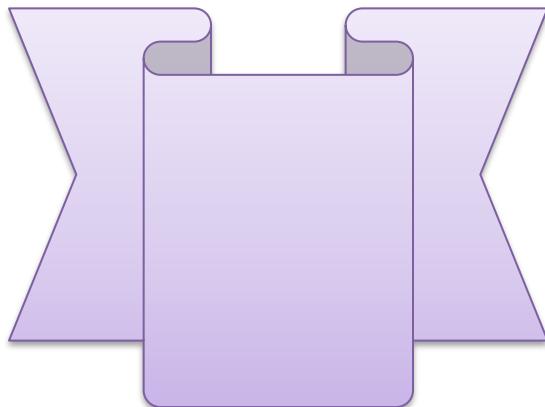


INTERNATIONAL JOURNAL OF MEDICAL ARTS



Volume 5, Issue 1, January 2023

<https://ijma.journals.ekb.eg/>



Print ISSN: 2636-4174

Online ISSN: 2682-3780



Available online at Journal Website
<https://ijma.journals.ekb.eg/>
Main Subject [Urology]



Original Article

Outcome of Ventrally Trans Positioned Total Preputial Flap for Staged Repair of Proximal Hypospadias

Mohammed Elghandour *, Mohamed Abdallah Hindawy, Sayed Eleweedy

Department of Urology, Faculty of Medicine, Al-Azhar University, Cairo, Egypt.

ABSTRACT

Article information

Received: 22-02-2023

Accepted: 30-03-2023

DOI: 10.21608/IJMA.2023.195587.1631.

*Corresponding author

Email: elghandoururology@gmail.com

Citation: Elghandour M, Hindawy MA, Eleweedy S. Outcome of Ventrally Trans Positioned Total Preputial Flap for Staged Repair of Proximal Hypospadias. IJMA 2023 January; 5 [1]: 2997-3005. doi: 10.21608/IJMA.2023.195587.1631.

Objectives: Our work seeks to evaluate the use of the ventrally trans-positioned total preputial flap [TPF] for staged proximal hypospadias correction.

Patients and Methods: An interventional prospective nonrandomized study included 20 participants who have proximal hypospadias and had a two-stage correction with TPF. The inclusion criteria were any uncircumcised children with proximal hypospadias [age was ranged from 6 months till 18 years]. Circumcised patients, recurrent cases and mid or distal shaft hypospadias were excluded from the study. Hypospadias objective scoring system utilized for post-operative analysis.

Results: The first stage operation's average patient age was 2.5 years [9 months–16 years]; and the typical follow-up period lasted 8 months. There was a proximal penile urethral meatus in 17 [85%] patients also penoscrotal in 2 [10%] and mid shaft in one case [5%] that converted to proximal shaft after release of chordee. After the second stage operation, seventeen patient [85%] had successful outcome and complications following surgery occurred in 3 [15%] patients with urethra-cutaneous fistula in one patient [5%], meatal stenosis one case [5%] and one case had persistent chordee [5%]. The results of the objective scoring evaluation for hypospadias were satisfactory in 95% of patients, with satisfactory both functional and cosmetic outcome.

Conclusion: With the 15% tolerable complexity rate, the ventrally trans-positioned total preputial flap [TPF] is a reliable procedure with acceptable success rate and low complications.

Keywords: Two-stage repair; Proximal hypospadias; Preputial flap



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INTRODUCTION

In 1:300 males, hypospadias is the second most frequent birth condition [1]. The best way to treat severe hypospadias has not yet been discovered [2]. The superiority of a two-stage strategy against a single-stage method is still up for dispute [3]. Despite the availability of other surgical procedures, the dual-stage repair is presently the treatment of choice for a lot of surgeons [4].

Regarding study presented a systematic assessment of 20 years' worth of articles on the treatment of severe primary hypospadias; staged repair was proven to have decreased complication rates [5]. Every time, a neomeatus that is positioned correctly and has a straight penis was the desired outcome [2].

Total preputial flap [TPF] transposition ventrally through the pedicle's buttonhole incision keeps its vasculature intact and aids to its reliability and versatility for proximal repair of hypospadias.

PATIENTS AND METHODS

The present study involved 20 male children with proximal hypospadias in total. It was an interventional prospective nonrandomized study, and had been carried out at Al-Azhar University Hospitals.

The inclusion criteria were any uncircumcised children with proximal hypospadias [age was ranged from 6 months till 18 years]. Patients who underwent only the first stage procedure and patients with less than six months of follow up were excluded from the study.

Surgical technique

First stage: Stay suture with 4-0 vicryl was secured into the apex of the glans penis to facilitate handling during subsequent dissection.

