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Transvers Preputial Island Onlay Flap for Management of Penoscrotal Hypospadias in Pediatrics

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Abstract

Introduction. Preparative onlay island flap surgery includes gained popularity as a means of treating hypospadias because it consistently produces outcomes that are both satisfactory functionally and aesthetically.
Purpose. To evaluate results in terms of erectile function, voiding pattern, and urine continence of transverse preputial island onlay flap technique in the treatment of penoscrotal hypospadias in pediatrics.
Materials and methods. 50 participants were enrolled randomly in the prospective study. Patients undergoing single-stage preputial flap repair included those with mid-penile, posterior penile hypospadias, shallow and narrow urethral plates smaller than 6 mm. Fifty individuals the follow-up period spanned (12–60 months).
Results. Out of 50 children, this study's findings demonstrated an early consequence following stage: wound infection in just one instance (2%), second, which was complicated by the spontaneous closure of a fistula. Following stage, results revealed three cases of meatal stenosis treated with repeated dilatation; sadly, one of them later developed urethral diverticulum. Additionally, one of instances required surgical correction due to a complex urethral fistula. The first two stages' aesthetic look was not excellent after procedure, but it improved when extra tissue was cut out and meatus moved into place on glans penis.
Conclusion. Longitudinal preputial island flap technique have a high success rate and that be used in a variety of instances for proximal hypospadias repairs.
Keywords: onlay flap, penoscrotal, hypospedius, urethrocutaneous fistulae, operative of Duckett

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Применение поперечного препуциального островкового лоскута в лечении пеноскротальных гипоспадий у педиатрических пациентов

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Резюме

Введение. Хирургические операции с наложением островкового лоскута пользуются все большей популярностью в качестве метода лечения гипоспадии, поскольку они позволяют стабильно достигать результатов, оптимальных и с функциональной точки зрения, и с эстетической.
Цель. Оценить результаты наложения поперечного препуциального островкового лоскута в лечении пеноскротальной гипоспадии у педиатрических пациентов с точки зрения эректильной функции, особенностей мочеиспускания и удержания мочи.
Материалы и методы. В проспективное исследование были включены 50 участников, отобранных случайным образом. Одноэтапная пластика с применением препуциального лоскута была выполнена пациентам со средней пенильной, задней пенильной гипоспадией, а также с тонкой и узкой уретральной пластинкой размером менее 6 мм. Период наблюдения за 50 пациентами составил 12–60 месяцев.
Результаты. По результатам исследования из 50 детей в одном случае на раннем этапе после операции развилась раневая инфекция (2%), которая осложнилась спонтанным закрытием свища. На следующем этапе были выявлены три случая меатального стеноза уретры, которые купировались повторной дилатацией; у одного из этих пациентов впоследствии развился дивертикул уретры. Кроме того, в одном случае потребовалась хирургическая коррекция из-за сложного уретрального свища. Эстетический вид после операции на первых двух этапах был далек от идеального, но после иссечения избыточной ткани и перемещения меатуса на его нормальное место, на головку полового члена, он значительно улучшился.
Заключение. Техника наложения продольного препуциального островкового лоскута характеризуется высокими показателями успешности лечения и может быть использована при различных видах проксимальной гипоспадии.
Ключевые слова: накладной лоскут, пеноскротальный, гипоспадия, уретрокожные свищи, уретропластика по Дакетту

■ INTRODUCTION

The ventral portion of the penis is where the urethral meatus is abnormally situated, which a congenital condition is known as penoscrotal hypospadias. Even though a number

of surgical treatments have been established to address it, a dependable and aesthetically acceptable method is still required. The present standard of care frequently entails intricate operations that carry a risk of complications such urethral stricture, fistula development, and less-than-ideal esthetic results. By assessing the effectiveness and safety transverse preputial island onlay flap method of the treatment of penoscrotal hypospadias, this study seeks to solve this clinical problem. Principal issues raised by the statement include: penoscrotal hypospadias as a congenital abnormality exists; limitations of the surgical methods used today, Reliability and visual appeal are required and possible issues [1].

