

OUTCOME OF COLD KNIFE INCISION COMPARED TO DIATHERMY FULGURATION IN POSTERIOR URETHRAL VALVE

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Abstract:

Background: Posterior urethral valves are the most common cause of congenital obstructive lesion in the newborns and infant male child, occurring at the distal portion of the prostatic urethra. Diathermy fulguration of valve is one of the commonest modalities which has been practiced by Pediatric Urologist since decades where success rate ranging from 50-70%. Despite high success rate, post-operative complications like hematuria, urinary tract infections, urinary incontinence, retention of urine, residual valve and urethral stricture may develop in significant number of patients. Incision of the posterior urethral valve by cold knife is one of the modalities in the recent years with insignificant complications and good outcome with success rate ranging from 70-90%.

Objective: To compare the efficacy of the cold knife with the diathermy fulguration in the management of the posterior urethral valve.

Materials and Methods: This study was conducted in Urology Department of Bangabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh from 1st January 2017 till 1st September 2018. A total 48 patients, diagnosed as a case of PUV and who fulfill the selection criteria were divided randomly by simple lottery method into 2 groups consisting of 24 patients in each group. Valve ablation was performed under standard aseptic condition according to groups. Patients were followed up at 3 and 6 months of initial intervention. They were re-evaluated during the follow up with history, clinical examination and investigation findings. Their subjective outcome and objective findings were assessed and compared in between the two groups.

Results: There was no significant difference in the age distribution in between the groups ($p=0.083$). Within the group, all the variable parameters were significantly improved prior and after the intervention. But, in between the groups, after 6 months of intervention, there was no difference in improvement of urinary flow ($p=0.695$). Incontinence of urine was not significant ($p=1.000$). The drop of mean serum creatinine level was not significant ($p=0.530$). Decrease in Mean PVR was not significant ($p=0.684$). Maximum flow rate was not significantly improved ($p=0.255$). Peri catheter bleeding and residual valve were not significant. Stricture urethra was not found in any patient in both groups.

Conclusion: Comparing the findings of the present study, it can be concluded that cold knife incision is equally effective in comparison to diathermy fulguration in the management of posterior urethral valve.

Keywords: posterior urethral valve, cold knife incision, diathermy fulguration

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Introduction

Posterior urethral valves (PUV) are the congenital mucosal folds in distal part of posterior urethra causing varying degrees of obstructions in male child[1]. The incidence ranges between 1:8000-1:25000 live births[2]. It was Hugg Hampton who reported the first

case of PUV in 1913 and in 1919, he described the three different types of PUV[3]. The presentation of PUV depends on the degree of urinary obstruction which is determined by the severity and orientation of the valves[4]. With the wide spread use of antenatal and postnatal ultrasonographic evaluation the diagnosis of PUV are identifiable in early life. Despite the early diagnosis and aggressive conventional treatment modalities the disease process still can be severe[2].

The ablation of PUV remains the main stay of technique. Ablation can be done by diathermy fulguration, Fogarty balloon dilatation, Bugbee electrode fulguration, Laser ablation and Cold knife incision[5]. Among these modalities, diathermy fulguration is the preferred approach among the urologist for the stable patients because it can diagnose as well as treat the patient in the same session[6]. For this purpose, preferable pediatric size (8.5F to 11.5F) resectoscope is used in adjunct with diathermy hook electrode in a corresponding working element. Glycine solution (1.5%) is used as an irrigating solution during the procedure[7].

Though diathermy fulguration is a common modality of treatment, it has got significant complications like hematuria, diathermy burn, urinary retention, urinary extravasation, urinary incontinence, dribbling, residual valve and urethral stricture[7,5]. In order to minimize and overcome these complications several refinements in the techniques and approaches have been implemented over the time.

In the recent years, Cold knife incision for the ablation of PUV has been introduced. Instead of use of diathermy current, cold knife urethrotome is used avoiding the thermal injury to urethra and surrounding sphincter. Here glycine water (1.5%) was used as an irrigating solution for the procedure.⁸ The post-operative per-urethral catheter is kept for 24-48 hours after both the procedures unless there is any significant post-operative complication like bleeding[7].

The aim of this study was to compare the outcome of cold knife incision with diathermy fulguration in terms of post-operative consequences of urinary flow, changes in Hydronephrosis and VUR, change in serum creatinine level, and complications like peri catheter bleeding, hematuria, urinary incontinence, residual valve and development of urethral stricture.

