Journal of Neonatal Surgery
ISSN(Online): 2226-0439
Vol. 14, Issue 25s (2025)
https://www.jneonatalsurg.com

OPEN ACCESS

Tip Hypospadias Repair: A Retrospective Review of The Factors Associated with Positive Surgical Outcomes

Dr. Sanjay P Dhangar[1], Dr. Shams Iqbal[2], Dr. Sonu K Plash[3], Dr. Shashank Patil[4]*, Dr. Sachin Patil[5], Dr. Ketan Vartak[6]

[1-6]Department of Urology, Bharati Hospital and Research Centre, BVDTU, Pune-411043, Maharashtra, India

***Corresponding Author:**

Dr. Shashank Patil,

Assistant Professor, Bharati Hospital and Research Centre, BVDTU, Pune-411043, Maharashtra, India. Email ID: drspdhangar@gmail.com

Orchid ID: https://orcid.org/0000-0002-0932-9414

Cite this paper as: Dr. Sanjay P Dhangar, Dr. Shams Iqbal, Dr. Sonu K Plash, Dr. Shashank Patil, Dr. Sachin Patil, Dr. Ketan Vartak, (2025) Tip Hypospadias Repair: A Retrospective Review of The Factors Associated with Positive Surgical Outcomes *Journal of Neonatal Surgery*, 14 (25s), 44-50

ABSTRACT

Introduction

Hypospadias is a congenital anomaly commonly in males. In India, according to 2011 census, the incidence of hypospadias is around one in 150 to one in 300 males child birth. Western countries have distal hypospadias as the most common variety, whereas in Asian countries the proximal varieties are more common. The total number of documented variations exceed 200. The tubularised incised plate (TIP) urethroplasty technique has gained widespread recognition and adoption following its popularization by Snodgrass in 1994. This manuscript aims to provide a comprehensive overview of the current state of the TIP technique for the repair of coronal, distal, mid and proximal penile hypospadias.

Materials and Methods

This study reviewed all the TIP hypospadias repairs done from August 2016 to July 2022 in the department of urology at a tertiary hospital. All the children upto thirteen years of age with coronal, distal, mid and proximal penile hypospadias were included in the study. We collected the demographic data alongwith the type of hypospadias, outcome of the surgery and the complications.

Results

The mean age of patient for hypospadias in our study was 1.6 years with a range from 11 months to 13 years. The most common hypospadias type was distal penile variety (75%). Urethra-cutaneous fistula occurred in 6.25 percent cases, meatal stenosis in 3.75 percent cases and stricture urethra at the site of the original meatus proximally in 1.25 percent cases. Patient factors that positively affect the surgical outcome were early age of repair, stretched penile length of 3.8 ± 0.9 cm, urethral plate width of 9.8 ± 1.8 mm. Distal location of the meatus with deep groove of the glans without chordee were favourable factors that were statistically significant (p-value of <0.05).

Conclusion

The tubularised incised plate urethroplasty technique proposed by Snodgrass stands tall for distal, mid as well as proximal hypospadias, provided the age at the time of surgery, stretched penile length, width of the urethral plate, location of the meatus, deep glans groove and absent chordee were taken care and evaluated before surgery..

Keywords: *Snodgrass repair, TIP repair, hypospadias repair, distal hypospadias, technique of hypospadias repair*.

1. INTRODUCTION

Hypospadias is a congenital anomaly commonly in males, with a reported incidence of approximately 18.6 cases per 10,000 live births within Europe (1). In India, according to 2011 census, the incidence of hypospadias is around one in 150 to one in 300 males child birth (4). Western countries have distal hypospadias as the most common variety, whereas in Asian countries the proximal varieties are more common. (3,4) The incidence of female hypospadias is further rare with an

