

SAFETY AND EFFICACY OF TUBELESS PERCUTANEOUS NEPHROLITHOTOMY

S. Falahatkar*, I. Khosropanah, A. Roshani, H. Niroumand and S. Nikpour

Urology Research Center, Razi Hospital, Guilan University of Medical Sciences, Rasht, Iran

Abstract- Percutaneous nephrolithotomy (PNL) is commonly used to treat patients with complex renal calculi. Placing a nephrostomy tube is the last step after completing PNL. Significant early postoperative discomfort after percutaneous procedure is usually secondary to nephrostomy tubes. The goal of this study is to evaluate the safety of tubeless PNL. A total of 45 patients with mean age of 46.6 years entered the study. Tubeless PNL was performed in 28 patients and 17 patients were treated with standard PNL. The results of 2 groups were compared with *t* test. In both groups, PNL was performed successfully without any significant complication. Postoperative hospitalization in standard group was 3.71 day and in tubeless group was 1.65 day that significant statistical difference was observed ($P < 0.05$). Analgesic dose using in standard group was 101.56 mg (pethidine) vs 99.07 mg (pethidine) in tubeless group, with no significant statistical difference. There wasn't any organ trauma. Rate of complications, including hematuria, extravasation, fever, UTI and urosepsis, didn't have any significant statistical difference in two groups. It seems that tubeless PNL may be an effective and safe method in renal stone treatment in selected patients. In comparison with standard PNL, tubeless PNL has some benefits including reduction the length of hospitalization. Further studies on more patients are needed to determine the advantages of this technique.

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Key words: Percutaneous nephrolithotomy, urinary lithiasis, tubeless, nephrostomy, stone residue, extravasation

INTRODUCTION

Percutaneous nephrolithotomy (PNL) is now a popular method for removal of renal and ureteral stones (1). Placement of a nephrostomy tube after the completion of PNL has been considered as a standard procedure by most urologists. The purpose of nephrostomy tube is to allow for the renal puncture to heal, to provide proper drainage of urine, tamponade of bleeding and to permit access to the collecting system if a secondary procedure is required (2).

Recently, some authors have challenged requirement of drainage tube after percutaneous procedures (3-8). In some studies, tubeless PNL is introduced as a safe and effective method which reduces post operative hospitalization and pain, leads to more rapid recovery and reduces narcotic dose used (3-5).

In this study we examined the necessity of routine placement of nephrostomy tube by comparing outcomes of tubeless and standard percutaneous nephrolithotomy.

MATERIALS AND METHODS

This study was a clinical trial which performed on 45 patients who underwent PNL from March 2006 to December 2006 in urologic clinic. One surgical team performed PNL on patients. The study was approved

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*** Corresponding Author:**

Siavash Falahatkar, Urology Research Center, Razi Hospital, School of Medicine, Rasht University of Medical Sciences, Rasht, Iran
Tel: +98 131 3232050
Fax: +98 351 3232050
Email: falahatkar_s@yahoo.com

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by Ethics Committee of Guilan University of Medical Sciences and written informed consent was obtained from all subjects.

Inclusion criterion was renal stone ≥ 2 cm in diameter. Exclusion criteria were: 1) patients with more than 2 percutaneous access, 2) significant residue of stone burden, 3) significant perforation of collecting system, 4) significant bleeding, 5) ureteral obstruction, 6) renal obstructive anomaly, and 7) immune suppression.

All of the patients underwent general anesthesia, and 5F ureteral catheter was placed transurethrally. Percutaneous access was created under fluoroscopic guidance with the patient in a prone position or in complete supine position without flank elevation. There was not any rolled towel under the flank and there was no change in leg position (9). The tract was dilated to 28-30 Fr using Amplatz dilators and then Amplatz sheet was placed.

Stone disintegration was performed with pneumatic lithotripsy. Then patients were divided randomly into two groups: for 17 patients nephrostomy tube was placed while for 28 patients no nephrostomy tube was used. These 2 groups were matched regarding to significant bleeding and collecting system perforation.

Length of hospitalization, narcotic dose used for patients and complication rate in 2 groups were compared. One day and 4 week after surgery, KUB or sonography was performed and on the basis of stone visualization, stone free rate of these two methods were distinguished.