1. Degloving and Release of chordae [Orthoplasty]: There was a circumferential skin incision 2-3 mm a coronal sulcus below, with preservation of the prepuce for flapping and Nelaton catheter with suitable diameter was inserted. The penile shaft was completely degloved, both dorsally between Bucks and Dartos fasciae and ventrally just beneath the skin to the penoscrotal junction. Then the urethral plate and tethering fibrotic bands at

penile shaft's ventral surface where completely transected [Fig. 1-a]. A synthetic erection was achieved to evaluate the penile curvature. If VC at least 30 degrees was still present, transverse ventral corporotomies, three times were done. If persistent chordae dorsal plication of the tunica albuginea was done [figure 1-b].

2. Preparation of the flap: Dissections close to the dorsal penile skin were performed to prepare the TPF pedicle. At the base of the pedicle, a blunt buttonhole was made with a hemostat and gently spread longitudinally [figures 2-a and 2-b].

3. Flap transposition: The TPF was transposed ventrally to the shaft of the degloved ventral side of the penis [sutured in the sulcus coronal distally additionally the urethral meatus proximally] [figures 3].

Urethral catheter was indwelling during three days, and the patients got oral third generation cephalosporin for 7 days.

Second Stage

Neo urethra tubularization [Urethroplasty]: Three months post operatively, after complete flap healing all flaps were greater than 10 mm wide. Stay sutures were fixed at the glans' tip and a Nelaton catheter was placed [figure 4]. A Para-urethral plate U-shaped incision of neo-plate was made starting from 2 mm distance below hypospadiac meatus till the glans at least 3 mm below the plate's distal end, and then deepening of that incision to underlying corpora cavernosa was done along the glans wings' apparent connection to the neo urethral plate to separate the new urethral plate from the glans wings by extending down the neo plate's edge on each side. Using continuous 5-0 vicryl on round needle for tubularization of a 2-layer neo plate. Turning all epithelium into the neo urethral lumen the first suture was placed proximally from native urethral opening upward and distally to tip of penis [figures 5 and 6]. Interrupted 5-0 vicryl sutures were applied as a second layer from cremasteric muscle or Bucks fascia starting proximal to distal. The urethral opening [the TPF's distal end] was trans-positioned to the glans' top edge through a tunnel done in the glans [figures 7 and 8]. Closure of the skin using 5/0 vicryl [figure 9]. Urethral catheter was indwelling for 10-14 days and the patients received oral third generation cephalosporin for 7 day.

