

Innovative Approaches to Surgical Treatment of Hypospadias in Children

Shukrulloev Fayozjon Zokirjon o'g'li

Bukhara state medical institute after named Abu Ali ibn Sino

Received: 2024, 15, Nov

Accepted: 2024, 21, Nov

Published: 2024, 09, Dec

Copyright © 2024 by author(s) and BioScience Academic Publishing. This work is licensed under the Creative Commons Attribution International License (CC BY 4.0).



Open Access

<http://creativecommons.org/licenses/by/4.0/>

Annotation: In the literature, greater attention has traditionally been paid to urethroplasty techniques. Consequently, issues such as the correction of penile curvature have long been discussed only within the context of the question: "Which is better: methods with or without preservation of the urethral plate?" Essentially, this debate boils down to the question: "Does a chordee exist?". Thus, the method proposed by R. Nesbit back in 1965 for correcting penile curvature, along with its modification by L. Baskin, remains the most popular to date.

Keywords: hypospadias, urethroplasty, penile malformation, pediatric urology, genital reconstructive surgery.

Severe forms of hypospadias remain a significant surgical challenge, with single-stage techniques often associated with complications that can range from 20% to 50%. A persistent debate in the literature concerns the choice between single-stage and two-stage approaches.

In 2011, a comprehensive survey of 377 surgeons from 68 countries was conducted to assess their professional preferences on this issue. The findings revealed a clear trend: the more proximally located the meatus, the more likely a two-stage method is chosen. For distal hypospadias, 71% of surgeons favored the TIP method (and thus methods preserving the urethral plate), while only 0.5% opted for two-stage approaches. However, for proximal hypospadias, the preference for two-stage techniques increased to 76.6%. Notably, the study did not specify the types of two-stage techniques employed. These could include procedures using free grafts without their own blood supply or operations repositioning a non-tubularized flap (typically preputial) with vascular supply to the future urethral location. The onlay technique (as described by J. Duckett) is applied in up to 29.5% of penoscrotal hypospadias cases.

Many authors analyzing various techniques for proximal hypospadias correction increasingly conclude that two-stage methods offer better functional and aesthetic outcomes. These approaches provide a greater degree of penile straightening and a lower complication rate. Consequently, the

choice of urethroplasty technique is often determined during penile curvature correction. The debate between single-stage and two-stage operations continues. A comparative analysis of publications over a decade (2002–2012) revealed that complication rates were similar for both approaches. Researchers suggested adopting a range of surgical techniques and refining individual approaches to improve outcomes.

Urethral plate tissue is primarily used for urethroplasty when the plate is wide, penile curvature is mild, and can be corrected by freeing the corpora cavernosa and performing dorsal plication of the tunica albuginea using methods such as those by R. Nesbit, L. Baskin, and their modifications. Single-stage urethroplasties like N. Hodgson's technique (tubularizing a dorsal flap) and TPIF (transverse preputial island flap) have seen declining support, with minimal discussion in recent literature. Onlay operations, such as OIF (onlay island flap), still hold relevance. Recently, TIP and GTIP methods have gained traction for proximal hypospadias treatment, especially when urethroplasty can be performed without transecting the urethral plate.

In cases of significant penile curvature requiring transection of the urethral plate for correction, two-stage techniques are increasingly favored. Among these, A. Bracka's method has garnered significant attention in recent years. One key advantage highlighted in publications is the creation of an artificial urethra securely fixed to the ventral surface of the corpora cavernosa, mimicking normal anatomy. This eliminates issues such as subcutaneous displacement of the artificial urethra. Additionally, many studies report a reduced complication rate with this technique.

Undoubtedly, the surgical treatment of proximal hypospadias remains challenging and is not free of complications. The growing popularity of A. Bracka's method has prompted researchers to examine its potential complications. These studies have further confirmed its superiority over single-stage techniques.

The complication rate often serves as an indicator of surgical efficacy. Attempts to use a transverse preputial flap with vascular supply to replace ventral penile defects, as a modification of Bracka's technique (which typically uses a free graft), resulted in significantly higher complication rates, primarily in the form of urethral diverticula. Consequently, the modified approach was abandoned.

Complication rates in the treatment of proximal hypospadias remain high, ranging from 32% to 68% across various studies. However, comparative analyses consistently favor staged approaches, which generally result in fewer complications.

When using the free graft technique, complications are similar to those seen with other surgeries. However, literature indicates that primary patients undergoing this technique may experience no complications after the first stage and a minimal complication rate (no more than 4.5%) after the second stage of surgical treatment.

