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Research Article

OUTCOMES OF OPEN VERSUS ENDOSCOPIC PROCEDURES DURING VESICAL CALCULUS MANAGEMENT

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ABSTRACT:

OBJECTIVE: To determine the outcomes of open versus endoscopic procedures during vesical calculus management

PATIENTS AND METHODS: The descriptive case series study was conducted in the department of Urology, Liaquat University of Medical and Health Sciences, Jamshoro. One hundred patients having vesical calculus presented to outpatient department who fulfilled inclusion criteria were selected. Informed consent was obtained from their parents/guardians to participate in this study. Once enrolled, history and physical examination were carried out. Vesical calculus diagnosis was established on X-ray KUB (Kidney, ureter and bladder) and/or ultrasound KUB. The presence of radiopaque shadow and/or movable hypoechoic object(s) with posterior acoustic shadowing were the diagnostic criteria adopted in this study. Simultaneously, size of stone was also noticed. After initial review, full hematology and biochemistry profiles along with urinalysis and urine culture were sent. The patients were admitted then and anesthesia review was obtained.

RESULTS: 100 patients having vesical calculus were then categorized according to treatment offered i.e. open cystolithotomy versus endoscopic surgery. 1 to 15 years with overall mean \pm SD age of patients was 6.23 ± 3.49 years. 94 (94%) were male and 06 (6%) were female. Overall male to female ratio was 15.6:1. Mean (\pm SD) stone size was 2.57 ± 0.94 mm in open surgery group and 2.68 ± 0.79 mm in endoscopic surgery group. 04 (7%) patients had complications in open surgery group and 02 (4.7%) patients in endoscopic surgery group had complications. Mean (\pm SD) duration of hospital stay was statistically significant in open surgery group as compared to endoscopic surgery group patients $\{8.32 \pm 1.40$ days versus 3.79 ± 1.08 days respectively; p -value=0.001}.

CONCLUSION: Endoscopic procedures (percutaneous suprapubic cystolitholapaxy and transurethral cystolitholapaxy) are safe and effective in treating pediatric bladder stone disease with minimal operative time, duration of catheterization and length of hospital stay.

KEYWORDS: Vesical calculus, Endoscopic procedures, open procedures.

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INTRODUCTION:

Urinary tract stone diseases affect 5-10% of population; [1] among them, 2-3% are children. [2] Of these 2-3%, pediatric bladder stone comprises 4.3% of all the cases of urinary stone disease. [3] In contrast to adults where bladder stones are consequence of outlet obstruction, neurogenic bladder, infection and/or presence of foreign bodies, [4] pediatric vesical calculi are usually endemic, and are found to be linked to socio-economic conditions, metabolic factors, diet and nutritional status. [5] In this regard, the management of this clinical entity remains a challenging task to urologist in term of both appropriate removal of stone in addition to correction of underlying metabolic abnormalities. [2] The bladder stone disease in children presents with difficulty in micturation, pyuria and fever. The frequency of hematuria is low as compared to adults. As there is usually no underlying obstructive lesion, urinary retention is less often than in adults. Lal et al in their case series demonstrate dysuria in 67.5%, fever and pyuria in 10.6%, urinary retention in 15.9% and hematuria in 2.6% of cases. [5] Unlike adults where outlet obstruction secondary to prostatic enlargement and urethral stricture is responsible for palpable bladder, the cause of urinary retention in children is attributable to impacted stone in urethra. [4] The treatment of vesical calculus has been revolutionized over time. Open suprapubic cystolithotomy was considered to be a standard procedure of vesical calculi treatment until mid twentieth century when various surgeons explored the options of cystolitholapaxy. [6] Since then various endoscopic modalities have been considered for management of bladder stone disease in adults due to shorter hospital stay and early recovery. [7] However, in pediatric population, endoscopic approaches require experience and skills for complete extraction and to prevent urethral injury. [2] Although, numbers of procedures viz. open suprapubic cystolithotomy, endoscopic litholapaxy, percutaneous suprapubic litholapaxy, extracorporeal shock wave lithotripsy (ESWL) have been defined in literature for management of vesical calculi, the consensus regarding the utility of best therapeutic modality varies according to geographical location. [2,3,8,9] In Pakistan, conventional suprapubic cystolithotomy is widely utilized treatment modality of pediatric vesical calculi as a result of limited resources and experience; however, trend is being changing towards adoption of endosurgical approaches. [8,9] Therefore, the purposes of this study were to determine the clinical presentations of pediatric patients having vesical calculus attending urological department of Liaquat University of Medical and Health Sciences,

Jamshoro and to compare the open versus endoscopic management of these patients.