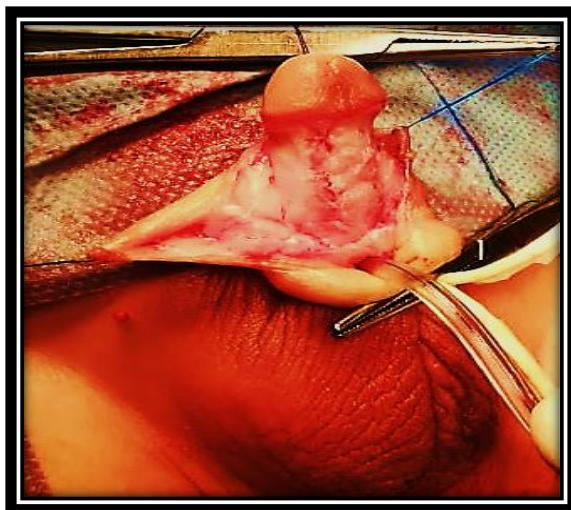


Figure [1]: a: Degloving, b: Ventral corporotomie

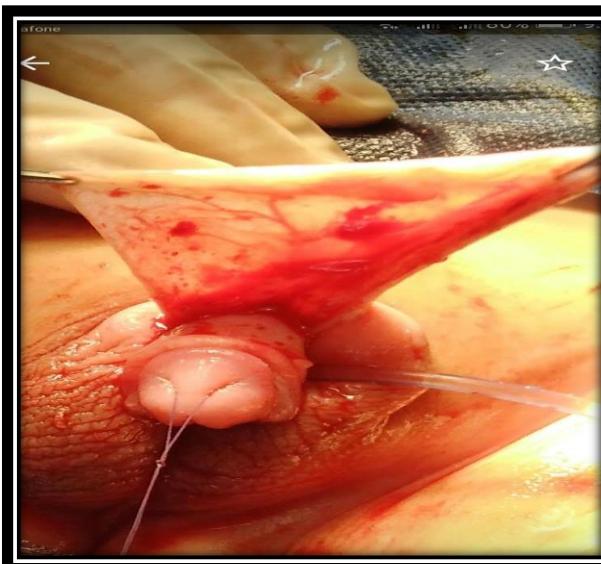


Figure [2]: a: Flap preparation, b: Buttonhole formation

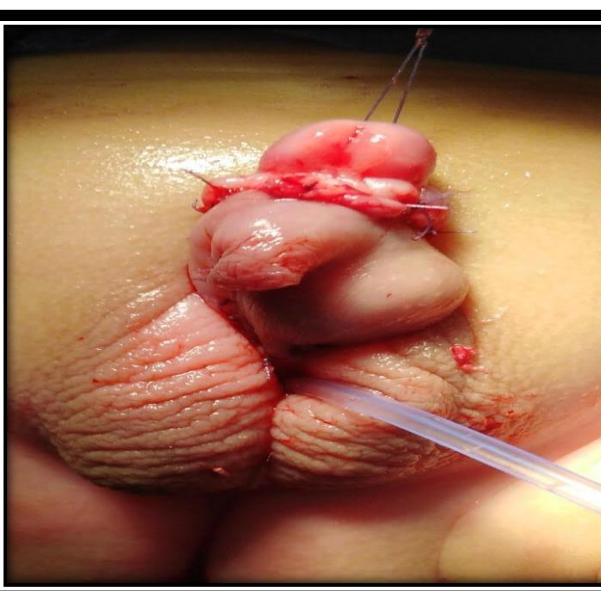
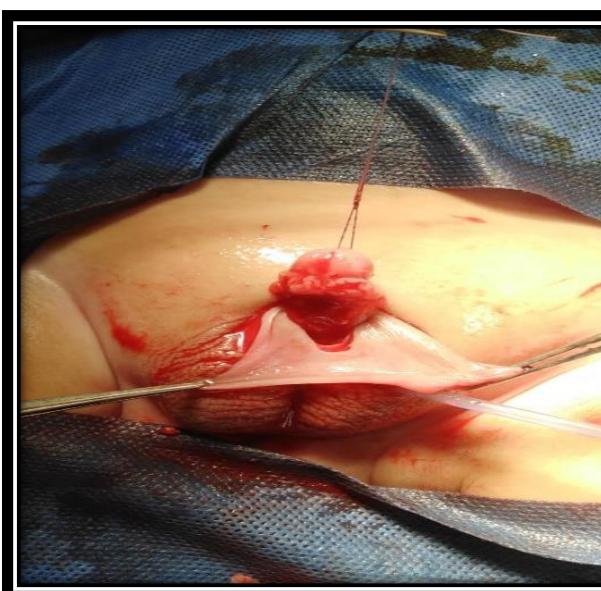