For many years, pediatric urologists have been working to develop a treatment algorithm for hypospadias. One modern approach bases the selection of surgical techniques on the severity of penile curvature in different forms of hypospadias.

The initial step involves a degloving procedure, which exposes the corpora cavernosa by mobilizing the penile shaft skin along with the dartos fascia from Buck's fascia. This is followed by an artificial erection test, where saline is injected into one of the corpora cavernosa to measure the angle of ventral curvature.

If the curvature does not exceed 30°, correction is performed using tunica albuginea plication of the corpora cavernosa. Subsequently, the TIP technique is applied. Alternatively, an onlay procedure may be performed if the meatus is proximally located and the surgeon prefers this method. In such cases, the defect is corrected in a single-stage operation.

If the curvature exceeds 30°, the urethral plate is transected and excised, followed by ventral "lengthening" corporoplasty. The ventral defect is replaced using a free graft from the inner preputial layer, as in the first stage of A. Bracka's method.

The risk of complications in the surgical treatment of hypospadias remains high, driving the ongoing search for new techniques. Researchers are exploring novel graft materials as well as modifications of existing methods.

For single-stage correction, one recommendation involves the use of a pre-tubularized buccal mucosa graft, which is anastomosed to the hypospadiac meatus. Buccal mucosa may also be applied as an onlay graft on the preserved urethral plate, similar to single-stage urethroplasty techniques. Alternatives to buccal mucosa include using the ventral tongue mucosa or bladder mucosa. The former is applied as a variation of the Bracka operation, while the latter serves as a tubularized graft.

Although staged free graft operations for proximal hypospadias are increasingly discussed in the literature, some authors continue to advance single-stage flap techniques, reporting reduced complication rates with modified approaches.

Of particular interest are tissue engineering methods for urethral reconstruction in hypospadias. These techniques involve complex preparation and are primarily applied to small groups of patients with severe cases. Currently, this approach is considered experimental and suitable for well-equipped facilities. However, studies describe minimal complication rates and a high success rate of 91%.

In complex surgical procedures such as hypospadias correction, the surgeon's professional skills and the volume of surgeries performed are often cited as critical factors for successful outcomes. Specialists in hypospadiology suggest that achieving good functional and aesthetic results requires performing 50 to 100 surgeries per year. A recent study analyzing the outcomes of over 17,000 patients treated in 75 centers across the UK demonstrated a significant reduction in surgical complications in high-volume centers compared to low-volume clinics—17.5% versus 25%.

An essential aspect of evaluating hypospadias surgery is the visual cosmetic outcome. The HOPE (Hypospadias Objective Penile Evaluation) method provides a standardized assessment of aesthetic results using a scoring system based on postoperative photographs. This tool is proposed as a means to guide the selection of optimal surgical techniques for hypospadias.

To evaluate and compare treatment outcomes across clinics, a unified approach to reporting information is necessary. For this purpose, a group of researchers developed the STROBE method (Strengthening the Reporting of Observational Studies in Epidemiology). It provides clear guidelines for structuring publications containing clinical observations. At a subsequent international congress on hypospadias, the STROBE framework was widely accepted by researchers and adapted for studies on hypospadias treatment outcomes.

Many unresolved questions remain in all areas of studying hypospadias, underscoring the relevance of this issue. Both global and domestic literature continue to actively discuss various aspects of penile surgical correction, options for urethroplasty, complications, and aesthetic outcomes. Significant attention is being directed toward the process of standardization and the development of algorithms across different aspects of this field.

A standardized approach will undoubtedly lead to comparable research data and predictable treatment outcomes. This goal is the focus of substantial efforts by a wide range of researchers today.

References:

1. Papes D., Bracka A., Altarac S. Two-stage hypospadias repair with inner preputial layer Wolfe graft (Aivar Bracka repair). *BJU Int* 2012;110(3):460–73. DOI: 10.1111/j.1464-410X.2012.11304.x. PMID: 22776570.
2. Snodgrass W., Bush N. *Hypospadiology*. Dallas: Operation happenis, 2015.

3. Horton C., Devine C. Use of dermal graft to correct chordee. J Urol 1975;113(1):56–8. PMID: 1089811.
4. Gittes R., McLaughlin A. Injection technique to induce penile erection. Urology 1974;4(4):473–4. PMID: 4418594.
5. Nesbit R. Congenital curvature of the phallus: report of three cases with description of corrective operation. J Urol 1965;93:230–2. PMID: 14260875.