

Percutaneous laser mini nephrolithotomy in the treatment of renal lithiasis: Experience within the University Hospital of Fez (about 20 cases)

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World Journal of Advanced Research and Reviews, 2023, 18(01), 304–308

Publication history: Received on 27 February 2023; revised on 07 April 2023; accepted on 10 April 2023

Article DOI: <https://doi.org/10.30574/wjarr.2023.18.1.0604>

Abstract

Laser percutaneous mini-nephrolithotomy is a minimally invasive surgical technique, used mainly for the removal of upper renal and ureteral lithiasis

The objective of our work is to test the feasibility, efficacy and safety of this technique by comparing the results with those of standard NLPC, flexible uretero-nephroscopy and extracorporeal lithotripsy.

We report a retrospective study of 20 cases of laser mini-NLPC over a period from January 2022 to January 2023 in the urology department.

Mini-NLPC is as safe and effective as standard NLPC for the management of small and medium-sized (10-30 mm) kidney stones, including decreasing the rate of bleeding requiring transfusion and improving the rate of eradication of multiple stones... Although its use requires a longer operating time and has a slightly higher rate of postoperative fever, some of these features such as the length of hospital stay, the dose of postoperative analgesics make it a technique of choice.

Keyword: Urolithiasis; PCNL; Endoscopy; Valdivia modified

1. Introduction

The surgical management of renal lithiasis has evolved over the last decades with the over the last few decades with the appearance of LEC, NLPC, and USR, which has limited the indications for open surgery.

Percutaneous nephrolithotomy is based on the principle of removing kidney stones, through a nephrostomy tunnel created by transcutaneous route allowing the passage of allowing the passage of endoscopic instruments capable of extracting, crushing or pulverize the stones. [1].

Since its first description more than 40 years ago by Fernström and Johansson [2], NLPC has continued to benefit from technological advances in terms of in terms of miniaturization of endoscopes and power sources, which has This has given rise to new variants of this technique such as minipercutaneous or mini-NLPC. The latter consists in performing this procedure using a nephroscope and access sheaths of reduced dimensions compared to standard compared to standard NLPC, with the aim of obtaining an optimal result while reducing reducing the morbidity, the intervention time and the length of hospitalization associated with this surgery.

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2. Material and methods

This is a retrospective study of 20 cases of mini laser NLPC over a 13-month period of 13 months from January 2022 to January 2023 in the urology department. of urology.

2.1. Inclusion criteria

We included all records found archived within the department:

20 records could be obtained.

2.2. Exclusion criteria

Patients with incomplete records were excluded from our study.

3. Results

Table 1 Complications according to the Clavien-Dindo classification

Type of complications (Grade Clavien-Dindo)	Number	Percentage
Hematuria (grade 1)	2	10%
acute pyelonephritis (grade 2)	1	5%
Urinary extravasation (grade 3)	1	5%

The mean age was 52 years with a sex ratio of 1.5.

The average size of the stones was 20.29 mm.

The mean operative time was 63 min. The average hospital stay was 2.58 days.

The success rate was 95%. The complication rate was 20%. No deaths were reported in our series.

5% of pyelonephritis, 10% of postoperative hematuria, only one case (5%) presented a urinoma. The mean drop in hemoglobin was 0.89 g/dl. No patient required a blood transfusion.

3.1. Positions during mini-NLPC

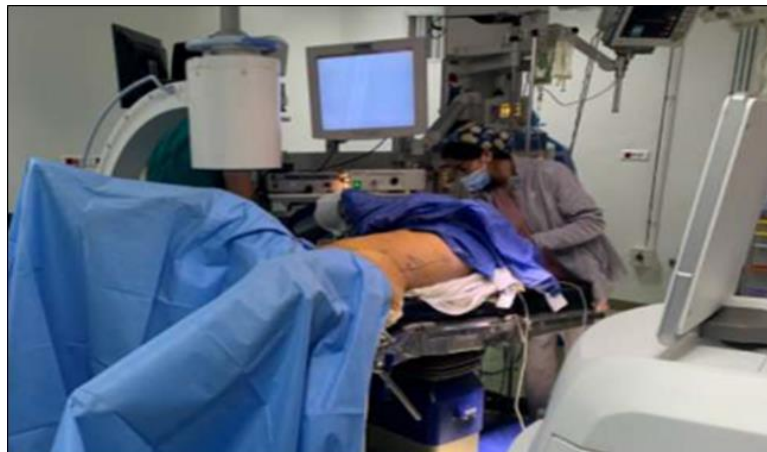


Figure 1 Modified Valdivia lateral position

It was Valdivia modified lateral in 90% of patients and prone in 10%. (Figure 1, Figure 2)

The prone position was suggested for two cases. One of these patients had large stones and the other one had a lithiasis with a superior calyctial seat.

