

Original research article**Comparative Study of Percutaneous Cystolithotripsy Versus Suprapubic Cystolithotomy****Dr. Kaushal Kumar¹, Dr. Dinesh Kumar Das², Dr. Ajit Singh³****1. Senior Resident, Department of Urology, PMCH Patna****2. Associate prof., Department of Urology, PMCH Patna****3. Prof., Department of Urology, PMCH Patna****Corresponding Author: Dr. Kaushal Kumar****Abstract**

Objectives: To describe our experience in the management of urinary bladder stone, comparing the outcome of percutaneous suprapubic cystolithotripsy with open cystolithotomy

Methodology: comparative study. Place and duration of the study: patients with urinary bladder stone attending department of surgery and Patna medical college and Hospital, patna. Study duration of one year. patients (33 male and 7 female), from 3-70 years of age were enrolled in the study. The size of the stones range from 30mm to 50mm. patients were divided in two equal groups, group 1 and 2. Group 1 submitted for percutaneous suprapubic cystolithotripsy and group 2 for open cystolithotomy. The procedure was done under general or spinal anesthesia.

Result: Mean of wound length in group 1 was 16.15mm(SD2.8) and 36.30mm(SD3.2) in group 2, p value <0.01. complete clearance of stone was achieved in all cases of group 2 whereas in group 1 patients complete clearance was noted in sixteen(80%) cases, P value0.106. transient hematuria occurred in seven(35%) patients in group 1, while in group 2 only two(10%) patients developed hematuria, p value (0.127). Postoperative fever was noted in eight(40%) patients and in one(5%) patient in group1 and 2 respectively, p value0.021. Postoperative pain that require parenteral analgesia in group 1 were two(10%) and in seven(35%) patients in group 2, p value 0.127.

Conclusion: percutaneous suprapubic cystolithotripsy is an efficient, safe, minimally invasive and cost effective method.

Keywords: cystolithotripsy, Bladder stone, Spinal Anesthesia.

Introduction

bladder stones were one of the most prevalent disorders among the poor class and the incidence was especially high in childhood and adolescent.¹ The decrease in incidence of bladder calculi is attributed mainly to dietary and nutritional progress especially in children.² A solitary bladder calculus is common, although multiple stones are found in 25% of cases.³ Bladder calculi account for 5% of urinary calculi.⁴ The major incidence of urinary lithiasis was bladder stones in children. As nations increased productivity and moved into industrial age, average income and food quality improved. These events resulted in disappearance of endemic bladder stone disease from previously affected population³. Bladder stone disease in children almost disappeared from European countries 50 to 60 years ago. It still is endemic in some of developing countries. Due to lack of health awareness, health infrastructure and research

facilities, Although new and effective therapeutic methods to treat urolithiasis have been introduced recently, urinary stones continue to occupy an important place in everyday urological practice.⁴ Various techniques have been used for the management of bladder stones, such as open cystolithotomy, transurethral cystolithotripsy, percutaneous cystolithotripsy (PCCL), and minimal invasive procedure including ESWL which is the least invasive, but has the limitation that its efficacy is determined by size and hardness of the stones. PCCL is well established technique with high efficacy and fewer complications than suprapubic cystolithotripsy 2,3 the study will be performed in the management of vesicle calculus by comparing the outcome of percutaneous suprapubic cystolithotripsy with open cystolithotomy. This study was conducted to evaluate the feasibility safety and effectiveness of PCCL comparing to SPCL.

Objectives

The management of urinary bladder stone, comparing the outcome of percutaneous suprapubic cystolithotripsy with open cystolithotomy

Review of literature

Bladder stones have been treated both medically and surgically for many centuries. The oldest bladder stone discovered dates back to 4800 BC and was found by archaeologists in Egypt around the turn of the 20th century⁵. The first literary references to bladder stones date back to a time as early as, or earlier than, the time of Hippocrates⁶. Operations to remove bladder stones via the perineum were performed by Hindus, Greeks, Romans, and Arabs. Ammonius (200 BC), Celsus (first century), and the Hindu surgeon Susruta were among the first to write about perineal lithotomy to treat bladder calculi⁷. In the 1500s, Pierre Franco introduced suprapubic lithotomy⁷. In an attempt to avoid incisions, another form of surgical treatment, transurethral lithotripsy, became more common in the early 1800s. Lithotripsy was developed through creative applications of everyday tools. Although many other creative and colourful transurethral instruments were developed, technological advancement in the modern era came in the form of the fenestrated lithotrite. This device allowed stones to be grasped and crushed so their fragments could be evacuated from the bladder via glass or metal suction bottles⁸. Sir Philip Crampton was the first to introduce the manual crushing concept in Dublin (circa 1834). However, litholopaxy was not firmly established until Henry J. Bigelow, the famous professor of surgery at Harvard, performed (1876) and popularized (1878) the procedure [1]. The mechanical crushing of stones remained popular through the 1960s and 1970s, although it was fraught with complications when performed by inexperienced urologists⁹. Paez et al (2007) described percutaneous removal of bladder stones via ultrasound-assisted access of the bladder through prior suprapubic tube tracts. In one case, they used a Mitrofanoff catheterization channel with a 30F Amplatz sheath. They reported no complications, and percutaneous treatment was judged a safe alternative in this population subset. This same procedure has also been described in continent diversions with urethral closure¹⁰. Demeriel et al.¹¹ reported the results in percutaneous cystolithotripsy using pneumatic lithotripsy in a group of 72 patients with neurogenic bladder dysfunction (42 adults and 30 children). Calculi had an average size of 5.5 cm in adults and 3.2 cm in children. The mean operative time was 20 minutes, all patients were free of calculi and there were no major intra- or postoperative complications. Tzortzis et al. 28 published the results of the percutaneous treatment of bladder stones under local anesthesia. Thirty-one patients underwent surgery, with success of 96.7%, with fever and hematuria observed in patients one and five, respectively. Tugcu et al.¹² compared cystolithotripsy to transurethral percutaneous approach in patients undergoing TURP with bladder calculus. Thirty-two patients were treated by transurethral resection, while 25 were approached percutaneously. Mean operative time was significantly longer in the transurethral

