

Research Article

J Ped. Nephrology 2018;6(3)
http://journals.sbmu.ac.ir/jpn

Hypospadias Repair Using Transverse Preputial Island Flap (Modified Asopa Procedure)

How to Cite This Article: Patil A, Sharma A, Narsing M, Sandesh P, Mukund A, Hemant P. Hypospadias Repair Using Transverse Preputial Island Flap (Modified Asopa Procedure). J Ped. Nephrology 2018;6(3).

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Received: Nov-2018

Revised: Nov-2018

Accepted: Dec-2018

Introduction: The modified Asopa's procedure for repair of hypospadias is well established and suited for patient characteristics for which Snodgrass urethroplasty cannot be done. We describe our experience with this procedure in 30 patients managed with this procedure highlighting the factors affecting outcome in this repair.

Materials and Methods: Data of 30 patients (age range 2.5-15 years) who underwent hypospadias repair in a tertiary care teaching institution from 2012 to 2015 with modified Asopa procedure (Hodgson XX technique) utilizing Transverse Preputial Island Flap by a single surgeon were reviewed and retrospectively analyzed according to age of patients, site of meatus, presence or absence of chordee, glans configuration and complications - fistula, glans dehiscence, meatal stenosis. These complications were further analyzed with respect to the various patient characteristics and GMS (Glans, Meatus and Shaft) score.

Results: The mean age of presentation was 5.5 years and mean follow-up period was 22 months. The mean total GMS score was 8.5; range being 11 to 5. In total, only six patients had complications (20%). The patients with low GMS score (7 or less) had no complications. The complication rate was more in proximal hypospadias repair (n= 5/24) when compared with distal hypospadias (n=1/6). There were more complications in patients with chordee (n=4/6) and those with conical glans (n=4/6).

Conclusion: Location of the meatus, presence/absence of chordee and glans configuration affect outcome in patients undergoing modified Asopa's procedure for hypospadias repair.

Keywords: hypospadias; Asopa's procedure; Child; Complications; Outcome.

Running Title: Hypospadias Repair Using Transverse Preputial Island Flap

Introduction

Hypospadias is defined as a urethral opening proximal and ventral to the normal glanular location. It occurs in 1 in 350 live male births [1, 2]. The urethral meatus may be located ventrally anywhere between the tip of the glans to the perineum [1]. Hypospadias is commonly, but not always, associated with chordee - ventral curvature of the penis [1]. In most cases, there is deficient ventral penile skin and a hooded dorsal prepuce [1].

The history of hypospadias surgery dates back to 1838 when the first unsuccessful attempt at hypospadias repair was done by Dieffenbach [1, 3] and the first successful repair was performed by Anger in 1874 [1, 2]. Initially, hypospadias repair involved multistage procedures based on some basic principles - ventral tube or strip of skin, perimeatal flaps, free grafts, use of penile or scrotal tissue for the tube, urethral mobilization,

and creation of a buttonhole in the preputial hood to transfer the skin ventrally [1, 2, 4, 5]. However, with proper understanding of the vascularity and healing of flaps, several newer surgical techniques have evolved for single stage repair of hypospadias [1]. Advances in suture materials, catheters, dressing, hemostasis, and the use of intra-operative magnification have all resulted in better cosmetic and functional results in the single stage hypospadias repair [1].

The use of Transverse Preputial Island Flap (TPIF) based on superficial dorsal vessels of the penis was first introduced by Asopa et al [1] in 1971. This repair was based on a transverse pedicle flap utilizing the undersurface of the prepuce to replace the urethra [6]. However, a major problem with this technique was penile torsion because of the transference of the entire preputial skin with the attached skin tube [6]. This technique was modified by Hodgson: the preputial skin was incised on a bias, leaving the newly constructed skin tube attached to the larger surface area of the incised preputial skin [6]. This procedure was termed as the Hodgson XX technique and has a lower fistula rate than the Duckett procedure (Duckett 1981) because the neourethra is left attached to the undersurface of the penis as reported by Wacksman in 1986 [7]. Because the preputial skin is totally dissected back to the penopubic angle, penile torsion does not occur in this technique [6].

