



CLINICAL PROFILE AND OUTCOME OF HYPOSPADIAS SURGERY IN A TERTIARY CARE HOSPITAL

Surgery

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ABSTRACT

This study evaluates the clinical profile, surgical techniques, and outcomes of hypospadias repair at a tertiary care hospital. A total of 30 patients underwent urethroplasty over 18 months, with the majority presenting distal hypospadias. The Tubularized Incised Plate (TIP) urethroplasty was the predominant surgical technique. Postoperative complications were minimal, including stenosis in 10% and fistula in 3.3% of cases. Reoperation was required in 13.3%, more commonly in patients with proximal hypospadias or flap repairs. Overall, TIP urethroplasty showed favourable outcomes, suggesting it as the preferred technique for most hypospadias cases in similar clinical settings. **Objective:** To assess the clinical profile, surgical techniques, and postoperative outcomes of patients undergoing hypospadias repair in a tertiary care hospital. **Materials And Methods:** This record-based cross-sectional observational study was conducted over 18 months in the Department of General Surgery at Muzaffarnagar Medical College, Uttar Pradesh, following ethical approval. The study enrolled the first 30 consecutive patients with hypospadias undergoing urethroplasty. Patients with ambiguous genitalia, a history of prior surgery, or lack of consent were excluded. Preoperative evaluation included assessment of hypospadias severity, penile curvature, and associated anomalies. Urethroplasty was performed using standard procedures including the Tubularized Incised Plate (TIP) urethroplasty or flap repair. **Results:** Among the 30 patients, the majority (50%) were aged 6–10 years, and 76.7% had distal hypospadias. TIP urethroplasty was performed in 90% of cases, while flap repair was done in 10%. Preoperative testosterone therapy was used in only 10% of patients. Most (86.7%) had no postoperative complications; stenosis occurred in 10%, and fistula in 3.3%. Re-operation was required in 13.3% of patients, with higher rates observed in younger age groups, proximal meatal positions, and flap repair cases, though these differences were statistically insignificant ($p>0.05$). **Conclusion:** TIP urethroplasty demonstrated favourable outcomes with fewer complications and re-operations, making it the preferred surgical technique. Although proximal hypospadias and flap repairs were associated with higher complication rates, these trends lacked statistical significance.

KEYWORDS

Flap Repair, Hypospadias, Postoperative complications, Re-operation rates, TIP urethroplasty.

INTRODUCTION

Hypospadias is a congenital malformation of the male external genitalia characterized by atypical development of the urethral folds and ventral preputial skin, leading to abnormal positioning of the urethral meatus.¹ This condition is typically defined by a triad of penile anomalies: (1) ectopic placement of the external urethral opening along the ventral surface of the penis, ranging from the glans to the perineum; (2) ventral penile curvature (chordee); and (3) a dorsally hooded prepuce with ventral deficiency.²

As the second most common congenital anomaly in male infants after cryptorchidism, hypospadias represents the most frequent penile congenital deformity, with an incidence of approximately 1 in 300 live births.^{3,5} It results from a disruption in the development of the urethra between the 8th and 16th weeks of gestation.⁶ Classification is based on the location of the ectopic meatus and includes anterior (glandular and sub coronal), middle (distal penile, midshaft, and proximal penile), and posterior types (penoscrotal, scrotal, and perineal).^{4,7} Approximately 70% of cases are distal and considered less severe, while the remaining 30% are proximal and represent more complex forms.⁸

Advancements in surgical techniques have improved outcomes in hypospadias management.⁹ The mainstay of treatment is surgical correction of the anatomical defect. A thorough preoperative assessment is critical and should include evaluation of penile size, glans configuration, meatal position and size, presence of meatal stenosis or megameatus, urethral plate width, preputial status, penile torsion, chordee characteristics, scrotal anatomy, and associated anomalies such as cryptorchidism, inguinal hernia, or persistent Müllerian structures.¹⁰

