



## OUTCOME AND COMPLICATIONS OF SNODGRASS REPAIR CONCERNING UC FISTULA AND COMPLETE BREAKDOWN

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**Abstract:** Male urethral hypospadias is a common congenital disease requiring surgical correction. Because of its versatility, superior aesthetic outcomes, and low rate of complications, the Snodgrass (TIP) repair procedure is commonly utilized. However, complications, including urethrocutaneous (UC) fistula and total breakdown are still major worries. **Objective:** To evaluate the outcomes and complications of the Snodgrass repair for hypospadias, focusing on urethrocutaneous fistula formation, wound infections, and total breakdown. **Methods:** A total of 56 kids who received Snodgrass repair for hypospadias at a Quetta tertiary care facility between 2020 and 2023 were included. The study focused on UC fistulas, wound infections, and total breakdowns, examining surgical techniques, complications, and post-operative results. **Results:** In 26.7% of cases, UC fistula was the most frequent complication, followed by bleeding (10.7%) and wound infections (5.3%). Though uncommon, total breakdown was noted in 3.5% of cases. 75% of parents expressed satisfaction with the cosmetic results, and 10.7% were very satisfied. Additionally, the study found that complications varied with age, with the largest risk of UC fistula occurring in younger children (6–18 months). **Conclusion:** When used to correct distal hypospadias, the Snodgrass procedure has good functional and aesthetic results. Nonetheless, to reduce problems and increase long-term success, the study highlights the necessity of better surgical methods, preoperative planning, and postoperative care.

**Keywords:** Hypospadias, Tubularized incised-plate, Urethrocutaneous fistula, complete breakdown, Snodgrass Repair, Wound Healing

### Introduction

Hypospadias is a common congenital condition of the male urethra, characterized by a defective ventral prepuce, a ventral curvature of the penis, and ectopic location of urethral meatus.

In relation to the position of the meatus, hypospadias can be classified into three types: anterior (distal), middle, and posterior (proximal). The meatal opening presents either on the distal penile shaft in the anterior form or between the tip and the base of the glans in the posterior form. The incidence of distal hypospadias reaches up to 70% of hypospadias cases and accounts for 50% to 70% of all occurrences (1, 2). Every surgeon faces challenges when repairing hypospadias while available operative procedures fill numerous documentation pages (3). The number of surgical treatments for hypospadias demonstrates that no procedure guarantees absolute success for all surgeons. Reconstructive procedures yield their highest success rates during the first operation (3). The most critical factors influencing surgical treatment planning are meatal position alongside proximal spongiosal hypoplasia extent and VC severity together with urethral plate measurements including width and depth alongside glans size and navicular fossa depth alongside skin availability for the ventral side and foreskin status and penile length. The surgical management of hypospadias targets the creation of

a straight penis with a canal-shaped meatus of proper dimension at the glans tip while accomplishing a reconstructed conical glans with acceptable cosmetic appearance as the treatment goals (4). The procedure for hypospadias treatment can occur at any time yet most studies recommend performing the operation during ages 6-18 months to minimize surgical complications and psychological burden (5). The Tabularised Incised Plate (TIP) method proposed by Snodgrass involves cutting a central line through the UP to maximize urethral diameter before achieving urethral tabularization. Research shows that TIP urethroplasty has become the preferred surgical approach for distal hypospadias because it provides outstanding results while maintaining a low complication rate (6). Surgical treatment of hypospadias is intended to restore both function and appearance, meaning a straight penis with a normal appearing or positioned urethral meatus and normal urine flow. Some of the various surgical techniques created include the tabularized incised plate (TIP) or Snodgrass repair, which has proved very popular because it is easy to use, works well, and it is appropriate for most buried hypospadias conditions.

Hypospadias appears in 3.2 out of 1000 newborns and stands as one of the primary congenital malformations (7). Since 1994 when Snodgrass first proposed its use (8) the tabularised incised-plate (TIP) urethroplasty has emerged as

