

# OUTCOME OF PERCUTANEOUS NEPHROSTOMY IN CHILDREN WITH URETEROPELVIC JUNCTION OBSTRUCTION

MOHAMMAD MAHFUZUR RAHMAN CHOWDHURY<sup>1</sup>, RIFAT ZAMAN<sup>2</sup>, MD. AMANUR RASUL<sup>1</sup>, AKM SHAHADAT HOSSAIN<sup>1</sup>, SHAFIQL ALAM CHOWDHURY<sup>1</sup>, MD. MIZANUR RAHMAN<sup>1</sup>

<sup>1</sup>Department of Urology, Dhaka Medical College & Hospital, Dhaka, <sup>2</sup>Department of Pediatrics, Dhaka Medical College Hospital, Dhaka.

## Abstract:

**Introduction and objectives:** Congenital ureteropelvic junction obstruction (UPJO) is the most common cause of hydronephrosis. Management protocols are based on the presence of symptoms and when the patient is asymptomatic the function of the affected kidney determines the line of treatment. Percutaneous nephrostomy (PCN) became a widely accepted procedure in children in the 1990s. The aim of the study was to evaluate the results of performing percutaneous nephrostomy (PCN) in all patients with UPJO and split renal function (SRF) of less than 10% in the affected kidney, because the management of such cases is still under debate.

**Methods:** This prospective clinical trial was carried out at Dhaka Medical College Hospital from January 2014 to December 2016. Eighteen consecutive patients who underwent PCN for the treatment of unilateral UPJO were evaluated prospectively. In these children, ultrasonography was used for puncture and catheter insertion. Local anesthesia with sedation or general anesthesia was used for puncture. Pig tail catheters were employed. The PCN remained in situ for at least 4 weeks, during which patients received low-dose cephalosporin prophylaxis. Repeat renography was done after 4 weeks. When there was no significant improvement in split renal function (10% or greater) and PCN drainage (greater than 200 ml per day) then nephrectomies were performed otherwise pyeloplasties were performed. The patients were followed up after pyeloplasty with renograms at 3 months and 6 months post operatively.

**Results:** All the patients had severe hydronephrosis during diagnosis and 14 patients with unilateral UPJO were improved after PCN drainage and underwent pyeloplasty. The rest four patients that did not show improvement in the SRF and total volume of urine output underwent nephrectomy. In the patients with unilateral UPJO who improved after PCN drainage, the SRF was increased to 26.4%  $\pm$  8.6% (mean  $\pm$  SD) after four weeks and pyeloplasty was performed. At three and six months follow-up, SRF value was 29.2%  $\pm$  8.5% and 30.8.2%  $\pm$  8.8% respectively.

**Conclusion:** Before planning of nephrectomy in poorly functioning kidneys (SRF < 10%) due to congenital UPJO, PCN drainage should be done to assess improvement of renal function.

**Key words:** Ureteropelvic junction obstruction (UPJO), percutaneous nephrostomy (PCN), hydronephrosis.

*Bangladesh J. Urol. 2017; 20(2): 61-64*

## Introduction:

Ureteropelvic junction (UPJ) obstruction is the most common cause of significant dilatation of the collecting system in the foetal kidney[1,2,3]. Although UPJ obstruction occurs in all paediatric age groups and it can be observed in the neonatal period[4] using antenatal

and/or postnatal ultrasound. A second point can be determined later in life by the presentation of symptoms[5]. A urinary tract infection (UTI) is the presenting sign in 30% of affected children beyond the neonatal period[1], and sepsis can still occur if the UTI remains untreated in patients with a UPJ obstruction.

**Correspondences:** Mohammad Mahfuzur Rahman Chowdhury, Department of Urology, Dhaka Medical College & Hospital, Dhaka

This may then turn into a life-threatening situation with the need to place a percutaneous nephrostomy (PCN). Investigations of UPJ obstruction include ultrasonography, diuretic renography, voiding cystourethrogram (VCUG) and recently, magnetic resonance urography (MRU) are used to diagnose UPJO. Postnatal ultrasonography is still the standard method for identification and follow-up studies of hydronephrosis in infants and children. Intravenous urography has been supplanted by radionuclide renography [99m-Tc-mercaptoacetyl triglycine (MAG3) or 99m-Tc-diethylenetriamine pentaacetate (DTPA)], which provides split renal function (SRF) data and an assessment of washout from the individual kidney<sup>(1)</sup>. In addition, a VCUG rules out the presence of a vesicoureteral reflux (VUR), which is reported to occur in 13-42% of patients<sup>(6,7)</sup>. Clear cut guidelines are available regarding management of UPJO in cases of preserved renal function but for poorly functioning kidney no universally accepted guidelines are available. The role of percutaneous nephrostomy (PCN) for drainage of the temporary infected kidney is well established in younger children where chances of renal recovery are high<sup>(1,8)</sup>. The aims of our study were to investigate whether SRF improves following PCN.

