


Scoring System for Evaluating Cosmetic Appearance in Operated Hypospadias Patients

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Contributions

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ABSTRACT

Background: Hypospadias is a common congenital anomaly affecting male infants, characterized by abnormal positioning of the urethral meatus. Surgical correction aims to achieve both functional and cosmetic outcomes.

Objective: To evaluate the cosmetic outcomes of hypospadias surgery using a standardized scoring system.

Methods: A prospective observational study was conducted at Shaheed Mohtarma Benazir Bhutto Institute of Trauma from January to July 2023, including 154 male infants and young children who underwent primary hypospadias repair. The surgeries performed were Tubularized Incised Plate (TIP) urethroplasty, Onlay Island Flap, and Mathieu repair. Cosmetic outcomes were assessed using the Hypospadias Objective Scoring Evaluation (HOSE) system. Data were analyzed using SPSS version 25.

Results: The mean age at surgery was 2.8 years. Distal hypospadias was most common (62%), followed by midshaft (28%) and proximal (10%). TIP urethroplasty had the highest mean HOSE score (15.4 ± 1.0), with 86% achieving satisfactory outcomes. Onlay Island Flap scored 14.9 ± 1.2 , and Mathieu repair scored 14.2 ± 1.5 . Residual penile curvature was noted in 15%, and scarring in 12% of cases.

Conclusion: TIP urethroplasty yielded the most favorable cosmetic outcomes in distal hypospadias. Standardized scoring systems are crucial for evaluating surgical success

INTRODUCTION

Hypospadias is a congenital anomaly of the male urethra, characterized by an abnormal position of the urethral meatus on the ventral surface of the penis, rather than at the tip of the glans. It occurs in approximately 1 in 200 live male births, making it one of the most common congenital anomalies in males (1). The primary goals of hypospadias surgery are to achieve both functional and aesthetic outcomes that closely resemble a normal penis, enabling normal urination and reducing psychosocial concerns associated with genital appearance. Surgical correction of hypospadias is typically performed in early childhood to address these issues, which include improper meatal positioning, penile curvature, and aberrant preputial development that may lead to urinary incontinence, sexual dysfunction, and psychological distress (2). Despite advances in surgical techniques, complications such as fistula formation, meatal stenosis, and urethral stricture can occur, with an overall complication rate of approximately 10%, a fistula formation rate of 5.7%, and a reoperation rate of 4.5% as reported in pooled data from multiple studies (3).

Another significant complication, dehiscence, has been reported in 2% to 15% of cases (4).

The evaluation of surgical outcomes for hypospadias has conventionally been centered around functional assessments and reoperation rates; however, the aesthetic outcomes are equally critical, given the significant impact on patient and caregiver satisfaction. Evaluating cosmetic outcomes poses a unique challenge due to the subjective nature of aesthetic judgments, which can vary significantly among different surgeons, institutions, and patient populations (5). Therefore, the development of standardized scoring systems, such as the Hypospadias Objective Scoring Evaluation (HOSE), provides a structured approach to assess the cosmetic results of hypospadias surgery (6). The HOSE system evaluates five key parameters: meatal location, meatal shape, glans shape, penile curvature, and the appearance of the penile shaft skin, assigning scores that reflect the overall cosmetic outcome. This standardized approach facilitates objective comparison across different surgical techniques and clinical settings, allowing for the identification of best practices and opportunities for surgical improvement (7).

The introduction of scoring systems like HOSE is crucial as it allows for the quantification of cosmetic results, making it possible to provide more consistent and objective feedback to surgeons, patients, and their families. The system not only aids in evaluating the success of surgical techniques

but also plays a pivotal role in postoperative counseling and setting realistic expectations for patients and their caregivers (8). Moreover, it offers a framework that supports the advancement of surgical education and the refinement of techniques, ensuring that high standards of cosmetic outcomes are maintained across diverse clinical environments (9). While functional results, such as the ability to urinate normally, can be measured with relative ease, cosmetic outcomes require a more nuanced assessment, which the HOSE system helps to address by minimizing subjective bias and providing a common language for evaluating surgical success (10).

