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Original Article

Pattern and Management of Hypospadias Among Children in a Tertiary Care Hospital

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Abstract

Hypospadias is one of the most common congenital anomalies of the male external genitalia, with wide geographical variation in anatomical patterns and surgical approaches. Optimal management remains challenging in resource-limited settings where delayed presentation and limited subspecialty care are prevalent. Objective: To evaluate the clinical patterns, surgical techniques, and early postoperative outcomes of hypospadias repair among children treated at a tertiary care hospital in Bangladesh.

Methods: This prospective cohort study was conducted in the Department of Pediatric Urology, Bangladesh Medical University (BMU), Dhaka, Bangladesh, from January 2023 to December 2025. A total of 153 children with hypospadias were enrolled using purposive sampling. Data on anatomical type, associated anomalies, surgical procedures, and complications were recorded. Analysis was performed using SPSS version 26.0.

Results: The mean age at surgery was 3.8±2.1 years. Distal hypospadias was observed in 89 patients (58.2%), midshaft in 41 (26.8%), and proximal in 23 (15.0%). Chordee was present in 47 patients (30.7%). The most common repairs were tabularized incised plate (TIP) urethroplasty (60.1%), followed by onlay island flap (23.5%) and two-stage repair (16.4%). Overall complication rate was 21.6%, with urethrocutaneous fistula (9.8%) and meatal stenosis (6.5%) being the most frequent. Complications were significantly higher in proximal hypospadias compared to distal types (34.8% vs. 16.9%, p=0.03).

Conclusion: Distal hypospadias predominated in this cohort, and TIP urethroplasty was the most frequently performed procedure. Proximal variants carried higher complication rates, emphasizing the need for specialized surgical expertise and long-term follow-up.

Keywords: Child, Congenital abnormalities, Hypospadias, Urethroplasty, Urologic surgical procedures

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Introduction

Hypospadias is a congenital anomaly of the male urethra characterized by an abnormally positioned urethral meatus on the ventral aspect of the penis, frequently accompanied by ventral curvature (chordee) and a hooded foreskin [1]. It results from incomplete urethral fold fusion during weeks 8–14 of gestation, with a reported global prevalence ranging from 1 in 300 to 1 in 1,000 live male births [2,3]. The prevalence varies significantly across geographic regions and ethnic groups, possibly due to differences in genetic susceptibility, environmental endocrine disruptors, and diagnostic criteria [4]. Clinically, hypospadias is classified according to the anatomical location of the meatus into distal (glanular, coronal, subcoronal), midshaft, and proximal (penoscrotal, scrotal, perineal) types [1,5]. Distal forms account for approximately 60–70% of cases in most series, while proximal variants are less common but associated with greater surgical complexity and higher complication rates [6]. Accurate classification is essential because the severity of hypospadias directly guides the choice of surgical technique and predicts postoperative

outcomes. The primary objectives of hypospadias surgery are threefold: to create a straight penis without chordee, to position the meatus at the tip of the glans, and to achieve a cosmetically acceptable penile appearance with a normal stream of micturition [7]. More than 300 surgical techniques have been described, reflecting the ongoing challenge of achieving optimal functional and aesthetic results. Among these, the tabularized incised plate (TIP) urethroplasty, first popularized by Snodgrass, has become the preferred technique for distal and many midshaft hypospadias due to its simplicity and favorable outcomes [8]. For proximal hypospadias with severe chordee, two-stage repairs or flap-based techniques such as the onlay island flap remain standard options [9]. Despite advances in surgical technique and postoperative care, complications remain common, occurring in 10–30% of cases depending on hypospadias severity, surgeon experience, and patient age at repair [10]. Urethrocutaneous fistula, meatal stenosis, urethral diverticulum, and glans dehiscence are the most frequently reported adverse events [7,10]. Most complications are identified within the first postoperative year, underscoring the need for structured long-term follow-up. In low- and middle-income countries (LMICs), including Bangladesh, the epidemiology and management outcomes of hypospadias are less well documented than in high-income settings [11]. Delayed presentation, limited availability of pediatric urology subspecialty care, and financial constraints often influence treatment patterns and results [12]. Bangladesh Medical University (BMU) serves as a major tertiary referral center for pediatric urological anomalies in Dhaka, yet systematic data on hypospadias patterns and surgical outcomes in this population remain scarce. Understanding local anatomical distributions and complication profiles is essential to guide surgical training, resource allocation, and quality improvement initiatives [13]. This prospective cohort study, therefore, aims to describe the clinical pattern, surgical management, and early postoperative outcomes of hypospadias among children treated at BMU, providing region-specific evidence to inform clinical practice.

Methodology

This prospective cohort study was conducted in the Department of Pediatric Urology, Bangladesh Medical University (BMU), Dhaka, Bangladesh, from January 2023 to December 2025. All male children aged 0–14 years diagnosed with hypospadias who presented to the outpatient department during the study period were eligible for enrollment. A total of 153 participants were recruited using purposive sampling.

