

Outcome of partial glandurethral disassembly in distal penile hypospadias repair

 Hesham Mohamed Kassem*,  Abdel Razik Yousef

Department of Pediatric Surgery, Faculty of Medicine, Zagazig University, Zagazig, Egypt

Received: 16/08/2025

Accepted: 06/09/2025

Published: 17/01/2026

Cite this article: Kassem HM, Yousef AR. Outcome of partial glandurethral disassembly in distal penile hypospadias repair. *Surg Child.* 2026;3(1):7-11.

*Corresponding Author: Hesham Mohamed Kassem, kassmhesham91yahoo.com

ABSTRACT

Aims: Several surgical techniques have been described for distal penile hypospadias (DPH) repair, including meatal advancement and glanuloplasty incorporated (MAGPI), tubularized incised plate (TIP), Mathieu, and glandular urethral disassembly (GUD). TIP is widely performed but has notable complications such as urethrocutaneous fistula and meatal stenosis, particularly in cases with a narrow glans or urethral plate. Urethral mobilization, first described by Beck (1898) and popularized by Koff (1981), avoids urethroplasty and reduces fistula risk, but traditional methods mobilize the urethra up to 1.5 cm. The GUD technique emphasizes minimal urethral mobilization with wide glandular dissection. To evaluate the outcomes of the GUD technique in different types of DPH.

Methods: This prospective study was conducted at Zagazig University Hospitals from April 2022 to April 2023. Thirty patients with primary or recurrent DPH or urethral fistula underwent repair using urethral mobilization. Patients with severe chordee, mid-penile, or proximal hypospadias were excluded. Operative details, complications, and follow-up findings were analyzed.

Results: The mean age at surgery was 2.7 years, mean operative time 38.1 minutes, mean hospital stay 12.8 hours, and mean catheter duration 4.6 days. Follow-up averaged 3.6 months. Types included 10 (33.3%) coronal, 7 (23.3%) recurrent DPH, 6 (20%) subcoronal, 3 (10%) glandular, 2 (6.6%) urethral fistula, and 2 (6.6%) megameatus with intact prepuce. Complications occurred in 5 patients (16.6%): meatal stenosis (6.6%), dehiscence (3.3%), meatal retraction (3.3%), and fistula (3.3%). No bleeding, infection, or iatrogenic chordee occurred.

Conclusion: The GUD technique with minimal urethral mobilization is a simple, safe, and effective approach for selected DPH cases, yielding low complication rates.

Keywords: Hypospadias, urethral mobilization, glandular disassembly, urethral advancement, distal penile hypospadias

INTRODUCTION

Hypospadias is one of the most common congenital anomalies of the male genitourinary tract, with an estimated incidence of 1 in 300 live births. Approximately 60%–76% of cases are classified as distal penile hypospadias (DPH).¹

Several surgical techniques have been described for DPH repair, including meatal advancement and glanuloplasty (MAGPI), tubularized incised plate urethroplasty (TIP), Mathieu repair, and glans-urethral disassembly (GUD).^{2,3} Among these, TIP has become the most widely performed technique. However, TIP is associated with complications such as urethrocutaneous fistula, meatal stenosis, and urethral stricture.^{4,5} Furthermore, its success depends on

urethral plate quality, and optimal outcomes generally require a glans width greater than 14 mm.^{6,7}

To overcome these limitations, the GUD technique has been introduced as an alternative. It is based on minimal urethral mobilization combined with wide glandular dissection, aiming to achieve satisfactory functional and cosmetic outcomes while reducing complication rates.

The novelty of our series lies in applying GUD specifically for DPH primary and complicated cases and systematically reporting both surgical and parent-reported outcomes. While previous reports have mainly focused on complications, our

study emphasizes the cosmetic and functional aspects in addition to complication rates.