This study highlights our institutional experience in hypospadias repair using the modified Asopa procedure.

Materials and Methods

This retrospective study was done in 30 patients (age range 2.5-15 years) who underwent hypospadias repair in a tertiary care teaching institution from 2012 to 2015 using the modified Asopa procedure (Hodgson XX technique) with a Transverse Preputial Island Flap (TPIF) by a single surgeon. Patients with no history of local surgery with a narrow urethral plate and hooded prepuce were included in the study.

Patients with a history of previous surgery, loss of preputial skin, and severe chordee were excluded from the study (patients with severe chordee are managed by a two-stage procedure, as against ventral tube repair which had a significant complication rate in our previous study) [8].

The patients were analyzed according to patient's age, site of meatus, presence or absence of chordee, glans configuration, and complications,

including fistula, glans dehiscence, and meatal stenosis. All patients were scored using the GMS method (Glans, Meatus and Shaft Scoring) [9].

The technique was as follows. After taking a glans-holding suture, a circumcising incision was outlined with a marker and extended to the midline ventrally beyond the meatus. A solution of 1:100 000 noradrenaline and 1 ml lidocaine was infiltrated along the marked line to ensure hemostasis. The skin was then incised and the penis was degloved superficial to the Buck's fascia. Dissection started ventrally and then dorsally to the penopubic junction.

The urethral meatus was incised proximally until the vascularized corpora spongiosum with a normal appearance was encountered, and normal bleeding from the native urethra was noted. The dysplastic urethral plate was resected. After the artificial erection test, the fibrotic tissue was excised and the modified Nesbit procedure was done if any more correction was required.

The inner preputial skin was marked according to the length of the urethral defect.

A transverse preputial island flap was mobilized along its pedicle from the overlying outer preputial skin up to the penopubic angle. The flap was then sutured according to the native urethra using 5-0/6-0 PDS continuous sutures.

Glansplasty was then done over the neourethra in two layers. The second vascular layer was given over the neourethra using the local tissue. The ventral surface was covered with the preputial skin after Byar's cut. The thinner left side was brought around and sutured in the midline, thereby avoiding penile torsion.

Dressing was done and the nelaton catheter was kept in place for 10 days. On the 10th postoperative day, the dressing and nelaton catheter were removed and the patient was allowed to pass urine (Figure 1). The patients were discharged on the same day and assessed after 1, 6, and 12 months.

Results

The mean age at presentation was 5.5 years, ranging from 2.5 to 15 years. The mean follow-up period was 22 months (range: 8 to 36 months). The glans was conical in 18 patients (60%) and splayed in 12 patients (40%) (Figure 2). The maximum and minimum G score was 4 and 1, respectively.

The mean G score was 2.7. Six patients (20%) had distal hypospadias and 24 (80%) had proximal hypospadias (Figure 3).

