

## Outcome of Tubularized Incised Plate Urethroplasty by Single Layer Urethral Closure with Flap and Double Layer Urethral Closure without Flap

\*Muhmmud S,<sup>1</sup> Chowdhury AL,<sup>2</sup> Mahmud AA,<sup>3</sup> Rahman M,<sup>4</sup> Roy AS,<sup>5</sup> Ali F,<sup>6</sup> Nilave NA,<sup>7</sup> Tabassum T<sup>8</sup>

### Abstract

**Background:** Hypospadias is one of the common genitourinary anomalies, has been treated with a variety of operative procedures, but tubularized incised plate urethroplasty (TIPU) has proven to be the most effective because of its simplicity and positive outcomes. The postoperative complications are thought to be reduced by a flap during the TIPU. It is still up for debate whether utilizing a flap is risk-worthy given the hazards involved in doing so as well as the issue of single or double layer urethral closure.

**Objective:** To compare the outcomes of TIPU by single layer urethral closure with flap and double layer urethral closure without flap in mid and distal hypospadias.

**Methods:** This prospective comparative study was conducted in the Paediatric Surgery Department, Mymensingh Medical College Hospital, Bangladesh, from January, 2022 to June, 2023. Patients aged up to 12 years with mid and distal hypospadias, according to inclusion and exclusion criteria was included in this study. Patients were divided alternatively in Group A(single layer with flap) and Group B(double layer without flap). Data of follow up schedule was recorded at 2<sup>nd</sup>, 4<sup>th</sup>, 8<sup>th</sup> and 12<sup>th</sup> week from the day of surgery. Data were processed both manually and by computer using computer software Statistical package for social sciences (SPSS) version 29.0.1.0.

**Results:** 47 patients were enrolled, 24 were in group A and 23 were in group B with a mean age  $6.16 \pm 3.345$  years. Mid penile, Distal penile and coronal hypospadias were 21%, 75% and 4% respectively. Postoperative complications were 41.7% in group A and 39.1% in group B ( $p = 0.849$ ) with urethrocuteaneous fistula (UCF) rate 33.3% and 30.4% respectively, less in 4-8 years age group. There were statistically significant differences ( $p < 0.05$ ) between two groups in terms of operative time ( $94.46 \pm 6.661$  vs.  $75.26 \pm 2.800$  min) and cosmetic outcome.

**Conclusion:** Flap does not seem to reduce overall complications of TIPU, rather has its own hazards. Double layer urethral closure without flap is beneficial considering operative time and cosmetic outcome. Researching with a multivariable comparison group throughout a broad study population could a concrete conclusion be drawn.

[Dinajpur Medical College Journal, 2026 Jul; 19 (2):220-228]

[Former M Abdur Rahim Medical College Journal]

DOI: <https://www.doi.org/10.69861/djmcj.2026.19.2.11>

**Keywords:** Hypospadias, Urethroplasty, Tubularized incised plate urethroplasty (TIPU), Double layer urethral closure, Flap

1. \*Dr. Shakil Muhmmud, Registrar, Department of Paediatric Surgery, Dinajpur Medical College Hospital, Dinajpur, Bangladesh. [john.proma@gmail.com](mailto:john.proma@gmail.com). <https://orcid.org/0009-0008-0162-1657>
2. Professor. Dr. ASM Lokman Hossain Chowdhury, Head of Department of Paediatric Surgery, Community Based Medical College, Bangladesh, Mymensingh, Bangladesh. <https://orcid.org/0009-0003-9028-7665>
3. Dr. Abdullah Al Mahmud, Associate Professor, Department of Paediatric Surgery, Mymensingh Medical College, Mymensingh, Bangladesh. <https://orcid.org/0009-0008-5610-4323>
4. Dr. Mizanur Rahman, Assistant Professor, Department of Paediatric Surgery, Dinajpur Medical College, Dinajpur, Bangladesh. <https://orcid.org/0009-0001-1854-0318>
5. Dr. Asish Saha Roy, Medical Officer, Netrakona District Sadar Hospital, Netrakona, Bangladesh. <https://orcid.org/0009-0002-2584-7294>
6. Dr. Farzana Ali, Indoor Medical Officer, Department of Paediatric Surgery, Dhaka Medical College Hospital, Dhaka, Bangladesh. <https://orcid.org/0009-0005-6044-0184>
7. Dr. Niaz Anam Nilave, Assistant Professor, Dept. of Paediatric Surgery, Dinajpur Medical College, Dinajpur, Bangladesh. <https://orcid.org/0000-0003-4771-496X>
8. Dr. Tasnim Tabassum, Department of Pathology, Dinajpur Medical College, Dinajpur, Bangladesh. <https://orcid.org/0009-0001-1040-9374>