Figure [3]: a: Flap transposition, b: Coverage of the penis by the flap



Figure [4]: Stay sutures and catheterization

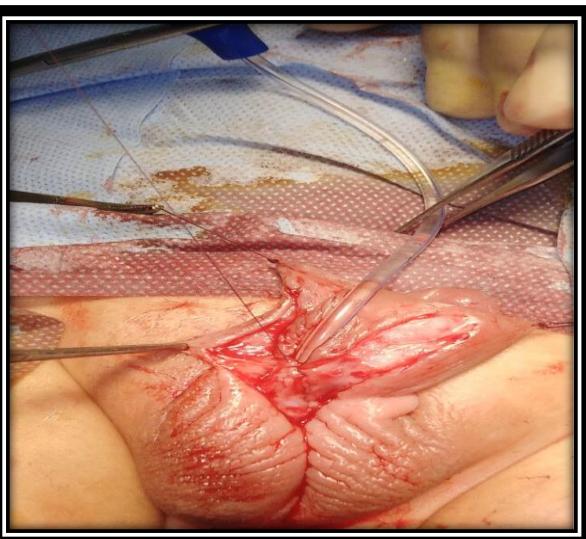


Figure [5]: U-shaped incision and tubularization

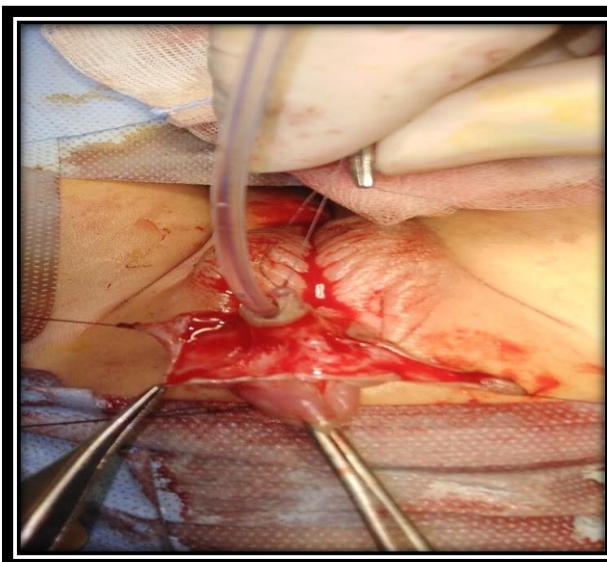


Figure [6]: Tube separation at the distal end

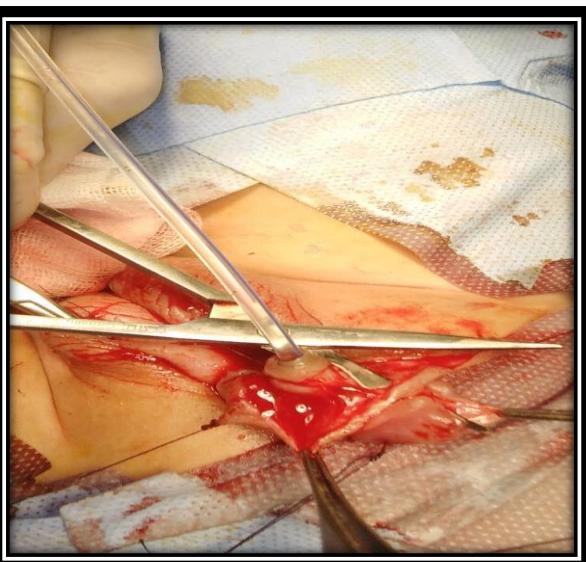


Figure [7]: Glans tunnel formation



Figure [8]: Tube transposition to the glans

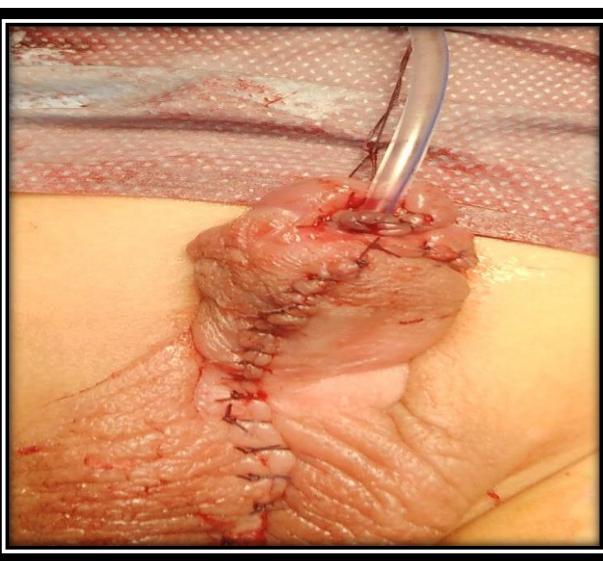


Figure [9]: Skin closure

Postoperative care and Follow up: All procedures were carried out by the same surgical team and were monitored for at least period three months postoperatively, during which two groups of parameters [functional and cosmetic] were evaluated. Follow-up visits were planned for the first week following surgery then weekly for the first month. Then every two weeks for the next 2 months, the postoperative functional outcomes were assessed by medical personnel and parents through direct vision of voiding flow and calibration of neo meatus after one month using appropriate catheter, and recording presence of complications.

Cosmetic assessment was also carried out by using [HOSE SCORE]^[6]

- Position of neo meatus.
- Shape of neo meatus. Either vertical slit like or rounded.
- Urinary stream. Either single stream or spray.
- Erection.
- Presence of fistula.

Statistical evaluation: Data was gathered, edited, coded, and entered the Statistical Program IBM SPSS 23 Package for Social Science. The numerical information was displayed as the mean. When parametric and median, standard deviations and ranges. When non-parametric data are discovered, the interquartile range [IQR] is used. Numbers and percentages were also used to display qualitative variables.

RESULTS

Twenty-five boys had undergone two stages urethroplasty of ventrally transposition of TPF technique. Five cases were eliminated [two declined to take part, the follow-up was lost in two and one patient had incomplete data]. Nine months old was the youngest child, even though the oldest was 16 years old with the mean age is about 2.5 ± 1.8 years. Only one patient had bilateral retractile testis associated with the hypospadias, and another one suffered from DM [table 1].

There was no need for preoperative testosterone injection as the glans width and penile length was within normal range in all cases. Chromosomal analysis was performed preoperatively in only 2 cases with bifid

scrotum and showed no abnormalities. Intraoperative finding of the urethral meatus site was penoscrotal in 2 cases [10%], proximal shaft in 17 cases [85%] and only one case [5%] showed pre-operatively midshaft meatus that converted to proximal shaft after release of chordee.