METHODS

Ethics

This prospective study was conducted at Zagazig University Hospitals between April 2022 and April 2023 to evaluate the outcomes of the GUD technique for different types of DPH. This study has been approved by the Institutional Review Board of the Faculty of Medicine, Zagazig University, with particular attention paid to the inclusion of vulnerable participants (e.g., children, pregnant women, individuals with disabilities) (Date: 12.01.2025, Decision No: ZU-IRB#9634). Additional safeguards were reviewed and approved by the committee. All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki. Written informed consent was obtained from the parents/guardians of all participants.

Inclusion Criteria

Primary cases of DPH, recurrent distal hypospadias, and urethral fistula cases.

Exclusion Criteria

Presence of moderate or severe chordee, mid-penile, proximal, or perineal hypospadias.

All patients with DPH, categorized by age (<2 vs ≥2 years) and by type (primary vs complicated). This stratification allowed evaluation of outcomes according to both age and complexity of the condition.

Preoperative evaluation included full medical history, physical examination, and routine laboratory tests (CBC, PT, PTT, INR, urinalysis).

Parental-reported cosmetic and functional satisfaction was assessed at follow-up using a structured questionnaire.

Surgical Technique

Under aseptic conditions, a stay suture was placed in the glans (4/0 silk), followed by a circumferential incision 2–3 mm below the meatus. The incision site was infiltrated with diluted adrenaline (1:100,000). A size 6 feeding tube was inserted into the urethra, and the penis was degloved with chordee release. A tourniquet was applied at the base of the penis, and artificial erection was performed to assess any residual chordee. The corpus spongiosum was dissected from below the visible bifurcation. The glans was incised in the midline and configured into an inverted Y around the meatus. The urethra was mobilized 1–2 cm with wide glandular dissection (Figure 1, 2). It was fixed to the glans tip and underlying corpora using 6/0 Vicryl, covered with a dartos flap, and the glans was approximated with 5/0 Vicryl. Circumcision and skin closure were completed with 5/0 rapid Vicryl (Figure 3). A compression dressing was applied, and the catheter was secured for four days.



Figure 1. Corpus spongiosum dissection urethral mobilization

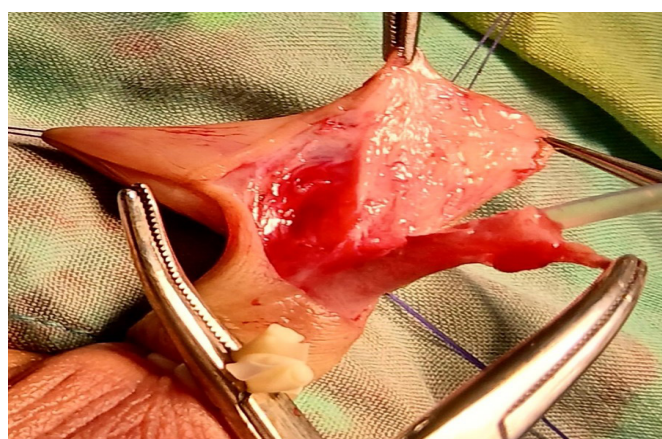


Figure 2. Wide glandular dissection and minimal urethral mobilization

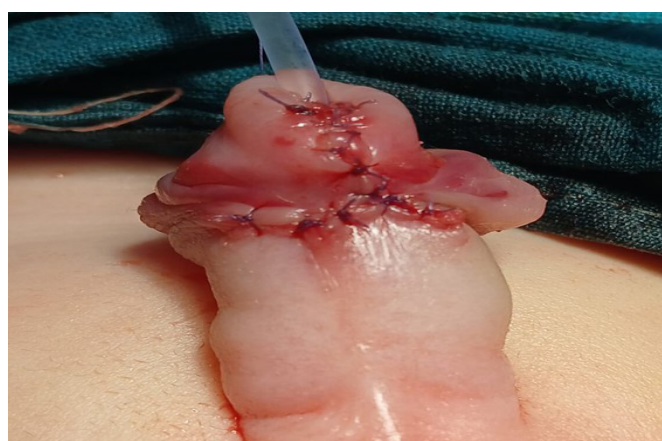


Figure 3. Final glans closure and reconstructed meat

Postoperative Care and Follow-up

Broad-spectrum intravenous antibiotics were administered 30 minutes before surgery and continued orally till removal of the catheter. The catheter was removed on postoperative day 4, urethral calibration began on day 7, and follow-up was scheduled weekly for one month, then monthly for six months.

