



# A Randomised Controlled Study Comparing Standard Tubeless PCNL and Tubeless Mini-PCNL For Renal Stones Less Than 2cm

Aditya Yelikar

Affiliation Assistant Professor, Department Of Urology GM's Medical College & Hospital, Ch. Sambhajinagar, Maharashtra, INDIA-431001.

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## KEYWORDS

Mini PCNL,  
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## ABSTRACT:

**Introduction:** Tubeless PCNL is associated with less morbidity. We compared standard tubeless PCNL to tubeless Mini PCNL for morbidity and stone free rates in order to improve outcomes of PCNL with minimal morbidity.

**Objectives:** To compare standard tubeless PCNL with tubeless mini PCNL with various perioperative parameters. To learn the safety of tubeless mini PCNL and compare the results with standard tubeless PCNL. We also aimed to compare pain, blood loss, hospital stay and complications between tubeless mini PCNL and standard tubeless PCNL.

**Methods:** Our study included 100 patients, 50 patients in group 1 (standard tubeless PCNL) & 50 patients in group 2 (tubeless mini PCNL). Patients with CKD, solitary kidney, ectopic kidney and previous diversion were excluded. Tract was dilated upto 24Fr in group 1 & up to 16Fr in group 2. No percutaneous nephrostomy was kept in any group. Post operative pain score was monitored at 12 and 24 hours. Additional analgesia was given if needed. Haemoglobin was measured pre operatively & on post op day 1. Stone clearance was checked with ultrasonography & X-ray KUB (kidney-ureter-bladder). Total Operative time, pain score, analgesic requirement, haemoglobin drop, complications were compared.

**Results:** Operative time was slightly longer in group 2 than in group 1 (38.58±3.79 vs 37.64±2.43 mins.  $p > 0.05$ ). Mean pain score was more in group 1 than in group 2 (5.88±1.05 VS 4.02±0.97,  $p < 0.005$ ). Post operative haemoglobin drop was more in group 1 than in group 2 (1.28±1.13 vs 0.77±0.97,  $p < 0.001$ ). Stone clearance in group 1 was 100% while in group 2 it was 96%.

**Conclusions:** Operative time is more in tubeless Mini PCNL whereas pain score, analgesic requirement and haemoglobin drop are more in standard tubeless PCNL comparatively.

## 1. Introduction

The Gold standard for managing all renal stones is PCNL now days with a success rate of  $> 90\%$  [1, 2, 3]. Many modifications and refinements of the standard PCNL have been developed to decrease morbidity, analgesic requirement, and hospital stay; such as the use of a smaller working sheath and nephroscope (mini-PCNL), omitting the use of a nephrostomy tube (tubeless PCNL), sealing of the nephrostomy tract with haemostatic

materials, and PCNL under regional anaesthesia [2,4,5]. Nephrostomy tube placement has several advantages like tamponading of the renal access tract, allowig for a second look surgery. However placing a nephrostomy may increase morbidity, pain, discomfort and thus may increase hospital stay [4,6,7]. We know tubeless PCNL was introduced in 1997 (8). Some studies have shown that tubeless PCNL leads to less postoperative pain at puncture site, less discomfort, slightly reduces the cost and leads to shorter hospital stay



[8-12]. We compared standard tubeless PCNL with tubeless mini PCNL with various perioperative parameters. Mini PCNL is when the tract dilatation size is less than 20Fr. We could not find a similar study in the literature.

## 2. Objectives

To compare standard tubeless PCNL with tubeless mini PCNL with various perioperative parameters. To learn the safety of tubeless mini PCNL and compare the results with standard tubeless PCNL. We also aimed to compare pain, blood loss, hospital stay and complications between tubeless mini PCNL and standard tubeless PCNL.

