OUTCOME OF ENDOSCOPIC FULGURATION OF POSTERIOR URETHRAL VALVES (PUV) IN CHILDREN

MOHAMMAD REZAUL KARIM[1], MOHAMMAD OHIDUZZAMAN KHAN[2], MOHAMMAD MUKHLESUR RAHMAN[3], MUHAMMAD MAHMUD ALAM[4], SUDIP DAS GUPTA[5], S.M. MAHBUB ALAM[6]

Abstract

Background: *Posterior Urethral Valves (PUV) are one of the most common urological problems having wide clinical implications and the prognosis depends upon the extent of the renal injury inflicted by the time of initiation of intervention and hence earlier the treatment, better the long-term outcome*

Objectives: *To evaluate the outcome of endoscopic fulguration of posterior urethral valves (PUV) in children.*

Method: *A cross-sectional analytical study was carried out on 50 male children with posterior urethral valves (PUV) from January 2011 to December 2012 in Dhaka Medical College Hospital, who were treated with endoscopic fulguration and came for routine follow-up.*

Results: *In this series, median age of patients was 2 years ranging from 1 to 12 years. Approximately half of the patients (46.0%) were 2 years. Sixty four percent presented with poor urinary stream, 38.0% presented with straining during micturition. The most common physical finding was palpable bladder 60.0%, UTI was present in 52.0% cases. Proteinuria was found in 46.0% cases, raised serum creatinine was found in 36.0% cases. Electrolyte imbalance was found in 12.0% of cases. Ultrasonogram of KUB showed severe hydronephrosis in 14.0% cases. Voiding cystourethrogram diagnosed PUV in 92.0% of cases. The follow-up period was 24 months. At the end of final follow-up 3 patients remained incontinent. Urinary tract infections were absent in 52.0% cases. Hydronephrosis disappeared in 30.0% cases. Chronic renal failure developed in 6.0% of cases. End stage renal disease was found zero during the follow-up period.*

Conclusion: *Follow-up period of longer duration needed to determine the ultimate outcome of these patients because some of the patients develop ESRD in the long run and ultimately renal transplant is the treatment. Treatment should be performed in higher centers where all the facilities are available.*

Bangladesh J. Urol. 2019; 22(1): 8-14

1. Assistant Professor, Dept. of Urology, Patuakhali Medical College, Patuakhali.
2. Assistant Professor, Dept. of Urology, Faridpur Medical College, Faridpur.
3. Assistant Professor, Dept. of Urology, Syed Nazrul Islam Medical College, Kishoregonj.
4. Resident Surgeon, Mugda Medical College & Hospita, Dhaka
5. Associate Professor & Head, Dept. of Urology, SSMH & Mitford Hospital, Dhaka
6. Professor of Urology & Head, Dept. of Urology, Dhaka Medical College, Dhaka

Correspondences: Assistant Professor, Dept. of Urology, Patuakhali Medical College, Patuakhali, Mobile-01792596984
E-mail: drrezabd@gmail.com
Received: 05 August 2018 **Accepted:** 15 November 2018

Introduction

Posterior urethral valves (PUV) is the most common cause of bladder outlet obstruction in children[1,2,3]. It is associated with poor urinary stream, incomplete bladder emptying and dilated posterior urethra.[4] Posterior urethral valves lead to chronic renal failure and end stage renal disease in children[5,6]. The incidence of posterior urethral valves is estimated to be between 1 in 3000 to 1 in 8000 male infants (Ghanem et al. 2004)[7]. Such patient present with a broad-spectrum of clinical severity[1,8].

Langenbeck is credited with first reporting congenital obstruction of the prostatic urethra in 1802. Despite

this observation it was left for Hugh Hampton Young, over a century later, to define and name the condition as posterior urethral valves. Young observed the anatomic variability of the anomaly and developed a classification that is still used almost 100 years later[6].

