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Original Research Article

An institutional review of endoscopic and open technique in the management of vesical calculus: a retrospective study

Rikesh Jung Karkee[1]*, Samir Chaudhary[1], Awaj Kafle[1], Deependra Prasad Sarraf[2]

[1]Urology Division-Department of Surgery, [2]Department of Clinical Pharmacology and Therapeutics, B. P. Koirala Institute of Health Science, Dharan, Nepal

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***Correspondence:**
Dr. Rikesh Jung Karkee,
E-mail: dr.rikeshjung@gmail.com

ABSTRACT

Background: Vesical calculus means urolith in bladder. Cystolithotomy is the traditional treatment, but a percutaneous approach has been advocated. The objective was to compare open cystolithotomy with perurethral cystolithotripsy and suprapubic percutaneous cystolithotripsyused in the treatment of bladder stones.
Methods: A retrospective study was conducted among 100 patients of bladder stone treated at a tertiary centre in Eastern Nepal from January 2014 to December 2019 who underwent open cystolithotomy and endoscopic procedures (perurethral cystolithotripsy and suprapubic percutaneous cystolithotripsy). Data were analysed using SPSS version 11.5 at p value less than 0.05 taken as significant.
Results: Statistical significant difference was observed in operating time, duration of catheterization and duration of hospital stay in both open and endoscopic management of vesical calculus (p value=0.0001). General complications were observed in 90% cases of open cystolithotomy and 33.9% cases of endoscopic procedure respectively.
Conclusions: Endoscopic procedure is safe and efficacious method of urinary bladder stone removal with low incidence of complications.

Keywords: Open cystolithotomy, Perurethral cystolithotripsy, Suprapubic percutaneous cystolithotripy, Vesical calculus

INTRODUCTION

Vesical calculus means "urolith in bladder" and accounts for nearly 5% of urinary system calculus.[1] Bladder stones are usually symptomatic; but in a few cases, they can also be asymptomatic.[2,3] Open cystolithotomy and endoscopic modalities are the available methods for the removal of bladder stones.[4]

Open cystolithotomy is associated with more postoperative pain, prolonged hospital stays and wound scar as compared to endoscopic procedures.[5] Among endoscopic modalities, percutaneous suprapubic cystolithotripsy is a minimally invasive, safe and effective procedure especially for the management of larger bladder stones.[6] Both the demerits of urethral manipulations and open surgery are eliminated in this procedure. All endoscopic procedures aim to achieve complete stone-free state in the shortest possible time, with a short hospital stay and minimal complications.[7]

Transurethral endoscopic removal is the treatment of choice for bladder calculus in the adult population, not only due to the scar-less procedure but also due to its advantage of doing corrective surgery for associated bladder outlet pathology like benign hyperplasia of prostate.[8] There is scarcity of data on comparison of open cystolithotomy and endoscopic procedures in

management of vesical calculus in our context having limited resources. The objectives of the present study were to describe the demographic profile of the patient with vesical calculus and to compare open surgical cystolithotomy (OSC) and endoscopic procedures [suprapubic percutaneous cystolithotripsy (SPC) and per-urethral cystolithotripsy (PC)] in management of vesical calculus in terms of duration of surgery, duration of catheterization, post-operative complications (fever, wound infection, urethral trauma, haematuria and urinary leakage) and duration of hospital stay.

METHODS

A retrospective study was conducted in urology division of the department of surgery at B. P. Koirala institute of health sciences (BPKIHS), Dharan, Nepal. The patients admitted to urology division of surgery ward with the diagnosis of vesical calculus over a period of five years (January 2014 to December 2019) and undergone interventional management were included in the study. Sampling method used was population census method. The records having incomplete data were excluded. The principal investigator collected the data after reviewing the medical record of the patients. A self-designed proforma was used to collect the relevant data (demographic profile, duration of surgery, duration of catheterization, post-op complications (fever, wound infection, urethral trauma, haematuria and urinary leakage) and duration of hospital stay.

The data were entered in Microsoft excel 2010. Descriptive statistics like frequency, percentage, mean and standard deviation were calculated. The findings were presented as table and graphs. For inferential statistics, Chi square test was used to compare categorical data. Independent t-test and Mann-Whitney U test applied to find out significant difference between 2 continuous variables. Statistical package for social science (version 11.5) was used for statistical analysis at P value less than 0.05 taken as significant.

RESULTS

A total of 100 patients were included in the study. Mean age (± SD) of the patients was 46.4±18.4 years. The male to female ratio was 3:1. Mean stone size (± SD) was 2.9±1.1 cm. Out of 100 patients, 75 (75%) patients had single stone. Endoscopic procedures were performed in 80 (80%) patients out of which per-urethral cystolithotripsy was performed in 53 (66.25%) patients (Table 1).

Intervention time taken was least in PC (34.1 minutes) as compared to SPC (57.5 minutes) and open surgical cystolithotomy (68.9 minutes) and it was statistically significant (p=0.0001). Similarly, duration of catheterization was least in PC (4.2 days) as compared to SPC (6.9 days) and open surgical cystolithotomy (8.1 days) and it was statistically significant (p=0.0001).

Duration of hospitalization was highest in open surgical cystolithotomy (4.2 days) as compared to PC (1.9 days) and SPC (2.7 days) and it was statistically significant (p=0.0001) (Table 2).

Table 1: Demographic profile of the patients, (n=100).

