

Tubeless PNL in the supine position

Sırt üstü pozisyonunda tüpsüz PNL

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ABSTRACT

Objective: To evaluate the safety, feasibility and efficacy of tubeless percutaneous nephrolithotomy (PNL) in a supine position in selected cases with renal stones.

Materials and methods: This descriptive study enrolled 120 patients who presented to the urology department at Benha Faculty of Medicine with renal stones between June 2009 and June 2010. All patients were evaluated based on their history, a physical examination, kidney, ureter, bladder (KUB), pelviabdominal U/S and spiral CT of the abdomen and pelvis without contrast or IVP in selected cases. The patients were followed up for postoperative pain, leakage and fever. Perinephric collection with ultrasound (U/S) was performed, and the Hb% and hematocrit were determined after 12 hours.

Results: The access to the stones was achieved through the lower calyx (70.8%) and middle calyx (29.2%) with a stone clearance rate of 100%, and there was no need for a 2nd session. The mean operative time was (67.1±19.2 min.), and the mean length of the hospital stay was (3.4±1.7 days). Three cases had perinephric collections <100 cc, which were managed conservatively and resolved within one week. Prolonged leakage occurred in three cases and also resolved spontaneously within five days. Three cases required a one-unit blood transfusion postoperatively. Stone-free status was achieved in all cases through the use of either the lower or middle calyx in the supine position during the operation. A single dose of non-steroidal anti-inflammatory drugs (NSAID) was needed in 30 cases for postoperative analgesia.

Conclusion: Tubeless PNL with the patients in the supine position can be used in selected cases with a favorable outcome and minimal morbidity with the potential advantage of decreases in the postoperative pain, analgesia requirement and hospital stay.

Key words: Percutaneous nephrolithotomy; percutaneous nephrostomy; renal stones; tubeless PNL.

ÖZET

Amaç: Böbrek taşları olan seçilmiş olgularda sırt üstü pozisyonunda tüpsüz PNL'nin güvenilirliği, uygulanabilirliği ve etkinliğini değerlendirmek.

Gereç ve yöntem: Bu tanımlayıcı çalışmaya Haziran 2009-Haziran 2010 tarihleri arasındaki dönemde Benha Tıp Fakültesi üroloji bölümüne böbrek taşı ile başvuran 120 hasta alındı. Hastaların tamamı öykü, fizik muayene, DÜS grafisi, pelviabdominal USG, abdomen ve pelvisin kontrastsız spiral BT'si veya seçilmiş olgularda IVP ile değerlendirildi. Hastalar ameliyat sonrası ağrı, sızıntı, ateş, USG ile perinefrik birikim açısından izlendi, %Hb ve hematokrit 12 saat sonra yapıldı.

Bulgular: Taşa erişim alt kaliks (%70.8) ve orta kaliks (%29.2) yoluyla yapıldı, taş temizlenme oranı %100'dü. İkinci bir seansa gerek duyulmadı. Ortalama işlem süresi 67.1±19.2 ve ortalama hastanede kalış 3.4±1.7 idi. Üç olguda konservatif olarak tedavi edilen ve bir hafta içinde düzelen <100 cc perinefrik birikim vardı. Üç olguda uzamış sızıntı görüldü, bunlar da beş gün içinde kendiliğinden düzeldi. Üç olguda ameliyat sonrası bir ünite kan transfüzyonu gerekti. Bütün olgularda sırt üstü pozisyonunda alt veya orta kaliks yoluyla taşsız durum sağlandı. Otuz hastada ameliyat sonrası analjezik olarak tek doz NSAİİ'a gerek duyuldu.

Sonuç: Sırt üstü pozisyonundaki hastalarda tüpsüz PNL, seçilmiş olgularda uygun sonuç ve minimal morbidite ile ve ameliyat sonrası ağrıda, analjezi gereksiniminde ve hastanede kalış süresinde azalma gibi olası avantajlarla kullanılabilir.

Anahtar sözcükler: Böbrek taşları; perkütan nefrolitotomi; perkütan nefrostomi; tüpsüz PNL.

