

SAFETY AND EFFICACY OF PERCUTANEOUS NEPHROLITHOTOMY IN INFANTS PRESENTING WITH OBSTRUCTIVE RENAL CALCULI AND ANURIA

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ABSTRACT: BACKGROUND: Urolithiasis in infancy is rare but important health issue. Etiology is multi factorial. Optimal management of pediatric stone disease is still evolving. Infants with bilateral obstructive renal stones are unique group of patients in whom prompt evaluation and management is necessary. **AIMS AND OBJECTIVE:** To evaluate safety and efficacy of PCNL in infants presenting with bilateral obstructive renal calculi and anuria. **MATERIALS AND METHODS:** From Nov. 2012 to March 2014, 18 renal units with calculi in 9 infants (6 boys, 3 girls) were treated with PCNL (Percutaneous Nephrolithotomy) at our institution. All infants presented with anuria, raised serum creatinin (mean 6.1mg/dl) and uremic symptoms due to bilateral obstructive renal calculi. All patients managed initially with peritoneal dialysis at nephrology unit, followed by bilateral DJ (Double J) stenting, then bilateral PCNL performed in two sittings. Mean age 8.5 months (4m to 12m), mean stone burden 1.7 cm (0.6cm to 3.0cm), 20 F pediatric nephroscope through 22F percutaneous access was used. Stones were fragmented with pneumatic lithotripter. **RESULTS:** Mean operative time was 60.22 mins (30 mins to 90 mins). Complete stone clearance was done in all cases without need for second look PCNL. Mean post op serum creatinin is 0.6mg/dl. No patient required blood transfusion, developed urosepsis, or had a procedure related complications. **CONCLUSION:** When performed by experienced urologists, PCNL is safe and effective procedure in infants presenting with bilateral obstructive renal calculi and anuria, provided these patients managed preoperatively with peritoneal dialysis and DJ stenting to optimise renal function and to relieve sepsis.

KEYWORDS: Infants, Obstructive renal calculi, uremia, peritoneal dialysis, double J stents, PCNL.

INTRODUCTION: Urolithiasis in infancy is rare but important health issue. Etiology is multi factorial.^[1] Optimal management of pediatric stone disease is still evolving.^[2] Infants with bilateral obstructive renal stones are unique group of patients in whom prompt evaluation and management is necessary.

AIMS AND OBJECTIVE: our aim is to evaluate safety and efficacy of PCNL (Percutaneous Nephrolithotomy)^[3] in these infants presenting with bilateral obstructive renal calculi and anuria.

MATERIALS METHODS: It is a retrospective study. From nov 2012 to march 2014, 9 infants (6boys, 3girls) with mean age 8.5months (Ranging from 4m to 12m), from low socio-economic background admitted our hospital.

They are presented with Symptoms like anuria, uremic symptoms (Fever, vomiting, dyspnea, altered sensorium, seizures), hematuria. Evaluated with renal function tests, ultrasound abdomen^[4] (mean serum creatinine was 6.1mg/dl, ultrasound showing bilateral obstructive renal calculi and

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bilateral moderate hydronephrosis) (Pro op charecterestics given in table 1). Keeping in mind uremic symptoms, all these infants initially managed with intermittent peritoneal dialysis (IPD) at nephrology unit. Then referred to urology department. Non contrast CT scan abdomen, pelvis^[5] performed (Fig. 1). Findings : bilateral obstructive renal calculi and bilateral moderate hydronephrosis, mean stone burden 1.7cm (0.6cm to 3cm)/renal unit, in 4 cases stones are more than one in number on one side, stones were located in renal pelvis or pelvi ureteric junction, no other calculi elsewhere, no congenital renal abnormalities. cystoscopy, bilateral retrograde uretero pyelogram, DJ stenting (3F)^[6] done under general anaesthesia (Fig. 2). Findings: normal urethra, bladder, ureters. Bilateral dilated pelvi-calyceal system in all cases, radio lucent calculi in 8 renal units.

After double J stenting all patients improved symptomatically, urine output is increased, Mean time for serum creatinine to become normal is 4days.urinary tract infection treated with culture directed antibiotics. After one week posted for PCNL. Before surgery urine was sterile in 5 pts. Mean pre-operative hemoglobin is 12.5g. Informed consent taken. Peri operative broad spectrum antibiotics given.

All bilateral (18 renal units) PCNL performed in two sittings under general anaesthesia. Cystoscopy and placement of ureteric catheter (3F) was done in lithotomy position. In prone position retrograde pyelogram and puncture done under fluoroscopic guidance. Tract dilated upto 22F with serial amplatz dilators 20F pediatric nephroscope used (Fig. 3).Stones fragmented with pneumatic lithotripter. All fragments removed. DJ stenting (3F) done and nephrostomy (14F) kept (fig 4). No major intraoperative complications.