Inclusion criteria: Children with a confirmed diagnosis of primary hypospadias (any anatomical type) whose parents or legal guardians provided written informed consent were included.

Exclusion criteria: We excluded children with previous hypospadias repair elsewhere (secondary cases), those with concomitant major life-threatening congenital anomalies requiring immediate non-urological surgery, and patients lost to follow-up before 30 days postoperatively.

Study procedure: All patients underwent preoperative clinical classification of hypospadias according to the modified Barcat system as distal, midshaft, or proximal [14]. Presence and severity of chordee were assessed intraoperatively after artificial erection using the Gittes maneuver [15]. Surgical technique (tubularized incised plate urethroplasty, onlay island flap, or two-stage repair) was selected by the attending pediatric urologist based on meatal location, degree of chordee, and urethral plate quality. All procedures were performed under general anesthesia by one of three consultant pediatric urologists. Postoperative complications, including urethrocutaneous fistula, meatal stenosis, and glans dehiscence, were documented at 7, 14, and 30 days post-surgery.

Data analysis: Data were entered into Microsoft Excel and analyzed using SPSS version 26.0. Continuous variables were expressed as mean ± standard deviation, and categorical variables as frequencies and percentages. Comparison of complication rates between distal and proximal hypospadias was performed using the Chi-square test, with $p<0.05$ considered statistically significant.

Result

A total of 153 children with primary hypospadias were included in the final analysis. The mean age at surgery was 3.8 years (standard deviation ±2.1 years, range 0.8–13.5 years). Nearly three-quarters of patients (71.9%) were aged between 1 and 5 years at the time of repair, while 15.7% were under 1 year and 12.4% were older than 5 years. Regarding anatomical distribution, distal hypospadias (glanular, coronal, subcoronal) was the most common type, observed in 89 patients (58.2%). Midshaft hypospadias accounted for 41 cases (26.8%), and proximal variants (penoscrotal, scrotal, perineal) were found in 23 children (15.0%). Associated chordee of any degree was present in 47 patients (30.7%), with the highest prevalence in proximal hypospadias (65.2%) compared to midshaft (34.1%) and distal types (14.6%). The tabularized incised plate (TIP) urethroplasty was the predominant surgical technique, performed in 92 patients (60.1%). Onlay island flap urethroplasty was used in 36 children (23.5%), and two-stage repair was reserved for 25 patients (16.4%), all of whom had proximal hypospadias with severe chordee. The overall 30-day postoperative complication rate was 21.6% (33 of 153 patients). Urethrocutaneous fistula was the most frequent complication, occurring in 15 patients (9.8%), followed by meatal stenosis in 10 patients (6.5%), glans dehiscence in 5 patients

(3.3%), and urethral diverticulum in 3 patients (2.0%). No patient developed complete urethral disruption or postoperative bleeding requiring reintervention. Complication rates varied significantly according to hypospadias severity. Among distal hypospadias, 15 patients (16.9%) experienced at least one complication; in midshaft, 9 patients (22.0%); and in proximal, 8 patients (34.8%). The difference between distal and proximal types was statistically significant (p=0.032). No significant association was observed between age at surgery and complication occurrence (p=0.214).

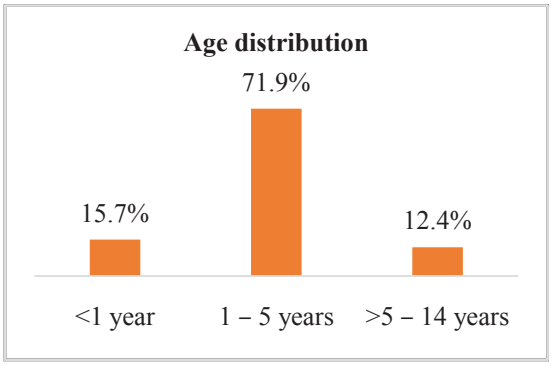


Figure 1: Age distribution of children with hypospadias at the time of surgery

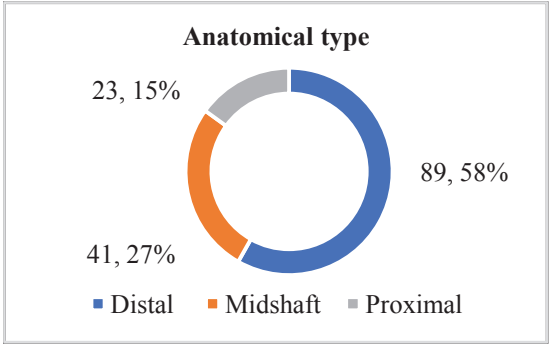


Figure 2: Anatomical type of hypospadias among study participants

Table 1: Association between anatomical type and presence of chordee

Type	Chordee		N	%
	present	Absent		
	n	n		
Distal	13	76	89	14.6
Midshaft	14	27	41	34.1
Proximal	15	8	23	65.2
Total	42	111	153	27.5

Note: Five of 47 chordee-positive patients had unclassifiable meatus due to severe ventral curvature; excluded from subtype analysis but included in overall rate (30.7%). Chi-square trend (distal to proximal, n=47): p=0.031.

