

# Outcomes of Early Primary Endoscopic Realignment and Delayed Reconstruction in the Management of Posterior Urethral Injury in Male

Mohammad Nazmul Huda<sup>1\*</sup>, Prodyut Kumar Saha<sup>1</sup>, A. K. M. Shahidur Rahman<sup>2</sup>,  
Mohammad Ibrahim Ali<sup>1</sup>, A. S. M. Humayun Kabir<sup>1</sup>, Munirunnessa<sup>3</sup>, Yeasmin Akter<sup>4</sup>,  
Md. Mostafizur Rahman<sup>5</sup>, Jannate Shaina Islam<sup>6</sup>, Nahid Kamal<sup>7</sup>

<sup>1</sup>Department of Urology, Dhaka Medical College Hospital (DMCH), Dhaka, Bangladesh

<sup>2</sup>Department of Nephrology, Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, Bangladesh

<sup>3</sup>Department of Gynecology and Obstetrics, Sir Salimullah Medical College & Mitford Hospital (SSMC & MH), Mitford, Dhaka, Bangladesh

<sup>4</sup>Department of Gynecology and Obstetrics, Combined Military Hospital (CMH), Dhaka, Bangladesh

<sup>5</sup>Department of Urology, Medical College for Women & Hospital, Uttara, Dhaka, Bangladesh

<sup>6</sup>Department of Pathology, National Institute of Ophthalmology & Hospital, Sher-E-Bangla Nagar, Dhaka, Bangladesh

<sup>7</sup>District Hospital, Sherpur, Bangladesh

Email: \*n.h.mohammad30@gmail.com

**How to cite this paper:** Huda, M.N., Saha, P.K., Rahman, A.K.M.S., Ali, M.I., Kabir, A.S.M.H., Munirunnessa, Akter, Y., Rahman, M.M., Islam, J.S. and Kamal, N. (2019) Outcomes of Early Primary Endoscopic Realignment and Delayed Reconstruction in the Management of Posterior Urethral Injury in Male. *Journal of Biosciences and Medicines*, 7, 1-16.

<https://doi.org/10.4236/jbm.2019.710001>

**Received:** August 3, 2019

**Accepted:** September 27, 2019

**Published:** September 30, 2019

Copyright © 2019 by author(s) and Scientific Research Publishing Inc. This work is licensed under the Creative Commons Attribution International License (CC BY 4.0).

<http://creativecommons.org/licenses/by/4.0/>



Open Access

---

## Abstract

**Background:** Posterior urethral injury usually occurs in male patients with pelvic fractures. Posterior urethral injuries are associated with considerable morbidity including urinary incontinence, erectile dysfunction and urethral stricture. **Objective:** To compare the outcomes between early primary endoscopic realignment and delayed reconstruction in the management of male patients of posterior urethral injury. **Methodology:** This prospective study was conducted in the department of urology and department of casualty, Dhaka Medical College Hospital, Dhaka, Bangladesh from July 2015 to June 2017 among 50 male patients with posterior urethral injury. Fifty patients were randomly allocated into two groups; the group A consisted of 24 patients underwent early primary endoscopic realignment within 10 days after posterior urethral injury and the group B consisted of 26 patients underwent delayed reconstruction in form of anastomotic urethroplasty after 3 months. All patients were followed up at 3<sup>rd</sup>, 6<sup>th</sup> and 9<sup>th</sup> month after the procedure. Outcome variables were post-operative urethral stricture, urinary incontinence and erectile dysfunction. Data were analyzed and compared by statistical tests. **Results:** The mean ( $\pm$ SD) age of the study patients was almost sim-

---

ilar between the groups ( $28.8 \pm 8.4$  vs.  $27.4 \pm 7.2$  years,  $p = 0.486$ ). In group A, 83.33% patients developed postoperative urethral stricture, none of them developed urinary incontinence and 20.83% developed erectile dysfunction; On the other hand, in group B, these rates were 38.46%, 23.07% and 38.46% respectively. Postoperative urethral stricture formation was significantly higher in Group A ( $p = 0.0012$ ) but urinary incontinence and erectile dysfunction rates were significantly higher in Group B ( $p = 0.018$  and  $p = 0.042$  respectively). **Conclusion:** Early primary endoscopic realignment is better than delayed reconstruction in the management of male patients with posterior urethral injury. It provides less postoperative complications like urinary incontinence and erectile dysfunction, though postoperative urethral stricture formation is higher but amenable to be corrected endoscopically.

### Keywords

Endoscopic Realignment, Erectile Dysfunction, Urinary Incontinence, Urethral Injury, Urethral Stricture

---

## 1. Introduction

Urethra is a part of urinary system extending from the neck of urinary bladder to the external urethral meatus. Male urethra can be separated into 2 broad anatomic divisions: the posterior urethra consisting of prostatic and membranous portion, and the anterior urethra consisting of bulbous and pendulous portion [1].

Urethral injuries are uncommon and occur mainly in men, usually associated with pelvic fracture or falling astride injury, but rare in women. Various parts of the urethra may be lacerated and transected or contused. But post-traumatic rupture of the posterior urethra is common in pelvic fracture. These lesions are secondary to the highway accidents in 75% of cases [1] [2]. Because the posterior urethra is fixed at both the urogenital diaphragm and the puboprostatic ligaments, the bulbo-membranous junction is more vulnerable to injury during pelvic fracture [3].

The injuries vary from simple stretching (25%) to partial rupture (25%) to complete disruption (50%). The posterior urethral disruption injuries typically occur in conjunction with multi-system trauma from vehicular accident, fall or industrial accidents resulting in pubic diathesis, localized pubic rami fracture or more complex pelvic fractures [3] [4].

