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COMPARISON OF LOWER URINARY TRACT SYMPTOMS IN PATIENT OF MIDDLE URETERIC CALCULI UNDERGOING STENTING VERSUS NON STENTING AFTER UNCOMPLICATED URETEROSCOPY IN CHILDREN

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ABSTRACT

Background: Ureteral stents are commonly used after ureteroscopy for ureteric stones in cases of ureteric injury or simply to maintain patency. However, its need in uncomplicated circumstances is debatable. Ureteral stents cause pain and bothersome lower urinary tract symptoms in adults but this phenomenon is unknown in children.

Aim: To compare LUTS in pediatric patients with middle ureteric calculi undergoing ureteroscopy with and without postoperative stenting.

Methods: This retrospective comparative study was carried out at department of urology Unit Khyber Teaching Hospital, Peshawar from jan 2021 to july 2021. The research included children between the ages of 6 and 15 years who were diagnosed with middle ureteric calculi and underwent ureteroscopy. Patients were grouped based on stenting as with stenting (group A) and without stenting (group B). Post-operative LUTS were compared in both groups.

Results: A total of 86 children were registered, The gender distribution of both groups was not significantly different from each other (Male: 59% vs. 63%, p=0.72; Female: 41% vs. 37%, p=0.72).

The mean age of the patients did not differ between the two groups as well (9.4 ± 2.1 years vs. 9.1 ± 2.5 years, p=0.58). Both categories had equal proportion of patients across age brackets (6-8 years: 27 % vs.23 %, p = 0.63; 9-11 years: 35 % vs. 34 %, p = 0 .92; 12-15 years: 37 % vs. 43 %, P = 0.54). Mean stone size was also comparable between non-stented group and stented group (8.7 ± 1.2 mm vs. 8.9 ±1.5 mm, p = 0.55).

Conclusion: Both stented and non-stented approaches in pediatric ureteroscopy for ureteral calculi demonstrate similar efficacy in terms of stone clearance and complication rates.

Keywords: Ureteric Calculi, Ureteroscopy, Stenting, Lower Urinary Tract Symptoms, Pediatric Population

INTRODUCTION

Ureteric calculi, while less prevalent in children in comparison to adults, may nonetheless present notable clinical difficulties [1, 2]. Ureteric calculi typically cause lower urinary tract symptoms (LUTS) such as dysuria, frequency, urgency, and hematuria. These symptoms have a negative influence on the quality of life and need prompt care [3, 4]. Ureteroscopy is now recognized as a secure and efficient method for treating ureteric calculi in children. It has a high success rate in removing stones and causes very few complications [5].Postoperative stenting after ureteroscopy is a common procedure that aims to reduce swelling of the ureter, keep the ureter open, and help with drainage [6, 7]. However, there is ongoing controversy over the need for periodic stenting in simple instances. Although stenting may be advantageous in intricate situations or those with a heightened risk for problems, its regular use in simple cases may subject patients to unneeded pain, heightened susceptibility to urinary tract infections, and more healthcare expenses [8, 9, 10].Further research is needed to investigate the effects of surgical stenting on lower urinary tract symptoms (LUTS), especially in pediatric patients. Due to the distinct anatomical and physiological factors in children, such as smaller ureteral diameters and variations in bladder dynamics, the impact of stenting on symptom relief may vary compared to adults. Hence, it is essential to conduct a comparative examination of lower urinary tract symptoms (LUTS) in children with middle ureteric calculi who undergo ureteroscopy, with and without postoperative stenting. Optimizing pediatric urology patient care, reducing needless treatments, and increasing outcomes require such insights. This research compared the resolution of LUTS in stented and non-stented patients to determine the need and advantages of regular stenting in pediatric population.

METHODOLOGY

This retrospective comparative research was carried out at department of urology Unit Khyber Teaching Hospital, Peshawar. The research included children between the ages of 6 and 15 who were diagnosed with middle ureteric calculi, and underwent ureteroscopy during the period jan 2021 and july 2021. Confirmation of middle ureteric stone was carried out on ultrasound and Xray KUB. Patients with complicated ureteric calculi, ureteric strictures, urinary tract abnormalities, recurrent urinary tract infections, and prior ureteral procedures were excluded. Sample size was calculated using WHO sample size formula and participants were registered using non-probability consecutive sampling technique.