A surgical treatment called hypospadias repair corrects hypospadias. The congenital disorder known as hypospadias causes urethra – the tube that exits body when you urinate – to grow improperly in penis. The meatus is another term for the urethral orifice. Usually, meatus located in the penis-tip [2–4].

Depending on the degree, a hypospadias correction might be a one- or two-stage process. A one-stage hypospadias correction is typically sufficient for children with mild hypospadias. One procedure constitutes a one-stage hypospadias correction. Child needs a two-stage hypospadias correction if they have pen scrotal hypospadias. Two operations, often six months apart, make up a two-stage treatment. The urologist may utilize child's mouth skin to help form their new urethra during this treatment [5–7]. Success rates for hypospadias repairs are very high. Child's penis will continue to grow and function normally; most repairs last a lifetime [8].

Every surgical operation has some risk involved. Among the dangers associated with hypospadias correction are anesthesia concerns. Resolving issues. Ailment, Hematoma, or mass of clotted blood. The following: edema, bruises, unfavorable scarring, or scarring that modifies sensation [8].

Following hypospadias correction, there are potential risks such as wound breakdown. The new location might not be embraced by the transplanted skin [9]. Other complication are urethrocutaneous fistula [10], urinary tract diverticulum [11], and reduced length of the penis [12].

Preputial onlay island flap surgery is becoming more and more well- liked as a means of treating hypospadias because it consistently produces outcomes that are both satisfactory functionally and aesthetically. Recurrence, urethral stricture, and urethrocutaneous fistulae remain the usual postoperative consequences, similar to previous procedures. All those complexities can be linked to inadequate flap vascularity [13]. Certain writers explain a method that addresses several with two faces to produce a more aesthetically pleasing result and a successful repair with fewer complications [7–9]. The goal in this study was to assess the cosmetic results, surgical procedure outcomes, and incidence of problems associated with the hypospadias, a double-faced preputial onlay island flap correction [14].

The transverse preputial island onlay flap technique's safety and effectiveness in treating penoscrotal hypospadias have to evaluate results in terms of erectile function, voiding pattern, and urine continence.

■ PURPOSE OF THE STUDY

To evaluate results in terms of erectile function, voiding pattern, and urine continence of transverse preputial island onlay flap technique in the treatment of penoscrotal hypospadias in pediatrics.

■ MATERIALS AND METHODS

Individuals and Techniques

In order to assess island flap with a double-faced transverse preputial onlay, fifty children who met the necessary requirements were enrolled. Subjects included patients with anterior, mid-, or posterior penile hypospadias, avec or without a little curvature of the penis that is below 30º following penile degloving, and with less than 6 mm in diameter urethral plates that are shallow and thin. Using the closed sealed envelope procedure, Patients were allocated at random. Patients with no complaints, those who have had their circumcisions, those who have had recurring episodes of absent prepuce, those who have diabetes or impaired immune systems, and those who have complicated urogenital abnormalities or disorders related to sexual development are all excluded [15].

Every Patient Experienced

A comprehensive evaluation of patient's medical history in addition to a local examination to determine the kind of hypospadias, chordee severity, and urethral plate state. Prior to surgery, every patient underwent a comprehensive preoperative laboratory evaluation, which included a complete blood count, a random blood sugar test, a virus screen, coagulation studies (PT/PTT), as tests for liver and kidney function [14].

Procedure

There were two stages to the treatment; the first stage started three months after the second. First, transverse incisions were made, and longitudinal cuts were made using the preputial inner skin as a model for the neourethra. In order to pass the catheter through without impeding the preputial vascularity, a buttonhole was made in the penile skin. To straighten the hooked penis, a transverse incision performed in corpus spongiosum and fibrous urethral plate. The hypospadiac aperture was incised in a circle, and the skin was raised in preparation for the transferred inner preputial tube anastomosis [15].

