

Tubeless percutaneous nephrolithotomy versus standart nephrolithotomy in geriatric patients: Single surgeon experience

 Mustafa Erkoç

Beylikduzu State Hospital, Clinic of Urology, Istanbul, Turkey

Copyright © 2020 by authors and Annals of Medical Research Publishing Inc.

Abstract

Aim: Percutaneous nephrolithotomy(PCNL) is the most effective and reliable surgical procedure in the world for large renal stones. Tubeless PCNL(T-PCNL) has recently been used effectively. The aim of our study is to compare two methods in elderly patients who underwent T-PCNL and Standard PCNL(S-PCNL).

Material and Methods: Our study included 60 patients over 60 years of age who underwent operation for renal stones in Beylikduzu State Hospital. T-PCNL was performed on 30 of these patients, whereas S-PCNL was performed on the remaining 30 patients. The mean age, presence of hypertension and diabetes, body-mass index(BMI) and stone size information was recorded within the framework of demographic data of the patients. Length of intraoperative and postoperative hospital stays, operation times, stone free rates, requirement of preoperative blood transfusion, decrease in postoperative hemoglobin, decrease in postoperative parenchymal thickness and Clavien scores were reviewed. Chi-square test and Student T Test was used for statistical analysis.

Results: In the light of the intraoperative and postoperative data, a statistically significant difference was found in favor of T-PCNL group compared to the S-PCNL group, in terms of length of hospital stays, operation times and postoperative narcotic analgesic use ($p < 0.05$). On the other hand, no statistically significant difference was found between the two groups on the basis of the stone free ratio, Clavien scoring, preoperative blood transfusion and postoperative renal parenchymal thickness.

Conclusion: T-PCNL is a safe and effective surgical procedure in geriatric patients with large renal stones, as is S-PCNL. T-PCNL was found to be superior in terms of length of hospital stay, operation times and postoperative narcotic analgesic use.

Keywords: Geriatric stone disease; percutaneous nephrolithotomy; renal stone; tubeless PCNL

INTRODUCTION

Urinary system stone disease is one of the most common diseases in the world. The incidence of renal stone in the whole population is 12%. While open stone surgery was implemented in renal stone treatments before, new treatment methods have been brought up today with the development of minimally invasive surgeries (1,2). PCNL is performed for the surgical treatment of stones over 2 cm, while ESWL and flexible ureterorenoscopy are performed for the treatment of stones under 2 cm. Additionally, mini PCNL and micro PCNL methods have also been used recently for stones under 2 cm (3).

PCNL was first introduced in 1976 when Fenström et al. removed the renal stones through entering the nephrostomy tract. Since then, many PCNL methods have been developed (4). While prone position is used in the standard PCNL, recently supine position has been

routinely applied in PCNL. Nephrostomy tube was used in the standard PCNL, whereas Bellman et al. introduced the concept of tubeless PCNL to the literature in 1997. After this date, the concept of tubeless PCNL has been widely used (5).

PCNL is a surgical procedure that can be performed at all ages. It can be performed in pediatric ages as well as in geriatric ages (6,7). There have been many recently conducted studies that have questioned the reliability of PCNL, especially in the geriatric population (7). It has been also demonstrated in these studies that PCNL can be used effectively and safely in the geriatric population as well.

The aim of this study is to demonstrate the efficacy and safety of both tubeless PCNL and standard PCNL in 60 standardized geriatric patients, who underwent operation for renal stones in our clinic, through the experience of a single surgeon.

Received: 10.12.2019 **Accepted:** 10.04.2020 **Available online:** 24.04.2020

Corresponding Author: Mustafa Erkoç, Beylikduzu State Hospital, Clinic of Urology, Istanbul, Turkey

E-mail: mustafa.erkoc@yahoo.com

MATERIAL and METHODS

This study was carried out with the Okmeydani Training and Research Hospital Ethics Committee's approval dated 16.04.2019 and numbered 1234.

