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Pelviureteric Junction Obstruction (PUJO) in Children: Our Experiences in Bangabandhu Sheikh Mujib Medical University (BSMMU)

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Abstract

Introduction: Pelviureteric junction obstruction (PUJO) is an important cause of upper urinary tract obstruction. We aimed to review the pattern of presentation and management outcomes of patients diagnosed with PUJO.

Methods: This retrospective observational study included 63 children aged 47 days to 14 years, diagnosed with Pelviureteric Junction Obstruction (PUJO) at Bangabandhu Sheikh Mujib Medical University (BSMMU) from January 2016 to December 2020. Patients with complete clinical records were included, and informed consent was obtained from parents or guardians. Data on demographics, clinical presentation, imaging, and treatment outcomes were analyzed using SPSS version 20.

Result: The 63 patients ranged from 47 days to 14 years old, with a median age of 2.7 years. The cohort included 48 males and 15 females, with a male-to-female ratio of 3.2:1. Unilateral PUJO was present in 90% of cases, with 30% right-sided and 60% left-sided. The most common symptom was occasional flank swelling with pain (83%), and 17% presented with a urinary tract infection. All patients had normal renal function at the time of surgery, where dismembered Anderson–Hynes pyeloplasty with a D-J stent was performed. Post-pyeloplasty, 95% of patients showed improved drainage and renal function, while 5% required nephrectomy.

Conclusion: PUJO is a common cause of urinary obstruction in children. Most of our patients underwent Anderson–Hynes pyeloplasty with satisfactory outcomes.

Keywords: Pelviureteric junction obstruction (PUJO); Pediatric urology; Anderson-Hynes pyeloplasty; Urinary tract obstruction; Surgical outcomes

Introduction

Pelviureteric junction (PUJO) obstruction refers to a blockage in the flow of urine from the renal pelvis to the proximal ureter, caused by structural narrowing at the pelviureteric junction. If not corrected, this obstruction can lead to hydronephrosis and progressive renal deterioration. It is the most common congenital anomaly of the upper urinary tract (UUT), leading to inadequate drainage from the renal pelvis and hydrostatic distension of the pelvis and renal calices [1]. In pediatric urology, this condition is frequently encountered and is characterized by an obstruction that impedes urinary flow from the renal pelvis into the ureter, resulting in significant renal damage and associated symptoms.

The prevalence of PUJO is roughly 1 in 500 live births [2,3], making

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it the most common cause of upper urinary tract obstruction in children [4]. This condition accounts for most cases of persistent postnatal hydronephrosis [5,6], with about half of antenatal hydronephrosis diagnoses on screening ultrasounds attributed to PUJO upon further investigation [7,8]. The improved detection of genitourinary abnormalities in fetuses, due to advancements in antenatal ultrasonography, has underscored the significant impact of PUJO. This is especially true in cases of bilateral obstruction, which can severely affect renal function and overall health.

PUJO can manifest at any age, from infancy to older adulthood, with a variety of symptoms and outcomes. In older children, PUJO may present in diverse ways, complicating early diagnosis. Delays in recognizing or diagnosing PUJO are linked to renal damage, highlighting the need for prompt diagnosis and treatment. Common symptoms include flank pain, abdominal swelling, and urinary tract infections, which may signal underlying obstruction. Early identification of these symptoms is essential to prevent further renal deterioration.

To evaluate PUJO, diagnostic tools such as ultrasonography CT urogram, and renal scintigraphy are used to determine the extent of obstruction and assess renal parenchyma [1]. The standard surgical treatment for PUJO is dismembered pyeloplasty, a technique developed by Anderson and Hynes, which has a success rate of 90 to 95% [9]. Although this procedure is preferred, nephrostomy may be considered in certain cases. Postoperative follow-up focuses on monitoring renal function and ensuring effective drainage, aiming for long-term improvement and the prevention of complications.

The aim of this study is to present our experiences in diagnosing and managing Pelviureteric Junction Obstruction (PUJO) in children at Bangabandhu Sheikh Mujib Medical University (BSMMU), highlighting the clinical challenges and outcomes associated with this condition. Through this study, we seek to contribute to the ongoing discourse on optimizing the care and treatment of pediatric PUJO, ultimately improving patient outcomes.