Parental-reported cosmetic and functional satisfaction was assessed at follow-up for complications and cosmetic results (slit-like meatus, straight penis, satisfactory urinary stream), using a structured questionnaire.

Statistical Analysis

Data were analyzed using SPSS version 20. Quantitative variables were expressed as mean±standard deviation and compared using Student's t-test. A p-value <0.05 was considered statistically significant. Statistical analysis included descriptive data as well as subgroup comparisons.

RESULTS

Patient Characteristics

A total of 30 patients undergoing distal hypospadias repair using the GUD technique were included. The mean age at surgery was 2.7 years, with a mean hospital stay of 12.8 hours. Catheter duration averaged 4.6 days, and patients were followed up for a mean of 3.6 months (**Table 1**).

Table 1. Postoperative patient characteristics

Parameter	Value
Mean age	2.7 years
Mean hospital stay	12.8 hours
Catheter duration	4.6 days
Mean follow-up	3.6 months

Types of Hypospadias

Coronal hypospadias was the most common type (33%), followed by recurrent (23.3%), subcoronal (20%), glandular (10%), urethral fistula (6.6%), and megameatus intact prepuce (6.6%). Distribution across age groups (<2 years vs ≥2 years) did not show a statistically significant difference (p=0.497) (**Table 2**).

Table 2. Types of hypospadias by age group

Type of hypospadias	<2 years	≥2 years	Total	p-value
Coronal	3 (30%)	7 (70%)	10 (33%)	
Recurrent	2 (28.6%)	5 (71.4%)	7 (23.3%)	
Subcoronal	3 (50%)	3 (50%)	6 (20%)	
Glandular	2 (66.7%)	1 (33.3%)	3 (10%)	
Urethral fistula	0 (0%)	2 (100%)	2 (6.6%)	
Megameatus intact prepuce	0 (0%)	2 (100%)	2 (6.6%)	
Total	10 (33.3%)	20 (66.7%)	30 (100%)	0.497 (NS)

NS: Non-significant

Postoperative Complications

Overall, complications were observed in 16.7% of patients (5/30). Meatal stenosis occurred in 2 patients which respond well with dilatation, wound dehiscence, meatal retraction, and urethrocuteaneous fistula each occurred in 1 patient Which required redo surgery. No statistically significant difference in complication rates was noted between age groups (<2 years vs ≥2 years, p=1.00) (**Table 3**).

Table 3. Postoperative complications by age group

Complication	<2 yrs (n=10)	≥2 yrs (n=20)	Total (n=30)
Meatal stenosis	1	1	2
Wound dehiscence	0	1	1
Meatal retraction	0	1	1
Urethrocuteaneous fistula	0	1	1
p-value	–	–	1.00 (NS)

NS: Non-significant

Patients with distal shaft meatal location had a significantly higher complication rate compared to coronal/subcoronal locations (25% vs 11.1%, p=0.04). The presence of mild chordee (12.5% vs 18.2%, p=0.71) and postoperative edema (20% vs 15%, p=0.74) were not significantly associated with increased complications (**Table 4, 5**).

Table 4. Complication rates by meatal location

Meatal location	n	Complications (n)	Complication rate	p-value
Coronal /subcoronal	18	2	11.1%	
Distal shaft	12	3	25%	
Total	30	5	16.7%	0.04*

*Distal shaft location significantly associated with increased risk of fistula formation

Table 5. Relationship of other factors with complication rates

Factor	Category	n	Complications (n)	Complication rate	p-value
Presence of mild chordee	Yes	8	1	12.5%	0.71 (NS)
	No	22	4	18.2%	
Postoperative edema	Yes	10	2	20.0%	0.74 (NS)
	No	20	3	15.0%	