incidence of one in 5,00,000 female births (3). It is characterized by a triad of a urethral meatus on the ventral aspect of the penis anywhere proximal to the glans to the perineum, a ventral curvature of the shaft of penis, known as chordee, and a foreskin which is incompletely formed dorsally and present as a hood (1,5). The spectrum of severity in hypospadias varies from the cosmetic appearance to the functional capacity of the penis in the form of voiding problems and the sexual problems in later life. The objectives that guide the surgical repair of hypospadias are multifaceted, encompassing the anatomical reconstruction of the penis to its appropriate length, the relocation of the urethral meatus to the tip of the glans, and the effective correction of any coexisting penile chordee. Ultimately, the goal of all the interventions is to achieve both a normal aesthetic appearance of the penis and unimpaired urinary and sexual function. Over the years, a multitude of surgical techniques have been developed and described for the correction of hypospadias. The total number of documented variations exceed 200 (5,6). Among these, the tubularised incised plate (TIP) urethroplasty technique has gained widespread recognition and adoption following its popularization by Snodgrass in 1994 (7), and has emerged as a cornerstone in the surgical management, particularly for cases involving distal and mid-penile hypospadias (8) and in some cases proximal hypospadias. The TIP technique is often favoured by surgeons due to its perceived versatility, relative ease of execution, and the generally favourable cosmetic outcomes it achieves.

This manuscript aims to provide a comprehensive overview of the current state of the TIP technique for the repair of coronal, distal, mid and proximal penile hypospadias. The specific objectives include: to analyze the outcomes of the TIP technique, including both the rates of surgical success and the incidence of postoperative complications and the factors associated with positive surgical outcomes.

2. MATERIALS AND METHODS

This study reviewed all the TIP hypospadias repairs done from August 2016 to July 2022 in the department of urology at a tertiary hospital, SMBT Institute of Medical Sciences and Research Centre, Nashik, Maharashtra, India. All the children upto thirteen years of age with coronal, distal, mid and proximal penile hypospadias were included in the study. All patients with proximal hypospadias and with severe chordee and those needed two stage repairs were excluded from the study. We collected the demographic data alongwith the type of hypospadias, outcome of the surgery and the complications.

Surgical technique

All patients were given general anaesthesia with supplemented by the caudal block. The surgical repair was done with the patients in supine position. Prior marking of the incision with sterile marker was done, which included marking alongside the urethral plate, with of 6-9 mm as per the width of the native urethral plate, encompassing the meatus and continuing circumcoronal 8-10 mm below the coronal sulcus. This helps avoid too close suture line near the glans during final suturing. A stay suture was taken on the dorsal glans to handle penis during the surgery. This was followed by the degloving of the penis. This was followed by the Gitte's test to look for any chordee. Dorsal plication was needed in patients with >30° chordee, as suggested by Snodgrass. Then, a vertical incision extending from the posterior part of the hypospadiac meatus to the glans tip was made. This was followed by the tubularisation of the urethral plate over 8/10/12 Fr silicon catheter as per the age of the patient, to form the neourethra. After reaching the glanular level, glans wings were made after applying pressure at the base of the penis to reduce the bleeding. The glanular neourethra was then made with approximation of the glans with mattress sutures, with distal part suturing done in continuous fashion with the neourethra. This was followed by the prepucioplasty and final skin closure with an intervening layer between the neourethra and the skin avoiding overlapping of the suture lines. We used 5-0/6-0 polydioxanone suture for the neourethra and 4-0/5-0 polydioxanone for the prepucioplasty and the penile skin closure as per the age of the patients. The catheter was fixed with prolene 3-0 suture to the glans suture taken initially. A conical glans with oval slit like meatus at the end of the surgery was the aim.

All the patients were given paracetamol for pain post-operatively. We followed the protocol of dressing and catheter removal as learned from Professor Asopa HS. The first dressing was done on 5th post-operative day, after which the patients were discharged. They recalled in the outpatient department for 2nd and 3rd dressing on 10th and 14 post-operative day. The catheter was removed on 14th post-operative day routinely, but in few cases, it was removed early on the decision of the operating surgeon. The stream of urine after catheter removal was noted. Further follow-up was advised after 15 days and then every 3 months for the first year followed by yearly follow-up. the minimum follow-up in the study was two years.

Statistical analysis

The patient and surgical data was collected and recorded in an excel sheet. It was then processed using the SPSS software version 21 for the data analysis. Descriptive statistical analysis was done after getting the demographic, peri-operative and follow-up data records. Percentages and frequencies describe the qualitative data. A p-value of less than 0.05 was considered significant.

