

**Original article****Effectiveness of totally tubeless percutaneous nephrolithotomy; a retrospective study**Nadali Moosanejad<sup>1</sup>, Ali Isapour<sup>2</sup>, Mehran Fazli<sup>3\*</sup>, Milad Bahari<sup>4</sup>, Ayyub Barzegarnejad<sup>2</sup>

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**Abstract:** since open surgery in urinary stone surgery has been replaced with percutaneous nephrolithotomy (PCNL), several studies have been done to modify this technique to reduce complications, hospitalization and costs. So, this study design to evaluated effectiveness of totally tubeless percutaneous nephrolithotomy. we reviewed 29 patients who underwent totally tubeless PCNL at our 2 centers from February 2011 to September 2012. All surgeries were performed by one surgeon. Based on inclusion criteria, 25 patients were enrolled in this study. All patients' data was analyzed by SPSS version 18. 25 patients (18 male and 7 female) with the mean age of  $50.32 \pm 11.50$  years were undergone totally tubeless PCNL procedure. The mean stone size was  $35.72 \pm 7.39$  mm. The mean operation duration was  $48.24 \pm 4.29$  minutes. The mean hemoglobin drop was  $1.38 \pm 1.00$  mg/dl. Only two patients (8%) requirement blood transfusion (each patients received 1U pack cell). Data showed all patients used NSAID (diclofenac suppository) analgesic and also, 8 patients (32%) needed narcotic analgesic (Pethidine) with mean dose of  $34.37 \pm 12.93$  mg. complications was observed in 2 patients (8%) (One patient had high fever and one other had prolong renal pain). The mean length of hospital stay was  $1.28 \pm 0.54$  days. our study show the totally tubeless PCNL surgery is a safe procedure with low analgesic requirement, low complication rate and lower hospitalization time.

**Keywords:** totally tubeless PCNL; complications; hospitalization time**1. Introduction**

In the recent years, percutaneous nephrolithotomy (PCNL) has been used widely for urinary stone disease instead of open surgery [1]. The reasons such as being minimally invasive and having high success rate and low-morbidity are major causes of replacing open surgery with PCNL procedures [2-4]. However, studies have shown that the placement of nephrostomy tube in patients undergoing standard PCNL procedure can cause postoperative discomfort, analgesic requirement, and prolonged hospital stay [2, 5, 6]. Thus, standard PCNL has been modified to PCNL without postoperative nephrostomy tube, called tubeless PCNL [7]. Also, some studies

suggested tubeless PCNL without ureter stents or double J stents and called it totally tubeless PCNL [8-13].

The aim of this study was to evaluated effectiveness of totally tubeless percutaneous nephrolithotomy.

**2. Material and Methods**

We retrospectively reviewed 30 patients who had undergone totally tubeless PCNL at our 2 centers from February 2011 to February 2012. Based on inclusion criteria, 25 patients were enrolled in this study. In fact, patients with stone-free status, no serious bleeding or collecting system perforation during the procedures, no clinical insignificant residual fragments (>4mm) and no more than one

access were included. On the other hand, patients with underlying disease (diabetes mellitus, hypertension), solitary kidney, congenital renal anomalies and bilateral PCNL were excluded.

### Method of Surgery

When the patients received general anesthesia, a 4-5F ureter catheter was placed into the ipsilateral ureter and then the catheter was attached to the urethral Foley catheter. Then, the patients were turned to the prone position. The surgeon used c-armed and 18-gauge needle to access the selected calyx. After logging in the collecting system by a guide wire, dilatation was performed by amplatz dilators and a 28-30F was placed in the collecting system. Next, a 26F rigid nephroscope was inserted, and pneumatic lithotripter was used to carry out stone fragmentation. After surgery, Fluoroscopy and pyelography were performed to evaluate the stone-free status. Finally, a 4-5F ureter catheter that was inserted before operation to alleviate their problem temporary, removed after surgery. For the patients who underwent totally tubeless PCNL, ureter catheter and urethral catheter were removed after the operation. Patients data such as; age, stone diameters, stone site, operation duration, before and after operation hemoglobin and creatinine level, complications rate, blood transfusion rate, analgesic need, type of analgesic, dose of analgesic, and duration of hospitalization were collected.

### Statistical analysis

Statistical analysis was performed by SPSS 18. The Chi-square test, fisher's exact test and student t-test were used whenever we deemed it appropriate. A P value of <0.05 was considered as statistically significant.

