Efficacy and safety of percutaneous nephrolithotomy in elderly patients

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Introduction:

Percutaneous nephrolithotomy is a minimally invasive method of treatment in renal lithiasis, being successfully procedure both young and elderly patients. The purpose of this intervention is to extract renal stones with minimal trauma to renal parenchyma.

In classical surgery, the patient's age, associated with other conditions can often be considered contraindications for the surgical intervention. In those cases is very important to develop a strategy that can afford to remove the stone using less aggressive techniques.

Urinary lithiasis is one of the most common urological pathologies known since antiquity. It is a real problem due to the increased prevalence of it's complications that many case the decline of renal function. Data from the literature highlights that approximately 20% of patients with recurrent lithiasis that required multiple surgery have developed a degree of renal deficiency.

The patient's symptoms can be different according to the localization of the stone and it's size, but the intensity and frequency may vary. Often, the presence of lithiasis may be asymptomatic , the stones can be accidentally discovered or can cause lumbar pain that irradiates anteriorly and inferiorly in the flank causing weakness and nausea.

The incidence of urinary lithiasis is approximately 3 times higher in men than females, and the probability of a man to develop lithiasis until the age of 70 is 1 to 8. The maximum frequency of the disease is between 35 and 55 years, being rarer before 20 years.

Approximately 1/4 of patients with urinary stones have a family history of urolithiasis.

Kidney lithiasis is currently occurring in developed countries, with an incidence of about 0.1% of the general population, with an increased prevalence in arid dry climate, so that, it has become an endemic disease in areas such as Southeast Asia, Middle East, India, etc., while Australia is a very rare disease. Also, it has an increased incidence in the US, the Nordic countries, the UK, and Central Europe.

Treatment of renal lithiasis in elderly patients is a topical issue due to the increasing age of the population and the incidence in this group of patients exceeds 10%.

Even if the practice of laparoscopic surgery and flexible ureteroscopy have reduced the number of cases with indication of percutaneous nephrolithotomy, it is recognized as the "gold standard" technique in the treatment of kidney lithiasis. Open surgical interventions remain reserved only for complicated cases where any other endoscopic surgical maneuver has failed.

Objectives.

The main objective of this paper was to highlight the efficacy and safety of percutaneous nephrolithotomy [NLP] in elderly patients [over 70 years].

The secondary objectives established consisted of:

• Evaluating the type and frequency of complications in elderly patients compared to younger ones in order to assess the effectiveness of treatment for this age group.

• The identification of complications and their frequency helps us to establish important conclusions in order to improve this type of treatment in the future.

• Most patients, in advanced age, have associated several conditions, so that we observed their contribution to the occurrence of intra or postoperative complications.

Methods

We performed 3 retrospective studies during a period of 20 years (1997- 2017) comprising patients who were admitted to the Urology Clinic, Tirgu Mures with diagnosis of renal stones who had the indication of percutaneous nephrolithotomy.

- In the first study we observed the effectiveness of percutaneous nephrolithotomy in the treatment of renal lithiasis by studying the frequency and type of complications that occurred in patients over 70 years of age and those below that age.
- In the second study, we evaluated the efficacy of NLP in a group of elderly patients [over 70 years]
- In the third study, we highlighted the possible associated conditions and the effectiveness of NLP in elderly patients [over 70 years].

All the patients included in the study:

- Have been informed about the diagnosis of renal lithiasis that was established after performing clinical and paraclinical investigations, alternatives to surgical treatment as well as the technique of performing percutaneous nephrolithotomy.
- They received all the information about possible NLP incidents or complications.
- They signed the informed consent attached to the observation sheet. For all patients, the confidentiality of personal data was respected.

All the results described in the related chapters are processed on groups of patients who have been hospitalized, diagnosed, investigated and surgically treated at Urology Clinic from Tîrgu Mureş.

Inclusion criteria and the classification of the obtained data in this study were:

- patients older than 18 years with renal stones located in the lower calyx, renal pelvis and ureteropelvic junction.

- the size of the kidney stone ≥ 20 mm; < 20 mm (stone size was calculated by taking into consideration the sum of the maximum diameters) and multiple lithiasis.

- the frequency of occurrence of intraoperative and postoperative complications according to age groups and size of the stone.

- age-groups: under the age of 70 and over 70 years old.

- number of days spent in the hospital (under and over 5 days according to the age groups and type of complications).

All patients signed an informed consent form prior to surgery.

