

INITIAL SINGLE CENTER EXPERIENCE OF PERCUTANEOUS NEPHROLITHOTOMY FOR RENAL STONES LARGER THAN 2.5 CM

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ABSTRACT

Objectives: To share our initial experience of PNL in the department of urology lady reading hospital Peshawar in terms of stone clearance and complications rate.

Methodology: This is a descriptive study conducted during the period from December 2015 to June 2016. Using non probability convenient sampling. Total 30 patients with renal stones of more than 2.5cm were selected for PNL. Data was analyzed on SPSS.

Results: In a cohort of 30 patients (22 male and 8 female) PNL was performed. The mean age was 39.5 (13 – 57) years. The mean operative time was 85.6 (60 – 200) minutes. The mean stone size was 3 (2.6 – 5) cm. There were 9 staghorn stones and 21 non staghorn stones. PNL was accomplished via a single access tract thru lower pole calyx in 29 cases, while only one case was performed via a single access tract thru middle calyx. The stone free rate was 95%. Mean hospital stay was 3 days. In only 6% (2/30) cases postoperative bleeding was observed necessitating blood transfusion. Similarly 6% (2/30) cases developed fever in the immediate postoperative period which was then subsided with parenteral antibiotics according to urine culture and sensitivity. No other complication was observed in our patients.

Conclusion: PNL is a safe and effective procedure associated with less morbidity, shorter hospital stay and is cost effective.

Key words: Percutaneous nephrolithotomy (PNL), Renal stones, Effectiveness, Complications.

INTRODUCTION

Percutaneous Nephrolithotomy (PNL) was described by Fernstrom and Johansson in 1976¹. The prevalence of urolithiasis is approximately 2 to 3 percent in the general population, and the estimated lifetime risk of developing a kidney stone is about 12 %². After introducing percutaneous nephrolithotomy (PNL), the treatment of kidney calculi has been improved. PNL is usually accompanied by less morbidity compared to open stone surgery³. The practice of PNL, having been refined over time, continues to evolve and has largely replaced open stone surgery for the treatment of complex upper tract stones unsuitable for SWL and ureterorenoscopy. This has been aided by advances in technology and equipments resulting in stone removal with less morbidity, shorter convalescence, and reduced cost compared with open surgery⁴. Recently European Association of Urology (EAU) has considered PNL as the first surgical option for large, multiple or inferior calyx kidney stones⁵. Most urologist believe that this operation is better than open surgery due to decreasing the length of stay, less morbidity, less pain and more

preserved kidney function⁶. Percutaneous nephrolithotomy is usually done with the patient prone, it is believed that for puncturing, and tract dilatation of the kidney which is retroperitoneal organ, the posterior approach provides a large working space with a lower incidence of splanchnic and vascular injury. However even in this position major complication, including haemorrhage and organ injury, have been reported in 0.9-4.7% of cases^{7,8}.

The aim of present study is to share our initial experience of PNL in the department of urology lady reading hospital Peshawar in terms of stone clearance and complication rate.

METHODOLOGY

The study was conducted in the department of urology lady reading hospital Peshawar from December 2015 to June 2016 as an initial experience of PNL. A total of 30 patients who underwent PNL for renal stones more than 2.5cm in our department in this period were selected for this study through the technique of non-probability convenient sampling. All patients irrespective of their age and gender, who were having renal stones of more than 2.5cm were included in this study, while those patients having stone size equal or less than 2.5cm or having some anatomic renal tract abnormalities were excluded from this study. All the procedures were carried out by a single surgeon, under general anesthesia and in prone position.

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Preoperative Evaluation

All patients were evaluated through a detailed history, clinical examination, serum creatinine, urine analysis and urine culture and sensitivity, complete blood count with coagulation profile. Radiological evaluation included ultrasonography and plain abdominal radiography (KUB), excretory urography (IVP) and those who were having deranged creatinine non contrast CT was done. Urinary tract infection (UTI) was treated in all patients according to urine culture and sensitivity. Single dose of prophylactic intravenous antibiotics were given to all patients.

Operative Technique

Under general anesthesia in lithotomy position pelvicalyceal system of the kidney containing stones was opacified by injecting a contrast medium (urografin) into an open ended ureteric catheter placed with the help of rigid cystoscope. Visualization of the renal tract was done through a fluoroscope.

