

## Original Research Article

# Prospective randomised study of cases of pelvic fracture urethral distraction defects managed by early alignment versus initial suprapubic urinary diversion with delayed urethroplasty

Arun Kumar<sup>1</sup>, Gunjeet Kaur<sup>2</sup>, Krishna Kant Singh<sup>1\*</sup>, H. S. Pahwa<sup>1</sup>, Awanish Kumar<sup>1</sup>,  
Dhirendra Pratap<sup>3</sup>, Priyanka Agrawal<sup>3</sup>

<sup>1</sup>Department of Surgery, KGMU, Lucknow, Uttar Pradesh, India

<sup>2</sup>Department of Pathology, Era's Lucknow Medical College, Lucknow, Uttar Pradesh, India

<sup>3</sup>Department of Surgery, K. K. Hospital, Lucknow, Uttar Pradesh, India

**Received:** 13 May 2020

**Accepted:** 08 June 2020

### \*Correspondence:

Dr. Krishna Kant Singh,

E-mail: [drkksinghkgmu@gmail.com](mailto:drkksinghkgmu@gmail.com)

**Copyright:** © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

## ABSTRACT

**Background:** In complex pelvic fracture urethral distraction defects (PFUDD), early management prevents incidence of devastating complications such as urinary incontinence, restenosis and urethra cutaneous fistula. The aim of the present study was to study the outcome of patients with PFUDD undergoing early alignment (either by rail roading or endoscopic) compared with initial suprapubic urinary diversion with delayed urethroplasty.

**Methods:** This was a prospective randomized study done at KGMU, Lucknow; having PFUDD during the period from June 2014 to July 2017. Patients with PFUDD were randomized in to two groups. Group A included 22 patients and managed by supra pubic cystostomy followed by delayed urethroplasty. Group B included 23 patients and managed by primary alignment by rail-roading and early endoscopic alignment. Patients were followed up after 6 weeks, 3 months and 6 months for measuring the primary and secondary outcomes during follow up.

**Results:** The most common age group that sustained pelvic fracture urethral distraction defects injury are male of 21-40 years. In group A, stricture was present in all patients at 6 weeks post-surgery. Open urethroplasty was done at 3 months in 60% and 10% patients at 6 months. In group B, stricture was present in 80% at 6 weeks, 40% at 3 months and 10% at 6 months. The incidence of ED in group A at 6 weeks, 3 months, was 25% patient which reduced to 20% at 6 months. In group B, ED was present in 30% patients 6 weeks, 3 months and which reduced to 25% at 6 months. No incontinence was observed in both groups.

**Conclusions:** Primary realignment has significant benefits compared to SPC as realignment approach is associated with a 50%-55% decrease in stricture formation.

**Keywords:** Open urethroplasty, Pelvic fracture urethral distraction defects, Primary realignment

## INTRODUCTION

Posterior urethral injuries are frequently associated with pelvic fracture. These injuries typically due to road traffic accidents or fall from height. In such situations, posterior urethra of men is affected in almost 3.5-19% of pelvic

fractures. In case of women, posterior urethra is rarely affected (0-6%), except by contusions or lacerations by bone fragments.<sup>1,2</sup>

Complex posterior urethral injuries with pelvic fracture require emergency management. The mode of treatment

vary worldwide, especially in developing and developed countries.<sup>3,4</sup> It is necessary of greater understanding of all available techniques to reconstructive urologists or else, the injury lead to devastating complication such as urinary incontinence, restenosis and urethra cutaneous fistula.<sup>5,6</sup>

There exists limited data on the success of endoscopic realignment and a lack of familiarity with realignment techniques at this time.

Hence the purpose of this study is to investigate the outcomes of patients with distraction injuries of the posterior urethra undergoing early alignment (either by rail roading or endoscopic) compared with initial suprapubic urinary diversion with delayed urethroplasty at a tertiary level trauma center in Lucknow city.

**METHODS**

This was a prospective randomized study carried out on 45 male patients attending surgery emergency or out-patient department of dept. of general surgery, urology and orthopedics, KGMU, Lucknow; having pelvic fracture associated urethral injury during the period from June 2014 to July 2017.

