Journal of Surgical Sciences (2012) Vol. 16 (2) : 76-79

JOURNAL OF SURGICAL SCIENCES

Original Article

PERCUTANEOUS NEPHROLITHOTOMY (PCNL) FOR MANAGEMENT OF RENAL STONE IN PEDIATRIC PATIENT- SINGLE CENTER EXPERIENCE

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Abstract

Introduction: Percutaneous nephrolithotomy (PCNL) is already an established method of management of renal stone in Bangladesh. Initially the procedure was restricted to adult age group only. Percutaneous Nephrolithotomy is the choice of procedure for management of renal stone in paediatric age group.

Objectives: To see the out come of stone clearance by Percutaneous Nephrolithotomy (PCNL)in paediatric age group

Methods: This was a study in single centre since January' 09 to December 2011. Total 11 cases of renal stone in paediatric age group were managed by PCNL. The age ranges from 4 years to 15years, average 8.47 years. We use pneumatic lithotripters. Nephrostomy tubes and D-J stent were used in 7 cases. In 4 cases only DJ stent were used. Post-operative haematocrit and creatinine was measured routinely.

Results: Total stone clearance was achieved in all cases. The major post-operative complication was urosepsis(n-1), managed conservatively. Total hospital stay was 3 to 5 days; average 3.5 days. Stents were removed after 2 weeks.

Conclusions: PCNL is a suitable procedure for the management of renal stone in pediatric age group. This needs expertise, longer learning curve under supervised training.

Introduction

Renal stone disease is not uncommon problem in Bangladesh. ESWL, PCNL, Open Surgery are the modalities of stone management. The advantage of ESWL by Chaussy et al[1] in 1982 has redefined the treatment of stone disease. Several reports have attested to its safety in pediatric population[2,3,4]. Safety of PCNL has also been established in this age group[5,6]. Methodology and type of equipment used differ. Here we express our experience and modification using the inner sheath of adult Storz Nephroscope and sometime 10Fr URS. This combines the advantage of safety and convenience of using adult size energy probes and instruments.

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Received: 04 September, 2012 **Accepted:** 08 January 2013

Materials and Method

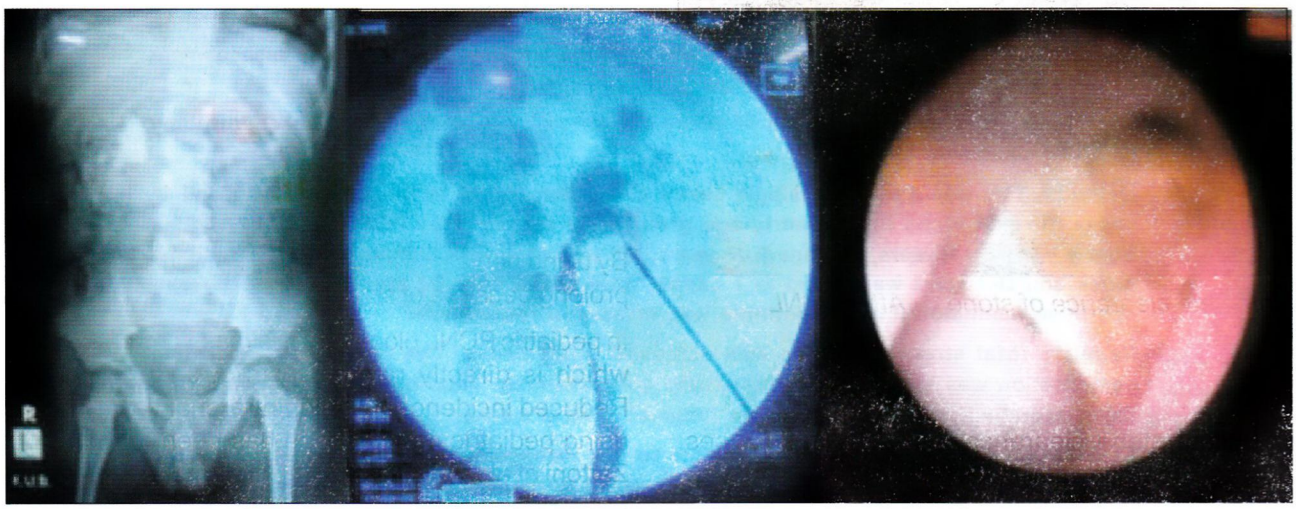
PCNL done in Pediatric patient (below 15 years) with renal stone admitted in the department of Urology Bangladesh Medical College Hospital from January' 09 to December 2011. Out come of PCNL analyzed retrospectively. Total 11 patients in 11 renal unite age 4 - 15 years (average 8.47years), all patient were male. After admission in the department of urology all the patient were evaluated by history, clinical examination and investigations. Basic workup of these patients includes renal function, urine culture and intravenous urogram. Those patients having growth of organism in urine c/s procedure postponed and antibiotic therapy as per c/s given. After proper treatment of infection PCNL was performed. One patient had positive urine culture. Procedure performed under general anaesthesia. Initial ureteric catheterization done in cystoscopic position then change the position to prone position. Initial puncture