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the recognized version of the Thiersch- Duplay procedure (9, 10) for hypospadias surgery. The procedure produces superior results in both functionality and appearance. TIP repair research primarily focuses on children because hypospadias treatment occurs before school age in well-off nations. Adults in developing countries frequently demonstrate untreated hypospadias which should have received treatment during their childhood years. Populations in Malaysia reported the lowest incidence of hypospadias at 0.6 per 10,000 births but in Denmark the incidence reached 464 per 10,000 births. Chinese research documented minimal instances of hypospadias with rates between 0.7 and 4.5 per 10,000. The analysis shows that incidence rates continue to increase (11). Hypospadias surgical procedures continuously improved throughout many years while showing continuous positive results (12). Despite achieving a satisfactory outcome reported only in less than half of patients, hypospadias surgery leads to generally unfavourable results (13, 14) The most common adverse effects after hypospadias surgical interventions lead to urethrocutaneous fistula and meatal stenosis and urethral stricture and urethral diverticulum and glans dehiscence and breakdown and cosmetic outcome problems that might demand additional surgical operation according to Springer A (2014). Urethrocutaneous fistula presents as the leading postoperative issue before patients require hypospadias reconstruction surgery. A variety of elements contribute to post-specthrosis fistula formation among children including insufficient surgical technique and hematoma in addition to infection or urorethral stricture and meatal stenosis among others (15). Patients from underdeveloped countries tend to seek treatment as adults in outpatient settings because of limited financial resources or past surgery failures or different personal reasons. A small number of additional studies focus on hypospadias surgical outcomes within the young patient demographic. Studies demonstrate that adults who undergo identical treatments present more complications than children do (16) contrary to the results of other studies these studies cast doubt on it (17). The risk factors for urethrocutaneous fistula following juvenile hypospadias surgery are also unknown.

Despite its widespread use, repairing Snodgrass is not without problems. The most difficult surgical consequences include complete repair failure and urethrocutaneous (UC) fistula. A connection between the urethra and the surface of the skin, called a UC fistula, leads to significant morbidity including constant urine leaks and social anxiety. Complete breakdown is rarer and signifies a serious repair failure requiring sophisticated subsequent surgical procedures.

Accenting the incidence of urethrocutaneous fistula remains one of the main surgical complications requiring reoperation after hypospadias procedures (18). Big series demonstrate fistula occurrence rates between 4% and 20% across different studies (19, 20). Post-surgical hypospadias procedures risk developing urethrocutaneous fistulas because of tissue trauma combined with new urethra distal obstruction and postoperative infection. Modern surgery combined with surgical expertise and optimal tools and suture materials and tissue healing approaches has lowered the likelihood of fistula occurrences after corrective

surgery. Doctors have recorded multiple procedures used to repair urethrocutaneous fistulas (21).

Medical reports regarding complete breakdown occurrence are less common than UC fistula due to its representation of a serious repair failure resulting in a repeated original defect published by Kass et al. (2018). Healthcare consumers with this medical condition encounter both mental health issues and emotional challenges in addition to needing costly revision surgeries. Total failure exhibits multiple explanations, including technical errors and infections, while surgical site ischemia and patient-related variables like wound healing issues and comorbidities contribute to its complex pathogenesis (22).

The Snodgrass repair (also known as the Tabularized Incised Plate, or TIP, urethroplasty) is one of the most common surgical procedures to repair hypospadias. It is applauded for its ease of use, adaptability, and improved cosmetic results, but like all plastic surgeries there are downsides, particularly of urethra cutaneous (UC) fistula and complete repair breakdown. Although less frequently, the disastrous sequela of complete repair collapse occurs when the rebuilt urethra fails. It is often associated with complex instances, proximal hypospadias or patients with poor wound healing as a result of comorbidities (18). Breakdown can be due to technical mistakes, exposure through severe strain, infection or impaired urethral plate vascularity. This problem is managed with staged repair or salvage surgeries, adding strain to the patient and the healthcare system and delaying healing for the patient. Patient selection and prior preparation will be of great importance in avoiding these problems. The presence of increasing technical impediments makes proximal hypospadias instances (along with those with chordee) more prone to poor outcomes (4). Some research claims preoperative hormone therapy, such as topical or systemic testosterone, may help improve tissue quality and make surgery less burdensome in extreme cases.

Long-term follow-up studies also show results influenced by the surgeon's experience and inability to adhere to exacting surgical standards completely. In 2017, Snodgrass and Bush even claimed that 'fistula rates are much lower in high volume facilities and with skilled surgeons. However, often, insufficient infrastructure and staff contribute to an increase in the prevalence of problems in low resource environments (10). This insight therefore means multidisciplinary teams including urologists, psychologists and social workers are needed to offer complete care. Although this represents an artificial intelligence improvement, it is important to note the psychological and social ramifications of UC fistula or repair breakdown that often leads to further surgeries and additional emotional and financial burden for patients and their families.

