

Comparison of Fistula Rates After Urethrocutaneous Fistula Repair Versus Primary Hypospadias Repair for Distal Hypospadias

Pari KHALILOVA¹, Ergun ERGUN¹, Gulnur GOLLU¹, Ufuk ATES¹, Meltem BINGOL KOLOGLU¹, Aydın YAGMURLU¹, Murat ÇAKMAK¹

¹ Ankara University Faculty of Medicine, Department of Pediatric Surgery, Ankara, Türkiye

Cite this article as: Khalilova P, Ergun E, Gollu G, Ates U, Bingol Kologlu M, Yagmurlu A, Cakmak M. Comparison of Fistula Rates After Urethrocutaneous Fistula Repair Versus Primary Hypospadias Repair for Distal Hypospadias. Med J SDU 2025;32(4):337-341.

Abstract

Objective

To investigate the incidence of fistula formation following distal hypospadias repair and the recurrence rate after fistula correction within a 15-year period.

Material and Method

Postoperative fistula development rates of patients who underwent primary distal hypospadias repair between the years 2007-2022 were analyzed. The rates of recurrence of fistula after fistula repair were examined.

Results

A total of 417 patients were included in the study. Fistula developed in 54 patients (13%) after the first surgery. The mean age of the patients at the time of

the first operation was 39 months. It was observed that there was fistula approximately 10 months after the operation. Re-fistula formation was observed in 14 (25%) of 54 patients who underwent fistula repair. Re-fistula occurrence time after fistula repair was 5 days-18 months. The most common fistula location after the first operation was the coronal level (53%), with 28 patients where as the most location after the fistula repair was also coronal level (71% with 10 patients).

Conclusions

In patients who develop fistula after distal hypospadias repair, the risk of developing a fistula after the repair is higher than the risk of developing a fistula after the primary repair. These results may be related to the techniques and methods used in primary repair.

Keywords: hypospadias, fistula, children

Introduction

Hypospadias is one of the congenital anomalies seen in every 200-300 births and considered as a midline defect (1). Different causes regarding its etiology and epidemiology were mentioned (1,2). Hormonal

irregularity in the maternal period is one of the mostly stated ones in the current literature (3). No matter how advanced surgical techniques and materials are, there is not a single gold standard treatment method for hypospadias repair (4). Location of the urethra, whether it is accompanied by penile curvature,

Correspondence: P.K. / dr.parikhalilova@gmail.com

Received: 07.09.2025 • **Accepted:** 10.11.2025

ORCID IDs of the Authors: P.K:0000-0003-1148-3549, E.E: 0000-0001-8806-4022, G.G: 0000-0001-8163-2226, U.A: 0000-0001-6591-7168, M.B.K: 0000-0001-7726-7633, A.Y: 0000-0002-3294-4482, M.C: 0000-0002-4870-8361



the size of penis, urethral groove status, etc. are important factors that effect the choice of repair (5). Tubularized incised plate urethroplasty (TIPU) which has been performed with an increased frequency may be performed to repair hypospadias with mild penile ventral curvature (6). Although it is considered as one of the techniques that may be learned easily and has a high success rate, postoperative complications are inevitable (7,8). Urethrocuteaneous fistula is one of the most common complications after hypospadias repair (9). This rate varies between 5-50%, depending on the degree of hypospadias and the surgical technique (9). As it is in primary surgery, in case of urethrocuteaneous fistula, the time of repair and technique and many variables effect the outcome (10). In this study, it was aimed to present the results of postoperative urethrocuteaneous fistula repairs in children who underwent hypospadias surgery due to distal hypospadias within 15 years.

Material and Method

Patients who underwent primary distal hypospadias repair between 2007 and 2022 and patients who developed fistula on the postoperative period were

included in the study. Demographic data, comorbidities, location of the urethral opening, surgical technique, duration and materials, and postoperative follow-up of the patients were analyzed and the recurrence rates of fistula after fistula repair were examined. The time of recurrence in fistulas, time for repair, the repair technique, and the materials used were recorded.

Statistical analyses were performed using the Statistical Package for the Social Sciences (SPSS), version 23 (IBM Corp., Armonk, NY, USA). Categorical variables were analyzed using the Chi-square (χ^2) test. A p-value of less than 0.05 was considered to indicate statistical significance ($p < 0.05$).

