Outcomes of early endoscopic realignment for pelvic fracture urethral injury

Kays Chaker (chakerkays@gmail.com)  
Department of Urology, LA RABTA Hospital, University of TUNIS EL MANAR

Yassine Ouanes  
Department of Urology, LA RABTA Hospital, University of TUNIS EL MANAR

Wassim Ben Chedly  
Department of Urology, LA RABTA Hospital, University of TUNIS EL MANAR

Mohamed Trigui  
Department of Urology, LA RABTA Hospital, University of TUNIS EL MANAR

Boutheina Mosbahi  
Department of Anesthesia, LA RABTA Hospital, University of TUNIS EL MANAR

Oumayma Chbeb  
Department of Anesthesia, LA RABTA Hospital, University of TUNIS EL MANAR

Wiem Elabed  
Department of Anesthesia, LA RABTA Hospital, University of TUNIS EL MANAR

Mokhtar Bibi  
Department of Urology, LA RABTA Hospital, University of TUNIS EL MANAR

Moez Rahoui  
Department of Urology, LA RABTA Hospital, University of TUNIS EL MANAR

Kheireddine Mrad Dali  
Department of Urology, LA RABTA Hospital, University of TUNIS EL MANAR

Adel Ammous  
Department of Anesthesia, LA RABTA Hospital, University of TUNIS EL MANAR

Yassine Nouira  
Department of Urology, LA RABTA Hospital, University of TUNIS EL MANAR

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Abstract

Introduction:

Post-traumatic rupture of the posterior urethra is a serious injury that can compromise the micturition and erectile prognosis of the often-young patient. The management of this lesion is still controversial, leaving the choice between early endoscopic realignment or suprapubic catheterization with deferred urethroplasty. The objective of this study was to report our clinical experience and outcomes with early endoscopic realignment (EER) for patients with pelvic fracture urethral injury.

Patients and Methods:

We underwent a retrospective review of patients with pelvic fracture associated urethral injury who underwent EER from 2010 to 2020. Preoperative, perioperative, and postoperative outcome data were collected. Complications for the surgical procedure was analyzed, as well as post-operative stenosis, urinary incontinence and erectile dysfunction. The primary endpoint was success, defined as satisfying micturition with no urethral stricture at the time of last follow up.

Results:

A total of 26 patients underwent primary endoscopic realignment. The median duration from injury to EER was 15.4 ± 10.25 hours. No patient experienced complications from endoscopic realignment. EER was successful in 16 patients (61.53%) at a median follow up of 34 months (18–54). Ten patients (38.46%) developed a urethral stricture during follow up. Seven patients (26.92%) were treated by one or two direct visual internal urethrotomy. Only 3 patients (11.53%) required urethroplasty. There were no urethroplasty failure after previous EER. Two patients (7.69%) reported stress urinary incontinence after EER. Four patients (15.88%) developed de novo erectile dysfunction.

Conclusion:

Early endoscopic realignment allows some patients to avoid a heavier surgical treatment, and doesn’t compromise the realization of a later urethroplasty.

Introduction

Post-traumatic rupture of the posterior urethra is a serious lesion that can compromise the micturition prognosis of the often-young patient. The management of this lesion remains controversial, between early endoscopic realignment (EER) or suprapubic catheterization with deferred urethroplasty [1, 2, 3]. EER is used to repair the urethral lesion and prevent urethral stricture [4]. This endoscopic technique appears to be a minimally invasive and non-bridging technique with second-line surgical treatment [5, 6]. The
objective of our study was to report our experience and outcomes with EER for patients with pelvic fracture urethral injury.