Surgical principles emphasize minimizing tissue trauma, judicious use of cautery, and ensuring a well-vascularized, tension-free multilayered reconstruction with epithelial inversion. Reconstructive techniques are broadly divided into single-stage and two-stage procedures, such as Bracka's repair. Single-stage methods include urethral plate

tubularization (e.g., Glanular Approximation Procedure and Snodgrass repair) and augmentation (e.g., onlay flap and Snodgrass techniques).¹¹ The Tubularized Incised Plate (TIP) urethroplasty, is preferred for distal hypospadias, while proximal variants often necessitate more complex, staged reconstructions.¹²

The ideal age for surgical intervention is between 6 and 18 months. If missed, the next feasible window is during preschool years (3–4 years), when the child is more compliant with postoperative care.¹³ Despite a wide array of surgical options and modifications, no single technique is universally suitable for all hypospadias cases. Surgical outcomes can be suboptimal, with complication rates reportedly exceeding 50%.^{14,15} Common postoperative complications include urethrocutaneous fistula (UCF), meatal stenosis, urethral stricture, diverticulum, glans dehiscence, wound breakdown, and unsatisfactory cosmetic results necessitating revision.¹⁶ UCFs in paediatric patients may result from factors such as meatal stenosis, urethral stricture, infection, bleeding, or technical errors during surgery.¹⁷

Therefore, the present study is undertaken to assess the postoperative outcomes and the spectrum of early and delayed complications following hypospadias repair in a tertiary care hospital setting.

MATERIALS AND METHODS

This record based cross-sectional observational study was conducted in hospital settings, under the Department of General Surgery at Muzaffarnagar Medical College, Uttar Pradesh, following approval from the Institutional Ethical Committee. The study was conducted for 18 months, including 12 months of data collection and 6 months of analysis. A total of first 30 patients with hypospadias attending the department were enrolled in the study. Children diagnosed with hypospadias requiring urethroplasty, and only those whose parents provided written informed consent were included in the study. Patients with ambiguous genitalia, a history of failed or prior hypospadias repair, or whose parents did not consent were excluded from the study. Medical records of patients diagnosed with hypospadias and treated with urethroplasty were reviewed to gather relevant demographic data,

clinical presentations, and surgical outcomes. Preoperative evaluation included a thorough clinical examination assessing the severity of hypospadias, meatal location, penile curvature, and any associated anomalies. The surgical approach was selected based on the anatomical findings and urethral plate characteristics, and written informed consent was obtained from parents or guardians.

Urethroplasty was performed using standard techniques such as the Snodgrass (Tubularized Incised Plate, TIP) repair, Duckett onlay island flap, or other methods tailored to individual cases. All procedures were done under general anaesthesia, with or without caudal analgesia. Intraoperative findings, surgical methods, and complications were carefully documented. Postoperatively, patients were monitored for urine output, catheter function, wound healing, and early complications including bleeding, oedema, infection, and fistula formation. Antibiotics and analgesics were administered according to institutional protocols, and catheter removal was scheduled based on the type of repair. Patients were followed up at 1, 3, and 6 months post-surgery to evaluate functional and cosmetic outcomes, as well as identify late complications such as fistula, urethral stricture, or persistent chordee.

Statistical Analysis

The collected data were entered into a Microsoft Excel spreadsheet by the investigator on the same day to reduce the risk of data entry bias. Continuous or quantitative variables were expressed as mean and standard deviation. Categorical or qualitative variables were represented as proportions, and differences between groups were analyzed using the chi-square test. All statistical analyses were conducted with a 95% confidence level.