NS: Non-significant

DISCUSSION

The primary objective of any hypospadias repair is to reconstruct a penis that is both functionally and cosmetically acceptable, while minimizing the complications.⁸ Among the different procedures described, the TIP urethroplasty has emerged as one of the most frequently performed operations for DPH worldwide. In our institution, TIP remains a standard technique, particularly due to its relative technical simplicity and satisfactory outcomes. However, it is well recognized that TIP results are significantly influenced by the anatomical characteristics of the urethral plate and glans.⁹ Factors such as plate depth, plate width, and glans diameter determine whether the neourethra will heal without tension and whether the suture line will remain intact. Several authors have suggested restricting TIP to patients with favorable anatomy, particularly those with a deeply grooved urethral plate (>6 mm) and glans width >14 mm, in order to reduce the risk of complications such as fistula, stenosis, and dehiscence.¹⁰ Conversely, when these parameters are unfavorable, TIP has been associated with higher complication rates, reaching up to 15–20% in some series.^{11,12}

In recent years, urethral mobilization-based approaches have regained attention as a valuable option for distal hypospadias repair. The key principle of these techniques lies in mobilizing the native urethra to bring it to the tip of the glans, thereby avoiding urethroplasty, flaps, or grafts.¹³ The main advantages of this technique include preservation of the native tissue, less suture line, and avoiding the incision or tubularization of the urethral plate. Moreover, the operation tends to be technically straightforward, with reduced operative time. However, this technique is not without risks. Excessive mobilization to the urethra may compromise vascularity, leading to complications such as meatal stenosis,



stricture, or fistula formation.¹⁴ To avoid this, Macedo Jr and colleagues¹³ described a modification with minimal urethral mobilization and wide glans dissection, which emphasizes careful preservation of urethral blood supply. This concept is closely aligned with the approach adopted in the present study.

The GUD technique offers a unique approach by combining minor urethral mobilization with significant glans deconstruction, facilitating precise urethral reconstruction. This method has been proposed as an alternative to traditional techniques, aiming to achieve optimal functional and cosmetic results in distal hypospadias repair.

Complication rates remain the most critical measures for evaluating the outcomes of any hypospadias repair. Urethrocutaneous fistula is considered to be the most frequently encountered complication after hypospadias surgery. In our study, the incidence of fistula was 3.3%, which compares favorably with previously reported rates. Most of the published data show fistula rates of approximately 3.8% following TIP and 5.3% after Mathieu repair,^{15,16} while Macedo Jr et al.¹³ reported a 3% fistula rate with their mobilization technique.

Wang et al.¹⁴ conducted a systematic review on outcomes of DPH repair using different techniques and reported that the incidence of urethral fistula was 3.8% following TIP repair. Similarly, Wilkinson et al.¹⁵ performed a meta-analysis evaluating postoperative outcomes in distal hypospadias repair and found that the incidence of urethral fistula after TIP repair was 13%.

This suggests that urethral mobilization can achieve outcomes comparable to the best-established procedures while preserving the native urethra. Importantly, the low fistula rate in our series supports the principle that limited and careful mobilization does not compromise urethral integrity.

Meatal stenosis was reported in 6.6% of cases in our study. This incidence is in line with several earlier reports,^{17,18} and notably lower than the 15% reported by Edan.¹⁸ One explanation for our relatively low stenosis rate may be the avoidance of suture urethroplasty and preservation of native urethral tissue and careful calibration of the meatus during the procedure. Furthermore, avoiding an incised plate (as in TIP) may reduce the risk of secondary scarring and contracture.

Meatal retraction was occurred in one patient (3.3%), which falls within the reported literature range of 2.7%–6.7%.²⁰ Glandular dehiscence encountered in one patient secondary to severe wound infection. This finding emphasizes the well-recognized effect of infection on wound breakdown, as documented by other authors.^{20,21} Therefore adequate infection prophylaxis, meticulous hemostasis, and careful dressing remain importantly in minimizing such infection.