Postoperatively ultrasound abdomen, X-ray KUB done in all cases on 2nd postop day. Complete stone clearance in all cases. No second look PCNL. No major postop complications (except fever and vomiting). Nephrostomy removed on 3rd postop day. Mean postop Hb 11.5g. PCNL on other side performed after 1week. Average hospital stay for each patient was 21days. All stones were sent for stone analysis. Patients discharged with DJ stents insitu, normal serum creatinine, good urine output, no fever.DJ stents removed 4wks postoperatively. Referred to nephrologist for metabolic evaluation.^[7]

RESULTS: 18 renal units in 9 infants treated with bilateral PCNL in two sittings. Pre-op IPD, DJ stenting done in all cases. Urine was sterile in 5pts before PCNL. Complete stone clearance done all cases without need for second look PCNL. Mean operative time 60.22mins (From cystoscopy to placement of nephrostomy). Mean postop serum creatinine is 0.6mg/dl. (mean values given in table 2). UTI'S treated with culture directed antibiotics. All postoperative complications were grade I according to clavien-dindo Classification, fever most common. No patient required blood transfusion, developed urosepsis or had a procedure related complications. (Complications table 3). Average hospital stay was 21days.

DISCUSSION: PCNL 1st series reported in pediatric age group by woodside et al in 1985.^[8] Indicated in stones >2cm in renal pelvis, >1cm in lower calyx, struvite or cystein stones, associated anatomic abnormalities.^[9] Gradually become the mainstay replacing ESWL as a monotherapy.^[10] Associated with lower re treatment rates. Offers complete stone clearance in single hosp. stay. Potentially morbid and life threatening if complicated.^[11]

Concerns of PCNL in Infancy:

- Body reserves are marginal and fragile,
- Smaller size kidney and collecting system,
- Greater mobility of kidneys,
- Anatomic and metabolic abnormalities^[12],
- Radiation risk,
- Instrumentation problems,
- Limited tolerance for blood loss,
- Hypothermia^[13] and urosepsis,
- Need for complete stone clearance with minimal morbidity,
- Higher stone recurrence rates. (20%.50% if metabolic problem).

Obstructive renal calculi with uremia should be promptly managed by peritoneal dialysis and DJ stenting to optimize renal function ^[14] and to relieve sepsis. Then followed by staged definitive management. Eradication of infection, correction of underlying anatomic and metabolic abnormalities should be done to prevent recurrent stone formation.^[15]

CONCLUSIONS: The management of urolithiasis in infants is still evolving. Any form of treatment necessitates balancing between 'stone free rate' and procedure related morbidity. PCNL as a monotherapy offers higher stone clearance rates with minimal morbidity.^[10] Infants with bilateral obstructive renal stones are unique group of patients. If performed by experienced endourologist PCNL is safe and effective procedure in these cases, provided managed with preoperative peritoneal dialysis and DJ stenting to optimize renal function and to decrease sepsis related complications.

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Sl. No.	Age month	Stone size in cm		Serum Creatinin		Operative time	
		Rt	Lt	Pre-op	Post-op	Rt	Lt
1	4.0	0.8	1.7	2.8mg	0.4	35min	40
2	7.6	1.5	2.1	6.4	0.6	40	55
3	4.3	1.7	2.5	7.0	0.5	45	80
4	9.2	2.0	0.8	10.6	0.8	60	65
5	10.5	0.9	0.6	3.0	0.7	40	70
6	12.0	2.1	3.0	9.4	0.8	55	90
7	11.0	3.0	1.0	8.6	0.6	70	85
8	10.2	2.5	1.5	3.0	0.6	90	35
9	8.4	1.6	2.7	4.2	0.4	50	30

Table 1: nine cases with age in months, stone size, pre-op post-op serum creatinine, operative time

Sl. No.	Parameter	Mean value
1	Age	8.5months
2	Stone burden	1.7cm/renal unit
3	Operative time	60.22mins
4	Serum creatinin preop/postop	6.11/0.6mg/dl

Table 2: mean values of age, stone burden, operative time, serum creatinine

Sl. No.	Complication	No. of pts
1	Fever	8
2	Vomitings	4
3	Pain at nephrostomy	4
4	Pain at catheter site	4
5	Foley catheter blockage	2
6	Paralytic ileus	1
7	Hematuria	3

Table 3: postop complications in no of patients

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