Study results were analyzed with *t* test. A *P* value of less than 0.05 was considered statistically significant.

RESULTS

Of cases understudy, 37.8% were female and 62.2% were male. The patients mean age was 46.6 years (SD: 12.13); 44.4% and 37.8% of patients had right and left renal stone, respectively, and 17.8% had bilateral stone. Chief compliant in 77.8% of patients was pain (the most common compliant); in 8.9% of patients chief compliant was hematuria and in 11.1% of patients stone had been found incidentally. Forty percent of patients had partial and 26.7% of them had complete staghorn stones.

Access to urinary system in 80% of cases was in lower calices apex and in 20% of patients in mid calices. Operation time in tubeless PNL group was 116.11 min and in standard group was 146.47 min. Length of hospital stay in standard and tubeless PNL group was 3.71 and 1.65 day, respectively (*P* < 0.05). Opioid dose used in tubeless and standard PNL group was 99.07 mg and 101.56 mg of pethidine, respectively. Table 1 shows the complications in tubeless and standard PNL groups.

Stone free rate in standard group was 77.8% and in tubeless group was 92.6%. In all patients one UTI was observed that was treated properly. Urosepsis, urinoma and urinary leakage was observed in no patients.

DISCUSSION

In 1986, Winefield *et al.* reported pain and long hospitalization after tubeless PNL (2). Nowadays, regarding reduction in morbidity and shorter hospital stay, tubeless PNL has been reconsidered. The technique now can be modified to a true outpatient procedure without a loss of efficacy or safety (4).

Bellman *et al.* have published their experience with tubeless surgery in 1997. These authors reported no significant complications, no urinomas, and no differences in transfusion rate with length of hospitalization being less than the controls (5). Aghamir *et al.* have reported that in tubeless PNL, length of hospitalization and analgesia requirements are less than standard PNL. They confirm that tubeless PNL is a safe and effective method in management of renal stones (6). In our study,

Table 1. Comparison of complications of PNL in two groups*

Complication	Tubeless	Standard
Perioperative bleeding	3.7 (1)	5.6 (1)
Organ trauma	0	0
Significant hematuria	11.1 (3)	0
significant extravasation	0	11.1 (2)
Post operative transfusion	11.1 (3)	11.1 (2)
Fever	0	11.1 (2)
UTI	0	5.6 (1)
Dilutional hyponatremia	0	0

Abbreviation: PNL, percutaneous nephrolithotomy, UTI, urinary tract infection.

* Data are given as percent (number).

significant statistical difference between length hospital stay in standard group (3.71 days) and tubeless group (1.65 days) was observed ($P < 0.05$). A series of studies from urologists at Kaiser Permanente Medical Center, included highlights of the group's 9-year experience with this technique, have shown that performance of tubeless PNL results in the mean hospitalization duration of 1.74 days (5).

In another research, comparison of the tubeless and standard PNL showed similar complication rates (10% vs. 14%), operative time (105 minutes vs. 130 minutes), and stone-free rates without ancillary procedures (95% vs. 90%). However the tubeless PNL group showed a statistically significant advantage over the standard group in terms of analgesia requirements (0.4 vs. 1.2 mg/kg of pethidine, $P < 0.01$), hospital stay (median, 1 vs. 4 days, $P < 0.01$), and convalescence (median back-to-work time, 7 vs. 15 days, $P < 0.01$) (7). Falahatkar *et al.* has reported that complications, operative time, and the length of hospitalization in selected patients undergoing tubeless PNL were all lower than those seen in the standard group. Tubeless PNL was thus found to be safe and effective, even in patients with staghorn stones (8).

In our study, comparison of complication rate and stone free rate in tubeless PNL group (92.6%) and standard group (77.8%) showed no significant statistical difference. In analgesic requirement there wasn't any significant difference between 2 groups (99 mg in tubeless vs 101.5 mg in standard group). Operation time was less in tubeless PNL group (116 min) compared to standard group (146 min), with a significant statistical difference.

In conclusion, it has been shown, in our study as well as others, that length of hospitalization can be reduced using tubeless PNL, which both economically and emotionally is important for the patients. It seems that tubeless PNL is effective and safe. More clinical studies with more patients are needed to approve tubeless PNL benefits.

Conflict of interests

The authors declare that they have no competing interests.

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