

## Original Research Article

# Totally tubeless percutaneous nephrolithotomy: one year single institute prospective study

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## ABSTRACT

**Background:** Urolithiasis forms an important domain in the practice of urology. PCNL is an important armamentarium in the management of urolithiasis, especially for larger and complex stones. The objective of this study was to study the safety and feasibility of totally tubeless (tubeless and stentless) percutaneous nephrolithotomy in selected cases.

**Methods:** The study consisted of 50 cases operated between June 2011 - May 2012 in Department of urology, SMS medical college and hospital, Jaipur. Patients were taken for standard fluoroscopy guided PCNL in prone position with track dilatation up to 24hours. Decision to go for totally tubeless procedure was taken intra-operatively. No weightage was given to the puncture (supra or infra costal) and the calyx selected for access. The exclusion factors were significant intraoperative bleeding, more than one track, residual stones, and injury to pelvicalyceal system. The parameters studied were hospital stay, post-operative pain, analgesia requirements and complication rates.

**Results:** Totally tubeless PCNL constituted 6.2% of the total PCNL during this period. The age ranged from 20 - 70 years with a mean of 43years. Average stone burden was 26.8mm. Mean hospital stay was 1.5 days with 60% of being discharged after 24 hours. Post-operative analgesia was required in 60% and 28% of the patients, with moderate to severe pain on day 0 and 1 respectively. No patient required intraoperative blood transfusion. Three patients had mild haematuria on day 0, with one requiring blood transfusion on day 2. No patient developed urinary leakage from skin wound. One patient developed urinoma requiring DJ stenting. No readmission was reported in 1 month follow up.

**Conclusions:** this study demonstrated that totally tubeless PCNL is safe well tolerated procedure, not affected by access track. It significantly decreases post-operative pain, analgesia requirement and hospital stay. The only limitation being its applicability in highly selected cases.

**Keywords:** PCNL, Totally tubeless

## INTRODUCTION

Urolithiasis forms an important domain in the practice of urology. PCNL is an important armamentarium in the management of urolithiasis, especially for larger and complex stones. PCNL was introduced in 1976.<sup>1</sup> Over the

years various refinements has been done in the procedure both to lower the morbidity as well as to increase the efficacy.

Traditionally, the standard teachings advocate some form of drainage of the kidney following the procedure. But

now, new concepts of tubeless PCNL and totally tubeless PCNL have come up.<sup>2,3</sup>

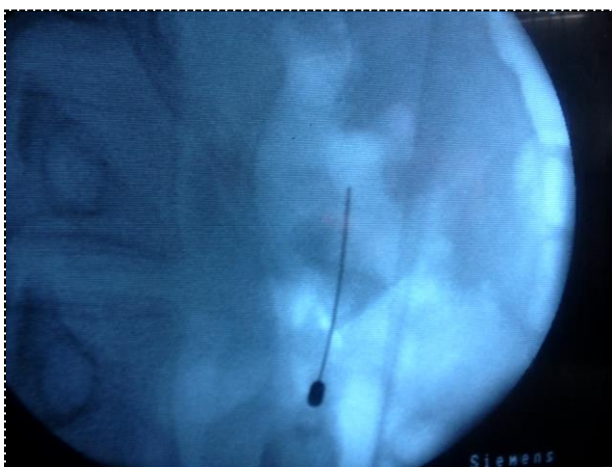
The objective of this study was to study the safety and feasibility of totally tubeless (tubeless and stentless) percutaneous nephrolithotomy in select cases.

## METHODS

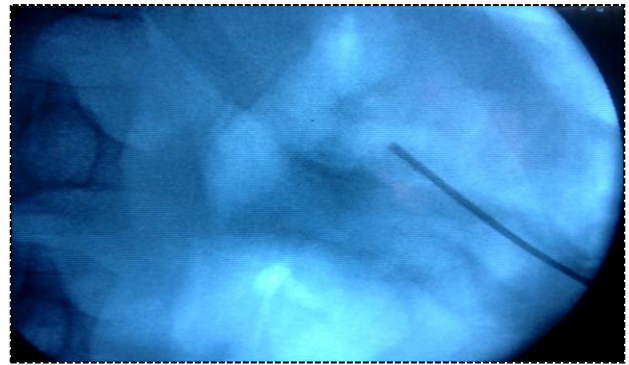
The study was conducted from June 2011 to May 2012 in Department of urology, SMS Medical College and Hospital, Jaipur. A total of 50 patients who underwent totally tubeless PCNL were enrolled in the study. Single stage percutaneous nephrolithotomy was done in all patients. Even no ureteric catheter was placed before/during the procedure. The percutaneous access was created under fluoroscopic guidance in prone position. 21 patients had supracostal access and 29 infracostal access. Tracts were dilated with telescopic metal dilators to 24 hours and appropriate Amplatz sheath introduced.