Materials and Methods:

This randomized clinical trial was conducted in Urology Department of BSMMU from 1st January 2017 till 1st September 2018. A total 48 patients, diagnosed as a case of PUV and who fulfill the selection criteria were divided randomly by simple lottery method into 2 groups consisting of 24 patients in each group (Group A: Diathermy fulguration - Control group and Group B: Cold knife incision - Study group). Patients in whom instrument negotiation could not be done, re-ablation of PUV and patients with cutaneous vesicostomy were excluded.

Detail history was taken from patient's parents/guardians. Which included age the patient, urinary symptoms like poor flow of urine, dribbling, incontinence, retention, associated fever and failure to thrive. Clinical examination for any palpable abdominal mass which could be bladder or hydronephrotic changes. Patients were evaluated with following investigations: Urine routine microscopic examination and C/S, Serum Creatinine, Complete blood count (Hb level), USG of KUB region with MCC and PVR, Uroflowmetry, Voiding cystourethrogram, and Urethrocystoscopy for final diagnosis.

Following preoperative preparation, counselling and consent, all the participants from the study population were scheduled for operation. Those patients who had urine culture positive they were treated with sensitive antibiotics. In operation theater, under general anesthesia, patient was positioned on lithotomy or frog leg position. Parenteral broad-spectrum antibiotic prophylaxis was given and under all standard aseptic precaution, valve ablation was done by the faculty members of department of Urology, BSMMU, Dhaka.

Diathermy fulguration:

Standard cystoscopy was done after proper urethral calibration whenever needed. Diagnosis was confirmed during withdrawal of cystoscope. Type of valve was noted. Resectoscope of 11F assembled with the corresponding working element with diathermy hook electrode was negotiated per urethra. The valve was hooked and ablated at 5,7 and 12 o'clock position with low setting current (cutting mode Watt 20). Glycine solution (1.5 %) was used as an irrigating solution.

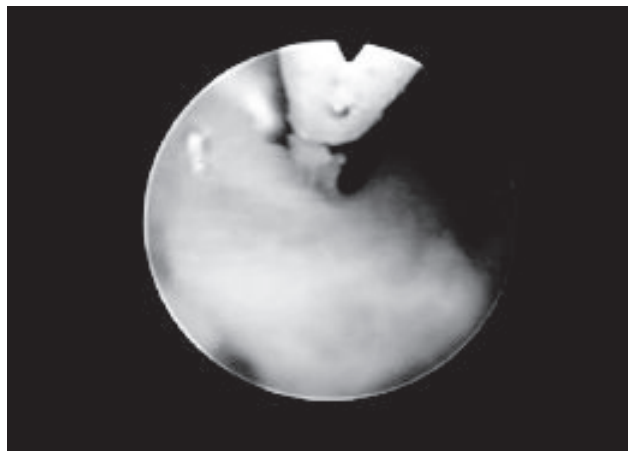


Fig.-1: Fulguration of Posterior urethral valve by diathermy hook.

Cold knife incision:

Standard cystoscopy was done after proper urethral calibration whenever needed. Diagnosis was confirmed during the withdrawal of the cystoscope. Type of valve was noted. Resectoscope of 11F assembled with corresponding working element with cold knife was negotiated per urethra. The valve was incised at 5, 7 and 12 o'clock position. 1.5 % glycine solution was used as an irrigating solution.

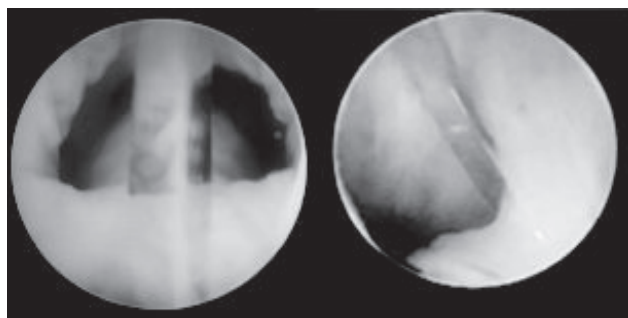


Fig.-2: Incision of Valve by sickle shaped cold knife.