Lower urinary tract obstruction, secondary to PUV, affects the entire urinary tract above the level of obstruction. Proximal urethra, prostate, bladder neck, bladder, ureters, and kidneys are all affected and suffer various forms of damage[6]. The severity and reversibility of changes occurred by PUV is variable. Early diagnosis and appropriate therapy may arrest progressive damage and facilitate recovery[3].

In the past boys with posterior urethral valves presented with a variety of symptoms at various ages. They ranged from newborns with life-threatening renal and pulmonary conditions to older children with minor voiding dysfunction. In general, the symptoms are age dependent with the more severely affected boys presenting earlier in life[6].

The widespread use of maternal ultrasound in the past 25 years in the United States has resulted in at least 80% of women undergoing maternal ultrasound screening study during pregnancy. Posterior urethral valves is the third most common antenatal genitourinary diagnosis made today and accounts for 10% of all fetal uropathy[6].

Between 50% and 70% of patients with posterior urethral valves will have vesicoureteral reflux at the time of diagnosis. Almost all patients with posterior urethral valves have severe hydronephrosis at diagnosis. The valve bladder or full valve bladder is a chronic condition in valve patients where despite successful valve ablation, intrinsic bladder dysfunction leads to deterioration of the upper urinary tracts and continence. Posterior urethral valves affect no organ more consistently and profoundly than the bladder. Incontinence is a major problem for valve patients[6].

The management of PUV has improved significantly in the last decade as a result of earlier diagnosis by ultrasound, improved total patient care, development in surgical techniques and availability of modern broad-spectrum antibiotics[9]. As a result of the overall prognosis of patients with posterior urethral valves has improved in recent years[10]. There has been a significant drop in infant mortality rate from obstructive uropathy due to posterior urethral valves[11].

In spite of successful ablation of valves some patients may have persistent VUR, and go into ESRD and require renal transplantation. Successful treatment of posterior urethral valves may also need bladder and ureteric surgery. Approximately 10-15% of children undergoing renal transplant have PUV. Long term treatment of bladder dysfunction may be required after fulguration[12]. So, the aim of this study to evaluate the outcome of endoscopic fulguration of posterior urethral valves (PUV) in children.

Materials and methods

This is a prospective type of study carried out Department of Urology, Dhaka Medical College and Hospital From January 2011 to December 2012. Male child with posterior urethral valves attending Dhaka Medical College Hospital. A total of fifty (50) male child with posterior urethral valves included in the study. In each case information about the patient was obtained in the form of a questionnaire. The questionnaire included age, weight, socioeconomic status, address of the patient, antenatal, natal and post natal period, presenting complaints, previous treatment and physical examination. A detailed history of micturition including its flow (poor or narrow urinary stream, dribbling of urine, straining, frequency of micturition), color of urine, episode of urinary retention, day or night wetting associated with fever and vomiting, failure to thrive, flank mass or suprapubic distention or any other complaints were noted. The associated signs were also recorded. Information was sought regarding diagnosis and treatment. The information obtained through the above process was followed up and supplemented by records of physical findings, laboratory investigations, radiology and imaging study, the treatment administered and the outcome of the treatment. The first fifty patient fulfilling the criteria was included in the study. The investigations were carried out to support the diagnosis and to determine complications of PUV, including laboratory tests, radiology and imaging studies.

On admission and after physical examination, free flow of urine was ensured by perurethral catheterization. Blood transfusion was ensured for correction of anaemia if necessary. In case of impaired renal function, protein restriction, adequate oral and I.V. fluid were ensured for improvement of renal function. It should be possible to stabilize the condition of patient and control urosepsis within 48-72 hours when a decision is made as whether a temporary diversion