**Patients And Methods**

**Patients:**

We retrospectively analyzed the case notes of all patients with pelvic fracture associated urethral injury who underwent EER from 2010 to 2020. We excluded from the study patients whose age was less than 16 years, patients with partial ruptures, associated lesions of the bladder neck or rectum, and previously incontinent patients. Initial management consisted of ultrasound-guided suprapubic cystostomy to relief retention of urine. Early endoscopic realignment can be performed when a stable patient is on the operating table for other surgery or as a stand-alone procedure in the absence of concomitant injuries. The endoscopic realignment is performed by two approaches, suprapubic and transurethral, and aims to bring the two ends of the urethra together in parallel over a urethral catheter in order to facilitate healing. The duration of catheterisation was 6 weeks for complete ruptures with voiding urethrography upon catheter removal. Patients who failed endoscopic realignment underwent delayed treatment with suprapubic catheter drainage and a planned urethroplasty at 3 months after injury. Preoperative and perioperative outcome data were collected. Detailed history taking regarding voiding dysfunction and potency pattern before trauma was obtained. We studied quality of micturition and the complications that occurred. Complications for the surgical procedure was analyzed, as well as post-operative stenosis and urinary incontinence. The primary endpoint was success, defined as satisfying micturition with no urethral stricture at the time of last follow up. Postoperatively, the patients were followed up at 3, 6, 12 months and annually, a precise evaluation of micturition was carried out, using IPSS score, uroflowmetry, and measurement of the post-void residual (PVR) urine as well as the quality of continence. Satisfactory voiding was defined by a Qmax $\geq$ 15 mL/s and a PVR < 150 mL by ultrasound. Urinary incontinence was assessed using the PAD test. Retrograde urethrography and cysto-urethroscopy were performed as needed, if residual urethral stricture was suspected. Erectile function was assessed by the patient's ability to have sexual intercourse with penetration without medical assistance, based on the International Index of Erectile Function questionnaire (IIEF-5).

**Statistical analysis:**

Statistical analyses were performed by using SPSS 25. Continuous data are presented as mean $\pm$ SD or median with ranges, and categorical data are presented as frequencies and percentages.

**Results**

A total of 26 patients underwent primary endoscopic realignment. The median age of patients was 26 years (16–39). The mechanism of urethral injury was road traffic accidents in 69.23% of cases, crush injuries in 19.23% of cases, or falls on the perineum from a great height in 11.53% of cases. Urethrorrhagia was present in 92.3% of cases. We noted a butterfly perineal hematoma in 42.3% of cases.
Urethral tear was of grade 3 in 11 (42.3%) patients and grade 4 in 15 (57.29%) of cases. The mean duration from injury to EER was 15.4 ± 10.25 hours. The median operating time was 60 (45–80) minutes. No patient experienced complications from endoscopic realignment. The catheter was removed on average 22 days (range 10–32) after EER. Realignment was successful in 16 patients (61.53%) at a median follow up of 34 months (18–54). Ten patients (38.46%) developed a urethral stricture during follow up. Seven patients (26.92%) were treated by one or two direct visual internal urethrotomy. Only three patients (11.53%) required urethroplasty. There were no urethroplasty failure after previous EER. Two patients (7.69%) reported stress urinary incontinence after EER. Median postoperative IIEF-5 score was 22 (18–25) at 12 postoperative months. De novo erectile dysfunction occurred in 4 (15.88%) cases. Functional outcomes of early endoscopic realignment are summarized in Table 1.

Table 1
Early endoscopic realignment: Functional outcomes.

<table>
<thead>
<tr>
<th>Early endoscopic realignment</th>
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<tbody>
<tr>
<td>Postoperative Q&lt;sub&gt;max&lt;/sub&gt; (mL/s, ±SD)</td>
<td>16.8 ± 5.6</td>
</tr>
<tr>
<td>Post-void residual urine volume (PVR) (mL, ±SD)</td>
<td>120 ± 10.9</td>
</tr>
<tr>
<td>Postoperative IPSS (± SD)</td>
<td>5 ± 3</td>
</tr>
<tr>
<td>Satisfactory voiding (N, %)</td>
<td>16(61.53)</td>
</tr>
<tr>
<td>Stress urinary incontinence (N, %)</td>
<td>2(7.69)</td>
</tr>
<tr>
<td>IIEF-5 (Median, IQR)</td>
<td>22 (18–25)</td>
</tr>
<tr>
<td>Follow up (Months, IQR)</td>
<td>34 (18–54)</td>
</tr>
</tbody>
</table>