### 3. Results

25 patients (18 male and 7 female) with the mean age of  $50.32 \pm 11.50$  years were undergone totally tubeless PCNL procedure. The mean stone size was  $35.72 \pm 7.39$  mm. Stone was located in medial calyx (n=4), lower calyx (n=6), upper calyx (n=6), pelvis (n=7), and upper ureter (n=2).

The mean operation duration was  $48.24 \pm 4.29$  minutes. There was no significant difference between men and women operation duration ( $47.50 \pm 3.91$  min vs.  $50.14 \pm 4.94$  min;  $P=0.17$ ).

The mean hemoglobin level before surgery was  $13.15 \pm 1.34$  mg/dl that become  $11.75 \pm 1.27$  mg/dl after surgery. The mean hemoglobin drop was  $1.38 \pm 1.00$  mg/dl. Only two patients (8%) requirement blood transfusion (each patients received 1U pack cell). The creatinine level before and after operation were  $0.93 \pm 0.24$  mg/dl and  $0.91 \pm 0.19$  mg/dl, respectively.

If pain killers were needed, two types of analgesic drugs were used to manage pain. Non-steroidal anti-inflammatory drugs (NSAID) (diclofenac suppository) were used for first-line analgesic therapy, and narcotic drugs (Pethidine) were used for second-line analgesic therapy. Data showed all patients used NSAID (diclofenac suppository) analgesic. Also, 8 patients (32%) needed narcotic analgesic. The mean dose of Pethidine used was  $34.37 \pm 12.93$  mg.

In addition, complications included high fever (more than  $38.5^\circ\text{C}$ ) and prolong renal pain were observed in 2 members (8%) of totally tubeless PCNL patients. One member of totally tubeless PCNL had high fever (more than  $38.5^\circ\text{C}$ ) and one member had prolong renal pain.

Finally, the mean length of hospital stay in totally tubeless PCNL patients was  $1.28 \pm 0.54$  days.

### 4. Discussions

Recently several modifications of PCNL have been tried to decrease pain, hospitalization time, and morbidity. It has been shown that using small caliber nephrostomy tube, mini percutaneous nephrolithotomy (mini-perc), external ureteral stentdouble-J stent, or avoiding nephrostomy or ureteral drainage (totally tubeless) decreases postoperative pain and hospitalization time [5, 14-17]. In the literature, tubeless PCNL studies are reported but only a few are totally tubeless PCNL.

The mean operation time was variable in previous studies. The operation time was reported between  $53.02 \pm 24.66$  minutes in Istanbuloglu et al. study at 2010 [18] to  $31.72 \pm 6.97$  minutes in Chang et al. study at 2011 [19]. It's seem the operation time is closely dependent to surgeon skills and surgical team experience.

The mean hemoglobin drop in percent study was  $1.38 \pm 1.00$  mg/dl and only two patients (8%) requirement of blood transfusion (each patients received 1U pack cell). The mean hemoglobin drop in Istanbuloglu et al. studies at 2009 and 2010 were  $1.57 \pm 0.91$  mg/dl and  $1.59 \pm 0.96$  mg/dl in totally tubeless PCNL patients, respectively. Same with our study, the blood transfusion rate was 9.3% and 4.4% in their first and second studies [1, 18]. Furthermore, some studies reported there was no significant difference was exist between standard PCNL and totally tubeless PCNL in hemoglobin drop and requirement of blood transfusion rate [1, 18, 19].

Various type of analgesic were used in previous studies; Aghamir et al. [8] used morphine, Hemendra N et al. [3] used diclofenac suppository and Mario Sofer et al. [20] used petedine in their studies. We used diclofenac suppository as a first line and Pethidine as a second line analgesic. All our patients

used diclofenac suppository but only 32% used Pethidine. All previous studies shown lower analgesic requirement in totally tubeless PCNL and suggested it's related to lack of nephrectomy catheter and double j stent [1, 8, 18, 19].

In our study complications were seen in 2 patients; one patients had high fever (more than 38.5°C) and another patients had prolong renal pain. Same results was observed in other studies; Istanbuluoglu et al. studies at 2010 reported complication in 2 patients (both had Prolonged drainage) who undergone the totally tubeless PCNL procedure [18]. Almost all studies in this field shown lower complication rate after totally tubeless PCNL procedure [1, 8, 9, 13, 18, 19].

Finally, the mean length of hospital stay in our patients was 1.28±0.54 days. This result was comparable with other studies that shown less hospitalization time after totally tubeless PCNL [1, 8, 9, 13, 18, 19]. It's suggested that lack of nephrectomy catheter and double j stent are important causes of less hospitalization time after totally tubeless PCNL [18].

