Pakistan Journal of Intensive Care Medicine
eISSN: 2708-2261; pISSN: 2958-4728
www.pjicm.com
DOI: https://doi.org/10.54112/pjicm.v5i01.60
Pak. J. Inten. Care Med., volume 2025: 60
Original Research Article

COMPLICATIONS OF SNODGRASS URETHROPLASTY IN PATIENTS WITH DISTAL AND MID PENILE HYPOSPADIAS

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(Received, 5th February 2024, Revised 28th March 2025, Accepted 5th April, Published 16th April 2025)

ABSTRACT

Background: *Hypospadias is a common congenital anomaly in males, with surgical correction being the primary treatment. The Snodgrass urethroplasty, or tubularized incised plate (TIP) urethroplasty, is widely used for distal and mid-penile hypospadias repair. However, postoperative complications such as urethrocutaneous fistula and meatal stenosis remain clinical concerns.* ***Objective:*** *To assess the postoperative complications of Snodgrass urethroplasty in pediatric patients with distal and mid-penile hypospadias.* ***Study Design:*** *Descriptive cross-sectional study.* ***Setting:*** *Conducted at Hayatabad Medical Complex, Peshawar, a tertiary care plastic surgery unit.* ***Duration of Study:*** *04-07-2024 to 04-01-2025.* ***Methods:*** *A total of 80 male patients, aged 1–10 years, diagnosed with distal or mid-penile hypospadias through physical examination, were enrolled. All patients underwent Snodgrass urethroplasty. Postoperative complications, specifically urethrocutaneous fistula and meatal stenosis, were assessed on the 30th postoperative day. Data were analyzed using SPSS version 22.0, and frequencies and percentages were calculated.* ***Results:*** *The mean age of the cohort was 5.79 ± 2.68 years. Distal hypospadias accounted for 87.5% of cases, while mid-penile hypospadias comprised 12.5%. Urethrocutaneous fistula was observed in 12.5% of patients, and meatal stenosis occurred in 6.25%. Complications were more frequently noted among patients with mid-penile hypospadias compared to those with distal variants.* ***Conclusion:*** *Snodgrass urethroplasty is an effective technique for correcting distal and mid-penile hypospadias, with acceptable complication rates. Urethrocutaneous fistula (12.5%) and meatal stenosis (6.25%) were the most common postoperative issues, particularly in patients with mid-penile hypospadias. Early identification and management of these complications are essential to improving surgical outcomes.*

Keywords: Snodgrass Urethroplasty, Complications, Urethrocutaneous Fistula, Meatal Stenosis

INTRODUCTION

Hypospadias is a congenital anomaly affecting the external genitalia in males. The condition is characterized by an atypical growth of the urethral fold as well as the ventral foreskin of penis, leading to the misplacement of urethral opening. Hypospadias is characterized by the disposition of the external urethral meatus, which might differ in degree and be associated with penile curvature. Patients may present with an additional genitourinary abnormality, contingent upon the precise position of hypospadias. Following undescended testis, hypospadias ranks as the second most prevalent congenital abnormality (1-3). This condition is recognized as one of males' most common congenital abnormalities. Hypospadias is observed in approximately 1 in every 150-300 live births (4, 5). Hypospadias is commonly classified into three categories: posterior, penile, or anterior, depending on the preoperative position of the meatus. Around 70% of hypospadias cases are classified as glandular or distally located on the penis, which are considered moderate variants. The remaining instances are categorized as more severe and complex (6).

Tubularized incised plate urethroplasty, or Snodgrass urethroplasty, has been the primary technique for repairing distal and midshaft hypospadias for a minimum of twenty years. This method is linked to favorable outcomes regarding cosmetic appearance and functionality, especially in cases where the urethral plate is narrow; however, these outcomes may be at risk of compromise (7, 8). In the Snodgrass urethroplasty, multiple problems have been documented, with meatal stenosis being the most prevalent. Several potential causes have been proposed for this condition. Furthermore, the formation of urethrocutaneous fistulas represents the most prevalent complication related to hypospadias treatment, with an incidence ranging from 4% to 25% (9). A study reported that the complications of Snodgrass urethroplasty in hypospadias patients were urethrocutaneous fistula (15%) and meatal stenosis (5%) (10).