After getting approval from institutional ethics committee, patients of pelvic fracture urethral distraction defects (PFUDD) of grade III, IV, and V attending surgery emergency or out-patient department were included in the study. Patients of urinary bladder neck injury, Patients having grade I, II urethral injury and who are not giving consent were excluded.

After getting informed consent, all consecutive patients with urethral distraction injury of posterior urethra were randomized by simple randomization technique in to two groups.

Group A included 22 patients and were managed initially by urinary diversion by supra pubic cystostomy followed by delayed urethroplasty. Group B included 23 patients and were managed by primary alignment by two methods rail-roading and early endoscopic alignment.

Patients were followed up after 6 weeks, 3 months and 6 months and the primary outcome measured was rate of stricture formation in both groups which was detected by RGU and uroflowmetry studies.

Secondary outcome measure was rate of erectile dysfunction and urinary incontinence in both groups during the follow up period. Demographic characteristics and other parameters were compared in both the groups.

Data was analyzed using Microsoft excel and presented in number and percentages. Groups were compared by student’s t-test. A two tailed ( $\alpha=2$ ) p value <0.05 considered as statistically significant.

**RESULTS**

A total of 45 patients were included in the study and randomly divided into two groups. Group A consists of 22 patients and group B consists of 23 patients. Age group distribution of patients in both the groups was presented in Table 1. The age of patients in both the groups were ranged from 1 to 50 years. Majority of the patients in both the groups belongs to 21-30 years of age (31.81% and 39.3% respectively). The difference in age distribution in both the groups was not significant (p>0.05).

**Table 1: Age wise distribution of patients in two groups.**

Age in years	Group-A (n=22)		Group-B (n=23)	
	N	Percentage	N	Percentage
0-10	1	4.54	1	4.34
11-20	6	27.27	6	26.08
21-30	7	31.81	9	39.13
31-40	5	22.72	4	17.39
41-50	3	13.63	3	13.04
51-60	-	-	-	-
>60	-	-	-	-
Total	22	100	23	100

**Table 2: Mode of injury in both groups.**

Mode of injury	Group-A (n=22)		Group-B (n=23)	
	N	Percentage	N	Percentage
RTA	15	68.18	16	69.65
FFH	6	27.27	7	30.34
Other fall of wall	1	4.5	-	-

**Table 3: Clinical characteristics observed in both groups.**

Variables	Group-A (n=22)		Group-B (n=23)	
	N	Percentage	N	Percentage
<b>Signs and symptoms</b>				
Blood at meatus	9	40.9	8	34.78
Hematuria	4	18.18	6	26.08
Bladder lump	9	40.9	8	34.78
Fracture pelvic	22	100	23	100
<b>Urinary retention</b>				
Present	7	31.82	8	34.78
Absent	15	68.18	15	65.21
<b>RGU grading</b>				
Grade III	6	27.27	6	26.08
Grade IV	11	50	10	43.47
Grade V	5	22.72	7	30.43

The mode of injury in both the groups was shown in Table 2. In both the groups, major mode of injury was road traffic accident (RTA) in 68.18% and 69.65% patients respectively followed by fall from height (FFH)

and it was found in 27.27 and 30.34% respectively. No significant difference was seen in mode of injury in both groups (p=0.71).

Table 3 presents the clinical characteristics observed in both the groups. Blood at meatus was present in 40.9% in group A and 34.78% patients in group B. Hematuria was present in 18.18% patients in group A, 26.08% in group B. Bladder lump was found in 40.9% patients in group A, 34.78% patients in group B. Fracture pelvic was present in 100%, patients in both groups. There were no

significant difference symptoms in both groups (p=0.98). Urinary retention was present in 31.82% patients in group A, in 34.78% patients in group B (Table 4). No significant difference was noted in incidence urinary retention in both groups (p=0.54). Maximum number of cases of ASST grade IV were in group A 50% and in group B it was 43.47% (p>0.05). Out of 45 cases in whom surgical procedure for urethral injuries were done, 3 patients expired due to associated injuries and 2 patients was lost to follow up. Hence, follow up was done only in 40 patients.