\*For correspondence

## Introduction

The term Hypospadias is derived from Greek word 'Hypo' means 'under' and 'spadon' means a 'rent' or 'fissure'. Hypospadias is a developmental anomaly caused by incomplete development of the anterior urethra, resulting in urethral meatus opening at the ventral surface of the penis. It is divided into Distal, Midshaft, and Proximal types according to the metal location after the chordee has been released. Hypospadias surgery aims to achieve good function and shape of the penis. Owing to complexity over 300 surgical methods have been developed since the distal amputation of the penis in 100-200 AD. Many surgical techniques have been tried to reduce postoperative complications of hypospadias repair, but universal acceptance is not for any of them.<sup>1</sup>

Tubularized incised plate urethroplasty (TIPU) has become an attractive method worldwide for hypospadias repair since its introduction in 1994 for distal hypospadias as it is relatively simple yet safe, dependable, and rapid procedure with demonstrated effectiveness, durability, and versatility.<sup>2-4</sup> TIPU includes single layer urethral closure augmentation by flap and have few modifications by surgeons for reducing complication rate mostly fistula and meatal stenosis.<sup>5</sup> In 2005, Snodgrass added double layer urethral closure in his method.<sup>6</sup> Double layer urethral closure with flap shows better results than single layer urethral closure with flap.<sup>7</sup> Most authors of different studies using single layer urethral closure with different flap or graft although current TIPU introduced by 'Snodgrass' includes double layer urethral closure. Post operative complications, especially UCF is believed to be minimized by this additional reinforcing vascularized flap. Unfortunately, isolation the flap may results in compromisation of the blood supply to the skin, impaired healing, skin deficiency for closure, and proneness to penile torsion. Besides, it needs extended

operative time, bleeding is more, and higher standards of surgical skill are required. Flapless urethroplasty by single and double layer urethral closure alone or with surrounding different soft tissue reinforcement have been tried by surgeons over the years to minimize flap related complications. Double layer urethral closure without flap has good glans approximation, proper wound vascularity, more cosmetic results, and less time consuming.<sup>8-10</sup>

To best of our knowledge, there is no study in our country and very few in abroad similar to comparing the outcomes of TIPU by single layer urethral closure with flap and double layer urethral closure without flap. So, there is scope to study on this topic for the benefit of the patients.

## Methods

This prospective comparative study was conducted in the Department of Paediatric Surgery, Mymensingh Medical College Hospital, Mymensingh, Bangladesh from January 2022 to June 2023 including patients age 6 months to 12 years having mid and distal hypospadias. We excluded patients with severe chordee, previous history of hypospadias repair or circumcision, other urogenital anomaly and comorbidities and hypospadias with narrow urethral plate or small penis. Considering the inclusion and exclusion criteria 47 cases were selected purposively for the study. Among them, 24 in group A (TIPU by single layer urethral closure with flap) and 23 in group B (TIPU by double layer urethral closure without flap). Follow up was recorded up to 7<sup>th</sup> post-operative day (POD) and at 2<sup>nd</sup>, 4<sup>th</sup>, 8<sup>th</sup>, 12<sup>th</sup> weeks after operation. Data were processed by both manually and computer using computer software Statistical package for social sciences (SPSS) version 29.0.1.0. The significance of this study was tested statistically by using the chi-square test ( $\chi^2$ ) and 't' test, with a p value <0.05 was considered as significant.

*Operative Procedure*

The initial steps are followed as described by Snodgrass and tabularization was done by continuous subcuticular sutures over the inserted tube with 6-0 polyglactin. The neourethra was covered with vascularized dorsal dartos flap or lateral penile dartos flap

in Group A. At the end of the procedure, skin of the penile shaft was reconstructed following glans reconstruction. We don't use any kind of operative loop or microscope. Bleeding was controlled by tourniquet or bipolar electrocautery.

