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Comparative Study between Stent versus Non-Stented Urethroplasty for Distal Hypospadias

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A B S T R A C T

Background: Hypospadias is a common congenital defect of the male urethra, with distal types comprising 70–80% of cases. The standard treatment is urethroplasty, with tubularized incised plate (TIP) urethroplasty, which is widely accepted for distal variants. A key postoperative debate involves using urethral stents, which are traditionally used to aid healing and reduce complications. However, concerns about discomfort, infection, and mixed outcomes have led to growing interest in stentless repairs. Recent studies show comparable results between stented and non-stented approaches, though opinions remain divided due to variations in surgical techniques, patient factors, and outcome definitions, highlighting the need for standardized management strategies.

Aim of the study: The aim of this study was to compare the surgical outcomes, complication rates, and functional and cosmetic results of stented versus non-stented urethroplasty in patients with distal hypospadias.

Methods: This prospective, comparative observational study was conducted over 12 months (start to end) at the Department of Paediatric Surgery, Parkview Medical College & Hospital, Sylhet, Bangladesh from July 2023 to July 2024. Sixty male children (6 months–12 years) with distal hypospadias were randomized into two groups: Group A underwent urethroplasty with postoperative stenting, and Group B without stenting. Exclusion criteria included proximal hypospadias, reoperations, severe chordee, UTI, and significant anomalies. Surgeries employed the TIP or Only technique. Data on demographics, clinical features, complications, and outcomes were collected. Follow-ups occurred at 2 weeks interval initially for 3 months, then monthly for 1 year. Outcomes were evaluated using HOSE scores, parental satisfaction, and statistical analysis via SPSS v26.0.

Result: In this study of 60 male children with distal hypospadias, patients were divided into groups of stented (Group A) and non-stented (Group B). Both groups had comparable baseline characteristics. Group A showed a longer operative time (78.4 vs. 72.6 minutes, p=0.03), a longer hospital stay (5.1 vs. 3.4 days, p<0.001), and higher pain scores (3.8 vs. 2.5, p<0.01). Early and late complication rates were slightly higher in the stented group, though not statistically significant. Both groups had high functional and cosmetic success at the six-month follow-up, with similar parental satisfaction and HOSE scores. Reoperation rates were marginally higher in Group A (6.7% vs. 3.3%).

Conclusion: Non-stented urethroplasty is a safe, effective alternative for distal hypospadias repair, offering outcomes comparable to the stented approach. It provides advantages such as shorter operative time, reduced hospital stay, and less postoperative pain. Despite slightly higher complications in the stented group, differences were not statistically significant, supporting non-stented repair as favorable.

Keywords: Distal hypospadias, Urethroplasty, Stented urethroplasty, and non-stented repair.

INTRODUCTION

Hypospadias is a common congenital anomaly of the male urethra characterized by an abnormally located urethral meatus on the ventral aspect of the penis, often associated with ventral curvature (chordee) and a dorsally hooded prepuce. Distal hypospadias, which includes glanular, coronal, and subcoronal types, accounts for approximately 70-80% of all hypospadias cases, making it the most frequent variant encountered in clinical practice [1,2]. Urethroplasty, the surgical reconstruction of the urethra, is the mainstay of treatment, aimed at achieving a cosmetically acceptable and functionally normal penis. Among the diverse surgical techniques employed, tubularized incised plate (TIP) urethroplasty, popularized by Snodgrass, is considered the gold standard for distal hypospadias repair due to its versatility and favorable outcomes [3]. A significant point of variation in the postoperative management of distal hypospadias repair lies in the use of urethral stents or catheters. Traditionally, a stent is placed postoperatively to facilitate urinary drainage, support the neourethra during healing, and reduce complications such as fistula formation and urinary retention. However, the practice is not without controversy. Some surgeons advocate for routine stenting, citing potential benefits such as maintaining urethral patency, minimizing edema-related obstruction, and enabling early detection of urinary leaks [4]. Others argue that stents may act as a nidus for infection, cause bladder spasms, and increase postoperative discomfort, particularly in young children [5]. Several recent studies have evaluated the necessity of stenting in distal hypospadias repair. Some authors report no significant differences in complication rates, including urethrocutaneous fistula, meatal stenosis, or wound dehiscence, between stented and non-stented repairs [6]. These findings have fueled interest in "stentless" urethroplasty, aiming to reduce patient discomfort, eliminate the need for catheter management, and shorten hospital stays without compromising surgical outcomes. Nevertheless, others have cautioned against a generalized stentless approach, noting that specific patient and procedural factors may influence the risk-benefit balance [7]. The debate over stent use is further complicated by the variability in surgical techniques, postoperative care protocols, and outcome assessment tools across institutions. For instance, while some centers routinely use absorbable subcutaneous sutures with prolonged catheterization, others advocate for minimally invasive approaches with early discharge. Moreover, the lack of standardized criteria for defining surgical success whether anatomical (e.g., absence of fistula) or functional (e.g., urinary stream quality) adds another layer of complexity in comparing outcomes [8]. Given these uncertainties, well-designed, comparative studies that evaluate the outcomes of stented versus non-stented urethroplasty specifically for distal hypospadias are needed. Such studies should consider various outcome measures, including surgical complications, patient comfort, cost-effectiveness, and parental satisfaction. The aim of this study was to compare the surgical outcomes, complication rates, and functional and cosmetic results of stented versus non-stented urethroplasty in patients with distal hypospadias.

