



## General Surgery

## FUNCTIONAL OUTCOME OF TUBULARIZED INCISED PLATE REPAIR IN HYPOSPADIAS

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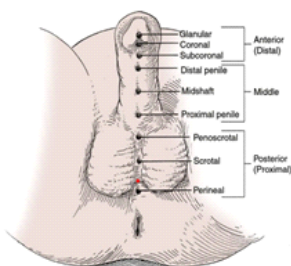
**ABSTRACT**

**Introduction** Tubularized Incised Plate Urethroplasty is an effective treatment because of its convenience and favorable cosmetic outcomes. The severity of hypospadias can vary, influencing the necessity and complexity of surgical repair. Surgical correction, often through "Tubularized Incised Plate urethroplasty," is recommended to restore normal urinary and sexual functions. **Objectives** This study evaluates the "Functional outcome of TIP urethroplasty in patients with distal and mid-penile hypospadias." **Methods** A quantitative, prospective, interventional, and longitudinal study was conducted at the Department of General Surgery, Dr. KNSMIMS, Barabanki, Uttar Pradesh, over 18 months. It included 30 patients aged below 18 years with distal penile and mid-penile hypospadias who underwent Tubularized incised plate urethroplasty." The Inclusion criteria were patients with distal penile and mid-penile hypospadias with follow-up for at least one year. Pre-operative assessments included history, physical, and local examinations, which evaluated "hypospadias type, chordee presence, penile length, meatal condition, glans shape, and urethral plate width". Tubularized incised plate urethroplasty was performed on all patients. Intraoperative evaluations focused on chordee correction. The presence of complications such as "urethrocutaneous fistula, meatal stenosis, urethral stricture, urethral diverticulum, glans dehiscence, and wound dehiscence" was also documented. **Results** TIP urethroplasty effectively improves functional and cosmetic outcomes in patients with distal penile and mid-penile hypospadias, with high satisfaction rates observed at one year. However, nearly half of the patients encountered complications, highlighting the need for meticulous surgical planning and enhanced post-operative management. **Discussion** The results demonstrate that TIP urethroplasty provides satisfactory functional and cosmetic outcomes for hypospadias repair. Most patients achieved normal urination. However, the occurrence of complications need to properly monitor patients' post-surgery. **Conclusion** TIP urethroplasty is effective in repairing distal and mid-penile hypospadias, yielding high patient satisfaction and acceptable complication rates. Further studies with larger sample sizes and longer follow-ups are recommended to validate these findings and explore long-term functional outcomes. Future research should focus on reducing problems and enhancing long-term results by developing more advanced surgical procedures and implementing thorough pre-operative and post-operative care.

**KEYWORDS :****INTRODUCTION**

Approximately 1 in 250 male newborns are affected with hypospadias, making it the second most prevalent genital anomaly after undescended testes. [1] "Hypospadias is defined by the presence of one or more of the three abnormalities that are associated with it, which are as follows: (1) ectopic urethral meatus; (2) chordee (penile curvature); and (3) ventral foreskin deficiency." [2,3] Prenatal diagnosis is feasible, and almost all patients are identified during a well-baby check after delivery. [4]. "Hypospadias is the second most common birth defect in male newborns, after undescended testis. [5] The urethral opening shifts to the underside of the penis as a result of the insufficient sealing of penile tissues throughout embryonic development. [6] A common classification for hypospadias is anterior, mid-penile, or posterior, depending on where the urethral opening was located before surgery." [7]. "Duckett suggested the predominant classification, where around 70% of hypospadias cases are categorized as either glanular or distally placed on the penis, which is regarded to be the mild type. The remaining cases are categorized as more complicated and severe." [8]

Classification of hypospadias "This classification includes three main positions: distal (found 60–65% of cases), mid-penile (found in 20–30% of instances), and proximal (found in 10-15% of cases)." [9]



**Figure 1:** "Classification of hypospadias according to the location of the urethral opening and divided into distal, midshaft, and proximal hypospadias." [11]

[Source: Christopher J. Long. Hypospadias; in Campbell Walsh Wein Urology) (Twelfth Edition). (Elsevier Health Sciences, 2020, page 4051.]

Severe hypospadias may appear as unusual genitalia, which requires further investigation to determine whether it is a problem of sex development. [10] However the exact cause is often not clear, it is widely assumed that a mix of environmental and hereditary variables contribute to its onset. These factors may include hormone irregularities that occur during pregnancy or interactions with certain drugs.

Hypospadias is a common birth defect that is corrected by surgical intervention at an early age. Approximately 250 surgical operations have been published, with a focus on attaining favorable functional and cosmetic outcomes as the main objectives of the surgery. Treatment for hypospadias usually involves surgical correction; the ideally preferred timing is six months to one year of age. The technique of surgery requires relocating the urethral opening to the point of the glans, replacing the foreskin when needed, and ensuring the child passes urine without hesitation and sexual functioning throughout his development. The choice of surgical procedure for hypospadias depends on factors such as the extent and place of the hypospadias, in addition to the surgeon's experience and choices.

