

# PERCUTANEOUS NEPHROLITHOTOMY FOR MANAGEMENT OF RENAL STONES, DR AZIZ UR RAHMAN EXPERIENCE AT NORTH WEST GENERAL HOSPITAL, PESHAWAR

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## ABSTRACT

**Objective:** The main aim of this study was to evaluate and to review our experience with percutaneous nephrolithotomy in management of renal stones and compare it with international standards.

**Material and Methods:** From Jan 2011 till Dec 2014, 151 patients underwent percutaneous nephrolithotomy by single surgeon and same surgical team in our hospital. Ultra sound, X-ray KUB, CT-IVU, NCCT or IVU were used for assessment of the kidneys and stones. All the procedures were carried out in prone position, all PCNL tracks were punctured under fluoroscopic guidance, dilated with Alken metallic telescopic or Amplatz dilators and pneumatic lithoclast was used for lithotripsy. Stones fragments were removed by forceps and suction, 20 to 26fr Foley catheter was inserted as nephrostomy at end of procedure when required. All patients underwent plain X-ray KUB for documentation of stone clearance. Data analysis included length of hospital stay, age and gender of patients, stone size, location and clearance and complications of procedure.

**Results:** Age range was from 3 to 71 years with mean age of  $(31.77 \pm 15)$  years, 99(66%) were male and 52(34%) were female patients. mean stone size was  $(2.5 \pm 0.84)$  cm. average hospital stay was  $(2.35 \pm 1.5)$  days, 37.7%, 47.7% and 14.6% presented with right, left and bilateral renal stones respectively. 51.7% were single while 48.3% were multiple stones and overall stone free rates were 90.2%. 4 patients needed blood transfusions due to bleeding, pleura was injured in two patients, one patient with single kidney went into renal failure who required dialysis for several days and then recovered smoothly and 6 (3.9%) suffered from post OP pyrexia.

**Conclusion:** PCNL is best treatment modality for management of renal stones with high clearance rates, minimum complications rates, low morbidity and short hospital stay. However well-equipped specialized centers, standard urological equipment's and well experienced surgeons are required to achieve best results.

**Key Words:** Percutaneous nephrolithotomy (PCNL). Renal stones. Alken dilators.

## INTRODUCTION

After invention of the percutaneous nephrolithotomy technique, management of renal stones has changed dramatically over the last two decades. Because of minimal invasiveness, less complications and high clearance rates, open surgery for kidney stones has been reduced to only 0.7%-4% of cases in well-equipped hospitals<sup>1,2</sup>. PCNL remains the procedure of choice for most stones that are more than 2 cm in size, complex staghorn calculi, some lower-pole stones, stones in calyceal diverticula, and larger renal stones that are refractory to SWL<sup>3,4,5</sup>. The high success rate of PCNL depends on experience of the surgeons, endoscopic equipment's and the instruments used for stones breaking<sup>6</sup>. According to one Global Study, the overall complication rate was 15% among which

bleeding was the most common complication<sup>7</sup>. In past 20 years dramatic improvement has been made in the techniques of PCNL procedure and instruments to reduce its complications.

The main aim of this study was to share, evaluate and to review our experience with percutaneous nephrolithotomy in management of renal stones.

## MATERIAL AND METHODS

From Jan 2011 till Dec 2014, more than 200 patients underwent percutaneous nephrolithotomy by single surgeon and same surgical team in our hospital among whom complete data was available in only 151 patients. CT-IVU, NCCT or IVU was used for assessment of the kidneys and stones, Ultrasound or IVU was used in some patients with single small stones. patient age, gender, any previous treatment, stone size, site and type, Complications during surgery, method of dilatation, stone clearance and hospital stay in days were determined from the records. Preoperative laboratory tests were complete blood count, serum urea and creatinine and urine cultures. All patients with urinary tract infections were treated with a complete course of culture-specific antibiotics pre operatively. All the

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procedures were performed under general anesthesia, ureteric catheterization, with help of cystoscope or ureteroscope, was performed and fixed to urethral catheter in all patients. All the procedures were carried out in prone position, all PCNL tracks were punctured under fluoroscopic guidance with help of Alken needle, dilated with Alken metallic telescopic dilators however Amplatz fascial dilators were used in 5 cases, Amplatz 30fr sheath was used for introduction of nephroscope in most of the cases however in five cases all of whom where children we used 22Fr Amplatz sheath for Mini PCNL and 0.9% normal saline fluid was used for irrigation and clear vision. Pneumatic lithoclast was used for lithotripsy in all patients. Stones fragments were removed by forceps and suction and 20-26fr Foley catheter was inserted as nephrostomy at end of procedure in 55% cases. All the patients were given IV antibiotics before the start of procedure, Foleys catheter and ureteric catheter were removed from most of the patients at first post operation day and ante grade DJ stenting was performed in 33% cases. In all the afebrile patients IV antibiotics were converted to oral antibiotics at first post operation day. All patients underwent plain abdominal X-ray KUB for documentation of stone clearance. Data analysis included length of hospital stay, age and gender of patients, stone size, location and clearance and complications of procedure.