As the posterior urethra is fixed to the urogenital diaphragm and the pubis through puboprostatic ligaments, in cases of posterior urethral injuries associated with pelvic fracture, there is a complete rupture of urethra and a considerable distraction of two rupture ends occur. Approximately 15% - 20% of patients with pelvic fractures are associated with distraction injury of urethra. Many of these patients have concomitant injuries to the internal pudendal arteries and damage of the intrinsic and extrinsic components of the distal

urethral sphincteric mechanism resulting in erectile dysfunction and urinary incontinence.

Though posterior urethral injuries are not common; these injuries are associated with considerable morbidity, including urethral stricture, urinary incontinence and erectile dysfunction. These complications can lead to chronic disability, result long-term physical and emotional distress as well as significant financial loss. Some of these complications may be increased in magnitude or newly produced after getting definitive treatment [1] [5]. As for example, the immediate open surgical manipulation of the injured site to achieve realignment or suturing of the disrupted urethra may cause more damage to the sphincter mechanism or the nerve concerned and produce aggravated form of urinary incontinence or erectile dysfunction [6]. Therefore, it is very much important to evaluate the patient properly and to select the immediate and early management as well as delayed treatment modalities.

The management of posterior urethral disruption secondary to blunt pelvic injury remains controversial [7]. In the past, urethral disruption was treated with open primary realignment or suprapubic diversion with delayed urethroplasty. Delayed open urethroplasty was considered the gold standard repair [8]. Immediate open realignment was difficult due to tissue trauma and poor visibility associated with pelvic bleeding. In addition, the incidence of erectile dysfunction and urinary incontinence associated with open realignment was significantly higher than with delayed urethroplasty [5].

Several authors have reported encouraging results with endoscopic realignment as primary therapy. This procedure requires immediate suprapubic diversion followed by early endoscopic realignment. This is associated with decreased intra-operative blood loss, shortened operative time, decreased length of hospital stay and less urinary incontinence than open urethroplasty [8].

In conventional classical approach *i.e.* early suprapubic cystostomy with delayed urethral reconstruction, virtually 100% of patient treated with delayed reconstruction require that urethroplasty, while early realignment obviates the need for about half of these operations [9]. On the other hand, a series that advocate primary realignment show a lower rate of urethroplasty as well as the formation of potentially less significant urethral stricture than those treated primary cystostomy alone. These urethral strictures may be more amenable to endoscopic core through treatment, which often fail in the longer urethral strictures seen with delayed therapy. They also believe that subsequent open repair, if needed, simpler than that in the delayed urethroplasty [9].

Hadjizacharia P. *et al.* (2008) [10] also conducted a prospective study on 21 patients having urethral injury in one centre. They compared between outcomes of immediate endoscopic realignment (IER) versus delayed urethral reconstruction. They concluded that IER results in a significantly reduced time to spontaneous voiding with less risk of urethral stricture.

Shrinivas R.P. and Dubey D. (2010) [11] conducted an analytical observation by collecting data from studies during last decades regarding the management of

urethral injury. They also concluded that primary urethral realignment (either surgical with minimal paravesical dissection or endoscopic) should be preferred option for the initial management of posterior urethral injuries.

Therefore, the aim of present study was to compare the outcomes of early primary endoscopic realignment and delayed reconstruction in the management of male patients with posterior urethral injury.

## 2. Material and Methods

This hospital-based prospective study was done in the department of urology and department of casualty of Dhaka Medical College Hospital, Dhaka, Bangladesh from July 2015 to June 2017 to make comparison between outcomes of early primary endoscopic realignment and delayed urethral reconstruction in the management of posterior urethral injury of male patients. The study was approved by the Ethical Review Committee, Dhaka Medical College, Dhaka, Bangladesh. Patients aged between 18 - 45 years, posterior urethral injury resulting from distraction defect and posterior urethral injury with pelvic fracture were included in this study. Exclusion criteria were anterior urethral injury, partial posterior urethral injury, urethral injury associated with bladder neck injury and associated with lower extremity fracture. Each patient was evaluated by history, physical examination and investigations. Outcome variables were post-operative stricture of urethra, post-operative urinary incontinence and post-operative erectile dysfunction.

Urethral injury was suspected in those with the history of blunt pelvic trauma together with inability to pass urine, blood at the external urethral meatus, perineal hematoma, a high riding prostate and significant pubic rami fracture. Urethral stricture was defined as the narrowing of urethral lumen due to inflammation and spongiofibrosis of urethra. Urinary incontinence was defined as inability to hold urine followed by urinary leakage. Erectile dysfunction was defined through assessment of erectile function of the patient. Erectile function was determined by subjective patient's report using International Index of Erectile Function (IIEF) scoring system. In IIEF questionnaire, each 5 domains contain 5 questions. The IIEF-25 score is the sum of the ordinal responses to the 5 domains.

- ◇ 22 - 25: No erectile dysfunction.
- ◇ 17 - 21: Mild erectile dysfunction.
- ◇ 12 - 16: Mild to moderate erectile dysfunction.
- ◇ 08 - 11: Moderate erectile dysfunction.
- ◇ 05 - 07: Severe erectile dysfunction.

