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Original Article

Incidence and Progress of Vesicoureteric Reflux after Primary Fulguration of Posterior Urethral Valves

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Abstract

Introduction: Posterior urethral valve (PUV) is the most frequent cause of urethral obstruction in male child. These lesions may result in lifelong disabilities with incontinence and decreased renal function despite optimal medical management. Primary fulguration without upper tract diversion is the preferred modality of treatment in most cases of PUV. Regular follow-up is needed to check completion of valve fulguration, renal function, status of hydronephrosis, vesicoureteric reflux (VUR), urinary tract infection (UTI), and bladder function. **Materials and Methods:** An interventional study among 30 purposively selected patients of PUV was conducted from December 2009 to July 2011. Most of the patients presented with weak urinary stream, dribbling of urine, straining at micturition, UTI, and palpable bladder. All children were subjected to ultrasonography (USG), blood urea, serum creatinine, routine urine examination, and culture studies. Structured questionnaire was used to collect information regarding improvement or disappearance of VUR and renal functional status before and after primary fulguration of PUV. **Results:** Ages ranged from 10 days to 14 years; 16 were between 1year and 14 years (53.3%), 11(36.7%) were infants, and the rest 03(10%) were neonates. Average serum creatinine levels were found gradually decreasing significantly ($p < 0.01$) in subsequent follow-ups. Average blood urea nitrogen (BUN) was also decreased significantly ($p < 0.05$). VUR was present in 63.3% cases. Non-VUR was found in 60% cases on right side and 50% cases on left side. On the third follow-up after 3 months it became 73.3% on right side and 63.3% on left side. Positive correlation found in Pearson correlation test about the changes of reflux grades before and after fulguration was significant ($p < 0.001$). It was significant on both left and right kidneys. Positive correlation found in Pearson correlation test about the changes of GFR before and after fulguration was also significant ($p < 0.001$). Collected data was cleaned, edited, and analyzed with the help of software SPSS window version 15.0. **Conclusion:** VUR disappeared in some cases and decreased in majority of the cases by 3 months after adequate restoration of urethral patency. Renal function came to normal range in two thirds of the cases.

Key words: Posterior urethral valves; Vesicoureteric reflux; Cystoscopic fulguration.

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INTRODUCTION

Posterior urethral valve (PUV) comprises the most common congenital anomaly causing bladder outlet obstruction in boys. The incidence is between 1 in 5000 and 1 in 8000 male births.[1,2] Langenbeck is credited with first reporting congenital

obstruction of prostatic urethra in 1802. Despite this observation, it was left for Hough Hampton Young, more than a century later to define the condition and name it posterior urethral valves (PUV).[3] He described three types of urethral valves: type I, type II, and type III. Type I represents 95% of PUV. There is a membrane that originates at the verumontanum and travels distally to insert in the anterior proximal membranous urethra with an opening present posteriorly at the verumontanum. The etiology is probably a result of the mesonephric ducts entering the cloaca more anteriorly than normal and fusing in the midline.[4] Type II valves are now generally considered to be non obstructive and are of historical interest only. Type III valves represent the other 5% and consist of a ring-type membrane distal to the verumontanum with a perforation present centrally. The membrane may occasionally migrate distally, forming a windsock appearance.[5] The cause of these valves is an incomplete dissolution of the urogenital membrane. Primary fulguration without upper tract diversion is the preferred modality of treatment in most cases of PUV. Regular follow-up is needed to check completion of valve fulguration, renal function, and status of hydronephrosis, VUR, urinary tract infection (UTI), and bladder function. Most of the available studies give widely variable data regarding the incidence of VUR, its course and correlation with renal function, with very few studies being available from the developing countries. In view of the above picture, this study was conducted in the Department of Paediatric Surgery, Dhaka Medical College and Hospital (DMCH).

MATERIALS AND METHODS

Thirty children between the ages of 10 days and 14 years (median 19 months), seen over a period of 20 months were evaluated. An interventional study was carried out in the Department of Paediatric Surgery, DMCH, to determine the improvement of renal function and incidence and progress VUR occurring after primary fulguration of PUV. PUV patients treated with fulguration alone were included. Parents were interviewed with a specific pre-designed and pre-tested questionnaire and other information was gathered by document review. All children were subjected to USG, blood urea, serum creatinine, routine urine examination, and culture studies. In presence of uremia, sepsis, dehydration, and metabolic derangements, preliminary catheterization was done until the above parameters were improved and the child was fit for anesthesia and surgery. Whereas the blood urea and creatinine levels were done immediately after admission, the 99mTc diethylene triamine pentaacetic acid (DTPA) scans were done electively after a period of catheterization followed by fulguration. PUV was confirmed on voiding cystourethrogram (VCUG) and at the same sitting, cystoscopy and fulguration of valves were done at 12, 2, 10, 5, and 7 o'clock positions using 7.5 Fr resectoscope. VUR was graded according to the international grading system.[6] The urethral catheter retained for 12–24 h and in