In conclusion, our study show the totally tubeless PCNL surgery is a safe procedure with low analgesic requirement, low complication rate and lower hospitalization time.

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#### References

- Istanbuluoglu MO, Ozturk B, Gonen M, Cicek T, Ozkardes H. Effectiveness of totally tubeless percutaneous nephrolithotomy in selected patients: a prospective randomized study. *International urology and nephrology* 2009,41:541-545.
- Feng MI, Tamaddon K, Mikhail A, Kaptein JS, Bellman GC. Prospective randomized study of various techniques of percutaneous nephrolithotomy. *Urology* 2001,58:345-350.
- Shah HN, Kausik V, Hedge S, Shah JN, Bansal MB. Initial experience with hemostatic fibrin glue as adjuvant during tubeless percutaneous nephrolithotomy. *Journal of endourology* 2006,20:194-198.
- Schick V. [Sealing of percutaneous nephrolithotomy access after complete stone removal with a hemostyptic gelatin powder (Spongostan)]. *Aktuelle Urologie* 2006,37:52-57.
- Singh I, Singh A, Mittal G. Tubeless percutaneous nephrolithotomy: is it really less morbid? *Journal of Endourology* 2008,22:427-434.
- Desai MR, Kukreja RA, Desai MM, Mhaskar SS, Wani KA, Patel SH, et al. A prospective randomized comparison of type of nephrostomy drainage following percutaneous nephrostolithotomy: large bore versus small bore versus tubeless. *The Journal of urology* 2004,172:565-567.
- Mishra S, Sabnis RB, Kurien A, Ganpule A, Muthu V, Desai M. Questioning the wisdom of tubeless percutaneous nephrolithotomy (PCNL): a prospective randomized controlled study of early tube removal vs tubeless PCNL. *BJU international* 2010,106:1045-1049.
- Aghamir S, Hosseini S, Gooran S. Totally tubeless percutaneous nephrolithotomy. *Journal of endourology* 2004,18:647-648.
- Karami H, Gholamrezaie HR. Totally tubeless percutaneous nephrolithotomy in selected patients. *Journal of endourology* 2004,18:475-476.
- Gupta V, Sadasukhi TC, Sharma KK, Yadav RG, Mathur R. Tubeless and stentless percutaneous nephrolithotomy. *BJU international* 2005,95:905-906.
- Karami H, Arbab AHMM, Hosseini SJ, Razzaghi MR, Simaei NR. Impacted upper-ureteral calculi > 1 cm: Blind access and totally tubeless percutaneous antegrade removal or retrograde approach? *Journal of endourology* 2006,20:616-619.
- Aghamir S, Khazaeli M, Meisami A. Use of Surgicel for sealing nephrostomy tract after totally tubeless percutaneous nephrolithotomy. *Journal of endourology* 2006,20:293-295.
- Crook TJ, Lockyer C, Keoghane SR, Walmsley BH. Totally tubeless percutaneous nephrolithotomy. *Journal of Endourology* 2008,22:267-272.
- Shah HN, Kausik VB, Hegde SS, Shah JN, Bansal MB. Tubeless percutaneous nephrolithotomy: a prospective feasibility study and review of previous reports. *BJU international* 2005,96:879-883.
- Rana AM, Mithani S. Tubeless percutaneous nephrolithotomy: call of the day. *Journal of endourology* 2007,21:169-172.
- Tefekli A, Altunrende F, Tepeler K, Tas A, Aydin S, Muslumanoglu AY. Tubeless percutaneous nephrolithotomy in selected patients: a prospective randomized comparison. *International urology and nephrology* 2007,39:57-63.
- Mouracade P, Spie R, Lang H, Jacqmin D, Saussine C. Tubeless percutaneous nephrolithotomy: what about replacing the Double-J stent with a ureteral catheter? *Journal of Endourology* 2008,22:273-276.
- Istanbuluoglu MO, Cicek T, Ozturk B, Gonen M, Ozkardes H. Percutaneous nephrolithotomy:

nephrostomy or tubeless or totally tubeless?  
Urology 2010,75:1043-1046.

19. Chang C-H, Wang C-J, Huang S-W. Totally tubeless percutaneous nephrolithotomy: a prospective randomized controlled study. Urological research 2011,39:459-465.
20. Sofer M, Beri A, Friedman A, Aviram G, Mabjeesh NJ, Chen J, et al. Extending the application of tubeless percutaneous nephrolithotomy. Urology 2007,70:412-416.