## 3. Methods

Our study included 100 patients, 50 patients in group 1 (standard tubeless PCNL) & 50 patients in group 2 (tubeless mini PCNL), with single renal stone less than 2 cm. Patients with CKD, solitary kidney, ectopic kidney and previous diversion were excluded. Tract was dilated upto 24Fr in group 1 & upto 16Fr in group 2. No percutaneous nephrostomy was kept in any group. Post operative pain score was monitored at 12 and 24 hours. Additional analgesia was given if needed. Haemoglobin was measured pre operatively & on post op day 1. Stone clearance was checked with ultrasonography & X-Ray KUB (kidney-ureter-bladder). Total Operative time, pain score, analgesic requirement, haemoglobin drop, complications (bleeding, fever, urinary leak, urosepsis, hydro or pneumothorax) and stone free rate were compared.

## 4. Results

Operative time was slightly longer in group 2 than in group 1 (38.58±3.79 vs 37.64±2.43 mins.  $p>0.05$ ). Mean pain score was more in group 1 than in group 2 (5.88±1.05 vs 4.02±0.97,  $p<0.005$ ). Post operative haemoglobin drop was more in group 1 than in group 2 (1.28±1.13 vs 0.77±0.97,  $p<0.001$ ). Stone clearance in group 1 was 100% while in group 2 it was 96%. There was no significant difference in complications between the two groups.

## 5. Discussion

PCNL was first introduced by Bellman [8]. Since then tubeless PCNL has emerged as a routine procedure now a days just as standard PCNL due to the merits it offers like less morbidity, less post operative pain at puncture site, less need for analgesics and reduced hospital stay. However patients with significant bleeding during the surgery, major collecting-system injury, turbid urine or sludge seen on nephroscopy, residual stones seen on fluoroscopy intraoperatively may require a nephrostomy tube to aid in hemostasis and to drain the pelvicalyceal system. We excluded patients from our study that had staghorn stones, congenital urinary tract anomalies, any form of ureteric obstruction, serious urinary infection, abnormal renal function,

Solitary functioning kidneys or kidneys with prior open surgery were also excluded from our study.

In our study the mean age, sex, average stone size and stone HU were not significantly different in the two groups [table A]. Whether nephrostomy placement helps in hemostasis was challenged in many studies [17,18]. These studies reported no difference in the hemoglobin change and development of perinephric hematoma or urinoma using a tubeless approach. Whereas in our study both groups were tubeless but the haemoglobin drop was significantly more in standard tubeless group. In our study The mean Haemoglobin drop in standard tubeless was 1.28 ± 1.13 and in tubeless mini PCNL group was 0.77 ± 0.97. Shorter hospital stay and shorter time to return to normal activity could decrease the costs of treatment and improve quality of health-care, which are indicated as advantages of the tubeless procedure [13, 14, 15]. In our study the mean hospital stay in standard tubeless PCNL group was significantly more than in tubeless mini PCNL group (41.88 ± 23.92 hours Vs 34 ± 17.73 hours). Similar to our study results another study has reported that factors influencing hospital stay included stone burden, number of access and tubeless PCNL. Of them tubeless PCNL was the most significant factor (16). A Meta analysis showed that the pain score by VAS was significantly more in the standard PCNL group as compared to the tubeless PCNL group [19]. Similarly in our study the mean pain score was significantly less in tubeless mini PCNL group as compared to standard tubeless PCNL group (4.02 ± 0.97 Vs 5.88 ± 1.05). This may be



attributed to the large tract size in standard tubeless PCNL group as compared to the tubeless mini PCNL group. Meta analysis of 14 randomised controlled trials comparing standard PCNL and tubeless PCNL showed no difference in stone free rate [20]. Similarly in our study there was no statistically significant difference in the stone free rate between the two groups. Comparing the complications which were measured as per the Clavien Dindo scoring system only grade 1 complications (fever, transient elevation of creatinine) were significantly more in standard tubeless PCNL as compared to tubeless mini PCNL group. But at the same time tubeless PCNL is associated with morbidity of a double J stent placement, needs a second procedure to remove the stent and it is not possible for a relook procedure for residual calculi due to non placement of a nephrostomy tube [21].

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