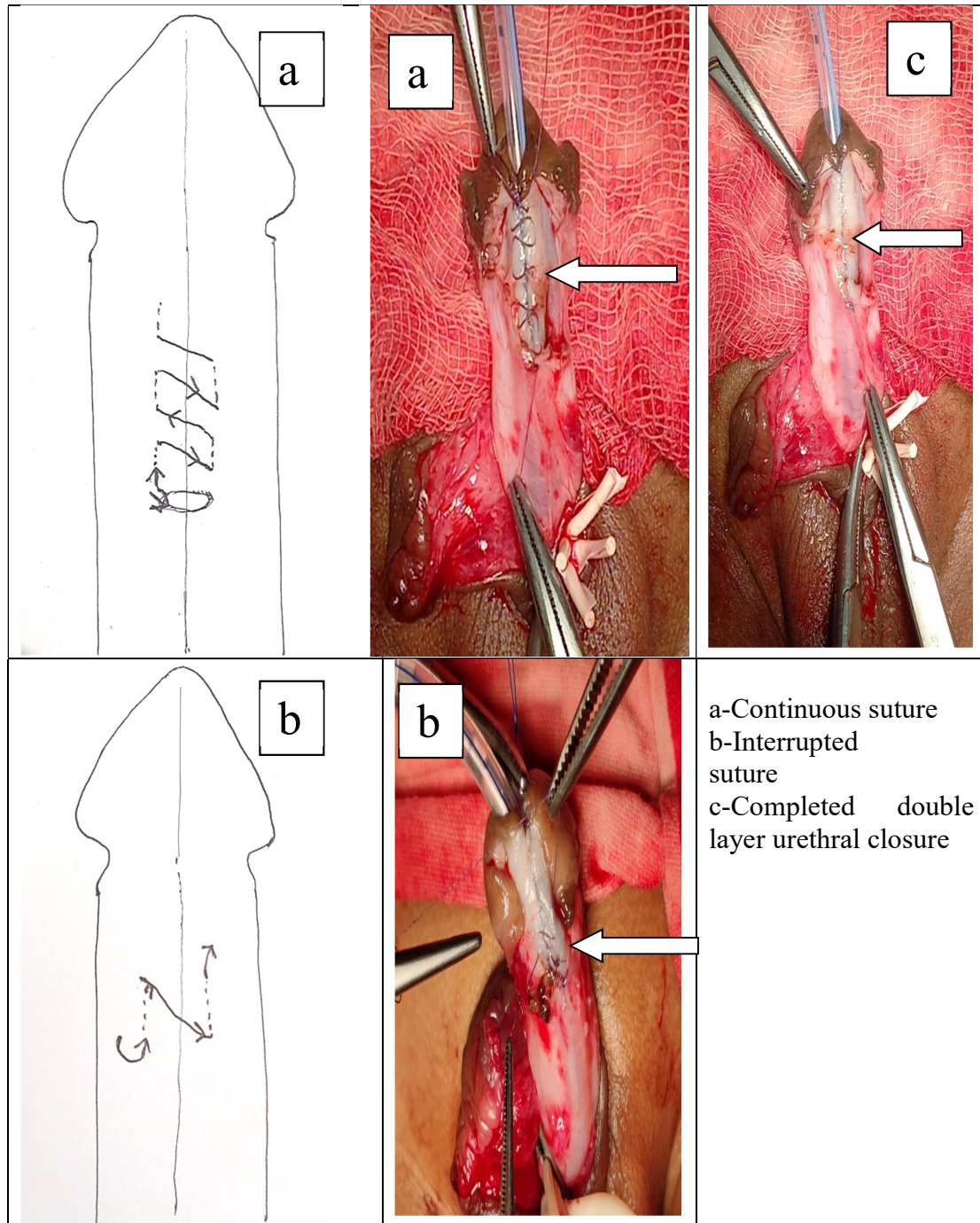


Figure 1. 2<sup>nd</sup> layer suture technique for double layer urethral closure without flap

For double layer urethral closure in Group B, a second layer subepithelial closure done after tubularization of neourethra over the first layer to cover the suture line either in continuous or interrupted manner with 6/0 polyglactin [Fig.1]. Then skin with dartos closure done for penile reconstruction without any intervening flap or graft.