should be performed where valve ablation was not possible. If a preliminary vesicostomy has been made, valve surgery was deferred for 1 to 2 years of age to ensure satisfactory physical growth of the child and maximum stabilization of urinary tract. The vesicostomy was closed at the same time as with valve ablation. Long term prophylactic antibiotics were used when reflux was present. Using a suitable sized cystoscope with a catheterizing channel, the valves were fulgurated under general anaesthesia. After proper antiseptic wash a well lubricated cystoscope was carefully inserted into the bladder. Working towards the bladder, using blend of coagulation and cutting current, the valve cusps were touched at 4 to 5 o'clock and 7 to 8 o'clock positions and 12 o'clock position. Two or three sharp bursts on either sides were usually enough to achieve satisfactory fulguration. Bladder was full with irrigation fluid and cystoscope was withdrawn. Then the bladder was compressed through the suprapubic region, free flow of urine was seen to ensure satisfactory valve ablation. Catheter was left into the bladder for 3 to 4 days. In some patients, second look surgery was required due to lack of normal flow of urine. The patient was usually discharged on 3rd to 4th postoperative days with advice. Antibiotics was ensured, catheter was withdrawn after 3 to 4 days and the normal flow of urine during voiding was checked. All the patients were counseled and requested to attend for follow up at mentioned date and place with reports of investigations mentioned: Patients are routinely followed up at regular intervals i.e, 1, 3, 6, 12, 18, 24 months. During each follow up urine for R/M/E and C/S, serum creatinine, USG of KUB were done. After meticulous checking and rechecking and compilation, data were analyzed using SPSS (Statistical Package for Social Science, version 17). The statistics used to analyze the data were descriptive statistics and tests done were Student's t-test, Chi-square test. The level of significance was set at 0.05 and $P<0.05$ was considered significant.

Results

The median age of the patients was 2 years ranging from 1 to 12 years. Approximately half (44%) of the patients were 2 years, followed by 20% 1 year, 18% 3 years and 18%, 4 years and above. No patients found below 1 year because, children whose urethra is too small to accept the available endoscope (Table 1). The patients with PUV in this series presented with a number of symptoms. Poor urinary stream was the commonest mode of presentation (64%), followed by suprapubic lump (58%), urinary tract infections (UTI) 52%, dribbling of urine (52%), straining (38%), frequency of micturition (20%), admitted with catheter (16%), failure to thrive (12%), vomiting (12%), flank mass (8%) (Table 2). The valves were ablated by endoscopic fulguration. It was evident that all the patients had type I valve (100.0%), 6.0% had bladder neck hypertrophy. Introduction of urethrocystoscope was difficult in 8.0% of cases and 2.0% had thick valve cusps (Table 3). Paired t test was used to assess the effects of serum creatinine following fulguration. Analysis indicated that before fulguration mean Serum Creatinine ±SD was 97.47 ± 36.35 µmol/L., following fulguration it decreased to 96.09 ± 36.63 µmol/L. and decreased to 63.39 ± 25.38 µmol/L. at the end of 24 months. It was found that statistically significant mean difference was observed in the follow up period (Table 4). Represents before fulguration 52.0% had urinary tract infections and during follow up it decreased to 6.0% at the end of 24 months. Chi-square test indicated that UTI decreased significantly in the follow up period (Table 5). It was evident that before fulguration, 44.0% had albuminuria of these 28.0% had mild(+), 12.0% had moderate (++) and 4.0% had severe(+++) proteinurea. After fulguration and during the follow up period albuminuria was found only 16.0% of cases. Overall improvement of proteinuria was 50.0% (Table 6). It was evident that before fulguration, 18.0% patients had Grade I, 26.0% had Grade II, 28.0% had Grade III and 14.0% had Grade IV hydronephrosis. Following fulguration, it decreased significantly indicating only 16.0% had Grade I, 10.0% had Grade II, 4.0% had Grade III hydronephrosis (Table VII). Incontinence of urine was one of the most important complications of fulguration. Three patients developed incontinence after fulguration. During the follow up period, these 3 incontinent patient became continent. Partial valve ablation occurred in 5 patients (Table-VIII).