The adequacy of the valve ablation was checked by cystoscopic re-visualization of the valve or by applying gentle suprapubic pressure on a saline filled bladder and observing the caliber and force of urinary stream per urethra in both the groups.

Then finally preferable size urethral catheterization was done. Per urethral catheter was kept for 24-48 hours in both the groups unless there is any pre-operative and per-operative complication like hematuria and peri catheter bleeding. If any gross hematuria and peri catheter bleeding was observed then it was managed accordingly.



Fig.-3: Demonstration of good caliber urine stream after ablation of PUV.

Both group's patients were discharged on 3rd post-operative day. Patients were followed up at 3 and 6 months of initial intervention. They were re-evaluated during the follow up with history, clinical examination and investigation findings. Their subjective outcome and objective findings were assessed and compared in between the two groups.

Statistical analysis of the results will be done by using computer based statistical software (SPSS 23.0) and Excel free software. Results obtained from comparison between control group and study group were analyzed. Quantitative variables (Age, Maximum flow rate, PVR, creatinine) were analyzed by Mann-Whitney test, independent t-test and Wilcoxon Signed Ranks test. Qualitative variables like (poor flow, incontinence, hydronephrosis, VUR, residual valve, stricture urethra) were analyzed by Fischer exact test and McNemar test. A 'p' value of < 0.05 was considered statistically significant.

The ethical clearance for the study was taken from the Institutional Review Board of BSMMU prior to the commencement of this study.

Results:

Age of the patients ranged from 11 months - 6 years in group A and 14 months -7 years in group B. There was no significant difference in the age distribution in between the groups (p-value >0.05) (Table I). Within the group, the all the variable parameters were significantly improved prior and after the intervention. But, in between the groups, after 6 months of intervention, there was no difference in improvement of urinary flow (p=0.695) (Table II). Incontinence of urine

was not significant ($p=1.000$) (Table III). The drop of mean serum creatinine level was not significant ($p=0.530$) (Table VIII). Decrease in Mean PVR was not significant ($p=0.684$) (Table IX). Maximum flow rate was not significantly improved ($p=0.255$) (Table X). Peri catheter bleeding and residual valve were not significant. Stricture urethra was not found in any patient in both groups (Table XI).

Discussion:

This prospective comparative study had been designed to find out the efficacy of cold knife incision in comparison to diathermy fulguration for the management of PUV.

In this study, age of the patients ranged from 11 months - 6 years in Group A and 14 months - 7 years in group B (Table I).

Daraji (2016) conducted similar study having age ranged from 1-5 years.⁶ In a study conducted by Babu and Kumar (2013), mean age of patients were 6.2

months in group A and 3.4 months in group B, which showed the dissimilarity in the age distribution with the present study.⁷ In this study, the mean age was 3.48 ± 1.68 years in group A and 4.38 ± 1.90 years in group B ($p=0.083$). The difference in the age distribution may be because they had used smaller size instrument (8.5 F resectoscope) compared to the present study, where 11 F resectoscope was used for the intervention.

In a study conducted by Sarhan et al. (2010), 19.2% patients presented with difficulty in micturition prior to intervention, but after the valve ablation there was significant improvement in the flow of urine in patients and only 5.1 % had some form of persistent difficulty in micturition.⁵ These findings coincided with the present study. Where maximum patients had difficulty in micturition prior to intervention but they had significant improvement in the flow of urine within both groups ($p=0.001$). But in between the groups after 6 months, improvement of urinary flow was not statistically significant ($p=0.695$) (Table II).

Table I

Distribution of the study subjects according to age in both groups (n=40)

Age (years)	Group		p-value (between groups)
	Group A	Group B	
	(diathermy fulguration) (n=20)	(Cold knife incision) (n=20)	
Age (Mean \pm SD)	3.48 \pm 1.68	4.38 \pm 1.90	^a 0.120
Range	(11 mon-6 yrs)	(14 mon-7 yrs)	

^aStudent t-test was done to measure the level of significance and p-value <0.05 was considered significant

Table II

Poor urinary flow among the study subjects in both groups (n=40)

Poor flow of urine	Group		p-value (between groups)
	Group A	Group B	
	(diathermy fulguration) (n=20)	(Cold knife incision) (n=20)	
Preoperative	20 (100.0)	20 (100.0)	^a 1.000
6 months after procedure	05 (25.0)	03 (15.0)	^a 0.695
p value (within the group)	^b 0.001	^b 0.001	

^aFisher's Exact test and ^bMcNemar test were done to measure the level of significance and p-value <0.05 was considered significant

This persistent in the poor flow was mostly because of inadequate valve ablation and the residual valve, similar reasons were noted in a study conducted by Babu and Kumar in 2013.⁷

Improvement in the urinary flow was the subjective assessment of the surgeons immediately after the intervention by seeing the urinary stream on suprapubic compression in a saline filled bladder (Figure 3) and, also patient's guardian's observation and assumption comparing the status of flow of urine prior and after the intervention.