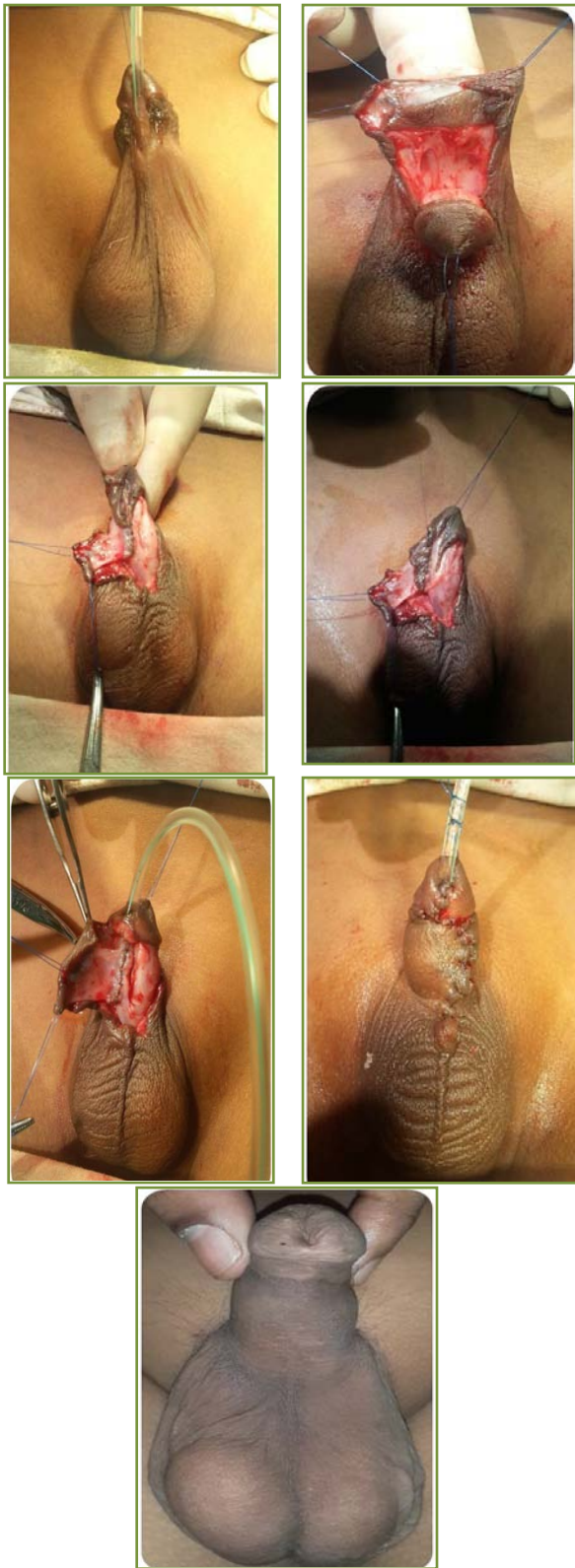


Figure 1. The technique of surgery in study group

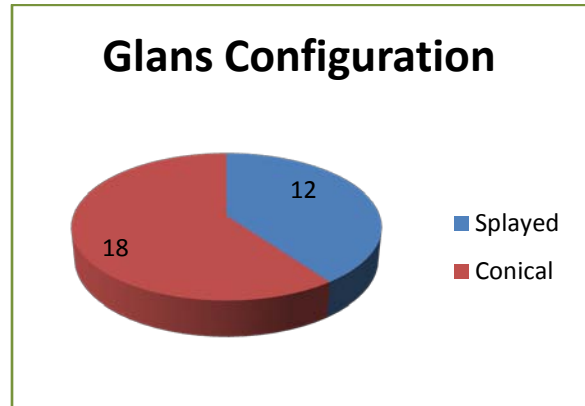


Figure 2. Pie-chart showing the glans configuration in 30 children.

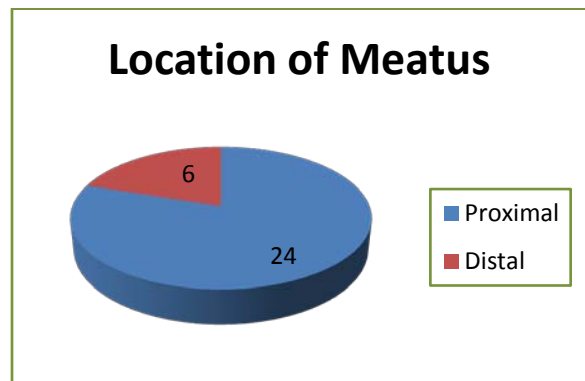


Figure 3. Pie chart showing the location of meatus in 30 children.

Thus, the maximum and minimum M score was 4 and 3 respectively with a median of 3.8. Chordee was present in 15 patients (50%). The mean S score was 1.8 with a maximum of 3 and minimum of 1. The mean total GMS score was 5.4. Four patients had a GMS score of 5, 4 had a GMS score of 6, 4 had a GMS score of 7, 3 had a GMS score of 8, 1 had a GMS score of 9, 10 had a GMS score of 10, and 4 had a GMS score of 11.