The stones were disintegrated with pneumatic lithotripsy and removed with forceps. Fluoroscopy and nephroscopy were performed to evaluate the stone-free status. The final decision to go for totally tubeless procedure was taken intra-operatively.

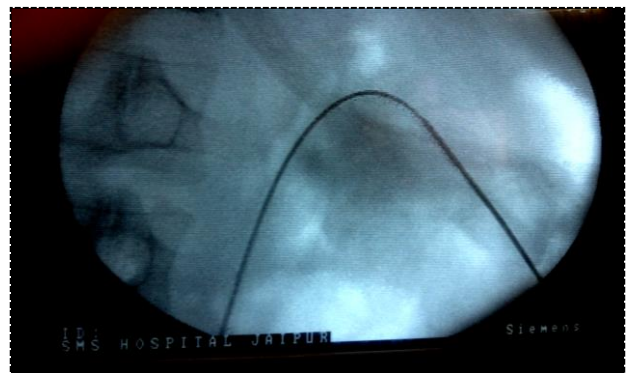
All the patients who had intraoperative bleeding, or required more than one track to clear the stone burden, had residual stones or there was injury to pelvicalyceal system, were excluded from the study. At the end of procedure no nephrostomy tube or jj stent was placed and the track was closed with a suture (1-0 silk). For follow up on first postoperative day, all patients underwent ultrasonography. In addition, X ray KUB was done for patients who had undergone stone fragmentation. X ray chest was done in patients in whom supracostal puncture was done. All the patients were discharged when they had no pain and urine became clear. Figure 1-6 shows total tubeless PCNL by supracostal access.



**Figure 1: Air pyelogram.**



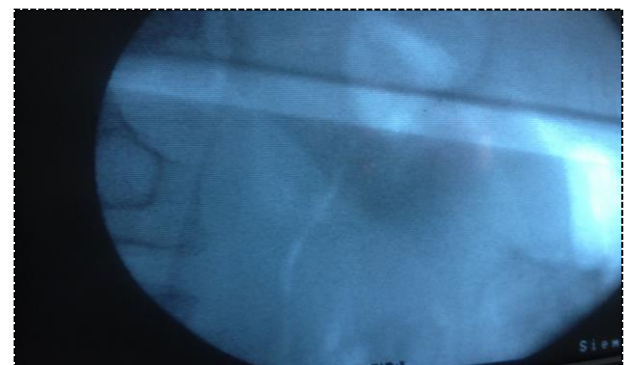
**Figure 2: Supracostal middle calyceal puncture.**



