Journal of Pediatric Urology (2016) 12, 42.e1–42.e6

Use of holmium laser for urethral strictures in pediatrics: A prospective study

A.I. Shoukry [a], W.N. Abouela [a], M.S. ElSheemy [a], A.M. Shouman [a], K. Daw [a], A.A. Hussein [a], H. Morsi [a], M.A. Mohsen [b], H. Badawy [a], M. Eissa [a]

[a]Pediatric Urology Department, Abu El Rish Children Hospital, Cairo University, KasrAlAiny Street, Cairo, Egypt

[b]Urology Department, Kasr Alainy Hospital, Cairo University, KasrAlainy Street, Cairo, Egypt

Correspondence to:
A. I. Shoukry, Pediatric Urology Department, Abu El Rish Children Hospital, Cairo University, KasrAlAiny Street, Cairo, Egypt,
Tel.: +201065332220

ahmedshoukry@kasralainy.edu.eg (A.I. Shoukry)
waseem_aboul_ela@yahoo.com (W.N. Abouela)
mohammedshemy@yahoo.com (M.S. ElSheemy)
shouman_10@yahoo.com (A.M. Shouman)
kareemdaw@hotmail.com (K. Daw)
ahmedalyhussein@kasralainy.edu.eg (A.A. Hussein)
Morsihani@gmail.com (H. Morsi)
mostmohsen@yahoo.com (M.A. Mohsen)
heshbadawy@gmail.com (H. Badawy)
meissa1@link.net (M. Eissa)

Keywords
Urethral stricture; Holmium laser; Visual internal urethrotomy; Children; Cystoscopy

Received 4 February 2015
Accepted 3 June 2015
Available online 11 August 2015

Summary

Introduction
The management of urethral strictures is very challenging and requires the wide expertise of different treatment modalities ranging from endoscopic procedures to open surgical interventions.

Objective
To assess the effectiveness and complications of retrograde endoscopic holmium: yttrium-aluminum-garnet laser (Ho: YAG) urethrotomy (HLU) for the treatment of pediatric urethral strictures.

Patients and Methods
From January 2010 to January 2013, 29 male pediatric patients with a mean age of 5.9 years and primary urethral strictures 0.5–2 cm long were treated using HLU. The stricture length was <1 cm in 16 (55%) patients and >1 cm in 13 (45%). Fifteen (51.7%) patients had an anterior urethral stricture, while 14 (48.3%) had a posterior urethral stricture. No positive history was found in 14 (48.3%) patients for the stricture disease, while six (20.7%) had straddle trauma and nine (31%) had an iatrogenic stricture.

All of the patients were pre-operatively investigated and at 3 and 6 months postoperation by uroflowmetry and voiding cystourethrography (VCUG). If there were suspicious voiding symptoms, selective uroflowmetry and VCUG were performed at 12 months postoperation.

Results
The mean operation time was 31.7 min (20–45 min). Twenty-three (79.3%) and 18 (62.1%) patients showed normal urethra on VCUG with improvement of symptoms at 3 and 6 months, respectively. Thus, recurrence was 37.9% after 6 months of follow-up. The mean pre-operative peak urinary flow rate (Q_{max}) was 6.47 ml/s. The mean postoperative Q_{max} at 3 and 6 months was 17.17 ml/s and 15.35 ml/s, respectively. The success rate and flowmetry results did not show any statistical significance in relation to site, length and cause of the strictures. The other 11 patients who failed to improve underwent repeated HLU sessions: 4/11 (36.3%) achieved successful outcomes. Among the seven patients with failed HLU for the second time, a third session was conducted. However, only one patient (14.2%) was cured, while open repair was needed for the remaining six.

Discussion
One study has previously been published on the management of pediatric urethral strictures using HLU. The present results are similar to short-term studies after a single session of visual internal urethrotomy using cold knife (VIU). In the present study, the length, location and cause of strictures did not significantly affect the results. However, the outcomes with strictures <1 cm were better than strictures >1 cm, although patients with strictures >2 cm were excluded. In the present study, the success rates among patients with second and third sessions of HLU were 36.3% and 14.2%, respectively. This was similar to other studies, which reported low success rate with the second session of VIU.

The present study was limited by the relatively short period of follow-up and the small number of patients. However, it was the first prospective study evaluating HLU for pediatric strictures. The use of flowmetry and VCUG for evaluation of all patients added to the strength of the study.

Conclusion
HLU can be safely used with good success rates for the treatment of primary urethral strictures (<2 cm) in children. Repeat HLU (more than twice) adds little to success.

http://dx.doi.org/10.1016/j.jpurol.2015.06.016

Introduction

The management of urethral strictures is very challenging and requires the wide expertise of different treatment modalities ranging from endoscopic procedures to open surgical interventions. If not treated properly, pediatric urethral strictures can have a massive impact on the future life of children with them.