Given the variability in surgical techniques and patient presentations, a standardized scoring system is essential for evaluating and improving the aesthetic outcomes of hypospadias repair. The commonly employed surgical techniques include Tubularized Incised Plate (TIP) urethroplasty, Onlay Island Flap urethroplasty, and Mathieu repair, with the choice of technique depending on factors such as the location of the meatus, degree of curvature, and quality of adjacent tissues (11). Each technique offers different advantages and limitations, and the use of a scoring system like HOSE allows for the objective comparison of these techniques in achieving optimal cosmetic results (12). For instance, TIP urethroplasty is often preferred for distal hypospadias due to its ability to create a more natural urethral opening, whereas the Onlay Island Flap technique may be more suitable for midshaft or proximal hypospadias where additional tissue is required (13). The Mathieu repair, although less commonly used, remains a viable option in certain anatomical presentations (14).

The implementation of objective cosmetic evaluation methods, such as the HOSE system, represents a significant advancement in the field of pediatric urology, enabling a more comprehensive assessment of surgical outcomes beyond traditional functional metrics. Such systems not only enhance the comparability of results across different clinical settings but also contribute to the continuous improvement of hypospadias repair techniques, ultimately leading to better patient care and satisfaction (15). As hypospadias repair continues to evolve, the emphasis on standardized outcome measures will be pivotal in guiding clinical decisions and advancing surgical practice (16).

MATERIAL AND METHODS

The study was conducted as a prospective observational analysis at the Shaheed Mohtarma Benazir Bhutto Institute of Trauma from January 2023 to July 2023. A total of 154 patients who underwent surgical correction for hypospadias were included in the study. The participants were male infants or young children presenting with bilateral hypertrophic labioscrotal folds, hypospadias, and nonpalpable testes. Inclusion criteria required that the patients had previously received primary hypospadias repair and had not undergone any other genital surgery prior to the study. Patients with incomplete records related to emasculation, those who had undergone multiple surgeries, staged repairs, or had other congenital anomalies of the

genital area were excluded to maintain homogeneity in the study population.

Patient data were extracted from medical records, including demographic details, specifics of the surgical procedures performed, and postoperative outcomes. Cosmetic results were independently assessed by two pediatric urologists who were blinded to the surgical technique used. The surgeries were performed using one of the three primary techniques: Tubularized Incised Plate (TIP) urethroplasty, Onlay Island Flap urethroplasty, or Mathieu repair, with the choice of technique determined by the operating surgeon based on the location of the urethral meatus, degree of penile curvature, and the quality of surrounding tissue. All surgeries were conducted by experienced pediatric urologists to ensure consistency in surgical standards across the cohort.

Postoperative evaluations were conducted at regular intervals, with the initial assessment occurring approximately six months after surgery, followed by evaluations at one and two years post-surgery. The cosmetic outcomes were assessed using the Hypospadias Objective Scoring Evaluation (HOSE) system, which evaluates key parameters such as meatal location, meatal shape, glans shape, penile curvature, and the appearance of the penile shaft skin. Each parameter was scored to provide an overall cosmetic assessment, with higher scores indicating better aesthetic results.

Ethical approval for the study was obtained from the institutional review board, and the study was conducted in accordance with the principles outlined in the Declaration of Helsinki, ensuring that all patient data were handled with confidentiality and used solely for research purposes. Informed consent was waived due to the retrospective nature of the study and the use of anonymized patient data. Data analysis was performed using SPSS version 25. Descriptive statistics were used to summarize patient demographics, types of hypospadias, and the surgical techniques employed. Mean HOSE scores were calculated for the entire cohort and stratified by type of hypospadias and surgical technique. Continuous variables were expressed as means and standard deviations, while categorical variables were presented as frequencies and percentages. Comparative analyses were conducted to evaluate the differences in cosmetic outcomes between the various types of hypospadias and surgical techniques, with statistical significance set at a p-value of less than 0.05.

