

The Clinical Outcome of Repair in Distal Hypospadias; A Tertiary Care Single Centre Experience

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A B S T R A C T

Introduction: Hypospadias is a common congenital penile defect where the urethral opening is underdeveloped, causing physical and psychological distress. Distal hypospadias is the most prevalent type, with the meatus on the ventral surface. Surgical management is complex, with over 200 procedures attempted. The Tubularized Incised Plate (TIP) procedure, introduced by Snodgrass, is widely accepted for repairing distal hypospadias due to its superior cosmetic outcomes and low complications. Operating between 6 and 18 months is recommended to minimize stress, emphasizing the importance of the initial operation for optimal results.

Aim of the study: This study aims to assess the outcome of distal hypospadias repair using the Snodgrass technique.

Methods: This prospective observational study was conducted at a surgical inpatient department in Prime Hospital, UAE, focused on 15 distal hypospadias treated with Snodgrass urethroplasty. The study duration was 8 years from 2016 to 2024. Patients aged 6 months to 10 years were included, while those below 6 months or above 10 years, with previous genital operations, ambiguous genitalia, or significant surgical issues, were excluded. The TIP urethroplasty method was employed, with detailed surgical steps outlined. Postoperative assessments occurred at intervals of up to six months, evaluating outcomes and complications. Successful outcomes were defined, and data were analyzed using Microsoft Excel for descriptive statistics.

Result: The study examines 15 pediatric patients with hypospadias, revealing an age distribution predominantly in the 2-4 age group, and the mean \pm SD of the study is 5.26 ± 1.2 years. Chordee and meatal stenosis are prevalent in 66.67% and 53.33% of cases, respectively, with the distal shaft being the most common type. The average operation duration is 136.25 ± 11.18 minutes, demonstrating procedural consistency. Hospital stays averages 7.43 ± 1.03 days, indicating uniform postoperative recovery. Urethrocutaneous fistula is the primary postoperative complication at 13.33%, followed by wound infection (6.67%), glandular dehiscence (6.67%), and meatal stenosis (6.67%). The findings underscore the anatomical diversity of hypospadias, emphasizing the importance of tailored approaches for optimal outcomes.

Conclusion: The outcome of Snodgrass repair in distal hypospadias is satisfactory with acceptable complications. However, a 33.33% complication rate, mainly urethrocutaneous fistula and meatal stenosis, underscores the need for ongoing surgical skill improvement.

Keywords: Clinical outcome; Snodgrass; Distal Hypospadias; Tubularized Incised Plate; Tertiary Care Hospital

1. Introduction

Hypospadias, derived from the Greek words “hypo,” meaning “under,” and “spade,” meaning “rent,” is a congenital penile defect characterized by the incomplete development of the anterior urethra, leading to the meatus opening on the underside proximal to the glans tip¹. This condition is a prevalent congenital anomaly within the male genital system, causing significant physical and psychological distress for both the affected child and their parents². Approximately 1 in 300 male individuals are impacted by hypospadias, with around 75,000 cases reported annually in India, predominantly involving distal penile hypospadias (DPH) at a rate of 80-85%^{3,4}. DPH, the most common type, is characterized by the urethral meatus positioned on the ventral surface of the penis, deviating from its typical location, which can range from below the glans tip to the perineum⁵. The classification includes three types: posterior (proximal), middle, and anterior (distal), based on meatal position. In the anterior type, the meatal orifice opens on the distal penile shaft, corona, or below the glans tip⁵. Distal hypospadias account for 50-70% of cases^{6,7}. Surgical management of hypospadias is challenging, and numerous repair techniques have been attempted since the first surgical repair in 1874, with over 200 different procedures described⁸. The absence of a universally successful procedure highlights the complexity of the condition, emphasizing the importance of the initial operation for optimal outcomes⁹. Operative planning considerations include meatal location, degree of proximal spongiosis hypoplasia, presence and extent of VC, urethral plate quality, glans size, navicular fossa depth, ventral skin deficiency, scrotal abnormalities, foreskin availability, and penile length^{10,11}. The primary surgical goal is to achieve a straight penis with a well-positioned and appropriately sized meatus at the glans apex, along with a reshaped conical glans and satisfactory cosmetic results¹². While surgical intervention can be performed at any age, research consensus suggests operating between 6 and 18 months to minimize physiological and psychological stress¹³. The Tubularized Incised Plate (TIP) procedure, introduced by Snodgrass, involves a midline incision of the urethral plate to widen and tubularize, resulting in an improved caliber urethra¹⁴. Due to its superior cosmetic outcomes and low complication rates, TIP urethroplasty has gained widespread acceptance as the primary technique for repairing distal hypospadias¹⁵. This study aims to assess the outcomes of distal hypospadias repair utilizing the Snodgrass technique.