**Figure 3: Guide wire introduction.**



**Figure 4: Supracostal track.**

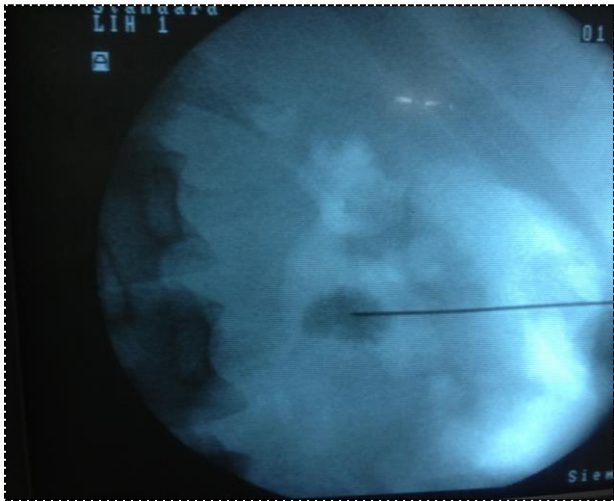


**Figure 5: Complete clearance with no jj and nephrostomy.**

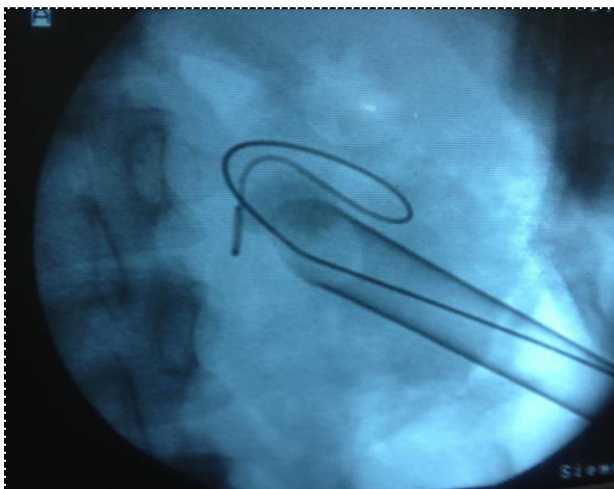


**Figure 6: Primary wound closure.**

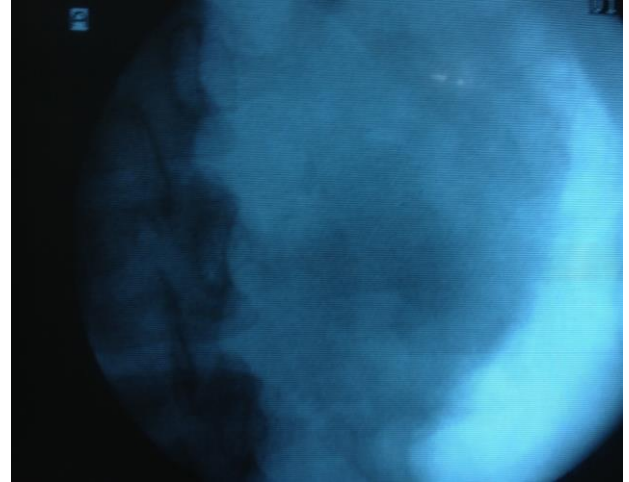
Figures 7-10 shows total tubeless PCNL by infracostal puncture.



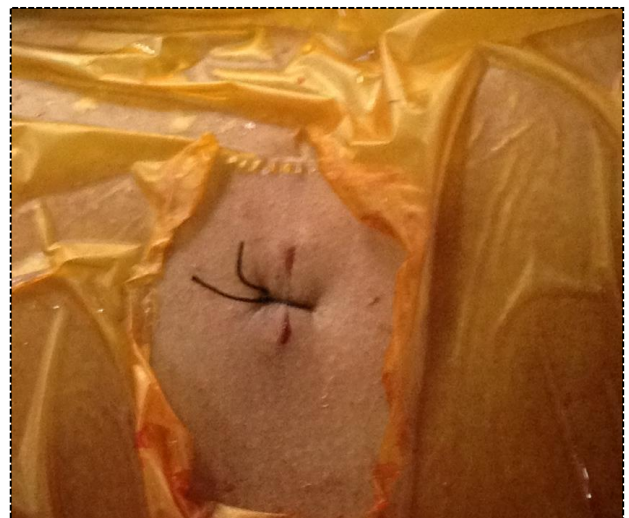
**Figure 7: Air pyelogram.**



**Figure 8: Infracostal track.**

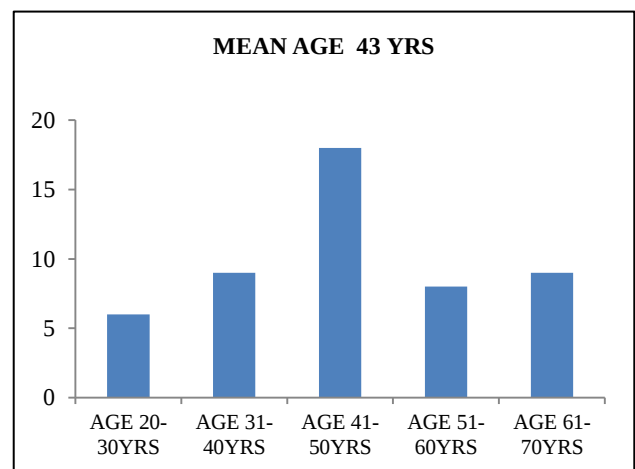


**Figure 9: Complete clearance with no jj and nephrostomy.**



**Figure 10: Primary wound closure.**

## RESULTS



**Figure 11: Age distribution of patients.**

Out of fifty patients, 44% were females and 56% were males.

Stone parameters- the size of the stone ranged from 16-30 mm with an average of 26.8 mm. mostly we had solitary stones(80%). Rest of the patients had either two (14%), or three stones (6%). The stone distributions amongst different calyces were in the order of middle calyx (28%), lower calyx (20%), combined (20%), upper calyx (16%), and pelvis (16%).