Patients

Patients were analyzed retrospectively. The study included 60 of 205 patients who underwent PCNL in Beylikduzu State Hospital Urology between March 2017 and March 2019. Patients who had undergone stone surgery for the first time over 60 years were included in the study. Patients who had previous kidney surgery, non-opaque stone, patients with congenital kidney anomalies were excluded from the study. Tubeless PCNL was administered to 30 of these 60 patients, whereas standard PCNL was administered to the remaining 30 patients. Pelvis stones were included in the study in order to provide standardization in terms of locations of the stone.

Operation Technique

All patients were examined in detail in terms of preoperative general internal examination and systemic diseases and evaluated with a detailed anamnesis form. Patients were evaluated preoperatively by means of complete blood count, serum creatinine, bleeding and coagulation times, serological tests (HIV, HBV, HCV) and urine culture. Patients with positive urine culture underwent operation after receiving antibiotherapy treatment for a sufficient amount of time. Operations of patients that use aspirin and other anticoagulant medications were postponed for about 7 to 10 days following the discontinuation of the said medications. All patients were evaluated preoperatively by means of kidney ureter bladder (KUB) radiography and intravenous urography, whereas the patients with creatinine values above 2 mg/dl were evaluated by means of spiral non-contrast tomography. Renal parenchymal thicknesses is measured with ultrasonography. Single access prone position PCNL was performed for both groups. Bull's Eye technique applied for access. On the first postoperative day, patients were evaluated for rest stones by means of kidney ureter bladder (KUB) radiography. Forty-eight hours after administering the

standard PCNL, antegrade pyelography was performed on the patients and the transition of residual stones and opaque materials to the ureter and bladder was observed and then the nephrostomy tube was removed. In addition, patients who underwent tubeless PCNL were evaluated by ultrasonography before discharge.

Statistical Analysis

Stone-free rates were evaluated according to the KUB radiography after 3 months. Patients' postoperative creatinine levels, their preoperative transfusion needs, renal parenchymal thicknesses, hospitalization times, Clavien scores, decrease in their hemoglobin levels, their stone free ratios, and analgesic needs were evaluated. Demographic and operational data of the patients were given as mean \pm standard deviation. Statistical analysis was performed using SPSS 15.0 software. The Kolmogorov-Smirnov test was used for normal distribution analysis. Chi-square test was used to compare the ratios and p values of less than 0.05 were accepted as the limit for statistical significance. Student T test was used for quantitative analysis.

RESULTS

60 patients over 60 years of age were included in our study. Patients were divided into two groups, standard PCNL (S-PCNL) group and tubeless (T-PCNL) group, with 30 patients in each group. Patients in both groups were similar in terms of mean age, presence of hypertension, body mass index (BMI), presence of diabetes and mean stone sizes ($p > 0.05$). Demographic data of the patients are shown in Table 1.

Table 1. Demographic data of patients

Demographic Data	S-PCNL(n=30)	T-PCNL(n=30)
Mean Age	67 \pm 3.2	66 \pm 3.6
Hypertension	5	4
Diabetes	4	5
Mean Stone Size (mm ²)	840 \pm 150	850 \pm 170
BMI	28.1 \pm 4.8	28.6 \pm 4.4

Table 2. Intraoperative and postoperative data of patients

Intraoperative and Postoperative data	S-PCNL(n=30)	T-PCNL(n=30)	p
Length of Hospital Stay	2.9 \pm 0.5	1.8 \pm 0.3	$p < 0.05$
Postoperative narcotic analgesic use	10(%33.3)	4(13.3)	$p < 0.05$
Operation time (minutes)	75 \pm 10.2	63 \pm 6.2	$p < 0.05$
Stone Free ratio	27(%90)	28(%93.3)	$p > 0.05$
Preoperative blood transfusion ratio	3(%10)	4(%13.3)	$p > 0.05$
Postoperative decrease in the hemoglobin count	2.4 \pm 0.6	2.2 \pm 0.5	$p > 0.05$
Postoperative decrease in the parenchymal thickness (mm)	4.2 \pm 1.1	3.9 \pm 0.9	$p > 0.05$
Clavien 1	3(%10)	3(%10)	$p > 0.05$
Clavien 2	3(%10)	2(%6.6)	$p > 0.05$

