



PERCUTANEOUS NEPHROLITHOTOMY (PCNL) - OUR EXPERIENCE AND OUTCOMES

Urology

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ABSTRACT

This retrospective study was conducted in Department of Surgery, SN Medical college, Agra from 1 January 2022 to 31 December 2023. Data of 200 patients upto the age of 70 years with renal calculi undergoing PCNL in our department, were reviewed in this study. PCNL was performed under general anaesthesia. After the placement of a ureteral catheter via cystoscopy in the lithotomy position, the patient was turned to the prone position. Access was gained using an 18-G initial puncture needle and a hydrophilic guidewire was passed into the collecting system under biplanar fluoroscopic guidance. The percutaneous tract was dilated up to 24 or 26 Fr for the 22 Fr nephroscope, according to the patient's age, caliceal dilatation, and the stone burden. Following the breakage of the stones using a pneumatic lithotripter, a 14 fr nephrostomy catheter was placed into the tract. On the first postoperative day, plain abdominopelvic radiograph was used to assess stone clearance. Of the 200 cases, we achieved complete stone clearance in 190 (95%), bleeding requiring transfusion in 12 (6%), urinoma formation occurred in 6 (3%) patients, sepsis in 4 (2%) and hydrothorax occurred in 2 patients (1%). Mean duration of hospital stay was 3.5 days.

KEYWORDS

INTRODUCTION

The incidence of urolithiasis varies according to age and geographical region and is of particular concern in developing countries. With the introduction of percutaneous nephrolithotomy (PCNL), open surgical approaches have begun to lose their popularity in the treatment of urolithiasis⁽¹⁾. Although PCNL is a well established minimally invasive treatment modality, the technique can lead to complications such as bleeding, injury to collecting system, abdominal visceral injury, hemothorax, sepsis etc⁽²⁾. We report our experience and outcomes with PCNL over a 2 year period in this study.

MATERIAL AND METHODS

This retrospective study was conducted in the Department of Surgery, SN Medical college, Agra from January 2022 to December 2023. 200 adult patients of both sexes and ages ranging from 18 to 60 years and undergoing PCNL in our department were included in this study. Preoperative patient histories, physical examinations, and routine laboratory tests including blood biochemistry, urinalysis, and urine cultures were evaluated. An abdominopelvic ultrasound, plain abdominal films, and intravenous urography/ CT urography were used as diagnostic imaging tools to determine stone size, location, and anatomical clues, as well as for planning treatment. After the placement of a ureteral catheter via cystoscopy in the lithotomy position, the patient was turned to the prone position. Access was gained using an 18-G initial puncture needle and a hydrophilic guidewire was passed into the collecting system under biplanar fluoroscopic guidance. The percutaneous tract was dilated up to 24 or 26 Fr for the 22 Fr nephroscope, according to the patient's age, caliceal dilatation, and the stone burden.

Following the breakage of the stones using a pneumatic lithotripter, a 14 fr nephrostomy catheter was placed into the tract.

On the first postoperative day, plain abdominopelvic radiograph was used to assess stone clearance. Stone pieces that appeared smaller than 5 mm on plain X-ray were accepted as clinically insignificant residual fragments. Stone burden and location, number, size and location of the renal tract, types of instruments, complications, stone clearance, duration of nephrostomy, and hospitalisation time were recorded as pre and postoperative factors.

RESULT

Table 1 outcome

Outcome	Frequency, n (%)
Stone free clearance	190(95%)
Residual fragments/calculi	10(5%)

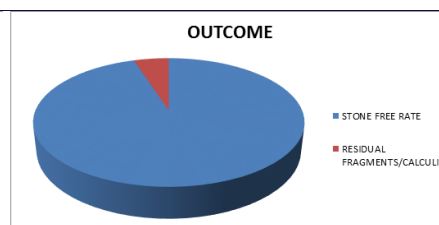


Fig 1 diagrammatic representation of outcome

Table 2 result

Complications n= 200	Frequency, n (%)
Fever(minor)	18(9%)
Bleeding requiring transfusion	12(6%)
Sepsis	4(2%)
Urinoma formation	6(3%)
hydrothorax	2(1%)

DISCUSSION

Currently, open surgery is rarely performed in the management of kidney stones, and PCNL has become a frequently applied minimally invasive surgery that leads to fewer complications, shorter durations of hospital stay, and reduced scar tissue formation^{(3),(4)}. The success rate of PCNL procedures has been reported as 72-98% in a large series published in the literature^{(5),(7)}. Segura et al⁽⁸⁾ reported a 98% success rate in a total of 1,000 patients who underwent PCNL in 1985, which is one of the first larger published series. The success rate in our series was 95% in a total of 200 cases.

PCNL, as a minimally invasive surgical method for the treatment of renal stones, can lead to complications including bleeding requiring transfusion, lung injury, bowel injury, major vascular injury, and sepsis. In 2011, the Working Group of the CROES PCNL Global Study evaluated complications of PCNL and the overall complication rate was reported as 2.5%. Of those, 80% were minor and 20% were major complications. Fever and bleeding were the most frequently reported complications^{(9),(10)}. Of the minor complications, fever was the most common complication (9%). The overall major complication rate in the present study was 12%, with haemorrhage being the most common complication. In our series, complex stones constituted a high percentage of cases, which might be a factor in the higher complication rate compared with the published literature. During the PCNL procedure, one of the most important complications is the development of acute haemorrhage. The transfusion rate has been

reported to be 0.5–4% and this can increase up to 20%⁽²⁾. Development of arteriovenous fistula or pseudoaneurysm can cause severe bleeding during PCNL, with a rate of 0.5%⁽⁵⁾. Stone burden and prolonged percutaneous surgery operation time might be factors associated with bleeding⁽¹¹⁾. In our series, the rate of bleeding requiring transfusion (6%) was in accordance with the published literature. Only 1(0.5%) cases required angioembolisation. Injuries to the neighbouring organs including liver, spleen, colon, and small intestine can also occur⁽¹²⁾. Supra and intercostal access might be related with occurrence of lung injury and pneumothorax. In the literature, the rates of hydrothorax and pneumothorax after PCNL were reported to be 6–12%⁽¹³⁾. Palnizky et al⁽¹⁴⁾ reported an 8% rate of pulmonary complications in their experience. In our series, pulmonary complications occurred in 2 cases (1%) that were associated with intercostal and supracostal access. These complications were treated conservatively, such as by inserting a chest tube. Lee et al⁽¹⁵⁾ reported renal pelvis laceration(0.9), ureteral avulsion(0.2) and urinoma formation (1.5%) in their series. In our series, we observed urinoma formation in 6(3%) and treated this with double-J stent insertion. 4(2%) patients developed sepsis, managed with upgrading antibiotics.

CONCLUSION-

In our experience, PCNL is a generally safe and effective minimally invasive surgical modality with acceptable complications and short duration of hospital stay.

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