URETERO PELVIC JUNCTION OBSTRUCTION IN THE NEWBORN

J. Kouranloo*, J. Ghorobi, M. Rouzrokh, M. Mohkam and M. Amirfyze

Department of Pediatric Surgery, Taleghani and Mofid Hospital, School of Medicine, Shaheed Beheshti University of Medical Sciences, Tehran, Iran

Abstract- Uretero pelvic junction (UPJ) obstruction is a common cause of hydronephrosis in infants. The frequent use of fetal ultrasound is allowing early (prenatal) diagnosis of numerous uropathies previously delayed until the child either became symptomatic or had a palpable mass. Newborn with severe obstruction often has marked improvement following correction, therefore, early diagnosis and operation are important. From 1993 to 2002, 21 patients were operated on for severe UPJ obstruction who were diagnosed before 6 weeks of age. Only 10 patients (63%) had antenatal ultrasonographic diagnosis, the remaining were diagnosed by postnatal ultrasound and IVP or radionuclide scan for palpable renal enlargement or for associated anomalies. Eighteen of them had unilateral and three had bilateral obstruction. Twenty-four pyeloplasties were done; all pyeloplasties were dismembered with tailoring of the dilatated renal pelvis. Postoperative renal function was followed with laboratory blood test, urine test or radionuclide scan or IVP. Postoperative complications included urinary tract infection in three patients and postoperative stenosis in one patient were seen. No mortality occurred on infants in unilateral but one occurred in bilateral obstruction. Also, there was one unrelated late death. We report documented functional improvement with minimal complications in unilateral or bilateral pyeloplasty in newborns with UPJ obstruction. We recommend that if the initial scan shows substantially reduced function in the obstructed kidney, a pyeloplasty (rather than nephrectomy) generally should be performed, because the newborn kidney has tremendous capacity for improvement in renal function following decompression.

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INTRODUCTION

Uretero pelvic junction (UPJ) obstruction is a common cause of hydronephrosis in infants (1). The most common cause of hydronephrosis in the newborn is an anomalous UPJ (1), which usually is secondary to an intrinsic fibrotic narrowing between the ureter and renal pelvis and in 20% of cases there is an accessory renal artery supplying the lower pole of the kidney. The frequent use of fetal ultrasound is allowing early (prenatal) diagnosis of numerous uropathies previously delayed until the child either became symptomatic or had a palpable mass and damaging renal function (2, 3). Newborns with severe obstruction often have marked improvement following correction; therefore, early diagnosis and operation are important.

We recommend that repair should be attempted in kidneys that show even minimal function. In this regard, dismembered pyeloplasty has showed good functional results and minimal complication.

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*** Corresponding Author:**
J. Kouranloo, Department of Pediatric Surgery, Taleghani and Mofid Hospital, School of Medicine, Shaheed Beheshti University of Medical Sciences, Tehran, Iran
Tel: +98 21 22227021
Fax: +98 21 22220254
E-mail: j_kouranloo@yahoo.com

MATERIALS AND METHODS

A total of 21 patients were treated in a period of 10 years (1993-2002) at Taleghani and Mofid hospitals affiliated to Shaheed Beheshtee University of Medical Sciences in near equal distribution as well as right and left side. The most common presenting symptom was an abdominal mass occurring in 18 of the 21 patients. The other 3 patients were found to have UPJ obstruction on screening intravenous pyelography (IVP) and abdominal ultrasound because of associated anomalies. Only 10 of these patients had antenatal ultrasonographic diagnosis.