In this present study, 20% cases in group A and 10% cases in group B had urinary incontinence preoperatively. After 6 months of intervention 15% had incontinence of urine within group A, but these were insignificant between and within the groups (p= 1.000) (Table III).

Similar to the present study, study conducted by Nakamura et al. (2010), they also found incontinence in 46.51 % cases prior to intervention and symptomatic improvement was observed in 85.0% cases 6 months after transurethral incision[8]. In a study conducted by Sarhan et al. (2010), they found 5.3% patients presented with incontinence of urine prior to surgery and almost all patients returned to continent in later

part of life after different interventions, which is similar to the present study who underwent cold knife incision[5].

The reason for incontinence of urine described by Nakamura et al. (2010), it was not only operative mishaps like burn and injury, rather it was multifactorial[8]. Age of the patient, recurrent urinary tract infection, small bladder capacity and valve bladder syndrome all contributed to the occurrence of incontinence. Their explanation contradicted with the present study. Despite absence of infection, normal capacity bladder and no significant operative mishaps there were persistent of incontinence in 3 cases in this present study. This could be the age factor and improper toilet training.

In a study conducted by Uthup et al. (2010), they found that, 28.56 % patients had hydronephrosis during presentation on ultrasonography[9]. After the primary intervention, there was significant residual hydronephrosis in 74% patients which was found comparable to the present study, where 40 % cases in group A and 35% cases in group B had persisted HDN after 6 months of intervention. It was found no significant difference in the resolution of hydronephrosis after 6 months of interventions in between the groups (p=1.000) (Table IV).

Table III
Urinary Incontinence among the study subjects in both groups (n=40)

Incontinence of urine	Group		p-value (between groups)
	Group A (Diathermy fulguration) (n=20)	Group B (Cold knife incision) (n=20)	
Preoperative	04 (20.0)	02 (10.0)	^a 0.661
6 months after procedure	03 (15.0)	02 (10.0)	^a 1.000
p value (within the group)	^b 0.500	^b 1.000	

^aFisher's Exact test and ^bMcNemar test was done to measure the level of significance and p-value <0.05 was considered significant

Table IV
Hydronephrosis/Hydroureteronephrosis among the study subjects in both groups (n=40)

HDN/HDUN	Group		p-value (between groups)
	Group A (Diathermy fulguration) (n=20)	Group B (Cold knife incision) (n=20)	
Preoperative	20 (100.0)	18 (90.0)	^a 0.487
6 months after procedure	08 (40.0)	07 (35.0)	^a 1.000
p value (within the group)	^b 0.001	^b 0.001	

^aFisher's Exact test and ^bMcNemar test was done to measure the level of significance and p-value <0.05 was considered significant

In this study, the grade of HDN in ultrasonography of KUB was described as mild, moderate and severe by the Radiologist, rather than measuring the anterior posterior diameter of the pelvis. According to their report findings, 70 % of patients both groups had moderate size hydronephrosis, 25 % had severe hydronephrosis in group A and 20% cases in group B. It was shown that there was significant improvement in the resolution of the grade of hydronephrosis within the group in both the groups ($p = <0.004$ in group A and $p = 0.001$ in group B). However, resolution of grades of hydronephrosis in between two groups after 6 months of intervention were not significant ($p = 0.434$) (Table V).

In another studies, 34 (77.3%) patients had bilateral HDN and 7 (16.0%) patients had bilateral HDUN and 7 out of 11 patients had bilateral HDN of at least grade III on follow up respectively. Two-third of the patients had complete regression of dilated system after longer duration and only two patients had persistent hydronephrosis up to 3 years of follow up[2,10].

