



Current Status Evaluation of Hypospadias Repair Results

28

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Abbreviations

AYA	Adolescents and Young Adults
DSD	Disorders of Sex Development
GMS	Glans–Meatus–Shaft
HOPE	Hypospadias Objective Penile Evaluation
HOSE	Hypospadias Objective Scoring Evaluation
IIEF	International Index of Erectile Function
PPPS	Paediatric Penile Perception Score
TIP	Tubularized Incised Plate

28.1 Introduction

The imagination and creativity of surgeons for centuries dealing with hypospadias have been challenged to create a functional and cosmetically acceptable phallus. Numerous new operations and techniques have been developed to achieve improved aesthetic results with fewer complications over the last 30 years. The current goals of hypospadias surgery are creating a straight penis with the meatus at the glans tip, creating a urethra of adequate and uniform calibre, symmetrical appearance of the glans and shaft, and possible normalization of erections and voiding [1].

The postoperative complications rate of hypospadias repair are still high, vary from 12 to 24% in the first years after surgery, and may go up to 60% in the long-term follow-up [2]. The incidence of late complications is directly related to the assemblage of other associated anomalies and the complexity of the repair; it is globally different from centre to centre, with a wide spectrum of presentations, previously it was around 24% in tertiary care centres [3], and the most common complication is a fistula, followed by meatal stenosis, penile curvature, and micturition related problems.

However, recent shreds of evidence suggest that complication rates for hypospadias repair may be greater than reported, approaching 50% for proximal hypospadias [4].

Some of these complications can be treated easily, like meatal stenosis, and some may need repetitive surgeries like fistula complications. End-stage renal affection may follow simple meatal stenosis or urethral stricture if it is not recognized early or not managed properly, especially if an inexperienced surgeon does urethroplasty or if the child is not precisely followed up.

A meticulously designed meatus during commences of hypospadias repair and a simple post-operative technique like meatal dilation may preserve renal function in a considerable number of cases. It may improve the future quality of life for those children.

Proper evaluation of hypospadias repair is crucial for both the operating surgeons and the affected children. Therefore, global standardiz-

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ing the evaluating scores for different follow-up aspects is the main core for auditing this common anomaly.

28.2 Preoperative Evaluation and Scoring

Proper evaluation of the hypospadias repair results should be extended to include an early precise preoperative assessment, as the different types of hypospadias and chordee degrees require various operations, have diverse complication rates, and different prognoses. On the other hand, some researchers may still argue that the complication rate may not correlate exactly with the degree of hypospadias nor the preoperative symptoms.

To improve treatment and comparison across centres and surgeons, a clear and consistent classification is necessary to standardize the hypospadias terminology. Though there are many classifications for hypospadias, the first, simplest, and practical classification was described a long time ago in 1886 by Kaufmann [5].

Later on, Duckett [6] classified hypospadias depending on the exact site of the meatus and presence or absence of chordee into eight subgroups (glanular, coronal, subcoronal, distal penile, mid-penile, proximal penile, penoscrotal, and perineal). Accordingly, one may choose the techniques designed for either distal or proximal hypospadias. But children with hypospadias associated with penile and gonadal anomalies should be classified under DSD (Fig. 28.1).

Microphallus is common in severe hypospadias. Gender assignment, endocrinal measurement, and the possibility of proper endocrinal treatment should be evaluated before the decision of surgical correction in such cases, especially when bilateral impalpable undescended testicles are associating the case. The hypospadias repair is warranted only after assigning the gender as male. Underdeveloped scrotum with bilateral cryptorchidism usually limits hypospadias reconstruction, so orchidopexy and properly staged hypospadias reconstruction are the best choice, preceding endocrinal management and orchidopexy are helpful for local tissue augmentation and decrease the rate of complication risk [7].