3. RESULTS

The mean age of patient for hypospadias in our study was 1.6 years with a range from 11 months to 13 years. The most common hypospadias type was distal penile variety and rest as shown in table 1. We were able to achieve neo-urethral

reconstruction with wide normal looking meatus at the tip of the glans in all the patients. After degloving with or without chordee release where needed, we were able to create a mean urethral length of 3.2 cm with a range from 1.4 to 5.8 cm.

Table1: Demographic data of the patients and follow up period

Parameters	**Mean± SD/Number**	**Percentag**
Age (years)	1.6 ± 0.5	
Weight (kg)	13.1 ± 3.1	
Stretched penile length (cm)	3.7 ± 0.9	
Urethral plate width (mm)	9.6 ± 1.6	
Meatus	**Number**	
Coronal	45	28.12
Distal penile	75	46.87
Mid-penile	24	15
Proximal penile	16	10
Glans groove		
Deep	128	80
Shallow	32	20
Chordee		
Absent	101	63.12
<30’	49	30.62
>30’	10	6.25
Torsion		
Absent	146	91.25
<30’	14	8.75
Follow up period (months)	Minimum	Maximum
	12	96

The most common complication (Table 2) was catheter symptoms with or without catheter blockage in ten percent of the patients. Overall complication rate was 20.62% in the study. Urethra-cutaneous fistula occurred in 6.25 percent cases, meatal stenosis in 3.75 percent cases and stricture urethra at the site of the original meatus proximally in 1.25 percent cases. Urethra-cutaneous fistula and stricture urethra patients were re-operated after 6 months and meatal stenosis patients were managed with regular and serial meatal dilatation only. Two patients had penile torsion post-operatively. Among these, one was minor and managed conservatively and the other was managed with degloving after 6 months of the first surgery.

Table 2: Complication rates among 160 patients operated for hypospadias

Type of complication	Number	Percentage
Urethro-cutaneous fistula	10	6.25
Meatal stenosis	6	3.75

Stricture urethra	2	1.25
Penile torsion	2	1.25
Glans dehiscence	3	1.87
Wound infection	7	4.37
Catheter symptoms	16	10.0
Total	33	20.62

Patient factors that positively affect the surgical outcome were early age of repair, stretched penile length of 3.8 ± 0.9 cm, urethral plate width of 9.8 ± 1.8 mm. Distal location of the meatus with deep groove of the glans without chordee were favourable factors that were statistically significant (p-value of <0.05) in our study (Table 3).

Table 3: Significance between patient factors and successful surgery outcomes

Variables	**Successful outcome patients**	**p-value**
Age (years)	1.5 ± 0.7	<0.05
Weight (kg)	13.2 ± 3.2	>0.05
Stretched penile length (cm)	3.8 ± 0.9	<0.05
Urethral plate width (mm)	9.8 ± 1.8	<0.05
Meatus		
Coronal	44 (27.5%)	<0.05
Distal penile	70 (43.75%)	<0.05
Mid-penile	20 (12.5%)	>0.05
Proximal penile	11 (6.87%)	>0.05
Glans groove		
Deep	118 (73.75%)	<0.05
Shallow	27 (16.87%)	>0.05
Chordee		
Absent	93 (58.12%)	<0.05
<30’	44 (27.5%)	>0.05
>30’	8 (5.0%)	>0.05
Torsion		
Absent	133	>0.05
<30’	12	>0.05

4. DISCUSSION

Hypospadias surgery is the most challenging reconstructive surgery among the field of urologic reconstruction surgeries. The concept of addressing hypospadias through the tubularization of the urethral plate has historical roots. Thiersch in 1869 and Duplay in 1874 described their techniques that laid the foundational principles for utilizing the urethral plate in hypospadias repair. Orkiszewski also described a similar surgical approach in 1987. Finally, Snodgrass was the person who popularized the tubularised incised plate (TIP) technique in 1994. He introduced the key modification of performing a midline incision on the urethral plate, which allowed for a tension-free tubularization of the plate to form the neourethra.

This innovation represented a significant step forward in the surgical management of hypospadias, contributing to improved functional and cosmetic outcomes.