Operative of Duckett

Neomeatus point will lie in the center of the Y. Each of the Y's upper two short limbs is 0.5 cm long. Coronary sulcus met by lengthy vertical leg of Y, which stretches entire length of penis glans. To make room for neourethra, the resulting three flaps are pulled and a soft tissue core is removed. An artificial erection can be produced by making a 3 mm subcoronal circumferential incision beneath the coronal sulcus. Carefully removed are all chordee and fibrous bands. Although it may extend laterally, the midline is where this fibrous tissue is thickest.

Surprisingly, a few surgeons employ dorsal plication to deal with the enduring penile curvature. To release urethra from the surrounding skin, urethral meatus is circumcised. The cutaneous boundaries are cut off, and the meatus and distal urethra are trimmed down to excellent spongiosum. The urethra and proximal spatulated meatus, which are fanned out and connected to the corpora, accept the oblique neourethra's proximal end [16].

Arteries supplying the flap's pedicle are preserved when the preputial and penile skin are released from the shaft in the vicinity of Buck's fascia. A rectangular flap with a width of 1.5 cm is ready. The length needs to be adequate to cross distance from meatus to tip of glans. One can achieve more length by making a horseshoe-shaped incision on either side of penile skin.

The flap is sutured into meatus after being tubularized around an F12 catheter, depending upon age of patient. When finished, the replacement urethra should have a diameter of F12. Cutting needles are used in continuous subcuticular sutures made of Polyglactin 7-0. On the ends, interrupted sutures are employed to allow for the excising of superfluous length.

Next, in a plane that extends from intrinsic blood supply of outer prepuce to base of penis, pedicle separates from the outer preputial skin [17].

Typically, flap is twisted so that proximal urethral meatus is linked to flap's right side. Proximal urethra is opened up by an oblique anastomosis, which allows the spongiosum and healthy tissue to be sutured to the tube. The corporal groove is where the neourethra's suture line is located. The corpora's tunica albuginea serves as the anchor for the proximal anastomosis. To prevent kinking of the proximal anastomosis and redundancy of the tube, the neourethra gradually pushed distally toward the glans. The tube's surplus length is trimmed off. Tube's upper dorsal end is sutured to the upper small median flap that results from Y incision [17]. The neourethra's tip is cut in a small V shape to create a meatus that resembles a slit. The neourethra is wrapped by the medially rotated glanular wings. The glanular wings are kept firmly in place in the midline by three transverse mattress sutures.

It is necessary to have a protective layer in between. When undergoing a long urethroplasty, it is best to remove the scrotal region's tunica vaginalis. An alternate method for forming a protective intermediate layer utilizes Smith's de-epithelialization strategy [17]. The prepuce's remaining portion is split along its midline and encircles the penis.

Procedures Involving Surgery

Two parallel incisions that curved proximally toward the original meatus delineated the urethral plate after draping the patient under general anesthesia. A traction suture then used to close the glans. A circular incision was made two to three millimeters in front of the coronal sulcus. The penile skin was degloved along Buck's fascia proximally down to the penopubic junction. All of the fiber bands encircling the corpus spongiosum were cut in order to eliminate any curvature. A computerized goniometer was used to measure the position, limits of ventral penile curvature during the artificial erection test. When there was little to no curvature left, two midline 5/0 silk sutures at 12 o'clock were used to execute a dorsal corporeal plication [13].

To prevent meatal stenosis, use a catheter Nelaton with an oval-shaped neomeatus and a 6/0 Vicryl suture with inverted edges. Using 6-zero vicryl sutures, the ventral glanular flaps were closed, and the dartos fascia was glued over the repair [14].

In Both Pairs

Up to discharge, patients received antispasmodics (oxybutynin), analgesics (paracetamol 15 mg/kg/dose), and postoperative prophylactic antibiotics (Amoxicillin 100 mg/kg/day). For eight to ten days, urethral catheter was kept in a diaper [15].