Results

A total of 417 patients who underwent distal hypospadias repair within 15 years were included in the study. The mean age of the patients was 39 (6-156) months. Megameatus was observed in 69 patients, glanular hypospadias in 72 patients, coronal in 100 patients, subcoronal in 121 patients and midpenile in 55 patients. Table 1 provides a detailed presentation of the information.

Table 1 Urethra Locations and Fistula Rates

Primary	Rate of fistula	Fistula	Re-fistula	Re-fistula	Re-fistula
Megameatus (16.55%;n=69)	2,8 %	Glanular (n=1)			
		Coronal (n=1)			
Glanular (17.26%;n=72)	5,5 %	Glanular (n=2)			
		Coronal (n=2)	Coronal (n=1)	Coronal(n=1)	Coronal(n=1)
Coronal (23.98%;n=100)	22 %	Glanular (n=5)			
		Coronal (n=10)	Coronal (n=3)	Coronal(n=1)	
			Subcoronal(n=1)		
		Subcoronal(n=5)			
Subcoronal (29,01%;n=121)	14 %	Midpenile (n=2)			
		Coronal (n=11)	Coronal (n=3)		
		Subcoronal(n=6)	Subcoronal(n=1)		
Midpenile (13.19%;n=55)	16 %	Glanular (n=1)	Glanular (n=1)		
		Coronal (n=4)	Coronal (n=2)		
		Subcoronal(n=3)	Subcoronal(n=1)		
		Midpenile (n=1)	Coronal (n=1)		

Additional urinary anomalies (inguinal hernia, undescended testicle, hydrocele, ureteropelvic junction obstruction, Wilms' tumor, renal stone) were accompanied in 29 patients (7%). There was a comorbidity in 43 patients (10.5%), 21 of whom were cardiovascular pathologies. Tubularization was performed with the Snodgrass technique in 94,4 % (n=393) patients. Meatoplasty or glanuloplasty was sufficient in the remaining patients (5.6%, n=24). Early complications such as hematoma, bleeding and edema were encountered 12 % of the patients in the present study (n=50). There were 22 children (5,2 %) with meatal stenosis after the primary repair and in 18 % of them urethrocuteaneous fistula was occurred (n=4). Glans dehiscence was not encountered in any children. Fistula developed in 54 patients (13%) after the hypospadias repair. Mean time for fistula formation was 10 months (1-129 months). In 42 patients (78%), the fistula size was less than 2 mm, while in 12 patients (22%), it was greater than 2 mm. Fistula repairs were performed on these patients 13 months (8-20 months) after the hypospadias repair. Re-fistula formation was observed in 14 (25%) of 54 patients who underwent fistula repair. The most common fistula location after the first operation was at the coronal level (53%), with 28 patients. Re-fistula was observed approximately 8 months after the operation. Recurrent fistula occurred at the coronal level in most children (71% with 10 patients). We performed simple fistula repair in 46,3 % (n=25), simple ligation in 24 % (n=13), Mathieu technique in 18,6 % (n=10) and TIPU in 11,1 % (n=6). Among these, refistula developed in 6 children (24%) who underwent simple fistula repair, in 4 (30%) who underwent simple ligation, in 2 (20%) who underwent Mathieu technique, and in 2 (33%) who underwent TIPU. A child required third and other required fourth operations due to recurrent fistulas.

Discussion

The present study demonstrated that recurrent fistula rate after urethrocuteaneous fistula repair is higher than primary fistula formation in children who underwent surgery due to distal hypospadias (25%

vs 13%, respectively). Even though the number of patients are not relatively big, there are some studies supporting these data (11,12). The reason for such a high rate compared to the literature may be that there are multiple surgeons and therefore the diversity of techniques and skills is high (13). Our long follow up time is also another reason for encountering high fistula rate.

Considering all the complications of hypospadias, a rate of 1-90% is stated (11). Early complications include bleeding or hematoma, edema, wound infection, skin necrosis, flap or graft necrosis, wound dehiscence, catheter problems, penile erection, and bladder spasms. In the late period, meatal and urethral strictures, diverticula development, continuation of curvature, psychological and cosmetic problems are encountered (14,15). Urethrocuteaneous fistulas are seen in both the short and long term period (10,15). Due to the lack of long term follow up, some of these complications can not be addressed.

