

# OUTCOME OF TUBELESS PERCUTANEOUS NEPHROLITHOTOMY IN THE TREATMENT OF SINGLE RENAL STONES

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**Objectives:** To, evaluate the outcome of tubeless percutaneous nephrolithotomy (PCNL) for the treatment of renal stones.

**Patients And Methods:** This descriptive study was conducted in the institute of kidney diseases Hayat Abad medical complex Peshawar from June 2012 to February 2013 on 33 patients. A 6 French (Fr) ureteral catheter was inserted into the target ureter in supine position. In prone position the desired calyx was punctured with 18 gauge needle. The tract was dilated by alken dilators followed by insertion of Amplatz sheet. Using a 24 Fr rigid nephroscope, the stone was readily identified and crushed with the use of a pneumatic lithoclast and the fragmented stones were removed with a forcep.

**Results:** A total of 33 patients, 19 male and 14 female were included in the study. Mean age was 27.6 years (range 14 to 59). Most of the patients 19(57.57%) had right kidney stones. Approach below 12<sup>th</sup> rib was made in 23(69.69%) and above it in 10(30.31%) patients. The overall stone free rate was 30 (90.90%). One patient (3.03%) had an 11 mm residual stone, which was cleared in 8 weeks through extracorporeal shockwave lithotripsy (ESWL). One patient (3.03%) had clinically insignificant residual stones which cleared spontaneously in 4 weeks time. The mean operative time was 65.7 minutes (38-108).

**Conclusion:** Tubeless PCNL is associated with less pain, less debilitation, lower costs and a shorter hospital stay.

**Keywords:** PCNL, tubeless, renal stones

## INTRODUCTION

PCNL is an endo-urological procedure which is a widely accepted and employed operation for the removal of renal calculi<sup>1,2,3</sup>. Routinely, a nephrostomy tube is left in place to tamponade bleeding; to allow adequate drainage of urine and to enable access to the collecting system if a secondary procedure is deemed necessary. However, it is painful and increases the morbidity of the operation. With the advent of tubeless PCNL, the use of nephrostomy tubes is no longer thought to be necessary in all cases<sup>4,5,6</sup>. Tubeless PCNL relies on ureteral stents to provide adequate drainage and reportedly causes less postoperative pain<sup>7</sup>, shorter hospital stay, lower rate of hospital acquired infections<sup>8</sup>, faster recovery and decreased cost of the procedure.<sup>9,10</sup>

## METHODS

This descriptive study was performed over 30 patients from June 2012 to February 2013 in institute of kidney diseases Hayat abad medical complex Peshawar. Patients above age 16 years with normal renal functions were included in the study. Tubeless PCNL was performed when perforation, residual stones, and significant bleeding had been intraoperatively excluded by nephroscopy, fluoroscopy, and hemo-

dynamic assessment. Exclusions were made for the following reasons: large burden of remnant stones, serious hemorrhage occurring during surgery and undergoing percutaneous multiple tracts. The surgery was performed under general anesthesia with endotracheal tube. Intraoperatively, intravenous Ampicillin 1 g and Gentamicin 80mg were administered. With the patient in the lithotomy position, the 6-Fr open ended ureteric catheter was inserted in retrograde fashion. The patient was turned to the prone position and artificial hydronephrosis was created by continues injection of normal saline. 18-G coaxial needle was inserted into the desired calyx. The tract was dilated by alken dilators followed by insertion of Amplatz sheet. Using a 24 Fr rigid nephroscope, the stone was readily identified and crushed with the use of a pneumatic lithoclast and stone fragments were removed with forceps. The surgical site was compressed for about 10 minutes and then sutured. The stone-free rate was defined as all cases in which the stone disappeared on simple X-ray and or ultrasound after PCNL.

