

Anderson-Hynes pyeloplasty with isthmotomy and lateropexy in horseshoe kidneys with pelviureteric junction obstruction in children

Shasanka Shekhar Panda, Minu Bajpai, Manisha Jana¹, Dalim Kumar Baidya², Rakesh Kumar³

Departments of Pediatric Surgery, ¹Radiodiagnosis, ²Anaesthesiology, and ³Nuclear Medicine, All India Institute of Medical Sciences New Delhi India

ABSTRACT

Objective: The objective of this study was to evaluate the results of Anderson-Hynes pyeloplasty with isthmotomy and lateropexy in horseshoe kidney with pelviureteric junction obstruction (PUJO).

Materials and Methods: Medical records of patients of horseshoe kidney with PUJO operated in our institute between June 1998 and June 2012 were reviewed. Anderson-Hynes pyeloplasty with isthmotomy and lateropexy was performed in all patients. The surgical outcome was evaluated with emphasis on the changes in degree of hydronephrosis by ultrasonography, renal drainage and function assessed by diuretic renal scans.

Results: We studied the records of eight children of horseshoe kidney having unilateral PUJO. Obstruction was caused by a crossing lower-pole vessel in two cases, a high ureteral insertion in three and narrowing of the PUJ in three cases. Post-operative follow-up (median 4.4 years, range 18 months to 10 years) revealed improved renal function and good drainage in all cases. Hydronephrosis disappeared in 3, 4 showed Grade 1 and one showed Grade 2 hydronephrosis. All children are doing well and have no symptoms.

Conclusion: Anderson-Hynes pyeloplasty with isthmotomy and lateropexy is a highly effective and safe procedure for treating PUJO in horseshoe kidney in children.

Key words: Anderson-Hynes pyeloplasty, horseshoe kidney, isthmotomy, lateropexy, pelviureteric junction obstruction

INTRODUCTION

Horseshoe kidney is the most common fusion anomaly of the kidney, with an incidence of approximately 0.25% of the general population.^[1] It results from fusion of metanephric buds between weeks 4 and 8 of embryogenesis, blocking their cephalic migration and normal rotation. The renal pelvis and ureters

are anteriorly displaced, with the ureters lying anterior to the isthmus with a tendency to kink, often resulting in hydronephrosis.^[2] Isthmotomy and lateropexy to complete the pyeloplasty is still recommended both in open^[3-6] and laparoscopic^[7,8] surgery.

The aim of this study was to evaluate the results of anderson-hynes pyeloplasty with isthmotomy and lateropexy in horseshoe kidney with pelviureteric junction obstruction (PUJO) in children.

MATERIALS AND METHODS

All cases of horseshoe kidney with PUJO were investigated by ultrasound abdomen and renal dynamic scan. The clinical records of eight children with PUJO in horseshoe kidney were reviewed. Parameters reviewed included pre-operative symptoms and complications, age at presentation of obstruction, degree of hydronephrosis, pre-operative differential renal function, patient age at operation and surgical findings. All eight patients underwent anderson-hynes pyeloplasty with isthmotomy and

For correspondence: Dr. Minu Bajpai,
Department of Paediatric Surgery, All India Institute of Medical Sciences, New Delhi - 110 029, India.
E-mail: bajpai2@hotmail.com

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lateropexy. The procedure was performed by open midline infraumbilical transperitoneal approach. In grossly dilated pelvis, reduction was done before pyeloplasty. Appropriate size infant feeding tube was used as transanastomotic stent with holes both in the ureteric and pelvis part of the tube. No separate nephrostomy tube was used for the drainage in the post-operative period. In all cases, a perinephric drain was placed.

To determine the outcomes we studied the post-operative course with emphasis on the changes in degree of hydronephrosis assessed by ultrasound using Society for Fetal Urology (SFU) grade, split renal function and drainage assessed by diuretic renal scans using diethylene triamine pentacetic acid as radionuclide. The time of furosemide administration (1 mg/kg intravenous [i.v.]) was individually based on visually confirmed, complete filling of the dilated pelvis. Drainage was calculated using standard computer generated curves. A rapid washout of over 50% after accumulation of the nuclide and furosemide administration was defined as a functional delay.^[9,10]

Statistical analysis

We analyzed our data using the Stata software version 11.0 (Stata Corp. College Station, TX). Results were calculated as median and inter-quartile range. Ethical review board approval was taken for this study.

RESULTS

All eight children had unilateral pathology, five left-sided and three right-sided. The age at diagnosis ranged from 6 months to 9 years (median 4.6 years). Children presented due to symptoms: six had recurrent abdominal pain, one had lower abdominal lump and one had a urinary tract infection (UTI). One of these children needed a temporary percutaneous nephrostomy. In seven out of eight cases, the differential function of the obstructed kidney was less than 35%. In one case of very poorly functioning obstructed unit, percutaneous nephrostomy was done and differential function recovered to 10% before pyeloplasty. Obstruction was confirmed in all cases by progressive accumulation of the nuclide or less than 50%

washout in the diuretic renal scan taking into consideration the results of ultrasound grading. There were 5 cases of SFU Grade 4 hydronephrosis and 3 cases of SFU Grade 3 hydronephrosis [Table 1]. None of the patients had dilatation of ureters. Intraoperative findings included crossing vessels in two cases, high ureteral insertion in three and narrowing of PUJ in three cases in which histology revealed intrinsic ureteropelvic obstruction. Post-operative renal scans were performed between 3 months and 5 years (median 18 months) after pyeloplasty. Three children demonstrated functional delayed drainage and five had total washout without furosemide [Table 1]. None of the patients had obstruction in post-operative renal dynamic scans.