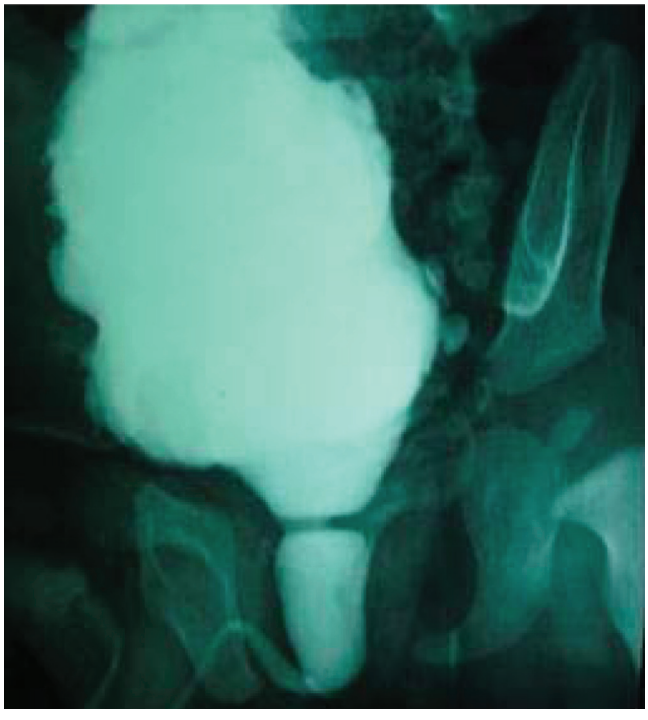

Figure 1: VCUG shows PUV

Figure 2: Bilateral VUR

Figure 3: Urethrocystoscopic view of PUV

Figure 4: After fulguration of PUV

uncomplicated cases the child was discharged on oral antibiotic on the first postoperative day. In children with VUR, long-term uroprophylaxsis and periodic urine cultures were advised. Patients were followed up at 7days, 1 month, and 3 months, when renal function tests, USG, routine urine examination, and culture, VCUG for VUR were carried out.[7] Glomerular filtration rate (GFR) was measured at presentation and after 3 months from the DTPA scan using Gates method.[8] Statistical analysis was performed using Pearson correlation test.

RESULTS

Age ranged from 10 days to 14 years; 16 were between 1 year to 14 years (53.3%), 11(36.7%) were infants, and the rest 3(10%) were neonates. More than two-thirds of the subjects had weak urinary stream (80.0%). Rest had normal urinary stream (20.0%). Dribbling of urine was present among 76.7% subjects. More than two-thirds of the study subjects had straining at micturition and 50% had UTI. Only one patient had associated congenital anomaly. Kidneys were ballotable in two cases and urinary bladder was palpable in 22 cases and 6 cases had concomitant phimosis. Serum creatinine level was found gradually decreasing in subsequent follow up in comparison with the previous one. This difference of creatinine level was found statistically significant ($p < 0.01$). Average BUN also decreased significantly ($p < 0.05$) (Table 1).

On admission, hydronephrosis of different grades was found in 95.7% cases. Grade 0 hydronephrosis was found in 3.3% cases which became 20% after 3 months. Grade III hydronephrosis was found in 16.7% cases on admission which later decreased after 3 months (6.7%) (Table 2).

Among the study subjects, VUR was present 63.3%. On admission non-VUR was found in 60% cases in right side and 50% cases in left side. On the third follow-up, i.e., after 3 months, it became 73.3% in right side and 63.3% in left side. On the other hand, Grade V VUR was found in 13.3% cases on admission and 0% cases after 3 months in right side. There were 3.3% Grade V VUR on left side on admission and 0% cases 3 months after fulguration (Table 3).

Positive correlation was found in Pearson correlation test about the changes of reflux grades before and after fulguration which was significant at the level of 0.01 ($p < 0.001$). This correlation was significant in both left and right kidney (Table 4).

Positive correlation was found in Pearson correlation test about the changes of GFR before and after fulguration which was significant at the level of 0.01 ($p < 0.001$) (Table 5).

On admission 46.7% patients had found bacterial growth in culture of urine which became 10.0% after 1 month. After 3 months it was 13.3%. On admission, 53.3% patients had urinary tract infection which became 16.7% after 1 month. After 3 months it was 13.3%.