In all patients renal and bladder ultrasound were obtained first; it was important to detect grade and the severity of the hydronephrosis, next VCUG was performed to evaluate probable presence of VU reflux; that was found in three of 21 in our patients. When we found abnormal ultrasound but there was no reflux, we evaluated the upper urinary tract as much as possible. We performed renal scan (diuretic renogram) in 14 patients by using technetium-99 (DTPA), the renal scan provides the relative function of each kidney and by injection of furosemide that showed significant upper tract obstruction. In the other 7 patients we performed IVP substituted for the diuretic renogram. Computed tomography (CT) scan was used only in two patients to confirm hydronephrosis and rule out renal tumor. The UPJ obstruction approached by the classic transverse anterolateral extra peritoneal approach gives the safest exposure of the kidney and its pedicle or through a dorsal lumbotomy. In dismembered pyeloplasty the peritoneum is retracted and the UPJ and the ureter are exposed with some stay sutures. The pelvis is opened and emptied and the UPJ is excised by the insertion of a feeding tube down to the bladder to exclude the presence of associated ureteral anomalies (4).

From 18 patients with unilateral obstruction, 17 patients had pyeloplasty and one had a cutaneous pyeloplasty, this patient on the involved side had minimal function by renal scan and no visualization by IVP, also a minimal amount of renal parenchyma was present; then, a cutaneous pyelostomy was performed, how the kidney would recover and to do definitive repair, later, but subsequently nephrectomy was performed. In the three patients with bilateral involvement two had simultaneous bilateral pyeloplasties and one had a unilateral left side nephrectomy for severe dysplasia and right side pyeloplasty was done. All pyeloplasties were dismembered with tailoring of the renal pelvis. Redundant pelvis was excised and care was taken not to resect too much of pelvic tissue and make the collecting system narrow. Previously, we placed nephrostomy tube and a stent through pelvis to ureter, but later only a feeding tube was placed through junction to ureter, the ureteropelvic anastomosis began with carefully placed 6-0 or 7-0 Vicryl or chromic gut sutures, that we performed with interrupted sutures, and the anastomosis was checked for water tightness, a Penrose drain was placed near the anastomosis.

Nephrouretrostomy tube was removed after 10-12 days if drainage was adequate through the anastomosis, and Penrose drain was usually removed on the third or fourth day if no urinary leak was present.

RESULTS

Twenty-one patients, 10 male and 11 female, were operated for UPJ obstruction whose diagnosis was made by 6 weeks of age. Eighteen of them had unilateral, 10 left and 8 right, and three had bilateral obstruction. All pyeloplasties were dismembered with tailoring of the renal pelvis. Postoperative renal function was followed by means of laboratory blood and urine tests and also by radionuclide scan or IVP.

One early postoperative death occurred in a patient with bilateral obstruction, he presented at 13 days with edema and elevated BUN and creatinine. Renal scan demonstrated no function in the right kidney and minimal in the left, also he developed systemic hypertension that began on the second postoperative day which was refractory to medical management. The patient developed congestive heart failure probably secondary to the hypertension and pulmonary edema and died on the 16^{th} postoperative day. The next death occurred by aspiration in a boy who was well for 5

month following a left pyeloplasty. Renal function had been good, and the autopsy confirmed a patent UPJ repair and adequate renal parenchyma. All other patients who had pyeloplasties continued to be well with either stable or improved renal function that was measured by biochemical parameters, renal scan or IVP Urinary tract infection was seen in 4 patients which was controlled with a single course of antibiotics. One patient, who had a bilateral dismembered pyeloplasty, required a repeat pyeloplasty of the right side 5 month later because of anastomotic stenosis; however, both kidney's functions were well 3 years later.

DISCUSSION

Diagnostic studies must do two things to confirm UPJ obstruction. First, obstruction of the urine flow must be demonstrated in the form of hydronephrosis or delayed function of the involved side. Second, the ureter must be demonstrated to distinguish a distal ureteral obstruction from a UPJ obstruction.

In 10%-15% of infants with UPJ obstruction both kidneys are involved. The diagnosis of UPJ obstruction in the infant is based upon the finding of hydronephrosis on ultra-sonography and poor drainage on a diuretic renogram, but in some centers IVP is substituted for the diuretic renogram (5-7).