Fig. 28.1 Neonate with proximal hypospadias “scrotal”, small phallus, severe chordee, and scrotal transposition, such case should be categorized as DSD

At 2004 Hadidi and Azmy [8], suggested that preoperative evaluation could be completed at the first operation for proper assessment by considering glans configuration, urethral opening, and quality of the penile skin. However, a two-stage procedure may be necessary in some cases, and this assessment may not be valid. The surgeon should evaluate the patient under good illumination with magnification and perception of the following features:

1. Glans configuration (cleft, incomplete cleft, or flat).
2. Urethral opening (if narrow, it should be dilated or incised).
3. Quality of the skin on the ventral aspect of the penis distal to the urethral meatus.
4. Quality of the skin proximal to the urethral opening (sometimes it is very thin and requires incision).
5. The scrotum (ensure that both testes are in the scrotum and exclude bifid scrotum and penoscrotal transposition).

A simple sheet including these items could be used for this unpretentious preoperative evaluation, even by junior staff (Fig. 28.2).

Hypospadias International Score (MCGU)

Name of Patient: _____

(HR No.): _____

Date of Birth: _____

Family History

Positive Negative

Hormone Therapy

Positive Negative

Date of Examination: _____














				Score		
1. Meatus	 I, Glanular Hypospadias 1	 II, Distal Penile Hypospadias 2	 III, Proximal Hypospadias 3	 IV, Perineal Hypospadias 4	1-4 <input type="radio"/>	
	2. Chordee	 No, Superficial chordee or < 15° 0	 > 15° o. < 45° 1	 Severe, deep chordee or ≥ 45° 2	0-2 <input type="radio"/>	
		3. Glans Width & Shape	 Cleft glans ≥ 14 mm 0	 Incomplete glans 12-14 mm 1	 flat glans < 12 mm 2	0-2 <input type="radio"/>
			4. Urethral Plate Width	 Urethral plate > 12 mm 0	 Urethral plate 8-12 mm 1	 Urethral plate < 8 mm 2
<p>Glanular Hypospadias with good glans = Score 1 Perineal Hypospadias with poor glans = Score 10</p>				<input type="radio"/> Total score 1-10		

Fig. 28.2 Hypospadias score sheet [8]

Importantly though, the surgeon has to consider the preoperative anatomic assessment of the glans–meatus–shaft (GMS) scoring, and recently a multivariate binary logistic regression analysis found the urethral plate, glandular groove, and glans shape were proved to be a more predictive factor for the fistula and stenosis complications [9].

Difficulty in classification will occur when the scrotum is distally transposed or when a different grade of penile curvature is present; ignoring these two items will end with a non-aesthetic penile look and may result in an inappropriately functioning penis (Fig. 28.3).

Radojicic and Perovic [10] found the correlation between morphology and vascularization of the prepuce and their impact on results of hypospadias repair, they reported morphological characteristics and their correlation with hypospadiac prepuce vascularization. The underdeveloped foreskin with an unfavourable vascular pattern, when used for urethroplasty, had higher complications. The severe hypospadias, the anatomical features of the prepuce have a greater influence in deciding one or two stages of repair.

However, in the absence of comprehensive paediatric penile anthropometry nomograms, the assessments are often subjective and are prone to have an interobserver variation. Furthermore, few studies describe penile anthropometry in children beyond neonatal age, and most of the publications have consider only the penile length and diameter [11]. In addition, there is a scarcity of data on normal glans concerned anthropome-

try, normal penile angles, and penoscrotal orientation, although similar ethnicity of study population poses another limitation.

28.3 Postoperative Evaluation of the Hypospadias Repair

Generally, measurement is the core of any science. But the assessment of hypospadias surgery is confined only to redo surgery rates and postoperative complications such as fistula and stenosis during the previous two decades. However, from the start of this century, the advances in techniques in specialist centres had consistently lowered complication rates. This has led to focus more on the subjective measures of voiding function, aesthetic look, psychosexual outcomes, and patient or parental satisfaction. In addition, the urinary flow rate assessment after hypospadias repair has been recently prompted with the availability of simpler equipment and theoretical concerns of an increased risk of neourethral stricture, which is mainly complicating the tubularized incised plate (TIP) repair.