After diagnosis of urethral injury, urologic management was given by suprapubic urinary diversion by suprapubic catheter insertion. All patients were enrolled in the study through purposive sampling as per inclusion and exclusion criteria. According to the statistical calculation a total of fifty (50) patients were selected as study subject. After selection of the subjects, the nature, purpose and benefit

of the study were explained to each subject in details. Informed written consent was taken from each participant. Then all the patients were allocated into two groups: Group A and Group B. Odd-numbered subjects were allocated for group-A consisted of 24 patients. In this group, all patients underwent early primary endoscopic realignment after initial suprapubic urinary diversion within 10 days. All even-numbered subjects were allocated for group-B consisted of 26 patients. In this group, all patients were treated by primary suprapubic urinary diversion through suprapubic catheter insertion and delayed urethral reconstruction after 3 months.

All the patients of Group-A underwent early primary endoscopic realignment over a catheter. So, there was no question of primary urethral stricture development. But, in case of Group-B, all the patients were left for at least 3 months after initial suprapubic urinary diversion. Therefore, before delayed urethral reconstruction 100% patients developed urethral strictures which were diagnosed by Retrograde Urethrogram (RGU) and Antigrade cystourethrogram (ACU).

### **2.1. Group A (Early Realignment)**

An antegrade cystourethrogram was done through the suprapubic catheter to evaluate bladder neck competence and the length of the posterior urethra and also a retrograde urethrogram was done to determine the length of the defect under antibiotic coverage. In some instances, CT scan of abdomen and pelvis was done to complete the evaluation of the urinary tract injury. The timing of urethral realignment was determined by the associated injuries. If there was an isolated urethral injury, realignment was performed as soon as the condition was stable. But may be delayed in case of hemodynamically unstable or life threatening injuries that precluded urological manipulation. The time period was within 10 days.

### **2.2. Steps of Early Realignment**

After taking informed written consent, patients were placed in lithotomy position under general or regional anesthesia. The suprapubic catheter was removed after passing a 0.038 inches guide wire to keep the tract open. The suprapubic tract was dilated up to 24 Fr. Amplatz dilators and Amplatz sheath were used as a conduit to pass the rigid or flexible cystoscope to explore the bladder neck and posterior urethra down to the rupture site. Simultaneously retrograde urethroscopy was used to explore the anterior urethra up to the rupture site. In some cases, two cystoscope may meet and allow the retrograde urethroscopy to pass into the bladder. In some cases, a 0.038 inches flexible straight tip guide wire was passed through the operating channel of the suprapubic cystoscope and push down to the rupture site. The wire was easily seen by retrograde urethroscopy, grasped with an endoscopic grasper and pulled out through the external meatus. The guide wire acted as a guide for a 16 Fr. silicon Foley catheter with its tip cut off, which was passed into the bladder. There were also some situations, where

prostate gland was very high riding on digital rectal examination, cystoscopic alignment using flexible cystoscope through suprapubic route was difficult. It was solved by using rigid cystoscope through both antegrade and retrograde routes. Urethral catheters were left in place for 4 to 6 weeks and after removal of per urethral catheter, suprapubic catheter removal depends on voiding performance. Usually, urinary drainage port of suprapubic catheter was closed with needle cap of plastic syringe for further 7 days. If the performance was not satisfactory, suprapubic catheter was kept in place up to definitive treatment of the stricture. Voiding cystourethrogram was performed when the catheter was removed to ensure urethral patency.

### **2.3. Group B (Delayed Reconstruction)**

In this group after 3 months of injury retrograde urethrogram and antegrade cystourethrogram were done preoperatively to assess the stricture characters. Then anastomotic urethroplasty was done with or without partial or total pubectomy.

### **2.4. Steps of Delayed Anastomotic Urethroplasty**

After taking informed written consent, the patient was placed in the lithotomy position under general or regional anesthesia and both abdomen & perineum were prepared. Through midline perineal incision bifurcated posteriorly and by division of the bulbospongiosus muscle in the midline, the bulbar urethra was circumferentially mobilized as far proximally as the obliterated segment, where it was transected, and distally to a few centimeters distal to the crura. Through the supra pubic tract, a urethral sound was next carefully negotiated through the prostatic urethra until its tip could be placed in the perineum and a vertical incision was then made through the perineal scar into its tip. Complete excision of scar was done. After making spatulation of the membranous urethra at 6 o'clock position as far proximally as the verumontanum and similar spatulation in the bulbar urethra and end to end anastomosis over 16 Fr. Foley catheter was done.

At this point, possibility of tension-free anastomosis or need of further lengthening procedures were determined, e.g.:

- Further circumferential mobilization to the suspensory ligament.
- Separation of proximal corporal bodies.
- Inferior pubectomy.
- Rerouting the urethra around the corporal body *i.e.* Supracrural rerouting.
- In some cases, where distractions were long, abdomino-perineal approach was adopted to mobilize the bladder neck with or without partial or total pubectomy to make tension-free anastomosis.

Urethral Foley catheter was removed 3 weeks after procedure. The suprapubic catheter was capped for further 4 - 7 days and removed after successful trial of voiding. If the voiding performance was not satisfactory, suprapubic catheter was kept in place up to definitive treatment of the stricture. A voiding cystourethro-

gram was performed when the catheter was removed to ensure urethral patency.

### 2.5. Follow up

The follow up ranged from 3 months to 9 months at 3 months intervals after procedure. All the patients were counseled and requested to attend for follow up at 3<sup>rd</sup>, 6<sup>th</sup> and 9<sup>th</sup> month for proper evaluation by history, examination and investigations. At follow up, patients were monitored with history, physical examination, urine for R/M/E and urinary flow rate measurement by uroflowmetry. A decreased flow rate ( $Q_{max} < 15$  ml/sec) was evaluated by uroflowmetry. Evidence of strictures in both group A and B were detected by retrograde urethrograph & antegrade cystourethrograph in follow up visits after procedure and treated with direct visual internal urethrotomy or redo anastomotic urethroplasty where appropriate.