Length of postoperative hospital stay of the patients was 2.9 ± 0.5 days in case of the S-PCNL group and 1.8 ± 0.3 days in case of the T-PCNL group, and the difference was found to be statistically significant ($p < 0.05$). In terms of narcotic analgesic use, narcotic analgesic was used in 10 (33.3%) patients in the S-PCNL group and in 4 (13.3%) patients in the T-PCNL group, and the difference was found to be statistically significant as well ($p < 0.05$). On the other hand, the operation time was 75 ± 10.2 minutes in case of the S-PCNL group and 63 ± 6.2 minutes in case of the T-PCNL group, and these results were also found to be statistically significant ($p < 0.05$).

In terms of stone free ratios, 27 (90%) patients were determined as stone-free in the S-PCNL group, whereas in the T-PCNL group 28 (93.3%) patients were determined as stone-free, and there was no statistically significant difference between the groups ($p > 0.05$). S-PCNL and TPCNL groups' Clavien 1,2 scores, preoperative blood transfusion ratios, postoperative decreases in the hemoglobin count, postoperative decreases in the parenchymal thicknesses were found to be 20% and 16.6%, 10% and 13.3%, 2.4 ± 0.6 and 2.2 ± 0.5 , 4.2 ± 1.1 and 3.9 ± 0.9 , respectively, indicating no statistically significant difference ($p > 0.05$). There was no patient with a Clavien 3,4,5 score. The intraoperative and postoperative data of the patients are shown in Table 2 in detail.

DISCUSSION

Many minimally invasive methods have been used in renal stone surgeries in recent times. PCNL is still the gold standard surgical treatment because of its success rate in renal stones over 2 cm, short durations of hospital stay and low cost (8).

Several studies have been conducted on the efficacy of PCNL in elderly patients. Nakamon et al. studied the efficacy and safety of PCNL in both elderly and young patients. They achieved similar results between the two groups in terms of operation success. Although chronic diseases and ASA scores were higher in the elderly patient group, there was also no difference between the two groups in terms of complication rates (9). In another similar study, Sahin et al. examined 27 patients that are over 60 years of age and 178 patients that are under 60 years of age, who underwent PCNL and who have only one kidney. They revealed that PCNL is an effective and reliable method in elderly patients on the basis of operation success and postoperative complications (10). In parallel with these studies, Besiroglu et al. divided the patients underwent PCNL into four different age groups; patients of 40-49 age, patients of 50-59 age, patients of 60-69 age, and patients over 70 years of age, and examined them as such. They revealed that PCNL is an effective and reliable method in all age groups (7).

The concept of T-PCNL was introduced in 1997 by Bellman et al. (5). Many studies have been carried out after since that date. Chen ZJ et al. compared S-PCNL and T-PCNL in their meta-analysis, in which they examined 947 patients in 15 studies. They set forth in this meta-analysis that T-PCNL

is superior to S-PCNL in terms of postoperative pain, analgesic use, length of hospital stay, and urine leakage, and that two methods yielded similar results in terms of other parameters (11). Ichaoui et al. compared T-PCNL and S-PCNL within the scope of another study involving 125 patients, which revealed that T-PCNL is advantageous in terms of postoperative pain and length of hospital stay. There are also other studies, where the efficacy of T-PCNL in pediatric and elderly patients has been reported (12). Samad et al. conducted a study investigating the efficacy of tubeless PCNL in children under 14 years of age. They reported that the success rate of T-PCNL and standard PCNL was similar and demonstrated that T-PCNL was superior to S-PCNL particularly in terms of length of hospital stay (13). Furthermore, no significant difference was found between T-PCNL and S-PCNL in the systematic review and meta-analysis performed by Nouralizadeh A et al. in children, in terms of operation success, complication rates, and operation times (14).

In a study similar to our study, Ozturk H. examined 27 patients over the age of 65, who underwent T-PCNL, and another 25 patients, who underwent S-PCNL. It was demonstrated in this study that T-PCNL is superior to S-PCNL in terms of length of hospital stay, operation time and postoperative narcotic analgesic use. On the other hand, both methods were found to yield similar results in terms of operation success, blood transfusion need, access number, postoperative decrease in the hemoglobin count, and Clavien scoring (15).