Cosmetic result assessment of hypospadias repair is inherently a subjective one. But recently, several researchers tried to introduce an objective criterion by the participation of healthcare professionals and also the parents. They are asked to share in the score evaluation of the aesthetic outcome of hypospadias repair by evaluating a series of standardized postoperative photographs. In one of such studies: the aesthetic result of the TIP repair was rated significantly better than the Mathieu repair for evaluation of the meatus, glans, shaft, and the overall penile appearance [12].

A validated scheme for the hypospadias repair evaluation was missing in the literature until the publication of the hypospadias objective scoring evaluation (HOSE) system score in 2001 [13]. Unfortunately, the uniformly recorded data in all repairs globally is missing. Applying the HOSE scoring system at all centres worldwide will help to compare the outcome of various techniques and decision-making, this will allow to counsel the parents preoperatively before deciding to consent for surgery.



Fig. 28.3 Despite a well-formed hypospadias repair, and this child still had unrecognized scrotal transposition, which reduces the actual functioning penile length

The shortcoming of the scoring system is that it does not assess relevant cosmetic variables like scrotal position, the shape of the glans, or the penile skin. Also, about the psychometric properties of the HOSE-score, only the interobserver reliability was tested.

So latter on (Hypospadias Objective Penile Evaluation), HOPE scoring system was developed to incorporate all surgically correctable variables: meatus position, meatus shape, glans shape, penile skin shape, and penile axis objectivity with standardized photographs, and anonymously coded patients, independent assessment by a panel, standards for a “normal” penile appearance, reference pictures, and assessment of abnormality degree [14].

In 2006, Toorn et al. [15] developed and presented the Hypospadias Penile Perception Score (HPPS), which incorporated all relevant surgically correctable variables through a set of standardized photographs and a panel assessing anonymous patients.

Validating instruments is painstaking work that requires meticulously following the highest methodological and technical standards, so other research projects went through this process to improve the instruments.

As the HOPE score solely reports the aesthetic outcome assessed by a physician, it must be supplemented with additional tools that evaluate the patient or caregiver satisfaction. So the Paediatric Penile Perception Score (PPPS) assesses patient or parental satisfaction of the genital appearance, which has been shown to differ from the surgeons’ opinion regarding the aesthetic outcome [16].

PPPS instrument proved to be practical to use, and the good internal consistency indicates its reliability. However, the high patient satisfaction similar to the control group was not anticipated and may contradict some of the few publications available. Good self-perception could reflect the improvement of surgical results that have been achieved with contemporary techniques. However, it seems unlikely that this is the main reason for the parents and the surgeon evaluation, and other factors must be meditated.

More recently, the attention to assessing the chordee and its correction (orthoplasty) emerged,

especially after a long-term follow-up. Penile curvature may be evaluated in the infant or child who has an erection at the time of examination; intraoperative assessment after penile shaft skin degloving by artificial erection which is usually achieved by injection of normal saline with a fine needle into the corpora directly or by insertion of the needle through the lateral aspect of one or the other corpora cavernosa [17].

Severe ventral curvature of the penis of 30° or more may impede normal sexual intercourse later on. Usually, it has a negative impact on the psychosexual functions in adulthood (Fig. 28.4). As a result, various techniques for straightening the penis has come into existence. However, on the other hand, preserving the neurovascular bundle remains precarious to maintain the glans sensitivity and thus avoid potential sexual dysfunction in the future.

In my opinion, the use of photography is neither a reliable nor an objective tool for judgement of the proper penile appeal; comparison between different photos by different cameras, with various resolutions and the varied focal distance, is extremely difficult or impossible, so using the digital callipers, measuring scale, and calibrated angle metre should be popularized and standardized for both anthropometry nomograms and evaluation of the results of penile reconstructive surgeries (Fig. 28.5).