Analytical Statistics

Statistical program (SPSS) used in conducting the statistical study. When comparing two means or between groups of qualitative data, the independent-samples t-test of significance was employed, and the chi-square test was utilized for comparison. A significant threshold of $P<0.05$ was established [16].

■ RESULTS

The frequency of problems related to the double face preputial onlay island flap is seen in Table (1). Flap necrosis, glanular dehiscence, penile rotation, urethral diverticulum, overall problems, and urethrocutaneous fistula are among the consequences noted. In 4% of cases, flap necrosis developed (2 out of 50). 10% of patients (5 out of 50) had glanular dehiscence. In 2% of cases, penile rotation was seen (1 out of 50). The incidence of urethral diverticulum was 4% (2 out of 50). A urethrocutaneous fistula occurred in 8% of patients (4 out of 50), while 28% of cases (14 out of 50) had complete problems. With p-values of 0.020 and <0.031, respectively, statistical analysis showed significant differences in the incidence of urethrocutaneous fistula and flap necrosis, suggesting that these problems might be connected to the surgical method used. There were no statistically significant changes observed in other problems, such as penile rotation and glandular dehiscence (p-values of 0.137 and 0.321). As shown in figure.

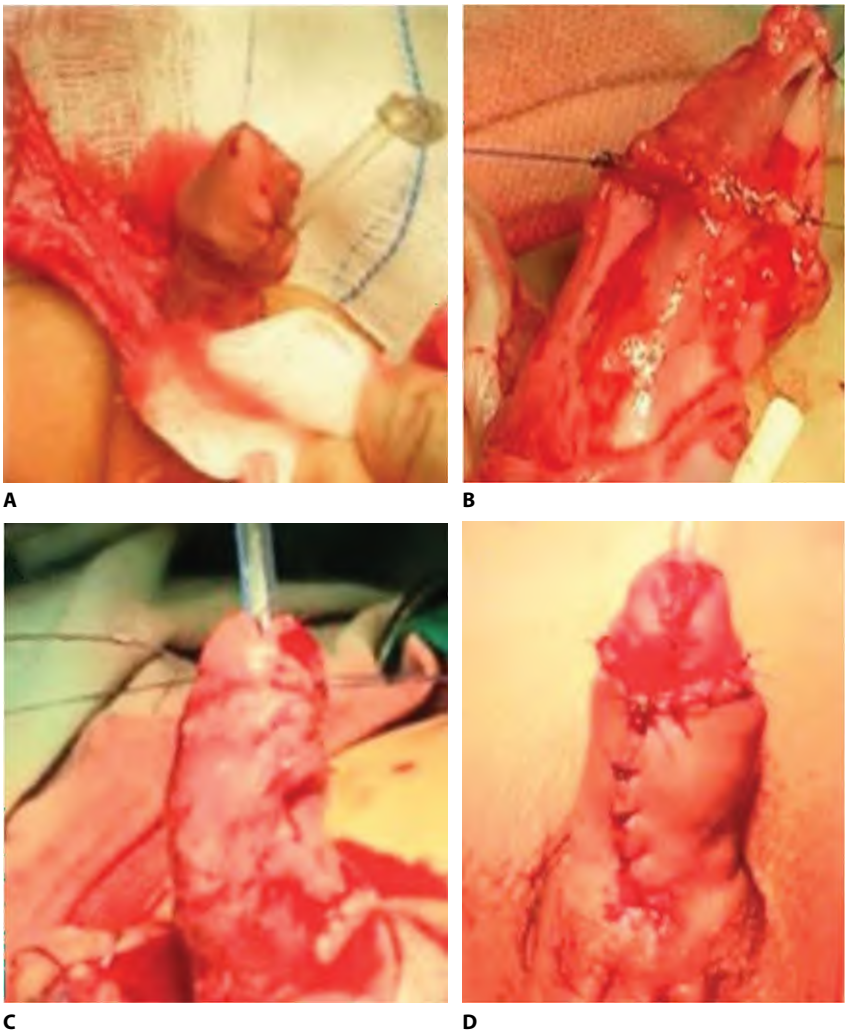
The results of the HOSE (Health Outcomes in Sexuality and Erectile Function) questionnaire are shown in Table 2, which includes specifics of the factors that were