PATIENTS AND METHODS:

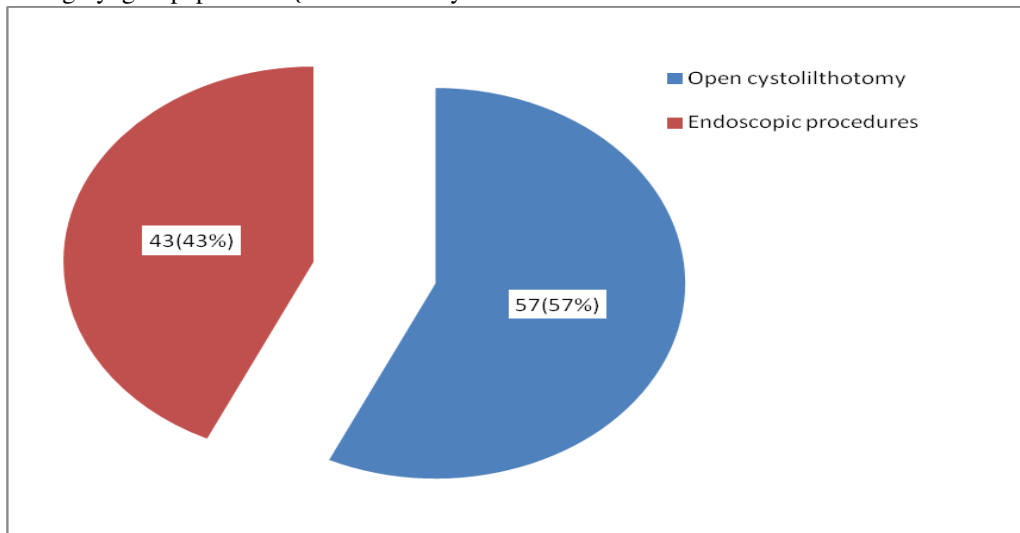
The descriptive case series study was conducted in the department of urology, Liaquat University of Medical and Health sciences, Jamshoro had the inclusion criteria as patients 1 - 15 years of age group having vesical calculus as defined in operational definitions, both genders and solitary stone whereas the exclusion criteria were patients having active urinary tract infection, having bleeding diatheses, vesical calculus in the presence of urinary diversion / diverticulum, recurrent vesical calculus and calculus associated with renal failure. Once enrolled, history and physical examination were carried out after informed consent. Vesical calculus diagnosis was established on X-ray KUB (Kidney, ureter and bladder) and/or ultrasound KUB. The presence of radiopaque shadow and/or movable hypoechoic object (s) with posterior acoustic shadowing were the diagnostic criteria adopted in this study. Simultaneously, size of stone was also noticed. After initial review, full hematology and biochemistry profiles along with urinalysis and urine culture were sent. The patients were admitted then and anesthesia review was obtained. The decision of open or endoscopic procedures was determined by consultant urologist. On the basis of this, they were categorized into open cystolithotomy and endoscopic surgery groups. Endoscopic procedure was also subgroup into transurethral cystolitholapaxy or percutaneous suprapubic cystolitholapaxy. The software SPSS was utilized for all statistical analyses while the frequencies, percentages and mean \pm SD was computed. Unpaired student t-test was used to compare the quantitative variables between open and endoscopic procedure groups. Chi-square test was utilized to compare the qualitative variables between open and endoscopic procedure groups. Statistical significance was taken at $p \leq 0.05$.