#### Materials and Methods:

This prospective clinical trial was carried out at Dhaka Medical College Hospital from January 2014 to December 2016. Patients presenting with gross hydronephrosis with split renal function (SRF) < 10% were included in this study. PCN was done in all cases to see improvement in renal function. Follow up with renal dynamic scan was done after 4 weeks. Technetium-99m diethylenetriamine pentaacetic acid (99mTc DTPA) was used for the diuretic renogram according to the standard institutional protocol. Eighteen consecutive patients were selected who underwent PCN for the treatment of unilateral UPJO and were evaluated prospectively. In these children, real-time ultrasound was performed to localize the pelvicaliceal system and guide the catheter into the system. A 6 Fr or 8 Fr pigtail catheter was placed using the Seldinger technique. The catheter was secured to the skin by a silk stitch and a closed drainage system was used by connecting the catheter to a urinary drainage bag. Local anesthesia with sedation or general anesthesia was used for puncture. The PCN remained in situ for at least 4 weeks, during which patients received low-dose cephalosporin prophylaxis as long as the catheter remained in place.

Urine cultures were done weekly, and the patients who developed urinary tract infections received a full course of antibiotics according to the results of the sensitivity tests and were then followed up with low-dose antibiotics during the PCN drainage. Daily PCN drainage was measured and repeat renography was done after 4 weeks. When there was no significant improvement in split renal function (10% or greater) and drainage of affected kidney (more than 200ml per day) then nephrectomy was performed otherwise pyeloplasty was performed. All patients underwent a pyeloplasty using the Anderson Hynes technique via a flank incision with a double-J stent kept in situ. The stent was removed 4 weeks after pyeloplasty. The patients were followed up after pyeloplasty with renograms at 3 months, 6 months.

#### Results:

A total of eighteen cases met the inclusion criteria and were included in the study. All the patients had severe hydronephrosis during diagnosis. PCN was done in all 18 cases. There were 08 boys and 10 girls and left side UPJO was seen in 13(72.22%) cases while right side UPJO in 5(27.78%) cases. Mean age of presentation was 4.5 years (range-01 to 13 years).

**Table-I**  
*Demographic profile of patients*

Total cases		18
	Boys	08
	Girls	10
Age (years)	Mean	4.5
	Range	01-13
Laterality	Right	05
	Left	13

Fourteen patients (77.77%) with unilateral UPJO were improved after PCN drainage and underwent pyeloplasty. The rest four patients (22.22%) who did not show any improvement or unchanged or deteriorating in the SRF and total volume of urine output underwent nephrectomy. UTI developed in 3(16.67%) cases which had been treated with a full course of antibiotics for 7-14 days. Remaining 15(83.33%) cases were completed 4 weeks of PCN drainage without any complication. In the patients with unilateral UPJO who improved after PCN drainage, the SRF was increased to 26.4% ± 8.6% (mean±SD) after four weeks and pyeloplasty was performed. At three and six months follow-up, SRF value

were 29.2% ± 8.5% and 30.8% ±8.8% respectively in improved patients.

**Table -II**  
*Summary of results.*

Total Cases		18
SRF	Improved	14
	Not improved	04
SRF (in improved 14cases)	At 4 weeks	26.4% ± 8.6%
	At 3 moths	29.2% ± 8.5%
	At 6 months	30.8% ±8.8%
Complication	UTI	03(16.67%)

SRF: split renal function.

**Discussion:**

Percutaneous nephrostomy was first described in 1955 by Goodwin et al. for relief of an obstructed kidney and became a widely accepted procedure in children in the 1980s.<sup>9,10,11,12</sup> Some reports in the 1980s described the use of PCN as an easy and safe procedure to determine the recoverability of renal function in obstructed kidneys<sup>(13)</sup>with a high technical success rate (88-99%) and a low complication rate (4-8%)<sup>(14,15)</sup>. The reported complications <sup>(14,15)</sup>in positioning a PCN were haematuria, UTI, displacement of the catheter, septicaemia, a hydrothorax or pneumothorax and urinary leakage. UTI developed in three children (16.67%) in our series. No other severe complications were reported. The best evaluation of the capacity of a kidney to recover after obstruction is a period of therapeutic trial and PCN has been recommended for this purpose. More recent studies<sup>(16)</sup>, however, have reported no significant improvement of SRF after PCN drainage. The use of PCNs should be limited to evaluate the recoverability of poorly functioning obstructed kidneys (SRF about 10%) before any nephrectomy<sup>(17)</sup>. Irving et al.<sup>(13)</sup> in their short series of 9 cases showed recovery after trial of PCN in 4 cases, a finding supported by other authors as well<sup>(10,13)</sup>. But Singh et al.<sup>(18)</sup> showed in their 29 cases series, only 7(24.1%) cases were functionally improved. But PCN in obstructed kidney may improve the renal function<sup>(19)</sup>. In our study functional assessment of renal recovery was done in all cases who presented with SRF < 10%. The SRF was increased to 26.4% ± 8.6% (mean±SD) after four weeks in 14(77.77%) cases. At three and six months follow-up, SRF value were 29.2% ± 8.5% and 30.8% ±8.8% respectively in improved

patients. Our study has some limitations. Follow-up schedule is very short and it is also a small sample trial.