Fig. 28.4 Severe residual penile chordee after a repaired distal hypospadias

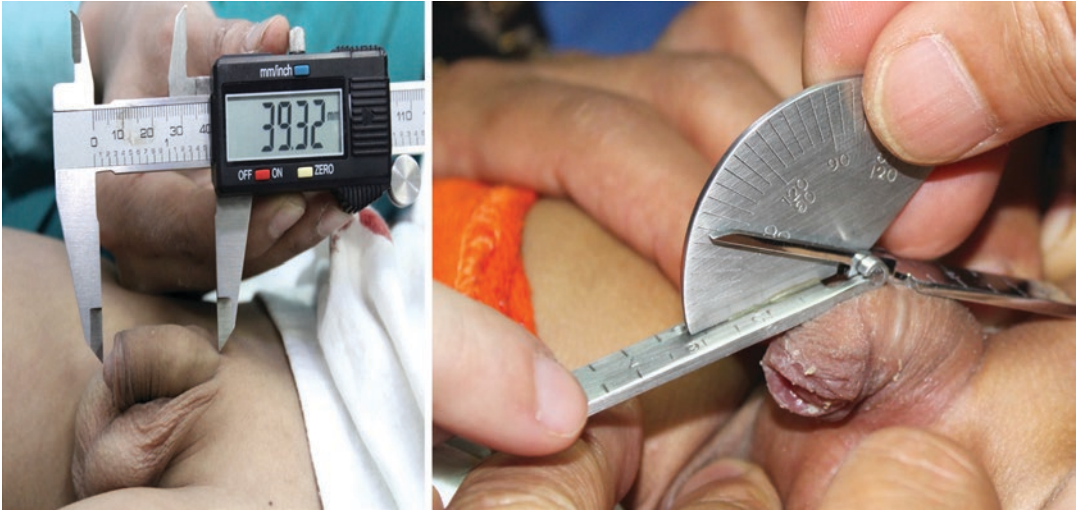


Fig. 28.5 Digital measuring scale and calibrated angle metre for precise penile anthropometric assessment

28.4 Psychosexual Outcome

Long-term psychological and psychosexual sequelae of hypospadias and their management are the most difficult aspects hypospadias repair to be quantified. The surveys and psychological tests in the 1990s inevitably reflect the unsatisfactory results achieved by outdated multistage procedures repair, and the surgery was generally undertaken at an older age. For example, Mureau et al. [18] reported that semi-structured interview studies in the Netherlands were conducted in men who had previously undergone hypospadias surgery, showed normal sexual adjustment, and experienced a normal adult sexual life. However, they expressed a more negative genital appraisal. Moreover, 37% sought further penile surgery to improve their functional or cosmetic outcome.

More recently, Mondiani et al. [19] compared variables of psychosexual adjustment in 42 men previously treated for hypospadias with a random sample of 500 unaffected men and found no differences in sexual function between the groups.

Most of the time, sexual function is normal or with minimal deviation after a successful correction of hypospadias. An erection should be obtainable, and fertility should not be affected unless the patient had associated undescended or

atrophic testicles or some forms of severe DSD. There has been considerable concern about these men's psychosocial and sexual outcomes, but a recent psychosocial study appears to refute this concern. A study used standardized questionnaires to compare psychosocial function in 189 children and adults who had undergone hypospadias surgery. They were compared with an age-matched set of controls who had undergone an inguinal herniotomy. There was no difference in psychosocial functioning between the groups [20]. The rate of sexually active cases increased with age. Still, it was consistently lower than in controls, which agrees with other studies showing a slightly delayed period at sexarche and masturbarche [21].

The erectile and sexual functions were suboptimal in approximately 10% of cases. Only mild erectile dysfunction was found, but no factors could be identified that could underlie the occurrence of erectile dysfunction. Diverse ejaculation problems were reported by a small number of participants in many studies. However, the lack of a standardized screening tool for ejaculation problems makes the comparison between studies more or less ponderous. Therefore, milking of the ejaculate, anejaculation, and other issues have been inconsistently reported. Still, if specifically

asked for, such problems seem to affect a significant proportion of men who had a previous hypospadias repair [22].