**Table 4: Comparison of primary outcome measures at different time interval in both groups.**

Variables	Group A (n=20)			Group B (n=20)		
	6 weeks N (%)	3 months N (%)	6 months N (%)	6 weeks N (%)	3 months N (%)	6 months N (%)
Incidence of stricture	20 (100)	12 (60)	2 (10)	16 (80)	8 (40)	2 (10)
Open urethroplasty	0 (0)	8 (40)	12 (60)	0 (0)	6 (30)	5 (25)
SPC removal	0 (0)	8 (40)	12 (60)	9 (45)	6 (30)	5 (25)
Urethral calibration	0 (0)	2 (10)	2 (10)	4 (20)	5 (25)	6 (30)
Co-axial dilatation	NA	1 (5)	1 (5)	2 (10)	4 (20)	4 (20)
Direct visual inter urethrotomy comparison	NA	0 (0)	1 (5)	5 (25)	2 (10)	1 (5)

**Table 5: Comparison of secondary outcome measures at different time interval in both groups.**

Variables	Group A (n=20)			Group B (n=20)		
	6 weeks N (%)	3 months N (%)	6 months N (%)	6 weeks N (%)	3 months N (%)	6 months N (%)
Erectile dysfunction	5 (25)	5 (25)	4 (20)	6 (30)	6 (30)	5 (25)
Open urethroplasty	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)

The post treatment follow-up of primary outcomes in two groups was summarized in Table 4. In group A stricture was present in all patients at 6 weeks post-surgery. Gradually patients of this group was stabilized enough to do open urethroplasty at 3 months (60%) and 6 months (10%). In group B, stricture was present in 80% at 6 weeks, 40% at 3 months and 10% at 6 months. In both the groups, no open surgery was done at 6 weeks. Most of patients of group A (60%) have retained their suprapubic catheter till 6 months of follow up. In group B 45% relieved from supra pubic catheter (SPC) at the time of 6 weeks, next 30% at 3rd month and remaining 25% patient removed SPC at 6 months after open urethroplasty.

In group A, no urethral calibration done in group A at 6 weeks of time intervals. But 10% patients required urethral calibration at 3, 6 months of follow up. In group B urethral calibration was done in 20% cases at 6 weeks, 25% patients at 3 months, in 30% pts. at 6 months. There was no co-axial dilatation up to follow up of 3 months from date of enrollment in group A. One patient

undergone for co-axial dilatation after urethroplasty. In group B. 10% patients undergone for coaxial dilatation at follow up of 6 week and 4 (20%) patient at follow up of 3 month and same percentage of patients at 6th month follow up.

Secondary outcome measures in terms of erectile dysfunction (ED) and incontinence was presented in Table 5. In group A, ED was present at 6 weeks, 3 months, was present in 25% of patients which reduced to 20% at 6 months. In group B, ED was present in 30% patients 6 weeks to 3 months and which reduced to 25% at 6th month. In both groups no incidence of incontinence was found from 6 weeks to 6 months.

**DISCUSSION**

The management of posttraumatic posterior urethral distraction defects has been one of the most technically difficult and challenging problem faced by urologists. It is an uncommon injury at an inaccessible, subpubic location involving exposed sphincter active and erectile

neurovascular anatomy, and has been associated with a history of lifelong disability in numerous patients who have sustained such trauma. The impending threat of losing the manhood makes the task psychologically as well as physically more challenging.