**OBJECTIVES**

This study evaluates the "Functional outcome of TIP urethroplasty in patients with distal and mid-penile hypospadias."

**MATERIALS AND METHODS**

A quantitative, prospective, interventional, and longitudinal study was

conducted at the Department of General Surgery, Dr. KNS Memorial Institute of Medical Sciences, Barabanki, Uttar Pradesh, over 18 months. It included 30 patients aged below 18 years with distal penile and mid-penile hypospadias who underwent "TIP (Tubularized incised plate) urethroplasty." The Inclusion criteria were patients with distal penile and mid-penile hypospadias with follow-up for at least one year. Exclusion criteria were refusal of consent, incomplete data, abnormal bladder function or upper urinary tract abnormalities, patients with penoscrotal hypospadias, and age over 18 years. After taking informed written consent to participate in the study titled "Functional Outcomes of TIP (Tubularized incised plate) repair in hypospadias", The study was include cases that meet the aforementioned criteria, as well as those that undergo a general physical examination, local examination, and history recording. Pre-operative assessments included history, physical, and local examinations, which evaluated "hypospadias type, chordee presence, penile length, meatal condition, glans shape, and urethral plate width". TIP urethroplasty was performed on all patients. Intraoperative evaluations focused on chordee correction. Post-operative assessments at immediate post-operation, six months, and one year included functional outcomes (urinary stream type, post-void dribbling, straining of the initiation of urine, and spraying during micturition) and cosmetic appearance using the Penile Perception Score (PPS). The presence of complications such as "urethrocutaneous fistula, meatal stenosis, urethral stricture, urethral diverticulum, glans dehiscence, and wound dehiscence" was also documented.

## RESULTS

**Table 1:** Distribution of Patients according to Chief Complaints.

| Chief complaints                               | Frequency | Percentage |
|------------------------------------------------|-----------|------------|
| Deviated urine stream                          | 6         | 20.00%     |
| Difficulty in micturition in standing position | 2         | 6.67%      |
| Thinning of the urine stream                   | 9         | 30.00%     |
| Abnormal splayed of urine                      | 13        | 43.33%     |
| Total                                          | 30        | 100.00     |

Table 1 present the primary urinary complaints reported by the patients before undergoing TIP repair. These data indicate that issues with the urine stream, particularly abnormal splaying and thinning of the urine stream, are the predominant concerns among the patients. These complaints indicate the functional difficulties associated with hypospadias, underscoring the importance of surgical intervention to alleviate these symptoms.

**Table 2:** Distribution based on preoperative evaluations.

| Preoperative evaluation |               | Frequency | Percentage |
|-------------------------|---------------|-----------|------------|
| Type                    | Mid penile    | 6         | 20.00%     |
|                         | Distal penile | 24        | 80.00%     |
| Chordee                 | Present       | 17        | 56.67%     |
|                         | Absent        | 13        | 43.33%     |
| Meatus                  | Normal        | 21        | 70.00%     |
|                         | Stenosed      | 9         | 30.00%     |
| Glans                   | Flat          | 8         | 26.67%     |
|                         | Conical       | 22        | 73.33%     |
| Urethral plate          | <8 mm         | 11        | 36.67%     |
|                         | >10 mm        | 19        | 63.33%     |

These data suggest that distal penile type, conical glans, and a urethral plate wider than 10 mm are predominant features in the sample, with chordee and meatus stenosis also notable conditions. This comprehensive preoperative evaluation helps in planning the surgical approach.

**Table 3:** Distribution based on Intraoperative Evaluation: – Gitte Test (Corrected After Degloving).

| Chordae correction            | Frequency | Percentage |
|-------------------------------|-----------|------------|
| Corrected                     | 11        | 36.7%      |
| Residual chordee (<10 degree) | 6         | 20%        |
| No chordae                    | 13        | 43.3%      |
| Total                         | 30        | 100%       |

Table 3 outlines the intraoperative findings related to chordee correction. These findings are critical as they reflect the surgical adjustments made to correct penile curvature, an essential step in achieving optimal functional and cosmetic outcomes.

**Table 4:** Post-operative functional outcome – Micturition

| Micturition                      | Frequency | Percentage |
|----------------------------------|-----------|------------|
| Single stream                    | 16        | 53.3%      |
| Multiple streams                 | 5         | 16.7%      |
| Post void dribbling              | 6         | 20.0%      |
| Spraying during micturition      | 1         | 3.3%       |
| Straining of initiation of urine | 2         | 6.7%       |
| Total                            | 30        | 100.0%     |

Table 4 assesses the functional outcomes of micturition following TIP repair. These varied outcomes highlight the range of functional improvements and residual issues following surgery.

