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Applicability of percutaneous nephrolithotomy operation in a county State Hospital

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Abstract

To evaluate percutaneous nephrolithotomy (PNL) operation, which is widely used and successfully performed in current practice, its applicability in district hospitals and to present the results of our operations. Between March 2014-2016, 32 PNL operations, which were performed in Urology Clinic of the Silvan County State Hospital, were retrospectively evaluated. All patients were assessed by routine urine tests, serum biochemical and coagulation tests, ultrasonography and computerized tomography. All operations were done by the same surgeon and performed at prone position under epidural or general anesthesia. Age, sex, stone size, laterality, operative time, fluoroscopy time, complications, stone-free rate were recorded. The sample included 17 women and 15 men with a mean age of 24.6 (11-42), and the mean stone size was 3.05 (2-5) cm. 29 patients had kidney stone (16 left-13 right) and 3 patients had proximal ureteral calculi. Incomplete duplex system was present in 6 patients. The total success rate was 93.75%. The mean operative time was 56 (28-120) minutes and mean hospitalization time was 2.6 (2-4) days. The operation failed in two patients. Blood transfusion was performed in 1 case (3.1 %). 4 patients who had postoperative hematuria were managed conservatively. However, none of the patients had intraabdominal organ injuries or required open surgery. PNL, which has become the gold standard in the treatment of large kidney stones, may be applied with similar success and complication rates of the literature, despite some difficulties arising from limited facilities in peripheral state hospitals.

Keywords: Percutaneous nephrostomy, county hospital, kidney calculi

Introduction

Urinary system stone disease is encountered at a rate of 4-20 % in developed countries [1-4]. Our country is in the endemic zone for stone disease with an incidence rate of 15 percent [5,6]. Especially in Southeastern and Eastern Anatolia Regions, incidence rates further increase due to climatic conditions and nutritional habits [6].

Nowadays, in association with technological developments, radical changes have taken place in the treatment of stone disease, minimally invasive treatments are living their golden age, and stone surgery is leading the way. Since its first application by Johansson and Fernström in the year 1976, percutaneous nephrolithotomy (PNL) has become increasingly popular [7]. In our country, the first series have been published in the beginning of 2000s. Since then, this treatment modality has been applied in increasing frequency. Despite difficulties arising from limited facilities, it has started to be used in peripheral state hospitals or even in county hospitals.

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In this study, our aim is to investigate the applicability of the widely used PNL in the treatment of stone diseases under conditions of a county state hospital, and share our surgical results.

Material and Methods

The outcomes of a total of 32 cases who had undergone PNL between March 2014 and 2016 in an urology clinic of Silvan county state hospital were retrospectively evaluated. Routinely demographic data, stone location, lateralization, stone size were evaluated. The patients were preoperatively evaluated using complete urinalysis, hemostasis panel, serum and urine creatinine values, ultrasound, and computed tomography. The study was performed in compliance with Helsinki Declaration, and preoperatively written consent forms were obtained from the patients. For patients younger than 18 years of age, written informed consent forms were obtained from their parents. Blood types of all patients were identified. Before the procedure for each patient two units of whole blood were kept ready for use. During the selection process of the cases to be operated, the patients with solitary kidney, staghorn stones, heavy stone burden, and those with additional diseases were referred to a well-equipped center.

The procedures were applied under epidural and general anesthesia. All cases were operated by a single surgeon. Before starting the PNL procedures, the operating room personnel and the nurses

attended training courses. The patients were monitored by their attending surgeon and the team, from their arrival in the operating room up to their admission into the ward during postoperative period.

Ureteral catheterization was performed using a 5F ureter catheter with the patient priorly in the lithotomy position and then the patient was laid in the prone position. Before intrarenal access, all patients had undergone retrograde pyelographic examinations after delivery of a radiopaque agent through a ureteral catheter. With the patient in the prone position, 18 gauge percutaneous access needle was used for intrarenal access. Generally, the lower calyx was entered via subcostal approach. In one patient intrarenal access was achieved between 11^{th} -12^{th} intercostal space. In another patient, access was carried out through this tract because of the preoperative presence of a percutaneous nephrostomy catheter. In one patient presence of bifid pelvis was revealed on intraoperatively obtained antegrade pyelograms which necessitated lower calyceal access (Figure 1). Under the guidance of C-arm fluoroscopy, using mechanical dilators over a guidewire, 30 F dilatation was performed to create an access tract. Operative time, stone-free rates and complications were recorded. Operative time was calculated as the time elapsed from the renal access up to the placement of a percutaneous nephrostomy catheter. On the 1^{st} day after the operation ureteral catheters and on the 2^{nd} day nephrostomy catheters were removed. The patients were discharged after cessation of urine leakage from the tract. Postoperatively, all patients were controlled with urinary ultrasonography and kidney ureter bladder. All data were reported as the number and percent or median (range), as appropriate see Table 1.