Generally, a respectable number of adolescents and young adults (AYA) who underwent hypospadiac surgeries were afraid to be mocked when naked compared to controls (20%). The most reported reasons mentioned by cases were shame, their genitals look different from their peer, smaller penis, and most of them being circumcised after hypospadias surgeries.

The International Index of Erectile Function (IIEF-5) is an abbreviated screening tool for erectile dysfunction based on the IIEF-15 questionnaire, which may be more accurate for assessing sexuality for hypospadiac cases [23].

Generally, men born with hypospadias have a good long-term outcome concerning sexual function and fertility than older reports. This indicates that surgical results and medical care have improved over the last decades, reflecting on the beneficent results for most hypospadias cases. But men with proximal forms are still present with lower fertility and are less satisfied with their sexual life. Of course, satisfaction with genital cosmetics is also essential for sound sexual life satisfaction. However, the acceptance of the cosmetic result is even more important. Clinical and psychological follow-up into adulthood is substantial, especially in boys born with proximal hypospadias [21].

The overall psychosexual outcome of a male suffering from hypospadias is unsteady but not comparable to normal healthy male peers. The most important factors associated with an impaired outcome were frequent penile surgeries and dissatisfaction regarding their penile aesthetic look. Importantly, these factors also seem involved in their satisfaction regarding hypospadias repair. Furthermore, most men were satisfied with their penile appearance, although the treating physicians may not perceive the final penile look after repeated surgeries as normal. Thus, accepting a more or less suboptimal aesthetic outcome as a physician could ultimately prove is more important for psychosexual well-being.

28.5 Fertility

Several studies have reported that severe hypospadias patients are more at risk of reduced fertility. Fertility issues and worry were most common in proximal cases of hypospadias and with more penile surgeries than controls (25.9% vs 12.0%, respectively) [24].

Nowadays, most of the hypospadiologists are facing a considerable number of new cases of hypospadias born to a father who had a previous hypospadiac surgery, and such cases are challenging for the operating surgeon to convince the family about the surgical and functional outcomes, where usually there is a decision regret after healthcare decisions.

References

1. Spinout AF, Poelaert F, Groen L, Van Laecke E, Hoebeke P. Hypospadias repair at a tertiary care center: long-term follow-up is mandatory to determine the real complication rate. *J Urol*. 2013;189(6):2276–81.
2. Winberg H, et al. The complication rate after hypospadias repair and correlated preoperative symptoms. *Open J Urol*. 2014;4:155–62. <http://www.scirp.org/journal/oju>. <https://doi.org/10.4236/oju.2014.412027>.
3. Retik AB, Atala A. Complications of hypospadias repair. *Urol Clin N Am*. 2002;29:329–39.
4. Pohl HG, Rana S, Sprague BM, Beamer M, Rushton HG. Discrepant rates of hypospadias surgical complications: a comparison of U.S. News & World Report and Pediatric Health Information System! Data and published literature. *J Urol*. 2020;203:616–23. <https://doi.org/10.1097/JU.0000000000000554>.
5. Kaufmann C. Verletzungen und Krankheiten der männlichen Harnröhre und des Penis. In: Bilothe T, Luecke A, editors. *Deutsche Chirurgie*. Lieferung 50a. Stuttgart: Verlag von Ferdinand Enke; 1886., Chap 5. p. 18–39.
6. Duckett JW. Hypospadias. In: Gillenwater JY, Grayhack JT, Howards SS, Duckett JW, editors. *Adult and pediatric urology*. 3rd ed. St. Louis: Mosby Year Book; 1996. p. 2550.
7. Spinoit A-F, Poelaert F, Van Praet C, et al. Grade of hypospadias is the only factor predicting for re-intervention after primary hypospadias repair: a multivariate analysis from a cohort of 474 patients. *J Pediatr Urol*. 2015;11(70):e1–6.
8. Hadidi AT, Azmy AF, editors. *Hypospadias surgery: an illustrated guide*. 1st ed. London: Springer Verlag; 2004. Reproduced with the kind permission of Springer Verlag