The differential renal function improved in all cases after pyeloplasty [Table 1]. In one case of very poorly functioning obstructed unit, percutaneous nephrostomy was done and differential function recovered from 10% before pyeloplasty to 18% after pyeloplasty. Sonographic follow-up after a period of 4.4 years (range: 18 months to 10 years) in all cases demonstrated improvement of the hydronephrosis. Post-operatively in three cases hydronephrosis disappeared, four children showed SFU Grade 1 and one showed SFU Grade 2 hydronephrosis.

The age at which last follow-up investigation was done ranged from 18 months to 10 years (median 4.4 years). All patients are now doing well. None had complaints except for one girl who developed single episode of UTI without complications 3 months after pyeloplasty.

DISCUSSION

Horseshoe kidney is the most common fusion anomaly of the kidney, with an incidence of approximately 0.1% of intravenous pyelographies.^[11] Hydronephrosis in horseshoe kidney from PUJO occurs in about 14% to 35% of cases.^[4,12,13] The clinical presentation of horseshoe kidney in children differs from that in adults: 80% of patients requiring surgery reported by Sharma *et al.*^[14] As reported by Pitts *et al.*^[13] and Culp *et al.*,^[15] 21-60% presented with calculi. In our study, none of the patients had calculi. In

Table 1: Pre- and post-operative SFU grade, renal function and drainage after Anderson-Hynes pyeloplasty for ureteropelvic junction obstruction in children with horseshoe kidney

Renal unit number	Pre-op SFU grade	Post-op SFU grade	Pre-op DF	Post-op DF	Pre-op drainage	Post-op drainage
1	4	2	10	18	Obs	Delayed
2	4	1	14	20	Obs	Delayed
3	4	1	20	24	Obs	Delayed
4	4	1	24	30	Obs	Free
5	3	No HDN	26	30	Obs	Free
6	4	1	20	35	Obs	Free
7	3	No HDN	34	44	Obs	Free
8	3	No HDN	38	42	Obs	Free

SFU = Society for Fetal Urology, DF = Differential function, Obs = Obstruction, Pre-op = Pre-operative, Post-op = Post-operative

25% (2/8) of our children, crossing vessels contributed to the obstruction to a higher degree than in PUJO without a fusion anomaly.^[16] A narrow PUJ was found during surgery in 37.5% (3/8) units; this is reported to occur in 78% of PUJO in normal kidneys.^[16]

In our study, obstruction is mostly due to high insertion of the ureter and crossing vessels (62.5%, 5/8) for which a dismembering pyeloplasty should be the procedure of choice. The renal pelvis and ureters in horseshoe kidney are anteriorly placed, with the ureters lying anterior to the isthmus with a tendency to kink, often resulting in hydronephrosis.^[2] Surgical management in the form of excision of stenotic ureteropelvic segments, trimming of a redundant pelvis, transposition of any aberrant vessels, and ureteropelvic anastomosis are the basic principles of management. Division of the isthmus has been a topic of debate during pyeloplasty in such patients. Culp *et al.*^[15] reported that isthmusectomy may allow the kidneys to lie in a more dependent position that maintains the patency of newly reconstructed ureteropelvic regions. After division of the isthmus, the medial portion of the separated kidney rotates to lessen the obstruction. Isthmotomy and lateropexy was done in all of our patients to decrease the risk of obstruction due to pressure where the ureter crosses the kidney.

Post-operatively, the differential function increased in all cases. The decrease in hydronephrosis in ultrasound and adequate drainage in renal dynamic scan were comparable to those in normal kidneys after Anderson-Hynes pyeloplasty. Ultrasound and renal dynamic scan are usually sufficient for the diagnosis, management and follow-up of patients of horseshoe kidney with PUJO. Ultrasound is very accurate and sensitive in these patients, which reduces the need for cross-sectional imaging in most cases.^[17]

Although we used a transperitoneal approach via lower midline or transverse incision for exposure of the PUJ in horseshoe kidney, the retroperitoneal approach via a flank incision also provides excellent exposure of the PUJ even in a horse shoe kidneys.^[9] Further, we used isthmotomy and lateropexy in all of our cases but this is not mandatory and simple Anderson-Hynes pyeloplasty via a flank incision without additional division of the isthmus and lateropexy of the kidney is also a highly effective and safe procedure for treating PUJO in horseshoe kidney.^[9]

CONCLUSION

Anderson-Hynes pyeloplasty with isthmotomy and

lateropexy is a highly effective and safe procedure for treating PUJO in horseshoe kidney.

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