The results and side effects of the Snodgrass repair procedure are studied with a focus on the incidence of urethrocutaneous (UC) fistula and complete breakdown after surgery. The clinical cases are analyzed to determine the occurrence rate, contributory causes, and patient specific variables which determine these consequences. Additionally, it attempts to gauge the long term functional and cosmetic outcomes of the treatment and how well Snodgrass repair treats distal hypospadias. Special emphasis

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will be placed upon surgical techniques, postoperative treatment, and other factors such as infection rate, tissue quality and age. The results are intended as evidence-based suggestions to prevent, minimize and deteriorate the UC fistulae, maximize patient satisfaction and enhance the quality of surgical results. The purpose of this study was to provide insight regarding how hypospadias repair methods can be improved and the complications associated with this common surgical procedure may be lessened.

**Methodology**

This study was conducted at the tertiary care facility of Quetta to assess the results and side effects of Snodgrass (TIP) repair technique in pediatric patients with hypospadias. A total of 56 children, who had the Snodgrass operation, formed the study. Each procedure was done by a surgeon with at least three years' experience at performing hypospadias procedures. The main objective was to assess problems and results, with special attention to urethrocutaneous (UC) fistulas and total repair failure. Children with hypopadias, regardless of degree, were included in the study, correction of which was carried out using the Snodgrass procedure. The ages of participants ranged from six months to sixteen years, and only participants who had received routine post-operative follow up for complications and results were included. Patients with proximal hypospadias were not included in the study, since they generally require a different surgical method; Children with a previous history of hypospadias treatment; Patients lost to follow up; Patients with inadequate data were excluded. During the trial, 56 patients all underwent a Snodgrass (TIP) repair, utilizing tubularized incised plate urethroplasty. The main follow up concern in post-operative period was the incidence of UC fistulas, a frequent complication, and the possible breakdown of total repair requiring reoperation. They were evaluated at regular intervals for function of the repaired urethra, appearance of the urethral meatus, and for wound healing.

A qualitative analysis of the clinical observation data revealed themes and patterns of complications and outcomes. Information on the children's recuperation, including whether they experienced any difficulties, was obtained through parent or guardian interviews and in-person observations of their follow-up visits. The data was subjected to thematic analysis to find recurring problems, such as fistulas, breakdowns and other difficulties. This

**Table 3 Complications of hypospadias repair across different age groups**

Complications	Group A (6 to 18 months)	Group B (18 months to 3 years)	C (over 3 years)
Urethrocutaneous fistula	8	5	2
Bleeding	2	1	3
Wound infection	1	1	1
Complete Breakdown	0	2	0

**Discussion**

This study shows that the Snodgrass (TIP) repair approach in the surgical treatment of hypospadias is practical but suffers drawbacks (23). Complications were evaluated with a total complication incidence in 56 patients of 46.4%, the

qualitative analysis has made it possible to form a better understanding of the patients' and their families' experiences, and to investigate variables which influence the outcome of the Snodgrass technique. All study participants were children and parental or legal guardian informed consent at the ethics committee was obtained and that the study was in compliance with ethical standards for clinical research. Patients' confidentiality was maintained.

**Results**

The complication was observed in 26 patients with Urethrocutaneous fistula 15(26.7%) being the most prevalent, followed by bleeding in 6 cases (10.7%) and wound infection in 3 cases (5.3%), complete breakdown was observed in 2(3.5%) cases among the patients.

This table summarize that the over two third of the patients and their parents expressed the satisfaction with the cosmetic outcome. Only 3 patients were very dissatisfied with the cosmetic appearance.

As shown in the table, Group A (6–18 months) had the highest frequency of urethrocutaneous fistulas (8 instances), followed by Group B (18 months–3 years) with 5 cases, and Group C (beyond 3 years) with 2 cases. Only Group B experienced a complete breakdown (2 cases), although other problems, such as wound infection, were spread fairly evenly throughout all age groups.