The optimal role and duration of postoperative urinary diversion after distal hypospadias repair remain matters of debate. Some authors advocate prolonged catheterization to

protect the repair, whereas others recommend early removal or even stentless approaches to reduce discomfort, bladder spasms, and infection risk.²¹ In our series, urethral catheters were maintained for four days, which provided sufficient time for wound stabilization without significantly prolonging hospitalization. The satisfactory results observed in our patients support the feasibility of this regimen. Nevertheless, randomized controlled trials are needed to establish an evidence-based consensus regarding stenting protocols.

Postoperative characteristics, including mean hospital stay (12.8 hours), catheter duration (4.6 days), and operative time (38.1 minutes), indicate that the GUD technique is efficient and associated with early recovery. Stratification by age and chordee showed no significant increase in complications, reinforcing the technique's applicability across different patient profiles.

Although this study primarily focused on complication rates, parent-reported outcomes were generally favorable. All parents reported satisfaction with the cosmetic appearance of the reconstructed glans and meatus. Functional outcomes, including urine stream and continence, were satisfactory in the early postoperative period. Future studies should incorporate standardized scoring systems such as HOSE or PPPS to quantify both cosmetic and functional outcomes.

Limitations

Although our study is limited by sample size and follow-up duration, our findings support GUD as a technique that allows glans mobilization with reduced closure tension, which may lower complication rates. Evidence from systematic reviews shows variable outcomes among distal hypospadias repairs, highlighting the need for larger, multicenter studies with extended follow-up. Incorporating standardized functional and cosmetic scores in future research will enable more thorough evaluation of surgical success.

CONCLUSION

The GUD technique represents a straightforward and safe option for managing DPH in carefully selected patients, offering satisfactory outcomes with a low rate of complications.

ETHICAL DECLARATIONS

Ethics Committee Approval

This study has been approved by the Institutional Review Board of the Faculty of Medicine, Zagazig University, with particular attention paid to the inclusion of vulnerable participants (e.g., children, pregnant women, individuals with disabilities) (Date: 12.01.2025, Decision No: ZU-IRB#9634). Additional safeguards were reviewed and approved by the committee.

Informed Consent

Informed consent was obtained from a parent or legal guardian. Where appropriate, age-adjusted assent was also obtained from the child. The inclusion of vulnerable populations in this study adhered to national and international ethical guidelines. Extra care was taken



to ensure voluntary participation, understanding, and protection of participant dignity and autonomy.

Peer Review Process

This manuscript was subject to external peer review.

Conflict of Interest

The authors declare no conflicts of interest related to this study.

Financial Disclosure

The authors received no financial support for the conduct or publication of this research.

Author Contributions

Concept: K.H.M., Y.A.R.; Design: K.H.M., Y.A.R.; Control: K.H.M.; Data collection and/or processing: K.H.M., Y.A.R.; Analysis and/or interpretation: K.H.M., Y.A.R.; Literature review: K.H.M., Y.A.R.; Article writing: K.H.M., Y.A.R.; Critical review: All authors.