All patients showed ventral curvature after degloving except two patients only. At the first stage of the surgery, in order to straighten the penis, the urethral plate and tethering fibrotic bands at ventral surface of penile shaft was transected in 18 cases [90%], and adding dorsal tunica albuginea plication [TAP] in 2 cases [10%] to achieve penile straightening. Only one case of the studied patients developed complications following the initial stage in the form of hematoma, infection and partial flap gangrene [table 2]. Debridement of the gangrenous tissue was performed under anesthesia and resulted in partial flap lost and contraction affected the length and width of the flap [figure 10]. No patients had flap failure after first stage.

Intraoperatively the width of neo urethral [flap] constructed at the second stage ranged between 10-20 mm and the mean was 15.0 ± 1 mm and its length ranged between 30.3-33.7 mm with mean length 32 ± 1.7 mm. Period of catheterization after tubularization of the neo urethral plate were 10 days. One case [5%] had uneventful urethral catheter slipping on the third post-operative day and unfortunately developed urethrocutaneous fistula later.

After the second step of surgery, average follow-up time was for all patients 8 months [6-12 months]. Three patients [15%] developed complications after the second stage urethroplasty as presented in table [3]. One patient had urethra-cutaneous fistula, the second had a meatal stenosis, and the third still has chordee.

During follow up period [6-12] months, the case of urethrocutaneous fistula underwent repair, the case of meatal stenosis initially responded to regular dilatation and the case of residual chordee underwent release after 12 months. The TPF procedure was successful in 17 patients [85%] and no further operations were needed. Minor complications were met among 3 of the studied patients [15%]. In order to evaluate our approach, we used the HOSE score; 95% of patients saw great outcomes, and the average number of follow-up months was 8 months [table 4].

Table [1]: The study's patients' demographic information

Parameter		Total no.=20
Age [years]	Mean ± SD Range	2.5± 1.8 0.75 – 16
Hypospadias	Primary	20 [100.0%]
Associated anomalies	Bilateral retractile testis	1 [5%]
comorbidities	Diabetic	1 [5%]

Table [2]: Complications following the first stage of surgery

Complications	Number	%
Hematoma	1	5%
Infection	1	5%
Partial flap necrosis and contraction	1	5%



Figure [10]: Flap gangrene

Table [3]: Post second stage urethroplasty complications

Complications	No.	%
Urethrocutaneous fistula	1	[5%]
Meatal stenosis	1	[5%]
Residual chordee	1	[5%]

Table [4]: Hypospadias objective scoring evaluation [HOSE]

Variable		Score	No. of patients
Location of the meatus	Distal glandular	4	19
	Proximal glandular	3	1
	Coronal	2	0
	Shaft of the penis	1	0
Shape of the meatus	Vertical slit	2	19
	Circular	1	1
Stream of the urine	Single stream	2	19
	Spray	1	1
Erection	Straight	4	19
	Mild angulation [<10]	3	0
	Moderate angulation [10-45]	2	1
	Severe angulation [> 45]	1	0
Fistula	None	4	19
	Single-proximal	3	1
	Single distal	2	0
	Multiple or complex	1	0

DISCUSSION

In proximal hypospadias, the objectives of repair include a straight penis, a neourethra of sufficient size, a meatus that is slit-like and has a well-formed glans, normal voiding with a sufficient stream, and few postoperative problems [7].

The present study seeks to assess the use of the ventrally trans-positioned total preputial flap [TPF] for staged proximal hypospadias repair.

As passionately as any other component of proximal hypospadiology, arguments for one-or two-stage correction of the condition are still made [8]. The problem cannot be resolved because there aren't any randomized, controlled trials that compare both methods [9].

Complication rate in single stage urethroplasty for proximal hypospadias repair ranged between 16.7% and 70% [10, 11]. The rate of complications in our series with 2 stages repair is 15%. Contemporary systematic review reported problems following main single-stage hypospadias surgery in the form of fistula [0-27.8%], urethral stricture [0-18%] and wound dehiscence of the glans [0-12%] on studies with 6603 patients. The reviewer conducted that proximal hypospadias one step correction has higher complications rate [12]. We agree with Springer *et al.* who postulated although that the two-stage operations take longer and cost more money but they typically result in a healthier urethral bed and lower tissue that is fibrous around the urethra [13]. Staged repairs are getting more popular right now, however, even with staged repair, expressed success rates vary significantly with several urethroplasty techniques [2, 14].