**Table 1: Hospital stays of patients.**

| Hospital stay       | Patient | %  |
|---------------------|---------|----|
| Discharged on day 1 | 30      | 60 |
| Day2                | 16      | 32 |
| Day3                | 03      | 06 |
| Day4                | 01      | 02 |

Mean hospital stay = 1.5 days.

**Table 2: Pain experienced by patients.**

| Pain          | Patient | %  |
|---------------|---------|----|
| Evening of D0 | 30      | 60 |
| Morning of D1 | 20      | 40 |
| Evening of D1 | 14      | 28 |
| Morning of D2 | 08      | 16 |
| Morning of D3 | 01      | 02 |

**Table 3: Haematuria experienced by patients.**

| Haematuria | Patients | % |
|------------|----------|---|
| D0         | 03       | 6 |
| D1         | 02       | 4 |
| D2         | 01       | 2 |

**Table 6: Comparing with other studies in general.**

| Study                          | Patient no. | Stone burden (mm) av | Hospital stay (days) | Stone free (%) | Transfusion rate | Complications                                         |
|--------------------------------|-------------|----------------------|----------------------|----------------|------------------|-------------------------------------------------------|
| Istanbulluo et al <sup>9</sup> | 45          | 21.2                 | 2.1                  |                | 4                | 4.4% (one DJ and one drainage tube)                   |
| C Kara et al <sup>10</sup>     | 30          | 25.6                 | 1.5                  | 96             | 0                | 6.6% transient fever, 3.3% pleural effusion 3.3% ESWL |
| Karami et al <sup>11</sup>     | 30          |                      | 1.5                  | 90             | 0                | 6.6% (infection 2pt)                                  |
| Gupta et al <sup>12</sup>      | 96          | <10                  | 1.8                  | 100            | 1.04             | DJ stenting 1pt                                       |
| Crook et al <sup>13</sup>      | 100         | 15.9                 | 2.9                  | 76             | 1                | 6.6% (sepsis, readmission, hydrothorax)               |
| Aghamir et al <sup>14</sup>    | 35          | 16.7                 | 1.5                  | 100            | 0                | 10%                                                   |
| Present study                  | 50          | 26.8                 | 1.5                  | 100            | 2                | 2% (DJ stenting)                                      |

Totally tubeless PCNL was first described by Wickham et al.<sup>2</sup> This shows that Acc to visual analogue scale our study results were comparable with those from Choi et al,

**Table 4: Urinary leakage.**

| Urine leakage   | Patients | % |
|-----------------|----------|---|
| URINOMA         | 01       | 2 |
| From skin wound | 00       | 0 |

None of our patients had post-operative fever or pneumo/hydro/ haemo thorax. Neither any readmission was required nor did any of the patients undergo any secondary procedure except one who required DJ stenting.

## DISCUSSION

**Table 5: Pain parameters comparison of different studies.**

| Study (standard PCNL)         | Vas on day 1               |
|-------------------------------|----------------------------|
| Giusti et al <sup>4</sup>     | 6.1                        |
| Singh et al <sup>5</sup>      | 9.6                        |
| Choi et al <sup>6</sup>       | 3.9                        |
| Marcovicht et al <sup>7</sup> | 3.8                        |
| Agarwal et al <sup>8</sup>    | 5.9                        |
| Present study                 | Day 0 - 4.1<br>Day 1 - 2.1 |

Traditionally, PCNL is followed by nephrostomy tube drainage. It has the advantages of providing reliable urinary drainage, hemostatic tamponade to the tract, and providing access for a secondary percutaneous procedure if required. The other school of thought is that the tube itself is a source of discomfort and prolongs hospital stay. So, tubeless (internal drainage with jj or ureteral catheter) and totally tubeless procedure were introduced.

Marchovicht et al.<sup>6,7</sup> As seen in Table 6. The stone burden in our study was 26.8mm which was higher than the other studies. The mean hospital stay was 1.5 days

which was comparable to other studies.<sup>10,11,14</sup> 100% of the patients were stone free following the procedure and none of them had any residual stones left.<sup>12,14</sup> 2 % patients had some complications requiring Double J stenting. The complications rate was less as compared to other studies.

## CONCLUSION

We believe that totally tubeless PCNL is a safe procedure in carefully selected patients. Pain and hospital stay can be significantly decreased by adopting this technique in preference to standard PCNL. Supracostal puncture is no contraindication to totally tubeless PCNL.

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*Conflict of interest: None declared*

*Ethical approval: The study was approved by the institutional ethics committee*

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