#### Post-operative Care

The patient initially kept with no food for 4-6 hours, followed by liquid to normal feeding. injectable antibiotics were continued upto 3rd postoperative day(POD) followed by oral antibiotics. Analgesics included nalbuphine hydrochloride and paracetamol syrup. Dressing was removed on 4<sup>th</sup> POD followed

by application of local antiseptic ointment. Patients were discharged at 6th POD. Urinary stenting was removed at 14th postoperative day. Urethral dilatation was advised by age specific urethral stent.<sup>11</sup>

#### Results

This prospective comparative study was conducted in the Department of Paediatric Surgery, Mymensingh Medical College Hospital, Mymensingh, Bangladesh from January 2022 to June 2023. Considering the inclusion and exclusion criteria 47 cases were selected purposively for the study. Among them, 24 was included in group A and 23 in group B.

Table I: Characteristics of patients of studied groups

| Characteristics        | Group A(n=24) | Group B(n=23) | Total(n=47)  |
|------------------------|---------------|---------------|--------------|
| Age (years)            | 6.19 ± 3.550  | 6.13 ± 3.195  | 6.16 ± 3.345 |
| Hypospadias type, N(%) |               |               |              |
| Coronal                | 0(0)          | 2 (9)         | 2(4.3)       |
| Distal penile          | 17 (71)       | 18 (78)       | 35(74.4)     |
| Mid penile             | 7 (29)        | 3 (13)        | 10(21.3)     |

Table I shows the characteristics of patients. The mean age in group A was  $6.19 \pm 3.550$ , group B was  $6.13 \pm 3.195$  and in total  $6.16 \pm 3.345$  years. Most of the patient having distal penile hypospadias and incidentally no coronal type in Group A.

Table II: Mean per operative time

| Operative time(minutes) | Operation technique | n  | mean  | SD    | t      | significance |
|-------------------------|---------------------|----|-------|-------|--------|--------------|
|                         | Group A             | 24 | 94.46 | 4.625 | 17.122 | $p = 0.015$  |
|                         | Group B             | 23 | 75.26 | 2.8   |        |              |

**Table II** shows the mean operative time for Group A was  $94.46 \pm 4.625$  minutes and for Group B was  $75.26 \pm 2.8$  minutes which was shorter than group A and statistically significant.

Table III: Meatal shape in both group

| Operation group | Meatal shape  |               | Total n(%) | Significance                                |
|-----------------|---------------|---------------|------------|---------------------------------------------|
|                 | Vertical n(%) | Circular n(%) |            |                                             |
| A               | 15(62.5)      | 9(37.5)       | 24(100)    | $\chi^2 = 5.436$<br>$df = 1$<br>$p = 0.020$ |
| B               | 21(91.3)      | 2(8.7)        | 23(100)    |                                             |
| Total           | 36(76.6)      | 11(23.4)      | 47(100.0)  |                                             |



Table III shows more vertical shape meatus in group B(91.3%) than group A(62.5%) considered as good cosmesis which is statistically significant

Table IV: Overall post-operative complications

| Complications         | Group A(24)<br>n(%) | Group B(23)<br>n(%) | Total(47)<br>n(%) | 'p' -value |
|-----------------------|---------------------|---------------------|-------------------|------------|
| Haemorrhage/Haematoma | 2(8.3)              | 1(4.3)              | 3(6.4)            | 0.576      |
| U-C fistula           | 8(33.3)             | 7(30.4)             | 15(31.9)          | 0.831      |
| Meatal stenosis       | 6(25)               | 4(17.4)             | 10(21.3)          | 0.524      |
| Skin necrosis         | 2(8.3)              | 0(0.0)              | 2(4.3)            | 0.157      |
| Glandular dehiscence  | 1(4.2)              | 0(0.0)              | 1(2.1)            | 0.322      |
| Wound infection       | 0(0.0)              | 0(0.0)              | 0(0.0)            |            |
| Total                 | 10(41.7)            | 9(39.1)             | 19(40.4)          | 0.859      |

Table IV shows total 10(41.7%) patients were developed complications in group A and 9(39.1%) patients in group B. Overall 19(40.4) patients developed complications. But no complication was with statistically significant difference between both groups.