REFERENCES

1. Baskin LS. Hypospadias and urethral development. *J Urol.* 2000;163(3):951-956. doi:10.1016/S0022-5347(05)67861-5
2. Keays MA, Dave S. Current hypospadias management: diagnosis, surgical management, and long-term patient-centred outcomes. *Can Urol Assoc J.* 2017;11(1-2):48-53. doi:10.5489/cuaj.4386
3. van der Horst H, de Wall LL. Hypospadias, all there is to know. *Eur J Pediatr.* 2017;176(4):435-441. doi:10.1007/s00431-017-2864-5
4. Snodgrass W, Bush N. Primary hypospadias repair techniques: a review of the evidence. *Urol Ann.* 2016;8(4):403-410. doi:10.4103/0974-7796.192102
5. Braga HLP, Lorenzo AJ, Pippi Salle JL. Tubularized incised plate urethroplasty for distal hypospadias: a literature review. *Indian J Urol.* 2008;24(2):219-225. doi:10.4103/0970-1591.40619
6. Sennert M, Perske C, Wirmer J, Fawzy M, Hadidi AT. The urethral plate and the underlying tissue: a histological and histochemical study. *J Pediatr Urol.* 2022;18(3):364.e1-364.e9. doi:10.1016/j.jpuro.2022.02.006
7. Marcou M, Bobbe SM, Wullich B, Hirsch-Koch K. Urethral plate characteristics in cases of non-proximal hypospadias may not be associated with a higher risk of complications when a two-stage repair is applied. *Front Pediatr.* 2022;10:900514. doi:10.3389/fped.2022.900514
8. Abbas TO, Braga LH, Spinoit AF, Salle JP. Urethral plate quality assessment and its impact on hypospadias repair outcomes: a systematic review. *J Pediatr Urol.* 2021;17(3):316-325. doi:10.1016/j.jpuro.2021.02.017
9. Atan A, Turkyilmaz Z, Karabulut R, Yesil S, Sonmez K. Comment on: urethral plate quality assessment and its impact on hypospadias repair outcomes: a systematic review and quality assessment. *J Pediatr Urol.* 2021;17(3):326-327. doi:10.1016/j.jpuro.2021.03.022
10. Zu'bi F, Chua M, El Ghazzaoui A, et al. Competency in tubularized incised plate repair for distal hypospadias: cumulative sum learning curve analysis of a single surgeon experience. *J Urol.* 2020;204(5):1326-1332. doi:10.1097/JU.0000000000001293
11. Abbas TO, Khalil IA, Hatem M, Boyko A, Zorkin S. Plate Objective Scoring Tool (POST) in distal hypospadias: Correlation with post-repair complications. *J Pediatr Urol.* 2024;20(2):238.e1-238.e6. doi:10.1016/j.jpuro.2023.11.022
12. Hammouda M, Hassan YS, Abdelateef AM, Elgammal MA. New concept in urethral advancement for anterior hypospadias. *J Pediatr Urol.* 2008;4(4):286-289. doi:10.1016/j.jpuro.2007.12.007
13. Macedo A Jr, Ottoni SL, Di Migueli RDD, de Mattos RM, Garrone G, Leal da Cruz M. A different approach to distal hypospadias repair: the GUD (glandular urethral disassembly) technique. *J Pediatr Urol.* 2021;17(5):690.e1-690.e6. doi:10.1016/j.jpuro.2021.07.022
14. Wang F, Xu Y, Zhong H. Systematic review and meta-analysis of studies comparing the perimeatal-based flap and tubularized incised-plate techniques for primary hypospadias repair. *Pediatr Surg Int.* 2013;29(8):811-818. doi:10.1007/s00383-013-3340-7
15. Wilkinson DJ, Farrelly P, Kenny SE. Outcomes in distal hypospadias: a systematic review of the Mathieu and tubularized incised plate repairs. *J Pediatr Urol.* 2012;8(3):307-312. doi:10.1016/j.jpuro.2011.08.006
16. Elemen L, Tugay M. Limited urethral mobilization technique in distal hypospadias repair with satisfactory results. *Balkan Med J.* 2011;29(1):56-59. doi:10.5152/balkanmedj.2011.008
17. Haider N, Hashim I, Iqbal MA, et al. Outcome of urethral mobilization and advancement after anterior hypospadias surgery. *Ann Pediatr Surg.* 2019;15(1):6. doi:10.1186/s43159-019-0002-5
18. Edan OAA. Urethral mobilization and advancement technique in distal types of hypospadias: short-term local experience. *Ann Pediatr Surg.* 2021;17(1):60. doi:10.1186/s43159-021-00109-w
19. Atala A. Urethral mobilization and advancement for midshaft to distal hypospadias. *J Urol.* 2002;168(4 Pt 2):1738-1741. doi:10.1016/S0022-5347(05)64483-0
20. Chua M, Welsh C, Amir B, et al. Non-stented versus stented urethroplasty for distal hypospadias repair: a systematic review and meta-analysis. *J Pediatr Urol.* 2018;14(3):212-219. doi:10.1016/j.jpuro.2017.11.023
21. Kumar A, Ram Dhayal I. A comparative study on the outcomes of hypospadias surgery following early versus late bladder catheter removal. *Cureus.* 2022;14(1):e26104. doi:10.7759/cureus.26104