Table-I

Age distribution of the patients (n=50)

Age in year	Number	Percent	Median
1	10	20.0	
2	22	44.0	
3	9	18.0	2.0
≥4	9	18.0	
Total	50	100.0	

Table-II

Percentage distribution of patients by follow-up of urinary symptoms

Complaint	Before Fulguration	Follow up in months 1	3	6	12	18	24	p value
Poor urinary stream	64*	0.0	0.0	0.0	0.0	0.0	-	-
Dribbling	52*	32.0	26.0	22.0	18.0	12.0	8.0	0.045[s]
Straining	38*	0.0	0.0	0.0	0.0	0.0	-	-
Frequency of micturition	20*	18.0	12.0	8.0	6.0	4.0	2.0	0.043[s]
Normal	0	50.0	62.0	70.0	76.0	88.0	92.0	-

* Multiple response

Table-III

Percentage distribution of the patients by operative findings (n=50)

Finding	Number	Percentage
Type I valves	50	100.0
Bladder neck hypertrophy	3	6.0
Difficult to introduce Urethrocystoscope	4	8.0
Thick valve cusps.	2	4.0

Table-IV

Repeated measure of Serum Creatinine (n=50)

Follow up period	Mean ± SD	p-value
Before fulguration VS 1month	97.47 ± 36.35 VS 96.09 ± 36.63	0.006[S]
1 month VS 3 months	96.09 ± 36.63 VS 85.02 ± 32.24	0.001[S]
3 months VS 6 months	85.02 ± 32.24VS 80.13 ± 30.44	0.001[S]
6 months VS 12 months	80.13 ± 30.44VS 72.18 ± 29.75	0.001[S]
12 months VS 18 months	72.18 ± 29.75 VS 69.56 ± 26.67	0.001[S]
18 months VS 24 months	69.56 ± 26.67 VS 63.39 ± 25.38	0.001 [S]

Table-V

Urine Examination (n=50)

Follow up period	Percentage	p-value
Before fulguration VS 1month	52.0 VS 42.0	0.001[S]
1 month VS 3 months	42.0 VS 34.0	0.001[S]
3 months VS 6 months	34.0 VS 24.0	0.001[S]
6 months VS 12 months	24.0 VS 14.0	0.001[S]
12 months VS 18 months	14.0 VS 8.0	0.001[S]
18 months VS 24 months	8.0 VS 6.0	0.001 [S]

Table-VI

Percentage distribution of patients by follow up of proteinuria

Urine albumin	Before	Follow up in months						Improvement
	fulguration	1	3	6	12	18	24	
Nil	56.0	62.0	68.0	72.0	76.0	80.0	84.0	50.0%
Mild	28.0	26.0	24.0	22.0	20.0	16.0	14.0	
Moderate	12.0	10.0	08.0	6.0	4.0	4.0	2.0	
Severe	4.0	2.0	0.0	0.0	0.0	0.0	0.0	

Table-VII

Percentage distribution of patients by follow-up of ultrasonographic hydronephrotic grading

Complaint	Before	Follow up in month					
	fulguration	1	3	6	12	18	24
Nil	14.0	18.0	24.0	40.0	52.0	60.0	70.0
Grade I	18.0	26.0	32.0	26.0	20.0	22.0	16.0
Grade II	26.0	16.0	14.0	18.0	16.0	12.0	10.0
Grade III	28.0	28.0	20.0	10.0	10.0	6.0	4.0
Grade IV	14.0	12.0	10.0	6.0	2.0	0.0	0.0

Table-VIII

Percentage distribution of the patients according to complications

Complication	Number	Percent
Partial valve ablation	5	10.0
Incontinence	3	6.0
Meatal stenosis	1	2.0

Discussion

This study was carried out in Dhaka Medical College Hospital. In the present series, 50 patients with posterior urethral valves (PUV) were treated by endoscopic fulguration during the study period from January 2011 to December 2012. All the 50 patients were male. Gonzales, McAninch)[3,13]. also PUV occurs only in males.

In this study, median age of the patients was 2 years ranging from 1 to 12 years. Approximately half (44%) of the patients were 2 years, followed by 20% 1 year, 18% 3 years and 18%, 4 years and above. It is near similar to the age group mentioned by Smith et al[8].