Overall, only 6 patients had complications (0.2%) – 3 patients (0.1%) had fistula, 2 (0.06%) had meatal stenosis, and 1 (0.03%) had glans dehiscence.

The 3 patients with fistula had a GMS score of 10 each. The 2 patients with meatal stenosis had a GMS score of 10 and 8. The patient who had glans dehiscence had a GMS score of 11. The patients with a low GMS score (7 or less) had no complications (Figure 4 and Table 1).

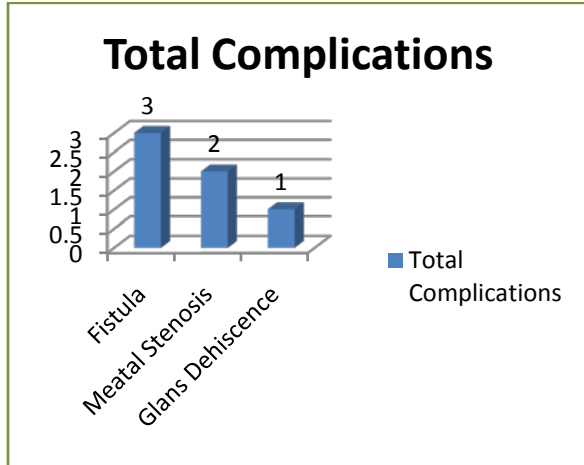


Figure 4. Bar chart showing total complications.

Table 1. Relation of GMS score and complications

GMS Score	Total Patients	Complications		
		Fistula	Meatal Stenosis	Glans Dehiscence
5	4	-	-	-
6	4	-	-	-
7	4	-	-	-
8	3	-	1	-
9	1	-	-	-
10	10	3	1	-
11	4	-	-	1

The complication rate was higher in proximal hypospadias repair (20.83 %) with meatal stenosis in one patient (4.16 %), glans dehiscence in one patient (4.16%), and fistula in 3 patients (12.5%). The complication rate of distal hypospadias repair was 16.66% (n=1) with only one case of meatal stenosis and no cases of glans dehiscence or fistula formation. There were more complications in patients with chordee (n=4/6), with fistula in 3 patients, glans dehiscence in 1 patient, and meatal stenosis in 1 patient. Only 1 patient with no chordee had meatal stenosis. There were more complications in patients with conical glans (n=4/6), including fistula in 2 patients, glans dehiscence in 1 patient, and meatal stenosis in 1 patient. Only 2 patients with splayed glans had complications - one had meatal stenosis and the other had coronal fistula (Table 2 and Figures 5-7).

None of the 30 patients developed skin necrosis, stricture, diverticulum, or residual chordee in the follow-up period. Four patients had 5-10 degrees of penile torsion, and 5 patients had some bulky skin cover on the ventral surface of the penis that was acceptable to the patients and parents.

Table 2. Relation of patient group and complications

Patient groups	Complications %			
	Fistula	Meatal stenosis	Glans dehiscence	Total
Total pt (30)	9.9% (3/30)	6.6% (2/30)	3.3% (1/30)	20% (6/30)
Type of hypospadias				
Proximal(24)	12.5% (3/24)	4.16 % (1/24)	4.16 % (1/24)	20.8% (5/24)
Distal (6)	-	16.6% (1/6)	-	16.6% (1/6)
Chodree				
Present (15)	20 % (3/15)	6.6% (1/15)	6.6% (1/15)	33.33 % (5/15)
Absent (15)	-	6.6% (1/15)	-	6.6% (1/15)
Glans configuration				
Conical (18)	11.1% (2/18)	5.5% (1/18)	5.5% (1/18)	33.3% (4/18)
Splayed (12)	8.3% (1/12)	8.3% (1/12)	-	16.6% (2/12)

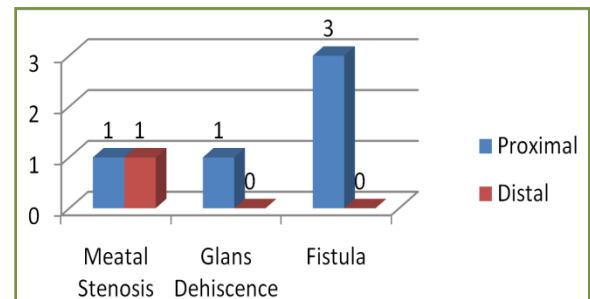


Figure 5. Complications in relation to the location of the meatus.

