



ULTRA MINI PCNL(UMP-MIP)- OUR EXPERIENCE

Urology

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ABSTRACT

Introduction: Urinary stone disease has affected humans since antiquity. Major evolutionary advances have made renal stone management improve and made it safer. The new minimally invasive techniques, such as extracorporeal shock wave lithotripsy (ESWL), retrograde intrarenal surgery (RIRS), and percutaneous nephrolithotomy (PCNL) along with the MIP have now largely replaced open surgery. The latest addition to these techniques is the, UMP (ultramini PCNL) which is a minimal invasive technique indicated in small renal stones.

Aims And Objectives:

1. To study prospectively the feasibility of success of the ultra mini technique in management of renal /Upper ureteric stones less than 2cm in size.
2. To study and compare the Intraoperative and Postoperative outcomes in both techniques.

Results: A total of 25 patients were included in the study. The mean age noted was 27.96, the study included pediatric age group too. Immediate stone clearance was in 24(96%) cases and stone clearance was 100% in all cases on follow up of 4weeks. The mean duration for surgery was 76.4 minutes. None of the patients needed a PCN tube placement. A double J stent was placed in 23(92%) cases whereas, 2 (8%) had a ureteric catheter in situ for 48 hours. The mean no of days of hospitalization noted was 3.0 days.

Conclusion: Our study shows that the new emerging technique, UMP is a safe and effective procedure for stones less than 2cm in size. In certain cases like pediatric age groups, stones in pelvicalyceal systems having no dilatation and calyceal diverticular stones, it seems to be very helpful. It is a promising alternative to RIRS and ESWL.

KEYWORDS

Pcni, Minimal invasive pcni (MIP), Ultra mini pcni (UMP), small stone management, paediatric stone

INTRODUCTION

Urinary stone disease has affected humans since antiquity. Urolithiasis associated morbidity is common around the world, with a lifetime prevalence of 5-10%.¹ Moreover, renal stones are a recurrent disorder, with risk of recurrence been reported as high as 50% in a lifetime.² Therefore, urolithiasis is considered a health problem with significant socioeconomic parameters, which influences the quality of life.

Major technical advancements have improvised minimally invasive techniques and the treatment process of kidney stones, such as extracorporeal shock wave lithotripsy (ESWL), retrograde intrarenal surgery (RIRS), percutaneous nephrolithotomy (PCNL) and laparoscopic ureterolithotomy, which have now replaced open surgeries in large number.

In order to reduce complications associated with larger instruments like blood loss, postoperative pain and potential renal damage, a modified technique of standard PCNL has been developed. This is performed with a miniature endoscope of 12 Fr via a small percutaneous tract (15-16 Fr) and named as minimally invasive PCNL (MIP) or mini-PCNL or mini Perc.

The latest advancement in the minimal invasive PCNL method is the "Ultra-Mini-PCNL (UMP).UMP, is an attempt to decrease the tract size further than Mini-PCNL. UMP is technique that uses a 3F telescope with an exclusively designed 7.5F nephroscope that allows the urologist to carry out PCNL with 11-13F sized sheaths.² This reduction in the tract size to as small as an 11F from a large 30F (standard), ultimately provides decreased cross-sectional surface area to almost one-eighth of the standard tract size. This miniaturization of the tract size helps in reducing bleeding and tissue trauma.

The purpose of this study is to observe the outcomes of ultra mini pcni in terms of morbidity and stone free rates in patients with stone size less than 2 cm

AIMS

1. To study prospectively the feasibility of success of the ultra mini

technique in management of renal stones less than 2cm in size.

OBJECTIVES

1. To study and compare the Intra operative and Postoperative outcomes of the technique.

MATERIALS & METHODS

An observational study was conducted in a tertiary care centre to evaluate the outcomes and feasibility of UMP.

Study Inclusion Criteria:

1. All age groups
2. Stone size less than 2 cm in the kidney or 1-1.5 cm in Pelviureteric junction.
3. Normal renal function

Exclusion Criteria:

1. Patients with Urosepsis
2. Uncorrected Coagulopathy

A total of 25 consecutive patients of renal stones were included in the study after informed consent.