Distal hypospadias (50-70%) represent the most common type of the hypospadias variety among the various varieties of hypospadias (9). In our study 75% of the cases were distal hypospadias type (coronal + distal). As the hypospadiac meatus goes proximally, the success of repair also goes in the reverse direction. This means that the surgical repair becomes complicated with more chances of complications. For distal hypospadias varieties, MAGPI and the Snodgrass techniques are considered more reliable and are done by most surgeons practicing the art of hypospadias repair (10). We also used the Snodgrass repair technique in the current study. Many hypospadias varieties are associated with chordee. Correction of this chordee is important to straighten the penis and to form the neourethra. We had chordee in 32.5% of the cases. Most of the chordee (<30°) were corrected (27.5%) after degloving the penis during initial phase of the surgery. Patients with >30° of the chordee (5%) needed dorsal plication, as described by Snodgrass (11).

One important step and concept in preventing the formation of fistula after the Snodgrass hypospadias repair is the introduction of an interposition layer between the newly formed urethra and the final skin closure. We used the dorsal prepuce alongwith the dartos in our study. We had fistula formation in 6.25% of the cases and penile torsion in 1.25% of the cases. Radi Alsharbaini et al had a fistula rate of 5.2% and torsion in 7.8% of the cases in their study (12). Fathi et al had a fistula rate of 33.3% in their study (13). Braga LH et al in their meta review reported 5.9% mean fistula rate (14).

In our study, we did complete degloving of the penis upto the peno-scrotal junction in all the cases. This prevented chordee as well as the torsion of the penis and allowed to perform the Gitte's test successfully. Selami and Warren also did the same in their patients and had good results (15). The glans dehiscence rate in our study was 1.87% while Fathi et al had no glanular dehiscence in their study (13). Elbakry A et al reported the glanular dehiscence rate of one percent in their study (16).

Stretched penile length of the patient before the surgery is an important factor for the final surgical outcome with respect to the cosmetic appearance and the function. We had stretched penile length of more than 3.6 cm in our study, which was statistically significant for the successful outcome. Abdelhalim et al also had similar significant positive results in their study (17).

3.75% cases had meatal stenosis in our study. Snodgrass and Wilkinson reported a similar meatal stenosis in their studies (18,19), while Braga LH et al reported meatal stenosis with a range from 0-17% in their meta review (14). Elbakry A et al reported the mean meatal stenosis rate of 3.6% in their study (16). In our study, we had stricture formation in the proximal part of the neourethra in 1.25% cases. Abdelhalim et al reported 3% stricture rate in their study (17). Elicevik et al and Yildiz et al reported a stricture rate of 0.8% and 0.7% in their case series (20,21).

The overall complication rate in our study was 20.62%, excluding the catheter symptoms, the rate comes down to 10.62%. Fathi et al reported a complication rate of 24% in TIP repair in their study (13). Snodgrass et al reported 0-17%, Xu et al reported 18.1%, and Asmal et al reported 7% complication rates in their studies (22,23,24).

Age at the time of surgery, stretched penile length, width of the urethral plate, location of the meatus, deep glans groove and absent chordee were the statistically significant factors that have a favourable surgical outcome. As suggested by European Association of Urology 2025 guidelines (25), the age for primary repair of hypospadias is 6 months to 18 months. In our study the mean age of surgical repair was 1.6 ± 0.5 years. Abdelhalim et al in their study operated children with a mean age of 3.5 ± 1.5 years (17). Ozmen et al operated children at the mean age of 8.58 (±8.3) in their study, but this mean age was reduced to 7.84 (±7.3) in the successful cases (26). We also had a reduced mean age of 1.5 ± 0.7 years in successful cases in our study.

The width of the urethral plate is very important parameter for the success of the hypospadias surgery. We had a good success with a urethral plate width of 9.8 ± 1.8 mm. Abbas et al suggested that for good outcome of TIP repair the urethral plate width should be more than 6 mm (27). Zhang et al suggested that the quality of the urethral plate is an independent and important factor that affect the surgical outcome of hypospadias surgery (28). Abdelhalim also suggested that a plate width of >9mm is good for healing after hypospadias surgery (17). In our study, deep glans groove was associated with a successful outcome. Karabulut et al in 2022 suggested that glans width of <14 mm affects the glanular dehiscence (29).