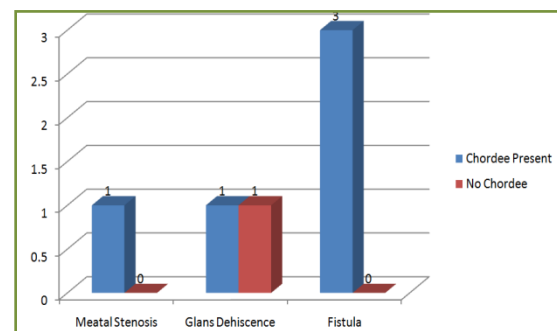


Figure 6. Complications in relation to the presence/absence of chordee.

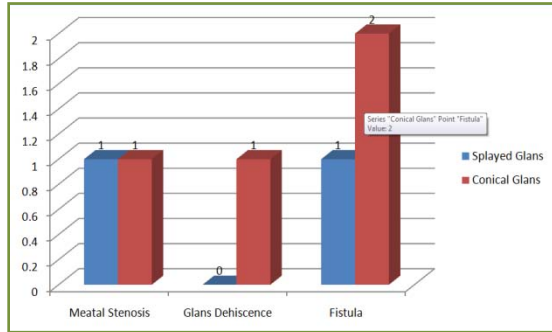


Figure 7. Complications in relation to glans configuration.

Discussion

With proper understanding of the vascularity and healing of flaps, several newer surgical techniques have emerged during the last 50 years [1]. Better cosmetic and functional results in a large percentage of patients in a single operation have resulted from advances in suture materials, catheters, dressing, hemostasis, and magnification [1]. One-stage hypospadias repair claims ideal anatomic and functional urethral reconstruction with good aesthetic restoration of the external genitalia, a low complication rate, minor psychological involvement, and reduced social costs.

The ideal surgical procedure for penoscrotal or perineoscrotal hypospadias with severe chordee remains elusive [10]. When hypospadias is associated with severe chordee, resection of the urethral plate becomes mandatory for orthoplasty [11]. The tubularized preputial island flap is then the technique of choice in patients with preserved prepuce [11, 12, 13]. The inner preputial skin is one of the most suitable epithelial structures available for neourethra creation with good vascularity [11, 14].

In this study with a limited number of patients, this procedure was done in patients unsuitable for Snodgrass repair and the urethral plate was preserved in as many patients as possible for an onlay island flap urethroplasty. Overall, the complication rate in the present series was 20% and the most common complication was fistula in 9.9% of the cases. Other complications were glans dehiscence in 3.3% and meatal stenosis in 6.6% of the patients. Although 4 patients had some bulky skin cover on the ventral aspect of the penis after this procedure, it did not bother the patients and their parents during the follow-up. This bulkiness could be avoided in most of the cases by extending the dorsal cut by a bias incision across the midline beyond the pedicle.

Penile torsion (a criticism of the Asopa technique) can occur in the Duckett technique too, especially if the pedicle is not adequately mobilized up to the base of the penis. The 5-10 degrees of torsion that was noted in 5 patients was minimal and did not cause any significant penile disfigurement on erection. In the Asopa technique, torsion can be avoided by an extended oblique cut and rotating the entire skin cover circumferentially to the maximum. In this study, penile torsion was not a significant problem as long as the entire preputial unit (neourethra and overlying skin) was dissected back to the penopubic angle, which completely released the penis to allow it to remain straight.