was made in desire calyx under fluoroscopic guidance. Tract was dilated by alken's metallic telescopic dilator.

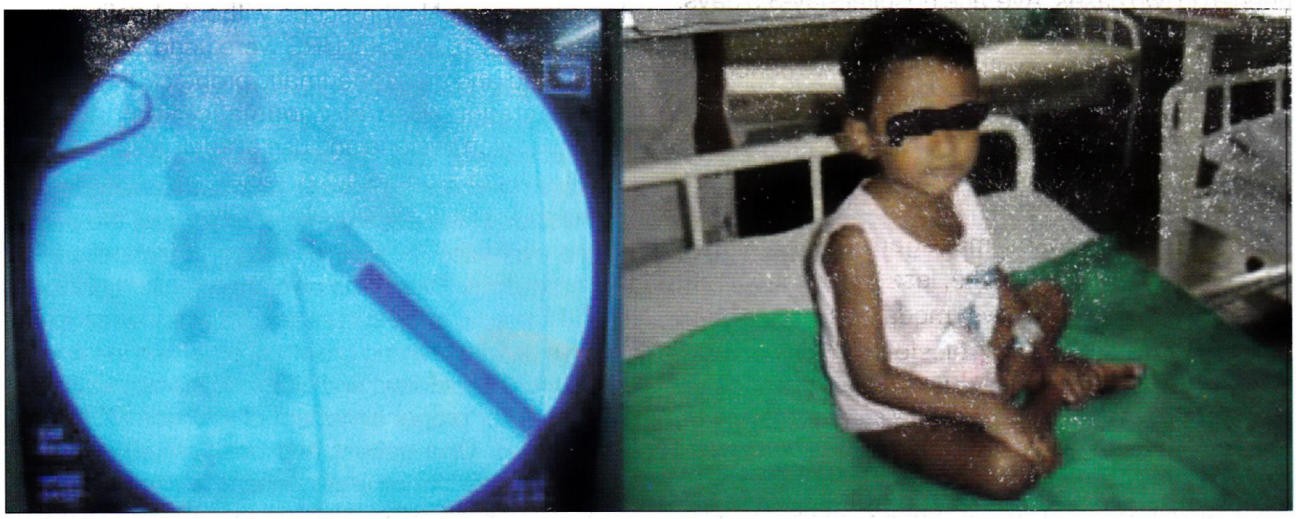
Location of stone	
Partial staghorn calculus	: 3 cases
Pelvis stone	: 3 cases
Pelvis stone and inf.calyceal stone	: 2 cases
Upper calyceal stone	: 2 cases
Residual upper calyceal stone after open surgery	: 1
Site of puncture	
Inferior calyceal puncture	: 7
Upper calyceal puncture	: 2
Mid calyceal puncture	: 2
Single (fluroscope guided)	

In some cases tract dilated upto 21 Fr and in some cases 24 Fr.