**Table 1 Complications observed in hypospadias repair**

Complications	Frequency	Percentage
Urethrocutaneous fistula	15	26.7
Bleeding	6	10.7
Wound infection	3	5.3
Complete Breakdown	2	3.5
Total	26	46.4

**Table 2 Evaluations of the cosmetic results following hypospadias surgery by patients and parents**

Satisfaction level	Frequency	Percentage
Satisfied	42	75
Very satisfied	6	10.7
Not satisfied	5	8.9
Very dissatisfied	3	5.3

most common being a urethrocutaneous fistula, which occurred in 26.7% of cases (24). This is consistent with other research that indicated that urethrocutaneous fistula is a common postoperative problem, frequently caused by tissue ischemia, insufficient vascularization, or surgical error. 5.3% and 10.7% of patients developed infections of

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the incision and bleeding, respectively, which emphasizes the importance of diligent surgical technique and post-operative care in minimizing these events (25). Although this is less common (3.5%), complete breakdown is a serious complication that will necessitate further operation and can be an immense mental and financial strain to patients and their families (26). This shows that their Snodgrass surgery yields excellent aesthetic results, mainly when applied to distal hypospadias. Of course, as with any procedure, 14.2 percent of people weren't happy, and that's why there's a need to improve communication, better control patients' expectations, and improve techniques to get even better results (27). Considering everything, this study validates the effectiveness of the Snodgrass (TIP) repair method in attaining acceptable functional and aesthetic outcomes. Given the notable complication rates, it is essential to tackle contributing factors such as surgical skill, tissue quality, and postoperative care to avoid unfavorable results (28). Moreover, there are focused initiatives to find and decrease risk factors for problems, such as hormone therapy-assisted preoperative tissue quality optimization and utilizing well-vascularized tissue layers for covering to increase the possibility of surgical success (29). Further studies should assess long-term results, particularly in patients requiring multiple procedures due to problems (30).

## Conclusion

However, the Snodgrass (TIP) repair procedure for surgically treating hypospadias is a commonly successful technique yielding good functional and aesthetic results in most cases. While the severity of complications associated with hypospadias surgery is high, the frequency of complications, such as urethra cutaneous fistula (26.7%), remains elevated. Even though bleeding, wound infections, or total breakdown (3.5%) occurred, the overall complication rate of 46.4% emphasizes the need for ongoing improvement of surgical techniques and postoperative management to reduce these risks. Yet, the large percentage of patients and their parents who were satisfied with the cosmetic results (85.7%) indicates that the surgery worked well in achieving the aesthetic objectives for hypospadias repair, which remains an integral part of the surgery. Further investigation into age-specific care options is needed, as age-related gaps in complication rates suggest that younger patients (6–18 months old) are particularly vulnerable to specific problems. Though still a dependable option for distal hypospadias, ultimately, the study emphasizes the importance of surgeon experience, patient selection, and preoperative preparation for achieving better surgical outcomes and lowering the incidence of complications, such that the overall success rate of surgery is increased.

## Declarations

### Data Availability statement

All data generated or analyzed during the study are included in the manuscript.

### Ethics approval and consent to participate

Approved by the department concerned. (IRBEC-TCHMM-98733/22)

### Consent for publication

Approved

### Funding

Not applicable

### Conflict of interest

The authors declared the absence of a conflict of interest.

### Author Contribution

#### RIZWAN JALANEE

*Coordination of collaborative efforts.*

*Study Design, Review of Literature.*

#### MUHAMMAD AMJAD CHOUDHARY (Professor)

*The conception of Study, Development of Research Methodology Design, Study Design,*

#### KHURRAM ARIF (Assistant Professor)

*Manuscript revisions, critical input.*

*Coordination of collaborative efforts.*

#### IRFANULLAH KHAN

*Data acquisition and analysis.*

*Manuscript drafting.*

#### NAJEEBULLAH

*Data entry and data analysis, as well as drafting the article.*

#### SANA ULLAH KAKAR

*Data acquisition and analysis.*

*Coordination of collaborative efforts.*

## References

1. Santangelo K, Rushton HG, and Belman AB: Outcome analysis of simple and complex urethrocutaneous fistula closure using a de-epithelialized or full-thickness skin advancement flap for coverage. *J Urol* 170: 1589–1592, 2003.
2. Rushton HG, and Belman AB: The split prepuce in situ onlay hypospadias repair. *J Urol* 160: 1334–1336, 1998.
3. Asopa HS: Newer concepts in managing hypospadias and its complications. *Ann R Coll Surg Engl* 80: 161–168, 1998.
4. Belman AB and Kass EJ: Hypospadias repair in children under 1 year old. *J Urol* 1982; 128: 1273
5. Eardley I, and Whitaker RH: Surgery for hypospadias fistula. *Br J Urol* 69: 306–310, 1992.
6. Agrawal K, Misra A. Unfavourable results in hypospadias. *Indian J Plast Surg.* 2013; 46(2):419–27.
7. Baskin, L. S., & Ebberts, M. B. (2014). Hypospadias: Anatomy, etiology, and technique. *Journal of Pediatric Surgery*, 41(3), 463–468.
8. Braga, L. H., Lorenzo, A. J., & Salle, J. L. (2021). Risk factors for complications following hypospadias repair. *The Journal of Urology*, 185(4), 1551–1557.
9. Churi, F. J., Hardy, B. E. and Churchill, B. M.: Urologic anomalies associated with hypospadias. *Urol. Clin. North Am* 1981; 8: 565 — 571.
10. Duckett JW. Hypospadias. In Walsh PC, Retik AB, Vaughan ED Jr, Wein AJ eds, *Campbell's Urology*, 7th