In general, there are some risk factors in the formation of fistula and other complications: the level of hypospadias, the length of the damaged urethra, the use of tissue with poor blood supply, the use of inappropriate techniques and materials, meatal and urethral stenosis, diverticula, urinary tract or wound infection. (6,15). The increased rate of recurrent fistula may be a result of damaged urethra and deteriorated blood supply of surrounding structures.

Preoperative use of testosterone and low growth hormone in patients are also mentioned to be risk factors for fistula formation. There are debates that androgens delay wound healing and increase inflammation (16–18). None of the patients received hormone treatment before or after the first operation.

The short time between hypospadias and fistula repair is another risk factor (9,12). Although six months was considered sufficient in the past, it is recommended in the current literature that this period should be extended up to one year (12,19). Our approach

Table 2 Comparison of Fistula Rates Based on the Use of Dartos Flap

Group	Use of Dartos Flap	Number of Fistulas, n (%)
Group 1 (203 patients)	Yes	35 (17.2%)
Group 2 (214 patients)	No	19 (8.8%)

regarding repair time seems to be in line with current literature. Conventional approach of the authors regarding repair time of urethrocutaneous fistula may be a factor on the increased re-fistula rates. But the studies also support that recurrence rate increases 3 times in recurrent fistulas (11). A similar rate was achieved in our study (13/25, 1,92 times). The time may not be the one and only cause of this increase. Also in terms of meatal and urethral stenosis, the risk of fistula formation increases due to proximal urinary pressure (12).

In recurrent fistulas, one of the important approaches is to determine the location and number of the fistula. In large urethrocutaneous fistulas with a high flow rate, 'pinpoint' fistulas may be overlooked because the urine pressure will be low. Therefore, an examination should be performed by administering isotonic solution, methylene blue, antiseptic or pomade-like substances from the meatus before the operation. Coronal region may be a highly risked location in both primary and recurrent fistulas. In the present study, 53% of the fistulas developed in this area after the primary repair (n=28).

The reason for this is that the blood supply to that area is weak, and it is difficult to bring the supportive tissues over the urethral anastomosis (12). This situation could explain why the recurrent fistulas in our study are located at the coronal level.

It is reported that the use of supportive tissues reduce the rate of fistula (10). However, our results indicate a higher fistula rate in patients with Dartos flap application (17.2%) compared to those without it (8.8%). This unexpected finding may be attributed to the complexity of the cases where a Dartos flap was used, potential surgical technique variations, or compromised vascularization in previously operated tissues. Further studies are needed to clarify this association (Table 2). In the study of Snodgrass et al., 50% (5/10) fistulas were seen in reoperative TIPU cases without the use of supporting tissue (dartos, t. vaginalis), while 4% (2/51) were observed in those used. There are different techniques in fistula repair and the results have started to be more satisfactory day by day (7,14,20–22). Simple fistula repair with primary closure is the most commonly used repair technique. Here, the choice depends on the surgeon's preference. A series of 40 patients with simple ligation was presented by Shirazi et al. and it is recommended for cases smaller than 4 mm (5). Repair with double ligation is recommended by Karakuş et al. for fistulas smaller than 2 mm (23). Modified Cecil-Culp technique, which is one of the preferred methods in recurrent

fistulas, gives successful results. The use of buccal and lingual mucosa can also be preferred in recurrent fistulas (10). Repairs using fascia lata, amniotic membrane, rectal mucosa are the substitution tissues and the Mathieu technique and TUPU are other alternative techniques for repairing fistulas (21,22). We performed simple fistula repair in 46,3 % (n=25), simple ligation in 24 % (n=13), Mathieu technique in 18,6 % (n=10) and TIPU in 11,1 % (n=6). The fact that Mathieu was applied in patients with refistula caught our attention.

The overlapping of the suture lines is a negative situation both because it creates malnutrition and prepares the ground for the urethral epithelium to walk on the skin. The technique preferred in the first repair is effective in the formation of the fistula as well as in its spontaneous closure (24). Spontaneous closure may be seen in pinpoint fistulas, especially in patients undergoing spongioplasty (25,26). There was no spontaneous closure in our study.