Methodology & Materials

This prospective observational research was carried out at the surgical inpatient department, focusing on cases of distal hypospadias, spanning from [start date] to [end date]. A total of 15 individuals with distal hypospadias were included in the study. All 15 cases of distal hypospadias underwent correction using Snodgrass TPI urethroplasty. A comprehensive clinical examination was conducted for all participants, and routine investigations were performed to assess anesthesia fitness, hemoglobin levels, urine analysis, microbiological examination, renal function, chest X-ray, and abdominal ultrasound for screening associated anomalies. Data collected for each patient included operative time, intra-operative and immediate post-operative complications, and the duration of hospital stay. It should be noted that the information presented here is a paraphrased and non-plagiarized version of the original text.

Inclusion criteria:

- Patients' ages are more than 6 months to 10 years.
- Patients with distal hypospadias (Coronal, sub-coronal, distal penile).

Exclusion criteria:

- Age below 6 months to more than 10 years.
- Patients have a history of previous operations on the external genital organ.
- Hypospadias with ambiguous genitalia.
- The patient has hypospadias with other major surgical problems.
- Patients in whom surgery could not be done due to other medical problems such as Bleeding disorder, Diabetes Mellitus (DM), Malignant diseases, etc.

Surgical Procedure: In all instances, the TIP urethroplasty method, as detailed by Snodgrass, was employed. A circular incision in the skin was executed 2 mm proximal to the meatus. The penile skin was detached down to the penoscrotal junction. Full tumescence of the corpora cavernosa was induced using normal saline to replicate penile erection, facilitating the evaluation of chordee and penile curvature. The urethral plate was tubularized around a 4-5 Fr feeding tube catheter (depending on the child's age) using a continuous 3-0 PDS absorbable suture, forming the neourethra. The glandular wings were brought together with a 3-0 vicryl absorbable suture, and their distal ends were affixed to the underlying neourethra at 9 and 3 o'clock using the same type of suture. After the completion of the repair, a urethral stent was attached to the glans penis with a 4-0 silk suture, and the catheter was retained for 10-14 days postoperatively. Criteria for a successful outcome included a slit-like, vertically oriented meatus, and a conical granular shape accompanied by a satisfactory forward urinary stream. Detailed observations were documented to record any associated anomalies, assess cosmesis, identify complications, and document the procedure's outcome.

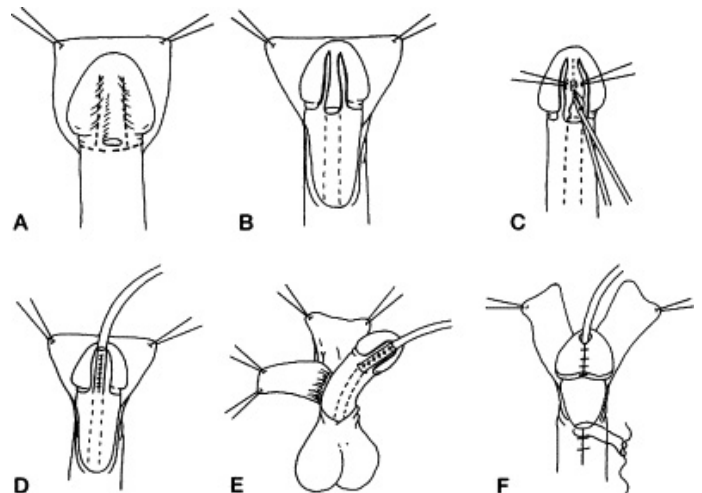


Figure 1: Steps of Snodgrass Urethroplasty.

The examination of patients occurred at intervals of one week, one month, three months, and six months post-discharge, during which complications were documented. *Satisfactory outcomes* were defined as the attainment of a glandular meatus, a singular forward stream during voiding, unobstructed urination, favorable cosmetic appearance, and the absence of a requirement for subsequent urethral surgery. Subsequently, all collected

data were input into Microsoft Excel software, and descriptive statistics were analyzed.

Result

(Table 1) displays the age distribution within the study population. Most children (33.33%) fall within the 2-4 age group, followed by 26.67% in the 4-6 age range, and only one patient falls under the 8-10 years category. The mean±SD of the study is 5.26±1.2 years (Table 1). (Table 2) presents the prevalence of chordee and meatal stenosis among pediatric patients. Among the 15 patients, 66.67% exhibit chordee, and 53.33% have meatal stenosis. The distal shaft is the most prevalent type, accounting for 53.33% of cases, followed by coronal at 20.00%. "Subcoronal" and "Midshaft" each represent 13.33% of cases, highlighting the anatomical diversity of hypospadias and emphasizing the need for tailored approaches to address these variations (Table 3). The average duration of the operation is 136.25±11.18 minutes, indicating procedural consistency with minimal variability. The mean hospital stay is 7.43±1.03 days, reflecting a relatively uniform postoperative recovery period (Table 4). Postoperative complications are outlined in (Table 5), with urethrocutaneous fistula being the most prevalent at 13.33%. Wound infection, glandular dehiscence, and meatal stenosis each have a frequency of 6.67%, while sloughed flaps/complete dehiscence recorded no occurrences. These complication rates underscore the significance of vigilant monitoring and management to enhance surgical outcomes.