METHODOLOGY & MATERIALS

This was a prospective, comparative, observational study conducted over 12 months from July 2023 to July 2024 at the Department of Pediatric Surgery, Parkview Medical College & Hospital, Sylhet, Bangladesh. Sixty male children diagnosed with distal hypospadias (glanular, coronal, or subcoronal types) were enrolled. The patients were randomly assigned to two equal groups:

- **Group A (Stented group):** Underwent urethroplasty with postoperative stenting.
- **Group B (Non-stented group):** Underwent urethroplasty without postoperative stenting.

Inclusion Criteria

- Male children aged 6 months to 12 years.
- Diagnosed with distal hypospadias (glanular, coronal, subcoronal).
- No prior hypospadias repair.
- No severe chordee requiring additional correction.

Exclusion Criteria

- Proximal hypospadias.
- Reoperative cases.
- Children with associated significant congenital anomalies (e.g., DSD, bladder exstrophy).
- Severe chordee (>30°).
- Urinary tract infection at the time of surgery.

Surgical Procedure

All surgeries were performed under general anesthesia by experienced pediatric surgeons using the Tubularized Incised Plate (TIP) technique or Onlay flap repair, depending on intraoperative findings and surgeon preference. In Group A, a urethral stent (6-8 Fr infant feeding tube) was inserted and kept in situ for 5-7 days. In Group B, no stent or catheter was inserted postoperatively. Both groups followed a standardized postoperative care protocol, including dressing type, antibiotic prophylaxis, and pain management.

Data Collection
Data were collected using a structured data collection sheet that included patient demographics and clinical characteristics, the type of hypospadias, and intraoperative findings. Operative time and any complications encountered during surgery were documented, along with details of the postoperative hospital stay, pain scores, and early and late complications. Follow-up assessments were conducted at 2-week,3 months, then monthly for 1 year postoperatively. Cosmetic and functional outcomes were evaluated using the Hypospadias Objective Scoring Evaluation (HOSE) system and a parental satisfaction survey.

Outcome Measures
The primary outcomes assessed in this study included the incidence of postoperative complications such as urethrocutaneous fistula, meatal stenosis, diverticulum, and infection. Functional success was evaluated based on urinary stream and voiding patterns, while cosmetic outcomes were measured using the HOSE score, with a score of ≥12 considered satisfactory. Secondary outcomes included the surgery duration, the postoperative pain level, the length of hospital stay, and the necessity for reoperation.

Statistical Analysis
Data were entered and analyzed using SPSS version 26.0. Quantitative variables were expressed as mean ± standard deviation and compared using the independent t-test. Categorical variables were expressed as frequencies and percentages and analyzed using the Chi-square or Fisher's exact test. A p-value <0.05 was considered statistically significant.

