



Research Article

AN INSTITUTIONAL STUDY COMPARING TUBELESS AND STANDARD PERCUTANEOUS NEPHROLITHOTOMY

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ABSTRACT

**Background:** The incidence of kidney stone is rising affecting about 9-10 % of the population & it recurs in about 50% of those patients. PCNL is the cornerstone modality in treating renal calculi.

**Aim:** This research is carried out to find out the efficacy, workability and safeness of tubeless PCNL vs. conventional PCNL.

**Methods:** This research work was conducted in the Department of Urology, Madurai Medical College over a length of 365 days from March 2022-February 2023. During this era 10 patients underwent tubeless PCNL for renal stones (group 1) & 10 underwent standard PCNL (group 2).

**Results:** About 50% of the patients fell in the age group of 46-60 years. Flank pain (90%) was the commonest chief complaint. Total stone clearance was achieved in 70% of the patients after tubeless PCNL. Post surgery blood transfusion was needed in 10% of the cases. The average hospital-stay post procedure was 2 days in group 1 while it was 3 days in 2nd group. Commonest post procedure complication was fever.

**Conclusions:** Tubeless PCNL is a totally reliable and concrete remedy for kidney stones with grade 1 or 2 Guy's rating; due to its lesser price, short surgical time, least blood transfusion need, analgesia and capability of the sufferers to regain their regular lifestyle activities faster make tubeless PCNL the desired modality these days.

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INTRODUCTION

Percutaneous nephrolithotomy (PCNL) is the latest remedy of preference in sufferers with huge kidney stone.<sup>1</sup> It produces stone-free outcomes as much as 87% (85-93%). Rupel *et al.* proposed the elimination of renal calculi via nephrostomy tract in 1941-42 This percutaneous treatment dates back to 1955-56, for the duration of which milestone turned into set by means of Goodwin *et al.* who made use of a PCN tube for evacuating a hydronephrotic kidney.<sup>4</sup> However, it was a whole lot later, in 1976-77, Fernstrom & Johansson did the foremost PCNL which thereafter gained its popularity.<sup>5</sup>

PCNL surgery have one of a kind levels of complexness that impacts stone clearance. The guy's stone rating<sup>6</sup> proposed via Thomas *et al.*, is a precious classification to classify the complexness of PCNL into four organizations based at the calculi burden and kidney anatomy.<sup>6,7</sup> In conventional PCNL technique, a PCN tube and D J stent were put at the cease of the surgery. In this technique post-operative pain and other adverse effects have been observed due to PCN tube placement.

Tubeless technique omits post-surgery PCN tube and it was first demonstrated by Wickham and associates.<sup>8</sup> The idea became revived by Bellman and co-workers with the addition

of an inner D J stent left in situ for upto 3-4 weeks. Tubeless technique is specially of 2 sorts: Tubeless with ureteric stent: wherein after finishing touch of the process D J stent is placed alone without PCN tube & completely tubeless PCNL: in which no PCN tube or D J stent is placed after the surgery.

Indications of PCNL

Stones bigger than 2 cm or refractory to ESWL, Staghorn calculus, Stone larger than 1.5cm in the lower pole.<sup>9,10</sup>

Objective

It was to analyse the treatment outcome of tubeless technique PCNL in comparison to standard one.

Type of study

It was a hospital based prospective study.

METHODS

This study was conducted in the Department of Urology, Madurai Medical College over a period of one year from March 2022-February 2023. During this period 10 patients underwent tubeless PCNL for renal stones (Group 1) & 10 underwent standard PCNL (Group 2). Patients were allocated to group 1 & 2 on alternate basis. For all patients undergoing

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PCNL procedure, broad spectrum parenteral antibiotics given prior to surgery. Under general anesthesia, patient kept in lithotomy position cystoscopy done using 30-degree rigid cystoscope. 5 Fr ureteric catheterization done, pelvicalyceal system was opacified with urograffin dye through ureteric catheter. In prone position under fluoroscopic guidance, calyceal puncture was made and guide wire introduced through initial puncture, sequential tract dilatation done with ALKEN metal dilators. 20 Fr nephroscope passed into 24 Fr sheath. Stones were fragmented with pneumolithotripter and fragments removed with tri-prong forceps.

**Statistical analysis**

SPSS (Statistical Package for Social Sciences) version 23.0 was used for data analysis. Descriptive statistics was used and data were presented in tables in Microsoft Excel worksheet wherever necessary.