Dissimilarity to the present study, they had studied the specific categories like HDN and HDUN but they had not elaborated the difference in improvement or deterioration of the dilated system in specific categories. this study didn't categorize unilateral or bilateral hydronephrosis or hydroureteronephrosis. However, none of the patient underwent worsening of the HDN during the follow up period.

Barber et al. (2009) in their study found that 85.7% of patients had VUR of different grades prior to the intervention[2]. After intervention, they found that 83.33% patients had improvement or resolution of the reflux and one patient had stable reflux which was similar to the present study, where 85 % in group A and 90% cases in group B had significant resolution of VUR seen after 6 months of intervention and 15 % in group A and 10 % in group B had persisted VUR. It was found significant resolution of VUR within the group before and after the treatment ($p = 0.031$ in both groups). But improvement of VUR was not significant in between groups ($p = 0.632$) (Table VI).

Table V
Grading of Hydronephrosis among both the study groups (n=40)

Grading of HDN/HDUN	Group		p-value (between groups)
	Group A (Diathermy fulguration)(n=20)	Group B (Cold knife incision)(n=20)	
Preoperative			
Mild	01 (5.0)	00 (0.0)	^a 0.477
Moderate	14 (70.0)	14 (70.0)	
Severe	05 (25.0)	04 (20.0)	
6 months after procedure			
Mild	05 (25.0)	04 (20.0)	^a 0.434
Moderate	02 (10.0)	03 (15.0)	
Severe	01 (5.0)	00 (0.0)	
p-value (within the groups)	^b 0.004	^b 0.001	

^aFisher's Exact test was done to measure the level of significance and p-value <0.05 was considered significant

Table VI
Vesicoureteral reflux among both the study groups (n=40)

VUR	Group		p-value (between groups)
	Group A (Diathermy fulguration) (n=20)	Group B (Cold knife incision) (n=20)	
Preoperative	08 (40.0)	07 (35.0)	^c 0.744
6 months after procedure	03 (15.0)	02 (10.0)	^c 0.632
p value (within the group)	^b 0.031	^b 0.031	

^cChi-square test and ^bMcNemar test was done to measure the level of significance and p-value <0.05 was considered significant

In this study, there was no significant regression of the grade of VUR with in the group ($p= 0.099$ in group A and $p=0.149$ in group B). and also, between the groups after 6 months of follow up ($p= 0.794$) (Table VII), which was comparable to other studies, they all had around 56-74% persistent different grades of VUR after 4-7 months of follow up, which was similar to the present study.^{9,11}

But, all these findings were not comparable to the study conducted by Mirshemirani et.al. (2013),¹² where they found 61.2% patients had VUR of different grades with both unilateral and bilateral presentation prior to intervention. After the intervention, they found VUR subsided in majority of the cases on follow up of 3-4 months, but they didn't specify regarding unilateral or bilateral regression of different grades of VUR changes before and after the intervention. This study didn't go for specific categorization of unilateral and bilateral VUR and their outcome differences.

In this present study, Preoperative mean serum creatinine was 1.10 ± 0.34 mg/dl in group A and 1.07 ± 0.25 mg/dl in group B ($p= 0.752$). After 6 months of intervention it was found dropped down to 0.75 ± 0.10 mg/dl in group A and 0.73 ± 0.08 mg/dl in group B ($p=0.489$). Within the group there was significant improvement in the serum creatinine level ($p=0.001$ in group A and $p = 0.001$ in group B). But difference in the improvement of serum creatinine level in between groups were not significant ($p=0.489$) (Table VIII), which is highly comparable to the study conducted by Ipekci et al. (2014), in their study, baseline preoperative creatinine level was 1.68 ± 2.97 mg/dl.

Patients were followed for the mean duration of 10.6 ± 4.2 months and found that the mean serum creatinine level drop down to 0.94 ± 1.69 mg/dl, which was highly significant ($p=0.028$) [13]. Similar drop down in the creatinine level was found by other authors in their studies after 3-6 months of intervention[2,9,10].

Table VII
Grading of VUR among both the study groups (n=40)

Grading of VUR	Group		p-value (between groups)
	Group A (Diathermy fulguration) (n=20)	Group B (Cold knife incision) (n=20)	
Preoperative			
Grade III	06 (30.0)	05 (25.0)	^a 0.937
Grade IV	02 (10.0)	02 (10.0)	
6 months after procedure			
Grade II	01 (5.0)	00(0.0)	^a 0.794
Grade III	01 (5.0)	01 (5.0)	
Grade IV	01 (5.0)	01 (5.0)	
p-value (within the groups)	^b 0.099	^b 0.149	

^aFisher's Exact test was done to measure the level of significance and p-value <0.05 was considered significant.

