Can We Use Single-step Dilation as a Safe Alternative Dilation Method in Percutaneous Nephrolithotomy?

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OBJECTIVE To examine the outcomes of the patients who underwent percutaneous nephrolithotomy with single-step dilatation technique in our clinic.

MATERIALS AND METHODS A total of 932 patients who underwent percutaneous nephrolithotomy by using single-step dilation technique in the period between 2008 and 2015 in our clinic were included in the study. Data of the patients were analyzed, such as age, sex, stone burden, operative time, fluoroscopy time, operation success, and perioperative and postoperative complications.

RESULTS An analysis of the data of 932 patients revealed similar operation success and complication rates as in the literature. Mean age of the patients included in the study was 48.9 years. Mean operative time was 66.6 minutes and mean fluoroscopy time was 139 seconds. Postoperative residual stone was detected in 17.1% of the patients. Postoperative fever was observed in 29 patients (3.1%), and sepsis developed in 11 (1.1%) of them. Additional postoperative procedures were required in 29 patients (3.1%). No patient was lost due to complications. Our data were compatible with the literature.

CONCLUSION Single-step dilation technique can be used as an effective and safe alternative dilation method in adult patients. UROLOGY 99: 38–41, 2017. © 2016 Elsevier Inc.

Percutaneous nephrolithotomy (PCNL) is a minimally invasive and a safe method for the treatment of kidney stones larger than 2 cm in diameter.[1,2] Establishment of the nephrostomy tract is one of the most important steps of PCNL. The types of dilators that are used for this purpose are Amplatz, metal telescopic, and balloon dilators. Balloon dilators are regarded considerably safe but their use is limited due to high costs. Amplatz dilators and metal telescopic dilators are inexpensive but dilation takes longer.[3,4] To shorten the time for dilation and consequently to reduce radiation exposure, single-step dilation that represents dilation of the tract with a 25-30 Fr dilator at one step was described.[5] Some studies showed that single-step dilation of the tract is safe and associated with short exposure to radiation.[6] There are also reports in the literature about the usage of single-stage fascial dilator (Webb's dilator) for dilation.[7]

In this study, we retrospectively reviewed data of the patients who underwent PCNL with single-step dilation technique in our clinic and discussed whether single-step dilation technique can be used as an alternative and safe method of dilation.

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MATERIALS AND METHODS

Data of 1150 patients who underwent PCNL in the period between 2008 and 2015 in our clinic were retrospectively analyzed. Among these, 932 consecutive patients who had PCNL with single-step dilation technique were included in the study. We used to prefer stepwise dilation with Amplatz dilators in our clinic initially. Therefore, 218 patients were excluded.

Demographic data of the patients such as age and sex were obtained. Preoperative imaging was implemented for all patients by noncontrast computed tomography (NCCT) scan of the whole abdomen. The terms "simple" or "complex" were used to easily describe the localization of the stones.[8] Kidney stones localized either in calyx or in pelvis were called as simple stones; stones filling one or more calices in addition to pelvis and staghorn stones were termed as complex stones. Data on stone types could not be obtained because stone analysis was missing for most of the patients as its cost is not covered by the social security association in our country.

All PCNL procedures were performed with the patient in prone position because we had no PNL experience in supine position, although similar success rates were reported for supine and prone positions in the literature.[9] The time from the administration of the contrast agent to the patient in the prone position until the insertion of the nephrostomy catheter was recorded as operative time. Again, fluoroscopic imaging time during the operation,

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number of access, and presence of perioperative complications were also recorded.

At the end of the operation, a 14 Fr reentry Malecot catheter was placed in all patients. Malecot catheters of the patients were removed in the postoperative days 1-3, in case of no complications. Patients who were followed up in the hospital were discharged when their catheters were removed. Postoperative complications such as transfusion requiring bleeding, fever, sepsis, and additional interventions were also recorded. All patients were reevaluated by NCCT, routinely taken at 1 month postoperatively. Operation success was defined as being stone free or having residual stone fragments of 4 mm or less.[10]

Statistics

This study primarily investigated the consistency of the data to the normal distribution. According to Kolmogorov-Smirnov test, our data did not fit to normal distribution. For this reason, the arithmetic mean, median, mode, standard error values were calculated when calculating the descriptive statistics of the data set. IBM SPSS 23 (Armonk, NY) was used for statistical analysis.

