

## ORIGINAL ARTICLE

## INITIAL EXPERIENCE OF PERCUTANEOUS NEPHROLITHOTOMY IN HAZARA REGION

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**Background:** Renal stone disease affects a large population of the world and surgical management is the main stay treatment for larger stones. In comparison to open procedures, percutaneous nephrolithotomy (PCNL) has been known to offer almost similar stone clearance with least patient morbidity. The study was done with the objectives to evaluate our initial experience of PCNL in the management of nephrolithiasis in Abbottabad. **Methods:** A case series study was carried out at a private hospital, Valley Medical Complex, Abbottabad, including the 35 patients undergoing PCNL from January 2015 to February 2016. **Results:** Thirty-five patients (23 male (65.7%) and 12 female (34.3%) underwent PCNL with a mean age of 35.57 years $\pm$ 6.701 and mean renal stones size of 24.49 mm $\pm$ 7.098. 28.6% stones (n=10) were located in the renal pelvis, 28.6% (n=10) in the lower pole of kidney and 42.9% (n=15) had stones in other sites of kidney. 25.7% patients (n=9) had mild, 57.1% (n=20) moderate and 17.1% (n=6) had gross hydronephrosis. 28.6% patients (n=10) had a single renal stone, 61.4% (n=18) had  $\geq 2$  stones whereas 7 patients (20%) had partial stag horn stone. Tract access was gained through upper pole in 8.6% patients (n=3), middle pole in 11.4% (n=2), and lower pole in 85.7% (n=30). Complete stone clearance was achieved in 30 patients (85.7%) whereas partial clearance accomplished in 3 patients (8.6%). Two patients had PCNL failure due to failed tract access. Postoperatively 10 patients (28.6%) had significant pain, 06 patients (17.1%) had fever and 1 patients (2.9%) required blood transfusion. **Conclusions:** PCNL is a safe procedure for management of upper urinary tract stones and is still in evolution stages in Hazara region.

**Keywords:** Renal stones; Percutaneous nephrolithotomy (PCNL); Hazara; Staghorn stone

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## INTRODUCTION

Urinary stone disease affects almost 12% of the population of the world. With a burden of 20% of urology OPDs, an increasing trend of urolithiasis is seen.<sup>1,2</sup> The incidence of urolithiasis varies according to age and geographical region, and is of particular concern in developing countries.<sup>3</sup> In Pakistan there is a 40% of renal problems are associated with stones<sup>4</sup> and a prevalence of 3% silent stones that may only be discovered incidentally or by screening.<sup>5</sup>

Goodwin and colleague described percutaneous approach to kidney for the first time in 1955 for the purpose of drainage of an obstructed renal system.<sup>6</sup> But it was not until 1976 when Fernstrom and Johansson used this approach to remove a renal stone, leading to an era of percutaneous renal surgery.<sup>7</sup> In the past, the surgical options available to the urologist for treatment of a large renal stone were limited to open surgical procedures such as nephrolithotomy and pyelolithotomy with their morbid disadvantages. Percutaneous nephrolithotomy (PCNL) has now become the mainstay of treatment for larger renal stones over the past 30 years.<sup>8</sup> This has been much aided by the recent advances in equipment and technology, resulting in removal of stone with shorter recovery time, morbidity and mortality.<sup>9,10</sup> Excellent results have been reported in terms of stone free rates

of almost 95% following PCNL. In developing countries like Pakistan, the unavailability of ESWL and PCNL makes open surgery as the most commonly used technique for the removal of renal stones.<sup>11</sup> However, it is an established fact that percutaneous surgery can be used as alternative to open surgery, whether alone or in combination with ESWL. PCNL is generally regarded as a safe treatment option and is associated with few specific complications. Many of the complications develop from the tract access with adjacent organ injury (e.g. lung, pleura, liver, colon and spleen). Other complications include haemorrhage, pain and fever.<sup>12</sup> The advantages of PCNL include a small incision, minimum complications, and shorter convalescence.<sup>13</sup>

Most of the published data of PCNL is from centres with a dedicated specialty in stone management. This constitutes the optimum achievable outcomes and hence may not represent the results of daily practice in non-specialized centres. The objective of this study is to evaluate our one year of initial experience of PCNL in the management of nephrolithiasis in Abbottabad.