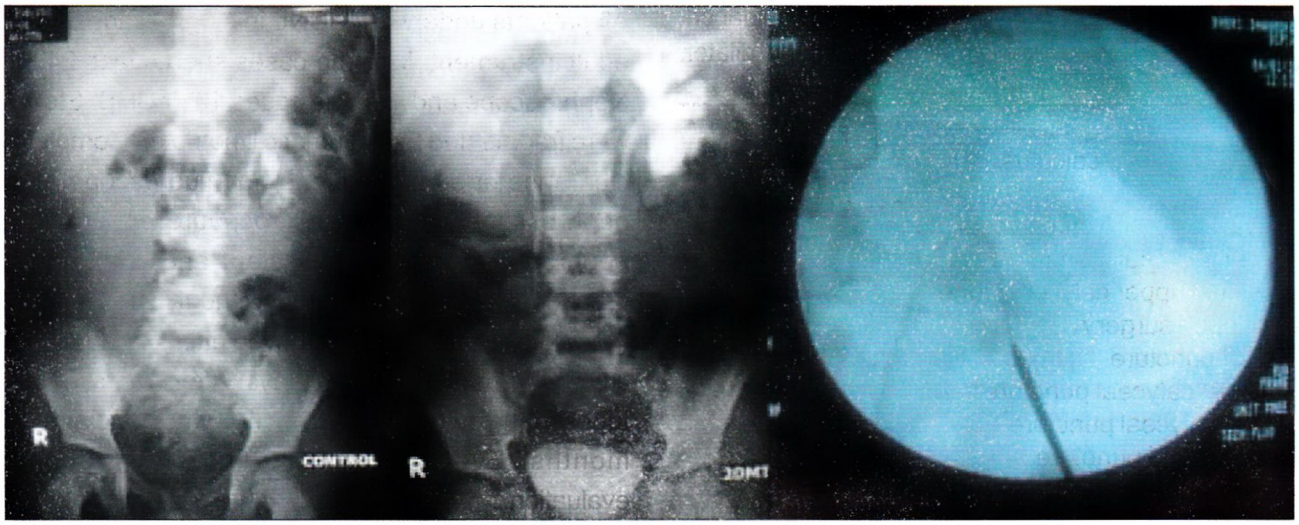
All patients underwent PCNL in single stage using adult instrument. In some cases sheath less 24 Fr Nephroscope and in some cases 10 Fr URS. Stone were fragmented by pneumatic lithotripter. Complete clearance of stone confirmed by fluoroscope and nephroscope. In 7 cases procedure ended with nephrostomy tube and JJ stent and in 4 cases procedure ended only JJ stent without nephrostomy tube. Nephrostomy tube removed after 24 hours and JJ stent removed after 21 days. After removing all tubes, urine culture was done. IVU was done after 3 months. Every patient underwent metabolic evaluation.



Right renal stone *Puncture & tract dilation* *Endoscopic view of stone*



Complete clearance of stone *After PCNL*



Left renal stone *IVU of left renal stone* *Puncture &dilatation*

Complete clearance of stone *After PCNL*

Results

Complete stone clearance achieved in all cases. Average operation time was 60 min.

Nephrostomy and D-J stenting in 7 cases. Only D-J stenting in 4 cases. Per-operative blood transfusion needed in two cases .Average hospital stay-3.5 days. Nephrostomy tube kept for 24 hours. Stent removed after 2 weeks. After 3 months in 10 cases we performed USG KUB, plain X-ray KUB and urine C/S. All revealed normal and no metabolic cause was found.

Discussion

Pediatric PCNL poses management challenges because of small kidney size, less knowledge about the longterm effect of newer modalities of treatment on kidneys and etiology of stone. ESWL is the treatment of choice for most of small calculi while PCNL or open surgery is reserved for larger stone.

Aim of treatment is complete clearance and treatment of underlying cause. The first series of pediatric PCNL was published by Woodside et al[7] claiming 100% stone free rate with no significant complications. They used standard dilatation technique. In series reported by Boddyu et al 90% stone free was achieved after sequential dilatation, 24 to 26 Fr sheath was used with no major complications. Segura has suggested the use of adult instruments in children.[8] Desai et al suggest limited tract dilatation <21 Fr and use of pediatric instruments[9].

By using pediatric instrument operation time became prolong because of small probe and forceps.

In pediatric PCNL blood loss is a major complication[10] which is directly related to tract size dilatation. Reduced incidence of major intrarenal vessel injury using pediatric nephroscope has been reported by Zattoni et al.[11]

In this series all cases performed by adult instrument without significant complication.

In some cases Nephroscope without sheath and in some cases 10 Fr adult URS were used. Vision was very good and adult pneumatic probe causes better fragmentation. Use of pneumatic lithotripter for fragmentation of stone and use of adult grasper helps in removal of stone quicker. One can avoid buying separate pediatric set of instruments which may result in considerable cost saving for a department in a developing country like Bangladesh.

Conclusion

PCNL is safe and effective procedure for management of renal stone in pediatric age group. Adult instrument can be used in pediatric patient with adult Nephroscope without sheath (24 Fr) or 10 Fr adult URS and adult pneumatic probe with pneumatic lithotripter.

Majority of renal stone can be treated by PCNL, open surgery is reserved for stones with anatomical abnormality.

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