

# A study of paediatric percutaneous nephrolithotomy in a tertiary care center

Joshi A<sup>1</sup>, Tiwari P<sup>2</sup>, Chanchlani R<sup>3</sup>

<sup>1</sup>Dr Arvind Joshi, Assistant Professor, Department of Surgery, <sup>2</sup>Dr Punit Tiwari, Assistant Professor, Department of Surgery, <sup>3</sup>Dr Roshan Chanchlani, Associate Professor, Department of Surgery. All are affiliated to Chirayu Medical College and Hospital Bhopal, MP, India

**Address for correspondence:** Dr Roshan Chanchalani, roshanchanchlani@gmail.com

## Abstract

**Aims:** To evaluate the technique of Paediatric Percutaneous Nephrolithotomy in terms of safety, outcome and efficacy in age group 1 to 14 years. **Material & Methods:** The observational study was done from October 2011 to October 2014 in Chirayu Medical College Bhopal. 25 cases of renal stone in paediatric age group were admitted in our hospital and evaluated for size of the stone, number of stones, associated congenital anomalies and complications. PCNL was done by standard technique. **Results:** A total number of 25 children were operated. Sex distribution in our study was male 15 and female 10, most of the patients were of age group 10-14 years. Most of the children (15) had large stones >2cm stones and small stone were seen in (6) cases. Malrotated kidney having stone was seen in 8(32%) cases. Complications as fever and haematuria were observed in 1 (4%) case. The maximum sheath size used in children was 24 F. Out of 25 children, only one patient required blood transfusion. **Conclusion:** Paediatric PCNL is safe procedure in expert and experienced hands. Minimal invasive procedures are beneficial in paediatric age group because of longer life expectancy and more risk of recurrence.

**Keywords:** PCNL (Percutaneous Nephrolithotomy), Stone Disease, Congenital Anomaly.

## Introduction

The prevalence of renal stone is approximately 2-3% in general population. In developing countries renal stone disease in children is not uncommon. Malnutrition, racial factors, anatomical and metabolic abnormalities as hypercalciuria, hyperoxaluria, hypocitraturia are important risk factors for high incidence and recurrence of stones in children [1]. In India it is more prevalent in northern states than in southern states of India. Earlier urinary stones were a major health problem, with a significant proportion of patients requiring extensive open surgical procedures with its high morbidity. In adults PCNL is well established as successful procedure and it has been reported effective in pediatric population since 1985.

Advancements in endoscopy instrumentation, such as smaller nephroscopes efficient energy sources for intracorporeal lithotripsy, including holmium: yttriumaluminum-garnet (YAG) laser and smaller

pneumatic lithoclast and ultrasound probes have greatly facilitated percutaneous treatment techniques in children. However, there is currently no international consensus on the indications for PCNL in children as open surgery has lost ground.

## Material and Method

The Study period includes three years from October 2011 to October 2014. After ethical committee approval the study was done in Chirayu Medical College and hospital Bhopal. 25 cases of renal stone in paediatric age group <14 years were admitted in our hospital were included and evaluated for size of the stone, number of stones, associated congenital anomalies and complications.

**Inclusion criteria:** Renal stones of >1.0 cm, failed cases of URS /ESWL, anatomical abnormality which obstructs the drainage & clearance. **Exclusion criteria:** CRF and bleeding disorders. All cases were evaluated preoperatively with routine laboratory investigations including urine examination, culture and sensitivity,

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Blood urea, Serum creatinine, X-ray KUB, Ultra sound KUB region, IVP, Non-contrast CT scan of KUB region for radiolucent calculi and patients with renal anomalies. **Technique:** Intravenous antibiotic prophylaxis was given and under general anesthesia, patients were subjected to retrograde catheterization (4-6 Fr) using cystoscope. After doing RGU patients were turned to prone position. Posterior inferior calyceal puncture with fluoroscopic guidance was performed by using 18 G needle and single step dilatation of tract over guide wire was performed up to 18-24 F as per stone burden and size of the patient by

using rigid nephroscope. Heated sterile saline was used for irrigation of tract. Stone fragmentation done by pneumatic lithoclast and three prong grasper was used to extract stone fragments and DJ Stent was placed. Nephrostomy was kept in all patients which was removed after 2 days. At the conclusion of procedure, stone clearance was evaluated fluoroscopically and sonologically. On the 1st Post-operative day -X-Ray KUB & Ultra Sound KUB region were done in all the patients to assess the stone clearance before removing the nephrostomy.