In this study among the older children one was 10 years and another was 11 years old with a life long history of straining to pass urine and poor urinary stream, which was never recognized as abnormal by them or by their parents. Most of the boys belong to low socioeconomic condition. Therefore, the findings of the study are in well agreement with the findings of the other research works (Smith et al.)[8].

PUV occurs in a sporadic fashion and there are occasional reports in siblings and twins suggesting a genetic basis.[13] In this series, no such relationship was found. In the developed countries 25- 30% cases of PUV were diagnosed prenatally[8]. But in this study only two fetus were diagnosed as a case of PUV.

In this study, the boys presented with a variety of clinical features listed. Poor urinary stream was the commonest mode of presentation (64%), followed by suprapubic mass (58%), urinary tract infections (UTI) 52%, dribbling of urine (52%), straining (38%), frequency of micturition (20%), admitted with catheter (16%), failure to thrive (12%), vomiting (12%), flank mass (8%). Poor urinary stream, dribbling and straining was common among the older children while in younger children failure to thrive and vomiting were prominent. UTI was more common in younger children. These findings correlate with the study done by Egami and Smith[14] and Ghanem et al (2004)[7].

In this study shows during follow-up of urinary symptom, it is evident that before fulguration 64.0% had poor urinary stream followed by dribbling of urine (52.0%),

straining (38.0%) and frequency of micturition (20.0%). Following fulguration, 50.0% patients became normal and it was increased to 92.0% at the end of 24 months. However, 8.0% patients still had complaints of dribbling and 2.0% patients still had complaints of frequency of micturition.

In present study physical examination revealed that 60% patients had a palpable bladder followed by 56.0% were anaemic, 18.0% had raised body temperature, 10.0% had ballotable kidney, others are phimosis, dehydration, inguinal hernia, patent urachus and meatal stenosis. This correlates with the study done by Egami and Smith[14].

In this study laboratory findings indicated that 56.0% patients were anaemic followed by 36.0% having raised serum creatinine (above 110 µmol/L.) and 12.0% had electrolyte imbalance. The analysis of renal function was based on serum creatinine concentrations. Before fulguration creatinine concentration ranged from 55 µmol/L. to 304 µmol/lit. Mean serum creatinine at diagnosis plus or minus standard deviation was 97.47 ± 36.35 µmol/L. and it was decreased to 63.39 ± 25.38 µmol/L. at 24 months follow-up. Paired t test indicates that serum creatinine significantly decreased from baseline to further follow-up, this correlates with the study done by Denes et al[15].

In this study before fulguration 52.0% had urinary tract infections and during follow up it decreased to 6.0% at the end of 24 months. Chi-square test indicated that UTI decreased significantly in the follow up period. The qualitative urinary protein determination at the time of initial urinalysis showed a negative reaction in 56.0% of patients. It was evident that before fulguration, 44.0% had albuminuria of these 28.0% had mild(+), 12.0% had moderate (++) and 4.0% had severe(+++) proteinurea. After fulguration and during the follow up period albuminuria was found only16.0% of cases. Overall improvement of proteinuria was 50.0%. This improvement is similar with the study done by Warshaw et al.[16].

This study shows ultrasonogram of KUB that before fulguration, 18.0% patients had Grade I, 26.0% had Grade II, 28.0% had Grade III and 14.0% had Grade IV hydronephrosis. Following fulguration, it decreased significantly indicating only 16.0% had Grade I, 10.0% had Grade II, 4.0% had Grade III hydronephrosis. Ultrasonographic changes correlate with the study done by Farhat et al.[6].

Cystoscopic fulguration was done in 5 patients for second time. Sometimes valve ablation procedure may require third time[8,17]. In one case, unilateral nephroureterectomy was done for non-functioning kidney and in another case only unilateral nephrectomy was done due to non-functioning kidney. Antireflux surgery was done in one patient. Meatotomy was done in 1 patient for meatal stenosis. Three patients were suffering from chronic renal failure and were admitted in paediatric nephrology ward. They improved after conservative treatment and dialysis was not required. This correlates with the study done by Parkhouse et al.[9]. Blood pressure was found normal in all cases during follow-up. The follow-up period was 24 months. Follow-up period should be longer duration to determine the ultimate outcome of these patients.