The complication rate was higher in patients with a conical glans configuration in comparison with a splayed glans. Patients with a conical glans typically have a narrow urethral plate with little distal extension, while patients with a splayed (well-clefted) glans tend to have a wider and healthier urethral plate with a better distal projection. This might be the reason for the higher rates of coronal fistula and meatal narrowing in patients with conical glans configuration.

The urethral plate is well vascularized and has a rich nerve supply and an extensive muscular and connective tissue backing. These features may explain the lower complication rate with onlay flaps than with tube flaps. Therefore, from these anatomical findings, we continue to advocate preservation of the urethral plate and the onlay island flap for hypospadias reconstruction [15].

Higher complication rates were seen in patients with proximal hypospadias, chordee, and conical glans configuration. Studies by Ghali et al, Ozturk et al, Imamoglu et al, Hollowell et al, and Chin et al also reported higher complication rates in patients with proximal hypospadias, severe chordee, and conical glans [16, 17, 18, 19, 20]. In studies that only included proximal defects, the overall complication rates increased to 31-33% with fistula rates of 17% [20, 21, 22, 23, 24].

Recently, the use of the Snodgrass technique has been extended to patients with narrower plates (8 mm), significant chordee, and proximal hypospadias by mobilization of the distal plate and proximal urethra [25, 26]. Although short-term results have been encouraging, there are certain concerns. Urethral plate mobilization may hamper the vascularity of the neourethra, leading to recurrent chordee on longer follow-up - as reported by Demirbileket *al* in onlay repairs [24]. In their study, 2 of the 3 patients who underwent urethral plate mobilization during an onlay

procedure developed recurrent chordee. Despite similar urethroplasty calibers, the uroflow curves and fistula positions in patients undergoing tubularized incised plate repair suggest that the neourethra distal to the fistula may be relatively narrow, creating flow resistance resulting in proximal fistula [27].

Braga et al reported a complication rate of 60% in cases with TIP repair versus 45% in patients with onlay repair [27]. In this study, the fistula rate was 51.4% in TIP repair and 25% in onlay flap repair [27]. The average flow rate was 6.4 ml/sec in TIP repair and 9 ml/sec in onlay repair [27]. The peak flow rate was 8.4 ml/sec in TIP repair and 1.9 ml/sec in patients with onlay repair [27]. Suijantarat et al and Snodgrass and Lorenzo reported complication rates of 37.5% and 33% in patients with TIP repair, respectively [28, 29]. However, longer follow-up and close monitoring are needed before preferring one approach to the other [27]. The modified Asopa technique allows a single-stage repair with the attendant benefits to the patient. It also has the primary advantage of incorporation of vascularized preputial flaps rather than the use of free grafts [10]. Patel et al confirmed the good long-term viability of preputial flaps in their 20-year review of outcomes using vascularized preputial flaps for severe hypospadias [10, 30]. It has been recommended to use preputial flaps as an island onlay when the urethral plate is preserved or as an island tube when it is not [10, 31].

The island onlay repair recreates a urethral plate with one side of the ventrally transposed inner preputial skin that is anchored to the medial margin of the corpora [tech]. When the medial edge of the flap is anchored to the corpora, the opposite end of the flap can easily be stretched to accurately match the neourethra to the size of the native urethra, which reduces the risk of turbulent voiding that might contribute to the formation of urethral diverticulum [tech]. As the adjacent suture lines are dorsal, the risk of fistula formation is also minimized [tech].

Conclusion

The modified Asopa transverse preputial flap technique is a well-established technique that can be used in patients unsuitable for Snodgrass TIP urethroplasty. The major advantage of this technique is its ability to maintain good vascularity to the neourethra and the skin cover, thereby avoiding urethral or penile skin necrosis. However, patients with proximal hypospadias,

severe chordee, and conical glans have higher complication rates.