Table 2: Distribution of surgical techniques according to hypospadias type

Anatomical type	TIP urethroplasty	Onlay island flap	Two-stage repair	Total
	(n)			
Distal	78	11	0	89
Midshaft	14	22	5	41
Proximal	0	3	20	23
Total	92	36	25	153

Table 3: Postoperative complications within 30 days stratified by hypospadias type

Complication type	Distal	Midshaft	Proximal	Total	%
	(n=89)	(n=41)	(n=23)	(n=153)	
Urethrocutaneous fistula	6	4	5	15	9.8
Meatal stenosis	5	3	2	10	6.5
Glans dehiscence	3	1	1	5	3.3
Urethral diverticulum	1	1	0	2	1.3
Any complication	15	9	8	32	20.9
No complication	74	32	15	121	79.1

Note: One patient had two concurrent complications; counted once in "any complication" (n=33, 21.6%). Distal vs. proximal χ^2 p=0.032.

Table 4: Comparison of complication rates by age at surgery

Age (years)	Complication			Total
	Present	Absent	Total	
	(n)			(%)
<1	4	20	24	16.7
1-5	26	84	110	23.6
>5-14	3	16	19	15.8
Total	33	120	153	21.6

Chi-square test across three age groups: p = 0.214 (not statistically significant)

Discussion

This prospective cohort study of 153 children with primary hypospadias at a tertiary care hospital in Bangladesh found that distal anatomical types predominated (58.2%), the tabularized incised plate (TIP) urethroplasty was the most frequently performed procedure (60.1%), and the overall 30-day postoperative complication rate was 21.6%, with significantly higher complications in proximal compared to distal variants (34.8% vs. 16.9%, p=0.032). The predomi

nance of distal hypospadias observed in this cohort aligns with published data from other low- and middle-income countries, where distal forms account for 55–65% of all cases [10]. This distribution reflects the global epidemiological pattern, although proximal variants are reportedly more common in certain Middle Eastern and South Asian populations, possibly due to differences in diagnostic completeness and referral filters [15]. The mean age at surgery in the present study (3.8±2.1 years) is substantially older than the recommended optimal window of 6–18 months, a finding consistent with other reports from resource-limited settings where delayed presentation and limited surgical access are common [11,16]. Earlier repair is associated with better psychological outcomes and lower parental anxiety, reinforcing the need for health system interventions to reduce surgical waiting times [1]. The preference for TIP urethroplasty in 92 patients (60.1%) reflects current international guidelines, which endorse this technique as the standard for distal and selected midshaft hypospadias [17]. The onlay island flap was used predominantly for midshaft defects with a healthy urethral plate but inadequate glanular groove depth, while two-stage repair was reserved exclusively for proximal hypospadias with severe chordee requiring division of the urethral plate. This stratified approach is consistent with published recommendations for complex hypospadias management [18]. The overall complication rate of 21.6% in the present study falls within the 10–30% range reported in contemporary series, although it is higher than the 10–15% typically reported from high-volume centers in high-income countries [6,19]. Urethrocutaneous fistula (9.8%) and meatal stenosis (6.5%) were the most common adverse events, mirroring findings from a recent meta-analysis of hypospadias repairs [20]. The significantly higher complication rate in proximal hypospadias (34.8%) compared to distal types (16.9%) is well recognized; proximal repairs require longer neourethral construction, more extensive dissection, and often two-stage procedures, all of which increase the risk of ischemic complications and fistula formation [17,21]. No significant association was found between age at surgery and complication rates (p=0.214), a finding that contrasts with some studies reporting higher complications in older children. However, other large series have similarly failed to demonstrate age as an independent predictor when controlling for hypospadias severity and surgical technique [16,22]. The present study did not identify surgeon volume or intraoperative factors such as operative time, which may confound the age–complication relationship. Despite these findings, this study provides much-needed baseline data on hypospadias patterns and short-term outcomes in Bangladesh, which can serve as a benchmark for quality improvement initiatives. Future multicenter studies with longer follow-up and validated patient-reported outcome measures are recommended.

Limitations

Single-center design, short 30-day follow-up, purposive sampling, lack of surgeon-volume stratification, and absence of validated patient-reported outcome measures limit generalizability and long-term interpretation.

Conclusion

Distal hypospadias predominated in this Bangladeshi tertiary cohort, with TIP urethroplasty as the preferred technique. The overall complication rate was 21.6%, significantly higher in proximal variants. These findings highlight the need for enhanced surgical training and structured long-term follow-up in resource-limited settings.

Recommendation

Multicenter prospective studies with ≥12 months follow-up and standardized outcome scores are recommended to improve hypospadias care quality in Bangladesh and similar low-resource countries.

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Ai Declaration

Artificial intelligence tools contributed marginally to manuscript preparation and development. All core scientific content was human-verified.

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