In present study, a total of 45 cases with pelvic fracture urethral distraction defects were enrolled. Maximum proportion of patients enrolled in the study was in 21-30 years age group (31.81% in group A and 39.13% in group B). The age group 21-30 years is the most productive age group, where in people enjoy taking risks, perform strenuous jobs and drive fast, just because of thrill or because of occupational.<sup>7-9</sup>

All patients who attended this hospital with PFUDD due to trauma in the study were males. This is because males are involved in more riskful occupation and usually drive fast which is one of the most important causes of traumatic injury. Dandan et al, also concur that urethral injury is predominantly a male problem.<sup>10</sup>

He reported that injuries to the posterior urethra are mostly secondary to pelvic fractures, while injuries to the anterior urethra are caused by straddle-type (e.g., bicycles, skateboards) or penetrating (often self-inflicted) injuries. Urethral injuries from trauma constitute only 10% of all GU injuries, with iatrogenic etiology constituting a significant fraction of all urethral injuries.

In present study, major mode of injury was RTA. It was 68.18% in group-A and 69.65% in patients of group B. Next to this mode of injury was fall from height and it was 27.27% and 30.345 respectively in both groups. There was no significant difference in mode of injury between two groups.

Bladder lump was the most common symptom in all groups of patients. It was 40.9% and 34.78% in group A and B respectively. Second most common symptom was blood at meatus it was maximum in group A, 40.9% then 34.78% in patients of group B. Hematuria was less common in comparison to above symptoms' it was present only in 18.18% patients of group-A while it is slightly common in group B 26.08% in patients.

Sherry has reported blood at the external urethral meatus to be the cardinal sign of urethral injury.<sup>11</sup> He suggested that rectal examination of the male patient with a posterior urethral injury may reveal a high riding prostate. Voiding may be difficult or impossible, however the patient who voids is not necessarily clear of urethral injury.

Cass et al, and Elliott et al, reported that blood at meatus is present in about half of significant urethral injuries. The remaining patients were diagnosed because of the inability to pass a Foleys catheter. Blood at the urethral meatus is a cardinal sign of posterior urethral injury, and is seen in 37% to 93% of cases.<sup>12,13</sup>

In this study mainly comparison done between two methods of urethral distraction defect management first suprapubic cystostomy with delayed urethroplasty and early primary urethral alignment by railroading and endoscopic method. In present study the removal of SPC starts from 6th week, and also at 3 months and 6 months. In group A, SPC removed from 45% patients as early as 6th week then next 30% in further follow up of 3 months.

While most of patients of group A, 60% have retained their suprapubic catheter till 6 months of follow up except 40% who undergone for open urethroplasty at 3rd month. These 60% remaining patients was undergone for open urethroplasty in between 3rd to 6th month then SPC removed from these patients. Some degree of impotence is noted in 30% to 60% of patients with pelvic fracture and urethral distraction injury.

However, the complications of the original pelvic injury are difficult to differentiate from the complications of attempts to repair urethral and bladder injuries. Several studies have shown that patients treated with primary endoscopic realignment have rates of impotence and incontinence similar to those of patients who have had either no treatment or open reconstruction.<sup>14,15</sup> These studies support the conclusion that these complications are the result of the injury itself and not of the treatment. Some patients who become impotent after injury spontaneously recover erectile function a year or two later.<sup>16</sup> Most patients who become impotent as a result of pelvic fracture have some degree of arterial insufficiency. Erectile impotence before urethroplasty in 17.6% and 20%.<sup>17,18</sup>

In this study mainly comparison was done between incidence of erectile dysfunction (ED) during pre and post intervention in group A and B was 25%, 25%, 20% and 30%, 30%, 25% of total patients respectively at follow up of 6 weeks, 3 months and 6 months. There is improvement in ED with time observed. There was no significant increase in ED surgical interventions done in both groups. This was in accordance with the findings of retrospective study done by Asci et al. In the present study, no incidence of incontinence was observed in both the groups.

## CONCLUSION

The findings of the study conclude that primary realignment has significant benefits compared to SPC as realignment approach is associated with a 50%-55% decrease in stricture formation. In SPC, 100% stricture was developed with delayed urethroplasty but the strictures that result are usually manageable by simpler techniques like urethral calibration, co-axial dilatation and direct visual internal urethrotomy. As the number of patients were fewer, it is difficult at this stage to comment on the comparative efficacy of each of the three techniques used in two groups. However, in terms of

enhancement in quality of life of patient, primary realignment gives a patient a better chance to lead.