Transverse island flap [TIF], tubularized incised plate urethroplasty [TIP], two-stage repair with a preputial skin transplant, buccal mucosal graft or bladder mucosal graft are all procedures used to treat proximal hypospadias [15]. Findings that have been published vary between centers. The reported complication rates for pedicle flap procedures range from 10 to 50% in the published literature and up to 34% of repairs fail [16]. There are two articles that discuss proximal hypospadias repair by preputial flap, Ozcan *et al.* [17] presented their research, which included 30 cases and a claimed 36% rate of sequelae, primarily 33% fistulas of patients and diverticula in 3%. The worst

complications rate was 95%. According to Tiryaki *et al.* [18] in 38 instances, mostly 21.1% have diverticula, fistula in 18.4%, and combination in 42.1 percent of patients. Proximal hypospadias of any age has been treated effectively using tubularized incised plate urethroplasty [TIP]; Nevertheless, Snodgrass *et al.* [19] found that expanding the criteria for this treatment to more proximal hypospadias was connected to a significant incidence of complications 21%, urethrocutaneous fistula. The two-stage flap surgery showed a 22% overall complication rate in a methodical evaluation of 20 years' worth of papers for the restoration of original severe hypospadias, has a 6% stricture/stenosis rate and a 10% fistula/dehiscence rate [5].

Al-Adl *et al.* [12] described a series of 45 patients with staged inner preputial skin graft surgery for proximal hypospadias. All of these issues were noted after one year of monitoring and the overall complication rate was 15%, with a 13.2% reoperation rate. Fistula in 3 cases, meatal stenosis in one case, neourthral diverticulum in 1 case, and partial glannular dehiscence in 1 case and they reported that the complication rates were lower than what is mentioned in the 20 years reviewed by Castagnetti and El-Ghoneimi [5].

In our series we do staged repair for proximal hypospadias in 20 patients with reported complication rate in 3 patients [15%] in the form of urethrocutaneous fistulae in one patient [5%], residual chordee in one patient [5%] and meatal stenosis in another patient [5%].

The present study has lowest complication rate than Al-Adl *et al.* [12]; Castagnetti and El-Ghoneimi [5]. The incidence of urethrocutaneous fistula is 5% among our patients, on the other hand Jayanthi V has documented a 16% fistula rate and a 17.5-33% failure rate for initial surgery [20]. Without urethral stricture or meatal stenosis, a rigid, less flexible, and non-distensible neo-urethral long TIP may be to blame in these elevated rates of complications. One of the most used methods for proximal hypospadias treatment is the transverse island flap [TIF] procedure, which was made famous by Duckett *et al.* who reported a 10% complication rate [21].

There have been numerous reports of hypospadias being repaired with pedicled onlays

or tubed grafts with a 40% fistula rate, a 10% stricture rate, and a 7% entire breakdown rate. In as many as 60% of cases, these treatments are linked to inadequate appearance as evidenced by excessive ventral bulkiness and anomalies in the meatus [15]. **Singh et al.** discussed they encountered the Asopa treatment; and noted that the rates of complications and fistulas with tubed repairs were 40% and 30%, respectively, while the rates with Onlay repairs were 18% and 30% [22].

In the conventional Onlay flap technique, they moved the vascular pedicle around the side of the penis that is rotated and asymmetrical in the traditional Onlay flap procedure, when there is not enough skin left to cover the penile ventral surface [23]. Modifications to this procedure included the use of a preputial flap with two Onlays, ventral transposition of the whole preputial flap, and passage of the dorsal pedicle through a buttonhole incision while protecting the blood arteries [24].

The present study included 20 individuals who undergo 2 stages for the treatment of proximal hypospadias with the technique of the ventrally trans-positioned total preputial flap [TPF]. This method produces good outcomes using 85 % success rate and less minor issues than usual 15 %. With the typical follow-up duration of 8 months, the results of functional and cosmetic outcome were satisfactory.

We believe that the reason for these positive results is a result of various principles that were taken into account when designing our method. First, we do buttonhole in the prepuce at the midline to create the flap to cover the degloved penis and form the neo-urethra. To provide adequate vascularity, allow for repair without strain, and reduce the possibility of post-operative flap retraction, the flaps are employed in their axial direction. Second, we use a wide flap to generate a broad neo-urethra. This offers a flexible and distensible neo-urethra without the danger of outflow resistance. Third, the flap's use of dorsal preputial skin, it lacks hair and shares that same characteristics inner as preputial skin, enables the flap's to length to be adjusted in accordance with the meatal site.

In the current study, the new urethra was covered by three layers. This could considerably lessen the development of fistulas and improving outcomes. A distinctive characteristic of proximal hypospadias is the presence of VC.

Fairy cuts, dorsal plication, ventral lengthening and corporal grafting are techniques for correcting curvature [23]. By transecting the plate in 35% of cases and using fairy cuts in 65%, Snodgrass and Bush were able to straighten peniles [2]. Just plate transection and dorsal plication were carried out by **Ozcan et al.** [17]. **Stanasel et al.** performed multiple procedures on these patients, including the plate's transection 71%, magical cuts 5% and grafting of the corpora 34% [26].