Any form of torsion preoperatively in a patient of hypospadias does not affect the surgical outcome. Even >30° of torsion preoperatively, 8.75% cases in our study, had a successful outcome. Bhat et al and Abdelhalim et al also suggested in their studies that penile torsion does not have any relation with post-operative outcome in TIP hypospadias surgery (30,17).

The limitations of our study were a smaller sample size, retrospective nature, absence of long-term outcome assessment of function, sexual response and cosmesis. The surgeon's experience and the role of pre-operative hormonal therapy were not taken care. Duration of the per urethral catheterisation was also not taken into consideration as the catheter was removed as per the decision of the surgeon irrespective of the duration of the catheterisation.

Despite all these limitations, our study provides highlights into long-term success of tubularised incised plate urethroplasty technique. The strength of the study lies in the longest follow up of 96 months and consistency of use of the tubularised

incised plate urethroplasty technique for even proximal hypospadias varieties. All this clearly stand aloud and correlate with other studies with same limitations and contribute to further enhance the encyclopaedia of hypospadias surgery.

5. CONCLUSION

The tubularised incised plate urethroplasty technique proposed by Snodgrass stands tall for distal, mid as well as proximal hypospadias, provided the age at the time of surgery, stretched penile length, width of the urethral plate, location of the meatus, deep glans groove and absent chordee were taken care and evaluated before surgery. The budding urologists should try to learn at least the TIP repair technique during their initial days followed by further redefining of their skills in due course of their practice.

Acknowledgements: None

Declarations: None

Conflicts of interest : Nil

Financial support : Nil

REFERENCES

[1] Halaseh, S.A.; Halaseh, S.; Ashour, M. Hypospadias: A Comprehensive Review Including Its Embryology, Etiology and Surgical Techniques. Cureus 2022, 14, e27544.

[2] https://www.hypospadiasfoundation.com/hypospadias-surgery-in-india/

[3] Rekha Choudhary, Suniti Verma, Gautam Ram Choudhary. Journal of South Asian Federation of Obstetrics and Gynaecology, September-December 2011;3(3):155-156.

[4] Ceccarelli, P. L.; Lucaccioni, L.; Poluzzi, F.; Bianchini, A.; Biondini, D.; Iughetti, L.; Predieri, B. Hypospadias: Clinical approach, surgical technique and long-term outcome. BMC Pediatr. 2021, 21, 523.

[5] Baskin L. What is Hypospadias? Clin Pediatr (Phila). 2017;56(5):409–18. https:// doi.org/10.1177/0009922816684613.

[6] Thiry S, Saussez T, Dormeus S, Tombal B, Wese FX, Feyaerts A. Long-Term Functional, Cosmetic and sexual outcomes of Hypospadias correction per formed in Childhood. Urol Int. 2015;95(2):137–41.

[7] Snodgrass W. Tubularized, incised plate urethroplasty for distal hypospadias. J Urol 1994;151(2):464–465.

[8] Snodgrass W. Changing concepts in hypospadias repair. Curr Opin Urol 1999; 9: 513–516.

[9] Chua ME, Gnech M, Ming JM, Silangcruz JM, Sanger S, Lopes RI, Lorenzo AJ, Braga LH. Preoperative hormonal stimulation effect on hypospadias repair complications: Meta-analysis of observational versus randomized controlled studies. J Pediatr Urol. 2017;13(5):470–80.

[10] Canning DA, Re. Urethral advancement in hypospadias with a distal division of the corpus spongiosum: outcome in 158 cases. J Urol. 2015;193(4):1368–9.

[11] Gecit I, Isik D, Pirincci N, Bilici S, Gunes M, Canbaz Y, Faruk Kocak O. Kutlay technique for hypospadias repair. Int Urol Nephrol. 2012;44(5):1311–8.

[12] Radi Alsharbaini, Hamdi Almaramhy. Snodgrass urethroplasty for hypospadias repair: A retrospective Comparison of two variations of the technique. Journal of Taibah University Medical Sciences (2014); 9 (1), 69–73.

