

RESEARCH ARTICLE

Percutaneous Nephrolithotomy (PCNL): First Experience in Mali

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Abstract

Objective: The aim of this study was to evaluate the results of our first experience in practising NLPC in Mali.

Patients and Methods: This is a descriptive cross-sectional study conducted in the urology departments of the Point G University Hospital and the ALMED Polyclinic in Bamako from August 2021 to November 2023, a period of 25 months. Patients who underwent SLIP for lithiasis during the study period were included in this study.

Results: A total of 43 cases of SLPS were performed during our study. The average age in our case series was 39 years, with extremes ranging from 6 to 78 years. The most represented age group was that of. Males were in the majority, accounting for 53.5% of cases, with a sex ratio of 1.15. The right kidney was the most affected, accounting for 55.81% of cases. Pyelic localisation was the most common, accounting for 51.16% of cases. The majority of stones were larger than 20 mm, accounting for 56% of cases. The average density was 1176 HU. Ultrasound was the energy source used to fragment the stones in 88.37% of cases. Stone-free status was achieved in 55.82% of cases. Postoperative recovery was uneventful in 42 patients (97.67%).

Conclusion: PCNL is a safe and reproducible technique in our country, and mastery of the technique significantly reduces complications.

Keywords: Nephrolithotomy, Percutaneous, Lithiasis, Experience, Mali.

1. Introduction

PCNL is a technique that involves direct access to the renal cavities via a nephrostomy tract, primarily to extract renal and ureteral stones with or without fragmentation during treatment. Percutaneous nephrolithotomy (PCNL) is the technique of choice for treating large kidney stones (≥ 2 cm). The choice of technique is mainly based on the surgeon's experience [1]. Technical advances and the miniaturisation of instruments have improved the effectiveness and reduced the morbidity of percutaneous nephrolithotomy (PCNL) [2].

The main risks of this procedure are haemorrhage, perforation of neighbouring structures (pleura, intestine, spleen, liver, etc.) and infection. [3] In practice, open kidney surgery for lithiasis has become rare today in urology departments that have mastered all techniques.

In Mali, despite the technical advances made in urology in recent decades, open surgery remains the procedure of choice in the vast majority of cases of urinary lithiasis, with all the discomfort this entails for the surgeon and complications for the patient. The aim of this original study is to evaluate the results of

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our first experience with PCSL in the management of urinary stones in Mali.

2. Patients and Methods

This is a descriptive, prospective cross-sectional study conducted in the urology departments of the Point G University Hospital in Bamako and the ALMED Polyclinic from August 2021 to November 2023, covering a period of 25 months. We included in this study all patients who underwent surgery for lithiasis by NLPC during the study period.

Patients diagnosed with renal lithiasis and treated by conventional surgery or other techniques were not included in this study.

After a physical examination, we performed a CT urography, a urine culture + antibiogram, a complete blood count, a creatinine test, a blood glucose test and a coagulation assessment on all our patients before the procedure. The data was entered into Word 2016 and analysed using EPI INF software.

3. Results

During our study, we performed 43 cases of NLPC out of a total of 2,836 surgical procedures, representing 1.51% of cases. The average age in our case series was 39 years, with extremes ranging from 6 to 78 years. The most represented age group was between 36 and 46 years old (Figure 1).

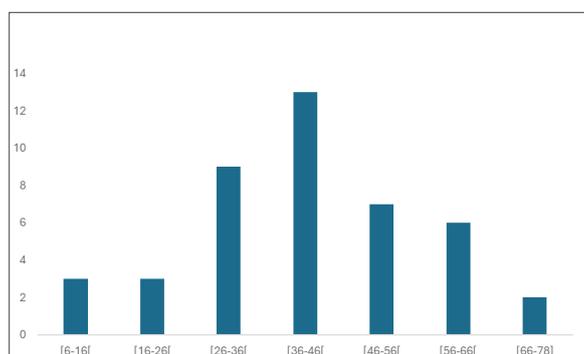


Figure 1. Distribution according to patient age

Male patients were in the majority, accounting for 53% of cases, with a sex ratio of 1.15 (Figure 2).