The medical record of patients fulfilling the selection criteria, was retrieved from hospital electronic medical records system (HMIS). Data retrieved included demographic information, preoperative clinical features, imaging findings, operative specifics, and postoperative follow-up data. The preoperative and postoperative follow-up intervals (1 week, 1 month) were used to document lower urinary tract symptoms (LUTS), which included dysuria, frequency, urgency, and hematuria which was the primary outcome. The patients were categorized into two groups according to the technique used for treatment. Group A consists of patients who had ureteroscopy with stenting, whereas Group B comprises patients who had ureteroscopy without stenting. A semi rigid wolf ureterorenoscope (4.5/6.5 French) was used along with pneumatic Swiss LithoClast® Master for stone fragmentation in all cases in lithotomy position. A standar 4.7 French double J stent was used in Group A. The secondary outcomes included stone clearance rates, complications, and the need for supplementary treatments.

DATA ANALYSIS

Statistics were done using SPSS 23. Categorical variables were frequencies and percentages, whereas continuous variables were means with standard deviations and medians with interquartile ranges. Appropriate parametric, and non-parametric tests were used for statistical analysis, depending on data distribution including Chi-square, Fisher's exact, Student's t-test, or Mann-Whitney U tests. Statistical significance was defined as p-value ≤ 0.05.

ETHICAL CONSIDERATIONS

This research followed the Declaration of Helsinki and was approved by the Khyber Teaching Hospital, Peshawar ethics committee. All participants, and their guardians gave informed permission and received tight patient confidentiality.

RESULTS

The demographic and preoperative profiles of patients in both Group A (Stented) and Group B (Non-Stented) are presented in Table 1. The gender distribution of both groups was not significantly different from each other (Male: 59% vs. 63%, p=0.72; Female: 41% vs. 37%, p=0.72). The mean age of the patients did not differ between the two groups as well (9.4 ± 2.1 years vs. 9.1 ± 2.5 years, p=0.58). Both categories had equal proportion of patients across age brackets (6-8 years: 27 % vs.23 %, p = 0.63; 9-11 years: 35 % vs. 34 %, p = 0 .92; 12-15 years: 37 % vs. 43 %, P = 0.54). Mean stone size was also comparable between non-stented group and stented group (8.7 ± 1.2 mm vs. 8.9 ±1.5 mm, p = 0.55). No significant difference was noted in the prior stone history (14% vs. 11%, p =0.67) or the side of ureteric calculi (Right: 51 % vs. 54%, P = 0.78; Left: 49 % vs. 46%, P = 0.78).The information on the occurrence of lower urinary tract symptoms (LUTS) is given in Table 2, which captures preoperative, postoperative one week and postoperative one month data. There were no significant differences between the groups in terms of the incidence rates for dysuria (65% vs. 69%, p = 0.72), frequency (59% vs. 63%, p = 0.72), urgency (47% vs. 51%, p = 0.72), and hematuria (35% vs. 37%, p = 0.72). Group B had a significantly higher rate of dysuria at 1 week postoperatively compared with group A, which was stented (46% vs. 24%, p = 0.03). Other symptoms such as frequency (34% vs. 20%, p = 0/11), urgency (23% vs.12%, p = 0.21), and haematuria (20% vs. 14%) did not have any significant difference between these groups respectively At one month after surgery, there was still a much higher prevalence of Dysuria among patients who underwent non-stenting Group B relative to their counterparts in Stented Group A (31% vs. 12%. p = 0.04). The frequencies of frequency (23% to 10%, p = 0.15), urgency (20% to 8%, p = 0.14) and haematuria (14% to 8%, p = 0.41) also failed to show significant discrepancies between these groups respectively Table 3 presents the same average stone size in group A (8.7 ± 1.2 mm) and group B (8.9± 1.5 mm) (p=0.55). The other one is related to a longer operation time for the first group (42.6 ± 7.3 minutes) as compared to the second one (39.8 ± 6.9 minutes) p=0.04). The second category concerns high stone clearance ratios which are comparable between the two groups of patients, i.e., Group A (94%) vs.

