OUTCOME OF PERCUTANEOUS NEPHROLITHOTOMY: OUR INITIAL EXPERIENCES

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Abstract:

Objective :*To find out the outcome of Percutaneous Nephrolithotomy*

Methods:*This prospective study was done in the Department of Urology, Shaheed Suhrawardy Medical College Hospital, Dhaka during the period of July 2016 to June 2017 .Thirty five patients with renal calculi were included in this study. All patients were evaluated by history, physical examination and investigations. Patients were counseled for PCNL it was done under sub-arachnoid block in all the cases. Intra operative complications in terms of bleeding requiring blood transfusion, pleural injury, renal pelvis injury, were recorded. Stone clearance were also recorded. Postoperative complications were also recorded in predesigned data sheet. Data analyses were done by SPSS – WIN 10.0 version.*

Result: *Mean age of the patients was 41.5±10.23 years and mean size of the stone was 2.58±.96cm. Mean operative time was121.7 minute. Stone clearance rate was 80% and residual stone was in 20% cases. Different complications were recorded in 42.85% cases. Hospital stay was 4.65±2.24 days.*

Conclusion: *Percutaneous Nephro-lithotomy is a good option in the management of renal calculi .It has good stone clearance rate, lower morbidity , shorter hospital stay and early return to work.*

Key words: *PCNL, Renal calculi*

Bangladesh J. Urol. 2019; 22(1): 80-84

Introduction:

Recently the removal of renal stone has undergone changes from open surgery to noninvasive and or minimally invasive procedure. Now four minimally invasive treatment modalities are available for the treatment of kidney stone such as ESWL (Extracorporial shock wave lithotripsy), PCNL (Percutaneous nephrolithotomy), RIRS (retrograde intrarenal stone surgery) and LSS(Laparoscopic stone surgery)[1].

Stone related factors (size, number, location and composition), renal anatomy and patient clinical factors

should all be considered in conjunction with various surgical modalities and the availability of equipment

before this surgical approach is selected. Stone burden (size and number) is perhaps the single most important factor in determining the appropriate treatment modality for a patient with renal calculi. Currently ESWL is the therapy of choice for the most symptomatic renal calculi due to its non-invasive nature, minimal anaesthesia and high level of patient and physician acceptance [2]. Despite the dominant position of ESWL, the procedure is not uniformly successful for all types and size of calculi[3].

Percutaneous removal of kidney stones recently has gained the favour over open surgery, since an increasing number of medical centers suggest it with rapid convalescences and diminished pain [4-7]. Prompt recovery shortens hospital stay and facilitates early return to job activity. In consequence percutaneous stone removal may be the cost effective[8]. Moreover because of low success rate and high retreatment rate of stones more than 2 cm by ESWL, PCNL is the preferred treatment options for such stones[9]. The present study has been designed to find out the outcome of treatment of renal calculi more than 2 cm in size by PCNL.

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Received: 05 February 2019 **Accepted:** 10 May 2019

Methods:

Between July 2016 to June2017, the present study was carried out in the Department of Urology Shaheed Suhrawardy Medical College and Hospital, Dhaka. Patients over the age of 15 years of either sex suffering from renal stone disease attending in Urology department were included in the study population. Those with large renal stone more than 2 cm. in size, single or multiple, or partial staghorn calculi, upper, middle and lower calyceal stone and sterile urine were included in the present study.

Thirty five patients were treated with PCNL. Random sample technique was applied to collect the sample from study population. Residual stones were treated with ESWL.

Exclusion criteria include children, stone size less than 2 cm. in size, patient with end stage renal disease, infected urine, pregnancy, patients with uncontrolled bleeding disorder, and those with congenital, acquired urinary or skeletal abnormalities. Patients with complete staghorn calculi were not included in this study. All patients were evaluated by history, physical examination, and investigation having similar protocol. The pertinent investigations are complete blood count, bleeding time, clotting time, blood sugar, blood urea, serum creatinine, serum electrolytes, urine routine and culture sensitivity, Ultrasonography of KUB region, plain X-ray of KUB region, X ray chest, Electrocardiogram, and Intravenous urography. Total 35 patients who fulfilled the criteria selected for PCNL. Before operation, each patient was evaluated and size and number of the stones, pelvicalyceal dilatation were recorded .Size and number of stone was determined preoperatively by ultrasonogram and excretory urography. Urinary tract infection was treated in all patients according to culture and sensitivity. A standard PCNL was performed with the patient under G/A. Access to the kidney was achieved through 1 puncture in 32 units and 2 puncture in 3 units. Pneumatic lithotripsy was used for stone fragmentation all cases. Rigid nephroscope was used for visualization and extraction of stones. At the end of the procedure 18 Fr nephrostomy tube was left in each puncture. The procedure was completed in 1 session in 30 kidneys and 2 sessions in 5 kidneys. Radiological evaluation was done postoperatively. Patient who were completely cleared of stones were considered stone free. Patients who were discharged home with residual stone were scheduled for ESWL which was performed as an out patient procedure.