Table 1: Changes of serum creatinine level and BUN

Biochemical Value (mg%)	On admission	After 1 Week	After 1 month	After 3 months	P value
	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	
Serum creatinine	1.03 ± 0.45	0.94 ± 0.45	0.82 ± 0.43	0.74 ± 0.40	< 0.01
BUN	59.27 ± 38.39	51.0 ± 34.13	45.56 ± 29.28	43.1 ± 25	< 0.05

Table 2: Progress of hydronephrosis following fulguration

Grade of hydronephrosis	Number of renal units (proportion)	
	On admission	After 3 months
0	2(3.3)	12(20.0)
I	18(30.0)	30(50.0)
II	30(50.0)	14(23.3)
III	10(16.7)	4(6.7)
Total	60(100.0)	60(100.0)

Table 3: Progress of VUR following fulguration

Grade of VUR	Number of renal units (proportion)			
	On admission		After 3 months	
	Right	Left	Right	Left
Non-VUR	18(60.0)	15(50.0)	22(73.3)	19(63.3)
I	2(6.7)	2(6.7)	0(0)	6(20.0)
II	3(10)	2(6.7)	5(16.7)	2(6.7)
III	2(6.7)	5(16.7)	0(0)	2(6.7)
IV	1(3.3)	5(16.7)	3(10.0)	1(3.3)
V	4(13.3)	1(3.3)	0(0)	0(0)
Total	30(100.0)	30(100.0)	30(100.0)	30(100.0)

Table 4: Changes in reflux grades before and after fulguration

Age	On admission		After 3 months	
	Left	Right	Left	Right
≤1/12				
10 days	0	0	0	0
10 days	I	II	I	II
15 days	0	0	0	0
30 days	IV	0	II	0
1/12–1 year				
1½ months	III	III	I	II
5 months	II	I	0	0

Table 4: (Continued)

Age	On admission		After 3 months	
	Left	Right	Left	Right
5 months	III	I	I	0
6 months	IV	0	IV	0
8 months	0	0	0	0
8 months	IV	0	III	0
9 months	0	0	0	0
9 months	IV	0	0	0
10 months	0	0	0	0
11 months	IV	II	II	0
1–5 years				
1	0	0	0	0
1	II	0	I	0
1	III	0	I	0
2	0	0	0	0
2	0	0	0	0
2	0	IV	0	II
2	III	0	I	0
2½	0	0	0	0
3	0	0	0	0
3	0	0	0	0
3	0	II	0	0
3	0	V	0	IV
4½	III	V	0	IV
5 –10 years				
5	V	V	III	IV
5	0	V	0	II
5½	I	III	0	II

DISCUSSION

Contrary to a report by Narasimhan et al., where preoperative and postoperative serum creatinine at the end of 1 year did not differ, in our series both serum creatinine an BUN were decreased significantly.[9] However Priti et al., reports

Table 5: Changes in GFR before and after fulguration

Age	On admission	After 3 months
≤1/12		
10 days	78	92
10 days	86	95
15 days	77	95
30 days	76	98
1/12–1 year		
1 ½ months	79	93
5 months	91	94
5 months	91	98
6 months	72	82
8 months	87	80
8 months	88	92
9 months	76	83
9 months	91	96
10 months	74	81
11 months	71	81
1 –5 years		
1	72	82
1	75	87
1	81	94
2	64	82
2	80	87
2	84	89
2	84	101
2 ½	75	85
3	80	85
3	80	85
3	96	95
3	96	101
4 ½	18	20
5–10 years		
5	72	81
5	72	60
5 ½	133	134

similar findings to our study regarding creatinine, BUN, and disappearance of hydronephrosis.[10]

Reflux is the major cause of postnatal damage in PUVs and persistence reflux is associated with bad outcome.[11] The rate of disappearance of reflux in our study is higher than the rate described in other series.[10–13] Improvement in GFR noted in our series was also supported by findings by Priti et al.[10]

Children can suffer from renal damage due to recurrent UTI not promptly diagnosed or subsequently evaluated. The highest incidence of underlying urinary tract abnormalities, such as vesicoureteral reflux, also occurs in this young age group. By promptly recognizing and appropriately treating the UTI, the physician minimizes the risk of injury to the kidneys. On admission 46.7% patients had found bacterial growth in culture of urine which became 10.0% after 1 month and after 3 months it was 13.3% which due to non compliance of patients. On admission 53.3% patients had urinary tract infection based on Urine R/M/E which became 16.7% after 1 month. After 3 months it was 13.3%.

Studies in patients with valves and bilateral reflux have demonstrated an inverse relationship between filling detrusor pressure and GFR.[14] Although we could not drive any clear cut correlation between rise in GFR and the resolution of reflux, we feel that they are both secondary to the reduction in back pressure following adequate fulguration. Although our study group was small, we did not come across any patient with persistent bladder dysfunction. This series includes only those patients who underwent fulguration. However we feel that adequate fulguration is the key to improvement of reflux and renal function in majority of cases.

CONCLUSION

In this study, VUR disappeared in some cases and decreased in majority of the cases by three months after adequate restoration of urethral patency. Renal function came to normal range in two-thirds of the cases. To clarify the improvement of VUR after primary fulguration, more follow up period is required.

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