## MATERIAL AND METHODS

An observational case series study was carried out at a private hospital, Valley Medical Complex,

Abbottabad. It included all the 35 patients undergoing percutaneous nephrolithotomy from January 2015 to February 2016. Patients selected for PCNL were aged above 15 years of age, irrespective of gender with normal renal function, mean stone size >2 cm, lower pole stones >1 cm, and ESWL failure. Patients seen in Urology OPD fulfilling inclusion criteria were recruited for the study. Their detailed history, Physical examination was done to follow strictly the exclusion criteria and control the confounders. Urine complete examination, culture & sensitivity, Ultrasound Abdomen and pelvis for KUB, and Intravenous urography were advised for all the patients. Other appropriate investigations were then performed accordingly like CT scan and renogram when indicated. Age and gender of the patients was noted along with the size of stone burden in mm, total number of stones as single multiple or partial stag horn, degree of associated hydronephrosis, site of stones in the kidney, i.e., renal pelvis, lower pole or other e.g. upper pole or multiple sites. All the procedures were performed by the same Urologist. Tract access was also noted as lower, middle or upper pole calyx puncture. Clearance of stones was documented as success, i.e., complete (no visible stone fragment on fluoroscopic image) partial (visible and inaccessible stone fragments on fluoroscope requiring ESWL session post operatively) or failure (inability to clear the stones completely or partially). On 1st post-operative day complications such as significant bleeding in the nephrostomy requiring blood transfusion, fever (temperature of >99 °F) or significant pain requiring more than twice daily intravenous Toradol (Ketorolac) for pain relief. General anaesthesia was given in all the patients. Pre-operatively Inj. Ceftriaxone 1gm was given. Fluoroscopic retrograde approach was used. With patient placed in lithotomy position an open ended 6 Fr ureteric catheter was passed and secured to a Foleys catheter, allowing injection of contrast material to opacity and distend the collecting system. Access gained to the collecting system via suitable calyx with patient in prone position, dilation of the tract over a .035-inch guide wire up to 30 Fr, followed by insertion of an amplatz sheath through which Storz rigid nephroscope 24 Fr was passed. Fragmentation of calculi was performed using pneumatic probe. 16 Fr nelton catheter was used in all cases as nephrostomy. Antegrade double J stenting was done at the end of the procedure. Nephrostomy tube was taken out on the next postoperative morning and DJ stent was removed after 1 week.

In 33 patients, the procedure was successfully carried out. Clearance of stone was highly dependent on location of stone. Renal pelvis stones had a higher stone clearance rate. Residual stones were treated with

ESWL. Complications such as fever, significant pain and bleeding were assessed on the first post-operative day. All of the patients were fit to be sent home on or before 3rd post-operative day.

Collected data was analysed in SPSS version 16. Mean±SD is calculated for numerical variables like age and stone size. Frequency or percentages are calculated for categorical variables like gender of patients, stone site, stone number, associated hydro nephrosis, calyx puncture, clearance and complications such as fever, bleeding and pain.

## RESULTS

Thirty-five patients underwent percutaneous nephrolithotomy from January 2015 to February 2016 at a Valley Medical Complex, Abbottabad as a pioneering experience in Hazara region. Mean age of the patients was 35.57 years±6.701. Mean size of the renal stones was 24.49 mm±7.098 with a range of 10–40 mm. Male patients were predominant with 23 male patients (65.7%) and 12 (34.3%) female patients.

28.6% stones (n=10) were located in the renal pelvis, 28.6% (n=10) located in the lower pole of kidney and 15 patients (42.9%) had upper pole, middle pole and combination of stones at different sites of kidney. Nine patients (25.7%) had presented with associated mild hydronephrosis, 20 patients (57.1%) with moderate hydronephrosis and 06 patients (17.1%) with gross hydronephrosis. 28.6% patients (n=10) had a single renal stone, 61.4% (n=18) had 2 or more stones whereas 7 patients (20%) had a partial stag horn stone. Access was gained through upper pole in 3 patients (8.6%), middle pole in 2 patients (11.4%), and lower pole in 30 patients (85.7%).

Complete clearance of stone fragments was achieved in 30 patients (85.7%) whereas partial clearance requiring an ESWL session was accomplished in 3 patients (8.6%). Two patients had a failed PCNL due to failure to gain tract access and had to be converted to open pyelolithotomy.