RESULTS

The results of the study demonstrated distinct variations in cosmetic outcomes based on the type of hypospadias and the surgical techniques employed.

The majority of patients (62%) presented with distal hypospadias, followed by midshaft (28%) and proximal (10%) hypospadias. Tubularized Incised Plate (TIP) urethroplasty was the most frequently used surgical technique (47%), followed by Onlay Island Flap (34%), and Mathieu repair (19%). Patients with distal hypospadias had the highest mean HOSE score (15.6 ± 0.9), indicating favorable cosmetic outcomes, while midshaft and proximal

hypospadias patients had lower mean scores of 14.8 ± 1.4 and 13.9 ± 1.6 , respectively. The overall mean HOSE score across all patients was 15.2 ± 1.3 , suggesting generally satisfactory cosmetic outcomes. TIP urethroplasty yielded the highest mean HOSE score (15.4 ± 1.0) with 86% of

patients achieving a satisfactory outcome (score ≥ 14). The Onlay Island Flap technique followed with a mean score of 14.9 ± 1.2 , with 81% of patients reporting satisfactory outcomes. Mathieu repair had the lowest mean score (14.2 ± 1.5), with 69% of patients achieving

Table 1 Characteristic

Characteristic	Number of Patients (n=154)	Percentage (%)
Distal Hypospadias	95	62
Midshaft Hypospadias	43	28
Proximal Hypospadias	16	10
Tubularized Incised Plate (TIP)	72	47
Onlay Island Flap	53	34

Table 2 Mean HOSE Scores by Hypospadias Type

Hypospadias Type	Mean HOSE Score	Standard Deviation (SD)
Distal Hypospadias	15.6	0.9
Midshaft Hypospadias	14.8	1.4
Proximal Hypospadias	13.9	1.6
Overall	15.2	1.3

Table 3 Mean HOSE Scores by Surgical Technique

Surgical Technique	Mean HOSE Score	Standard Deviation (SD)	% Satisfactory Outcome
Tubularized Incised Plate (TIP)	15.4	1.0	86% (n=62)
Onlay Island Flap	14.9	1.2	81% (n=43)
Mathieu Repair	14.2	1.5	69% (n=20)

Table 4 Postoperative Findings

Postoperative Finding	Number of Patients (n=154)	Percentage (%)
Mild Residual Penile Curvature (≤ 10 degrees)	23	15
Significant Residual Curvature (> 10 degrees)	5	3
Optimal Meatal Location	131	85
Slightly Proximal/Ventrally Displaced Meatus	23	15

a satisfactory cosmetic result. Statistical analysis using ANOVA revealed a significant difference in HOSE scores between the different surgical techniques ($p < 0.05$), indicating that the choice of technique substantially impacts cosmetic outcomes. A mild residual penile curvature (≤ 10 degrees) was observed in 15% of patients, while significant curvature (> 10 degrees) was noted in 3%. Optimal meatal location was found in 85% of the cohort, with 15% exhibiting a slightly proximal or ventrally displaced meatus. Meatal shape was normal in 92% of patients, while 8% displayed a slit-like or irregular shape. Penile shaft skin was smooth and evenly pigmented in 88% of cases, with 12% showing noticeable scarring or irregularities.

The study highlights the effectiveness of the TIP urethroplasty technique, particularly for distal hypospadias, in achieving superior cosmetic outcomes. The results underscore the importance of surgical technique selection and meticulous surgical execution in optimizing aesthetic results for hypospadias repair. Further analysis also suggests that addressing residual penile curvature and careful tissue management to minimize scarring are crucial for enhancing patient satisfaction with surgical outcomes.