RESULTS:

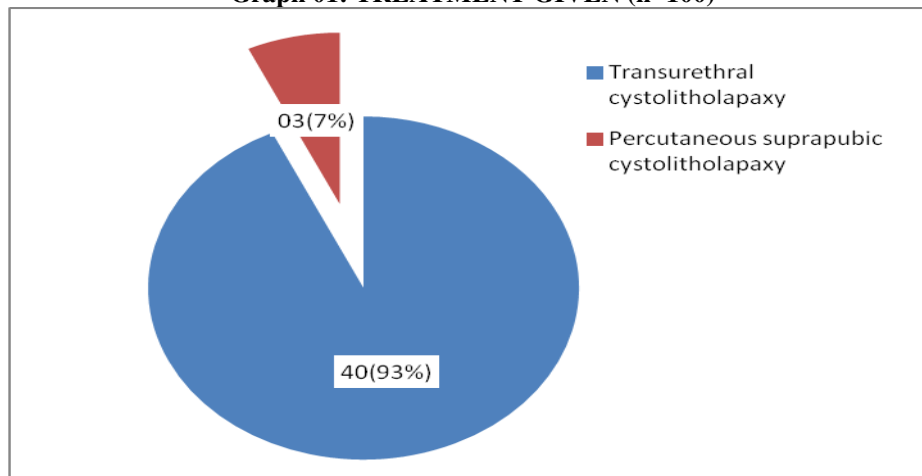
The age range of patients was between 1 to 15 years with overall mean \pm SD age of patients was 6.23 ± 3.49 years. Majority (49%) of cases had age 1-5 years {27 (47.2%) in open surgery group and 22 (51.1%) in endoscopic surgery group}. Mean \pm SD ages in two groups (open and endoscopic) were 6.19 ± 3.71 years and 6.28 ± 3.24 years respectively, difference between two means was statistically insignificant (p -value = 0.904). Out of 100 patients in this study, 94 (94%) were male and 06 (6%) were female. Overall male to female ratio was 15.6: 1. In open surgery group, 53 (93%) were males and 04 (7%) were female, (Male:

Female ratio was 13.2: 1) while in endoscopic surgery group, 41 (95.3%) were males and 02 (4.7%) were females (Male: Female ratio = 20.5: 1). Mean (\pm SD) stone size was 2.68 ± 0.79 cm in open surgery group and 2.57 ± 0.94 cm in endoscopic surgery group. The difference between two means was statistically insignificant (p -value=0.540). Mean (\pm SD) operative time was 62.16 ± 9.60 minutes in open surgery group as compared to 34.40 ± 5.23 minutes in endoscopic surgery group. The difference between two means was statistically significant (p -value=0.001). In this study, 04 (7%) patients had complications in open surgery group and 02 (4.7%) patients in endoscopic surgery group had complications. The difference between the two groups was statistically insignificant (p =0.692). The mean (\pm SD) duration of hospital stay was statistically significant in open surgery group as compared to endoscopic surgery group patients { 8.32 ± 1.40 days

versus 3.79 ± 1.08 days respectively; p -value=0.001}. At one month follow up, no residual stone was encountered on ultrasound KUB in this study. Therefore, stone clearance was 100% with both procedures.