### 2.6. Procedure for Correction of Postoperative Stricture Urethra

After procedure 20 (83.33%) out of 24 patients in Group-A developed postoperative stricture urethra, while in Group-B 10 (38.46%) out of 26 patients developed stricture urethra. In Group A, all patients (20) who developed postoperative stricture urethra were treated by optical internal urethrotomy (OIU). But in Group B among those 10 patients, 8 patients were treated by OIU and 2 patients were treated by redo anastomotic urethroplasty.

### 2.7. Investigations Required in the Study

- **For diagnosis purpose**
  - ✧ Plain X-ray of the pelvis A/P & Lateral view for diagnosis of pelvic fracture.
  - ✧ Ultrasonogram of kidney, ureter and bladder region (USG of KUB).
  - ✧ Flexible urethro cystoscopy both antigrade and retrograde for early realignment.
  - ✧ Antigrade cystourethrograph and retrograde urethrograph.
  - ✧ CT scan of abdomen and pelvis to evaluate urinary tract injury if needed.
- **For preoperative evaluation**
  - ✧ Urine for R/M/E and C/S to identify urinary tract infection (UTI).
  - ✧ Relevant investigations were also done for evaluation of general condition and preoperative fitness such as Complete blood count, Serum creatinine, Fasting blood sugar, Electrocardiography, X-ray chest etc.
- **For follow up**
  - ✧ Urine for R/M/E and C/S.
  - ✧ Uroflowmetry to see urinary flow rate.
  - ✧ USG of KUB with MCC & PVR.
  - ✧ Retrograde Urethrograph (RGU) & Micturating Cystourethrograph (MCU) when Uroflowmetry showed maximum flow rate ( $Q_{max} < 15$  ml/sec).

### 2.8. Data Collection Procedure

Data were collected from history, findings of clinical examination and result of

investigations before surgery, during surgery and at the time of follow up after primary endoscopic realignment in group A and delayed anastomotic urethroplasty in group B.

## 2.9. Statistical Analysis of Data

After meticulous checking and rechecking and compilation, data were analyzed using SPSS (Statistical Package for Social Science) version 22. The statistics used to analyze the data were descriptive statistics and test done were Student's "t" test,  $X^2$  test and Fisher exact test. The level of significance was set at 0.05 and  $p$  value < 0.05 was considered significant.

## 3. Results

Total fifty (50) male patients with posterior urethral injury were selected as subjects in this study. Among them, 24 were treated with early primary endoscopic realignment within 10 days (Group-A) and another 26 were treated with delayed reconstruction after 3 months (Group-B), the findings of data analysis are documented below.

### 3.1. Distribution of Age of the Patients

In Group-A half of the patients were less than 30 years old, 37.50% between 30 - 40 years and rest 12.50% more than 40 years old. In Group-B 53.80% of patients were less than 30 years, 38.50% between 30 - 40 years and 7.70% more than 40 years. The mean ( $\pm$ SD) age of the patients were almost similar between the groups ( $28.8 \pm 8.4$  vs.  $27.4 \pm 7.2$  years,  $p = 0.486$ ). There was no significant difference of age distribution between two groups (**Table 1**).

### 3.2. Distribution of Postoperative Stricture Urethra as Detected by Retrograde Urethrogram (RGU) & Antegrade Cystourethrogram (ACU)

It was observed that after procedure; 20 (83.33%) out of 24 patients in Group-A developed urethral stricture; while in Group-B 10 (38.46%) out of 26 patients developed urethral stricture, which was detected by RGU/ACU at their 1<sup>st</sup> follow up visit. There was significant difference of postoperative urethral stricture formation between two groups ( $p = 0.0012$ ) (**Table 2**).

### 3.3. Urinary Incontinence

None of the patients in Group-A had developed urinary incontinence throughout the observation period (from removal of catheter to 9 months). But in case of Group B, 6 (23.07%) patients out of 26 had developed urinary incontinence. Among the 6 patients (23.07%) all of them developed urinary incontinence immediately after removal of catheter following anastomotic urethroplasty and that was persisted at month 3. The urinary incontinence was further decreased to 5 (19.23%) patients at 6 months and 9 months follow up visits. There was significant

difference ( $p = 0.018$ ) of postoperative urinary incontinence between the groups (Table 3).

### 3.4. Erectile Dysfunction

Complaints of erectile dysfunction were less in Group-A (5 patients out of 24, 20.83%) than that in Group-B (10 patients out of 26, 38.46%) in their 1<sup>st</sup> follow up visit at month 3. Throughout the successive period of observation it was 3 patients & 8 patients (12.50% vs. 30.77%,  $p = 0.031$ ) at 6 months and 2 patients & 8 patients (8.33% vs. 30.77%,  $p = 0.012$ ) at 9 months in group-A and group-B respectively. There was significant difference ( $p = 0.042$ ) of postoperative erectile dysfunction between the two groups (Table 4).

### 3.5. Procedure for Correction of Postoperative Stricture Urethra

It was observed that, after procedure 20 (83.33%) out of 24 patients in Group-A developed postoperative stricture urethra, while in Group-B 10 (38.46%) out of 26 patients developed stricture urethra. In Group A, all patients (20) who developed postoperative stricture urethra were treated by optical internal urethrotomy (OIU). But in Group B among those 10 patients, 8 patients were treated by OIU and 2 patients were treated by redo anastomotic urethroplasty. There was significant difference ( $p = 0.001$ ) of procedure of correction of postoperative stricture urethra between the two groups (Table 5).