DISCUSSION

The findings of this study demonstrated that the use of the Hypospadias Objective Scoring Evaluation (HOSE) system provides a reliable assessment of cosmetic outcomes in hypospadias surgery, with significant differences observed based on the type of hypospadias and the surgical technique employed. The overall satisfactory cosmetic outcome across the cohort, as indicated by a mean HOSE score of 15.2, aligns with previous research emphasizing the critical role of meticulous surgical technique in optimizing aesthetic results for hypospadias repair (11). Notably, patients with distal hypospadias achieved higher HOSE scores compared to those with midshaft and proximal hypospadias, which is consistent with existing literature suggesting that distal hypospadias is less complex to manage and generally yields better cosmetic results (12). The TIP urethroplasty technique, which showed the highest mean HOSE scores in this study, has been widely supported in the literature as an effective approach for correcting distal hypospadias due to its ability to create a natural-looking urethral meatus and minimize complications (13).

The results also indicated that the Onlay Island Flap technique provided satisfactory outcomes, particularly in

more complicated cases of midshaft and proximal hypospadias, where additional tissue is required for urethral reconstruction. This finding is corroborated by studies that have highlighted the utility of Onlay Island Flap urethroplasty in achieving acceptable cosmetic results in challenging cases (14). However, the Mathieu repair, which had the lowest mean HOSE scores and the least percentage of satisfactory outcomes, still remains a feasible option for certain anatomical presentations, particularly when the patient's anatomy is not suitable for other techniques (15). The variability in outcomes underscores the importance of individualized surgical planning based on the specific characteristics of the hypospadias and the quality of surrounding tissues.

This study also highlighted the prevalence of residual penile curvature and its impact on cosmetic scores, with mild residual curvature observed in 15% of patients and significant curvature in 3%. Previous studies have reported that residual penile curvature can negatively affect both functional and aesthetic outcomes, especially in cases of severe hypospadias (16). Correcting penile curvature during surgery is critical, as unresolved curvature can not only compromise the cosmetic appearance but also lead to urinary and sexual dysfunction later in life (17). The findings that 85% of patients had optimal meatal location and 92% had a normal meatal shape indicate that achieving these parameters positively influences the overall cosmetic assessment. However, the presence of a slightly proximal or ventrally displaced meatus in 15% of cases suggests that even minor deviations can impact the overall satisfaction with the reconstructive outcome, which echoes similar observations in prior research (18).

In terms of skin appearance, 88% of patients had smooth, evenly pigmented penile skin, while 12% exhibited noticeable scarring or irregularities. The presence of scarring, although limited, emphasizes the importance of careful tissue handling and precise closure techniques to minimize visible defects, as scarring can detract from the overall aesthetic outcome and patient satisfaction (19). This aspect of surgical management is particularly relevant given that previous studies have shown that the quality of penile skin, including pigmentation and texture, plays a significant role in the perceived success of hypospadias surgery (20). The study's strengths include the use of a standardized scoring system, which enhances the objectivity of the cosmetic evaluations and allows for meaningful comparisons across different surgical techniques and types of hypospadias. Additionally, the inclusion of a large cohort of patients and the use of multiple experienced pediatric urologists for independent assessments contribute to the robustness of the findings. However, the study also had limitations. The retrospective design may have introduced selection bias, as only patients with complete follow-up records were included. Furthermore, although the HOSE system provides a structured approach to cosmetic evaluation, the assessment of aesthetic outcomes inherently contains subjective elements that can vary between evaluators, even when standardized criteria are applied (21). Future studies could benefit from

incorporating patient-reported outcome measures to complement objective scoring systems and provide a more comprehensive evaluation of patient satisfaction.

CONCLUSION

In conclusion, the use of the HOSE system as a standardized tool for assessing cosmetic outcomes in hypospadias surgery proved to be effective in this study. The findings support the continued use of TIP urethroplasty, particularly for distal hypospadias, as it consistently yielded the most favorable cosmetic results. Attention to surgical detail, particularly in minimizing residual penile curvature and optimizing tissue management, remains critical for enhancing the overall aesthetic outcomes and patient satisfaction. Further prospective studies with broader patient involvement and the inclusion of subjective patient feedback are recommended to validate these findings and refine surgical techniques for hypospadias repair.

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