Postoperatively during the first 24 hours 10 patients (28.6%) had significant pain, 06 patients (17.1%) had fever and 1 patients (2.9%) required a pint of blood transfusion due to excessive bleeding.

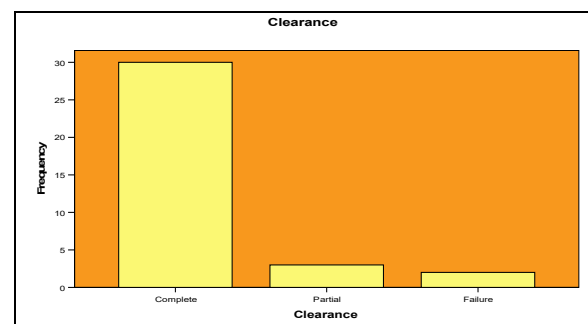


Figure-1: Frequency of stone clearance

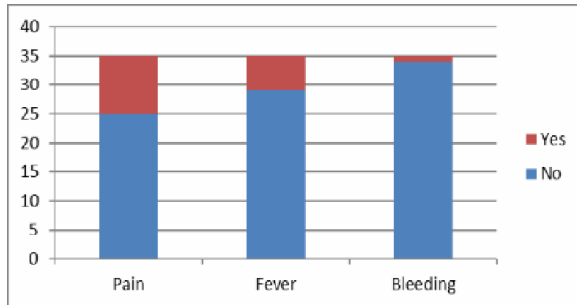


Figure-2: Incidence of post operative complications

## DISCUSSION

Nephrolithiasis has been generally regarded as a disease of relatively younger population; this fact was also observed in our present study where the mean age of patients presenting with renal stones was 35.57 years. The optimal goal of the surgical management of nephrolithiasis has been identified as the maximum stone clearance with minimum morbidity of the patient.<sup>14</sup> Generally; Percutaneous nephrolithotomy is accepted as a safe endourological procedure for renal stone management. The overall morbidity from PCNL ranges from 7–18% depending upon the number of patients and associated complications of the renal tract.<sup>15</sup> In comparison to open surgical management for renal stones PCNL has been associated with less morbidity. In a community-based study, approximately 90% of renal stones were successfully removed, and at some experienced renal stones care centre, this rate approached 100%.<sup>16</sup>

American Urological Association (AUA) guideline 2004 recommends PCNL as first line modality for the patients with large or stag horn calculi. Stone clearance rate of 98.3% had been reported from Mayo Clinic in 1000 patients for the small symptomatic calculi of renal pelvis and upper ureter which was almost equivalent to open surgery and superior to SWL monotherapy (54%).<sup>17</sup> In this present study, stone clearance rate was 85.7% with 8.6% patients needing an adjuvant session of ESWL. Previous studies showed overall major complication rate for PCNL was between 4–8%. Rate of blood transfusion range from 2–23% in contemporary studies.<sup>18,8</sup>

Factors associated with increased blood loss during PCNL includes hypertension, diabetes mellitus, large stone size, multiple access tracts and certainly the surgeon's experience.<sup>19</sup> In this study only 1 patient (2.9%) was transfused a pint of blood after the surgery. Transfusion rate is lower as compared to international rates, probably due to optimal pre-operative preparation and better case selection. Injury to adjacent organs including liver, spleen, lung, pleura and colon is rare.<sup>19</sup> In this study, no patient had any injury to the surrounding structures. With PCNL the most common

associated medical complication is fever occurring in 23–25% patients.<sup>20</sup> Only 1–2% of these patients develop urosepsis.<sup>20</sup> In this study, 17.1% patients had transient fever on the 1<sup>st</sup> postoperative day.

Urinary fistulae have also been reported in some previous studies but none was encountered in this present study. Overall mortality of PCNL ranges from 0.5–1.1%, which is attributed to severe blood loss, urosepsis or pulmonary complications. No surgery related mortality was documented in the present study.

## CONCLUSION

PCNL is a safe endourological modality for the management of renal stone disease. More expertise are needed to be attained to further increase the procedure success and minimize associated complications.

## AUTHORS' CONTRIBUTION

UF and MFM: Data collection. MAM: Data compilation and statistical work. NJ: Article writing.

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