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Introduction

Percutaneous nephrolithotomy (PNL) is a well-established technique for the treatment of renal stones. Percutaneous nephrolithotomy has replaced open stone surgery for large renal calculi because it is a less invasive technique. After completion of the last stage of PCNL, the nephrostomy tube is placed according to the standard procedure.^[1] The purpose is to provide hemostasis along the tract, avoid urinary extravasation and maintain adequate drainage of the kidney.^[2] Several modifications of PCNL have been considered in attempts to decrease pain, hospital stay and morbidity. It has been shown that using a small-caliber nephrostomy tube, a miniperc, an internal stent, and tubeless PCNL can decrease postoperative pain and the length of the hospital stay.^[3] The term “tubeless percutaneous nephrolithotomy” was first used by Bellman et al.^[4] The tubeless PCNL involves internalization of the postoperative renal drainage by placement of an internal stent (either ureteric or JJ catheter) and bladder catheter instead of the traditional nephrostomy tube.^[5] Karami and Gholamrezaie^[6] and Aghamir et al.^[7] reported a technique for a completely tubeless PCNL without any externalized ureteral catheter or double-J stent. They found that this technique is safe and effective, requires a shorter hospital stay and less administration of analgesics and leads to a fast recovery time.

In this prospective study, we evaluated the safety, feasibility and efficacy of tubeless PCNL in the supine position in selected cases of renal stones.

Materials and methods

This study included 120 patients who presented to the Urology Department at Benha Faculty of Medicine with renal stones in the period between June 2009 and June 2010. Informed written consent was obtained from all participants, and the study protocol was approved by the Research Ethical Committee of the Faculty. The following inclusion criteria were applied: patients with renal stones that were removed without significant (more than 4 mm) residual fragments, no perforation in the pelvicalyceal system during PCNL and patients with single access. The following exclusion criteria were applied: patients with stage horn and complex renal stones, multiple percutaneous tracts (>1), pelvicalyceal system perforation, significant bleeding and/or clinically significant residual fragments at the end of the procedure and the use of bilateral PCNL or PCNL in a solitary kidney. All patients were evaluated according to their history, physical examination, KUB, pelviabdominal U/S, spiral CT of the abdomen and pelvis without contrast or IVP in selected cases.

Supine PCNL technique

PCNL in the supine position was performed under general anesthesia. The patient was placed in the supine position with the side harboring the stone close to the operating table (Figure 1).

The ipsilateral flank was elevated with a water bag, and the ipsilateral arm was laid on the thorax. Intravenous access was established in the contralateral arm after a standard cystourethroscopy, and a 6 Fr open tip ureteral catheter was inserted into the ipsilateral ureteral orifice.

Kidney puncture was performed under fluoroscopy after distending the pelvicalyceal system with diluted contrast medium from the ureteric catheter. The puncture site and path were chosen in the mid axillary line; then, an 18-gauge puncture needle was advanced into the appropriate calyx.

A 0.38 floppy-tipped guide wire was advanced into the chosen calyx, and tract dilatation was performed after opacification of the PCS with the contrast medium in a retrograde fashion under fluoroscopic guidance, using Alken dilators up to 27 Fr. A 30 Fr Amplatz sheath was used, and then a standard 26 Fr rigid nephroscope was used for stone retrieval (Figure 2).