Discussion

Post-traumatic ruptures of the posterior urethra are an increasingly common condition nowadays, given the increase in the frequency of road traffic accidents [6]. Complications of urethral rupture can be severe, including urethral stricture, incontinence and erectile dysfunction [6]. These complications can be a real handicap, especially for young subjects. In complete ruptures of the posterior urethra, there is a solution of urethral continuity with an ascension of the prostate, creating a gap between the prostatic apex and the bulbar urethra [7]. The urethra thus, retracts and the interfragmentary space fills with fibrous tissue resulting from the organization of the hematoma and urinary extravasation [7]. Possible treatment options include primary endoscopic realignment, delayed urethroplasty, and delayed endoscopic urethrotomy. Inappropriate treatment of post-traumatic ruptures of the posterior urethra can lead to various comorbidities. Local extravasation may cause persistent infection or even abscess formation. Fu Q [8] has shown that the advantages of primary endoscopic realignment are multiple: A lower rate of stenosis than after suprapubic catheter bypass alone (69% versus 10%), avoiding a second operation in about one third of patients [7, 8]; a secondary urethroplasty will be technically easier if the prostate and urethra are well aligned [8]. Endoscopic realignment also avoids long-term complications of suprapubic
bladder drainage: urinary tract infections, patient discomfort [6, 9]. According to Webster's study [10], urinary incontinence was more frequent after primary realignment than after delayed urethroplasty (20% versus 2%). Referring to the meta-analysis performed by Koraitim [11] through a review of 771 cases published in the literature, endoscopic realignment (n = 326) was associated with a 53% stenosis rate, a 5% urinary incontinence rate. The use of a subsequent intervention for urethral stricture after immediate success of realignment was found in 42% of cases [11]. However, Park [12], also reported that patients initially treated with endoscopic realignment developed stenosis requiring urethroplasty more frequently than those who underwent initial drainage with a suprapubic catheter alone (6/6 cases, 100% in the endoscopic realignment group versus 22/25 cases, 88% in the suprapubic catheter group).

**Conclusion**

Early endoscopic realignment for posterior urethral injuries is a technically feasible procedure. It could lower the incidence of urethral stricture development. It doesn't appear to increase the rate of erectile dysfunction nor urinary incontinence, more over strictures that occur after realignment may be easier to treat.

**Declarations**

**ETHICS APPROVAL AND CONSENT TO PARTICIPATE:**

The study was approved by the ethics committee of THE RABTA UNIVERSITY HOPITAL, TUNIS.

Approval was granted by THE RABTA UNIVERSITY HOPITAL LOCAL ETHICS COMMITTEE (ID: 169568) (Approval date: 16.08.2020).

All methods were performed in accordance with the relevant guidelines and regulations set out by the Declaration of Helsinki.

An informed consent was obtained from all participants. Proof of consent to participate can be requested at any time.

**CONSENT FOR PUBLICATION:**

Not applicable.

**AVAILABILITY OF DATA AND MATERIALS:**

The datasets generated and analyzed during the current study are not publicly available due to patient privacy but are available from the corresponding author on reasonable reques.

**COMPETING INTERESTS:**

The authors declare that they have no competing interests.
FUNDING:

No Funding was received.

AUTHORS’ CONTRIBUTIONS

KC, YO, WBC, MT contributed to the study design, data collection and data analysis.

KC, KMD, MB, BM, OC, WE, MR contributed to manuscript writing and review.

YN, AA critically revised the manuscript.

All authors read and approved the final manuscript.

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