## Results

In our centre, a total number of 25 children were operated. Out of 25 patients 10 patients had congenital anomalies but none of the anomalies was associated with operative difficulties during the PCNL procedures which was due to expertise surgeons except one case of horse shoe kidney in which the stone was approached through the upper calyx and in all other cases the approach to the stone was through the lower calyx.. **(Table.3)** Complications as fever and haematuria was observed in 1 (4%) case. **(Table.4)** All the patients were followed for one year period and were doing well.

**Table 1: showing agewise distribution of cases**

Age Group	No of Patients-25	%
0-5 years	2	8
5-10 years	8	32
10-14 years	15	60

In study population boys were more commonly involved than girls. Disease was more common beyond the age of 10 years.

**Table 2: showing various sizes of stones in patients**

Size of Stone	No of patients- 25
Small stone(<2cm,multiple)	6
Large stone(>2cm)	15
Staghorn calculus	1
Bilateral (<2cm)	3

Most of the children (15) had large stones >2cm stones.

**Table 3: showing distribution of congenital anomalies in patients**

Congenital anomalies	No of patients-25	%
Horse shoe kidney	1	4
Malrotated kidney	8	32
Duplex moiety	1	4
Total	10	40

Malrotated kidney was most common congenital anomaly encountered in study.

**Table 4: showing various complications in patients**

Complications	No of patients-25	%
fever	1	4
haematuria	1	4
Paralytic ileus	2	8
Urosepsis	1	4
Perinephric collection	0	0
conversion to open	0	0

## Discussion

With the evolution of technique and miniaturization of urological instruments the management of pediatric stone disease has significantly changed. Traditionally Shock wave lithotripsy is the treatment of choice for most of small calculi while PCNL or open surgery is reserved for larger stones with anatomic abnormalities [2,3].

The indication of PCNL are large upper tract stone burden (>1.5 cm), lower pole calculi > 1cm, concurrent anatomic abnormalities impairing urinary drainage, including uretero pelvic junction obstruction. The use of ESWL is the treatment option in children with upper ureter and renal pelvic stones <2cm and lower pole calyx stone < 1cm. Stone free rates following PCNL are reported in literature as 73-96%. The first series on paediatric PCNL was published by Woodside et al with 100% stone free rate with no significant complications [4]. Large retrospective series of PCNL monotherapy have demonstrated high efficacy rates that approach 90%. Samad et al found age and weight not to be barrier to performing PCNL successfully [5]. In an effort to reduce the number of tracts and associated morbidity, some centers have chosen to follow primary PCNL with adjunctive SWL therapy to clear residual stone fragments. Bayrak et al compared PCNL and open surgery and concluded that PCNL had better results [6]. Similar to adult population, large retrospective series have demonstrated that PCNL is a safe and effective procedure for the management of nephrolithiasis in children.

Schuster et al described PCNL as completely replacing open surgery for renal stones in paediatric population [7]. Zeren and associates reported a 87% stone-free rate using ultrasound and EHL for fragmentation and tract dilatation from 18F to 30F [8]. In our study we have evaluated the indications of PCNL in pediatric age group by doing PCNL indifferent clinical situations like children with anatomical anomalies, children with

unfavourable calyceal anatomy. In our series most of the children 15 (60%) had large stones >2cm stones and small stone was seen in 6(24%) cases. Anatomical anomaly Malrotated kidney having stone was seen in 8(32%) cases which is comparable with the literature. Complications as fever and haematuria were observed in 1 (4%) case. Desai and co workers reported a stone-free rate of 89.8% using EHL through a 14F nephroscope and a 20-24 F sheath. Of these, 61% needed multiple tracts, and 45% were staged procedures [9]. With increasing experience, PCNL is currently being used as monotherapy and in combination with SWL (sandwich therapy) in children and ESWL is accepted as first line therapy in management of paediatric stones [10].

## Conclusion

Paediatric PCNL is safe procedure in expert and experienced hands. Minimal invasive procedures are beneficial in paediatric age group because of longer life expectancy and more risk of recurrence.

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