Hypospadias, a congenital malformation characterized by the urethral meatus opening on the ventral side of the penis instead of the tip, is a condition frequently addressed through surgical intervention. The data on this subject is scarce locally. Therefore, this study aims to determine the complications of Snodgrass urethroplasty in patients with distal and mid penile hypospadias. The results of this study will help our medical professionals understand the potential complications and implement strategies for prevention and management, which is paramount to optimizing outcomes and ensuring the long-term success of hypospadias correction surgeries. This study will also help shed light on the complexities of complications associated with Snodgrass urethroplasty, providing a foundation for further research and clinical refinement in the field, leading to patient care and reducing morbidity.

METHODOLOGY

This descriptive study was conducted at the Department of Plastic Surgery, Hayatabad Medical Complex, Peshawar, from 04-07-2024 to 04-01-2025 after securing ethical approval from the institute. A non-probability consecutive sampling technique was employed to enroll 80 male children aged 1 to 10 years diagnosed with distal or mid-penile hypospadias confirmed by physical examination. We determined the sample by taking a 5% complication rate of meatal stenosis derived from a prior study[10] along with a 95% confidence level and 4.8% absolute precision. Patients who had proximal hypospadias, severe chordee, congenital heart disease, or absence of a urethral plate were screened out.

We acquired consent from the patients' parents/guardians. Demographic variables, which included age, socioeconomic status, and residential background, were recorded. Surgical intervention

involved Snodgrass urethroplasty beginning with a circumferential subcoronal incision 2 mm proximal to the native meatus. A U-shaped incision was made along the urethral plate edges, followed by a midline incision to facilitate tension-free tubularization using 5/0 resorbable sutures. A dartos flap was mobilized dorsally via a buttonhole or a lateral approach and layered over the neourethra for reinforcement. Glans wings were approximated, and the degloved penile skin was closed meticulously.

A consultant with over five years of post-fellowship experience made postoperative evaluations at 30 days. Complications such as urethrocutaneous fistula (persistent urine leakage) and meatal stenosis (evident by urinary retention or recurrent infections) were assessed clinically.

SPSS 23 was used for analysis with descriptive statistics (mean ± SD) for age and frequencies/percentages for demographics, type of hypospadias, and complications. Stratification was performed using the Chi-square test at a 5% significance level.

RESULTS

In our study the mean age of 80 patients was 5.79±2.68 years. The type of hypospadias showed that 70 (87.5%) patients had distal hypospadias while 10 (12.5%) patients had mid penile hypospadias (Table 2). Regarding the postoperative complications, we observed that 10 patients (12.5%) developed a urethrocutaneous fistula, while 70 (87.5%) did not experience this complication. Additionally, five patients (6.2%) developed meatal stenosis while 75 (93.8%) did not (Table 3).

We found 70 patients with distal hypospadias, 3 (30.0%) had urethrocutaneous fistula, while 7 (70%) of the 10 patients with mid penile hypospadias had this complication (p = 0.005). Regarding the meatal stenosis, 2 (40.0%) of the patients with distal hypospadias and 3 (60.0%) of those with mid penile hypospadias developed this complication (p = 0.001) (Table 4).

Table 1: Demographics

Demographics		N	%
Residence	Urban	43	53.8%
	Rural	37	46.2%
Socioeconomic status	Low class	25	31.2%
	Middle class	42	52.5%
	High class	13	16.2%

Table 2: Type of hypospadias

Type of hypospadias	N	%
Distal hypospadias	70	87.5%
Mid penile hypospadias	10	12.5%

Table 3: Complications

Complications		N	%
Urethrocutaneous fistula	Yes	10	12.5%
	No	70	87.5%
Meatal stenosis	Yes	5	6.2%
	No	75	93.8%

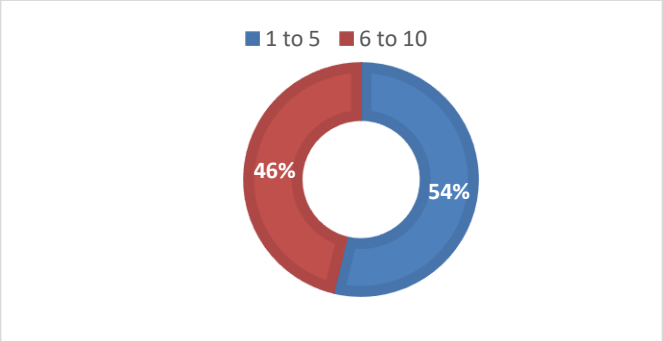

Figure 1: Age distribution (Years)