Table 1. Patient demographics and operative parameters

Operative and demographic data	Value
Patient old (mean)	24.6±3.2
Female/male ratio	17/15
Lateralization right/left	18/14
Stone size (cm)	3.05±0.7
Operative time (min.)	56 ±13
Floroscopy time (min.)	3.9±0.7
Hospital stay (day)	2.6±0.4
Sucses rate	%93.75
Blood transfusion	1 (%3.1)
Hematuria	4(%12.5)

±(standard deviation)

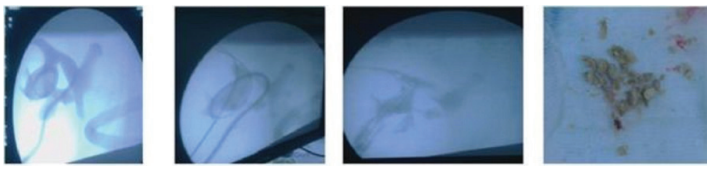

Figure 1. The cases with biphid renal pelvis

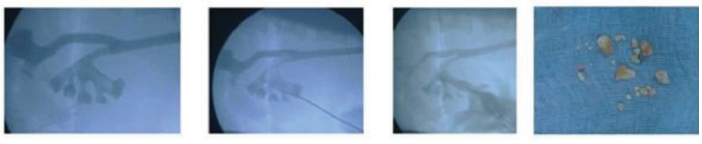

Figure 2. The cases with biphid renal pelvis

Results

Study population consisted of 15 male, and 17 female patients, with an overall median age of 24.6 (11-42) years. Stones were localized in the right (n=16 patients), left (n=13) kidneys, and proximal ureter (n=3) kidneys, while 6 patients had incomplete duplication of collecting system (Figure 1-2). The PNL procedures were performed under epidural (n=5) or general anesthesia (n=27). One patient underwent cystolithotripsy, ureterorenoscopy, and PNL because of rest Double J stent (DJS) which had remained in situ for 2.5 years. Median stone size (3.05 cm; range, 2- 5 cm), operative time (56 min; range, 28-120 min), hospital stay (2,6 days; range 2-4 days) were recorded. PNL procedures with postoperative rest stones of ≤ 4 mm in size were deemed to be successful, and our success rates were detected as 93.75 percent. PNL procedure failed in one patient who underwent a second PNL operation. In one patient after ureteral catheterization, and immediately before intrarenal access, fluoroscopy broke down which necessitated placement of a ureteral 4.8 F 28 cm DJS, and premature termination of the procedure. Neither Pulmonary or intraabdominal organ injuries were encountered, nor any life-threatening complications were observed. One patient (3.1 %) underwent blood transfusion because of hemorrhagic complications. In 4 (12.5 %) patients, a drop in hematocrit values which did not require blood transfusion was observed (Table 1).

Discussion

Percutaneous nephrolithotomy is a minimally invasive and effective treatment modality which has been used for nearly 40 years. It has been applied as the first-line therapy in the management of renal stones bigger than 2 cm. In the literature success rates ranging between 71 and 90 % were reported for the first percutaneous lithotripsy series, however in our country success rates varying between 68, and 77 % were reported for first series of PNL [5, 6]. In current series higher success rates have been achieved thanks to accumulating experience.[8-11] In our study success rate has been detected as 93.75 percent. We think that, our higher success rate relative to literature findings is related to our patient selection and residency training that we have received in a high-volume clinic.

Various complications of PNL procedure of wide spectrum have been reported in the literature which include bleeding, collecting system, visceral organ, pleural injuries, metabolic and physiologic complications, postoperative fever and sepsis, venous thromboembolism, neuromuscular complications, persistent urine leakage from the nephrostomy tract, obstruction, loss of renal function and death [12-15]. Complications seen in our cases includes bleeding requiring transfusion (n=1; 3.1 %), and decrease in hematocrit which has increased with conservative treatment (12.5%). In one patient, because of a technical problem in fluoroscopy device occurring during access, the procedure was terminated prematurely. In one patient the procedure was terminated by using 4.8 F 28 cm DJS. In one patient PNL was applied during the second session to achieve stone-free state. In this case during the first session dilatation could not be achieved because of broken guidewire with resultant failed access.

Although having limited number of cases, we accomplished success rates in compliance with literature reports, and complications as solid organ or colonic injury, and pneumothorax

were not observed. However, it should be kept in mind that in these cases these complications could be seen, and requirement for multidisciplinary treatment might arise. We think that, under conditions where specialists of every discipline are not available, as is the case with a county hospital, these operations should be absolutely performed in coordination with a more specialized center.

Conclusions

We think that, despite all the difficulties arising from limited facilities, PNL, which has currently become the gold standard treatment method for stone disease, can be performed in peripheral county state hospitals with acceptable complication rates and success rates closer to those reported in the literature.

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