4 of our patients benefited from a combined treatment by flexible-laser ureteroscopy (20%). (Figure 3)



Figure 2 Entry zone of the puncture needle



Figure 3 Fluoroscopic control of the puncture site during combined laser-flexible ureteroscopy treatment

4. Discussion

The overall success rate (stone free) in our series is 95%, which is comparable to that found in the literature.

The effectiveness of mini-NLPC is still debated. Proponents of this method mention limited blood loss, greater maneuverability, reduced postoperative pain and limited hospital stay. Limitations of the procedure include the need to disintegrate the stones into fragments small enough to pass through a smaller sheath, which lengthens the duration of the operation. [2]

The average operative time was 63 minutes with extremes of 50 to 110 min. Our average operative time is consistent with the results obtained in the literature.

The modified Valdivia supine (or modified lateral) position shortened the operative time by slightly more than 20 minutes. Moreover, with this position we could perform a combined ureteroscopy-laser treatment. This is very difficult with the prone position (ventral decubitus). Thus, the modified lateral Valdivia position offers comfort to the surgeon and repositioning of the patient who is intubated and perfused is not necessary.

However, the kidney is more mobile and upper calicium puncture is more difficult.

The overall complication rate in our series is 20%, which is slightly lower than the figures reported in the literature. [3]

The overall complication rate of standard mini-NLPC in the literature varies between 11.9% and 37.9%, depending mainly on the experience of the operator, the technical platform, the anatomical variations of the kidney and excretory tract, the presence of comorbidity and the high rate of nosocomial infections.

The mortality rate of mini-NLPC in the literature is between 0% and 0.02%. In our series, no death was reported.

Table 2 Comparison between mini-NLPC and NLPC in the literature

	Mini NLPC Our series	NLPC Mishra S	NLPC Cheng	NLPC Netto	NLPC Benckekroun
Year	2022	2011	2010	2007	2001
Number of cases	20	28	69	119	103
Success rate %	91.7	100	70	84.1	92
Residual calculations %	8.3	0	30	15.9	8

The success rate of our mini-NLPC series (95%) is comparable with those of NLPC in the literature

The average duration of the procedure, calculated from the puncture of the renal cavities to the closure of the puncture site, was 63 minutes with extremes from 50 to 110 min.

In our series the complication rate was 20%. The total complication rates published in a recent series of mini-NLPC according to the Clavien system range from 11.9% to 37.9%.

Clavien grades I, II, III, IV, and V are seen in 2.7-20.8%, 1.4- 17.3%, 0- 10.3%, 0-0.05%, and 0-0.02% of patients, respectively. In comparison, total complication rates in conventional NLPC series range from 16.2% to 60.3%, and Clavien I, II, IIIa, IIIb, IVa, IVb, and V rates are observed in 4- 41.2%, 4.5-17.6%, 0-6.6%, 0-2.8%, 0-1.1%, 0- 0.5%, 0-0.1%, respectively. [4,5]

Table 3 Comparison of operating time between mini NLPC and NLPC in the literature

	Mini NLPC	NLPC							
Our series	Our series	Yeong-ching et al		Gusti et al		Sofer et al		Minshra et al	
		Standard	Tubless	Standard	Tubless	Standard	Tubless	Tubless TT	Standard
Duration Mean Operative (Minute)	63	126,6	94,9	112	98	130	116	33+/- 16	31+/- 16

The mini-NLPC appears to be a logical outcome of the progress in the miniaturization of endoscopic surgery and the introduction of new technologies.

The success of NLPC depends directly on the mastery of the procedures for puncturing the renal cavities and dilating the pathway, hence the need for a perfect knowledge of the anatomy of the kidney and the orientation of the renal cavities, as well as of the equipment necessary to perform this procedure.

At present, the recommendations of the various learned societies reserve mini-NLPC for the treatment of kidney stones in children.

It is efficient because of its results compared to other techniques and its low morbidity. It is also well accepted by the patient, especially since the duration of hospitalization is short, with the possibility of performing it as an outpatient surgery, and its financial cost is acceptable.

Compliance with ethical standards

Acknowledgments

Acknowledgments for the staff of the Department of Urology, Hassan II University Hospital, Fez, Morocco.

Disclosure of conflict of interest

No conflict of interest.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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