Table 4: Stratification of complications with type of hypospadias

Complications		Type of hypospadias				P value
		Distal hypospadias		Mid penile hypospadias		
		N	%	N	%	
Urethrocutaneous fistula	Yes	3	30.0%	7	70.0%	0.0001
	No	67	95.7%	3	4.3%	
Meatal stenosis	Yes	2	40.0%	3	60.0%	0.001
	No	68	90.7%	7	9.3%	

DISCUSSION

We observed that the mean patient age was 5.79 ± 2.68 years; our cohort was notably older compared to other studies. Alsharbaini et al. showed that the mean age in their study was 1.5 years (11). While age is rarely considered a primary variable in hypospadias repair outcomes, we assume that older children may present unique challenges due to thicker fibrous tissues or delayed healing, which could impact complication rates. Majid et al. reported lower fistula rates (2.7%) in their Snodgrass group. However, their patients were younger, suggesting surgical outcomes might be associated with age-related anatomical or physiological factors (12).

The distribution of hypospadias types in our study, which was 87.5% distal and 12.5% mid-penile, sits well with epidemiological patterns observed in other studies, such as those conducted by Peyvasteh et al., where distal cases predominated (13). It was observed that urethrocutaneous fistula in our study occurred in 12.5% of patients; this prevalence is similar to Pramod et al., who reported a 15% fistula rate in their cohort (10). Roychoudhury et al. showed that urethrocutaneous fistula occurred in 10% of patients, and Jain et al reported major and minor fistulas in 24%, which is quite above the prevalence in our cohort (14, 15). The higher rate in Jain et al's study can be attributed to their smaller sample size of 57 (15).

Meatal stenosis occurred in 6.2% of our patients in our study; this figure aligns with Roychoudhury et al., who reported a 10% stenosis rate in their study, and Majid et al., where stenosis was seen in 8.11% cases (1, 15). However, Peyvasteh et al. observed no stenosis in their Snodgraft cohort, indicating that technical modifications such as graft augmentation may reduce this complication. The higher stenosis rates observed in mid-penile cases in our study could be due to the increased tension during tubularization or inadequate plate incision depth.

The notable association between mid-penile hypospadias and meatal stenosis observed in our study emphasized that mid-penile and proximal hypospadias repairs integrally involve longer neourethral segments, which can increase the risk of complications like stenosis due to tension during tubularization or inadequate plate mobilization (16).

Our findings highlight the importance of surgical technique refinement. Adopting the Snodgrass method, a Snodgrass variant which incorporates a dorsal inlay graft, as described by Peyvasteh et al., could mitigate fistula and stenosis risks. Despite a similar age range, their 6.66% fistula rate and no incidence of stenosis show that

[Citation: Aamir M, Ullah I. (2025). Complications of snodgrass urethroplasty in patients with distal and mid penile hypospadias. *Pak. J. Inten. Care Med.* ***2025****: 60*. doi: https://doi.org/10.54112/pjicm.v5i01.60]

graft use enhances outcomes (13). Similarly, prioritizing dartos flaps over preputial flaps, as recommended by Alsharbaini et al., may reduce complications (11). We recommend that standardized postoperative protocols, including catheter management and follow-up, could minimize catheter blockage or infection, contributing to complications.

CONCLUSION

We conclude that Snodgrass urethroplasty effectively repaired the distal and midpenile hypospadias and resulted in fewer complications, such as urethrocutaneous fistula (12.5%) and meatal stenosis (6.2%). We observed that the complications were notably higher in patients with midpenile hypospadias. Tailored techniques and vigilant follow-up could optimize outcomes based on defect severity.

DECLARATIONS

Data Availability Statement
All data generated or analysed during the study are included in the manuscript.
Ethics approval and consent to participate
Approved by the department Concerned. (IREB-HMC-QAD-F-00-APPROVAL NO 1871)
Consent for publication
Approved
Funding
Not applicable

CONFLICT OF INTEREST

The authors declared an absence of conflict of interest.

AUTHOR CONTRIBUTION

MOHAMMAD AAMIR (Trainee Medical Officer)
Conception of Study, Data Collection, Development of Research Methodology Design, Study Design, manuscript Review, and final approval of manuscript.Manuscript revisions, critical input.
IRFAN ULLAH (Associate Professor)
Conception of Study, Final approval of manuscript.
Data entry, data analysis, and drafting the article.

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