[13] Basem A. Fathi, Ahmed A. Elgammal, Osama M. Ghoneimy, Ahmed A. Alrefaey, Tamer A. Abouelgreed, Mohamed A. Elhelaly and El-Sayed I. El-Agamy. Urethral advancement and glanuloplasty versus tubularized incised plate urethroplasty for distal hypospadias repair: a prospective randomized study. BMC Urology (2023) 23:70.

[14] Braga LH, Lorenzo AJ, Salle JL (2008) Tubularized incised plate urethroplasty for distal hypospadias: a literature review. Indian J Urol 24:219–225.

[15] Sozubir S, Snodgrass W. A new algorithm for primary hypospadias repair based on TIP urethroplasty. J Ped Surg 2003; 38: 1157–1181.

[16] Elbakry A (2002) Further experience with the tubularized-incised urethral plate technique for hypospadias repair. Br J Urol Int 89:291–294.

[17] Khaled M. Abdelhalim, Hassan A. Abdelwahab, Esam Abdelgawad Mahmoud H. Sherief. Predictors of successful outcome of tubularized incised plate for primary distal hypospadias repair. African Journal of Urology (2021) 27:164.

[18] Snodgrass W (2005) Snodgrass technique for hypospadias repair. Br J Urol Int 95:683–693.

[19] Wilkinson D, Farrelly P, Kenny S (2012) Outcomes in distal hypospadias: a systematic review of the Mathieu and tubularized incised plate repairs. Pediatr J Urol 8:307–312.

[20] Elicevik M, Tireli G, Sander S. Tubularized incised plate urethroplasty: 5 years' experience. Eur Urol. (2004) 46:655–9.

[21] Yildiz T, Tahtali IN, Ates DC, Keles I, Ilce Z. Age of patient is a risk factor for urethrocutaneous fistula in hypospadias surgery. J Pediatr Surg. (2013) 9:900–3.

[22] Snodgrass WT, Granberg C, Bush NC. Urethral strictures following urethral plate and proximal urethral elevation during proximal TIP hypospadias repair. J Pediatr Urol (2013) 9 (PtB): 990–4.

[23] Xu N, Xue XY, Li XD, Wei Y, Zheng QS, Jiang T, et al. Comparative outcomes of the tubularized incised plate and transverse island flap onlay techniques for the repair of proximal hypospadias. Int Urol Nephrol (2013). doi:10.1007/s11255-013-0567-z

[24] Aslam R, Campbell K, Wharton S, Bracka A. Medium to long term results fol lowing single stage Snodgrass hypospadias repair. J Plast Reconstr Aesthet Surg (2013) 66:1591–5.

[25] https://d56bochluxqnz.cloudfront.net/documents/full-guideline/EAU-Guidelines-on-Paediatric-Urology-2025.pdf, page 32, section 3.7.5.3

[26] Oktay Ozman, Murat Kuru, Murat Gezer, Fatih Gevher, Bulent Onal. Outcomes of Hypospadias Surgery Performed by Different Surgeons Under the Supervision of an Experienced Pediatric Urology Surgeon. Journal of Urological Surgery, 2019;6(2):144-147.

[27] Abbas TO: The rising need for preoperative objective quantification of curvature in patients with hypospadias. J Pediatr Urol 17: 599-600, 2021.

[28] Zhang J, Zhu S, Zhang L, Fu W, Hu J, Zhang Z and Jia W: The association between caudal block and urethroplasty complications of distal tubularized incised plate repair: Experience from a South China National Children's Medical Center. Transl Androl Urol 10: 2084-2090, 2021.

[29] Karabulut R, Turkyilmaz Z, Atan A, Kaya C and Sonmez K: What are the factors affecting glanular dehiscence after hypospadias surgery? Actas Urol Esp (Engl Ed) 2022, 46: 4-15.

[30] Bhat A, Bhat M, Kumar V, Kumar R, Mittal R, Saksena G (2016) Comparison of variables affecting the surgical outcomes of tubularized incised plate urethroplasty in adult and pediatric hypospadias. Pediatr J Urol 12(2):108.1-117..

.