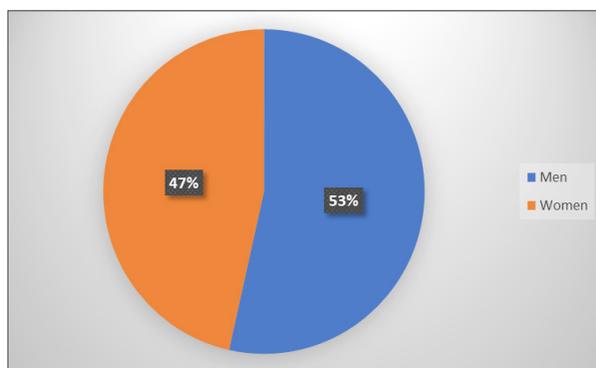


Figure 2. Distribution by sex

Table 1 shows the number of patients with a history of urinary stone treatment.

Table 1. Distribution according to history of urinary stone treatment.

Urological history	Frequency	Percentage
Lumbar puncture	6	13,95%
JJ's ascent	1	2,33%
No history of urological problems	28	65,12%
NLPC	5	11,63%
Ureterolithotomy	1	2,33%
Ureteroscopy	2	4,65%
Total	43	100,00%

We had a history of lithiasis in 34.88% of cases.

Urine tests were performed routinely in all patients prior to surgery. In our series, cultures were sterile in

36 patients (83.73%); Escherichia coli was isolated in 4 patients (9.31%); Klebsiella pneumoniae was isolated in 2 patients (4.66%); Staphylococcus aureus was isolated in 1 patient (2.33%).

Abdominal and pelvic CT scans were performed routinely in all patients in our series.

The right kidney was the most affected, accounting for 55.81% of cases.

Table 2. Distribution according to stone location

Seat	Frequency	Percentage
Pyelic	22	51,16%
Caliciel	4	9,31%
Coral-like	6	13,95%
Pyelo-caliciel	11	25,58%
Total	43	100,00%

The majority of stones were larger than 20 mm, representing 56% of cases.

The average density was 1176 HU. The predominant density range was greater than or equal to 1000 HU.

Modified supine position was the positioning used for all patients in our series. All patients underwent general anaesthesia.

In our series, renal puncture was performed under fluoroscopic guidance in all patients.

The energy source used for stone fragmentation was ultrasound in 88.37% of cases, followed by pneumatic in 6.98% of cases.

Stone-free status was achieved in 55.82% of cases during our study.

Nephrostomy drainage was effective in all patients, and the average duration of kidney drainage was 3.1±1 days.

The postoperative course was uneventful in 42 patients (97.67%), and one case of pyelonephritis was recorded. The average length of hospital stay was 2.3±1.2 days.

4. Discussion

NLPC accounted for 1.5% of our activities during our study. This result is very different from that of H. Boumzaoued in Morocco, who found 49.48% of NLPC out of a total of 772 cases of urinary lithiasis [4]. This difference can be explained by the fact that this was our first experience with NLPC and also by the lack of information on the technique in Mali.

The average age was 39, with extremes ranging from 6 to 78. Ghoundale O et al found the same result of 39, with extremes ranging from 25 to 56 [5]. These results are similar to those of many authors who found young subjects in their studies [6,7,8].

Lithiasis can affect all ages, but young people are more affected, as these studies show. In our study, three

The majority of patients had a single stone, accounting for 67.44% of cases. The pyelic location was the most common, accounting for 51.16% of cases (Table 2).

patients were under the age of 16, and the youngest was six years old. As our facility does not often have equipment suitable for children, this constitutes an obstacle to the indication of NLPC for patients in this age group.

Males were the most represented gender, accounting for 53.5% of cases with a ratio of 1.15. This result is similar to those of many other authors who have reported a male majority [6]. Grisard S et al in France found 41% women in their study [9].

In our series, 34,88% of patients had a history of surgical treatment for urinary stones.

Xin Chang Zou et al found a history of urinary stone treatment in 71.1% of patients in their series [10]. This result once again demonstrates the recurrent nature of lithiasis and the value of developing less invasive techniques such as SLPS in order to limit the damage to the kidney caused by open surgery.