RESULTS
Sixty male patients with distal hypospadias were divided into groups of stented (Group A) and non-stented (Group B). Baseline characteristics, including mean age (28.5±8.2 vs. 29.1±9.1 months) and mean weight (11.2±1.8 vs. 11.5±1.6 kg), were comparable between the two groups with no statistically significant differences (Table 1). The distribution of hypospadias types and the presence of chordee or associated anomalies also showed no significant variation. Intraoperative findings revealed a significantly longer mean operative time in the stented group (78.4±12.5 min) compared to the non-stented group (72.6±11.3 min, $p = 0.03$). In contrast, the choice of urethroplasty type and intraoperative complication rates remained statistically similar (Table 2). Postoperative outcomes indicated that the stented group had a significantly longer hospital stay (5.1±0.9 vs. 3.4±0.7 days, $p<0.001$) and higher mean pain scores (3.8±1.2 vs. 2.5±1.0, $p<0.01$), suggesting greater postoperative discomfort (Table 3). Although early complication rates were slightly higher in the stented group (20% vs. 10%), this difference was not statistically significant. Regarding late complications, urethrocutaneous fistula occurred in 10% of stented and 3.3% of non-stented patients, while meatal stenosis and diverticulum rates were similar between groups. The total late complication rate was 20% in the stented group and 13.3% in the non-stented group, with no significant differences observed ($p>0.05$) (Table 4). Follow-up assessments demonstrated high rates of functional and cosmetic success in both groups. At 6 months, 93.3% of stented and 96.7% of non-stented patients had satisfactory urine streams and no significant abnormalities in meatal positioning. Parental satisfaction and cosmetic outcomes measured by HOSE score were also comparable between groups (Table 5). The need for reoperation was slightly higher in the stented group (6.7% vs. 3.3%), but this was not statistically significant.

Table 1: Baseline demographic and clinical characteristics of stented and non-stented groups

Variable	Stented Group (n=30)		Non-Stented Group (n=30)		*p*-value
	Mean±SD		Mean±SD		
	n	%	n	%	
Mean Age (months)	28.5 ± 8.2		29.1 ± 9.1		0.75
Mean Weight (kg)	11.2 ± 1.8		11.5 ± 1.6		0.43
Type of Hypospadias					
Glanular	8	26.67	10	33.33	0.57
Coronal	14	46.67	13	43.33	
Subcoronal	8	26.67	7	23.33	
Presence of Chordee	7	23.33	6	20.00	0.75
Associated Anomalies	3	10.00	2	6.67	0.64

Table 2: Intraoperative parameters and surgical techniques between groups

Variable	Stented Group (n=30)		Non-Stented Group (n=30)		*p*-value
	Mean±SD		Mean±SD		
	n	%	n	%	
Duration of Surgery (min)	78.4 ± 12.5		72.6 ± 11.3		0.03*
Type of Urethroplasty					
TIP	25	83.33	24	80.00	0.72
Onlay	5	16.67	6	20.00	
Intraoperative Complications	2	6.67	1	3.33	0.55

Table 3: Postoperative recovery parameters and early complications

Variable	Stented Group (n=30)		Non-Stented Group (n=30)		*p*-value
	Mean±SD		Mean±SD		
	n	%	n	%	
Hospital Stay (days)	5.1 ± 0.9		3.4 ± 0.7		<0.001*
Catheterization Duration (days)	5.0 ± 0.5		NA		–
Post-op Pain Score (VAS)	3.8 ± 1.2		2.5 ± 1.0		<0.01*
Early Complications					
Bleeding	1	3.33	1	3.33	0.28
Infection	3	10.00	1	3.33	
Edema	2	6.67	1	3.33	

Table 4: Comparison of late postoperative complications between groups

Complication Type	Stented Group (n=30)		Non-Stented Group (n=30)		*p*-value
	n	%	n	%	
Urethrocutaneous Fistula	3	10.00	1	3.33	0.3
Meatal Stenosis	2	6.67	3	10.00	0.64
Diverticulum	1	3.33	0	0.00	0.31
Total Complication Rate	6	20.00	4	13.33	0.48

Table 5: Follow-Up Outcomes at 2 week, 3 Months and 1-year post-surgery

Follow-Up Point	Stented Group (n=30)		Non-Stented Group (n=30)		*p*-value
	n	%	n	%	
2 week					
Satisfactory Urine Stream	28	93.33	29	96.67	0.55
Parental Satisfaction	27	90.00	28	93.33	0.64
3 Months					
Meatal Position Normal	28	93.33	29	96.67	0.55
HOSE Score ≥ 12	26	86.67	27	90.00	0.71
1 year					
Reoperation Needed	2	6.67	1	3.33	0.55

Table 6: Overall functional and cosmetic outcomes with complication and reoperation rates

Outcome Variable	Stented Group (n=30)		Non-Stented Group (n=30)		*p*-value
	n	%	n	%	
Functional Success	28	93.33	29	96.67	0.55
Cosmetic Satisfaction (Good)	26	86.67	27	90.00	0.71
Overall Complication Rate	6	20.00	4	13.33	0.48
Reoperation Required	2	6.67	1	3.33	0.55