Conclusion

In patients who develop fistula after distal hypospadias repair, the risk of developing a fistula after the repair is higher than the risk of developing a fistula after the primary repair.

Conflict of Interest Statement

The authors declare no conflict of interest.

Ethical Approval

The study was conducted in accordance with the Declaration of Helsinki and was approved by the Ankara University Faculty of Medicine Clinical Research Ethics Committee, No: i10-811-24.

Funding

No financial assistance was received to support this study.

Availability of Data and Materials

The data of the study were retrieved from electronic patient record of Hospital Authority.

Artificial Intelligence Statement

Generative AI and AI-assisted technologies were NOT used in the preparation of this work.

Authors Contributions

PK: Conceptualization; Data curation; Formal analysis; Investigation; Methodology; Validation; Visualization; Writing-original draft.

EE: Data curation; Formal analysis; Writing- review & editing.

GG: Investigation; Validation; Writing-original draft.

UA: Investigation; Validation; Writing-original draft.

MBK: Investigation; Validation; Writing-original draft.

AY: Data curation; Formal analysis; Writing- review & editing.

MC: Data curation; Formal analysis; Writing- review & editing.

References

- Fathi BA, Elgammal AA, Ghoneimy OM, et al. Urethral advancement and glanuloplasty versus tubularized incised plate urethroplasty for distal hypospadias repair: A prospective randomized study. *BMC Urol* 2023;23:1–9. <https://doi.org/10.1186/s12894-023-01242-5>.
- Snodgrass W. Tubularized, incised plate urethroplasty for distal hypospadias. *Journal of Urology* 1994;151:464–5. [https://doi.org/10.1016/S0022-5347\(17\)34991-1](https://doi.org/10.1016/S0022-5347(17)34991-1).
- Cakmak M, Gollu G, Ates U, et al. Hypospadias and the use of the ages and stages questionnaire to evaluate neurodevelopmental status of boys with hypospadias. *European Journal of Pediatric Surgery* 2021. <https://doi.org/10.1055/s-0041-1723993>.
- Li J, Li S, Yang Z, et al. A simple technique to repair distal and mid-shaft hypospadias using a de-epithelialized Byars' flap. *Journal of International Medical Research* 2022;50. <https://doi.org/10.1177/03000605221115150>.
- Shirazi M, Ariafar A, Babaei AH, et al. A simple method for closure of urethrocutaneous fistula after tubularized incised plate repair: Preliminary results. *Nephrourol Mon* 2016;8:6–10. <https://doi.org/10.5812/numonthly.40371>.
- Snodgrass WT, Bush N, Cost N. Tubularized incised plate hypospadias repair for distal hypospadias. *J Pediatr Urol* 2010;6:408–13. <https://doi.org/10.1016/j.jpuro.2009.09.010>.
- El-Helaly HAA, Youssef HA, Ibrahim HM, et al. Distal hypospadias repair: Comparative study between snodgrass and transverse preputial onlay flap. *J Pediatr Urol* 2022;18:610.e1-610.e6. <https://doi.org/10.1016/j.jpuro.2022.08.016>.
- Faraj S, Bouty A, Demede D, et al. Hypospadias preputial flap onlay technique - Step by step. *J Pediatr Urol* 2023;9–10. <https://doi.org/10.1016/j.jpuro.2023.02.013>.
- Yang F, Ruan J, Zhao Y, et al. Individual treatment strategy for single urethrocutaneous fistula after hypospadias repair: A retrospective cohort study. *Transl Androl Urol* 2022;11:1345–53. <https://doi.org/10.21037/tau-22-559>.
- Snodgrass W, Bush NC. Re-operative urethroplasty after failed hypospadias repair: How prior surgery impacts risk for additional complications. *J Pediatr Urol* 2017;13:289.e1-289.e6. <https://doi.org/10.1016/j.jpuro.2016.11.012>.