Objectives

The aim of the study was to assess our experiences in diagnosing and managing outcomes of Pelviureteric Junction Obstruction (PUJO) in children at Bangabandhu Sheikh Mujib Medical University (BSMMU).

Methodology and Materials

This retrospective observational study was conducted at the Department of Pediatric Surgery, Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, Bangladesh, over a 5-year period from January 1, 2016, to December 31, 2020. The study population included 63 patients diagnosed with PUJO during this period.

Inclusion Criteria:

- Children diagnosed with Pelviureteric Junction Obstruction (PUJO) aged between 47 days and 14 years.
- Patients with complete clinical records and follow-up data.

Exclusion Criteria:

- Patients with incomplete records.
- Children with other major urological abnormalities that could confound results.

Informed consent was obtained from the parents or guardians of all patients, ensuring confidentiality and voluntary participation. Data were collected retrospectively from medical records, encompassing demographic characteristics, clinical presentation, investigations, treatment modalities, and follow-up outcomes. Initial diagnosis of Pelviureteric Junction Obstruction (PUJO) was based on clinical presentation and imaging studies, including ultrasound and, when necessary, CT urogram or diuretic renograms. All patients underwent surgical intervention, primarily dismembered Anderson-Hynes pyeloplasty with DJ stent placement, while additional procedures, such as nephrectomy, were performed based on renal function. Post-surgery, patients were followed up with diuretic renograms to evaluate improvement in renal drainage and function. Data were analyzed using SPSS version 20, with descriptive statistics including frequencies and percentages used to summarize demographic characteristics, clinical presentation, types of PUJO, and surgical outcomes.

Results

Table 1: Demographic Characteristics of the Study Patients (n=63).

Variables		Frequency	Percentage (%)
Age (in years)	≤5	33	52.38
	5-10	20	31.75
	>10	10	15.87
Age (Range & Median)	47 days - 14 years (Median: 2.7 years)		
Gender	Male	48	76.19
	Female	15	23.81

The age distribution revealed that over half of the patients 33 (52.38%) patients were ≤5, with a median age of 2.7 years. Additionally, 20 (31.75%) patients were between 5 and 10 years old, while 10 (15.87%) patients were >10. Regarding gender distribution, there was a notable male predominance, with 48 (76.19%) males compared to 15 (23.81%) females, resulting in a male-to-female ratio of approximately 3.2:1.

Table 2: Distribution of PUJO Among the Study Patients (n=63).

Type of PUJO	Frequency	Percentage (%)
Unilateral	57	90.48
Right-sided Unilateral	19	30.16
Left-sided Unilateral	38	60.32
Bilateral	6	9.52

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The majority of patients, 57 (90.48%), had unilateral PUJO, with a higher incidence of left-sided obstruction in 38 (60.32%) patients, compared to 19 (30.16%) patients with right-sided obstruction. Bilateral PUJO was less common, observed in 6 (9.52%) patients.

Table 3: Clinical Presentation of PUJO in the Study Patients (n=63).

Symptom	Frequency	Percentage (%)
Occasional Flank Swelling with Pain	52	82.54
Urinary Tract Infection	11	17.46
Total	63	100

The most common clinical symptom among the patients was occasional flank swelling with associated pain, reported in 52 (82.54%) patients. Additionally, 11 (17.46%) patients presented with a urinary tract infection at the time of diagnosis.

Table 4: Post-Surgical Outcomes of PUJO Management (n=63).

Outcome	Frequency	Percentage (%)
Pyeloplasty	60	95.24
Nephrectomy	3	4.76
Total	63	100

Following surgical intervention, the majority of patients, 60 (95.24%), showed improved renal function as indicated by post-pyeloplasty diuretic renogram. However, a small subset, 3 (4.76%) patients, required nephrectomy. These results demonstrate the overall effectiveness of Anderson–Hynes pyeloplasty in managing PUJO, with a high success rate in preserving renal function.

Discussion

Pelvi-ureteric junction (PUJ) obstruction, a common cause of pediatric hydronephrosis, affects approximately 1 in 1000 to 2000 live births and can present in children of all ages [10]. Advances in imaging technology have enhanced early detection, with many cases now identified during the perinatal period.[6] Research indicates that functionally significant PUJ obstruction is found in about 1 in 1500 fetuses screened via antenatal ultrasonography. The condition is more predominant in male [11] and often affects the left side. This study aimed to review the pattern of presentation and management outcomes of patients diagnosed with PUJO.