RESULTS

In our study, 50% of cases were aged 6-10 years, followed by 40% aged up to 5 years, and the least three (10%) cases were aged 11-18 years. A maximum of 23(76.7%) individuals exhibited distal hypospadias, whereas four patients (13.3%) presented with middle meatal positions and three patients (10%) with proximal meatal positions. [Table-1]

Table 1- Age Distribution And Meatal Position Among Patients With Hypospadias

Variable	Number	Percentage
Age group (Years)		
Up to 5 years	12	40
6-10 years	15	50
11-18 years	3	10
Total	30	100
Meatal Position		
Distal	23	76.7
Middle	4	13.3
Proximal	3	10
Total	30	100

Only three (10%) individuals had preoperative testosterone therapy. The Tubularised Incised Plate (TIP) urethroplasty was the predominant technique in 27 (90%) of the cases, whereas flap repair was conducted in the other three (10%) cases. A majority of 26 patients (86.7%) experienced no complications, although three (10%) patients developed stenosis and one (3.3%) patient developed fistula development. [Figure-1]



Figure 1- Post-operative complications among patients

The majority of patients (86.7%) did not require secondary surgical intervention, while re-operation was necessary in 13.3% of cases. Postoperative urethral dilatation was performed in 10% of patients, whereas the remaining 90% did not require any additional procedures. [Table-2]

Table 2- Postoperative Outcomes In Terms Of Re-operation And Additional Procedures

Variable	Number (n=30)	Percentage
Re-operation		
No	26	86.7
Yes	4	13.3
Additional post-operative procedures		
Dilatation	3	10
None	27	90

Patients aged up to 5 years had a re-operation rate of 16.7%, while 13.3% of children aged 6-10 years required re-operation; no re-operations were necessary for patients in the 11-18 years age group. Proximal meatal position cases exhibited the highest re-operation rate at 33.3%, followed by middle meatal position at 25%, and distal meatal position at 8.7% in hypospadias patients. One third of flap repair patients underwent re-operation, whereas only 11.1% of cases in the TIP urethroplasty group required re-operation. The study found no significant correlation between patient age, meatal location, or kind of surgery and the necessity for re-operation ($p>0.05$). [Table-3]

Table 3- Association Of Re-operation With Different Variables In Patients

Variable		Re-operation		Test of significance
		No (n=26)	Yes (n=4)	
Age group (Years)	Up to 5 years	10(83.3)	2(16.7)	$X^2 = 0.577$, $df=2$; $P = 0.749$ (NS)
	6-10 years	13(86.7)	2(13.3)	
	11-18 years	3(100)	-	
Meatal Position	Distal	21(91.3)	2(8.7)	$X^2 = 1.938$, $df=2$; $P=0.380$ (NS)
	Middle	3(75)	1(25)	
	Proximal	2(66.7)	1(33.3)	
Type of surgery	Flap Repair	2(66.7)	1(33.3)	$X^2 = 0.032$, $df=1$; $P = 0.858$ (NS)
	TIP urethroplasty	24(88.9)	3(11.1)	
Total		26(86.7)	4(13.3)	

In the current study, one (33.3%) patient who had flap repair experienced problems, in contrast to three (11.1%) cases in the TIP urethroplasty group. The variation in complication rates among different surgical types was statistically insignificant ($X^2(1)$; $p=0.858$). [Table-4]

Table 4- Association Of Type Of Surgery With Complications In Patients

Type of surgery	Complications		Total
	No	Yes	
Flap Repair	2(66.7)	1(33.3)	3(100)
TIP urethroplasty	24(88.9)	3(11.1)	27(100)
Total	26(86.7)	4(13.3)	30(100)

Hypospadias is a common congenital malformation of the male external genitalia. Despite the evolution of over 300 surgical techniques aimed at correcting hypospadias, outcomes remain variable, with complications such as urethrocutaneous fistula, meatal stenosis, and the need for re-operation continuing to pose challenges.

DISCUSSION

In the present study, most patients (50%) were aged 6–10 years, with 40% under 5 years, reflecting the common practice of deferring hypospadias surgery until the child is developmentally fit for anaesthesia and surgery.¹⁸ The ideal surgical window is between 6 and 18 months to optimize healing and reduce psychosocial impact.¹⁹ Mir TA et al²⁰ reported a mean presentation age of 50 months (range: 5 months to 12 years). The delayed presentation in our study likely reflects limited awareness and reduced perception of severity among lower socioeconomic groups.