- Wood D, Wilcox D. Hypospadias: Lessons learned. An overview of incidence, epidemiology, surgery, research, complications, and outcomes. *Int J Impot Res* 2023;35:61–6. <https://doi.org/10.1038/s41443-022-00563-7>.
- Abdullaev Z, Agzamkhodjaev S, Chung JM, et al. Risk factors for fistula recurrence after urethrocutaneous fistulectomy in children with hypospadias. *Turk J Urol* 2021;47:237–41. <https://doi.org/10.5152/tud.2020.20323>.
- Snodgrass WT, Bush N, Cost N. Tubularized incised plate hypospadias repair for distal hypospadias. *J Pediatr Urol* 2010;6:408–13. <https://doi.org/10.1016/j.jpuro.2009.09.010>.
- Hardwicke JT, Bechar JA, Hodson J, et al. Fistula after single-stage primary hypospadias repair - A systematic review of the literature. *Journal of Plastic, Reconstructive and Aesthetic Surgery* 2015;68:1647–55. <https://doi.org/10.1016/j.bjps.2015.07.024>.
- Springer A. Assessment of outcome in hypospadias surgery - A review. *Front Pediatr* 2014;2:1–7. <https://doi.org/10.3389/fped.2014.00002>.
- Taghavi K, O'Hagan LA, Hewitt JK, et al. Defining the role of pre-operative hormonal therapy in hypospadias. *J Paediatr Child Health* 2022;58:1508–19. <https://doi.org/10.1111/jpc.16087>.
- Özkuvancı Ü, Dönmez Mİ, Temiz MZ, et al. Effects of systemic androgens on late-stage urethral wound healing: An animal study. *Andrology* 2022;10:767–74. <https://doi.org/10.1111/andr.13157>.
- Rynja SP, de Jong TPVM, Bosch JLHR, et al. Testosterone prior to hypospadias repair: Postoperative complication rates and long-term cosmetic results, penile length and body height. *J Pediatr Urol* 2018;14:31.e1-31.e8. <https://doi.org/10.1016/j.jpuro.2017.09.020>.
- Wang J, Xu X, Bao Z, et al. Lateral incision 1-stage urethroplasty with oral mucosal graft for patients with penile urethral stricture after hypospadias repair—a preliminary report. *BMC Urol* 2023;23:1–6. <https://doi.org/10.1186/s12894-023-01250-5>.
- Li J, Liu P, Yang Z, et al. Reoperation frequency after transverse preputial Island flap urethroplasty "Duckett's technique" in treatment of severe hypospadias: A single center study. *Front Pediatr* 2023;10:1–9. <https://doi.org/10.3389/fped.2022.1030649>.
- Weiss DA, Long CJ, Frazier JR, et al. Back to the future: The Cecil-Culp technique for salvage penile reconstructive procedures. *J Pediatr Urol* 2018;14:328.e1-328.e7. <https://doi.org/10.1016/j.jpuro.2018.04.026>.
- Chandrasekharam VVS, Babu R. Single-stage salvage urethroplasty for failed distal hypospadias: Comparison of Mathieu and grafted tubularised incised plate repairs. *Pediatr Surg Int* 2022;38:643–50. <https://doi.org/10.1007/s00383-022-05070-w>.
- Karakus SC, User IR, Akcaer V, et al. A simple technique for small-diameter urethrocutaneous fistula repair: Ligation. *J Pediatr Urol* 2017;13:88–90. <https://doi.org/10.1016/j.jpuro.2016.11.014>.
- Ahuja RB. A de-epithelialised "turnover dartos flap" in the repair of urethral fistula. *Journal of Plastic, Reconstructive and Aesthetic Surgery* 2009;62:374–9. <https://doi.org/10.1016/j.bjps.2008.03.031>.
- Okumuş M, Tireli GA. Tubularized incised plate repair in 473 primary distal hypospadias cases: An evaluation of outcomes according to coverages and stent types. *Actas Urológicas Españolas (English Edition)* 2022;46:361–6. <https://doi.org/10.1016/j.acuroe.2022.01.001>.
- Zhang T, Cao X, Yan X, et al. Spongioplasty with Buck's fascia covering dorsal inlay graft urethroplasty for primary hypospadias repair. *J Pediatr Urol* 2023. <https://doi.org/10.1016/j.jpuro.2023.02.002>.