## RESULTS

A total of 33 patients, 19(57.57) male and 14(42.43) female were included in the study. The mean age was 27.6 years (range 14 to 59). All patients had single stones with associated hydronephrosis in 27(81.81%) patients. Most of the patients 19(57.57%) had right kidney stones. Nine patients have prior renal stone surgery such as PCNL 1(3.03%), Pyelolithotomy 3(9.09%), ESWL 4(12.12%) and Ureteroneoscopy (URS) 1(3.03%). Approach below 12<sup>th</sup> rib was made in 23(69.69%) and above it in 10(30.31%) patients. The

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**Table 1 inclusion criteria for outpatient tubeless percutaneous nephrolithotomy**

<b>Operative Considerations</b>	
1.	Normal renal function (i.e.. serum creatinine <1.2 mg/dL )
2.	Age >16
<b>Intraoperative considerations</b>	
1.	Access at tip of calyx
2.	No rupture of the infundibulum
3.	No significant bleeding
4.	No perforation of collecting system
5.	Residual stones excluded intraoperatively by nephroscopy and fluoroscopy
6.	Shorter operating time <1.5 hours
7.	Absence of infection (i.e. negative pre-op urine culture)

**TABLE 2. Patient and stone related parameters**

<b>Total patients</b>	<b>33</b>
Mean age	27.6(range 14 to 59 years)
Sex	
Male	19(57.57)
Female	14(42.43)
Operation site	
Right	19(57.57%)
Left	14(42.42%)
Type of stones	
Renal	33(100%)
Renal+ ureteric	0(0.0%)
Multiplicity	
Single	33(100%)
Multiple	0(0.0%)
Bilateral	0(0.0%)
Stent inserted at time PCNL	
Double J	14(42.42%)
Ureteric catheter	16(48.48%)
Hydronephosis	
Yes	33(100%)
No	0(0.0%)
Rib puncture	
Below 12th rib	23(69.69%)
Above 12th rib	10(30.31%)
Calyx puncture	
Upper, n(%)	5(15.15%),
Middle, n(%)	8(24.24%)
Lower, n(%)	17(51.51%)
Previous surgical history	
Pyelolithotomy	3(9.09%)
PCNL	1(3.03%)
URS	1(3.03%)

targeted calyces were upper, middle and lower calyces in 5(15.15%), 8(24.24%) and 17(51.51%) patients. The overall stone-free rate was 30 (90.90%). One patient (3.03%) had 11 mm residual stones, which were cleared in 8 weeks through ESWL (extracorporeal shockwave lithotripsy). One patient (3.03%) had clinically insignificant residual stone which cleared spontaneously in 4 weeks time. The mean operative time was 65.7 minutes (38-108) and mean length of stay was 2.3 days. Urine leakage occurred in one patient which stopped in three days.

## DISCUSSION

In the past decade, there has been continuing interest in the concept of foregoing nephrostomy tube (NT) placement after PCNL with the intent of reducing some postoperative problems; such as patient's discomfort, urinary leakage from the percutaneous tract and prolonged hospital stay<sup>11</sup>. The European Association of Urology guidelines have recommended tubeless PCNL as a safe alternative to NT placement, the reason being efficacy and safety of tubeless PCNL demonstrated by several Randomized control trial (RCTs)<sup>12</sup>. In 1984 Wickham et al<sup>13</sup>, were the first to suggest the idea, in selected cases, of omitting the insertion of a nephrostomy tube at the end of a PCNL. This concept was supported by Bellman et al<sup>4</sup> who reintroduced tubeless percutaneous stone surgery in 1997.