**Selection of Subjects**

**Inclusion Criteria**

Age ≥18 years. Male or female patients diagnosed with renal calculi undergoing surgery.

**Exclusion criteria**

Pregnancy. Age <18 years. Patients not willing to undergo surgery, Sepsis, Patient with solitary kidney or bleeding diathesis.

**RESULTS**

Table 1 depicts frequency distribution of patients according to age. In this study, maximum frequency 50% of patients belonged to 46-60 years age followed by 20% of patients belonging 31-45 years age.

**Table 1** Age distribution

Age (in years)	Number of patients	Percentage
<30	2	10
31-45	4	20
46-60	10	50
>60	4	20

Table 2 depicts frequency distribution of presenting complaints viz. flank pain (90%), burning micturition (50%), frequent micturition (10%), hematuria (10%), vomiting (20%), fever (10%) and dysuria (8%).

**Table 2** Presenting features

Complaints	Present	Percentage
Flank pain	18	90
Burning micturition	10	50
Frequent micturition	2	10
Hematuria	2	10
Vomiting	4	20
Fever	2	10
Dysuria	2	10

Table 3 depicts frequency distribution of stone burden among patients. In our study patient presented with single stone (60%), two stones (20%), three stones (10%) and multiple stone disease (10%) in both the groups.

**Table 3** Stone burden

Group 1			Group 2		
Stone burden	Number of patients	Percentage	Stone burden	Number of patients	Percentage
One	6	60	One	6	60
Two	2	20	Two	2	20
Three	1	10	Three	1	10
Multiple	1	10	Multiple	1	10

Table 4 depicts frequency distribution of patients with stone laterality. In our study group 1 patients were encountered with left side (50%), right side (40%) and bilateral stone disease (10%) & group 2 with left side (60%), right side (30%) and bilateral stone disease (10%).

**Table 4** Stone laterality

Group 1			Group 2		
Stone laterality	Number of patients	Percentage	Stone laterality	Number of patients	Percentage
Left	5	50	Left	6	60
Right	4	40	Right	3	30
Bilateral	1	10	Bilateral	1	10

Table 5 depicts frequency distribution of patients with Guy's stone score. Guy's scoring system is as follows:

1. Grade I - A solitary stone in the mid/lower pole with simple anatomy or a solitary stone in the pelvis with simple anatomy
2. Grade II - A solitary stone in the upper pole with simple anatomy or multiple stones in a patient with simple anatomy or any solitary stone in a patient with abnormal anatomy
3. Grade III - Multiple stones in a patient with abnormal anatomy or, stones in a calyceal diverticulum or partial staghorn calculus
4. Grade IV - Staghorn calculus or any stone in a patient with spina bifida or spinal injury.

In current study, group 1 patients presented with grade-1 (50%), grade-2 (20%), grade-3 (20%) and grade-4 (10%) while group 2 patients presented with grade-1 (60%), grade-2 (20%), grade-3 (10%) and grade-4 (10%).

**Table 5** Guy's stone score

Group 1			Group 2		
Guy's stone score	Number of patients	Percentage	Guy's stone score	Number of patients	Percentage
Grade 1	5	50	Grade 1	6	60
Grade 2	2	20	Grade 2	2	20
Grade 3	2	20	Grade 3	1	10
Grade 4	1	10	Grade 4	1	10

Table 6 depicts frequency distribution of stone clearance among patients. In our study in group 1; 70% of patients had complete and 30% had partial stone clearance while in group 2; 90% of patients had complete and 10% had partial stone clearance.

**Table 6** Stone clearance

Group 1			Group 2		
Stone clearance	Number of patients	Percentage	Stone clearance	Number of patients	Percentage
Complete	7	70	Complete	9	90
Partial	3	30	Partial	1	10

Table 7 depicts frequency distribution of transfusion required among patients. In this study 10% of patients required blood

transfusion and remaining 90% of patients did not require transfusion in both the groups.

**Table 7** Transfusion required

Group 1			Group 2		
Transfusion Required	Number of patients	Percentage	Transfusion Required	Number of patients	Percentage
Yes	1	10	Yes	1	10
No	9	90	No	9	90

Table 8 depicts post operative hospital stay of patients. In this study in group 1; 60% of patients were discharged on day-2, 30% of patients on day-3 and 10% of patients on day-1. The mean hospital stay was 2 days while in group 2; 40% of patients discharged on day-2 & 60% of patients on day-3. The average hospital stay was of 2 days.