9. Güler Y. TIPU outcomes for hypospadias treatment and predictive factors causing urethrocutaneous fistula and external urethral meatus stenosis in TIPU: clinical study. *Andrologia*. 2020;52(9):e13668. <https://doi.org/10.1111/and.13668>.
10. Radojicic ZI, Perovic SV. Classification of the prepuce in hypospadias according to morphological abnormalities and their impact on hypospadias repair. *J Urol*. 2004;172:301–4. <https://doi.org/10.1097/01.ju.0000129008.31212.3d>.
11. Puri A, Sikdar S, Prakash R. Pediatric penile and glans anthropometry nomograms: an aid in hypospadias management. *J Indian Assoc Pediatr Surg*. 2017;22:9–12.
12. Gough DCS, Verwerid M, Dickson AP. An objective assessment of the results of hypospadias surgery. *BJU Int*. 2003;91(Suppl. 1):62.
13. Holland AJ, Smith GH, Ross FI, Cass DT. HOSE: an objective scoring system for evaluating the results of hypospadias surgery. *BJU Int*. 2001;88:255–8. <https://doi.org/10.1046/j.1464-410x.2001.02280>.
14. van der Toorn F, Scheepe JR, Essnk-Bot ML, Borsboom GJJM, Wolffenbuttel KP, van den Hoek J. HPPS: a validated scoring system for evaluating cosmetic result after hypospadias surgery. *J Ped Urol*. 2006;2:135.
15. Toorn F, de Jong T, de Gier RE, et al. Introducing the HOPE (hypospadias objective penile evaluation)-score: a validation study of an objective scoring system for evaluating cosmetic appearance in hypospadias patients. *J Pediatr Urol*. 2013;9:1006–17.
16. Haid B, Becker T, Koen M, et al. Penile appearance after hypospadias correction from a parent's point of view: comparison of the hypospadias objective penile evaluation score and parents penile perception score. *J Pediatr Urol*. 2016;12(33):e1–7.
17. Menon V, Breyer B, Copp HL, et al. Do adult men with untreated ventral penile curvature have adverse outcomes? *J Pediatr Urol*. 2016;12:31.e1ee7.
18. Mureau MA, Slijper FM, van der Meulen JC, Verhulst FC. Psychosexual adjustment of men who underwent hypospadias surgery; a norm-related study. *J Urol*. 1995;154:1351–5.
19. Mondiani N, Ponchiotti R, Bonafe M, et al. Hypospadias. Incidence and effects on psychosexual development as evaluated with the Minnesota multiphasic personality inventory test in a sample of 11,649 young Italian men. *Urol Int*. 2002;68:81–5.
20. Wilcox DT, Ransley PG. Medicolegal aspects of hypospadias. *BJU Int*. 2000;86:327–13.
21. Örtqvist L, Fossum M, Andersson M, Nordenström A, Frisén L, Holmdahl G, Nordenskjöld A. Sexuality and fertility in men with hypospadias; improved outcome. *Andrology*. 2017;5:286–93. <https://doi.org/10.1111/andr.12309>.
22. Tack LG, Springer A, Riedl S, et al. Psychosexual outcome, sexual function, and long-term satisfaction of adolescent and young adult men after childhood hypospadias repair. *J Sex Med*. 2020;17:1–11.
23. Rosen RC, Cappelleri JC, Smith MD, et al. Development and evaluation of an abridged, 5-item version of the international index of erectile function (IIEF-5) as a diagnostic tool for erectile dysfunction. *Int J Impot Res*. 1999;11:319–26.
24. Kumar S, Tomar V, Yadav SS, et al. Fertility potential in adult hypospadias. *J Clin Diagn Res*. 2016;10:PC01–5.