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OPTIMIZING OUTCOMES IN PEDIATRIC VESICOURETERIC REFLUX: IMPORTANCE OF EARLY DIAGNOSIS AND SURGICAL INTERVENTION

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Abstract
This prospective study conducted at the Department of Pediatric Surgery, Institute of Child Health, over a 2½-year period aimed to investigate primary vesico ureteral reflux (VUR). The study enrolled pediatric patients presenting with symptomatic recurrent urinary tract infections (UTIs), predominantly under the age of 3 years, with a male predominance. Bilateral cases accounted for 62.9% of the total, with Grades III, IV, and V reflux representing 83.9% of the renal units studied. Cohen's Reimplant was the primary surgical intervention, achieving a success rate of 95.6%. The study underscores the importance of early surgical intervention to minimize renal damage in patients with persistent VUR, emphasizing the need for timely referral and multidisciplinary management strategies.

Keywords: Vesico Ureteral Reflux, Uretero vesical junction, Child health, urethral valve

Introduction
Vesico Ureteral Reflux (VUR) was a complex and dynamic phenomenon characterized by the abnormal retrograde flow of urine from the bladder into the upper urinary tracts[1,2]. While it was a normal occurrence in many animal species during early development, it was considered abnormal in humans, often indicating disordered anatomy and function at the uretero vesical junction (UVJ). Despite the potential for the reflux event to resolve as a child grew[3-5], it remained a significant clinical concern due to the risk of ascending urinary tract infections and associated nephropathy, which could lead to hypertension and renal insufficiency[4]. Extensive research had been directed towards understanding the pathophysiological components of VUR, urinary tract infections, and renal scarring, aiming to elucidate their causal relationships. VUR presented as a heterogeneous condition with diverse features[6,7], suggesting that multiple factors may have contributed to its development and its associations with urinary tract infections and nephropathy[8]. Moreover, evidence suggested a potential genetic basis for VUR, with familial clustering and higher risks among siblings and twins. Understanding the dynamics of VUR, particularly in terms of low-pressure versus high-pressure reflux, was crucial for predicting renal prognosis and guiding management

strategies[9,10]. Spontaneous resolution rates varied depending on factors such as reflux grade and gender, with faster resolution typically observed in boys with higher-grade reflux. Overall, gaining insight into the complexities of VUR and its associated complications was essential for developing effective screening, prevention, and treatment strategies, particularly in pediatric populations.

Methodology:

This prospective study was conducted at the Department of Pediatric Surgery, Institute of Child Health, over a period of 2½ years, spanning from August 2009 to January 2012. The study focused on primary vesico ureteral reflux (VUR). Patients were followed up for one year postoperatively to assess the resolution of reflux. Those who underwent surgical intervention were compared with patients managed solely with chemoprophylaxis in terms resolution of reflux.

Criteria for selection

Inclusion criteria

All patients diagnosed with primary vesicoureteral reflux (VUR), regardless of grade or laterality, were included in the study.

Exclusion criteria

Patients with secondary vesicoureteral reflux due to underlying pathologies such as associated bladder outlet obstruction (e.g., posterior urethral valve) and neurogenic bladder dysfunction were excluded from the study.

Results and discussion

This prospective study was conducted in the Department of Pediatric Surgery at the Institute of Child Health and Hospital for Children over a period of 2.5 years, from August 2009 to January 2012. A total of 35 patients who met the selection criteria were enrolled and attended the pediatric surgery department during this study period.

Table: 1 Characteristics of patients

S.No	Characteristics	N (%) 35
1	**Age** • Neonate • Infant • 1-3 years • 3-5 years • >5 years	 1 (2.9%) 4 (11.4%) 16 9 (45.7%) 5 (14.3% 9 (25.7%)
2	**Gender** • Male • Female	 22 (62.9%) 13 (37.1%)
3	**Laterality distribution** • Unilateral (Right or Left) • Bilateral	 13 (37.7%) 22 (62.9%)
4	**Management type** • Medical management • Surgical management	 6 29

Table: 2 Grades of reflux

S. No	Grade of vesico ureteral reflux	No of renal units	
		Before follow up	**After follow up**
1	Grade 1	1 (1.8%)	1 (1.8%)
2	Grade 2	8 (14.3%)	5 (63%)

3	Grade 3	13 (23.2%)	13 (100%)
4	Grade 4	24 (42.8%)	24 (100%)
5	Grade 5	10 (17.9%)	8 (80%)






Figure: 1 MCU Showing Varying Grades of Reflux

Our study highlights several important findings regarding pediatric vesicoureteric reflux (VUR). Most cases presented under 3 years, emphasizing the early onset of symptoms associated with VUR. Furthermore, the study population was predominately male, with a male-to-female ratio of 1:0.6. The proportion of bilateral VUR cases was greater than unilateral VUR cases, indicating the possibility of bilateral renal involvement.

There were 83.9% of renal units with higher-grade reflux (Grades III, IV, V), illustrating the severity of reflux in our patient population. Cohen's Reimplantation was the most commonly used surgical technique, with a notable 95.6% success rate. Lich-Gregor and Lead better techniques were used less frequently in cases where surgical intervention failed.

Preoperative assessment of reflux severity and postoperative evaluation of reflux resolution relied heavily on ultrasound and micturating cystourethrogram. Medical management alone may have limited efficacy in treating persistent Grade III, IV, and V reflux.

Surgical intervention early in patients with VUR can mitigate the risk of kidney damage, as our study shows. Early intervention could prevent further renal complications associated with VUR in many of our cohort patients by preventing renal damage caused by VUR by the time surgical treatment was initiated.

A multidisciplinary approach, including early diagnosis, effective management strategies, and close follow-up, is essential to optimizing patient outcomes and minimizing renal morbidity in pediatric patients with primary VUR.

Conclusion

The significance of early diagnosis and appropriate management of primary vesicoureteric reflux (VUR) in pediatric patients is highlighted by our study. High success rates have been demonstrated for surgical interventions in resolving reflux, particularly Cohen's Reimplantation. In addition, the study emphasizes the need to refer patients for surgery early to minimize kidney damage. The management of pediatric VUR and mitigating associated renal morbidity will require a multidisciplinary approach and close follow-up.

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