In the present study, the urethral plate additionally tethering fibrotic bands was cut to correct the penile chordee in 90% of cases. Adding dorsal plication of the tunica albuginea [TAP] in the remaining 10% of cases to achieve penile straightening.

A certified postoperative assessment system is the HOSE. Acceptable outcomes for the correction of hypospadias are those with a total score of 14 or higher [6].

Fifty-five patients in whom had hypospadias with two stages surgery utilizing combined procedures HOSE was utilized by **Hussein et al.** in 19 patients experienced favorable results, while 36 individuals did not [27]. 50% of the time, **Ozcan et al.** received a score of 16 or above [17].

In the present research, we utilized HOSE in 20 patients with the same method and had fantastic findings in 90% of patients, scoring greater than 14 points.

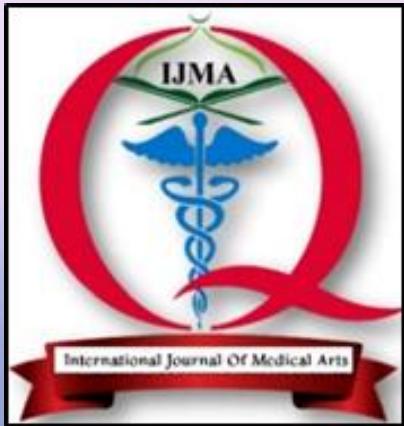
Limitation: A small patient population and a brief follow-up period. Long-term follow of the patient after puberty is required to determine patient satisfaction.

Conflict of Interest and Financial Disclosure: None.

REFERENCES

1. Snodgrass W, Bush N. Recent advances in understanding/management of hypospadias. F1000 Prime Rep. 2014;6:101. doi: 10.12703/P6-101.
2. Snodgrass W, Bush N. Staged Tubularized Autograft Repair for Primary Proximal Hypospadias with 30-Degree or Greater Ventral Curvature. J Urol. 2017 Sep;198[3]:680-686. doi: 10.1016/j.juro.2017.04.019.
3. Pfistermüller KL, Manoharan S, Desai D, Cuckow PM. Two-stage hypospadias repair with a free graft for severe primary and revision hypospadias: A single surgeon's experience with long-term follow-up. J Pediatr