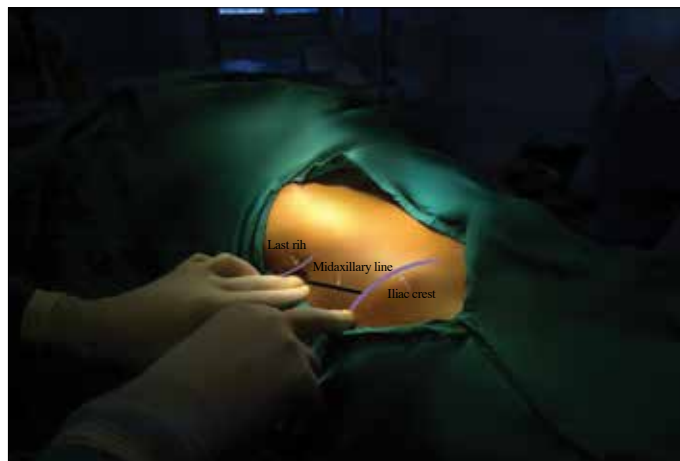


Figure 1. Position of the patient

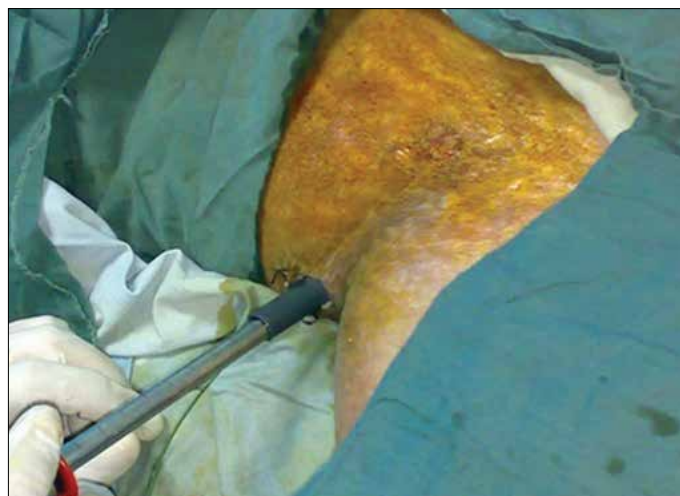


Figure 2. PCNL in supine position

Fragmentation of the stone was performed when needed by a pneumatic lithoclast. Finally, antegrade pyelography was performed in all cases to check the integrity of the collecting system and detect any perforation. The amplatz sheath was then removed, leaving the urethral and ureteric catheters in for 24 hrs. The patients were followed up for postoperative pain, leakage and fever, and perinephric collection with U/S, Hb% and hematocrit were performed after 12 hours.

The collected data were tabulated and analyzed using the Statistical Package for the Social Sciences (SPSS) version 17 software. Suitable statistical values were computed (frequencies, mean, standard deviation and range).

Results

The preoperative patient characteristics are shown in Table 1. No significant difference was found in age or stone size. Table 2 shows the stone criteria. Access to the stones was achieved through the lower calyx (70.8%) and the middle calyx (29.2%). Stone clearance was successful in 100% of the cases with no need for a 2nd session. Operative time, hospital stay, outcome, intra & postoperative complications are listed in Table 3. There was no bleeding from the nephrostomy site. Three cases had perinephric collection <100 cc, which was managed conservatively and resolved within one week. Prolonged leakage occurred in three cases and also resolved spontaneously within five days. Three cases required a one-unit blood transfusion postoperatively due to a low Hb% and hematocrit drop.

Stone-free status was achieved in all cases. Ureteric catheters were removed after 24 hours, except in 6 cases (3 cases with prolonged leakage and 3 cases with perinephric collection).

Discussion

PCNL has revolutionized the management of large renal stones by decreasing the morbidity and reducing the length of the hospital stay when compared with open surgery.^[8] Valdivia et al.,^[9]

effectively demonstrated that elevation of the desired flank in the supine position enables safe PCNL with low risk of colon injury.

Table 2. Stone criteria

Stone size	Mean±SD	Range
	2.6±1.08	(1- 4.5) cm
Stone number	No. (n=120)	(100%)
Single	80	66.7
Multiple	40	33.3
Stone site		
Pelvis	80	66.7
Pelvis & upper calyx	5	4.1
Pelvis & lower calyx	15	12.5
Upper & lower calyx	20	16.7
Radio-opacity		
Radio-opaque	113	94.2
Radio-lucent	7	5.8

Table 3. Operative and postoperative variables

Variable	No.	%
Access		
Lower calyx	85	70.8
Middle calyx	35	29.2
Variable	Mean±SD	Range
Operative time	67.1±19.2	(35-100) min.
Hospital stay	3.4±1.7	(1-7) days
Outcome	No.	%
Stone free	120	100.0
Residual stones	0	0.0
Postoperative analgesics	No.	%
NSAID		
Single dose	30	25
1st day		
Postoperative complications	No.	%
Prenephric collection	3	2.5
Fever	7	5.8
Leakage	3	2.5
Blood transfusion	No.	%
Needed (500 mL)	3	2.5
Not needed	117	97.5