Table 1
The incidence of complications for the double face preputial onlay island flap varies

Complications	No.	%	p-value
Flap necrosis Glanular dehiscence Penile rotation	2 5 1	4 10 2	0.020* 0.137 0.321
Urethral diverticulum Total complications Urethrocutaneous fistula	2 14 4	4 28 8	0.020* <0.031* 0.047*

Table 2
Factors from the HOSE questionnaire for each group

HOSE Variable	Score HOSE	No.
Meatal shape Vertical Slit Circular	2 1	22 28
Urinary stream Single Stream Sprayed	2 1	44 6
Erection Straight Mild angulation Moderate angulation	4 3 2 1	50 0 0 0
Fistula None Single distal Single proximal	4 3 2	48 2 0
Q Multiple or complex	1	0
Meatal position Glannular Distal closest Glannular Coronal Penile shaft	4 3 3 2	46 4 0 0



Preputial transverse flap: A – transverse preputial flap dissection; B – sutures were used to transposition the flap ventrally; C – Closing the glandular wings and securing the dartos fascia over the repaired; D – Using a Bayer's flap, the skin was sutured to the residual skin on both lateral sides (ventral skin closure)

examined for each group. Meatal location, fistula existence, erection, urine stream, and meatal morphology are among the criteria evaluated. As shown below:

- Vertical slit: 22 patients (score 2) 28 patients in the circular (score 1).
  Stream of urine:
  44 patients in a single stream (score 2). Six patients were sprayed (score 1).
  Erection:
- 50 patients (scoring 4) are straight.
- Patients with mild angulation: 0 (score 3)
- 0 patients had moderate angulation (score 2).

Fistula:

- 48 patients (scoring 4) had none.
- Two patients are single distal (score 3).
- 0 patients are single proximal (score 2).
- 0 patients are multiple or complex (score 1).

Meatal position:

- 46 individuals (scoring 4) have glandular.
- Four individuals are the distal most from Glans (score 3).
- Coronal: 0 patients (score 2).
- Penile shaft: 0 patients (score 1).

Group A's postoperative HOSE score ranged from 12 to 16, with a mean of 14.9±1.1. Group B's postoperative HOSE score was 12.4±1.7, with a range of 10 to 16.

■ DISCUSSION

In order to ascertain results, and problems, this study focuses on longitudinal preputial flap procedures penoscrotal hypospadias correction. Fifty cases of proximal hypospadias are included in the study; cases where the technique included the sacrifice of the urethral plate are not included. Following the initial phase, wound infection, urethrocutaneous fistula, and Cosmetic problems can occur. Following the second stage, fistula, urethral diverticulum, and meatal stenosis are among the complications. While there is still uncertainty over the best surgical procedure for treating severe hypospadias, the preputial island flap has been linked to a lower rate of complications than alternative methods. The study's two-stage longitudinal perpetual island flap procedure was designed to treat cases of proximal hypospadias. The cases' average age was 23.05 months [17].

Regarding ventral curvature (chordee), no recurrence was observed throughout the follow-up phase of this investigation. This could be explained by intraoperative chordee repair using a transected urethral plate and the excision of all fiber bands surrounding the corpus spongiosum.

Theoretically, a longer urethral defect could increase the difficulty of the surgery and raise the possibility of complications. Both lengths less than 3 cm and longer than 3 cm of the neourethra were linked to a decreased likelihood of issues [18]. Since the repair was done in two stages, we were not able to find a higher rate of issues in this study despite the protracted urethral defect compared to other studies.

The important ventral curvature problem needs to be addressed in addition to proximal hypospadias repair. A recurrence risk of roughly 37% was linked to simple dorsal plication in comparison to urethral plate transection [19].