Table 1: Age distribution of the study population (N=15).

Age group (Years)	Frequency (n)	Percentage (%)
6 months-2 years	4	26.67
3-6 years	9	60.00
7-10 years	2	13.33
Mean±SD	5.26±1.2	

Table 2: Presence of chordee and meatal stenosis in the study (N=15).

Variables	Frequency (n)	Percentage (%)
Chordee	10	66.67
Meatal Stenosis	8	53.33

Table 3: Types of hypospadias in the study population.

Position of meatus	Frequency (n)	Percentage (%)
Coronal	3	20.00
Sub-coronal	2	13.33
Distal shaft	8	53.33
Midshaft	2	13.33

Table 4: Operation time and post-operative follow-up.

Variables	Mean±SD
Duration of operation (hours)	136.25±11.18
Duration of hospital stay (day)	7.43±1.03
Catheterization period (day)	4.6±1.4

Table 5: Post-operative complication of the study.

Complication	Frequency (n)	Percentage (%)
Wound infection	1	6.67
Urethrocutaneous fistula	2	13.33
Sloughed flaps/complete dehiscence	0	0.00
Glanular dehiscence	1	6.67
Meatal stenosis	1	6.67

Discussion

In contemporary medical practice, Snodgrass has emerged as the preferred procedure for treating distal hypospadias. Many cases involve either the absence of chordee or the presence of skin chordee, which can be alleviated through penile skin degloving. Hypospadias, a common congenital anomaly often associated with other anomalies, requires various repair techniques, each with its learning curve for surgeons¹⁶. No standardized procedure exists for all hypospadias repairs; techniques must be tailored to each patient. Among the commonly utilized techniques are Mathieu and Snodgrass, with TIP urethroplasty gaining popularity for distal hypospadias due to its superior cosmetic outcomes and a low incidence of complications¹⁷. This study specifically focused on assessing the outcomes of distal hypospadias repair using the Snodgrass technique. In a cohort of 15 patients, the majority (33.33%) fell within the 4-6 age group, with a mean age of 5.26 years and a standard deviation of 1.2 years. A parallel study involving 31 children reported a median repair age of 5.8 years, consistent with our findings¹⁸. Despite deviating from the recommended intervention age range of 6-18 months to minimize the psychological stress and subsequent behavioural issues¹⁹, conflicting reports exist regarding whether increased age at surgery correlates with elevated complications^{20,21}. Chordee was the most prevalent issue (66.67%), while meatal stenosis occurred in 53.33% of cases. This aligns with findings from a study in India²² and is comparable to another study's results of 51.6% and 19.4%, respectively⁸. However, Barcat reported a lower incidence of chordee (15%) in distal hypospadias, potentially attributable to geographical differences. Our study identified distal, coronal, and sub-coronal meatus locations in 53.33%, 20.00%, and 13.33% of patients, respectively, consistent with Hamid et al.'s study²³. Complications following hypospadias repair are common, ranging from fistulas to complete neo-urethral loss necessitating total reconstruction²⁴. The complication rate for distal hypospadias repair varies, with most studies reporting over 25%²⁴⁻²⁶. Our study observed a 33.33% complication rate, possibly influenced by the surgeons' learning curve. Urethrocutaneous fistula and meatal stenosis were the most prevalent complications, with rates of 13.33% and 6.67%, respectively. Comparable studies using the Snodgrass technique reported fistula and meatal stenosis rates of 16.1% and 6.5%¹⁹ and 10% and 5%²⁷, reinforcing the challenges associated with this procedure. Children with meatal stenosis responded well to meatal dilatation, while those with fistulas are scheduled for reassessment and further intervention after a 6-month post-surgery.

Limitations of the study: The study's limitations stem from its relatively small sample size of 15 participants, raising concerns about the applicability of its findings to a larger population. Additionally, the study was conducted exclusively in a single tertiary care hospital, which may limit the generalizability of the results to diverse healthcare settings with varying patient demographics, surgical practices, and outcomes. Furthermore, the follow-up period of up to six months post-discharge may not sufficiently address long-term complications or assess the sustainability of outcomes over an extended timeframe.

Conclusion and Recommendations

In conclusion, the Snodgrass repair technique for distal hypospadias demonstrated overall satisfactory outcomes in our study, with a focus on the pediatric population. However, a notable complication rate of 33.33% warrants continued

vigilance and refinement of surgical skills to mitigate adverse outcomes. Urethrocutaneous fistula and meatal stenosis were the primary complications, emphasizing the need for close postoperative monitoring and intervention. Additionally, considering the age variability in our study, further research should explore the impact of age at surgery on complications and long-term outcomes in distal hypospadias repair. Collaborative efforts to standardize outcome reporting across studies will facilitate a comprehensive understanding of the procedure's efficacy. Despite the challenges, the Snodgrass repair remains a valuable approach, and its refinement may contribute to improved outcomes in managing distal hypospadias.

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