- Urol. 2017 Feb;13[1]:35.e1-35.e7. doi: 10.1016/j.jpurol.2016.08.014.
4. Shukla AK, Singh AP, Sharma P, Shukla J. Two Stages Repair of Proximal Hypospadias: Review of 700 Cases. *J Indian Assoc Pediatr Surg.* 2017; 22[3]:158-162. doi: 10.4103/0971-9261.207627.
 5. Castagnetti M, El-Ghoneimi A. Surgical management of primary severe hypospadias in children: systematic 20-year review. *J Urol.* 2010; 184[4]:1469-74. doi: 10.1016/j.juro.2010.06.044.
 6. Holland AJ, Smith GH, Ross FI, Cass DT. HOSE: an objective scoring system for evaluating the results of hypospadias surgery. *BJU Int.* 2001 Aug;88[3]:255-8. doi: 10.1046/j.1464-410x.2001.02280.x.
 7. Ali MM, El-Hawy MM, Galal EM, Tawfieq ER, Anwar AZ. Results of two-stage transverse preputial island flap urethroplasty for proximal hypospadias with chordee that mandate division of the urethral plate. *Cent European J Urol.* 2021; 74[1]:89-94. doi: 10.5173/ceju.2021.0245.R2.
 8. Dason S, Wong N, Braga LH. The contemporary role of 1 vs. 2-stage repair for proximal hypospadias. *Transl Androl Urol.* 2014 Dec;3[4]: 347-58. doi: 10.3978/j.issn.2223-4683.2014.11.04.
 9. Badawy H, Orabi S, Hanno A, Abdelhamid H. Posterior hypospadias: Evaluation of a paradigm shift from single to staged repair. *J Pediatr Urol.* 2018 Feb;14[1]:28.e1-28.e8. doi: 10.1016/j.jpurol.2017.07.007.
 10. Acimi S, Abderrahmane N, Debbous L, Acimi MA, Mansouri J. Koyanagi- Snow-Hayashi Urethroplasty in Severe Hypospadias Repair: Between Hope and Reality. *Urology.* 2021 Jun; 152:129-135. doi: 10.1016/j.urology.2020.11.058.
 11. Kang L, Huang G, Zeng L, Huang Y, Ma X, Zhang Y, et al. A New Modification of the Koyanagi Technique for the One-stage Repair of Severe Hypospadias. *Urology.* 2016 Jul;93:175-9. doi: 10.1016/j.urology.2016.03.032.
 12. Al-Adl AM, Abdel Aal AM, El-Karamany TM, Noureldin YA. Two-stage repair of proximal hypospadias with moderate to severe chordee using inner preputial skin graft: prospective evaluation of functional and cosmetic outcomes. *World J Urol.* 2020 Nov;38[11]:2873-2879. doi: 10.1007/s00345-020-03075-5.
 13. Springer A, Krois W, Horcher E. Trends in hypospadias surgery: results of a worldwide survey. *Eur Urol.* 2011 Dec;60[6]:1184-9. doi: 10.1016/j.eururo.2011.08.031.
 14. Greenfield SP, Sadler BT, Wan J. Two-stage repair for severe hypospadias. *J Urol.* 1994 Aug; 152[2 Pt 1]:498-501. doi: 10.1016/s0022-5347[17] 32781-7.
 15. Elmoghazy H, Hussein MM, Mohamed E, Badawy A, Alsagheer G, Abd Elhamed AM. A novel technique for repair of mid-penile hypospadias using a preputial skin flap: results of 110 patients. *Int Urol Nephrol.* 2016; 48[12]: 1943-1949. doi: 10.1007/s11255-016-1416-7.
 16. Subramaniam R, Spinoit AF, Hoebeke P. Hypospadias repair: an overview of the actual techniques. *Semin Plast Surg.* 2011 Aug;25[3]: 206-12. doi: 10.1055/s-0031-1281490.
 17. Ozcan R, Emre S, Kendigelen P, Elicevik M, Emir H, Soylet Y, Buyukunal SN. Results of a Two-stage Technique for Treatment of Proximal Hypospadias with Severe Curvature: Creation of a Urethral Plate Using a Vascularized Preputial Island Flap. *Urol J.* 2016 Apr 16;13[2]:2629-34. PMID: 27085564.
 18. Tiryaki S, Ölkəbərova V, Dokumcu Z, Ergun R, Tekin A, Yagmur I, Ulman I, Avanoglu A. Unexpected outcome of a modification of Bracka repair for proximal hypospadias: high incidence of diverticula with flaps. *J Pediatr Urol.* 2016;12(6):395.e1-395.e6 Dec. doi: 10.1016/j.jpurol.2016.04.046.
 19. Snodgrass WT, Nguyen MT. Current technique of tubularized incised plate hypospadias repair. *Urology.* 2002 Jul;60[1]:157-62. doi: 10.1016/s0090-4295[02]01620-5.
 20. Jayanthi VR. The modified Snodgrass hypospadias repair: reducing the risk of fistula and meatal stenosis. *J Urol.* 2003 Oct;170[4 Pt 2]:1603-5; discussion 1605. doi: 10.1097/01.ju.0000085260.52825.73.
 21. Duckett JW. The island flap technique for hypospadias repair. *Urol Clin North Am.* 1981 Oct;8[3]:503-11. PMID: 7324317.
 22. Singh BP, Solanki FS, Kapoor R, Dassi V, Kaswan HK, Agrawal V, et al. Factors predicting success in hypospadias repair using preputial flap with limited pedicle mobilization [Asopa procedure]. *Urology.* 2010 Jul;76[1]:92-6. doi: 10.1016/j.urology.2010.01.020.
 23. Gonzalez R, Smith C, Denes ED. Double onlay preputial flap for proximal hypospadias repair. *J Urol.* 1996 Aug;156[2 Pt 2]:832-4; discussion 834-5. doi: 10.1097/000005392-199608001-00078.
 24. Standoli L. One-stage repair of hypospadias: preputial island flap technique. *Ann Plast Surg.* 1982 Jul;9[1]:81-8. doi: 10.1097/00000637-198207000-00013.
 25. Gong EM, Cheng EY. Current challenges with proximal hypospadias: We have a long way to go. *J Pediatr Urol.* 2017 Oct;13[5]:457-467. doi: 10.1016/j.jpurol.2017.03.024.
 26. Stanasel I, Le HK, Bilgutay A, Roth DR, Gonzales ET Jr, Janzen N, et al. Complications following Staged Hypospadias Repair Using Transposed Preputial Skin Flaps. *J Urol.* 2015 Aug;194[2]:512-6. doi: 10.1016/j.juro.2015.02.044.
 27. Hussein NS, Samat SB, Abdullah MA, Gohar MN. Cosmetic and functional outcomes of two-stage hypospadias repair: an objective scoring evaluation and uroflowmetry. *Turk J Urol.* 2013 Jun;39[2]:90-5. doi: 10.5152/tud.2013.015.



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Print ISSN: 2636-4174

Online ISSN: 2682-3780

of Medical Arts