The protocol used for the selection of patients consisted of:

- history

- abdominal ultrasound

- intravenous pyelogram (IVP) and/or computed tomography (CT)

- complete blood count, biochemical, and coagulation parameters

- urine cultures

Surgical technique:

A 5 Ch ureteral catheter and a 18 Ch urethral catheter were inserted in lithotomy position under spinal anesthesia. The calyceal system was visualized by using contrast material introduced into the ureteral catheter. Intrarenal access was achieved by using a percutaneous access needle under C-armed scopy unit. A hydrophilic guide wire was inserted. Dilatation was performed by the use of 9-24 Ch Alken dilators and a nephroscope sheath (sPNL) was inserted. A 26-Ch nephroscope (Karl Storz, Germany) was used for nephroscopy. Fragmentation was performed by the aid of an ultrasonic lithotripter, and stones were removed by using a stone extraction device. The intervention in almost all cases was finalized with the insertion of a 20-Ch nephrostomy tube under fluoroscopy.

Results.

In the first study who was conducted over a period of 5 years based on the analysis of the data of 56 patients aged over 70 years. The mean age was 73,9 years. We observed that the incidence of urolithiasis was higher in females 69.6 % (n = 39) than male 30.4 % (n = 17). In most of the cases the stone was localized in the pyelon (61 %), staghorn stones in 16%, inferior calycs in 5% and multiple lihiasis in 4% of the cases. Comorbidities were multipe included hypertension (48.2 %) , cronic ischemic cardiopathy (28.6 %) , cronic cardiac failure (16.1 %) , diabetes type II (17.9 %) , obesity (39.3 %) , chronic renal failure (8.9 %) , chronic or recurrent urinary tract infections (30.4 %), history of kidney stones (21.4 %) , solitary kidney surgery (1.8%), renal malformation (horseshoe kidney and renal incomplete duplication) (3.6 %) ,urethral stricture (3.6 %). 9 patients had duble "J" catheter on admission. The average length of stay in hospital after PCNL was 6,4 ± 2,8 days and the mean duration of the surgery was 27-30 minutes. The stone-free rate was: 82%.

The second study was conducted over a period of a year. Out of the total 200 investigated subjects 106 (53%) were male and 94 female (47%) patients. The mean age of patients was 53.65 years old (12.18 Standard Deviation - SD), ranging between 25 and 81 years old. 178 patients were younger than 70 years (Group1) and 22 were older than 70 (Group2). The stones were mostly localized in the renal pelvis (142), inferior calyx (46) and ureteropelvic junction (4). 28 cases of staghorn calculi were treated with percutaneous nephrolithotomy. The renal stone was larger than 2 cm in 76% and less than 2 cm in 13% of the cases and 11% of the cases had multiple lithiasis. Intraoperative complications were: migrating fragments (22%), hemorrhage (12%), lesions of the renal pelvis and difficulties of percutaneous access or dilatation (6%). There were no significant correlations between intraoperative complications and the two groups of patients ($p > 0.05$). The postoperative complications were: bleeding (20%), obstruction caused by stone fragments (22.5%), hydronephrosis (18%), fistula (13%). There were no significant correlations between postoperative complications and the two groups of patients ($p > 0.05$). The average length of stay in hospital after PCNL was 5.58 +/- 2.69 days SD. In most cases patients were discharged in less than 5 days (60% of the cases). Patients were hospitalized for more than

5 days due to complications like hemorrhage or obstruction which required adjuvant treatment. The stone-free rate was: 77.5%.

The third study was evaluated based on a retrospective study performed over a period of 16 years (1997-2012). A totally of 323 patients were selected for this study (162 women, 161 men) diagnosed with kidney stones and operated using the percutaneous nephrolithotomy procedure. The age of the patients was over 70. 85 patients (26.31%) had comorbidities

that were preoperatively diagnosed and treated where necessary. Overall status of "stone free" at the end of surgery was present in 263 patients(81.42%). 60 patients (18.58%) had residual fragments. Residual stones were solved by a new percutaneuos nephrolithtomy session, spontaneous elimination or extracorporeal shock wave lithotripsy . The most common complications were bleeding and infection. We had no deaths. No hemostasis nephrectomy was necessary.

Conclusions.

PCNL is a safe and effective method of treatment for large and complex stones that can be performed in both young and elderly patients.

Despite the existing comorbidities, the effectiveness of percutaneous nephrolithotomy in the elderly is comparable to that in younger patients who had a lower incidence of associated disease.

The presence of comorbidities in the elderly requires a more careful preoperative assessment but has not influenced postoperative outcomes, the frequency and type of complications, the "stone free" rate or the duration of hospitalization.

Intra and postoperative complications may occur in both age groups (younger patients or over 70 years of age) but does not represent a decisive factor in the choice of therapeutic attitude in elderly patients.

Percutaneous nephrolithotomy is a complex, effective and safe treatment method for kidney lithiasis, with an increased "stone free" rate in both young and elderly patients. The rate of "stone free" after percutaneous nephrolithotomy in elderly patients is not influenced by age or associated conditions (if they are detected and treated preoperatively), but can be influenced by the number of stones, size, location and complexity.