Informed written consent was taken from all patients. All patients included in the study were evaluated as per the proforma. A detailed history was taken and physical examination was done. Laboratory investigations were carried out as per requirement. The tests included haemogram, renal function tests, blood sugar level, coagulation profiles and urinalysis with urine culture and sensitivity. Appropriate antibiotics were given according to sensitivity pattern preoperatively in cases where urine culture showed evidence of infection. Others received standard 3 doses of cefuroxime(1.5grams) as per our department protocol.

Intra-operative PCN fluid culture or stone cultures were sent whenever feasible or indicated.

Radiological evaluation was done in the form of plain X-ray of kidney,

ureter and bladder (KUB) and ultrasound of the abdomen and KUB. All patients underwent an intravenous urography (IVU) or CT Urography prior to the procedure to assess the collecting system and were taken up for surgery.

Surgical Steps

Under general or spinal anesthesia, the patient was given lithotomy position on fluoroscopic table. A 6 Fr ureteric catheter was passed into the pelvi-calyceal system under fluoroscopic guidance to opacify pelvicalyceal system. The patient was turned prone and puncture of the desired calyx was done under fluoroscopic control with an 18-gauge trocar needle/PCN needle. A 0.035-inch guide wire was then introduced into the renal collecting system via the puncture needle and positioned in the ureter or else in the superior calyx.

For ultra mini pcnl, only a single-step dilatation is required. Dilatation was done under fluoroscopic control and the 11F or 13F metal Amplatz sheath was passed over the dilator to provide direct access to the collecting system. The 7.5F nephroscope was then passed through the sheath to visualize the collecting system.

Stones were fragmented under direct visualization using Holmium: YAG laser using a 365 μ end-firing optical fiber, using power up to 30 W (1.5 J/20 Hz). Stone fragments were washed out using the "water-jet" effect using saline with an irrigation pump. An additional feature of this technique is spontaneous expulsion of stone fragments through the sheath under the influence of the turbulence (whirlpool effect) produced by the irrigation fluid as they are broken up, as opposed to conventional PCNL, where each fragment requires to be manually extracted.

The UMP system (KARL STORZ, Germany) is also equipped with an irrigation channel which runs through the whole length of the cannula and allows irrigation or "washing-out" of the pelvi-calyceal system of all the debris at the end of the procedure using a hand-held syringe². This helps in clearing out the kidney of all fragments and achieving a stone-free status on the table.

All underwent a tubeless procedure and the flank was compressed for 10 min. If DJ stent was not placed then ureteric catheter was kept for 48 hours and it was removed after confirming stone clearance on X-ray KUB and no soakage of PCN site. Clearance was defined as no stone visible on X-ray KUB and all fragments less than 4 mm were considered as clinically insignificant residual fragments.

We noted patient demographics, stone characteristics (size, number, location), operative time, postoperative analgesic requirement, stone clearance and double 'J' stent placement. Any complications either intra operative or postoperative were noted. Lastly, pre and postoperative hematology and biochemistry were noted. Analgesic requirement and need of transfusion were also noted for.

RESULTS

A total of 25 patients were included in the study. all patients had single stone of size, less than 2cm. Demographics: study included 15(57%) male patients and 10(43%) female patients. The mean age noted was 27.96, the study included pediatric age group too.

Laterality: 13(52%)cases had stone on the right side whereas, 12(48%) cases had on the left side. The mean stone burden noted was 13.16. the most commonest location was the pelvis with 11(44%) followed by the inferior calyx(32%). Most common calyx for entry in our study was the inferior calyx (52%). Immediate stone clearance was in 24(96%) cases and Stone clearance was 100% in all cases on follow up of 4weeks. 1 patient (4%) needed ancillary procedure of ESWL for the stone residue. The mean duration for surgery was 76.4 minutes.

None of the patients needed a PCN tube placement. A double J stent was placed in 23(92%) cases whereas, 2 (8%) had a ureteric catheter in situ for 48 hours. The mean drop in hemoglobin was 1.36 \pm 0.27gm%. among the 25 patients who underwent ultra mini PCNL, 1(4%) developed fever and 1(4%) had a pelvic perforation as complication, which were managed conservatively.

The mean number of days of hospitalization noted was 3.0 days. Each patient received a standard dose of 1 gm paracetamol infusion 8 hourly for 24hours: Any further dosage was called as additional dose requirement. Only one patient needed additional 2 doses. The mean

irrigation fluid required was 2.86 litres.

