilation and supplement with CIC in selective cases to prevent urethral adhesion and recurrence, this approach was only proven effective in some patients. Criticism has arisen from the patient selection for urethral dilation and other surgical options. Certainly, for the strictures that have recurred early after 2 dilations, definitive surgical options should be considered.[5] However, the decision to perform "one-stop" urethroplasty is a complex and challenging one, especially when considering long-term major morbidities in young children, such as erectile dysfunction and urinary incontinence.[7]

Although the initial short-term audit reported 84.3% of the patients had a satisfactory result with respect to the urinary stream and the subsequent cystoscopic findings,[6] this long-term audit showed that the majority of patients (57.7%) required multiple dilations, CIC, or definitive surgeries such as urethrotomy and urethroplasty. We believe that this approach certainly was not for all urethral strictures; nevertheless, this technique can be useful in settings such as requiring an alternative to suprapubic catheter, management of "simple" strictures, and treatment of patients (or parents) refusing or waiting for urethroplasty.

Other minimally invasive techniques, laser urethrotomy and balloon dilation, in the management of urethral stricture in pediatric urology have been described. The initial results from those studies have been promising and certainly would have their roles in the management of this condition in the future.[13,14] The issues with those techniques were the availability of the equipments, hospital accreditation to operate those equipments, and surgeons' preference. Further studies to compare such modern techniques with the current dilation method should be encouraged.

CONCLUSION

Guide wire-assisted urethral dilation avoids the risks associated with blind dilation techniques and continues to be a safe alternative for urethral strictures in pediatric urology. We performed this technique 235 times in 52 children without any major complication. However, only 42.3% of the patients were considered "recurrence free" after a maximum of 2 dilations and 25% with strictures had progressed significantly, requiring definitive surgical intervention. Urethral dilation should be considered only in selected cases and emergency settings.

CONFLICT OF INTEREST

None declared.

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