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

Mustafa Erkoc

Beylikduzu State Hospital, Clinic of Urology, Istanbul, Turkey

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.
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 ± 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

<table>
<thead>
<tr>
<th>Demographic Data</th>
<th>S-PCNL(n=30)</th>
<th>T-PCNL(n=30)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Age</td>
<td>67±3.2</td>
<td>66±3.6</td>
<td></td>
</tr>
<tr>
<td>Hypertension</td>
<td>5</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Diabetes</td>
<td>4</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Mean Stone Size (mm²)</td>
<td>840±150</td>
<td>850±170</td>
<td></td>
</tr>
<tr>
<td>BMI</td>
<td>28.1±4.8</td>
<td>28.6±4.4</td>
<td></td>
</tr>
</tbody>
</table>

Table 2. Intraoperative and postoperative data of patients

<table>
<thead>
<tr>
<th>Intraoperative and Postoperative data</th>
<th>S-PCNL(n=30)</th>
<th>T-PCNL(n=30)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length of Hospital Stay</td>
<td>2.9±0.5</td>
<td>1.8±0.3</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Postoperative narcotic analgesic use</td>
<td>10(%33.3)</td>
<td>4(13.3)</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Operation time (minutes)</td>
<td>75±10.2</td>
<td>63±6.2</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Stone Free ratio</td>
<td>27(%90)</td>
<td>28(%93.3)</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Preoperative blood transfusion ratio</td>
<td>3(%10)</td>
<td>4(13.3)</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Postoperative decrease in the hemoglobin count</td>
<td>2.4±0.6</td>
<td>2.2±0.5</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Postoperative decrease in the parenchymal thickness (mm)</td>
<td>4.2±1.1</td>
<td>3.9±0.9</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Clavien 1</td>
<td>3(%10)</td>
<td>3(%10)</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Clavien 2</td>
<td>3(%10)</td>
<td>2(%6.6)</td>
<td>&lt;0.05</td>
</tr>
</tbody>
</table>
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). S-PCNL demonstrated in this study that T-PCNL is superior to S-PCNL particularly in terms of length of hospital stay. Furthermore, no significant difference was found between T-PCNL and S-PCNL in the systematic review and meta-analysis performed by Nousralizadeh 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.*

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

*Mustafa Erkoc ORCID: 0000-0003-0679-2873*
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