Table VIII
Comparison of serum creatinine level before and after treatment among both the study groups (n=40)

Serum creatinine (mg/dl)	Group		p-value (between groups)
	Group A (Diathermy fulguration) (n=20)	Group B (Cold knife incision) (n=20)	
Preoperative	1.10 ± 0.34	1.07 ± 0.25	^a 0.752
6 months after procedure	0.75 ± 0.10	0.73 ± 0.10	^a 0.530
p value (within the group)	^b 0.001	^b 0.001	

^aStudent t test and ^bWilcoxon Signed Ranks test was done to measure the level of significance and p-value <0.05 was considered significant.

This study shows, PVR within the group before and after the intervention was significantly decreased in both groups ($p=0.001$ in group A and $p=0.011$ in group B). However, PVR in between the groups weren't statistically significant 6 months after intervention ($p=0.684$). (Table IX).

These findings were consistent with the study conducted by Ipekci et al. (2014) where they found that prior to intervention, patients had the mean PVR of 32.30 ± 19.18 ml and after mean follow up duration of 10.6 ± 4.2 months they found out that mean PVR was dropped to 22.48 ± 18.32 ml and it was significant ($p=0.001$) similar to the present study[13].

Ipekci et al. (2014), in their study, found that baseline Qmax of 12.99 ± 5.81 ml/sec and after the mean follow up duration of 10.6 ± 4.2 months the Qmax increased to 17.11 ± 6.54 ml/sec ($p=0.001$). The significant difference in the preoperative and post-operative flow rate, was improved in 80.7% cases[13]. This

improvement was similar to the findings of the present study. Here preoperatively, group A had mean Qmax 6.23 ± 0.90 ml/sec and group B had mean Qmax 6.19 ± 1.09 ml/sec. Later follow up after 6 months of intervention it showed that the mean Qmax increased to 12.66 ± 2.04 ml/sec in group A and 13.59 ± 2.44 ml/sec in group B. This was highly significant ($p=0.001$ in group A and group B) within the group, however, there was no significant difference in improvement of urine flow rate in between the groups after 6 months of intervention ($p=0.255$). (Table X).

Gupta et al. (2013), in their study, they ascertained 2 age groups. Group A (5-10 years) and group B (10-15 years). They found that Qmax 15.26 ± 4.54 ml/sec in group A and 22.50 ± 7.24 ml/sec in Group B was normal for that age group of patients[14]. The values of Qmax with relation to age didn't fully matched with this present study. Yang et al. in 2010 and 2013 in their study, they gave minimally accepted Qmax values around 10th

Table IX

Comparison of post void residual urine before and after treatment among both the study groups (n=40)

Post void residual urine (ml)	Group		p-value (between groups)
	Group A	Group B	
	(Diathermy fulguration) (n=20)	(Cold knife incision) (n=20)	
Preoperative	62.85 ± 39.76	61.75 ± 26.50	^a 0.437
6 months after procedure	36.60 ± 13.34	41.90 ± 21.28	^a 0.684
p value (within the group)	^b 0.001	^b 0.011	

^aStudent t test and ^bWilcoxon Signed Ranks test was done to measure the level of significance and p-value <0.05 was considered significant.

Table X

Comparison of maximum flow rate (Qmax) before and after treatment among both the study groups (n=32)

Qmax (ml/sec)	Group		p-value (between groups)
	Group A	Group B	
	(Diathermy fulguration) (n=15)	(Cold knife incision) (n=17)	
Preoperative	6.23 ± 0.90	6.19 ± 1.09	^a 1.000
6 months after procedure	12.66 ± 2.04	13.59 ± 2.44	^a 0.255
p value (within the group)	^b 0.001	^b 0.001	

^aStudent t test and ^bWilcoxon Signed Ranks test was done to measure the level of significance and p-value <0.05 was considered significant.

percentile of the nomogram was >11.5 ml/s in children d" 6 years and >15ml/s in children age e" 7 years. This present study only coincided with the age of the patients but values of Qmax differed. It was found that majority of the patients in this study had Qmax less than their ascertained normal value according to age stated by Gupta et.al. (2013) and Yang et al. (2013).^{14,15} Patients didn't go for repeat uroflowmetry because of their symptom's improvement observed by the guardians and USG finding also showed decrease in amount of PVR and regression of HDN/HDUN and VUR after the intervention. Patients were kept in follow up and it was found improvement in the symptoms despite these less values of Qmax. It was concluded that, less Qmax values could be because of inadequate hydration, failure of maintenance of privacy for the procedure, fear and nervousness of the child.