**Table 5:** Penile perception score (PPS): Immediate

| PPS                                    | Very satisfied | Satisfied | Dis-satisfied | Verydis-satisfied | P value |
|----------------------------------------|----------------|-----------|---------------|-------------------|---------|
| Penile Length                          | 11             | 17        | 2             | 0                 | 0.0001* |
| Position and shape of urethral opening | 10             | 19        | 1             | 0                 | 0.0001* |
| Shape of glans                         | 5              | 25        | 0             | 0                 | 0.0001* |
| Shape of penile skin                   | 6              | 19        | 5             | 0                 | 0.0001* |
| Penile axis                            | 3              | 26        | 1             | 0                 | 0.0001* |
| The general appearance of penis        | 6              | 12        | 12            | 0                 | 0.0001* |

In table 5 shape of the glans is satisfactory for all 30 patients, while the shape of the penile skin and penile axis also show high satisfaction rates. These scores indicate overall positive immediate cosmetic results.

**Table 6:** Penile perception score: After 6 months

| PPS                                    | Very satisfied | Satisfied | Dissatisfied | Very dissatisfied | P value |
|----------------------------------------|----------------|-----------|--------------|-------------------|---------|
| Penile Length                          | 11             | 17        | 2            | 0                 | 0.0001* |
| Position and shape of urethral opening | 12             | 17        | 1            | 0                 | 0.0001* |
| Shape of glans                         | 7              | 23        | 0            | 0                 | 0.0001* |
| Shape of penile skin                   | 7              | 18        | 5            | 0                 | 0.0001* |
| Penile axis                            | 3              | 26        | 1            | 0                 | 0.0001* |
| General appearance of penis            | 9              | 13        | 8            | 0                 | 0.0001* |

In table 6 the shape of the glans is satisfactory for all 30 patients. Satisfaction with the shape of penile skin, penile axis, and general penile appearance is also sustained, demonstrating long-term positive outcomes.

**Table 7:** Penile perception score: After 1 year.

|                                        | Very satisfied | Satisfied | Dissatisfied | Very dissatisfied | P value |
|----------------------------------------|----------------|-----------|--------------|-------------------|---------|
| Penile Length                          | 11             | 17        | 2            | 0                 | 0.0001* |
| Position and shape of urethral opening | 12             | 17        | 1            | 0                 | 0.0001* |
| Shape of glans                         | 8              | 22        | 0            | 0                 | 0.0001* |

|                             |    |    |   |   |         |
|-----------------------------|----|----|---|---|---------|
| Shape of penile skin        | 9  | 17 | 4 | 0 | 0.0001* |
| Penile axis                 | 3  | 26 | 1 | 0 | 0.0001* |
| General appearance of penis | 12 | 10 | 8 | 0 | 0.0001* |

Table 7 show that after one year, the satisfaction scores are consistent with earlier follow-up periods. The results suggest that while most patients maintain high satisfaction, some dissatisfaction with the general appearance of the penis is due to postoperative complications.

**Table 8:** Complications occur in post-operative patients of Hypospadias.

| Complications | Frequency | Percentage (%) |
|---------------|-----------|----------------|
| No            | 16        | 53.3           |
| Yes           | 14        | 46.7           |
| Total         | 30        | 100            |

Table 8 provide data on postoperative complications following hypospadias treatment among 30 patients. This distribution underscores the critical need for meticulous surgical planning and postoperative management to minimise complications and improve outcomes in hypospadias treatment.

**Table 9:** Complications based on Age.

| Age             | Frequency | Percentage |
|-----------------|-----------|------------|
| <5 years        | 3         | 10.0%      |
| 5 – 10 years    | 10        | 33.33%     |
| >10 – 18 years  | 1         | 3.33%      |
| No complication | 16        | 53.33%     |
| Total           | 30        | 100%       |

Table 8 examine postoperative complications according to age groups. This distribution indicates that complications are relatively uncommon, but they are more frequent in the age group 5-10 year.

**Table 9:** Distribution based on postoperative complication.

| Postoperative complication | Frequency | Percentage |
|----------------------------|-----------|------------|
| Urethrocutaneous fistula   | 4         | 13.3%      |
| Meatal stenosis            | 1         | 3.3%       |
| Urethral stricture         | 1         | 3.3%       |
| Urethral diverticulum      | 0         | 0.0%       |
| Glans dehiscence           | 4         | 13.3%      |
| Wound dehiscence           | 4         | 13.3%      |
| No complication            | 16        | 53.3%      |

Table 9 shows lists of specific complications following surgery. Urethrocutaneous fistula, glans dehiscence, and wound dehiscence. A significant portion, 53.3% (16 patients), did not experience any complications, suggesting that while some specific complications do occur, the majority of patients have a complication-free recovery.