Group B (97%) p=0..49). The final point deals with equal rates of intraoperative complications frequency for all subjects: p =0 .64.

Table 4 provides a summary of postoperative complications. There was no significant difference in the incidence of urinary tract infection (10% vs. 6%, p=0.48), ureteral stricture (2% vs. 0%, p=0.39), bleeding (6% vs. 3%, p=0.55) and re-hospitalization (8% vs. 3%, p=0.36) between the groups; however, its frequency was more than that of other complications. Only subjects from group A experienced stent related symptoms (14%, p<0.01).As indicated in Table 5, stent removal was necessary for all patients in Group A (100% vs. 0%, p<0.01). The need for stone fragment retrieval (6% vs. 3%, p=0.49), ureteral dilatation (2% vs. 0%, p=0.39), and second ureteroscopy (6% vs. 3%, p=0.49) were similar in both groups. There were no patients who required percutaneous nephrolithotomy in either group (0% vs. 0%, p=1.00).

The two groups had similar characteristics at baseline and received matching rates of stone clearance. However, the stented group took a longer time to complete the procedure and showed higher levels of stent-related symptoms compared to the non-stented group that had an increased incidence of dysuria after surgery. In general, these variations should be put into consideration in making a decision between stenting and not stenting with regard to balancing post-operative symptom relief against burdening patients with stent-related symptoms.

Table 1: Patient Demographics and Preoperative Characteristics

Characteristic	Group A (Stented) (n=51)	Group B (Non-Stented) (n=35)	p-value
Gender			
Male	30 (59%)	22 (63%)	0.72
Female	21 (41%)	13 (37%)	0.72
Age (years) Mean ± SD	9.4 ± 2.1	9.1 ± 2.5	0.58
6 – 8 years	14 (27%)	8 (23%)	0.63
9 – 11 years	18 (35%)	12 (34%)	0.92
12 – 15 years	19 (37%)	15 (43%)	0.54
Total	51 (100%)	35 (100%)	
Stone Size (mm), Mean ± SD	8.7 ± 1.2	8.9 ± 1.5	0.55

Previous Stone History, n (%)	7 (14%)	4 (11%)	0.67
Side of Ureteric Calculi			
Right, n (%)	26 (51%)	19 (54%)	0.78
Left, n (%)	25 (49%)	16 (46%)	0.78

Table 2: Preoperative and Postoperative Lower Urinary Tract Symptoms (LUTS)

Time Point	LUTS	Group A (Stented) (n=51)	Group B (Non-Stented) (n=35)	p-value
Preoperative	Dysuria	33 (65%)	24 (69%)	0.72
	Frequency	30 (59%)	22 (63%)	0.72
	Urgency	24 (47%)	18 (51%)	0.72
	Hematuria	18 (35%)	13 (37%)	0.72
1 week post-op	Dysuria	12 (24%)	16 (46%)	0.03
	Frequency	10 (20%)	12 (34%)	0.11
	Urgency	6 (12%)	8 (23%)	0.21
	Hematuria	7 (14%)	7 (20%)	0.45
1 month post-op	Dysuria	6 (12%)	11 (31%)	0.04
	Frequency	5 (10%)	8 (23%)	0.15
	Urgency	4 (8%)	7 (20%)	0.14
	Hematuria	4 (8%)	5 (14%)	0.41

Table 3: Stone Characteristics and Operative Details

Parameter	Group A (Stented) (n=51)	Group B (Non-Stented) (n=35)	p-value
Stone Size (mm), Mean ± SD	8.7 ± 1.2	8.9 ± 1.5	0.55
Procedure Time (min), Mean ± SD	42.6 ± 7.3	39.8 ± 6.9	0.04
Stone Clearance Rate, n (%)	48 (94%)	34 (97%)	0.49
Intraoperative Complications, n (%)	4 (8%)	2 (6%)	0.64

Table 4: Postoperative Complications

Complication	Group A (Stented) (n=51)	Group B (Non-Stented) (n=35)	p-value
Urinary Tract Infection	5 (10%)	2 (6%)	0.48
Ureteral Stricture	1 (2%)	0 (0%)	0.39
Stent-related Symptoms	7 (14%)	0 (0%)	<0.01
Bleeding	3 (6%)	1 (3%)	0.55
Re-hospitalization	4 (8%)	1 (3%)	0.36

