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Role of visual internal urethrotomy in pediatric urethral strictures

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Abstract *Purpose:* To evaluate the efficiency of visual internal urethrotomies (VIUs) in pediatric patients.
Patients and methods: Thirty-four patients aged 0.2—16.3 years were treated with VIUs as a primary treatment for urethral stricture at our institution during 1980—2010. The stricture characteristics and need for repeat treatments as well as the results of repeat VIUs or dilatations were evaluated in a long-term follow-up.
Results: Each time first VIUs or repeat treatments were carried out there was a 22—33% success rate at 5 years. Twenty-four patients (71%) were treated successfully after repeat VIUs or dilatations at a median of 6.6 years' follow-up. None of the five patients with strictures longer than 2 cm were successfully treated, compared with 24 of 29 patients with shorter strictures ($p = 0.001$). However, stricture etiology or location did not have an impact on success. Currently four patients have undergone an open operation because of stricture and six patients are on a home dilatation program.
Conclusion: Single VIU is successful for about one-quarter of pediatric patients with a urethral stricture. With repeated VIUs or dilatations 71% of the patients can achieve success. In strictures less than 2 cm, up to three VIUs can be attempted, but longer strictures need open correction if the patient does not wish to follow the home dilatation program.

Introduction

Pediatric urethral strictures are uncommon; published results on their treatment usually contain only a limited number of patients and the results are only occasionally

Abbreviations: VIU, visual internal urethrotomy.

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evaluated objectively by urethrogram or flow measurements [1,2]. Iatrogenic strictures, especially caused by hypospadias repair or transurethral surgery are most common in boys, followed by strictures caused by perineal trauma [1,3].

Visual internal urethrotomy (VIU) or dilatations are mostly quick and easy procedures and have been willingly selected as the primary treatment procedure for occurring strictures. As in adults, the efficiency of repeat VIUs treatment for urethral strictures is also questioned in pediatric patients [1,2]. During the 1990s it was shown that the failure rate with VIU increases with increasing length of the strictures, and, in particular, the value of repeat VIUs has been questioned [4,5]. However, even in adults, dilatations and VIU are still the most common treatment options [6].

In this study we evaluated the efficiency of single and repeated VIUs or dilatations under general anesthesia when treating our pediatric urethral stricture patients. Secondly, we wanted to examine what kinds of strictures respond best to the treatment.

Patients and methods

The hospital records of patients treated consecutively for urethral stricture with VIU in the Department of Pediatric Surgery of Helsinki University Central Hospital during the years 1980—2010 were analyzed. Patients with meatal stenosis, bladder exstrophy, posterior urethral valves or other congenital obstructions were excluded, as well as patients who had undergone the first VIU elsewhere. We identified 34 patients eligible for analysis. Their median age was 6.3 (range 0.2—16.3) years at the time of first VIU. The etiology of the strictures was hypospadias repair in 21 patients (62%), external trauma in three patients (9%), and iatrogenic trauma with catheter in two patients (6%); the etiology was unknown in eight cases (24%). The stricture was located in the bulbous urethra in 25 patients (74%), and in the penile urethra in seven patients (21%); the whole anterior urethra was affected in two patients (6%). The stricture was located in the proximal anastomosis in 18 hypospadias patients after a tubular type or on-lay type island flap operation, in the whole anterior urethra in two patients, and in the distal penile urethra in one patient. The stricture length was more than 2 cm in five patients (15%). In most cases prior to VIU the stricture was tight for a 2-mm rod and a Ch7.5 or Ch10 cystoscope was tight in all cases. Urethral dilatations were carried out under general anesthesia with curved metallic rods (the diameter increased by 0.5 mm with each rod). Dilatations or urethral calibrations after VIU were usually performed up to biggest rod that could pass the urethral meatus without difficulty. Usually a silicone catheter was left for 2 days after VIU, and for 1 or 2 days after urethral dilatation.

The symptoms or findings resulting in urethral stricture diagnosis were diverse (Table 1). Five children did not have subjective symptoms but had been operated for hypospadias and were evaluated because of poor maximal flow 1.9—7.6 mL/s (median 6.3 mL/s). Preoperative flow measurement was carried out in 22 cases. Voiding cystourethrography was done for nine patients.

Table 1 Main symptoms or clinical findings in 34 children with urethral stricture resulting in visual internal urethrotomies.

Symptom	No of patients (%)
Poor stream	7 (16)
Poor flow measurement	7 (16)
Voiding difficulty	5 (12)
Painful urination	5 (12)
Urinary tract infection	5 (12)
Urinary retention	3 (7)
Daytime wetting	2 (5)
Hematuria	2 (5)
Pollacisuria	1 (2)
Post-micturation dribbling	1 (2)

Follow-up times were measured to latest outpatient visit or to next procedure (repeat VIU, urethral dilatation under anesthesia, start of outpatient/home dilatation program or open operation). During the follow-up, the patients with repeat VIU or urethral dilatation under general anesthesia were grouped together, but subgroup analysis was also done for the patients with repeat VIUs only.

The follow-up consisted of evaluation of symptoms and flow rate measurement. Urethrocystoscopy was performed if the situation was unclear.

Results of first and repeat VIUs or dilatation were evaluated with the Kaplan—Meier analysis. Preoperative flow measurements and the measurements in the latest control were compared using the Mann—Whitney test (Statview 5.0.1, SAS Institute Inc., Cary, NC, USA).

Results

Of the 34 patients, 24 patients (71%) seem to be healed with one or repeated mini-invasive operations during 0.6—17.4 (median 6.6) years of follow-up (Fig. 1). Four patients have undergone open operation, all with good initial result. Six patients are still on a home or outpatient dilatation program, in which dilatations are done at a median of 1-month intervals (range once a week to once every second month). Of those 24 who eventually healed with mini-invasive methods, nine patients had one operation, eight patients had two operations, four patients had three operations, and one patient had four operations. In addition, two patients were on a temporary home/outpatient dilatation program for 3 and 10 months after having undergone the third mini-invasive treatment. They have developed no re-strictures after cessation of clean intermittent catheterization (CIC) in a follow-up of 5.6 and 9.5 years.

Repeat treatments were carried out at a median 0.3 (range 0.05—12.3) years after previous VIU or dilatation under general anesthesia. In the Kaplan—Meier analysis the stricture recurrence rates at 2 and 5 years' follow-up were 53—78% and 67—78% respectively after each VIU or dilatation under general anesthesia (Fig. 2). In 22 patients who had undergone only VIUs, without separate dilatations under general anesthesia, the recurrence rates were about