A standard PNL was performed in prone position. Access to the stone was made through a single lower calyceal puncture. Alken metallic sequential dilators were used for tract dilatation and standard 30FR amplatz sheath as working channel. Rigid nephroscope was used in all cases for visualization and stone extraction. Pneumatic lithotripsy was used in all cases for stone fragmentation. At the end of procedure ureteric catheter and 16-18Fr nephrostomy tube was placed.

Follow up and data collection

After a week time X – ray KUB with or without nephrostogram and for radiolucent stones ultrasonography was performed for residual stone. Patients who were completely cleared of stones were considered stone free. Significant residual fragments 6 or more than 6mm was treated with ESWL. Clinically insignificant stone fragments (CIRFs) were those which were asymptomatic and non-obstructing of less than 6mm size. Data was collected on paper and then saved in the computer and was processed using SPSS.

RESULTS

A total of 30 patients (22 male and 8 female) underwent PNL at our centre. The mean age was 39.5 (13 – 57) years. The mean operative time was 85.6 (60 – 189) minutes. The mean stone size was 3 (2.6 - 5) cm. There were 9 (30%) staghorn stones and 21 (70%) non staghorn stones. PNL was accomplished via a single access tract thru lower pole calyx in 29 cases, while only one case was performed via a single access tract thru middle calyx. The stone free rate was 95%. Those patients who were left with significant residual fragments (6 or more than 6mm) were treated with ESWL postoperatively. 10% (3/30) patients were having solitary functioning kidneys and 100% stone clearance

was achieved in those patients. Mean hospital stay was 3 days. In only 6% (2/30) cases postoperative bleeding was observed necessitating blood transfusion. No patient needed angioembolization or exploration and or nephrectomy. Similarly 6% (2/30) cases developed fever in the immediate postoperative period which was subsided with parenteral antibiotics according to urine culture and sensitivity. No other complications were observed in our patients.

DISCUSSION

Despite the introduction of SWL for treatment of renal calculi, PCNL still plays an important role in the treatment of large stone burden, radiolucent stones and stones in patients with anatomic concerns. Improvement of endourologic instruments and lithotripsy devices has yielded greater success rates and lower complications rates for percutaneous renal surgery⁹.

Proper access is a prerequisite for complete clearance of renal calculi by PCNL. The ideal tract is one that provides the shortest and straightest access to all calculi¹⁰.

In our study the overall stone-free rate was 95%. This rate is higher than that reported by Maghraby et al. and Singla et al. and Jou et al. after a single session (52% and 70.7% and 82.5% respectively)^{11,12,13} and lower than that reported by Holman et al. (96%)¹⁴.

The mean operative time in our study was 80 minutes which is shorter than that reported by Kurtulus et al, who reported mean operative time of 2.3 and 2.2 hours¹⁵. Factors that may cause prolonged PCNL in patients after open surgery are difficulties in tract dilation in scarred collecting system and perinephric spaces, quality and efficacy of lithotripter, difficulties in stone fragments removal by grasping forceps and rigid nephroscopy in scarred kidneys and cautious fixation of kidney in the retroperitoneum.

PCNL is generally accepted as a safe procedure. Hemorrhage is the most frequent complication of this procedure. Excessive bleeding can occur during needle passage, tract dilatation, or nephrostomy^{16,17,18}. Similar to our study acute bleeding requiring transfusion has been reported in 3% to 12% of cases^{18,19}. Fortunately, in our study and the Sarhad Khan et al. study no patient required selective embolization or nephrectomy²⁰. The organs most often injured during PCNL and stone removal are the lungs and pleura, with possible pneumothorax or hydrothorax^{21,22}. In our study there was no such incidence. Bowel perforation can be a serious complication of PCNL puncture. Juan et al. study had a few cases of colon perforation during PCNL²³. We did not face bowel perforation in our study. Similar to other studies, our study also showed that there are no differences between primary and patients with previous open surgery or PCNL history in terms of stone free rate (SFR) and hospitalization time^{24,25,26}. Overall morbidity

ranges from 7.5% to 18% depending on the sample size and the presence of complicated renal stones^{27,28}. Overall mortality of PCNL ranges from 0.5% to 1.1% and is generally attributed to severe hemorrhage, urosepsis or pulmonary embolism²⁷.

CONCLUSION

PNL is an effective and safe minimally invasive modality for the treatment of all types and size of renal calculi. It is associated with less morbidity, shorter hospital stay, early return to activities and also very cost effective procedure.

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