## Discussion

Hypospadias occurring 1 in 125 live male births and must ever move us to the highest surgical endeavor and the surgery comprises both art and science. The type and incidence of complications vary with the forms of hypospadias and its repair technique. The common complications are urethrocutaneous fistula (UCF), meatal stenosis, stricture urethra and residual chordee.<sup>10-14</sup>

UCF is the most reported complication of hypospadias surgery; currently an expected fistula formation of 10-20% exists for one stage hypospadias surgery. After tubularization, surgeons use various barrier layers, such as double breasting, skin de-epithelialization, tunica vaginalis wrap, dorsal subcutaneous flap, scrotal dartos flap, external spermatic fascia flap, and spongioplasty. Neourethra covering with penile dartos (PD) may produces necrosis in the preputial skin, which can lead to UCF. However, there is still disagreement over the best interposing tissue for urethroplasty to prevent UCF development, and none is suitable for fulfilling the ultimate purpose.<sup>14</sup>

The use of double layer urethral closure in TIPU has been shown to decrease the UCF

rate from 21% to 11%. Fattah et al. found only 3.8% fistula rate in double layer urethral closure in comparison to 14.3% in single layer urethral closure. Chakraborty et al. found 3.4% UCF in flap group and 5.3% in non-flap group, which were almost same and not statistically significant.

Snodgrass et al. conducted a study of 551 patients with distal hypospadias where in a large portion showed that there was no difference in fistula rates between with and without barrier flaps. They also assumed that the dartos barrier layer preventing fistulas in single layer urethral closure may serve by the second layer urethral closure. Current study showed 33.3% UCF rate for group A and 30.4% in group B; and there was no significant difference in between the groups like other studies. Özkuvanci et al. believed that a proper neourethra does not require an extra flap to be placed over it. For double layer urethral closure, in our opinion, the urethral plate should be thick enough to permit tubularization in two layers when it is dissected.<sup>15-23</sup>

Though historically valued, the use of an additional flap is not entirely safe, as it lengthens the operation by 30-45 minutes to

isolate the flap and cover the neourethra. Additionally, the surgery results in additional bleeding from the flap or harvested area, and it requires exceptional surgical expertise. Chakraborty et al. showed the mean operative time for TIPU with flap  $96.34 \pm 6.66$  minutes and without flap group  $71.39 \pm 9.76$  minutes. In our study, mean operative time for group A was  $94.46 \pm 4.625$  minutes and for group B  $75.26 \pm 2.800$  minutes, which is consistent with Chakraborty et al. and statistically significant.

Schultz et al. suggested 6 to 18 months a suitable age range for hypospadias restoration, while Sajid and Karim suggesting 2-3 or 3.5 years in our country. Late infancy is preferred for healthy tissue maturation, as suggested by Chakraborty et al. In our study, the mean age was  $6.16 \pm 3.345$  years, which is far beyond the current recommended age for hypospadias repair but consistent with the findings of other studies at our country. This is also a reality of developing world where many patients present late due to lack of consciousness, ignorance, and financial crisis. Interestingly, we found that the rate of fistula was less in 4-8 years age group in our study.<sup>15-18</sup>

Winberg et al. in a meta-analysis of 17 articles including 1572 cases showed 13% fistula rates. The fistula rate is more in Asian and developing countries. According to reports from Ghana, Nigeria, Tanzania UCF with TIPU had a 28%, 33.1% and 40.5% rate respectively. In our country, it ranges from 13.33 to 34.88 in different studies at different part of our country. We found 31.9% fistula rate comprising both groups which is higher for international perspective but consistent with our and other developing countries; that can be improved by using magnification, more fine suture materials and experienced surgical hands.<sup>16-20</sup>

Meatal stenosis, the second-most significant adverse event of TIPU. We found 6(25%) meatal stenosis in group A and 4(17.4%) in group B, less in group B but not statistically significant. Chakraborty et al. also not found statistically significant difference as ours. In our country, meatal stenosis ranges from 16 to 40% consistent with our study 10(21.3%). Meatal stenosis has been linked to fistula, according to numerous studies. We found 7(70%) cases of meatal stenosis were associated with UCF and was statistically significant ( $p = 0.004$ ). Meatal stenosis can be avoided by extending the urethral groove to the mid-glans rather than the tip of the glans and keeping the creation of the neourethra at the same level.<sup>18-20</sup>