In current study, distal hypospadias was most common (76.7%), followed by middle (13.3%) and proximal (10%). This aligns with findings by R K Maurya et al²¹, who observed distal meatus in 47.22%, mid-penile in 29.61%, and proximal in 19.44% of cases. Similarly, Akmal M et al²² reported 60% distal and 40% proximal cases, supporting the predominance of distal hypospadias as the most

frequent anatomical form.

In the current study, only 10% of patients received preoperative testosterone, consistent with selective use protocols where it is reserved for cases with small phallus or inadequate tissue bulk. Local or parenteral testosterone has been shown to improve penile size, skin vascularity, and pliability, thereby enhancing surgical outcomes with minimal side effects.^{23,24}

In present study, TIP urethroplasty was performed in 90% of cases, reflecting its status as the gold standard for distal hypospadias repair due to its favourable outcomes and low complication rates.²⁵ Pradana Nurhadi et al²⁶ similarly reported TIP use in 76.4% of cases, supporting our findings. Flap repair, used in only 10% of patients, is typically reserved for cases with anatomical variations where TIP is not feasible. These results further affirm the efficacy and preferred status of TIP urethroplasty for distal hypospadias correction.

In this study, 86.7% of patients had no complications, and with complications limited to stenosis (10%) and fistula formation (3.3%). These results are consistent with reported complication rates of 5–15% in other studies. Appeadu-Mensah et al²⁷ reported 18% fistula and 3% stenosis rates, while Pradana Nurhadi et al²⁸ noted 79.5% complication-free outcomes and 20.5% fistula in TIP cases, supporting the effectiveness of TIP urethroplasty. The re-operation rate was 13.3%, indicating a generally successful primary repair. Previous literature-reported rates of 3.3%–6.7% following distal hypospadias repair.²⁹

Association Of Age Group, Meatal Position, And Surgery Type With Re-operation

In the current study, patients aged ≤5 years had a slightly higher re-operation rate (16.7%) compared to those aged 6–10 years (13.3%), though not statistically significant. Suggesting age is not a key predictor of re-operation—consistent with findings by Yu-chuan Lu et al²⁹ and Ru W et al³⁰

Re-operation rates were higher in middle (25%) and proximal (33.3%) meatal positions compared to distal cases (8.7%), though differences were statistically insignificant, likely due to small subgroup sizes. Yu-chuan Lu et al²⁹ reported similar trends, proximal hypospadias as an independent risk factor for re-operation. Essa W et al³¹ also observed higher re-operation rates in penoscrotal and proximal shaft defects post-TIP repair, which contrasts with our findings and may be attributed to the smaller sample size in this study.

Flap repair cases had a higher re-operation rate (33.3%) than TIP urethroplasty cases (11.1%), but the difference showed no statistical significance. This supports the general preference for TIP due to its lower complication and re-operation rates. Multiple studies have reported proximal and perineal hypospadias as major risk factors for increased complications and secondary procedures.³²

In parallel with the re-operation data, flap repair was associated with a higher rate of postoperative complications compared to TIP urethroplasty. Although the trend suggests that TIP repair may be safer, the small sample size again prevented these differences from reaching statistical significance.

Despite its strengths, this study has several limitations. The small sample size (n=30) and single-center design limit generalizability. Its retrospective nature may introduce information bias due to incomplete medical records. And the lack of a control group prevents comparison with other treatment modalities. Future research should focus on larger, multicenter prospective studies with extended follow-up to assess long-term outcomes. Comparative analyses of surgical techniques and evaluation of preoperative testosterone therapy could further enhance treatment strategies.

CONCLUSION

This study provides valuable insights into the clinical profile and surgical outcomes of hypospadias repair in a tertiary care setting. Most patients were younger and presented with distal hypospadias, with TIP urethroplasty being the most commonly performed procedure. Postoperative complications were infrequent, with few cases of stenosis or fistula, and re-operations were required in a limited number of patients.

Although proximal meatal position and flap repairs showed higher

rates of complications and re-interventions compared to TIP urethroplasty, these differences were not statistically significant. Overall, TIP urethroplasty emerged as the preferred technique due to its lower complication and re-operation rates.

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