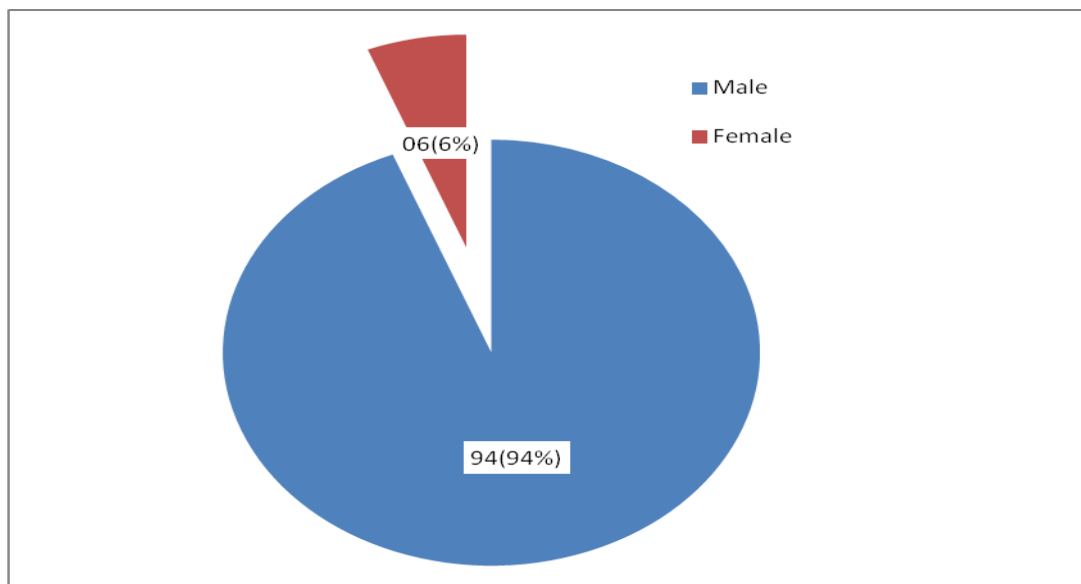
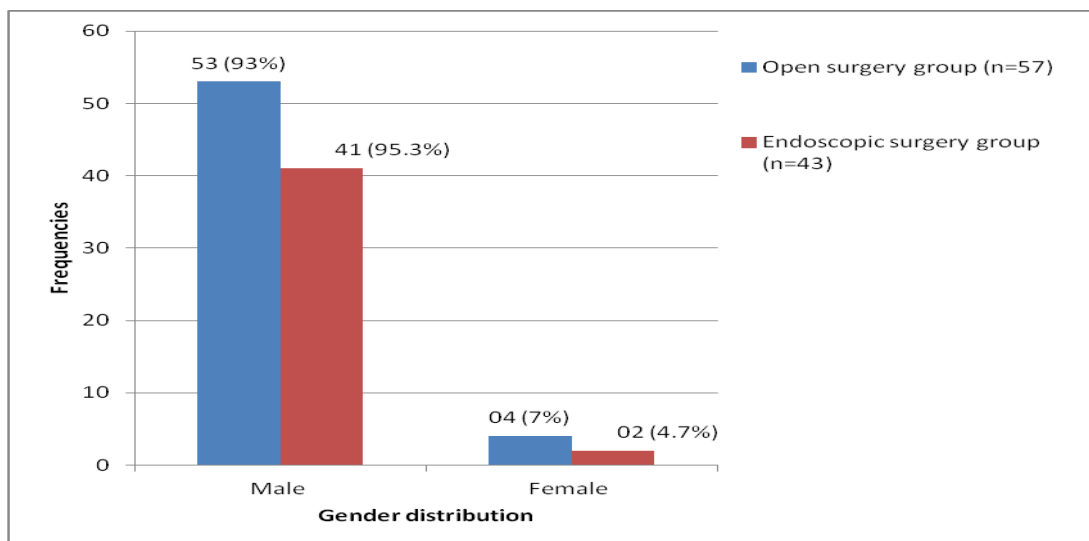


Graph 01: TREATMENT GIVEN (n=100)



Graph 02: ENDOSCOPIC PROCEDURES (n=43)**Table 01: AGE DISTRIBUTION (n=100)**

| Age of patients (Year) | (Open surgery group) | | (Endoscopic surgery group) | | Total | |
|------------------------|----------------------|------|----------------------------|------|----------|------|
| | (n = 57) | % | (n = 43) | % | (n =100) | % |
| 1-5 | 27 | 47.4 | 22 | 51.1 | 49 | 49.0 |
| 6-10 | 20 | 35.1 | 15 | 34.9 | 35 | 35.0 |
| 11-15 | 10 | 17.5 | 06 | 14.0 | 16 | 16.0 |

**Graph 03: GENDER DISTRIBUTION (n=100)**

Graph 04: GENDER DISTRIBUTION IN BOTH GROUPS (n=100)**TABLE 02: STONE SIZE (n=100)**

| | Open surgery group (n=57) | Endoscopic surgery group (n=43) | p-values* |
|------------------------|------------------------------|------------------------------------|-----------|
| Stone size 9 in cm) | 2.68±0.79 | 2.57±0.94 | 0.540 |

Data is shown in mean followed by (\pm SD) in parentheses; *using unpaired student t-test

