



UNILATERAL URETEROPELVIC JUNCTION OBSTRUCTION IN PEDIATRIC PATIENTS – FOLLOWUP AFTER PYELOPLASTY

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ABSTRACT

Ureteropelvic junction obstruction (UPJO) is a common cause of paediatric hydronephrosis, often requiring pyeloplasty to preserve renal function. A prospective study (July 2023–December 2024) included 28 children (3 months–12 years) with unilateral UPJO undergoing open dismembered pyeloplasty. Preoperative and postoperative assessments used ultrasonography (Society for Foetal Urology [SFU] grading) and diuretic renography (^{99m}Tc -DTPA) to measure hydronephrosis, glomerular filtration rate (GFR), and differential renal function (DRF). Complications were recorded. Data were analysed using SPSS v27.0 ($p < 0.05$). Of 28 patients (75% male, 71.4% left-sided), 67.9% showed improved renal function and hydronephrosis. Mean SFU grade decreased from 3.07 to 2.14 (30.3%, $p < 0.001$), GFR increased from 30.57 to 32.72 mL/min (7.0%, $p = 0.049$), and DRF improved from 31.76% to 35.61% (12.1%, $p < 0.001$). Complications included urinary tract infection (14.3%), redo pyeloplasty (7.1%), and anastomotic leakage (3.6%). Anderson-Hynes pyeloplasty effectively improves renal function and resolves hydronephrosis in most paediatric UPJO cases, with low complication rates. Early intervention optimizes outcomes.

KEYWORDS : Ureteropelvic junction obstruction, pyeloplasty, paediatric urology, renal function, hydronephrosis

INTRODUCTION

Ureteropelvic junction obstruction (UPJO) is a leading cause of hydronephrosis in children, potentially impairing renal function if untreated [1]. It results from impaired urinary flow from the renal pelvis to the proximal ureter, causing elevated intrapelvic pressure and progressive renal damage. UPJO is more common in males (2:1 to 4:1 ratio) and predominantly affects the left kidney (60–70%) [2,3]. Antenatal ultrasonography has increased early detection, enabling timely intervention before irreversible renal injury [4].

Anderson-Hynes dismembered pyeloplasty is the gold standard for surgical correction, aiming to restore unobstructed urinary drainage and preserve renal parenchyma [5]. Reported success rates range from 80–95%, yet the extent of renal functional recovery remains debated, particularly in young children with variable baseline function [6,7]. Radiological assessments, including ultrasonography (Society for Foetal Urology [SFU] grading) and diuretic renography (^{99m}Tc -DTPA), are critical for evaluating postoperative outcomes, measuring hydronephrosis resolution, glomerular filtration rate (GFR), and differential renal function (DRF) [8].

Despite extensive literature, prospective data on postoperative renal function and hydronephrosis outcomes in paediatric UPJO, particularly in Indian populations, are limited. This study aims to evaluate the postoperative outcomes of Anderson-Hynes pyeloplasty in children with unilateral UPJO, focusing on SFU grading, GFR, DRF, and complications.

MATERIALS AND METHODS

This prospective observational study was conducted at a tertiary care centre in Jaipur, India, from July 2023 to December 2024, with approval from the institutional ethics committee and informed parental consent.

We enrolled 28 children aged 3 months to 12 years with

unilateral UPJO confirmed by ultrasonography and diuretic renography (^{99m}Tc -DTPA). Inclusion criteria included congenital unilateral UPJO and parental consent. Exclusion criteria were bilateral UPJO, vesicoureteral reflux, prior ipsilateral renal surgery, or associated anomalies (e.g., duplex system, horseshoe kidney). A non-probability convenience sampling method was used.

Ultrasonography assessed hydronephrosis severity using the SFU grading system [9]. Diuretic renography (^{99m}Tc -DTPA) confirmed obstruction and measured GFR and DRF. Patients were well-hydrated, received 185–296 MBq (5–8 mCi) of tracer, and furosemide (1 mg/kg, maximum 20 mg) was administered at 20 minutes post-injection. Clearance half-time ($T_{1/2}$) was calculated: $T_{1/2} < 20$ minutes indicated normal drainage, while $T_{1/2} > 20$ minutes suggested obstruction [10].

All patients underwent open Anderson-Hynes dismembered pyeloplasty via an anterolateral extraperitoneal flank approach. The obstructed UPJ segment was excised, the ureter spatulated, and pelvi-ureteric anastomosis performed with interrupted 4-0 Vicryl sutures over an indwelling ureteral stent. A drain was placed, and the stent was removed at 4 weeks.