**Table 8** Post procedure hospital stay

Group 1			Group 2		
Hospital stay	Number of patients	Percentage	Hospital stay	Number of patients	Percentage
Discharged on day-1	1	10	Discharged on day-1	0	0
Discharged on day-2	6	60	Discharged on day-2	4	40
Discharged on day-3	3	30	Discharged on day-3	6	60

Table 9 depicts post-operative complications in both the groups.

**Table 9** Post-operative complications.

Group 1			Group 2		
Post-op complication	No of patients	Percentage	Post-op complication	Number of patients	Percentage
Fever	3	30	Fever	4	60
Perinephric collection	2	20	Perinephric collection	1	10
Sepsis	1	10	Sepsis	2	20
Bleeding	1	10	Bleeding	1	10

Table 10 shows post-operative analgesia requirement.

**Table 10** Analgesia requirement.

Group 1			Group 2		
Drugs Required	Number of patients	Percentage	Drugs Required	Number of patients	Percentage
Paracetamol	7	70	Paracetamol	4	40
Tramadol	1	10	Tramadol	2	20
NSAIDS	2	20	NSAIDS	2	20
Morphine based	0	0	Morphine based	2	20

**DISCUSSION**

In current study we included 10 cases with kidney stones who underwent tubeless technique & 10 underwent standard one. Cases mainly were found with flank pain (90%) followed by burning micturition (50%), vomiting (20%), hematuria (10%) & fever (10%).

Proceeding to scientific findings, first we analysed the calculi burden in which most of sufferers presented with one stone. In current study, patients came with isolated stone (60%), two

calculi (20%), three calculi (10%) and manyfold(10%) in each of the groups. We also analysed the stone laterality wherein group 1 patients those with left sided calculi were (50%), right sided (40%) and bilateral ones (10%) & group 2 with left (60%), right (30%) and bilateral ones (10%) whereas Homayounieh *et al* confirmed 28% were left sided, 22% were right sided and 50% cases were bilateral.<sup>13</sup> These elements affect the final outcome of surgical technique.

Subsequent, we analysed the guy's rating and in our study group 1 patients presented with grade-1 (50%), grade-2 (20%), grade-three (20%) and grade-four (10%) even as group 2 sufferers those with grade-1 disease were (60%), grade-2 (20%), grade-3 (10%) and grade-four (10%) whereas in a study by Thomas *et al* showed 87.5% cases in guy's stone score grade I, 22.2% in grade II, 16.7% in grade III, zero% in grade IV.<sup>14</sup> It carries straightforward accountability to the calculi-free rate, also influencing operative time and post procedure hospital duration in PCNL cases.<sup>15</sup>

Calculi clearance is another main outcome parameter and in our observation in group 1; 70% of patients had whole and 30% had partial stone clearance at the same time as in group 2; 90% of patients had whole and 10% had incomplete clearance. Likewise calculi free outcome was seen in 87.6% cases in a study by Khadgi *et al*.<sup>16</sup> In current study in both the groups 10% of patients required blood transfusion while study by Bhat *et al* confirmed 7% of cases required blood transfusion.<sup>17</sup>

In current study in group 1; 60% of cases were emanated from the hospital on day-2, 30% of patients on third and 10% on first day. The average hospital duration was 2 days while in group 2; 40% of cases emanated on day-2 & 60% of on day-3. The mean hospital stay was 3 days whereas Bhangu *et al* observed average stay of 1 and a half days.<sup>18</sup> Commonest feature in post surgical period was febrile illness (30%) which was similar to study by Lai *et al* which concluded 10.4% of such cases.<sup>19</sup> Another most common post operative feature found was peri-elrenal loculation (20%) followed by hemorrhage(10%).

The cons in our study is that it is a single institutional study & large scale study is required for definitive comparison between the two modalities of treatment.

**CONCLUSION**

Tubeless PCNL is a totally reliable and concrete remedy for kidney stones with grade 1 or 2 Guy's rating; due to its lesser price, short surgical time, least blood transfusion need, analgesia and capability of the sufferers to regain their regular lifestyle activities faster make tubeless PCNL the desired modality these days.

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