Table 1. Patients' criteria

Variable	Mean±SD	Range
Age	47.02±4.15	(40-55) years
Gender	No. (n=120)	(100%)
Male	93	77.5
female	27	22.5
Recurrent cases	No. (n=51)	(42.5%)
After PCNL	21	17.5
After open surgery	30	25.0

In this study sample, PCNL was performed in 120 patients without the use of a nephrostomy tube; only a ureteric catheter was inserted for 24 hrs. The access was achieved through the lower calyx in 85 patients (70.8%) and through the middle calyx in 35 patients (29.2%).

The operative time ranged from 35-100 minutes (67.1 ± 19.2) (Mean $\pm$ SD), and the hospital stay ranged from 1-7 days with a mean of 3.4 ± 1.7 . This result is in agreement with that of the study by Istanbuluoglu et al.,^[2] who reported that the mean operative time for tubeless supine PCNL was 51.79 ± 25.23 minutes, and the mean hospital stay was 2.09 ± 1.75 days. Our results are also in agreement with the findings of Kara et al.^[10] who found that the mean operative time was (22-50 min). However, in the present study, the mean patient hospital stay (3.4 ± 1.7) may be considered too long in comparison to that reported by Limb and Bellman,^[5] who reported a mean of 1.25 days. On the other hand, the insertion of the double -J stent has some disadvantages, such as urinary tract difficulties, in addition to the need for cystoscopy to remove it, making the process more costly^[11]. Leibovici et al.^[11] also reported that quality of life was affected in 45% of their patients due to flank pain, symptoms in the lower urinary tract, anxiety and sleep disturbance in cases with internal stents. Only 30 patients of the patients in this study required a single dose of NSAID as the postoperative analgesia. This result is in agreement with that of Shah et al.^[12] who reported that tubeless PCNL decreased the postoperative analgesia requirement and hospital stay.

The stone-free rate was 100% in our study. This result is comparable to that reported by Kara et al.,^[10] (96%), but it is higher than those reported by Shoma et al.^[13] (89%), Shah et al.^[12] (93.3%), and Sofer et al.^[14] (91%).

Hemorrhage is the most significant complication of PCNL.^[15] A concern of many urologists with the tubeless technique is the lack of a tamponade effect in the nephrostomy tract.^[16]

Another concern regarding the tubeless PCNL technique is the inability to monitor excessive hemorrhage and tract hemostasis.^[17]

Nephrostomy tube placement at the end of the standard PCNL is thought to decrease these complications.^[6] Omitting the nephrostomy tube placement may expose the patient to significant morbidity and, therefore, increase the need for sealing the tract. To date, the use of sealing materials remains controversial because many studies have failed to demonstrate a significant decrease in urinary extravasation or bleeding.^[18,19] In contrast, in a prospective study, Maheshwari and coworkers demonstrated no significant increase in the postoperative bleeding in 20 patients who underwent a one-stage tubeless PCNL.^[20]

In the present study, 3 of 120 cases (2.5%) developed perinephric collection ranging from 50-100 cc. These cases were managed conservatively, and the collections resolved spontaneously within one week. Prolonged leakage developed in 3 cases and persisted for 5 days. Blood transfusion was needed in 3 cases due to a drop in the Hb% and hematocrit values postoperatively (2.5%). This result is in agreement with that reported by Wickham et al.,^[21] who reported transfusions in 6%, while Zilberman et al.^[22] reported a 0-11.9% transfusion rate in tubeless PCNL.

Therefore, our current study represents an additional step towards extending the applicability of tubeless PNL. We believe that this study will contribute to the further popularization of the tubeless technique for the benefit of the patients, medical teams and the health care system.

In conclusion, tubeless PCNL with the patients in the supine position can be used in selected cases with a favorable outcome and minimal morbidity, with the potential advantage of decreased postoperative pain, analgesia requirements and hospital stay.

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Conflict of interest

No conflict of interest was declared by the authors.

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