The results pertaining to the double face prenuptialonlay island flap's problems align with earlier research that emphasizes the variation in complication rates linked to different penile reconstruction methods. Although this treatment is generally safe, proper surgical technique and postoperative management are essential to reduce the hazards, as evidenced by the considerable incidence of flap necrosis (4%) and urethrocutaneous fistula (8%).

Insufficient blood flow or strain on the surgical site may be the cause of flap necrosis, which is consistent with results from other research highlighting the significance of vascularity in flap survival [14]. Moreover, careful urethral anastomosis is necessary due

to the incidence of urethrocutaneous fistula, a well-recognized complication in urethral procedures [15]. The stated overall problems rate of 28% is comparable to comparable research, showing that although problems are not unusual, they are frequently efficiently treated with the right surgical methods and aftercare [16].

Penile rotation and glanular dehiscence, on the other hand, did not differ significantly, which might be due to individual anatomical variations and the intrinsic heterogeneity in patient healing. This finding lends credence to the idea that although certain issues are directly related to surgery, others might be impacted by variables unique to each patient [17].

All things considered, the double face preputialonlay island flap is still a good choice for penile reconstruction; however, in order to maximize patient outcomes, it is crucial to be aware of and manage any potential risks. The HOSE questionnaire results show that the patient group has a preponderance of positive characteristics related to meatal position, erection quality, urine stream, and meatal morphology. The majority of participants (28 patients) had a circular meatal shape, which has been linked with prior research to better urine function and less complications [18].

According to the urinary stream data, 44 patients were able to maintain a single stream after surgery, indicating that their urinary function was effective. This result is consistent with research that highlights the role that meatal shape plays in maximizing urine flow and minimizing problems [19].

The data revealed that all 50 patients reported a straight erection in terms of erection quality suggesting a positive outcome in erectile function. This is in line with other research findings that emphasize the importance of anatomical reconstruction. in preserving straight erections following surgery [20].

The lack of serious side effects, like fistula formation (48 patients reported none), adds credence to the efficiency of the surgical methods used. The low incidence of fistula formation in this cohort, a known consequence of urological surgery, is indicative of cautious surgical technique [21]. With the majority of patients (46) exhibiting a glandular position the meatal position results likewise point to a positive prognosis. This is crucial because appropriate meatal placement can improve urine function and lower the chance of urethral reconstruction-related problems [21].

Overall, the HOSE questionnaire analysis shows favorable results for the criteria evaluated confirming the efficacy of the surgical methods applied to this patient population.

■ CONCLUSION

The following are the study's main conclusions: Complication rates were 20.0% overall. There was a statistically significant difference. The most frequent issues in group A were necrosis of the skin flap and glanular dehiscence. The diverticulum and urethrocutaneous fistula were the most frequent problems in group B. Following resolution, patients in both groups saw positive cosmetic results and successful surgical outcomes. Group A's HOSE score, which measures postoperative outcomes, was statistically greater than group B's. When compared to the inner technique approach, this study indicates that the double-faced technique may be a promising choice for hypospadias correction. To validate these results, more investigation could be required.