## RESULTS

Among all patients only 151 patients who underwent PCNL in our hospital had a complete record, age ranged from 3 to 71 years with mean age of  $(31.77 \pm 15)$  years, 99(66%) were male and 52(34%) were female patients. mean stone size was  $(2.5 \pm 0.84)$  cm. The demographic data is summarized in table 1. Average

**Table 1: Demographic Data of Patients**

<b>Mean age</b>	<b><math>31.77 \pm 15</math> years</b>
Male : Female	1.9 : 1
Stone Size	$2.5 \pm 0.84$ cm
Single : multiple stones	1.07 : 1
Right : Left	1 : 1.26

**Table 2: Results of PCNL Procedure**

<b>Mean hospital stay</b>	<b><math>2.35 \pm 1.5</math> days</b>
Mean stone clearance	90.2%
Bilateral PCNL	3.3% 5 cases
Bilateral PCNL clearance rate	100% cases
Complications Rate	4.6% cases
Post-operative pyrexia	3.9% cases
Tubed PCNL	55% cases
Tubeless PCNL	45% cases
Mini PCNL	5 cases

hospital stay was  $(2.35 \pm 1.5)$  days, 37.7%, 47.7% and 14.6% presented with right, left and bilateral renal stones respectively. 51.7% were single while 48.3% were multiple stones and overall stone free rates were 90.2%. 4 patients developed bleeding during the operation that needed blood transfusions and all of them recovered smoothly without any intervention, pleura was injured in three patients, in all of patients it happened during superior calyx approach, one was recognized during



Figure 1: Fluoroscopic guided PCNL



Figure 2: Nephroscope instrument inserted into the Amplatz sheath



Figure 3: Complete staghorn right renal stone

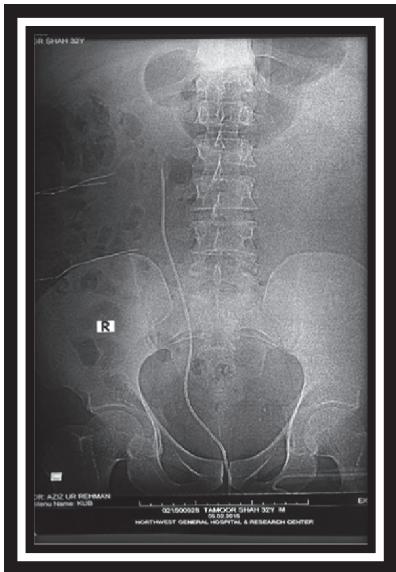


Figure 4: Post PCNL x-ray KUB of same patient with ureteric catheter in place. Stone completely cleared.

surgery, stones were cleared and chest tube was inserted and was removed at first post OP day, second case presented with hydrothorax at 5<sup>th</sup> post OP day in OPD with shortness of breaths, chest tube was passed and removed after one day, he also recovered smoothly with no consequences. Third patient with single kidney went into renal failure who required dialysis for several days and for pleural injury chest intubation and DJ stenting was performed, chest tube was removed on first post OP day and he also recovered smoothly with no consequences. Post-operative pyrexia was noticed in 6 patients (3.9%), all of the patients were well hydrated and continued with IV antibiotics post operatively till patients became afebrile. Overall results of our PCNL procedures are summarized in table 2.

## DISCUSSION

PCNL has become the standard procedure in management of large kidney stones for the last several years because of less morbidity, complications and less hospital stay. It has been recommended by the American association urology and European association urology guidelines for stones equal to or greater than 2 cm<sup>8,9</sup>.

Many radiological investigations are performed to see the anatomy of the pelvicalyceal system and stones, in our study we found NCCT to be superior over plain x-ray KUB and IVU regarding the assessment of the stones and renal parenchyma relation, puncture site determination, relation of the colon to the kidney and reducing the chances of colon injury during track formation. Two positions most commonly used for PCNL are the flank, prone and supine positions<sup>10</sup>. Prone position is traditionally been used by the surgeons since invention of the PCNL procedure<sup>11</sup>. We noticed that prone position

has the advantage of easy access to the posterior calyx without difficulty, less chances of bleeding and visceral injury and making of multiple tracts with similar results as international studies<sup>12</sup>.

PCNL track is formed under ultrasound, fluoroscopy or combination of the two<sup>13,14,15</sup>. PCNL track dilators are of many types' i.e. metallic telescopic dilators, semi rigid plastic sequential dilators and balloon dilators<sup>16</sup>. A single step one shot technique using Amplatz serial dilator over a metallic telescope dilator has been introduced recently with safe and effective results<sup>17,18</sup>. Any calyx can be punctured according to the stones locations but care must be taken not to puncture the pleura. Ultrasound guided track formation in upper calyx approach has few chances of injuring the pleura as compared to use of fluoroscope. We had two complications of pleura damage both of which were during assess to the upper calyx with supra costal approach by using fluoroscope. Both of the patients needed chest intubation and recovered post operatively.

The overall complication rates of PCNL may go up to 83%,(19,20) which includes blood transfusion (11.2%-17.5%) and fever (21.0%-32.1%), septicemia (0.3%-4.7%) and colonic perforation (0.2%-0.8%) but in contrast to these studies the complications rates were quiet few, In our study 4 patients(2.65%) had bleeding that needed blood transfusion, 2 had pleural injury(1.3%), one patient went into acute renal failure (0.66%) and one (0.66%) presented with clot colic 7 days post operatively. Urosepsis chances are highly increased after PCNL procedure that may reach up to 32.7%, therefore pre OP antibiotics therapy is mandatory<sup>21,22</sup>.

Most of surgeons prefer nephrostomy tube to be left in tract for tamponed effect but many studies show that even tube less PCNL is a feasible and safe procedure in management of renal stones<sup>23,24,25</sup>. In our study we did tubeless PCNL to 45% of the cases with similar outcomes as that of the tubed PCNL.

With advances in equipment's and techniques PCNL clearance rates has increased with time which varies from 72% to 98%, with acceptable complication rates reported for large series<sup>26,27</sup>. In our study the stone free rates during discharge from hospital were 90.2%.

## CONCLUSION

PCNL is best treatment modality for management of renal stones with high clearance rates, minimum complications rates, low morbidity and short hospital stay. However well-equipped specialized centers, wide range of standard urological equipment's and well experienced surgeons are required to achieve best results.

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