Procedure

Complete blood count, biochemical analyses, coagulation tests, and urine cultures were performed in all patients preoperatively. Patients with positive urine cultures were given appropriate antibiotic therapy. All patients were operated when they had sterile urine culture. Under general anesthesia, an open-ended 6 Fr ureteral catheter was placed using a cystoscope in the lithotomy position, then the patient was turned to prone. After injecting contrast media through the ureter catheter, an access needle was inserted through an appropriate calyx to the renal collecting system under fluoroscopic guidance. After a guide catheter was placed, the percutaneous nephrostomy tract was created using Amplatz dilator set, first with a 6 Fr dilator then for single-step dilatation with a 25-30 Fr dilator. The same technique was used in the patients requiring a second access due to a complex stone. 24 fr rigid nephroscope was used for the procedure and an ultrasonic lithotripter was used in all patients for stone fragmentation. A 14 Fr Malecot reentry catheter was placed at the end of the procedure, routinely.

Table 1. Preoperative data of the patients

	Number of Patients (n = 932)	Percent
Gender		
Female	374	40.1
Male	558	59.9
Comorbidity		
Yes	236	31
No	696	69
Operation side		
Right kidney	511	54.8
Left kidney	421	45.2
Stone site		
Simple stone	525	56.3
Complex stone	407	43.7
Stone opacity		
Opaque	851	91.4
Nonopaque	81	8.6
ESWL		
Yes	223	24
No	709	76
Open renal surgery history		
Primary	851	91.4
Secondary	81	8.6

ESWL, extracorporeal shock wave lithotripsy.

Table 2. Access details

	Number of Patients (n = 932)	Percent
Number of access		
Single access	814	87.3
Two accesses	99	10.6
Three accesses	19	2.1
Access site		
Subcostal	937	87.6
Intercostal	132	12.4
Access method		
Triangulation	895	96.4
Bull's eye	34	3.6

RESULTS

Of the 932 participants, 374 (40.1%) were females and 558 (59.9%) were males, and mean age was 48.9 ± 0.43 (18-88) years. In 646 patients (69%), no comorbidity was observed, whereas at least one comorbidity, mostly hypertension, was detected in 236 patients (31%). Operation was performed due to stones in the right kidney in 511 (54.8%) and in the left kidney in 421 (45.2%) patients. Simple stones were detected in 525 (56.3%) and complex stones in 407 (43.7%) patients. Eighty-one patients (8.7%) with PNL had a history of a previous ipsilateral open stone surgery. Kidney stones were opaque in 851 (91.3%) and nonopaque in 81 (8.7%) patients. No information on Hounsfield units of the stones was obtained. Preoperative extracorporeal shock wave lithotripsy history was reported by 223 (24%) patients with opaque stones (Table 1). Mean operative time was 66.6 ± 1.39 (20-180) minutes. Mean fluoroscopy time was 139 ± 3.6 (20-600) seconds. Single access was sufficient for 833 (91.4%) patients whereas 99 (10.7%) required multiple access. A total of 937 had subcostal access and 132 had intercostal access. Renal access was performed by using the triangulation technique in 96.4% and the bull's-eye technique in 3.6% of the patients. Successful access was achieved in all patients (Table 2). NCCT taken on postoperative month 1 revealed residual stone fragments of 4 mm or more in 160 patients (17.1%). The patients were also evaluated in terms of perioperative and postoperative complications. Bleeding that requires transfusion was observed in 16 patients (1.7%) intraoperatively and in 30 (3.2%) patients postoperatively. Postoperative fever occurred in 29 patients (3.1%) and in 11 (1.1%) of them sepsis developed; they required treatment in an intensive care unit. Postoperatively, 32 patients (3.4%) required additional intervention for discharge from the surgical incision. Ureterorenoscopy was performed in 29 (3.1%) of these, due to stone fragments that were displaced and moved down to the ureter. Double J stents were used in 32 patients. Selective angioembolization was performed in 2 patients (0.2%) due to uncontrollable bleeding (Table 3).