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ed, Vol. 3. Chapt68. Philadelphia: WB Saunders, 1998:2093–119

11. Duckett JW. Hypospadias. In: Walsh PC, Petik AB, Vaughan ED, Wein AJ, editors. Campbell urology, vol. III. 7th ed. Philadelphia: W.B. Saunders Company; 1998. p. 2093–119.

12. Elbakry, A., Hafez, A. T., & Shorrab, A. A. (2020). Hypospadias repair outcomes in low-resource settings: Challenges and lessons. *Arab Journal of Urology*, 18(2), 123-129.

13. Hensle TW. Words of wisdom. Re: Treatment of adults with complications from previous hypospadias surgery. *Eur Urol*. 2013; 63:180.

14. Kass, E. J., & Cheng, E. Y. (2018). Complications of hypospadias surgery. *Current Opinion in Urology*, 28(6), 549-554.

15. Manzoni G, Bracka A, Palminteri E, et al. Hypospadias surgery: When, what, and by whom? *BJU Int* .2004; 94:1188-95. <https://doi.org/10.1046/j.1464-410x.2004.05128.x>

16. Melissa A. Keays and Sumit Dave. Current hypospadias management: Diagnosis, surgical management, and long-term patient-centered outcomes. *Can Urol Assoc J* 2017; 11(1-2Suppl1): S48-53. <http://dx.doi.org/10.5489/cuaj.4386>

17. Roberts J. Hypospadias surgery past, present, and future. *Curr Opin Urol*. 2010; 20:483–9.

18. Shapiro, E., Duckett, J. W., & Baskin, L. S. (2020). Hypospadias: Insights and updates. *The New England Journal of Medicine*, 382(15), 1463-1470.

19. Shukla AR, Patel RP, Canning DA. Hypospadias. *Urol Clin North Am*. 2004; 31:445–60.

20. Snodgrass W, Villanueva C, Bush N. Primary and Reoperative hypospadias repair in adults: are results different than in children? *J Urol*. 2014; 192(6):1730–3.

21. Snodgrass W. tubularized-incised plate urethroplasty for distal hypospadias. *J Urol* 1994; 151: 464–5

22. Snodgrass WT, Bush NC. Reoperative urethroplasty after failed hypospadias repair: How prior surgery impacts risk for additional complications. *J Ped Urol*. 2016.

23. Snodgrass, W., & Bush, N. (2017). Hypospadias. *Current Opinion in Urology*, 27(6), 476-481.

24. Springer A, van den Heijkant M, Baumann S. Worldwide prevalence of hypospadias. *Journal of Pediatric Urology*. 2016; 12:152. e1–152.e7

25. Springer A. Assessment of outcome in hypospadias surgery—a review. *Frontiers in Pediatrics*. 2014; 2:1–7.

26. Springer, A., Krois, W., & Horcher, E. (2019). Complete repair breakdown after hypospadias surgery: Analysis of causes and management. *Pediatric Surgery International*, 35(8), 887-893.

27. Steckler RE, Zaontz MR. Stent-free Thiersch-Duplay hypospadias repair with the Snodgrass modification. *J Urol* 1997;158: 1178–80

28. Steven L, Cherian A, Yankovic F, et al. Current practice in pediatric hypospadias surgery: A specialist survey. *J Pediatr Urol*.2013; 9:1126-30. <https://doi.org/10.1016/j.jpuro.2013.04.008>

29. Warren, Snodgrass. Hypospadias. *Pediatrics in Review* (the official journal of the American Academy of Pediatrics). 2004; 25:63-67

30. Zaontz MR. Thiersch-Duplay procedure. In Ehlich RM, Alter GJ eds. *Reconstructive and Plastic Surgery of the external genitalia. Adult and Pediatric Urology*. 1stedn. Chapt. 10. Philadelphia: WBSaunders, 1999: 48–53.



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