## DISCUSSION

The chief complaints of patients highlight the functional impairments caused by hypospadias. These findings underscore the importance of timely surgical intervention to correct these urinary issues, improving the patient's quality of life. Effective correction of these symptoms is a primary goal of TIP repair, as highlighted in various studies, including those by Kambouri et al. [10]. (2020), which emphasizes functional as well as cosmetic outcomes.

The preoperative evaluation provides a detailed overview of the anatomical variations and complexities associated with hypospadias. These findings align with the observations of Belal et al.[56] (2018), who also found a high prevalence of distal penile hypospadias and significant rates of chordee. Kambouri et al.[10] (2020) also reported similar preoperative profiles, indicating a commonality in the presentation of hypospadias across different populations.

Intraoperative findings are critical for understanding the immediate challenges faced during surgery. The Gitte test, used to assess the adequacy of chordee correction, showed that a significant proportion of patients required intraoperative adjustments. Adnan et al.[11] (2022) emphasized the importance of achieving tension-free tubularization and adequate chordee correction for successful outcomes. The intraoperative use of techniques like the Gitte test

ensures that the surgical corrections are effective and durable. The findings underscore the complexity of hypospadias repair and the necessity for meticulous surgical planning and execution.

Postoperative micturition outcomes are a critical measure of the success of hypospadias repair. These outcomes are consistent with those reported by Mahmud et al. [11] (2023), where similar functional improvements were noted. The variation in postoperative outcomes highlights the need for continued follow-up and possibly additional interventions for some patients. The goal of TIP repair is to normalise urinary function, and while the majority of patients achieve this, a significant minority may require further treatment to address residual issues.

Immediate postoperative satisfaction is a key indicator of surgical success. "This study found that most patients were either very satisfied or satisfied with the penile length, position, and shape of the urethral opening, the shape of the glans, penile skin, and penile axis." Adnan et al.[10] (2022) also reported high immediate satisfaction rates following TIP urethroplasty with a dorsal flap, emphasizing the importance of achieving good cosmetic results immediately post-surgery.

Immediate satisfaction can significantly impact the patient's and family's perception of the success of the surgery and is crucial for the overall acceptance of the surgical intervention.

Six months postoperatively, patient satisfaction remained high. This study found that most patients continued to be very satisfied or satisfied with various aspects of penile appearance. Kambouri et al. [10] (2020) reported similar sustained satisfaction levels at six months, indicating that the positive outcomes of TIP urethroplasty are maintained over time. This sustained satisfaction is crucial as it reflects the long-term stability of the surgical outcomes and suggests that the benefits of the surgery extend well beyond the immediate postoperative period.

One year after surgery, the satisfaction scores remained consistent, though a slight increase in dissatisfaction with the general appearance of the penis was noted. This slight decrease over time is consistent with the findings of Mahmud et al.[11] (2023), who observed minor aesthetic concerns in some patients during long-term follow-up. Overall, the sustained high satisfaction rates demonstrate the long-term effectiveness of TIP urethroplasty but also highlight the importance of addressing any emerging concerns to maintain high satisfaction levels.

Postoperative complications varied by age, with younger patients (<5 years) having a lower complication rate (10%) compared to those aged 5-10 years (33.3%). Belal et al.[12] (2018) also found fewer complications in younger children, suggesting that early surgery might be associated with better outcomes.

The reasons for higher complication rates in older children could include increased physical activity and different healing responses. This age-related variation in complications underscores the need for tailored postoperative care and monitoring based on the patient's age. The study identified urethrocutaneous fistula, glans dehiscence, and wound dehiscence as the most common postoperative complications, each occurring in 13.3% of patients. Meatal stenosis and urethral stricture were less common, affecting 3.3% of patients each. Mahmud et al.[11](2023) reported similar complication rates, highlighting the common challenges in hypospadias repair.

The relatively low overall complication rate (53.3% of patients experienced no complications) supports the safety and effectiveness of TIP urethroplasty. However, these findings also emphasise the need for vigilant postoperative care to address any complications that arise promptly.

## CONCLUSION

The findings of our study indicate that patients who have received hypospadias correction exhibit satisfactory cosmetic, functional, and surgical outcomes. It is necessary to do more extensive research including many centers to evaluate both sexual outcomes and patient self-assessment to have a more comprehensive picture of the results of hypospadias repair.

Future research should focus on identifying strategies to minimize

complications and improve long-term outcomes. Additionally, comprehensive pre-operative counseling and post-operative support can help manage patient and parent expectations, thereby enhancing overall satisfaction with the surgical outcomes.

In summary, TIP urethroplasty remains a robust surgical technique for hypospadias repair, yielding consistent and favorable long-term results. Continuous efforts to optimize surgical protocols and post-operative care are essential in further improving the quality of life for individuals affected by hypospadias.

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