Conclusion

In concluded that endoscopic fulguration with observation is the treatment of choice for posterior urethral valves. Patients improved dramatically following fulguration of posterior urethral valves. Early diagnosis and appropriate therapy may arrest progressive damage and facilitate recovery. Further multicenter studies with long term follow up are necessary to gather more information about the disease.

References

1. Connor, JP and Burbige, KA 1990, Long-term urinary continence and renal function in neonates with posterior urethral valves J. Urol, vol. 144, pp.1209-11.
2. Hutton, KAR, Thomas, DFM and Arthur, RJ 1994, Prenatally detected posterior urethral valves: is gestational age at detection a predictor of outcome? , J. Urol., vol.152, pp.698-701.
3. Karmakar, SJ 2001,Long term results of surgery for posterior urethral valves ,Paediatric Surg Int, vol. 17, pp. 8-10.
4. McAninch, JW 2004. Smith's general urology, McGraw-Hill, USA.
5. Farhat,W , Mclorie, G and Capolicchio, G, Khoury, A, Bagil, D and Meguerian, PA 2000, Outomes of primary valve ablation versus urinary tract diversion in patients with posterior urethral valves, Urology, vol. 56, pp.653-7.
6. Misseri, R and Glassberg, KI 2004, Surgery for posterior urethral valvesin Glenns urologic

surgery, 6th edn, eds. Glenn, JF & Keane, TE, Lippincott William & Wilkins, Philadelphia.

7. Ghanem, MA, Wolffenbuttel, KP and Vylder, AD 2004, Long term bladder dysfunction and renal function in boys with posterior urethral valves based on urodynamic findings, J. Urol., vol.171, pp.2409-12.
8. Smith, GHH & Ducket, JW 1996, Urethral lesions in infants and children, in Adult and paediatric urology, eds Gillenwater, JY & Grayhack, JT, Mossby.
9. Parkhouse, HF, Barratt, TM, Dillon, MJ, Duffy, PG, Fay, J, Ransley, PG, Woodhouse, CR and Willams, DL 1988, Long-term outcome of boys with posterior urethral valves , Brit. J. Urol., vol. 62, pp.59-62.
10. Warshaw, BL, Hymes, LC and Trulock, TS and Woodward, JR 1985, Prognostic features in infants with obstructive uropathy due to posterior urethral valves , J. Urol., vol.133, pp.240-3.
11. . Merguerian, PA , MCLorie, GA and Churchill, BM 1992, Radiographic and serologic correlates of azotemia in patients with posterior urethral valves, J. Urol., vol. 148, pp.1499-1503.
12. Roth, KS, Carter, WH and Chan, JCM 2001, Obstructive nephropathy in children : long term progression after relief of posterior urethral valve, Pediatrics, vol.107, pp.1004-10.
13. Gonzales, ET 2002, Posterior urethral valve and other urethral anomalies in Campbells urology,8th edn, eds Walsh, PC , Retik, AB & Vaughan, ED, Saunders, Philadelphia, pp.2207-29.
14. Elise, D & Bauer, SB 2005, Pediatric urology in Handbook of urology , 3rd edn, eds Siroky, MB , Oates, RD & Babayan, RK , Lippincott Willams & Wilkins, Philadelphia, pp.355-377.
15. Denes, ED , Barthold, JS and Gonzalez, R 1997, Early prognostic value of serum creatinine levels in children with posterior urethral valves , J. Urol, vol. 157, pp.1441.
16. Grainger, RG and Allison, D 2001, Grainger & Allisons diagnostic radiology, W B Saunders company, Philadelphia.
17. Egami, K and Smith, ED 1982, A study of the sequence of posterior urethral valves , J. Urol., vol.127, pp.84-87.