**Conclusion:**

Before planning of nephrectomy in poorly functioning kidneys (SRF < 10%) due to congenital UPJO, PCN drainage should be done to asses improvement of renal function. Because in this study, most of the poorly functioning kidneys show significant improvement in renal function after PCN drainage.

**Conflict of interest:** None.

**References:**

1. Campell-Walsh Urology, 10th Edition, Alan J. Wein, Louis R. Kavoussi et al., Philadelphia 2012, pp. 3212.
2. Whitaker RH. Some observations and theories on the wide ureter and hydronephrosis. Br J Urol. 1975Aug;47(4):377-85.
3. Koff SA, Hayden LJ, Cirulli C. Shore. Pathophysiology of ureteropelvic junction obstruction: experimental and clinical observations. RJ Urol. 1986 Jul;136(1 Pt 2):336-8.
4. Brown T, Mandell J, Lebowitz RL. Neonatal hydronephrosis in the era of sonography. AJR Am J Roentgenol. 1987 May;148(5):959-63.
5. Williams DI, Kenawi MM. The prognosis of pelviureteric obstruction in childhood: a review of 190 cases. Eur Urol. 1976;2(2):57-63.
6. Zerlin JM, Ritchey ML, Chang AC. Incidental vesicoureteral reflux in neonates with antenatally detected hydronephrosis and other renal abnormalities. Radiology. 1993 Apr;187(1):157-60.
7. Anderson NG, Abbott GD, Mogridge N, Allan RB, Maling TM, Wells JE. Vesicoureteric reflux in the newborn: relationship to fetal renal pelvic diameter. Pediatr Nephrol. 1997 Oct;11(5):610-6.
8. Watson RA, Esposito M, Richter F, Irwin RJ Jr, Lang EK. Percutaneous nephrostomy as adjunct management in advanced upper urinary tract infection. Urology 1999;54: 234–9.
9. Ozayar A, Friedlander JI, Shakir NA, Gahan JC, Cadeddu JA, Morgan MS. Equivocal ureteropelvic junction obstruction on diuretic renogram—should minimally invasive pyeloplasty

- be offered to symptomatic patients? *J Urol.* 2015 Apr;193(4):1278-82.
10. Pode D, Shapiro A, Gordon R, Lebensart P. Percutaneous nephrostomy for assessment of functional recovery of obstructed kidneys. *Urology* 1982;19:482–5.
  11. Fontenot PA Jr, Capoccia TR, Wilson B, Arthur A, Duchene DA. Robotic-assisted Laparoscopic Pyeloplasty: Analysis of Symptomatic Patients With Equivocal Renal Scans. *Urology.* 2016 Jul;93:92-6.
  12. Lam W, Fernando A, Issa R, Heenan S, Sandhu S, Le Roux P, Anderson C. Is routine postoperative diuresis renography indicated in all adult patients after pyeloplasty for ureteropelvic junction obstruction? *Urology.* 2015 Jan;85(1):246-51.
  13. Irving HC, Arthur RJ, and Thomas DF: Percutaneous nephrostomy in paediatrics. *Clin Radiol.* 1987, 38: 245–248.
  14. Yavascan O, Aksu N, Erdogan H et al.. Percutaneous nephrostomy in children : diagnostic and therapeutic importance. *Pediatric Nephrol.* 2005, 20(6):768-72.
  15. Farrell TA, Hicks ME J. A review of radiologically guided percutaneous nephrostomies in 303 patients. *Vasc Interv Radiol.* 1997 Sep-Oct;8(5):769-74.
  16. Dhillon HK. Prenatally diagnosed hydronephrosis: the Great Ormond Street experience. *Br J Urol.* 1998, 81(suppl 2): 39–44.
  17. Gupta DK, Chandrasekharam VV, Srinivas M, Bajpai M.. Percutaneous nephrostomy in children with ureteropelvic junction obstruction and poor renal function. *Urology.* 2001 Mar;57 (3):547-50.
  18. Singh A, Bajpai M, Panda SS, Sharma N. Role of percutaneous nephrostomy in poorly functioning kidney due to pelviureteric junction obstruction in older children. *Journal of Progress in Paediatric Urology,* 2013 Sept.—Dec., 16(2):46-49
  19. Zhang S, Zhang Q, Ji C, Zhao X, Liu G, Zhang S, Li X, Lian H, Zhang G, Guo H. Improved split renal function after percutaneous nephrostomy in young adults with severe hydronephrosis due to ureteropelvic junction obstruction. *J Urol.* 2015 Jan;193(1):191-5.