*Funding: No funding sources*

*Conflict of interest: None declared*

*Ethical approval: The study was approved by the Institutional Ethics Committee*

## REFERENCES

1. Koraitim MM, Marzouk ME, Atta MA, Orabi SS. Risk factors and mechanism of urethral injury in pelvic fractures. *Br J Urol.* 1996;77(6):876-80.
2. Ríos E, Martínez-Piñero L. Treatment of posterior urethral distractions defects following pelvic fracture. *Asian J Urol.* 2018;5(3):164-71.
3. Mundy AR, Andrich DE. Pelvic fracture-related injuries of the bladder neck and prostate: Their nature, cause and management. *BJU Int.* 2010;105:1302-8.
4. Barrett K, Braga LH, Farrokhyar F, Davies TO. Primary realignment vs suprapubic cystostomy for the management of pelvic fracture-associated urethral injuries: A systematic review and meta-analysis. *Urology.* 2014;83:924-9.
5. Kulkarni SB, Joshi PM, Hunter C, Surana S, Shahrour W, Alhajeri F, et al. Complex posterior urethral injury. *Arab J Urol.* 2015;13:43-52.
6. Fu Q, Zhang J, Sa YL, Jin SB, Xu YM. Recurrence and complications after trans perineal bulboprostatic anastomosis for posterior urethral strictures resulting from pelvic fracture: A retrospective study from a urethral referral center. *BJU Int.* 2013;112:358-63.
7. Eustace D, Wei H. The Role of Driver Age and Gender in Motor Vehicle Fatal Crashes. *J Transportation Safety Journey.* 2010;2(1):28-44.
8. Gulliver P, Begg D. Personality factors as predictors of persistent risky driving behavior and crash involvement among young adults. *Injury Prevention.* 2007;13:376-81.
9. Jenkins EL, Kisner SM, Forsbroke DE, Layne LA, Stout NA, Castillo DN, et al. Fatal injuries to workers in United States, 1980-1990: A decade of surveillance; national profile 2007;13:376-81.
10. Dandan IS, Farhat W. Trauma, Lower genitourinary. Available at: <http://emedicine.medscape.com/article/828251-overview>. Accessed on 10 January 2019.
11. Sherry E. World Ortho Textbook of Orthopaedics. Trauma and Sports Medicine. Chapter 28. 2010.
12. Cass AS, Godec CJ. Urethral injury due to external trauma. *Urology.* 1978;11:607-11.
13. Elliott DS, Barrett DM. Long-term follow-up and evaluation of primary realignment of posterior urethral disruptions. *J Urol.* 1997;157:814.
14. Asci R, Sarikaya S, Büyükalpelli R, Saylik A, Yilmaz AF, Yildiz S. Voiding and sexual dysfunctions after pelvic fracture urethral injuries treated with either initial cystostomy and delayed urethroplasty or immediate primary urethral realignment. *Scand J Urol Nephrol.* 1999;33:228-33.
15. Koraitim MM. The lessons of 145 posttraumatic posterior urethral strictures treated in 17 years. *J Urol.* 1995;153:63-6.
16. Turner-Warwick R. Prevention of complications resulting from pelvic fracture urethral injuries-and from their surgical management. *Urol Clin North Am.* 1989;16:335-58.
17. Matthews LA, Herbener TE, Seftel AD. Impotence associated with blunt pelvic and perineal trauma: penile revascularization as a treatment option. *Semin Urol.* 1995;13:66-72.
18. Armenakas NA, McAninch JW, Lue TF, Dixon CM, Hricak H. Posttraumatic impotence: magnetic resonance imaging and duplex ultrasound in diagnosis and management. *J. Urol.* 1993;149(5):1272-5.

**Cite this article as:** Kumar A, Kaur G, Singh KK, Pahwa HS, Kumar A, Pratap D, et al. Prospective randomised study of cases of pelvic fracture urethral distraction defects managed by early alignment versus initial suprapubic urinary diversion with delayed urethroplasty. *Int J Res Med Sci* 2020;8:2426-30.