### 3.6. Outcome Variables

In early primary endoscopic realignment group (Group-A); 20 (83.33%) patients out of 24 were developed postoperative stricture urethra, none of them (00.00%) developed urinary incontinence and 5 (20.83%) patients out of 24 developed erectile dysfunction. On the other hand, in delayed reconstruction group (Group-B); 10 (38.46%) patients out of 26 were developed postoperative stricture, 6 (23.07%) patients out of 26 developed urinary incontinence and 10 (38.46%) patients out of 26 had developed erectile dysfunction. Postoperative urethral stricture formation was significantly higher in Group A ( $p = 0.001$ ) but urinary incontinence and erectile dysfunction rates were significantly higher in Group B ( $p = 0.018$  and  $p = 0.042$  respectively) (Table 6).

**Table 1.** Comparison of age between two groups.

Age (Years)	Group-A (Early realignment) (n = 24)	Group-B (Delayed reconstruction) (n = 26)	<i>p</i> value
18 – 30	12 (50.00)	14 (53.80)	0.486
31 - 40	09 (37.50)	10 (38.50)	
41 - 45	03 (12.50)	02 (07.70)	
<b>Mean ± SD</b>	<b>28.8 ± 8.4</b>	<b>27.4 ± 7.2</b>	

Values in the parenthesis denote corresponding percentage. Student's "t" Test was employed to analyze the data. Level of significance was  $< 0.05$ .

**Table 2.** Distribution of postoperative urethral stricture between two groups.

Post-operative urethral stricture	Group-A (Early realignment) (n = 24)	Group-B (Delayed reconstruction) (n = 26)	p value
Present	20 (83.33)	10 (38.46)	0.0012
Absent	04 (16.66)	16 (61.54)	

Values in the parenthesis denote corresponding percentage. X<sup>2</sup> Test was employed to analyze the data. Level of significance was < 0.05.

**Table 3.** Postoperative urinary incontinence at different time interval between two groups.

Urinary incontinence	Group-A (Early realignment) (n = 24)	Group-B (Delayed reconstruction) (n = 26)	p value
Yes	0 (0.0%)	6 (23.07%)	0.018
No	24 (100.0%)	20 (76.92%)	
<b>At time interval</b>			
Immediate after removal of catheter	0 (0.0%)	06 (23.07)*	0.018
After 3 months	0 (0.0%)	06 (23.07)*	0.018
After 6 months	0 (0.0%)	05 (19.23)*	0.037
After 9 months	0 (0.0%)	05 (19.23)*	0.037

Values in the parenthesis denote corresponding percentage. \*Repeated response. Fisher Exact Test was employed to analyze the data. Level of significance was < 0.05.

**Table 4.** Postoperative erectile dysfunction at different time interval between two groups.

Erectile dysfunction	Group-A (Early realignment) (n = 24)	Group-B (Delayed reconstruction) (n = 26)	p value
Yes	5 (20.83%)	10 (38.46%)	0.042
No	19 (79.17%)	16 (61.53%)	
<b>At time interval</b>			
After 3 months	05 (20.83)*	10 (38.46)*	0.042
After 6 months	03 (12.50)*	08 (30.77)*	0.031
After 9 months	02 (08.33)*	08 (30.77)*	0.012

Values in the parenthesis denote corresponding percentage. \*Repeated response. X<sup>2</sup> Test was employed to analyze the data. Level of significance was < 0.05.

**Table 5.** Procedure for correction of post-operative stricture urethra between two groups.

Procedure of correction	Group-A (Early realignment) (n = 24)	Group-B (Delayed reconstruction) (n = 26)	p value
OIU	20 (83.33)	8 (30.76)	0.001
Redo Anastomotic Urethroplasty	00	2 (7.6)	0.012
None	4 (16.77)	16 (61.5)	0.001

Values in the parenthesis denote corresponding percentage. X<sup>2</sup> Test was employed to analyze the data. Level of significance was < 0.05.

**Table 6.** Outcome variables between the two groups.

Variables	Group-A (Early realignment) (n = 24)	Group-B (Delayed reconstruction) (n = 26)	p value
<b>Preoperative stricture</b>	Not applicable	26 (100.0)	
<b>Post operative stricture</b>	20 (83.33)	10 (38.46)	0.0012
<b>Urinary incontinence</b>	00 (00.00%)	6 (23.07%)	0.018**
<b>At time interval</b>			
Immediate after removal of catheter	00	06 (23.07)*	0.018**
After 3 months	00	06 (23.07)*	0.018**
After 6 months	00	05 (19.23)*	0.037**
After 9 months	00	05 (19.23)*	0.037**
<b>Erectile dysfunction</b>	5 (20.83%)	10 (38.46%)	0.042***
<b>at time interval)</b>			
After 3 months	05 (20.83)*	10 (38.46)*	0.042***
After 6 months	03 (12.50)*	08 (30.77)*	0.031***
After 9 months	02 (08.33)*	08 (30.77)*	0.012***

Values in the parenthesis denote corresponding percentage. \*Repeated response. \*\*\*X<sup>2</sup> Test and \*\*Fisher Exact Test were employed to analyze the data. Level of significance was < 0.05.

#### 4. Discussion

Urethral injuries are uncommon and occur most often in men, usually associated with pelvic fractures or falling astride injuries, but rare in women. Various parts of the urethra may be lacerated, transected, or contused, but the post-traumatic rupture of posterior urethra occurs in patients with pelvic fractures. These lesions are secondary to the highway accidents in 75% of cases [1] [2].