Ultrasonography was repeated at 3 months to assess hydronephrosis regression. Diuretic renography was performed at ≥ 6 months to evaluate GFR, DRF, and drainage. Complications (e.g., urinary tract infection [UTI], anastomotic leakage, redo pyeloplasty) were recorded.

Data were entered in Microsoft Excel and analysed using SPSS v27.0. Categorical variables (e.g., gender, side, complications) were expressed as frequencies and percentages. Continuous variables (e.g., SFU grade, GFR, DRF) were presented as mean \pm standard deviation (SD). Paired t-tests assessed pre- and postoperative differences, with $p < 0.05$ considered significant.

RESULTS

Of 28 patients, 75% (n=21) were male, and 71.4% (n=20) had left-sided UPJO. The majority (35.7%, n=10) were aged 0–24 months, followed by 25–48 months (21.4%, n=6). Common presenting symptoms included pain (21.4%), fever (14.3%), abdominal mass (14.3%), and antenatal detection (7.1%).

Postoperative outcomes showed significant improvements. Mean SFU grade decreased from 3.07 ± 0.38 to 2.14 ± 0.45 (30.3% reduction, $p < 0.001$). GFR increased from 30.57 ± 6.12 to 32.72 ± 5.98 mL/min (7.0% increase, $p = 0.049$). DRF improved from $31.76 \pm 4.23\%$ to $35.61 \pm 4.15\%$ (12.1% increase, $p < 0.001$). Overall, 67.9% (n=19) of patients showed improvement, 21.4% (n=6) remained static, and 10.7% (n=3) worsened.

Table No.1- Showing Comparison In Pre And Post Operative Value Of SFU, GFR, DRF

Variable	Before Treatment	After Treatment	Mean Difference	Percentage Relief	SD	SE	P value	Significance
SFU	3.07	2.14	.93	30.29	.5394	.1019	<0.001	Highly Significant
GFR(ml/min)	30.57	32.72	2.15	7.03	3.707	0.7006	0.0049	Significant
DRF(ml/min)	31.76	35.61	3.85	12.12	3.683	0.6961	<0.001	Highly Significant

Complications occurred in 25% of cases. UTI was the most common (14.3%, n=4), followed by redo pyeloplasty (7.1%, n=2) due to persistent obstruction, and anastomotic leakage (3.6%, n=1). No patients required secondary nephrectomy.

DISCUSSION

This prospective study demonstrates that Anderson-Hynes pyeloplasty is highly effective for paediatric unilateral UPJO, with 67.9% of patients showing significant improvements in renal function and hydronephrosis. The 30.3% reduction in SFU grade aligns with recent studies reporting morphological improvement post-pyeloplasty [11]. The 7.0% GFR and 12.1% DRF improvements are consistent with Salih et al. (2021), where 75.8% of children with low baseline DRF (<20%) showed significant recovery [12]. These findings suggest that early surgical intervention, particularly in infants, enhances nephron preservation due to higher regenerative capacity [13].

The 75% male predominance and 71.4% left-sided preponderance corroborate established epidemiological patterns [2,3]. Antenatal detection (7.1%) and symptomatic presentations (e.g., pain, fever) highlight the role of prenatal ultrasonography and clinical vigilance in early diagnosis, especially in regions with variable access to screening [14]. Complications (25%) were comparable to literature, with UTI (14.3%) being the most common, consistent with Koff's findings [15]. Redo pyeloplasty (7.1%) reflects challenges like anastomotic stricture, emphasizing the need for meticulous surgical technique [16].

Limitations include the small sample size (n=28), variability in patient age (3 months–12 years), and surgeries performed by different surgeons, which may affect outcomes. The Indian cohort adds regional relevance, as access to antenatal screening may influence presentation patterns. Future studies should explore long-term outcomes, larger cohorts, and minimally invasive techniques (e.g., laparoscopic or robotic pyeloplasty) to further optimize management [17].

CONCLUSION

Anderson-Hynes dismembered pyeloplasty effectively resolves hydronephrosis and improves renal function in most children with unilateral UPJO, with a 30.3% reduction in SFU

grade, 7.0% GFR increase, and 12.1% DRF improvement. The 67.9% improvement rate and low complication rate (25%) underscore its role as the gold standard. Early diagnosis via antenatal ultrasound and timely intervention optimize outcomes. Standardized imaging protocols, including ultrasonography and diuretic renography, are critical for postoperative monitoring. Larger studies with long-term follow-up are needed to refine management strategies.

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