TABLE 03: OPERATIVE TIME (N=100)

| | Open surgery group (n=57) | Endoscopic surgery group (n=43) | p-values* |
|--------------------------------|------------------------------|------------------------------------|-----------|
| Operative time (in minutes) | 62.16±9.60 | 34.40±5.23 | 0.001 |

Data is shown in mean followed by (\pm SD) in parentheses; *using unpaired student t-test

TABLE 04: COMPLICATIONS (N=100)

| Complications | Open surgery group (n=57) | Endoscopic surgery group (n=43) | p-values* |
|---------------|------------------------------|------------------------------------|-----------|
| Yes | 04 (7) | 02 (4.7) | 0.697 |
| No | 53 (93) | 41 (95.3) | |

Data is shown in number followed by percentages in parentheses; *using chi-square test

TABLE 05: TYPES OF COMPLICATIONS (N=100)

| Complications | Open surgery group (n=57) | Endoscopic surgery group (n=43) |
|-----------------|------------------------------|---------------------------------|
| Urethral injury | 00 (0) | 01 (2.3%) |
| Urinary fistula | 01 (1.8%) | 00 (0) |
| Extravasation | 01 (1.8) | 01 (2.3%) |
| Wound infection | 02 (3.5%) | 00 (0) |

Data is shown in number followed by percentages in parentheses

TABLE 6: DUARTION OF HOSPITAL STAY (N=100)

| | Open surgery group (n=57) | Endoscopic surgery group (n=43) | p-values* |
|----------------|------------------------------|------------------------------------|-----------|
| Stay (in days) | 8.32±1.40 | 3.79±1.08 | 0.001 |

Data is shown in mean followed by (\pm SD) in parentheses; *using unpaired student t-test

DISCUSSION:

The vesical calculus is the oldest problem in a mankind history and common in developing countries. The prevalence of pediatric bladder stone disease is reported to be 4.3%. [3] In contrast to adults where outlet obstruction is the major etiological factor [4]; pediatric vesical calculus is the sequel of environmental and metabolic factors. Hence, treatment of this clinical entity is the

challenging task to concerned urologist and has been issue of debate in literature. [10-16]

Vesical calculus is common in male populations. Although, studies from Pakistan showed male predominance, the male to female ratios were variable in these studies. Lal et al demonstrated a male to female ratio of 6:1. [5] Samiullah et al noticed a male to female ratio of 2.3:1. [8] In this

observational study of 100 patients, high male to female ratio of 15.6:1 was encountered. The high dominance of male in this study was probably the result of male dominance and more concern of male children in society. The treatment of vesical calculus has been a subject of debate in literature. Currently, open and endoscopic techniques are the two main approaches of treating vesical calculus. [11-16] Conventionally, in Pakistan, open cystolithotomy is the technique of choice due to limited resources and skills, but trends are changing towards adoption of more endoscopic procedure due to early recovery and minimal morbidity.[8,9] Sahito RA, et al prospectively divided 100 vesical calculus children into two groups: A and B. [9] Each group comprised of 50 patients. Percutaneous suprapubic cystolitholapaxy was carried out in group A patients whereas open cystolithotomy was performed in group B patients. The duration of catheterization and operative time were high and statistically significant in open cystolithotomy group. However, complications were statistically insignificant (3 cases of wound infection and 2 cases of urinary fistula in open cystolithotomy group). Their results are comparable to the results of this study. In the study by Mahran MR, et al low and statistically significant difference was encountered in duration of hospital stay with endoscopic procedures for vesical calculus.[12] Similarly complication rates were statistically insignificant, which is nearly comparable to this study. At one month follow up, stone clearance was 100% in both groups of patients in this study. This is comparable to the study conducted by Al-Marhoon et al which showed complete clearance of stone in all 107 children treated by open or endourological procedures for vesical calculus. [13]

CONCLUSION:

Majority of pediatric vesical calculus presents with lower abdominal pain and tenderness. Hematuria is less frequent presentation. Endoscopic procedures (percutaneous suprapubic cystolitholapaxy and transurethral cystolitholapaxy) are safe and effective in treating pediatric bladder stone disease with minimal operative time, duration of catheterization and length of hospital stay.

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