Data collection:

The clinical history of the patients, physical examination findings and relevant investigations, operative time, preoperative event, required adjuvant procedures e.g.ESWL, post operative complication e.g. wound infection, pain, urinary fistula, residual stone, postoperative X-ray,duration of hospital stay were recorded for analysis. All patients were followed monthly for 3months. All patients asked about the time required to return to normal activities.

Data analysis:

After collection of data, these were evaluated meticulously. SPSS-WIN 10.0 version analysis program were used.

Results:

Mean patient age± SD 41.5±10.23 (26-60). Total intraoperative complications were recorded in 15(42.85%) cases and was managed immediately. Post operative complications including transient fever, urinary tract infection, septicaemia, urinary fistula were observed . On analysis, the overall post operative complications were significantly lower .The mean operation time of PCNL group was (121.71 ±28.14 minutes) .

Table-I

Peroperative complications

Peroperative complications	No.of patients	Percentage
Bleeding	12	34.28%
Pleural injury	02	4.4%
Renal pelvis injury	02	4.4%
Ureteral injury	0	0

Table –II

Bleeding requiring Blood Transfusion

Units of Blood	No of patients	Percentage
One Unit	08	22.85
Two Units	04	11.42

Regarding bleeding requiring blood transfusion, 12 cases (34.28%) required blood transfusion and among them 1 unit was required in 8(22.85%) cases and 2 units required in 4 (11.42%) cases. 23 cases had no need of blood transfusion.

Table -III
Postoperative complications

Post operative complications	No. of patients	Percentage
Postoperative transient fever	15	42.85%
Urinary tract infection	04	11.4%
Septicaemia	02	5.7%
Ureterocutaneous fistula	02	5.7%

Transient fever was observed in 42.85% (n=15) cases in immediate postoperative period which was subsided within 48 hours with routine postoperative treatment. 4 (11.4%) patients had documented urinary tract infection . They were treated with antibiotics according to their antibiotic sensitivity. Unfortunately 2 patients developed urosepsis which needed vigorous treatment with ICU facility treatment. Urinary fistulas develop in 2(5.6%) cases which were trearted by keeping DJ stenting.

Stone clearance including residual stone at discharge home and in follow up, complete clearance was found in 28 (80%) kidneys and residual stones were found in 7 kidneys (20%) cases and were subject to ESWL. So 20% of the patients needed adjuvant procedure ESWL for clearance of the residual stone.

Table –IV
Stone clearance and residual stone

	No. of kidneys	Percentage
Complete Stone clearance	28	80%
Residual stone	7	20%

Mean hospital stay was 4.65 ±2.24 days and Return to work was 3.66 ± 1.55 weeks.

Table –V
Mean hospital stay and mean time to return work

Hospital stay(days)	4.65±2.24
Return to work(weeks)	*3.66±1.55*

Discussion:

Present study has been designed to find out the outcome of PCNL. Total 35 patients were selected for PCNL. Renal stone disease is generally an ailment of middle aged people; this was also observed in present study where the mean age of the patients was 41.5 years. The goal of surgical treatment is to achieve maximum stone clearance with least morbidity to the patients. Percutaneous nephrolithotomy is generally accepted as a safe procedure. The overall morbidity ranges from 7.5-18% depending upon the sample size and the presence of complicated renal stones.[10]

The average size of stone was 4.01 cm.± 0.98 cm.

In present study, the mean operation time was noted 152 ±25.11 min. In comparative study of Alkohlani et al. showed mean operation time 127±30 min in PCNL [11]. Snyder and Smith also showed lower time required in PCNL than open operation [12]. Mean operation time observed in present study is in accordance with those in literature.