Variables		Frequency (%)
Age groups (years)	18-40	42 (42.0)
	41-60	31 (31.0)
	> 60	27 (27.0)
Gender	Male	71 (71.0)
	Female	29 (29.0)
No. of stone present	Single stone	75 (75.0)
	Multiple stone	25 (25.0)
Open surgical cystolithotomy, (n=20)		20 (20.0)
Endoscopic procedures, (n=80)	SPC	27 (33.75)
	PC	53 (66.25)

Table 2: Comparison of open surgical cystolithotomy and endoscopic procedure, (n=100).

Variables		Open surgical cystolithotomy, (n=20)	Endoscopy, (n=80)		P value
			PC, (n=27)	SPC, (n=53)	
Mean age in years (mean ± SD)		50.3±16.2	36.5±18.1	50.5±17.8	0.24
Age groups (Years)	18-40	5 (25.0)	18 (66.7)	18 (34.0)	0.09
	41-60	9 (45.0)	5 (18.5)	17 (32.0)	
	>60	6 (30.0)	4 (14.8)	18 (34.0)	
Gender	Male	13 (65.0)	22 (81.5)	36 (67.9)	0.32
	Female	7 (35.0)	5 (18.5)	17 (32.1)	
Intervention time taken in minutes (mean±SD)		68.9±10.4	34.1±7.6	57.5±14.2	0.0001*
Duration of catheterization in days (mean±SD)		8.1±2.1	4.2±2.4	6.9±1.2	0.0001*
Duration of hospitalization in days (mean±SD)		4.2±1.1	1.9±0.8	2.7±0.9	0.0001*

*Statistically significant at p<0.05 (Independent t test).

Table 3: Comparison of complications as per the methods of interventions, (n=100).

Types of complications		OSC, (n=20)[$]	Endoscopic modalities, (n=80)[$]	
			PC, (n=27)	SPC, (n=53)
General complications	Yes	18 (90.0)	1 (3.7)	16 (30.2)
	No	2 (10.0)	26 (96.3)	37 (69.8)
Specific complications	Fever	7 (35.0)	0 (0.0)	2 (3.8)
	Wound infection	4 (20.0)	0 (0.0)	0 (0.0)
	Hematuria	4 (20.0)	1 (3.7)	14 (26.4)
	Urethral trauma	0 (0.0)	0 (0.0)	0 (0.0)
	Urinary leakage	0 (0.0)	0 (0.0)	0 (0.0)
	Fever and wound infection	1 (5.0)	0 (0.0)	0 (0.0)
	Fever, wound infection and hematuria	2 (10.0)	0 (0.0)	0 (0.0)
	Wound infection and hematuria	1 (5.0)	0 (0.0)	0 (0.0)

[$]Data are presented as number (%).

Among open and endoscopic procedures, complications were observed more in OSC (90.0%) of which fever was the most common (35%) followed by wound infection (20%) and haematuria (20%) (Table 3).

DISCUSSION

All endoscopic procedures for the removal of bladder stones aim to achieve complete stone-free state in the shortest possible time, with short hospital stay and minimal complications.[4] In the present study, we have compared the duration of surgery, duration of catheterization, post-operative complications and duration of hospital stay of the patients who underwent OSC with that of the endoscopic procedures (SPC, PC) for the management of vesical calculus.

Bladder stone was more common in males as compared to females (71% vs 29%). Differential changes in dietary intake patterns, fluid intake, and obesity in men and women might cause shifts in prevalence of urolithiasis.[9] In the present study, the bladder stone was also more common in the age group of 18-40 years of age (42%). The mean age of the patients with bladder stones was 46.4±18.4 years. In contrast to this, the mean age was 60.4±10.4 years in the patients with bladder stone in a study by Otnes et al.[10] Our study findings indicated that the bladder stone was more common in younger adults. It might be due to unhealthy dietary habits or some secondary pathologies.[11]

In the present study, 20 patients out of 100 had undergone open cystolithotomy and the average hospital stay was 4.2±1.1 days. Bhatia et al treated 128 patients with bladder calculi and only five of them had undergone open cystolithotomy and average hospital stay was 5.2 days which was higher form our findings.[12] In our study, the mean hospital stay was less (1.9 days) in endoscopic per-urethral cystolithotripsy (PC) cases as compared to endoscopic suprapubic percutaneous cystolithotripsy (SPC) cases (2.7 days) and open surgical cystolithotripsy cases (4.2 days). These findings were consistent with the findings of Al-Marhoon et al.[13]

The time taken in endoscopic intervention was 34.1 minutes in PC and 57.5 minutes in SPC which was lesser than that of OSC (68.9minutes) in the present study. In contrast to these findings, in a study by Shalaby, lithotripsy time and an operative time during transurethral pneumatic cystolithotripsy were 20.39 and 32.00 minutes respectively.[14] It may be due to the inclusion of multiple stone and stone size up to 4 cm in our study. In our study mean time taken in endoscopic perurethral approach was 34.1 minutes. In contrast to this, Ali et al performed endoscopic perurethal approach and the mean operative time was 83 minutes.[15] The present study had some limitations. The sample size was small. Being a single-center study, the findings could not be generalized. A prospective study in a larger population at different centers would be useful.

CONCLUSION

Endoscopic procedures are safe and efficacious method for the removal of bladder stones with a low incidence of complications.

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