Table 5: Need for Additional Interventions

Intervention	Group A (Stented) (n=51)	Group B (Non-Stented) (n=35)	p-value
Stent Removal	51 (100%)	0 (0%)	<0.01
Stone Fragment Retrieval	3 (6%)	1 (3%)	0.49
Ureteral Dilatation	1 (2%)	0 (0%)	0.39
Second Ureteroscopy	3 (6%)	1 (3%)	0.49
Percutaneous Nephrolithotomy	0 (0%)	0 (0%)	1.00

Discussion

Groups A and B were comparable regarding demographic and pre-operative characteristics; specifically, gender distribution, age, stone size, previous stone history, and side of ureteric calculi had no significant differences. These findings echo those made by Borghi et al (2002) who also found no significant difference in the preoperative characteristics between stented and non-stented groups in pediatric populations undergoing ureteroscopy for ureteral calculi [11].The two groups had similar incidence of LUTS preoperatively which is consistent with other studies that have suggested that there is similar presence of symptoms before surgery irrespective of stent placement (Tasian et al., 2016) [12]. However, post-operative dysuria was significantly higher in Group B (Non-Stented) compared to Group A (Stented), at both 1 week and 1 month postoperatively as revealed by our study. Shields et al. (2009), on the other hand found out that there was no any statistically

significant difference between dysuria observed among stented and non-stented patients [13]. The increased incidence of dysuria in non-stented patients in our study suggests that postoperative dysuria might be reduced through stenting because it may alleviate obstruction and inflammation of the urinary tract.During this period, frequency, urgency as well as hematuria did not differ significantly among the groups at both 1 week and 1 month postoperatively similar to Denstedt et al.'s findings [14] elsewhere.Our study showed no evidence of a difference in stone size between groups which is consistent with Türk et al.'s results [15]. However, the procedure time was significantly longer for the stented group (42.6 ± 7.3 minutes) compared to the non-stented group (39.8 ± 6.9 minutes), which agrees with Glowacki et al's report where longer operative times in stented patients were due to the additional steps required for stent placement and positioning [16].

Group A had a stone clearance rate of 94% while Group B had 97%, which is almost similar to that reported by Preminger et al., (2007) [17]. Similarly, the incidence of intraoperative complications between group A and group B was not statistically different as indicated by Wang et al.'s meta-analysis [18].There were no significant differences in postoperative complications such as urinary tract infection (UTI), ureteral stricture, bleeding and re-hospitalization. The rate of occurrence of UTI (10% in Group A vs. 6% in Group B) falls within the range described by Pearle et al. (2005) who noted that postoperative UTI ranged from 5-15% among other similar populations [19]. Only one case of ureteral stricture was identified in the stented group whereas Shukla et al. (2004) also reported a similar low incidence of ureteral strictures post-ureteroscopy [20].Stent-related symptoms were observed only on the stented group alone at 14%, this is consistent with literature claims that highlight commonness of discomfort and complication as noted by Joshi et al. (2003) [21].

Except for stent removal required by all patients in the group, the rest of the groups were at par in terms of their additional requirements like stone fragment retrieval, ureteral dilatation and second ureteroscopy. This is typically expected as has been discovered in previous studies such as those by Lingeman et al. (1997), who reported similar intervention rates [22]. The lack of need for percutaneous nephrolithotomy in both groups is consistent with the high stone clearance rates observed.There were some differences between our findings and previous studies regarding post-operative dysuria rates and procedure times. A related study conducted by Patel et al. (2004), however, arrived at different conclusions regarding advantages and disadvantages of stenting following ureteroscopy [23]. Higher dysuria rates among non-stented group indicate that there may be benefits to this procedure as a means of reducing some symptoms after surgery; this could have clinical implications.

Conclusion

Both stented and non-stented approaches in pediatric ureteroscopy for ureteral calculi demonstrate similar efficacy in terms of stone clearance and complication rates. However, stenting appears to mitigate postoperative dysuria at the cost of stent-related symptoms and longer procedure times. These findings highlight the importance of individualized patient management and further research to optimize postoperative outcomes.

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