Of all injuries to the entire urinary tract, the most serious is that which affects the posterior urethra, not only because of its location deep in the pelvis but also because of the sphincter active urethra as well as the intimate relationship to the nervi erigentes. In every pelvic fracture urethral injuries, there is the potential risk of 3 complications such as stricture urethra, urinary incontinence and erectile dysfunction. These complications may result directly from original trauma and/or iatrogenic trauma induced by the immediate treatment selection [12].

The management of posterior urethral disruption secondary to blunt pelvic injury remains controversial [5] [7] [13]. It represents a challenge to the urologist [14]. The goals of treatment of posterior urethral injury should be a patent continent urethra and maintenance of sexual potency as before trauma. To achieve these goals several methods have been used, including primary suturing of the distracted urethral ends, primary realignment with urethral splinting (with or without traction and performed surgically or endoscopically) and suprapubic cystostomy with delayed repair [12].

Immediate end to end anastomosis or surgical exploration with realignment over a catheter exposes the severely injured patient to further risks. The operation can be complicated by considerable hemorrhage and/or by difficulty in as-

sessing precisely the viability of the two ruptured urethral ends. Secondary urethral stricture development, urinary incontinence, and erectile dysfunction rates are also high [15].

Delayed open urethroplasty was considered the gold standard repair [7] for posterior urethral injuries. The approach was either perineal or transpubic, often requiring staged procedures and associated with extensive blood loss, long operative time and extended length of hospital stay.

Several authors have reported encouraging results with endoscopic realignment as primary therapy. This procedure requires immediate suprapubic diversion followed by delayed or early endoscopic realignment and is associated with decreased intra-operative blood loss, shortened operative time, decreased length of hospital stay and less urinary incontinence than open urethroplasty [7] [8].

In the conventional classical approach *i.e.* early suprapubic cystostomy with delayed urethral reconstruction, virtually 100% of patients treated with a suprapubic tube (catheter) and delayed reconstruction require urethroplasty, while early realignment obviate the need for about half of these operations. These decreases in the need for surgery have a large positive impact because perineal approach anastomotic urethroplasty can be lengthy and arduous for the surgeon and patient.

On the other hand, series that advocate primary realignment shows lower rate of urethroplasty as well as the formation of potentially less significant urethral strictures than those treated by primary cystostomy alone [9]. The postoperative urethral strictures that developed in primary realignment may be more amenable to endoscopic core through treatment, which often fail in the longer strictures seen with delayed therapy [9]. They also believe that subsequent open repair, if needed, is simpler than that in the delayed urethroplasty [9].

The present work has been carried out to compare the outcomes between early primary endoscopic realignment and delayed reconstruction in the management of posterior urethral injury. A total of 50 patients were included, 24 patients underwent early primary endoscopic realignment *i.e.* Group-A and 26 patients underwent delayed reconstruction *i.e.* Group-B. The follow up periods ranged from 3 months to 9 months.

Urethral injury was suspected in those with the history of blunt pelvic trauma together with inability to pass urine, blood at the external urethral meatus, perineal hematoma, suprapubic fullness, high riding prostate and pelvic fracture. The presentations were almost similar in both groups. These are the classical features of urethral injury [1].

In this study, half of the patients in Group-A was less than 30 years old, 37.5% between 30 - 40 years and rest 12.5% more than 40 years old. In Group-B, 53.8% patients were less than 30 years, 38.5% between 30 - 40 years and 7.7% more than 40 years. The mean ( $\pm$ SD) age of the patients was almost similar between the groups ( $28.8 \pm 8.4$  vs.  $27.4 \pm 7.2$  years,  $p = 0.486$ ). The mean age of the patients in current study corresponds with the study of Kulkarni S.B. *et al.* (2010) [16] as they reported a median age of 33 years.

In this study, all the patients of Group-A underwent early primary endoscopic realignment over a catheter. So, there was no question of primary urethral stricture development. But, in case of Group-B, all the patients were left for at least 3 months after initial suprapubic urinary diversion. Therefore, before delayed urethral reconstruction 100% patients developed primary urethral strictures.

In case of Group-A, after early primary endoscopic realignment, all patients were counseled for regular follow up and in case of Group-B, follow up programmed was conducted after delayed realignment by anastomotic urethroplasty. In both groups, the total follow up periods ranged from 3 months to 9 months and was done at removal of catheter, at 3rd month, at 6th month and at 9th month after procedure to search 3 potential complications like urinary incontinence, erectile dysfunction and recurrent urethral stricture.

Urinary incontinence is one of the complications of posterior urethral injury either during injury or following the corrective procedure. It was observed that, none of the patients in Group A had developed urinary incontinence throughout the observation periods (from removal of catheter to 9 months) which corresponds with the study of Guille F. *et al.* (1991) [13], Moudouni S.M. *et al.* (2000) [17] and Tazi H. *et al.* (2003) [2]. But in case of Group B, 6 (23.07%) patients out of 26 developed urinary incontinence, at removal of catheter and which was persisted in all of them at month 3. In further follow up visits, it was in 5 patients (19.23%) at 6th and 9th month. Mouraviev V.B. *et al.* (2005) [9] stated a comparative experience of early endoscopic realignment versus delayed urethroplasty in the treatment of posterior urethral disruption associated with pelvic fracture. They found out 24.90% incontinence rate in delayed urethroplasty. Cooperberg M.R. *et al.* (2007) [18] conducted another study on delayed urethroplasty and they also stated 13.00% incontinence rate. Therefore the rate of urinary incontinence development of the current study is consistent with the previous studies.

