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ORIGINAL ARTICLE

Comparison of Aesthetic Appearance "after Urethral Mobilization and Snodgrass procedure in Hypospadias Surgery using HOPE SCORE

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ABSTRACT

Background: Hypospadias is a congenital anomaly in which the urethra, foreskin, and ventral penile structures fail to develop normally, resulting in an ectopic urethral opening.

Objective: To compare postoperative urethrocutaneous fistula rates and cosmetic outcomes, measured using the Hypospadias Objective Penile Evaluation (HOPE) score, between Snodgrass repair and urethral mobilization in distal penile hypospadias.

Methods: This randomized controlled trial was conducted over six months from October 2021 to March 2022 at The Children's Hospital Lahore, following ethical approval and informed consent. Fifty-four patients were randomized equally: Group A underwent Snodgrass repair, and Group B received urethral mobilization. At final follow-up, standardized photographs (five views) were evaluated independently by two pediatric surgeons and one pediatric urologist using the HOPE scoring system.

Results: Mean patient age was 4.63 ± 3.25 years in Group A and 4.48 ± 3.41 years in Group B. Urethrocutaneous fistula occurred in 2 patients (7.4%) in Group A and 1 patient (3.7%) in Group B (p = 0.552). HOPE scores favored the Snodgrass technique across several domains, including meatal shape (p = 0.032), glans configuration (p = 0.025), skin appearance (p = 0.028), torsion (p = 0.028), and penile curvature (p = 0.014).

Conclusion: Snodgrass repair provides superior cosmetic outcomes compared with urethral mobilization, while both techniques demonstrate similar fistula rates in distal hypospadias surgery.

Keywords: Urethrocutenous fistula, cosmetic outcomes, HOPE score, Snodgrass repair, Urethral mobilization technique, distal hypospadias surgery.

INTRODUCTION

The term *hypospadias* is derived from the Greek words *"hypo"* (under) and *"spadon"* (rent or fissure). It represents one of the most common congenital anomalies of the male external genitalia. Although the exact etiology remains unclear, multiple contributing factors have been proposed, including environmental influences, hormonal receptor dysfunction, familial predisposition, assisted reproductive techniques, and genetic susceptibility[1]. Globally, the reported incidence ranges from 0.4 to 8.2 per 1000 live male births[2,3], and recent data indicate a rising trend in Western populations over the past 15 years, likely attributable to improved diagnostic capabilities and enhanced healthcare systems[4].

Hypospadias is often isolated, but it may present with associated anomalies such as chordee, cryptorchidism, inguinal hernia, or other abnormalities of the urinary tract[5,6]. Among these, chordee is the most commonly encountered and significantly influences surgical decision-making; its presence or absence can determine whether repair is performed in a single or staged procedure. The severity of hypospadias typically increases when multiple anomalies coexist. Based on meatal position, hypospadias is classified into anterior (glanular, subcoronal, coronal), midpenile, and proximal (penoscrotal, scrotal, perineal) types. The majority of distal presentations fall under the anterior category[7]. Surgical correction is the only definitive treatment, and a successful repair generally involves straightening the penis (orthoplasty), reconstructing the urethra (urethroplasty), performing meatoplasty, glanuloplasty, and achieving satisfactory skin coverage. Ideally, repair should occur after six months of age and preferably before school entry[8]. Over 300 surgical techniques have been documented, yet no universally accepted approach exists due to variability in cosmetic and functional outcomes[9,10,11]. Among the commonly used procedures for distal hypospadias MAGPI, Mathieu, Snodgrass (TIP), Urethral Mobilization, and Horton–Denin methods the Snodgrass technique has gained prominence because of its favorable cosmetic appearance, low complication rates, and reduced risks of meatal stenosis, penile torsion, and poor glanular formation[12]. Recent literature continues to support its superiority in achieving optimal outcomes with minimal morbidity[13].