In our study, the median age of patients with Pelvi-ureteric Junction Obstruction (PUJO) was 2.7 years, which aligns closely with the findings of Jayakumar et al. [4], where the mean age was approximately 3.3 years. This indicates that a significant portion of PUJO cases is detected in very young children. Another study supports this observation, noting that 60% of cases were detected by one year of age [12]. This consistency across studies suggests that PUJO is commonly identified in early childhood, reinforcing the importance of early detection and intervention in this age group.

In our study, there was a notable male predominance, with 48 (76.19%) males and 15 (23.81%) females, resulting in a male-to-female ratio of approximately 3.2:1. This gender distribution aligns with findings from several other studies. Jain et al. [13] reported an even higher male predominance, with 86.7% of the cases being boys. Similarly, Another study observed a male-to-female ratio of 2:1 [14,15], while Senguttuvan et al. [12] reported a ratio of 4:1. These consistent findings across different studies highlight that PUJO is more commonly diagnosed in males compared to females, indicating a potential gender predisposition in the occurrence of this condition.

In our study, the majority of patients (90.48%) had unilateral PUJO, with a Significantly predominant of left-sided obstruction (60.32%), compared to right-sided obstruction (30.16%). Bilateral PUJO was less common, observed in only 9.52% of the patients. These findings are consistent with those reported by Senguttuvan et al. [12], who also observed a higher incidence of left-sided PUJO (52.3%) compared to right-sided (20.4%) and bilateral obstruction (27.3%). The predominance of left-sided obstruction in both studies suggests a potential anatomical or developmental predisposition for PUJO on the left side, a trend that has been noted in other studies as well [14].

In our study, the most common clinical symptom was occasional flank swelling with associated pain, reported in 82.54% of patients. Additionally, 17.46% of patients presented with a urinary tract infection (UTI) at the time of diagnosis. These findings align with another study which noted tenderness in the flank in 16.2% of cases [1]. The significant presence of pain and UTI across various studies underscores the importance of these symptoms as key indicators of PUJO.

In our study, following surgical intervention, 95.24% of patients showed improved renal function as indicated by post-pyeloplasty diuretic renogram. However, a small subset of 4.76% of patients required nephrectomy. These findings are consistent with previous studies, which also reported high success rates for Anderson-Hynes pyeloplasty in managing PUJO. One study found that Anderson-Hynes dismembered pyeloplasty led to improved renal function in all patients post-surgery, with only a small percentage requiring nephrectomy [14]. Another study similarly highlighted the effectiveness of the Anderson-Hynes procedure, with nephrectomy performed in a few cases due to nonfunctional kidneys [1]. These results emphasize the overall efficacy of Anderson-Hynes pyeloplasty in preserving renal function while managing PUJO, with a success rate of around 98%,[16] confirming its status as a reliable surgical option.

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These outcomes underscore the robustness of Anderson-Hynes pyeloplasty in treating PUJO, affirming its critical role in ensuring long-term renal preservation. The minimal need for nephrectomy further highlights the procedure's effectiveness in preventing the progression of renal impairment.

Limitations of the study

This study had several limitations:

- Small sample size may limit the generalizability of the findings.
- Single-center study might introduce bias in the results.
- The study's limited geographic scope may introduce sample bias, potentially affecting the broader applicability of the findings.

Conclusion

Pelviureteric Junction Obstruction (PUJO) is a predominant cause of urinary tract obstruction in children, particularly affecting males and commonly presenting as left-sided unilateral obstruction. Our study at Bangabandhu Sheikh Mujib Medical University (BSMMU) demonstrates that Anderson–Hynes pyeloplasty is an effective surgical intervention, with 95% of patients showing improved renal function post-operatively. The need for nephrectomy in a small fraction of cases highlights the importance of early diagnosis and timely surgical intervention to prevent irreversible renal damage. These findings reinforce the value of Anderson–Hynes pyeloplasty as the standard treatment for PUJO in pediatric patients and suggest that further research should focus on long-term outcomes and potential enhancements in surgical techniques.

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