Delayed films are essential in evaluating obstructive processes. They may show function in a kidney that has early nonvisualization and may demonstrate accumulation of contrast in dilated ureter, helping to differentiate between UPJ and distal ureteral obstruction. It is important to notice that if all length of ureter has not been visualized preoperatively, its patency should be checked prior to beginning the anastomosis by passing a catheter distally to the bladder (4).

The renal scan has several advantages over an IVP in the newborn (8), because of the relative immaturity of renal function in the newborn, visualization of the collecting system on IVP may not be optimal, in addition the renal scan provides an excellent method for the relative function of each kidney. On the other hand, in the diuretic renal scan, upper urinary tract obstruction is assessed by injecting furosemide. When the renal pelvis is full in the presence of significant upper tract obstruction, the half- time will be longer than 20 minutes (9). In a child with unilateral mild hydronephrosis, and no indication to prompt evaluation, the diuretic renogram is better performed at 6-8 weeks to allow for maturation of renal function (10).

Whereas there is bilateral hydronephrosis or solitary hydronephrotic kidney, prompt evaluation is important, particularly if the hydronephrosis is severe (11). Renal ultrasound and CT scan are useful in differentiating hydronephrosis from congenital mesoblastic nephroma and cystic dysplasia (12). They are also helpful if the ureter is dilated, which differentiates between proximal and distal obstruction. A voiding cystourethrogram should be done because it may show associated vesicoureteral reflux or other bladder or urethral anomalies (13, 14). If the level of obstruction can not be determined by those techniques either antegrade pyelography or retrograde pyelograms for females is performed (15). Antenatal sonographic diagnosis of UPJ obstruction is becoming more common, the changes in management that will result by experience. In uretro drainage, early delivery or term delivery and prompt repair are all possible (16, 17). Certainly with unilateral obstruction, letting the child go to term and then dealing with the obstruction has usually resulted in a kidney with good function (18). Previously, we placed nephrostomy tube and a small stent through kidney and pelvis to ureter, but later only a feeding tube was placed through the renal parenchyma and through junction then placed in ureter. We found no difference between these two procedures (19, 20). We recommend that if the initial scan shows substantially reduced function in the obstructed kidney, a pyeloplasty (rather than nephrectomy) generally should be performed, because the newborn kidney has tremendous capacity for improvement in renal function following decompression (3). In some cases, it is helpful to place a percutaneous nephrostomy tube to assess renal function (21), temporary diversion of the pelvic urine

is indicated in infants with severe unilateral pelvic dilatation and poor relative function. In a recent study from Manchester, the recovery after pyeloplasty was significantly lower in the delayed pyeloplasty group than in those who were operated early, and the authors suggested that there might be a role for early surgery in babies with renal pelvis diameter greater than 20 mm and on obstructed curve, even without fall of function (22). In the long term series from Great Ormand Street Hospital, there were some renal units, which did not recover function at all after conservatism and delayed surgery (23).

Conflict of Interests

The authors declare that they have no competing interests.