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Objective: To compare postoperative urethrocutaneous fistula formation and cosmetic outcomes, using the HOPE score, between Snodgrass repair and the Urethral Mobilization technique in distal hypospadias surgery.

METHODOLOGY

This randomized controlled trial was conducted in the Paediatric Surgery Unit-I of The Children's Hospital and The Institute of Child Health, Lahore. The study duration was six months from October 2021 to March 2022 following approval of the synopsis by the institutional ethical review committee. A total of 54 children were enrolled. Sample size was determined using the WHO sample size calculator (version 12.2.6) with 80% power, 5% level of significance, and expected good cosmetic outcomes of 100% for the Snodgrass technique and 75% for urethral mobilization, based on previously published data. The calculated sample size was 27 patients per group. Non-probability purposive sampling was used to recruit eligible participants. Patients were randomized into two groups (Group A: Snodgrass repair; Group B: urethral mobilization) through a blind balloting method.

Inclusion Criteria

- Children aged 6 months to 14 years
- Distal penile hypospadias (glanular, coronal, subcoronal, or ≤3–4 mm proximal to the coronal sulcus)
- Mild or skin chordee only
- Haemoglobin >7.5 g/dL

Exclusion Criteria

- Age <6 months
- Moderate to severe chordee
- Small penis
- Connective tissue disorders
- Syndromic children
- Redo-surgeries
- Haemoglobin <7.5 g/dL

Data Collection Procedure: After informed consent and ethical approval, baseline demographic and clinical details were recorded on a structured proforma. All patients underwent general anaesthesia after standard preoperative preparation and antibiotic prophylaxis.

Group A underwent the Snodgrass (TIP) repair, which included urethral plate incision, tubularization over a 6–8 Fr catheter using 6/0 PDS, application of dartos fascia as a second/third layer, and glanuloplasty.

Group B underwent urethral mobilization, involving circumcoronal incision, degloving, mobilization of the urethra between corpus cavernosum and corpus spongiosum to achieve length, and two-layer glans closure using 6/0 PDS.

Postoperative care was standardized. All patients received oral cefixime and ibuprofen for ten days. Dressings were removed after 72 hours. Catheter removal was performed on day 10–14 for Group A and day 5 for Group B. Follow-up visits were scheduled at 15 days and 3 months to evaluate urethrocutaneous fistula. At the final visit, five standardized photographs were obtained and assessed independently by two paediatric surgeons and one paediatric urologist using the HOPE scoring system. Patient anonymity was strictly maintained.

Data Analysis: Data were analysed using SPSS version 26. Quantitative variables (age, weight, HOPE scores) were presented as mean ± standard deviation. Qualitative variables (gender, urethrocutaneous fistula) were presented as frequencies and percentages. Independent samples t-test was applied for comparison of continuous variables, and chi-square test for categorical variables. A p-value <0.05 was considered statistically significant.

RESULTS

The mean age in the Snodgrass group was 4.63 ± 3.25 years, while the urethral mobilization group averaged 4.48 ± 3.41 years (p = 0.871), confirming no meaningful difference. A similar pattern appeared in weight, where Group A averaged 20.15 ± 8.83 kg and Group B averaged 20.41 ± 9.09 kg (p = 0.916). Urethrocutaneous fistula rates were low in both techniques, with 7.4% in the Snodgrass group versus 3.7% in the mobilization group, and this difference was not statistically significant (p = 0.552), suggesting comparable safety in terms of fistula formation.