REFERENCES

1. Kaur R, Kaur R. Symptoms, risk factors, diagnosis and treatment of urinary tract infections. *Postgrad Med J.* 2021;97(1154):803–812.
2. Kennelly M, Thiruchelvam N, Averbeck MA, et al. Adult Neurogenic Lower Urinary Tract Dysfunction and Intermittent Catheterisation in a Community Setting: Risk Factors Model for Urinary Tract Infections. *Adv Urol.* 2019;2019:2757862.
3. Peelaerts W, Mercado G, George S, et al. Urinary tract infections trigger synucleinopathy via the innate immune response. *Acta Neuropathol.* 2023;145(5):541–559.
4. Flores-Mireles AL, Walker JN, Caparon M, Hultgren SJ. Urinary tract infections: epidemiology, mechanisms of infection and treatment options. *Nat Rev Microbiol.* 2015;13(5):269–84.
5. Pape L, Gunzer F, Ziesing S, et al. Bakterielle Erreger, Resistenzentwicklung und Behandlungsoptionen beim ambulant erworbenen Harnwegsinfekt im Kindesalter [Bacterial pathogens, resistance patterns and treatment options in community acquired pediatric urinary tract infection]. *Klin Padiatr.* 2004;216(2):83–6.
6. Mortazavi-Tabatabaei SAR, Ghaderkhani J, Nazari A, et al. Pattern of Antibacterial Resistance in Urinary Tract Infections: A Systematic Review and Meta-analysis. *Int J Prev Med.* 2019;10:169.
7. Diao M, Li L, Ming AX, et al. Efficacy of Laparoscopic Management of Posterior Urethral Diverticulum in Anorectal Malformations. *Eur Urol.* 2023;83(1):55–61.
8. Chou CP, Levenson RB, Elsayes KM, et al. Imaging of female urethral diverticulum: an update. *Radiographics.* 2008;28(7):1917–30.
9. Greiman AK, Rolef J, Rovner ES. Urethral diverticulum: A systematic review. *Arab J Urol.* 2019;17(1):49–57.
10. Ibrahim E., Salem A., Abd Elhafez A. The Proximal Hypospadias Repair by Using Longitudinal Preputial Double-Layerd Island Flap Technique. *Egyptian Journal of Hospital Medicine.* 2022;88(7):3969–3975.
11. Srivastava R, Tandale M, Panse N. Management of urethrocutaneous fistula after hypospadias surgery – An experience of thirty-five cases. *Indian Journal of Plastic Surgery.* 2011;44(1):98–103.
12. Aritonang J, Wahyudi I, Situmorang GR, Rodjani A. Comparison of outcome and success rate of onlay island flap and dorsalinlay graft in hypospadias reconstruction: a prospective study. *Res Rep Urol.* 2020;16(12):487–494.
13. Elemam A, Gismalla MD, Taha SM. Transverse Ventral Island Preputial Tube Versus Double Face Preputial Tube in the Repair of Penoscrotal Hypospadias: Does the Dissection of the Tube from Dorsal Preputial Skin Affect the Outcome of Repair? *Global J Med Res: I Surg Cardiovasc Syst.* 2017;17(1):10.
14. Olajide AO, Salako AA, Aremu AA, et al. Complications of transverse distal penile island flap: urethroplasty of complex anterior urethral stricture. *Urol J.* 2010 Summer;7(3):178–82.
15. Carney KJ, McAninch JW. Penile circular fasciocutaneous flaps to reconstruct complex anterior urethral strictures. *Urol Clin North Am.* 2002;29(2):397–409.
16. Salgado CJ, Chim H, Tang JC, et al. Penile reconstruction. *Semin Plast Surg.* 2011;25(3):221–8.
17. Vieiralves RR, Conte PH, Felici EM, et al. Impact Assessment of Urethral Meatus Morphology and Penile Biometry in Transurethral Prostate and Bladder Surgery. *Adv Urol.* 2017;2017:6321702.
18. Abdeen BM, Leslie SW, Badreldin AM. Urethral Strictures. [Updated 2024 Oct 29]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024. Available from: https://www.ncbi.nlm.nih.gov/books/NBK564297/
19. Erickson BA, Granieri MA, Meeks JJ, et al. Prospective analysis of erectile dysfunction after anterior urethroplasty: incidence and recovery of function. *J Urol.* 2010;183(2):657–61.
20. Geltzeiler CB, Wieghard N, Tsikitis VL. Recent developments in the surgical management of perianal fistula for Crohn's disease. *Ann Gastroenterol.* 2014;27(4):320–330.
21. Dos Santos JVQV, Görgen ARH, Bortolini T, et al. Outcomes of urethral meatal preservation ventral urethroplasty for female urethral stricture: a series of cases. *Rev Bras Ginecol Obstet.* 2024;46:e-rbgo20.