Table 1: Demographic Details

FACTORS	RESULTS
Age	Mean: 27.96
Sex	Male:15(57%); Female: 10(43%)
Mean stone size	13.16cm
Stone location	Pelvis: 11 Inferior calyx: 8 Superior calyx: 3 Middle calyx: 3

Table 2 : Outcome Results:

Parameter	Result
Mean operative time	76.4 mins
Mean hospital stay	3 days
Ancillary procedure done	1 case (ESWL)
Mean hemoglobin drop	1.36 gm%
Complications	Perforation: 1patient Fever: 1patient

DISCUSSION:

Emergence of PCNL has led to significant change in management of renal calculi. The standard PCNL is now a time-tested method for managing renal calculi. It has a better stone free rate irrespective of the stone size and location, also an early recovery in comparison to open methods. The conventional PCNL, requires a 26 to 30-Fr tract for renal access with rigid nephroscope of diameters up to 26- 28 Fr. These large scopes allow maximal working and irrigation channels with good vision making PCNL most accepted technique for renal stone management.

Despite the standard PCNL's successful stone free rates, it is associated with significant morbidity. Moreover, these large size sheaths and scopes are not a feasible option in pediatric age group.

The latest advancement, UMP is a promising technique added to the pcnl armamentarium to the urologist. It appears to be safe and feasible for small burden stones and seems to be a very helpful technique in dealing with pediatric renal stones where the pelvicalyceal systems are small.

Decreased diameter of the Amplatz sheath still provides the surgeon adequate working access. Along with significant reduction in damage to the renal parenchyma³. The present study shows that the UMP an effective and safe procedure, with decreased overall duration of hospital stay, reduced postoperative pain, and fewer complications.

UMP is ideal in small renal stones of size less than 20mm and offers itself as an alternative to ESWL or the other new technique which is currently very popular, the RIRS. It is specially handy in cases such as, lower pole stones which are difficult to be managed by RIRS, calyceal diverticular stones, and ESWL failed cases stones⁴.

The decreased morbidity rate in terms of small size of the tract leading to less tissue trauma, lesser blood loss and lesser postoperative pain is all possible by the UMP. It can be performed completely "tubeless" in most of the conditions, which is a great comfort for the patient with relatively early recovery. Nowadays, in most of the centers it is being performed as a day care procedure, where patients are being discharged in 24 hours of the procedure. The immediate stone free clearance and also long term stone free rates seem to be higher with UMP in comparison to ESWL.

Though this cannot replace the standard PCNL, it can be a supplementary technique, which especially may be of a great advantage in pediatric ages. The cost is lesser than RIRS, which is also a matter of consideration in developing countries.

The limitations of UMP are that it can be difficult to use in branched stones, in case of bleeding, vision may get hampered leading it to convert to standard PCNL, no instrument can be used due to which clot removal or sometimes, stone retrieval is not possible.

CONCLUSION:

Our study shows that the new emerging technique, UMP is a safe and effective procedure for stones less than 2cm in size. In certain cases like pediatric age groups, stones in pelvicalyceal systems having no

dilatation and calyceal diverticular stones, it seems to be very helpful. It is a promising alternative to RIRS and ESWL.

REFERENCES

1. Stamatelou KK, Francis ME, Jones CA, Nyberg LM, Curhan GC. Time trends in reported prevalence of kidney stones in the United States: 1976-1994. *Kidney Int.* 2003;63:1817-23.
2. Desai J, Zeng G, Zhao Z, Zhong W, Chen W, Wu W. A novel technique of ultra-mini-percutaneous nephrolithotomy: introduction and an initial experience for treatment of upper urinary calculi less than 2 cm. *Biomed Res Int.* 2013;2013:490793.
3. Patrick Jones, Grace Bennett, Omar M. Aboumarzouk, Stephen Griffin, and Bhaskar K. Somani. *Journal of Endourology*. Sep 2017.816-824
4. Agrawal MS, Agarwal K, Jindal T, Sharma M. Ultra-mini-percutaneous nephrolithotomy: A minimally-invasive option for percutaneous stone removal. *Indian J Urol [serial online]* 2016;32:132-6.