Along with UCF, other complications that surgeons frequently deal with include oedema, penile torsion, recurrent curvature, bleeding, haematoma, wound infection, wound dehiscence, preputial dehiscence, glans dehiscence, complete wound breakdown, meatal stenosis, urethral stricture, urethral diverticulum, penile skin deficiency, and abnormal penile skin configuration. According to a meta-analysis by Pfistermuller et al. in 2015 of 49 studies, only 4–8.2% of TIP repairs result in complications, with complications being more common in regions of the world except the USA and Europe. In Ethiopia, Tihitena et al. reported 34.3% complication rate. Reports from Ghana and Tanzania, had complications with TIPU in 28% and 61.60% cases respectively. In our country, different studies showed TIPU complications ranging from 20% to 60%. Chakraborty et al. found 25.86% complications in with flap group and 23.68% in without flap group having no significant difference. We also found no significant difference in our both groups as 41.7% in group A and 39.1% in group B. In combination we had 40.4% complication rate which is higher in comparison to USA and

Europe but consistent with the findings of other studies in our country and other developing countries. On follow up schedule, only 2 skin necrosis was noted within 6<sup>th</sup> POD in group A and on later they sloughed out. All Glandular dehiscence and UCF noted on 2<sup>nd</sup> week after removal of stent. Meatal stenosis and residual chordee mostly noticed at last follow up (12<sup>th</sup> week).<sup>15-20</sup>

Our finding of more vertical shape meatus in group B (91.3%) was statistically significant. There was no skin necrosis and glandular dehiscence in group B. Only 4(17.4%) patients had residual chordee in group B in comparison to 8(33.3%) in group A. So, considering skin necrosis, glandular dehiscence, meatal shape and residual chordee Group B seems to have more cosmetically sound outcome than group A.

The native healthy urethral plate, location of the meatus, and the quality of the surrounding tissue are all thought to be independent predictors of TIPU. The surgeon's experience, surgical technique, and penis size are further factors to consider. Our study showed that, there is no significant difference between two groups in terms of post operative complications. Additionally, urethroplasty by double layer urethral closure without a separate flap seen to be more advantageous due to its less operative duration, quick recovery time, improved cosmetic results, reduced penile torsion and curvature, and can avoid flap related problems. In our opinion, it is not advantageous to deploy additional flap as neourethral covering in every case with TIPU.<sup>21</sup>

### *Conclusion*

Use of a flap in TIPU procedure has no significant effect on the result of post operative complications and carries its own hazards. In mid and distal hypospadias with healthy, adequate urethral plate and

periurethral tissue; double layer urethral closure without flap is better considering operative time and cosmetic outcome than single layer urethral closure with flap during TIPU, which can serve as a good surgical option for hypospadias repair.

### *Limitations of the study*

Regular follow up sometimes could not be done on the exact date and long term follow up was beyond the scope in short study period.

Use of more fine suture materials and magnification could not be maintained due to resource constraints and surgeons' choice. All the operations were not done by the same surgeons and with equal expertise.

### *Recommendation*

When the neourethra is adequately created by double layer urethral closure, a flap is not always required in the TIPU procedure.

To achieve high surgical success rates surgeons must improve their surgical skill, use delicate instruments, fine suture materials, optical magnification, create neo-urethras of the proper size, and generally establish dedicated paediatric urology centers.

After with a multivariable comparison group throughout a broad study population could a solid conclusion be drawn.

### **References**

1. Eltatawy AG, Gamea AS, Loulah MA, Badr ML. A comparative study between Snodgrass versus Mathieu with dartos flap urethroplasty for distal hypospadias repair. *Menoufia Medical Journal*. 2019;32(2):489-93.
2. Snodgrass, W., 1994. Tubularized, incised plate urethroplasty for distal hypospadias. *The Journal of urology*, 151(2), pp.464-465