access, three (7%) of such patients having residual calculi and requiring a second approach, and other three (7%) developing urethral stricture at follow-up. Gan et al.¹³ reported their experience with children less than one year of age. Fifteen boys with a mean age of 8.2 months (3.0 to 11.5 months) and average calculi of 1.4 cm (0.9 to 2.2 cm) were treated percutaneously. All children were free of calculi, with average operating time of 25 minutes and mean hospital stay of 2.8 days. Wollin et al.¹⁴ reported 100% success rate and no complications in 15 patients treated percutaneously. Vassilios et al.¹⁵ concluded that PCCL under local anaesthesia is safe and well tolerated by the patients, with no complication.

Material and methods

The Comparative study, Patient attending the department of surgery and urology, Patna medical college and Hospital, Patna, Bihar. Study duration of One year. This study was conducted on patients with urinary bladder stone and ultrasound confirming the urinary bladder stone and getting admitted to PMCH. A written informed consent was taken from all patient included in the study. A detailed history taking, through clinical examination was done for these patient.

Inclusion Criteria

All patients were evaluated with history and clinical examination, abdominal ultrasound, Those patients who had vesical calculus of size 3-5 cms, Both sexes were included.

Exclusion Criteria

Patients with stone smaller than 3 cms and greater than 5 cms, history of previous bladder surgery, congenital anomalies of bladder, open prostatic surgery.

A finger is introduced into the bladder to determine whether the stone is lying free in the bladder or is impacted in a diverticulum. Free stones are easily removed by means of lithotomy forceps. Impacted calculi should be dislodged first and then removed. In most of the cases, the urine is not infected and intravesical bleeding is well controlled, the cystostomy wound is closed using absorbable suture material and bladder is drained by urethral catheter. The abdominal wound is closed with a drain in the retropubic space of Retzius. Drain is removed after 48 hours and catheter on the 6th to 7th postoperative day.

Results

Patients were divided in two equal groups 1 and 2, twenty cases in each group. Groups 1 were submitted for percutaneous Suprapubic cystostolitholapaxy and group 2 for open cystolithotomy. We compare the result between group 1 and group 2, regarding stone clearance, length of the incision, duration of operation, duration of the catheterization, hematuria, wound infection, urinary leakage, transient pyrexia and the need of postoperative analgesia. More number of cases belonged to age group of 31 to 50 years (17 cases, 10 and 7 cases in group1 and group2 respectively). The youngest age at presentation was 3 years and eldest age at presentation was 72 years. Mean age of presentation in group 1 was 44.45 years (SD- 13.78) and in group 2 was 34.05 years (SD- 22.21). On t- test, p value was found to be 0.083; hence there is no significant difference in age of patients in our study. There were 18(90%) male patients and 2(10%) female patients in group 1, and 15(75%) male patients and 5(25%) female patients in group 2. p value was found to be 0.407; hence there is no significant difference in age of patients in our study. Size of calculus were within 30-50mm, mean size of calculus in group 1 was 37.30mm(SD-3.05) with largest being 44mm and smallest being 30mm. Whereas in group2 mean size of calculus was 33.71mm(SD-3.10) with largest stone being 40mm and smallest being 30mm. Regarding transient hematuria, seven(35%) patients in group 1 developed hematuria which resolved spontaneously after 24 hours, while in group 2

two(10%) patients developed hematuria, so number of patients with transient hematuria were more in group 1(35%) when compared to group 2(10%) and this difference was not found to be statistically significant(p value=0.127), Regarding operation time, in group 1 the mean of the operative time was 81.84 minutes, while the mean of the operative time in group 2 patients was 33.61minutes, p value<0.001.

Comparison of postoperative urinary leakage among two groups Regarding urinary leakage , no patients in group 1 developed urinary leakage, while in group 2 three patients developed urinary leakage that accounts form 15%, so number of patients with postoperative urinary leakage were more in group 2(15%) when compared to group 1(0%) and this difference was not found to be statistically significant(p value=0.231), Regarding duration of the hospital stay, in group 1 patients the mean duration of the hospitalization was 2.45days(SD-0.51), while in group 2 patients the mean duration of the hospitalization was 6.40 days(SD-1.27), so number of patients with duration of the hospital stay is more in group 2 when compared to group 1 and this difference was found to be statistically significant(p value<0.001).

