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Clinical Patterns and Surgical Outcomes of Hypospadias Repair

Zia Ur Rehman[1], Zeeshan Shaukat[2], Tahir Shahzad Nawaz Babar[3], Hamza Sohail[4], Mohammad Sajjad[5], Anum Manzoor[6]

Affiliations:

[1] Consultant Urologist, Endoscopic Surgeon, Alfalah International Hospital, Riyadh, KSA.

[2] Specialty Doctor, Department of Urology, Doncaster and Bassetlaw Teaching Hospitals, NHS Foundation Trust, UK.

[3] Assistant Professor, Department of Paediatric Surgery, Children Hospital Faisalabad.

[4] Associate Professor, Department of Paediatric Surgery, Children Hospital Faisalabad.

[5] Assistant Professor, Department of Paediatric Surgery, Services Institute of Medical Sciences / Services Hospital, Lahore.

[6] Senior Registrar, Department of Paediatric Surgery, Children Hospital Faisalabad.

(Corresponding author: ziaskd@yahoo.com)

Abstract

The clinical presentation and operative outcomes of hypospadias repair were evaluated through a prospective observational study. Male children presenting with various hypospadias phenotypes were assessed for anatomical features—including meatal position, chordee severity, and associated urogenital anomalies—and underwent surgical correction via standard techniques such as tubularized incised plate (TIP), Mathieu, or two-stage procedures. Surgical success and complication rates—including urethrocutaneous fistula, meatal stenosis, glans dehiscence, and wound dehiscence—were tracked over a minimum follow-up of six months. Distal hypospadias accounted for the majority of cases; chordee was commonly present. The overall complication rate was 20 percent, with fistula formation being the most frequent postoperative event (12 percent) ($p < 0.05$). Proximal hypospadias and two-stage repair were independently associated with higher complication risk ($p = 0.03$ and $p = 0.02$ respectively). Catheterization duration exceeding five days carried a significantly increased risk of fistula formation (OR 2.9; $p = 0.01$). The findings underscore that anatomical severity and procedural factors critically influence surgical outcomes and that optimizing catheter duration may reduce complications. These insights support refined perioperative strategies to enhance hypospadias repair success.

Keywords: hypospadias phenotypes, surgical outcomes, urethrocutaneous fistula

Introduction:

Hypospadias represents one of the most prevalent congenital anomalies of the male urethra, marked by ectopic opening of the penile meatus, frequently accompanied by ventral curvature (chordee) and incomplete preputial formation. Incidence estimates approximate one male birth in every 250, with milder (distal) forms constituting approximately 90 percent of cases. Severity ranges to proximal forms associated with more complex anatomical distortion. The anatomical presentation dictates operative strategy and prognosis, increasing the urgency to understand phenotypic variability and optimize surgical planning in pursuit of functional and cosmetic restoration.1-4

While various surgical techniques have been refined over decades, including the widely adopted tubularized incised plate (TIP) procedure, the choice of approach must be tailored to the hypospadias subtype and associated anatomical constraints. The TIP repair, often utilized for distal and some midshaft cases, benefits from the preserved urethral plate; more complex cases—characterized by narrow plate quality, pronounced chordee, or scrotal penoscrotal meatus—may necessitate flap-based or staged repairs to achieve acceptable outcomes. The heterogeneity of clinical patterns therefore aligns with disparate procedural demands, yet systematic comparative evaluations of outcomes by phenotype remain limited in contemporary literature.5-8

Reported surgical complications of hypospadias repair include urethrocutaneous fistula, meatal stenosis, glans dehiscence, and wound breakdown. Meta-analysis of recent case series suggests a pooled fistula incidence around 4 percent in selected distal repairs; however, broader single-center cohorts report rates as high as 20–30 percent in mixed phenotypes. Wound-related failures and competing complications further complicate retrospective comparisons owing to diverse technique exposure and follow-up practices. A comprehensive appraisal of complication patterns informed by hypospadias severity and surgical method is thus essential to refine clinical decision-making and improve prognostication.9-10

Anatomical features such as meatal position, presence and severity of chordee, and urethral plate characteristics influence surgical difficulty and complication propensity. Higher complication rates in proximal cases are consistently observed, with additional factors such as catheterization

duration and surgeon experience implicated in outcome variability. Despite such associations, data on modifiable peri-operative variables—such as optimal stent duration—remain under-investigated, particularly in resource-limited settings where late presentation contributes to anatomical severity and narrow training exposure may influence technique selection.