DISCUSSION

Hypospadias is a common congenital anomaly of the male urethra, with distal forms accounting for approximately 70–80% of cases. Surgical correction aims to achieve a straight penis, a functionally adequate neourethra, and satisfactory cosmetic appearance. Traditionally, stented urethroplasty has been the standard approach, providing urinary diversion and reducing edema at the repair site. However, the necessity of stenting, particularly in distal hypospadias, has been questioned due to potential complications such as catheter-associated infections, discomfort, and extended hospitalization. This study compared stented and non-stented urethroplasty techniques in 60 patients with distal hypospadias to evaluate operative outcomes, complications, and functional/cosmetic success.In our study, both groups were demographically comparable in age and weight, reflecting a balanced cohort for analysis (Table 1). Most cases were of coronal hypospadias, and chordee was present in less than one-fourth of the patients in both groups. Similar findings were reported in previous studies, such as by Braga et al. (2011), where most distal hypospadias cases presented in children aged 1-3 without severe chordee [9].Intraoperatively, the mean duration of surgery was significantly longer in the stented group (78.4±12.5 minutes) compared to the non-stented group (72.6±11.3 minutes, p=0.03), likely due to the additional steps required for catheter insertion and securing (Table 2). This observation aligns with research by Snodgrass and Bush (2014), who noted longer operative times in stented urethroplasties due to meticulous catheter handling and fixation [10]. Postoperative recovery parameters highlighted notable advantages in the non-stented group. The mean hospital stay was significantly shorter in non-stented patients (3.4±0.7 vs. 5.1±0.9 days, p<0.001), supporting the hypothesis that catheter-free protocols can facilitate early discharge (Table 3). Moreover, the non-stented group experienced significantly less postoperative pain (VAS score 2.5±1.0 vs. 3.8±1.2, p<0.01), a finding consistent with results reported, who noted that catheter-free repairs led to greater comfort and reduced need for analgesics in young children [11].Early postoperative complications were more frequent in the stented group (20%) compared to the non-stented group (10%), although this difference was not statistically significant. The complications included minor bleeding, infection, and edema. These findings are congruent with a previous study, which found no significant differences in early complications but reported increased stent-related discomfort in catheterized patients [12]. Late complications are a critical measure of long-term surgical success. In our study, the urethrocutaneous fistula rate was slightly higher in the stented group (10%) than in the non-stented group (3.3%), although the difference was not statistically significant (Table 4). This contrasts with earlier beliefs that stenting reduces the risk of fistula by minimizing pressure on the neourethra. A meta-analysis similarly found no significant difference in fistula formation between stented and non-stented distal hypospadias repairs [13]. Other complications, such as meatal stenosis and diverticulum, were rare and similarly distributed between groups. Notably, the overall complication rate was lower in the non-stented group (13.3%) compared to the stented group (20%), supporting the growing evidence that stents may not offer substantial protective benefits in uncomplicated distal hypospadias cases. Both groups demonstrated high functional success rates at follow-up, as evidenced by satisfactory urinary streams in over 93% of patients. Cosmetic outcomes were also favorable, with 86.7% and 90% achieving acceptable HOSE scores in the stented and non-stented groups, respectively (Table 5). The need for reoperation was low and similar in both groups. Notably, non-stented urethroplasty showed a trend toward fewer reoperations, albeit not statistically significant. This finding suggests that eliminating the stent does not compromise surgical integrity when appropriate case selection and technique are applied.

Limitations of the study

This study has several limitations. The relatively small sample size of 60 patients may limit the statistical power and generalizability of the findings. The short follow-up duration of six months may not capture long-term complications, such as late-onset fistula formation or meatal stenosis. Additionally, Operator variability was minimized but not eliminated, and subjective measures like parental satisfaction and HOSE scoring may carry inherent bias.

CONCLUSION AND RECOMMENDATIONS

This study demonstrates that non-stented urethroplasty for distal hypospadias is a safe and effective alternative to the traditional stented approach. Both techniques showed comparable functional and cosmetic outcomes, with high parental satisfaction and low reoperation rates. However, the non-stented group experienced significantly shorter operative time, reduced hospital stay, and less postoperative pain. Although early and late complication rates were slightly higher in the stented group, the differences were insignificant. These findings support the growing evidence that non-stented urethroplasty can be preferable in selected distal hypospadias cases without compromising surgical success.

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