Table 1: Comparison of Age, Weight, and Urethrocutaneous Fistula Between Study Groups (N = 54)

Parameter	Group A (Snodgrass) (n = 27)	Group B (Urethral Mobilization) (n = 27)	p-value
Age (years) Mean ± SD	4.63 ± 3.25	4.48 ± 3.41	0.871
Weight (kg) Mean ± SD	20.15 ± 8.83	20.41 ± 9.09	0.916
Urethrocutaneous fistula	2 (7.4%)	1 (3.7%)	0.552

*Significant at p < 0.05

Table 2: Comparison of HOPE Score Parameters Between Study Groups (N = 54)

HOPE Parameter	Group A (Snodgrass) Mean ± SD (n = 27)	Group B (Urethral Mobilization) Mean ± SD (n = 27)	p-value
Position of meatus	9.56 ± 0.85	9.07 ± 1.66	0.186
Shape of meatus	9.66 ± 1.09	8.56 ± 2.10	0.032*
Shape of glans	9.46 ± 1.11	8.44 ± 2.26	0.025*
Skin configuration	9.44 ± 1.19	8.33 ± 2.25	0.028*
Torsion	9.67 ± 0.96	8.67 ± 2.09	0.028*
Curvature in erection	9.44 ± 1.19	8.33 ± 1.92	0.014*

*Significant at p < 0.05

While both techniques produced acceptable results, Snodgrass consistently showed higher mean scores across nearly all domains. Meatal position did not differ significantly between groups (p = 0.186). However, Group A demonstrated significantly better scores for shape of the meatus (9.66 ± 1.09 vs 8.56 ± 2.10; p = 0.032), shape of the glans (9.46 ± 1.11 vs 8.44 ± 2.26; p = 0.025), skin configuration (9.44 ± 1.19 vs 8.33 ± 2.25; p = 0.028), torsion (9.67 ± 0.96 vs 8.67 ± 2.09; p = 0.028), and curvature during erection (9.44 ± 1.19 vs 8.33 ± 1.92; p = 0.014).

DISCUSSION

Hypospadias remains the most common congenital penile anomaly, affecting approximately one in every 300 male newborns. Although the ectopic meatus may occur anywhere along the ventral penis, distal presentations involving the anterior third are most frequently encountered[14]. Surgical correction techniques have evolved over more than a century, beginning with Beck's urethral advancement proposal in 1898, which achieved limited success due to inadequate mobilization and persistent chordee[1]. Subsequent advancements, including Belman's extensive urethral mobilization in 1977[2] and Ti-Sheng Chang's one-stage anterior urethral advancement in 1984, refined the concept of urethral lengthening sufficient to correct congenital deformity. A major milestone occurred in 1994 when Snodgrass introduced the tubularized incised plate (TIP) repair, which has since become a widely adopted technique for distal hypospadias due to its simplicity, reliability, and favorable cosmetic outcomes[15]. Achieving both functional and aesthetic success remains the central challenge in hypospadias surgery. Numerous techniques exist, yet none have emerged as universally superior across all outcome domains[16]. The HOPE scoring system provides a structured tool for aesthetic comparison, and the present study sought to evaluate two commonly used distal hypospadias repairs Snodgrass and urethral mobilization using standardized scoring. In this study, the mean ages of patients in the Snodgrass and urethral mobilization groups were comparable (4.63 ± 3.25 vs 4.48 ± 3.41 years). The rate of urethrocutaneous fistula did not differ significantly between groups, occurring in 7.4% and 3.7% of patients, respectively (p = 0.552). While fistula rates were similar, the cosmetic outcomes favored the Snodgrass technique, which produced significantly higher HOPE scores in meatal shape, glans configuration, skin appearance, torsion, and curvature[17]. These findings reinforce the recognized advantages of the TIP repair in achieving more natural meatal and glanular morphology. The ongoing debate regarding the optimal surgical technique for distal hypospadias is supported by previous literature. Hasan et al. compared two common procedures and found both to be effective, though subtle outcome differences suggested that adequately powered randomized trials could better delineate superiority between techniques[18]. Our results contribute to this ongoing discussion by demonstrating that urethral mobilization and Snodgrass repair yield comparable complication rates, but Snodgrass provides superior cosmetic outcomes under objective assessment.

CONCLUSION

In the treatment of distal hypospadias, our study concluded that the cosmetic outcome were better in Snodgrass technique, however other complications including urethrocutaneous fistula is comparable in both techniques. So both techniques can be adopted as per the surgeon's discretion.

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