

# Surgical Outcomes of Percutaneous Nephrolithotomy in Rural Tertiary Care Hospital

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## Abstract

**Introduction:** Percutaneous nephrolithotomy (PCNL) is the most common procedure for large renal calculus and upper ureteric stones. Outcome of the procedure varies depend on many factor such as stone features, renal anatomy, and patient characteristics. **Aim:** The aim of our study was to present our experience in PCNL and the outcome analysis.

**Materials and Methods:** This prospective study was conducted in 53 patients. Stone-free rates were assessed intraoperatively, on the first post-operative day, and at outpatient review using radiography. Intraoperative and post-operative complications were analyzed.

**Results:** Fifty-three patients who had 53 PCNL procedures of which 29 were male and 24 were female. Stone size was varying from 18 to 4.5 cm with a mean size of 3.07 cm. All the case was done in prone position only. The average operating time was  $128 \pm 39.03$  min. Stone-free rate was 91.2%. There was no pleural injury and morbidity. Duration of mean hospital stay was  $8.07 \pm 2.43$  days.

**Conclusion:** PCNL is a safe procedure for renal and upper ureteric stones. Large renal stones can also be managed by PCNL.

**Key words:** Complications, Percutaneous nephrolithotomy, Stone-free rate

## INTRODUCTION

Urolithiasis considered to be a health-care problem due to its prevalence and recurrence. Renal stone management has evolved from open surgery to minimal invasive surgical procedures. First report of the removal of renal stones through nephrostomy by Rupel and Brown in 1941,<sup>1</sup> since then, there have been significant improvements in techniques, instruments, and experience. First reported percutaneous nephrolithotomy (PCNL) is by Fernström and Johansson in 1976.<sup>2</sup> Further development of the technique is greatly due to introduction of the renal endoscope and ultrasonic lithotripsy by Alken *et al.*<sup>3</sup>

European Association has considered PCNL as the first option for large, multiple, or inferior calyx stones.<sup>4</sup> Open stone surgery has been largely replaced by PCNL because of its cost-effectiveness, lower morbidity, shorter operative time, and lower post-operative complications.<sup>5,6</sup> PCNL is recommended for cases with stones larger than 20 mm<sup>2</sup>, cases failed with extracorporeal shock wave lithotripsy (ESWL), or cases accompanied by anatomical malformation. However, PCNL does carry a risk of significant morbidity, with contemporary series describing a complication rate of 20.5%. PCNL is a gold standard procedure for upper renal tract stones.

## Aim

The aim of our study was to present our experience in PCNL and the outcome analysis.

## MATERIALS AND METHODS

This is a prospective study conducted in the Department of Urology at Tirunelveli Medical College. Sample

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size was 53. Patient data were collected for each case. Stone-free rates were assessed intraoperatively, on the first post-operative day, and at outpatient review using radiography. Intraoperative and post-operative complications were analyzed.

## RESULTS

This is a single-center study which contributed 53 patients who had 53 PCNL procedures of which 29 were male and 24 were female. The mean age was  $39.03 \pm 8.92$  years. Male:female ratio was 1.2:1. Four patients were diabetic and two were hypertensive. Stone size was varying from 18 to 4.5 cm with a mean size of 3.07 cm. Of these 23 left-sided stone and 30 right-sided, 32% were pelvic and 56% were calyceal calculus, 3% were staghorn calculus, 2% were upper ureteric calculus, and 7% were pelvicalyceal calculus. The lower calyx was the most common site of stone location (48.2%). Stones were multiple and bilateral in 4% of cases. All the cases were done in prone position only. The average operating time was  $128 \pm 39.03$  min. The lower calyx was the most common site of stone location (48.2%) and puncture site (86.8%), and stone-free rate was 91.2%.

Tracts were dilated using serial dilatation and Amplatz sheath of size 28 Fr used in all cases. Calyceal puncture was infracostal in all cases, 46 (86.8%) cases lower calyceal puncture, 5 (9.4%) cases middle calyceal puncture, and 2 (3.7%) cases were converted to open pyelolithotomy. Lower calyceal puncture was done in 86.8% patients. Stone-free rate was 91.2%. After the procedure, nephrostomy and double J stenting were done in all the cases. 8 (15.1%) cases had blood transfusion and 6 (11.3%) cases had recorded post-operative complications such as fever and hematuria. There was no pleural injury and morbidity. Duration of mean hospital stay was  $8.07 \pm 2.43$  days.

## DISCUSSION

Surgical management of renal tract stone disease has evolved during the past two decades after the introduction of minimal invasive techniques such as ESWL and PCNL.<sup>6</sup> PCNL has become a common procedure performed in patients with renal calculi.<sup>7</sup> Since the recurrence rate for renal stones is high, these patients often need reintervention. Reports have claimed higher failure rates of PCNL in patients with prior open intervention.<sup>8,9</sup> Conversely, Shah *et al.* and Margel *et al.*, in their studies demonstrated that anatomical changes after open stone surgery such as infundibulum stenosis, perinephric fibrosis, bowel displacement, and incisional hernia may decrease PCNL success rate and increase its complications.<sup>10,11</sup>

Margel *et al.* and Tugcu *et al.* have also expressed that operative time was longer in patients with a history of previous open nephrolithotomy.<sup>11,12</sup> 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.<sup>13-15</sup> Accurate reporting of complications is an essential component to critical appraisal and innovation in surgery and specifically in PCNL. A standardized complication reporting methodology is necessary to enable appropriate comparisons between institutions, time periods, or innovations in technique.<sup>16,17</sup> The Dindo *et al.* grading system has become widely accepted in urology and has facilitated the study of PCNL complications.<sup>18</sup>

## CONCLUSION

More than 95% of patients had complete stone clearance with PCNL alone. PCNL is effective and safe procedure for calculus of more than 1.5 cm if kidney is properly accessed and calyceal system is assessed. Advantages of PCNL in comparison with surgery include cost-effectiveness, less complications, less discomfort, and increased stone-free rate.

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