The ultimate goal of the surgeon and patient, as well as the family, is searching for a minimally invasive procedure with a high cure rate. Several studies have been performed to assess the effectiveness of different laser modalities [1—3], including holmium: yttrium-aluminum-garnet laser (Ho: YAG) in adult urethral strictures [4]. However, for pediatric urethral strictures, only one study has previously been conducted to assess the efficacy of Ho: YAG [5].

It is believed that the present study is the first prospective study that assess the effectiveness and complications of retrograde endoscopic Ho: YAG laser urethrotomy (HLU) for treating pediatric urethral strictures.

Materials and methods

Twenty-nine boys with a urethral stricture $\leq$2 cm were included in the present study from January 2010 to January 2013 using HLU. Exclusion criteria were patients who had undergone previous open urethroplasty, urethral dilatation, visual internal urethrotomy, or those presenting with diverticulum, multiple level urethral strictures or following a fractured pelvis with urethral disruption.

All patients were pre-operatively investigated with history, examination, uroflowmetry and VCUG (Fig. 1 and Fig. 2). They were followed up with urine analysis and culture, uroflowmetry and VCUG at 3 and 6 month postoperation. If there were suspicious voiding symptoms, selective uroflowmetry and VCUG were performed at 12 months postoperation. All patients were toilet trained and could void upon request to perform the uroflowmetry. Stricture location was categorized as posterior (membranous) or anterior (penile (six patients) or bulbar (nine patients)) urethral stricture.

Surgical technique

Under general anesthesia, all patients were placed in the lithotomy position. A third-generation cephalosporin antibiotic was pre-operatively given to all patients as a prophylaxis. An 11-Fr pediatric cystoscope (Karl Storz, Germany) was initially inserted to reach the stricture, and then a 0.035 inch guide wire or 3-Fr ureteric catheter was introduced through the stricture to the urinary bladder. Scar tissue was incised at the 12-o'clock position under the guidance of a guide wire or ureteric catheter until fresh mucosa appeared. This was performed using a 0.73 mm laser fiber (SphinX 30W, holmium-YAG laser, LISA Laser Products—OHG, Germany) (2.75 J, 11.0 Hz). Finally, a 10-14-Fr silicone catheter was indwelled, according to age of the patient, which remained for 7 days and was then removed. None of the patients received any medical or intralesional steroid injections. Two patients were <3 years old. In all patients, the urethra accommodated the 11-Fr cystoscope.

The procedure was considered successful if the patient did not report any postoperative voiding difficulty, with a postoperative maximum flow rate (Q_{max}) > 15 ml/s and normal VCUG. Lastly, the effects of different clinical parameters on the outcome — including length, location and cause of strictures — were analyzed.

Statistical method

Statistical analysis was performed using the statistical package SPSS version 15 (IBM, USA). Statistical differences between groups were tested using the Chi-squared test, Nonparametric Mann—Whitney test, Wilcoxon signed-rank test, Kruskal—Wallis test and Friedman test. A *P*-value <0.05 was considered to be statistically significant.

Results

The pre-operative data and different causes of urethral strictures are presented in Table 1. The mean age was 5.9 years (median 5.0, range 2—13 years). All patients presented with obstructive symptoms.

The period from the onset of urethral stricture to time of treatment was difficult to precisely identify as most patients were without clear cause (48.3%). However, this period ranged from 3 to 6 months in the remaining patients (iatrogenic and traumatic patients).

The mean operative time was 31.7 ± 6.2 min (range 25—45, median 30 min). The operative time was longer in

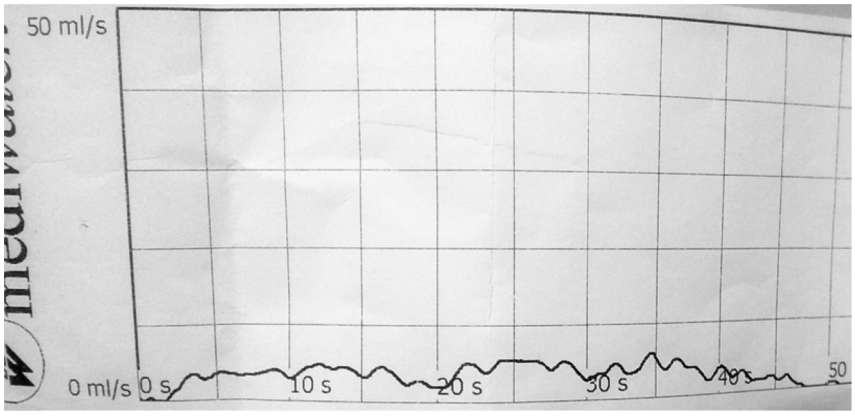

Figure 1 Uroflowmetry of one of the patients.