3. Chakraborty P, Mandal KC, Roy S, Tewary SK, Halder PK, Kumar A. The use of preputial dartos flap in the primary repair of distal hypospadias: a single-centre experience. *Journal of West African College of Surgeons*. 2023 Jan 1;13(1):27-35.
4. Lorenzo AJ, Snodgrass WT. Regular dilatation is unnecessary after tubularized incised-plate hypospadias repair. *BJU international*. 2002 Jan;89(1):94-7.
5. Snodgrass W, Yucel S. Tubularized incised plate for mid shaft and proximal hypospadias repair. *The Journal of urology*. 2007 Feb;177(2):698-702.
6. Snodgrass WT. Snodgrass technique for hypospadias repair. *BJU international*. 2005 Mar;95(4):683-93.
7. Baba AA, Wani SA, Bhat NA, Mufti GN, Lone TN, Nazir S. Buck's fascia repair with glanuloplasty in hypospadias surgery: a simple approach with excellent outcome. *Journal of pediatric urology*. 2017 Dec 1;13(6):633-e1.
8. Sajid MM, Karim MS. Comparison between the outcome of tunica vaginalis blanket wrap and non-wrap procedures in urethroplasty. *Journal of Paediatric Surgeons of Bangladesh*. 2012;3(1):30-6.
9. Komma J, Talari VK, Kotaiah MT, Nagarjuna K. Comparative study of transverse Preputial Onlay Island Flap vs Tubularised Island Flap urethroplasty. *Journal of Evolution of Medical and Dental Sciences*. 2017 May 1;6(35):2903-9.
10. Goodacre T, 'Plastic and reconstructive surgery', in: Norman S. Williams, P. Ronan O'Connell, Andrew W. McCaskie (eds), *Bailey & Love's Short Practice of Surgery*, 27<sup>th</sup> edn. CRC Press, 2018:634-647
11. Karim SR, Abdullah SM, Shaha BK, Rahman MM, Amin MR. Short Term Outcome of Urethroplasty with or without Urethral Stent: A Comparative Study. *Medicine Today*. 2012;24(1):23-6.
12. Baskin LS, 'Hypospadias', In: Arnod G Coran, N Scott Adzick, Thomas M Krummel, Jean-Martin Laberge, Robert C. Shamberger, Anthony A. Caldamone (eds), *Pediatric surgery*, 7<sup>th</sup> edn, Saunders, Philadelphia, 2012:1531-1552
13. Carrasco A, Murphy JP, 'Hypospadias', In: George W. Holcomb, J. Patric Murphy, Shawn D. St. Peter(eds), *Holcomb and Ashcraft's Pediatric Surgery*, 7<sup>th</sup> edn. Elsevier, 2020:918.
14. Bakal Ü, Abeş M, Sarac M. Necrosis of the ventral penile skin flap: a complication of hypospadias surgery in children. *Advances in Urology*. 2015;2015(1):452870.
15. Zaidi RH, Casanova NF, Haydar B, Voepel-Lewis T, Wan JH. Urethrocutaneous fistula following hypospadias repair: regional anesthesia and other factors. *Pediatric Anesthesia*. 2015 Nov;25(11):1144-50.
16. Mondal SK. Hypospadias Repair: Our Experience in BSMMU & Others Private Hospital in Dhaka, Bangladesh. *SAS J Surg*. 2021 Aug;8:455-9.
17. Walid A, Minhajuddin S, Rajib K. Tabularised Incised Plate (TIP) urethroplasty in narrow V/S wide urethral plate: a comparative study in a developing country perspective. *Arch Pediatr Surg*. 2021;5(10.36959):472.
18. Mohammed M, Bright F, Mteta A, Mbwanbo J, Ngowi BN, Mbwanbo O, Yongolo S, Mganga A. Long-term complications of hypospadias repair: a ten-year experience from northern zone of Tanzania. *Research and Reports in Urology*. 2020 Oct 12:463-9.
19. Salam MA, Rahman ML, Asaduzzaman M, Islam M, Lenin N. Tubularized Incised Plate Urethroplasty for the Repair of Distal Hypospadias: A Simple Versatile



- Technique. Bangladesh Journal of Urology. 2017;20(2):65-9.
20. Mahmud SM, Tashfika UH, Ferdous KM. Outcome of classical tubularized incised-plate urethroplasty (TIP) for primary anterior hypospadias repair: 5 years' experience. Saudi J Med. 2023;8(1):33-7.
21. Galal M, Taha DE, Elabden KZ, Nabeeh H, Abdelbaky T. The effect of pre-incision urethral plate width and glanular width on the outcome of tubularized incised urethral plate repair surgery in distal penile hypospadias, a prospective study. Urology Journal. 2021 Nov 4;19(01):50-5.
22. Snodgrass, W.T., Bush, N. and Cost, N., 2010. Tubularized incised plate hypospadias repair for distal hypospadias. Journal of pediatric urology, 6(4), pp.408-413.
23. Tarhan, H., Kazanci, F., Ucan, A., 2008. TIPU results in hypospadias without using cover flap. Turkish Journal of Urology, 34(3), pp.354-359.