In this study, immediate after the operation 3 (15.0%) patients in group B had mild peri catheter bleeding and there was no bleeding in group A. Bleeding was not of significant difference in between the groups (p=0.231) and those patients were managed conservatively by perineal compression (Table XI).

This finding consisted with the study conducted by Babu and Kumar (2013), where 3 patients (1 in group A and 2 in group B) developed bleeding during post-operative period which were managed conservatively[7]. Similar study conducted by Sarhan et al. (2010) found that significant hematuria and peri catheter bleeding observed in 2 patients who underwent cold knife incision of the valve and they were treated conservatively. They managed one by perineal compression and other by cystoscopy and coagulation of the oozing urethral mucosa in this present study no cystoscopy and coagulation of oozing vessel was required[5].

In a study conducted by Ipekci et al. (2014), they found that 13.4 % of the children had residual valve and they had to undergo reablation later[13]. Consisted with the

present study, patient who were in follow up, after 6 months of intervention it was found that 25% patients in group A and 15% patients in group B had residual valve (p=0.695) which was insignificant in between the groups (Table XI).

Later these patients had to undergo reablation of the valves for their deteriorating symptoms. Sarhan et al. (2010) and Mirshemirani et al. (2013) had similar findings in their studies, where they also found 0.68% and 15.3% patient required redo ablation of the residual valve respectively[5,12].

In this present study, none of the patient from both the groups developed stricture urethra (Table XII). Contradiction with this study, Babu and Kumar (2013), in their study reported the development of stricture in 21.9% patients who underwent fulguration but they didn't find any stricture after cold knife incision of the valve.

Their reason for development of stricture urethra was electrosection during fulguration leading to deep burn in the corpus spongiosum[7]. Similar explanation was given by Crook (1982) [16]. Sarhan et al. (2010), in their study, found that urethral stricture developed in 2% with the loop resection which was similar to the outcome found in the study conducted by Babu and Kumar in 2013[5,7]. Mirshemirani et al. (2013) in their study found that 7.1% of patients developed stricture urethra after fulguration. They also had the similar explanation like above authors in addition, they explained the caliber of urethra and inappropriate size of the instrument also contributed for formation of stricture.¹² Similarly, Myers and Walker (cited Sarhan et al. 2010), Ipekci et al. in 2014 also reported the development of the stricture urethra after the both modes of intervention but they were insignificant[5,13]. Whereas, study conducted by Nijam and Scholtmeijer (1991), they reported zero (0) incidence of stricture after fulguration in all the age groups[17].

Table XI
Post-operative complications among both the study groups (n=40)

	Group		p-value (between groups)
	Group A	Group B	
	(Diathermy fulguration) (n=20)	(Cold knife incision) (n=20)	
Peri catheter bleeding (immediate)	0 (0.0)	3 (15.0)	^a 0.231
Residual valve (after 6 months)	5 (25.0)	3 (15.0)	^a 1.000
Stricture urethra (after 6 months)	0 (0.0)	0 (0.0)	^a 1.000

^aFisher's Exact test was done to measure the level of significance and p-value <0.05 was considered significant.

Table XII*Distribution of the study subjects by 3 months after procedure among both the study groups (n=40)*

	Group	
	Group A (diathermy fulguration) (n=20)	Group B (Cold knife incision) (n=20)
Poor flow of urine	05 (25.0)	05 (25.0)
Incontinence of urine	03 (15.0)	02 (10.0)
HDN/HDUN	11 (55.0)	10 (50.0)
VUR	06 (30.0)	05 (25.0)

Conclusion:

Comparing the statistical findings of the present study, it can be concluded that cold knife incision is found to be equally effective to diathermy fulguration in the treatment of the posterior urethral valve.

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