Table 1: Age distribution

Age wise distribution of the patients among the two groups					
Age group	PCCL		SPCL		P value
	Frequency	percent	Frequency	Percent	
<10yrs	1	5	5	25	0.083
10-30yrs	1	5	3	15	
31-50yrs	10	50	7	35	
>50yrs	8	40	5	25	
Total	20	100	20	100	
Mean SD	44.45+ ₋ 13.78		34.05 + ₋ 22.51		0.083

*Chi-square test **Independent 't' test

Table 2: Sex distribution

Sex wise distribution of the patients among the two groups					
sex	PCCL		SPCL		P value
	Frequency	percent	Frequency	percent	
Male	2	10	5	25	0.407
Female	18	90	15	75	
Total	20	100	20	100	

Table 3: Size of calculus

Comparison of size of calculus among the two groups			
Size of calculus in mm	PCCL	SPCL	P value
Mean	37.30	33.71	0.00*
Std. Deviation	3.05	3.10	

Table 4: Duration of surgery

Comparison of duration of surgery among the two groups			
No. of days	PCCL	SPCL	p value
Mean	81.84	33.61	<0.001
Std. Deviation	8.00	3.17	

Table 5: Duration of catheterization

Comparison of duration of catheterization among the two groups			
No. of days	PCCL	SPCL	p value
Mean	3.55	8.15	<0.001
Std. Deviation	0.51	0.81	

Discussion

A solitary bladder calculus is common, although multiple stones are found in 25% of cases. Vesical calculi are either primary or secondary [16]. Majority of the patients present with irritative bladder symptoms. Various techniques have been used to remove calculi from the bladder including open cystolithotomy, percutaneous cystolithotripsy, transurethral lithotripsy [17, 18]. open cystolithotomy is the most invasive option, it is a very reliable form of therapy and continues to represent the gold standard treatment to remove big bladder stones. Open surgery has the inherent problems of long scar, prolonged catheterization, extended hospitalization and risk of infection [19]. In children, especially in boys, because of the size limitation secondary to the small urethra and concerns about iatrogenic urethral injury, so endoscopic manipulation more difficult and fraught with danger. Gopala Krishnan and colleagues were the first to report the use of a percutaneous suprapubic approach in managing bladder calculi [20]. The morbidity of percutaneous suprapubic approach is significantly less than that of open cystolithotomy [21, 22]. Stone clearance has been achieved partially in patients with group 1, as when we get access to the bladder throughout the suprapubic approach, stone had been fragmented in small pieces through the pneumatic lithoclast, and then removed by stone forceps and so complete stone clearance couldn't be achieved because of very small fragments left behind as couldn't pick by stone forceps. While in group 2, in open vesicolithotomy stone has been removed in one segment. Our study agrees with Firas Al-Hammouri MD et al in which they noted that in 10(90%) patients complete clearance was noted except for one patient partial clearance was seen. Regarding transit hematuria that occurred in the postoperative period, in group 1 seven patients developed hematuria, accounting for about 35% that took benign course and resolved spontaneously in the 1st 24 hours postoperatively. While in group 2 only one patient developed hematuria, accounting for about only 5% of the group 2, that also took benign course and resolved in the 1st 24 hours postoperatively, that mean the p value less than 0.127, so there is clinical and statistical difference between two groups, Rafique Ahmed Sahito and co-workers and study performed by Camacho and co-worker which also observed that hematuria occurred in two(4%) patients who were subjected for percutaneous approach but there is no statistical difference between two groups[45], this can be explained probably due to excessive manipulation occurring during our procedure and may be due to the type of the lithoclast that we are used. Regarding duration of the catheterization, in group 1 the mean duration of the catheterization was 3.55 days, after that catheter was removed, while in group 2 the mean

duration of the catheterization was 8.15 days, p value <0.001, that mean there was clinical and statistical difference between both groups. Our study agrees with study performed by Nazar Ali Memon, et. al, in which they found that the duration of catheterization in patients undergoing percutaneous approach was 48-72hrs, and also similar to the study performed by Bahita and Biyani [23], the duration of catheterization in the patients undergone percutaneous approach was about 2-3 days. Although our study agree with study performed by Ahmed Sahito, et. al, they found the duration of catheterization in the percutaneous group was 2-3 days, and the duration of catheterization in the open group was about 5-7 days.

Conclusion

Percutaneous suprapubic cystolithotripsy is efficient, safe with low incidence of complications and minimally invasive technique for treating bladder calculi. It has definite edge on open cystolithotomy. It had reduced hospital stay, postoperative pain, wound infection, duration of catheterization and overall cost with imperceptible scar. Percutaneous suprapubic cystolithotripsy is a better way of managing vesical stones as compared to open vesicolithotomy in selected group of patients.

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