The results of our study have been found to be consistent with the literature. T-PCNL and S-PCNL were compared in patients over 60 years that underwent PCNL in our study, and it was found as a result that T-PCNL is advantageous in terms of length of hospital stay, operation time, and postoperative narcotic analgesic use. However, there have been various limitations of our study as it was a retrospective method and included a limited number of patients. And when comparing the operation time, it should be kept in mind that tubeless PCNL is applied to patients with easier access. In addition, the length of time during which the fluoroscopy was administered, was not recorded during the operation.

CONCLUSION

The results of our study show that T-PCNL is an effective and safe treatment method as is S-PCNL in elderly patients that undergo renal stone surgery. T-PCNL is more advantageous than S-PCNL in terms of length of hospital stay, postoperative narcotic analgesic use and operation time. There is a need for an extensive series of studies that are better designed supporting our results on this subject.

Competing interests: The authors declare that they have no competing interest.

Financial Disclosure: There are no financial supports.

Ethical approval: This study was carried out with the Okmeydanı Training and Research Hospital Ethics Committee's approval dated 16.04.2019 and numbered 1234.

Mustafa Erkoç ORCID: 0000-0003-0679-2873

REFERENCES

1. Johnson CM, Wilson DM, O'Fallon WM, et al. Renal Stone epidemiology: a 25-year study in Rochester, Minnesota. *Kidney Int* 1979;16:624-31.
2. Sahin A, Akan S. Laparoscopic surgery for upper ureteral calculi in geriatric patients: 5 years of experience. *The Aging Male* 2019;1-5.
3. Goodwin WE, Casey WC, Woolfe W. Percutaneous trocar (needle) nephrostomy in hydronephrosis. *JAMA* 1955;157:891-4.
4. Fernström I, Johansson B. Percutaneous pyelolithotomy. A new extraction technique. *Scand J Urol Nephrol* 1976;10:257-9.
5. Bellman GC, Davidoff R, Candela J, et al. Tubeless percutaneous renal surgery. *J Urol* 1997;157:1578-82.
6. Turk C, Petřík A, Sarica K, et al. EAU Guidelines on Interventional Treatment for Urolithiasis. *Eur Urol* 2016;69:475-82.
7. Besiroglu H, Merder E, Dedekarginoglu. Percutaneous nephrolithotomy is safe and effective in aging male patients: a single center experience. *Aging Male* 2019;1-6.
8. Antonelli JA, Pearle MS. Advances in percutaneous nephrolithotomy. *Urol Clin North Am* 2013;40:99-113.
9. Nakamon T, Kitirattrakarn P, Lojanapiwat B. Outcomes of percutaneous nephrolithotomy: comparison of elderly and younger patients. *Int Braz J Urol* 2013;39:692-701.
10. Sahin A, Atsu N, Erdem E, et al. Percutaneous nephrolithotomy in patients aged 60 years or older. *J Endourol* 2001;15:489-91.
11. Chen ZJ, Yan YJ, Zhou JJ. Comparison of tubeless percutaneous nephrolithotomy and standard percutaneous nephrolithotomy for kidney stones: A meta-analysis of randomized trials. *Asian J Sur* 2019; 1015-9584/30338-5.
12. Ichaoui H, Samet A, Ben Hadjalouane H, et al. Percutaneous Nephrolithotomy (PCNL): Standart Technique Versus Tubeless- 125 Procedures. *Cureus* 2019;11:4251.
13. Samad L, Zaidi Z. Tubed vs tubeless PCNL in children. *J Pak Med Assoc* 2012;62:892-6.
14. Nouralizadeh A, Simforoosh N, Shemshaki H, et al. Tubeless versus standart nephrolithotomy in pediatric patients: a systematic review and meta-analysis. *Urologia* 2018;85:3-9
15. Ozturk H. Tubeless versus standard PCNL in geriatric population. *Actas Urol Esp* 2015;39:494-501.