REFERENCES

1. Johnson CE, Elder JS, Judge NE, Adeeb FN, Grisoni ER, Fattlar DC. The accuracy of antenatal ultrasonography in identifying renal abnormalities. Am J Dis Child. 1992 Oct; 146(10):1181-1184.
2. Grisoni ER, Gauderer MW, Wolfson RN, Izant RJ Jr. Antenatal ultrasonography: the experience in a high risk perinatal center. J Pediatr Surg. 1986 Apr; 21(4):358-361.
3. King LR, Coughlin PW, Bloch EC, Bowie JD, Ansong K, Hanna MK. The case for immediate pyeloplasty in the neonate with ureteropelvic junction obstruction. J Urol. 1984 Oct; 132(4):725-728.
4. Cockrell SN, Hendren WH. The importance of visualizing the ureter before performing a pyeloplasty. J Urol. 1990 Aug;144(2 Pt 2):588-592.
5. Mathiot A, Liard A, Eurin D, Dacher JN. [Prenatally detected multicystic renal dysplasia and associated anomalies of the genito-urinary tract]. J Radiol. 2002 Jun;83(6 Pt 1):731-735. French.
6. Elder JS, Duckett JW. Prenatal urology. In: Gillenwater JY, Grayhack JT, Howards SS, Duckett JW, eds. Adult and pediatric urology. 2nd ed. St. Louis: Mosby/Year book; 1991. p.1711-1810.
7. Perez LM, Friedman RM, King LR. The case for relief of ureteropelvic junction obstruction in neonates and young children at time of diagnosis. Urology. 1991 Sep; 38(3):195-201.
8. Ash JM, Gilday DL. Renal nuclear imaging and analysis in pediatric patients. Urol Clin North Am. 1980 Jun; 7(2):201-14.
9. Koff SA, McDowell GC, Byard M. Diuretic radionuclide assessment of obstruction in the infant: guidelines for successful interpretation. J Urol. 1988 Nov; 140(5 Pt 2):1167-1168.
10. Parker RM, Rudd TG, Wonderly RK, Ansell JS. Ureteropelvic junction obstruction in infants and children: functional evaluation of the obstructed kidney preoperatively and postoperatively. J Urol. 1981 Oct; 126(4):509-512.
11. Beetz R, Bartenstein P, Stein R. [Age-dependency of isotope drainage in diuretic renograms]. Klin Padiatr. 2002 May-Jun; 214(3):104-108. German.
12. Kirks DR, Kaufman RA. Function within mesoblastic nephroma: imaging--pathologic correlation. Pediatr Radiol. 1989; 19(2):136-139.
13. Dejter SW Jr, Gibbons MD. The fate of infant kidneys with fetal hydronephrosis but initially normal postnatal sonography. J Urol. 1989 Aug; 142(2 Pt 2):661-662
14. Peters CA, Mandell J, Lebowitz RL, Colodny AH, Bauer SB, Hendren WH, Retik AB. Congenital obstructed megaureters in early infancy: diagnosis and treatment. J Urol. 1989 Aug; 142(2 Pt 2):641-645
15. Whitaker RH. Methods of assessing obstruction in dilated ureters. Br J Urol. 1973 Feb; 45(1):15-22.
16. Harrison MR, Golbus MS, Filly RA, Callen PW, Katz M, de Lorimier AA, Rosen M, Jonsen AR. Fetal surgery for congenital hydronephrosis. N Engl J Med. 1982 Mar 11; 306(10):591-953.
17. Elder JS, Duckett JW Jr, Snyder HM. Intervention for fetal obstructive uropathy: has it been effective? Lancet. 1987 Oct 31; 2(8566):1007-1010.
18. Madden NP, Thomas DF, Gordon AC, Arthur RJ, Irving HC, Smith SE. Antenatally detected pelviureteric junction obstruction. Is non-operation safe? Br J Urol. 1991 Sep; 68(3):305-310.
19. Arda IS, Oguzkurt P, Sevmis S. Transanastomotic stents for dismembered pyeloplasty in children. Pediatr Surg Int. 2002 Mar; 18(2-3):115-118.

20. McMullin N, Khor T, King P. Internal ureteric stenting following pyeloplasty reduces length of hospital stay in children. Br J Urol. 1993 Sep; 72(3):370-372.
21. Koff SA, Campbell KD. The nonoperative management of unilateral neonatal hydronephrosis: natural history of poorly functioning kidneys. J Urol. 1994 Aug; 152(2 Pt 2):593-595.
22. Subramaniam R, Kouriefs C, Dickson AP. Antenatally detected pelvi-ureteric junction obstruction: concerns about conservative management. BJU Int. 1999 Aug; 84(3):335-338.
23. Dhillon HK. Prenatally diagnosed hydronephrosis: the Great Ormond Street experience. Br J Urol. 1998 Apr; 81 Suppl 2:39-44.