Intra operative complications recorded was 15 cases (42.85%) Pleural injury occurred in 2(4.4%) and renal pelvis injury occurred in 2(4.4%) cases. In a study of Alkohlani et al. intra operative complications like bleeding, pleural injury, renal pelvis injury, ureteral injury occurred in 7(16.3%) patients in PCNL. The result of the present study was comparable with the above study. Very few post operative complications were encountered after percutaneous nephrolithotomy in this series.

Bleeding is generally avoided by an anatomically oriented access. Major bleeding requiring termination of the procedure, placement of nephrostomy tube and secondary intervention at a later date .In most cases venous bleeding is stopped when nephrostomy tube is clamped for some hours. Persistent or late secondary bleeding is caused by arterial injury and can be managed by angiographic embolisation. Nephrectomy is rarely necessary while major vascular injuries requiring further intrervention occurs in only 2-3% cases[13-16]. In our study per operative bleeding requiring blood transfusion were in 12 (34.28%) cases. And in 1 case developed persistent bleeding in which therapeutic embolization is needed. None of case neeeded nephrectomy for bleeding complication. In study of Alkohlani et al. reported blood transfusion was required in 14 % cases [10]. RassweilierJJ et al. shows 10% blood transfusion in PCNL [17].In present study the amount of bleeding requiring blood transfusion was relatively higher in comparison of other studies. This may be due to the fact that these were the initial cases of PCNL in this centre.

The most common postoperative medical complication associated with PCNL is post operative transient fever 23-25%.[13], Only fraction of these patients develop urosepsis which has an overall incidence 1-2%.[14] In these study, 42.85%(n=15) patients had postoperative transient fever. 4 (11.7%) patients developed urinary tract infection and among them 2 patients developed urosepsis and 2 patients had urinary fistulas, A study on complication of PCNL by Lee WJ et al in a series of 542 patients reported 4% overall complications [18]. Another study by Al-Kohlani et al. showed overall complication in PCNL group was 8(18.6%). In present study the complication rate was almost similar to the above studies. In study by Alkohlani KM, et al.,urinary fistula recorded 2 (4.7%) The results of the present study are comparable with the above study. Cutaneous fistula recorded in PCNL patients of the present study is due to temporary ureteral obstruction due to oedema which was subsequently relieved by J-J stenting.

In present study complete stone clearance rate of PCNL were 28 (80%). Stone clearance at discharge home including stone free rate and frequency of residual stone were significantly lower. Brannen and associates reported 96% stone free rate for PCNL and Alkohlani KM et al. 82% stone free rate in PCNL. The residual stone are fragments of the targeted stones detected on post operative X- rays of the kidneys, ureter and bladder. In the present study 7 (20%) patients were found to have residual stone in postoperative plain radiograph. Brannen GE et al. in his study reported 6 (2.4%) residual stone following PCNL [8]. Segura JW et al. in a review article recorded 3% to 10.4% residual stone in different series following PCNL approach[19]. Stone clearance rate and residual stone primarily depend upon the stone size, stone burden and composition. For this reason there is difference in residual stone rate which we have observed in above two studies. In present study the stone free rate and residual stone rate is comparable with above studies. To treat the residual stone, adjuvant procedure was needed and all were treated with ESWL. Out of 35patients in PCNL group, 7 (17.5%) patients required ESWL for complete clearance of stone. In a review study of percutaneous removal of kidney stone published in the journal of Urology by Segura J W reported addition of adjuvant procedure in only 2.7% cases [19].

The mean hospital stay was 4.65±2.24 days. Preminger GM et al. reported 4 days of hospital stay for PCNL [20]. In another comparative study by Brannen GE reported similar result of 5.5 ± 0.3 days of hospital stays after PCNL . In a comparative study of Alkohlani KM et al. also reported of mean hospital stay 6.4 days in PCNL .The present study is almost similar to those studies. In evaluating the time to return work, in PCNL group time required to return work was 3.66 weeks. In study of Al Kohlani et al., reported mean 2.5 weeks ± .8 weeks required to return work in

PCNL .Brannen and associates, and Snyder & Smith also shows rapid return to work in PCNL. The result of the present study is almost similar to the above studies.

Conclusion:

Percutaneous nephrolithotomy is a good treatment option of renal calculi more than 2 cm in size. It has a high stone free rate, lower morbidity, shorter operation time and early return to work.

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