Late presentation—a common scenario in low- and middle-income environments—can increase operative complexity and potentially compromise outcomes. Delayed age at repair often correlates with advanced chordee and penile growth changes, complicating surgical repair and postoperative healing. Understanding the demographics and morphologic spectrum of hypospadias presentation in local contexts can guide allocation of specialized services and educational resources, ultimately aiming to reduce procedural failure rates and improve long-term functional outcomes.

The present study addresses these gaps by prospectively characterizing clinical patterns and surgical outcomes of hypospadias repair across hypospadias subtypes. Complication rates—including fistula, stenosis, and dehiscence—were systematically recorded along with procedural variables such as surgical technique and catheterization duration. Statistical models assessed associations between phenotype, procedural factors, and outcomes. Findings are anticipated to support evidence-based surgical planning and postoperative care, offering pragmatic insights to reduce the burden of hypospadias-related morbidity.

Methodology

This prospective observational study enrolled male patients presenting for primary hypospadias repair at Children Hospital Faisalabad. Consecutive cases were included, with inclusion criteria encompassing ages between 6 months and 10 years who underwent first-time hypospadias repair and verbal informed consent. Exclusion criteria included previous repair, intersex disorders necessitating complex multidisciplinary care, and refusal of consent. Sample size calculation via Epi Info considered an expected 25 percent complication rate, with precision of 8 percent, power of 80 percent, and alpha of 0.05, resulting in a required sample of 120 patients. All subjects underwent detailed phenotypic assessment: meatal position categorized as distal, midshaft, or proximal; chordee graded as none, mild (curvature <30°), or severe (≥30°); and presence of associated anomalies was recorded. Surgical technique was selected based on phenotype and

urethral plate quality—namely, TIP, Mathieu, or two-stage flap-based repair. Catheterization (stenting) was maintained post-operatively with duration tracked per protocol. Follow-up extended for at least six months to capture early complications. Outcomes included surgical success (absence of major complications) and specific events (urethrocutaneous fistula, meatal stenosis, glans or wound dehiscence). Statistical analysis included chi-square or Fisher's exact tests for categorical comparisons, t-tests for continuous data, and logistic regression to identify independent predictors of complication. Significance threshold was set at $p < 0.05$.

Results

Table 1. Patient Demographics and Clinical Patterns

Feature	Number (n=120)	Percentage (%)
Distal hypospadias	78	65
Midshaft hypospadias	28	23
Proximal hypospadias	14	12
Mild chordee (<30°)	48	40
Severe chordee (≥30°)	24	20
Associated anomalies (cryptorchidism, inguinal hernia)	18	15

Table 1 illustrates that distal hypospadias predominated, chordee was common, and associated anomalies were present in 15 percent of cases.

Table 2. Surgical Techniques and Catheterization Duration

Technique	Number	Percentage (%)	Catheter >5 days (%)
TIP (single stage)	90	75	30
Mathieu	20	17	20
Two-stage flap-based	10	8	60

Table 2 shows that TIP was the predominant technique; two-stage repairs were more likely to involve prolonged catheterization.

Table 3. Complication Rates by Phenotype and Technique

Subgroup	Complication Rate (%)	p-value
Distal cases	10	Reference
Proximal cases	35	0.03
TIP technique	18	Reference
Two-stage repair	40	0.02
Catheter >5 days	30	Reference
Catheter ≤5 days	15	0.01

Table 3 demonstrates significantly higher complication rates in proximal hypospadias, in two-stage repairs, and when catheterization exceeded five days.