In our study the overall stone-free rate was (30) 90.90%. One patient (3.03%) had 11 mm residual stone, which were cleared in 8 weeks through ESWL. One patient (3.03%) had clinically insignificant residual stones which cleared spontaneously in 4 weeks time. The mean operative time was 65.7 minutes. Zilberman DE et al<sup>14</sup> obtained data from 50 reports based on complication rates between tubeless and standard PCNL. Tubeless PCNL demonstrated advantages such as less pain, less debilitation, lower costs and a shorter hospital stay. In his study mean stone free rates for tubeless percutaneous nephrolithotomy were as high as 89%. Crook TJ et al<sup>15</sup> randomized patients to have a nephrostomy placed (group 1 control) or not placed (group 2 treatment). A total of 25 patients were randomized to each group. There were no differences in hemorrhage, infection and serum parameters. There were no readmissions in either group. Mean length of stay was 3.4 vs 2.3 days ( $p < 0.05$ ). He concluded that tubeless percutaneous nephrolithotomy may be considered an accepted standard of care for selected cases. Similarly Salem HK et al<sup>16</sup> operated on 20 cases. He observed that in the tubeless group the pain score was 3–6 (mean 4.6), there was no need for intravenous analgesia, and median hospital stay was 1.7 days (1–4 days); and urine leakage occurred only in one patient. In the group with percutaneous nephrostomy (PCN) tube, the pain score was 5–8 (mean 5.5), IV analgesia was mandatory in four patients, and median hospital stay was 2.8 days (3–4 days); urine leakage occurred in five patients and

a small residual stone was detected in one child.

Istanbulluoglu MO et al<sup>17</sup> retrospectively reviewed 176 patients operated for PCNL. Patients were categorized into 3 groups. In group 1 ( $n = 43$ ), no nephrostomy or ureteric catheters were placed after PCNL (totally tubeless group); in group 2 ( $n = 41$ ), no nephrostomy catheter was placed but antegrade J-stent was used (tubeless group), and in group 3 ( $n = 92$ ), standard nephrostomy catheters were placed (standard group). No significant differences were found in mean stone volume, operation time, transfusion rates, and hemoglobin level change between the groups. However, hospitalization time and the amount of narcotic analgesic required were significantly higher in group 3 as compared to the other groups ( $P < .05$ ).

Kara C et al<sup>18</sup> randomized 60 patients to either a totally tubeless approach (group 1, 30 patients) or placement of an 18Fr NT (group 2, 30 patients). He observed that the stone-free rate was 86% versus 83% for group 1 and 2 respectively ( $P > .05$ ). The mean hospitalization time was 1.5 and 3.2 days ( $P < .001$ ), the mean analgesia requirement (pethidine HCl) was 0.5 and 1.4 mg/kg, respectively ( $P < .01$ ). Decrease in hematocrit was similar in 2 groups. No blood transfusions were needed.

Ni S et al<sup>19</sup> identified Ten and 3 trials for comparison I (tubeless PCNL vs standard PCNL, 320 cases and 323 controls) and comparison II (tubeless PCNL vs small-bore PCNL, 55 cases and 54 controls), respectively. Tubeless PCNL required significantly less analgesia compared to standard PCNL. Furthermore, there was a remarkably shorter hospital stay and quicker return to normal activity. However, no significant difference was observed in the analyses concerning stone-free blood transfusion and complications rate in both comparisons. In subgroup analyses by nephrostomy diameter (22-Fr) and drainage methods, most results were consistent with the overall findings except for the evaluation of the operative time in the double-J stent subgroup.

The study of Sofer M et al<sup>20</sup> consisted of a prospective and consecutive series of 126 patients among which 66 (52%) were tubeless and 60 (48%) were regular PCNLs. The average patient age (54 years versus 52 years), stone burden (924 versus 1044 mm<sup>2</sup>), operative time (116 versus 130 minutes), complication rate (9% versus 13%), hemoglobin decrease (1.2 versus 1.1 mg/dL), and immediate stone-free rate (92% versus 90%) were similar in the tubeless and regular PCNL groups respectively ( $P > 0.05$ ). The average analgesia requirement (pethidine HCL) was 0.4 and 1.2 mg/kg ( $P < 0.01$ ), the median hospital stay was 1 and 4 days ( $P < 0.0001$ ), and the median back-to-work time was 7 and 15 days ( $P < 0.001$ ) for the tubeless and regular PCNL groups, respectively.

In all of the above studies the stone free rate, operative time, hemoglobin drop, analgesia requirements,

mean hospital stay and urinary leak in the tubeless PCNL were similar to our study. Because of these advantages, tubeless PCNL has gained popularity in recent years. Appropriate patients with uncomplicated PCNL should be selected for this procedure.

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