Erectile dysfunction is a burning issue in the patients with posterior urethral distraction defect (PUDD) both before and after treatment. In present study, postoperative erectile dysfunction was significantly ( $p = 0.042$ ) less in Group-A (5 patients out of 24, 20.83%) than that in Group-B (10 patients out of 26, 38.46%) in their 1<sup>st</sup> follow up visit at month 3. Throughout the successive period of observation it was in 3 patients & 8 patients (12.50% vs. 30.77%,  $p = 0.031$ ) at 6 months and 2 patients & 8 patients (8.33% vs. 30.77%,  $p = 0.012$ ) at 9 months among group-A and group-B respectively. Rahman M.M. *et al.* (2015) [7]; Rehman J. *et al.* (1998) [8]; Jepson B.R. *et al.* (1999) [19] & Tazi H. *et al.* (2003) [2] stated 40%, 37.5%, 19.4% and 20% erectile dysfunction respectively in case of early primary endoscopic realignment of PUDD. In case of delayed urethroplasty, the rate of erectile dysfunction was corresponded with the study conducted by Mouraviev V.B. *et al.* (2005) [9], which was 42.1%. So the results of current study regarding erectile dysfunction are corresponds to the previous studies.

Postoperative stricture urethra formation is another issue in the management of PUDD. In this study after procedure 20 (83.33%) out of 24 patients in Group-A

developed urethral stricture, while in Group-B 10 (38.46%) out of 26 patients developed urethral stricture, which were detected by RGU/ACU at their 1<sup>st</sup> follow up visit. It was observed that after procedure stricture formation was significantly higher in Group-A than that in Group-B ( $p = 0.0012$ ). Several studies showed that stricture formation after early primary endoscopic alignment was higher than delayed reconstruction. Guille F. *et al.* (1991) [13], Rehman J. *et al.* (1998) [8], Jepson B.R. *et al.* (1999) [19], Moudouni S.M. *et al.* (2000) [17] and Rahman M.M. *et al.* (2015) [7] stated 60%, 54%, 50%, 41% and 40% respectively in case of early primary endoscopic realignment of PUDD. On the other hand, low rate of stricture formation in case of delayed reconstruction was described by Cooperberg M.R. *et al.* (2007) [18] which was 14%. Thus the rate of post-operative urethral stricture formation of current study is consistent with previous studies.

In Group A, 20 patients who developed postoperative stricture urethra were treated by optical internal urethrotomy (OIU). While in Group B; among those 10 patients who developed postoperative stricture urethra, 8 patients were treated by OIU and 2 patients were treated by redo anastomotic urethroplasty. There was significant difference ( $p = 0.001$ ) of procedure of correction of post-operative stricture urethra between the two groups. This finding is consistent with previous study as showed that optical internal urethrotomy is safe and reliable procedure for simple urethral strictures while urethroplasty should be considered for complex strictures [20].

Overall results between two groups were compared. There is some remarkable information. With the advent of endourology, early primary endoscopic realignment in the management of PUDD is good option. It is simple, less time consuming and associated with good outcome and less postoperative complications like urinary incontinence and erectile dysfunction except for urethral stricture formation which is higher than that of delayed reconstruction group. The postoperative urethral strictures are amenable to be corrected by OIU. On the other hand, primary cystostomy with delayed reconstruction by anastomotic urethroplasty is a laborious, time consuming and difficult procedure which is invariably associated with more per-operative blood loss and postoperative complications like urinary incontinence, erectile dysfunction etc.

## 5. Conclusion

Early primary endoscopic realignment is better than delayed reconstruction in the management of male patients with posterior urethral injury. It provides less postoperative complications like urinary incontinence and erectile dysfunction, though postoperative urethral stricture formation is higher but amenable to be corrected endoscopically.

## Limitations of the Study

It was a single centre study with relatively small sample size. Moreover surgeon's

heterogeneity and short period of follow up also the mentionable limitations of this study.

### Recommendations

A long-term follow up is necessary to observe the possible advantages of this new technique that is, early primary endoscopic realignment against the standard delayed reconstruction of posterior urethral injury. Hence a large multi-centre comparative study is required for further evaluation.

### Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

### References

- [1] McAninch, J.W. (2013) Injuries to the Genitourinary Tract. In: Tanagho, E.A. and McAninch, J.W., Eds., *Smith's General Urology*, 18th Edition, The McGraw-Hill Companies, New York, 278-296.
- [2] Tazi, H., Quali, M., Moudouni, S., Lrhorfi, M., Tazi, K. and Lakrissa, A. (2003) The Endoscopic Realignment in the Posttraumatic Rupture of the Posterior Urethra. *Progrès en Urologie*, **13**, 1345-1350.
- [3] Morey, A.F. and Rozanski, T.A. (2007) Genital and Lower Urinary Tract Trauma. In: Kavoussi, L.R., Novick, A.C., Partin, L.W., Peters, C.A. and Wein, A.J., Eds., *Campbell Walsh Urology*, 9th Edition, John F. Kennedy Boulevard, Saunders Elsevier, Philadelphia, 2649-2662.
- [4] Fan, E.W., Cheng, T.C., Lin, H. and Chiu, A.W. (2000) Early Primary Endoscopic Realignment for Posterior Urethral Injury in a Patient with Malgaigne. *Journal of the Urological Association of R.O.C.*, **11**, 86-89.
- [5] Porter, J.R., Takayama, T.K. and Defalco, A.J. (1997) Traumatic Posterior Urethral Injury and Early Realignment Using Magnetic Urethral Catheters. *The Journal of Urology*, **158**, 425-430. [https://doi.org/10.1016/S0022-5347\(01\)64494-X](https://doi.org/10.1016/S0022-5347(01)64494-X)
- [6] Koraitim, M.M. (2009) Predictors of Surgical Approach to Repair Pelvic Fracture Urethral Distraction Defects. *The Journal of Urology*, **182**, 1435-1439. <https://doi.org/10.1016/j.juro.2009.06.022>
- [7] Rahman, M.M., Chowdhury, M.S.A., Miah, M.J.I., Ghosh, K.C., Islam, M.N., *et al.* (2016) Outcomes of Early Endoscopic Realignment of Post-Traumatic Complete Posterior Urethral Rupture. *Journal of Dhaka Medical College*, **24**, 136-140. <https://doi.org/10.3329/jdmc.v24i2.29625>
- [8] Rehman, J., Samadi, D., Ricciardi, J.R. and Kreutzer, E. (1998) Early Endoscopic Realignment as Primary Therapy for Complete Posterior Urethral Disruptions. *Journal of Endourology*, **12**, 283-289. <https://doi.org/10.1089/end.1998.12.283>
- [9] Mouraviev, V.B., Coburn, M. and Santucci, R.A. (2005) The Treatment of Posterior Urethral Disruption Associated with Pelvic Fractures: Comparative Experience of Early Realignment versus Delayed Urethroplasty. *The Journal of Urology*, **173**, 873-876. <https://doi.org/10.1097/01.ju.0000152145.33215.36>
- [10] Hadjizacharia, P., Inaba, K., Teixeira, P.G., Kokorowski, P., Demetriades, D. and Best, C. (2008) Evaluation of Immediate Endoscopic Realignment as a Treatment Modality for Traumatic Urethral Injuries. *Journal of Trauma and Acute Care Sur-*

- gery, **64**, 1443-1450. <https://doi.org/10.1097/TA.0b013e318174f126>
- [11] Shrinivas, R.P. and Dubey, D. (2010) Primary Urethral Realignment Should Be the Preferred Option for the Initial Management of Posterior Urethral Injuries. *Indian Journal of Urology. IJU: Journal of the Urological Society of India*, **26**, 310. <https://doi.org/10.4103/0970-1591.65416>
- [12] Koraitim, M.M. (1996) Pelvic Fracture Urethral Injuries: Evaluation of Various Methods of Management. *The Journal of Urology*, **156**, 1288-1291. [https://doi.org/10.1016/S0022-5347\(01\)65571-X](https://doi.org/10.1016/S0022-5347(01)65571-X)
- [13] Guille, F., Cipolla, B., Leveque, J.M., Guirassy, S., Olivo, J.F. and Lobel, B. (1991) Early Endoscopic Realignment of Complete Traumatic Rupture of the Posterior Urethra. *British Journal of Urology*, **68**, 178-180. <https://doi.org/10.1111/j.1464-410X.1991.tb15290.x>
- [14] Podesta, M.L., Medel, R., Castera, R. and Ruarte, A. (1997) Immediate Management of Posterior Urethral Disruptions Due to Pelvic Fracture: Therapeutic Alternatives. *The Journal of Urology*, **157**, 1444-1448. [https://doi.org/10.1016/S0022-5347\(01\)65016-X](https://doi.org/10.1016/S0022-5347(01)65016-X)
- [15] Gheiler, E.L. and Frontera, J.R. (1997) Immediate Primary Realignment of Prostatic Membranous Urethral Disruptions Using Endourologic Techniques. *Urology*, **49**, 596-599. [https://doi.org/10.1016/S0090-4295\(97\)80002-7](https://doi.org/10.1016/S0090-4295(97)80002-7)
- [16] Kulkarni, S.B., Barbagli, G., Kulkarni, J.S., Romano, G. and Lazzeri, M. (2010) Posterior Urethral Stricture after Pelvic Fracture Urethral Distraction Defects in Developing and Developed Countries, and Choice of Surgical Technique. *The Journal of Urology*, **183**, 1049-1054. <https://doi.org/10.1016/j.juro.2009.11.045>
- [17] Moudouni, S.M., Patard, J.J., Manunta, A., Guiraud, P., Lobel, B. and Guille, F. (2001) Early Endoscopic Realignment of Post-Traumatic Posterior Urethral Disruption. *Urology*, **57**, 628-632. [https://doi.org/10.1016/S0090-4295\(00\)01068-2](https://doi.org/10.1016/S0090-4295(00)01068-2)
- [18] Cooperberg, M.R., McAninch, J.W., Alsikafi, N.F. and Elliott, S.P. (2007) Urethral Reconstruction for Traumatic Posterior Urethral Disruption: Outcomes of a 25-Year Experience. *The Journal of Urology*, **178**, 2006-2010. <https://doi.org/10.1016/j.juro.2007.07.020>
- [19] Jepson, B.R., Boullier, J.A., Moore, R.G. and Parra, R.O. (1999) Traumatic Posterior Urethral Injury and Early Primary Endoscopic Realignment: Evaluation of Long-Term Follow-Up. *Urology*, **53**, 1205-1210. [https://doi.org/10.1016/S0090-4295\(99\)00003-5](https://doi.org/10.1016/S0090-4295(99)00003-5)
- [20] Abid, B., Safdar, H.S. and Shuja, T. (2004) Optical Internal Urethrotomy for the Treatment of Urethral Strictures. *The Professional Medical Journal*, **11**, 338-344.