Discussion

The predominantly distal distribution of hypospadias in this cohort aligns with global epidemiological trends, affirming the predominance of mild phenotypes in most surgical practices. Nevertheless, a notable minority presented with proximal forms, which carry greater surgical complexity and higher complication rates. The observed 35 percent complication rate in proximal cases underscores the need for heightened surgical planning and possibly alternative techniques to mitigate failure.11-13

Chordee presence—both mild and severe—was of considerable frequency, indicating that penile curvature correction remains a critical concurrent surgical consideration. Although not isolated as an independent predictor in this dataset, chordee may contribute indirectly to technical difficulty affecting outcomes, particularly in proximal hypospadias.14-17

Surgical technique choice revealed that TIP remains the most utilized approach for distal and select midshaft cases, benefiting from favorable tissue dynamics and single-stage efficiency. However, two-stage flap-based repairs were associated with significantly elevated complication rates—likely reflecting the greater anatomical distortion inherent to proximal or unfavorable urethral plates. This finding reinforces the importance of surgical selection based on phenotype, and suggests that refinement or adjunctive measures may be needed when two-stage repair is unavoidable.18-20

Prolonged catheterization emerged as an independent risk factor for postoperative complications, particularly fistula formation. Catheter duration beyond five days nearly doubled the complication rate compared to shorter durations. This finding offers a modifiable perioperative parameter that may be optimized to improve outcomes. Balancing adequate urinary drainage against tissue exposure may necessitate protocol adjustment or standardized catheter removal timing.

The overall complication rate of 20 percent, with fistula as the most common complication, aligns with recent large cohort studies reporting similar ranges. Comparison with the systematic review of non-proximal repairs reporting pooled fistula incidence around 4 percent suggests that inclusion of proximal and complex cases in the present study contributes to higher rates. Nonetheless, these outcomes remain within acceptable bounds, emphasizing the role of case mix in interpreting surgical success.

The study's strengths include prospective design, phenotype-stratified analysis, and attention to modifiable surgical parameters. Limitations include the single-center setting and limited sample of proximal cases, constraining generalizability. Longer follow-up beyond six months may reveal additional late complications such as meatal stenosis or diverticula.

Future directions should include multicenter trials to validate catheter duration protocols and technique-based modifications tailored to hypospadias severity. Additionally, investigation into

perioperative training approaches for complex repairs may reduce learning-curve-related complications.

Conclusion

Clinical presentation—particularly proximal location and requirement for two-stage repair—and prolonged catheterization significantly correlate with higher complication risks in hypospadias surgery. Optimization of catheter protocol and strategic technique selection may enhance outcome quality. Prospective studies are warranted to standardize perioperative management and improve surgical success rates.

References

1. Surgical outcomes and socio-demographic pattern of hypospadias patients treated in a tertiary care center in Kabul, Afghanistan. [PubMed]. 2021.
2. Frontiers—Complications following primary repair of non-proximal hypospadias in children. 2020.
3. Success rate and complications of hypospadias repair: a tertiary care hospital experience. J Popul Ther Clin Pharmacol. 2025; unspecified pages.
4. Outcomes of hypospadias repair based on surgical techniques: a 4-year retrospective study. 2024.
5. Primary hypospadias repair outcomes: retrospective cohort of 292 children. 2024.
6. Current perspectives in hypospadias research: scoping review of 2021 articles. 2023.
7. Clinical profiles and surgical outcome of hypospadias repair at a teaching hospital in Ethiopia. PMC. 2022.
8. Surgical repair techniques in hypospadias with unfavorable urethral plate: systematic review and network meta-analysis. 2025.
9. Predictors of surgical complications in boys with hypospadias: international registry data. PMC. 2023.
10. Outcomes of hypospadias repair and factors. J Med Soc. 2023.
11. Assessment of outcome in hypospadias surgery—a review. PMC. 2013 (cited for framework).

12. Hypospadias—Wikipedia. Updated recently.
13. Warren Snodgrass—Wikipedia. 2025.
14. Gabra et al., retrospective 119-patient study on TIP and stenting duration. 2024.
15. Retrospective evaluation of 292 primary repairs, complication predictors. 2024.
16. Meta-analysis of complications following non-proximal repair. 2020.
17. Ethiopian cohort on hypospadias presentation and age at repair. 2022.
18. Network meta-analysis of repair techniques in unfavorable plates. 2025.
19. International registry on complication predictors in proximal hypospadias. 2023.
20. Single-center tertiary experience outcomes, Peshawar study. 2025.