Patients with a history of open nephrolithotomy who are treated with SLPS will undergo longer operating times but without any loss of efficacy or additional morbidity, according to Margel et al. [11]. However, these differences were not found by B Lojanapiwat et al [12]. In our practice, PCNL on a previously operated kidney was entirely feasible. We did not note an increase in the complication rate, but there were more puncture attempts when the pyelocaliceal system was deformed by previous surgery, with greater difficulty in dilating the percutaneous pathway. We believe that the use of Alken metal dilators is very important in overcoming scar fibrosis.

The ECBU was positive in 16.27% of cases requiring antibiotic therapy before, during and after NLPC. This result is similar to that of Imad Soussou et al in Morocco, in which 4 patients had a positive ECBU, representing 10.81% of cases. [13].

Abdominal and pelvic CT scans were performed routinely in all patients in our series. Mbodji M.M

et al in Senegal also used abdominal and pelvic CT scans to locate and characterise stones in their series [14]. The use of CT provides accurate information on the organs in the vicinity of the planned puncture site (spleen, liver, colon, pleura and lung) [1]. The right kidney was the most affected by stones, accounting for 55.81% of cases in our series. Bouteuille C et al also found the right kidney in 59.21% of cases in their series [15]. These results differ from those of Amine Derouiche et al, who found 56% of cases to involve the left kidney in their series [16]. The stones were single in the majority of patients, accounting for 67.44% of cases. This result is comparable to that of Palmero. X et al, who found a single stone in 93.1% of their series [17].

Pyelic localisation was the most common, accounting for 51.16% of cases. El Bahri et al also found pyelic localisation in 49.6% of cases in their series [18].

The size of the stones in our series was less than 20 mm in the majority of patients, i.e. 44% of cases. This result differs from those of other authors who found larger sizes, i.e. 25, 39.76 and 52.55 mm respectively [8,9,15]. This could be explained by several factors in our context: this was our team's first experience with PCNL, and the operating time factor, which depends on the size of the stone and the surgeon's experience.

Under general anaesthesia, we adopted a modified supine position, which allowed us to perform the anaesthesia and the various stages of SLPC at the same time, thus limiting anaesthetic risks and saving operating time. This position allows retrograde and antegrade access to the kidney without any need to turn the patient over [19].

The energy source used in stone fragmentation was ultrasound in 88.37% of cases, followed by pneumatic energy in 6.98% of cases. Youness et al used the same energy sources to fragment stones in their study [20]. These results differ from those of Traoré O et al, who used pneumatic energy in 97.72% of their series [6]. According to the EAU 2025 guidelines on urinary lithiasis, the energy sources are ultrasound and pneumatic energy, or a combination of the two, for the management of lithiasis by NLPC [21].

In our series, we achieved a stone-free rate of 55.82%. Mbodji M.M et al in Senegal found a stone-free rate of 96% in their series. Post-operative complications were minor in 97.6% of cases, with 2.33% of patients developing acute pyelonephritis.

For Duvdevani et al, major complications included 21 cases of urosepsis out of 1,583 cases (1.3%), 16

cases (1%) of pneumothorax/hydrothorax, and 13 cases (0.8%) of bleeding requiring transfusion or embolisation [22]. These differences can be explained by their larger series, 56% of which were stone-free. We had an average hospital stay of 2.3±1.2 days. This result differs from those of Bagrodia A and Maheshwari PN et al, who found lengths of stay of 3 and 4 days, respectively [23,24]. This difference can be explained by the relatively smaller size of our stones. The smaller size of the stones allowed us to break them up in less time with fewer complications.

5. Conclusion

NLPC is a safe and reproducible technique in our developing countries south of the Sahara. The availability of equipment and mastery of the technique and its indications enable surgeons, regardless of their country or culture, to achieve better results with fewer complications.

In our departments, this initial experience with percutaneous surgery has had a significant impact on the management of kidney stones, significantly reducing the number of lumbotomies performed for this lithiasis pathology. This surgery still needs to be learned and taught in order to minimise surgical risks. It does not rule out other therapeutic options: conventional surgery still has its place in cases where the procedure fails, while residual stones remain the preserve of LEC or ureteroscopy.

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