References

1. Asopa HS. Newer concepts in the management of hypospadias and its complications. *Ann R Coll Surg Engl.* 1998;80:161-168.
2. Backus LH, Defelice CA. Hypospadias: then and now. *Plast Reconstr Surg* 1960;25:146-68.
3. Dieffenbach JF. Guérison des fentes congénitales de la verge, de Hypospadias. *Gazette de médecine* 1837;5:156.
4. Duckett JW. Hypospadias. In: Walsh PC, Retik AB, Stamey TA, Vaughan ED, eds. *Campbell's Urology*, 6th edition. Philadelphia: WB Saunders Co, 1992:1892-1919.
5. Devine CJ Jr, Horton CE. A one stage hypospadias repair. *F Urol* 1961;85:166-72.
6. Hadidi AT, Men behind principles and principles behind techniques. In Hadidi AT, Azmy AF, eds. *Hypospadias Surgery: An Illustrated Guide*. Springer-Verlag Berlin Heidelberg 2004:19-49.
7. Wacksman J, The Modified Asopa (Hodgson XX) Procedure to Repair Hypospadias with Chordee. In Hadidi AT, Azmy AF, eds. *Hypospadias Surgery: An Illustrated Guide*. Springer-Verlag Berlin Heidelberg 2004:187-90.
8. 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.
9. Patel RP, Shukla AR, Austin JC, Canning DA. Modified tubularized transverse preputial island flap repair for severe proximal hypospadias. *BJU International* 2005;95:901-4. doi:10.1111/j.1464-410X.2005.05425.x
10. Sowande AO, Olajide AO, Salako AA, Olajide FO, Adejuyigbe O, Talabi AO. Experience with transverse preputial island flap for repair of hypospadias in Ile-Ife, Nigeria. *Practitioners Section* 2009;6(1):40-3.
11. Duckett JW Jr. Transverse preputial island flap technique for repair of hypospadias. *Urol Clin N Amer* 1980;7:423-30.
12. Duckett JW. The island flap technique for hypospadias repair. *Urol Clin North Am* 1981;8:503-8.
13. Elder JS, Duckett JW. Urethral reconstruction following an unsuccessful one-stage hypospadias repair. *World J Urol* 1987;5:19-6.
14. Erol A, Baskin LS, Liu YW, Liu WH. Anatomical studies of the urethral plate: why preservation of the urethral plate is important in hypospadias repair. *BJU International* (2000);85:728-34.
15. Ghali AM. Hypospadias repair by skin flaps: A comparison of onlay preputial island flaps with either Mathieu's meatal-based or Duckett's tubularized preputial flaps. *BJU Int.* 1999;83:1032-1038.
16. Ozturk H, Onen A, Otçu S, et al. The outcome of one-stage hypospadias repairs. *J Pediatr Urol.* 2005;1:261-266.
17. Imamoglu MA, Bakirtas, H, Tuygun C, et al. Clinical experiences with different one-staged surgical methods for primary hypospadias cases. *Int Urol Nephrol.* 2002;33:107-112.

18. Hollowell JG, Keating MA, Snyder HM 3rd, et al. Preservation of the urethral plate in hypospadias repair: extended applications and further experience with the onlay island flap urethroplasty. *J Urol* 1990;143:98–100.
19. Chin TW, Liu CS, Wei CF. Hypospadias repair using a double onlay preputial flap. *PediatrSurgInt*2001;17:496–8.
20. Wiener JS, Sutherland RW, Roth DR, et al. Comparison of onlay and tubularized island flaps of inner preputial skin for the repair of proximal hypospadias. *J Urol* 1997;158:1172–4.
21. Barroso U Jr, Jednak R, Spencer Barthold J, et al. Further experience with the double onlay preputial flap for hypospadias repair. *J Urol* 2000;164:998–1001.
22. Emir L, Germiyanoglu C, Erol D. Onlay island flap urethroplasty: a comparative analysis of primary versus reoperative cases. *Urology* 2003;61:216–9.
23. Demirbilek S, Kanmaz T, Aydin G, et al. Outcomes of one-stage techniques for proximal hypospadias repair. *Urology* 2001; 58:267–70.
24. Bhat A. Extended urethral mobilization in incised plate urethroplasty for severe hypospadias: A variation in technique to improve chordee correction. *J Urol*. 2007;178:1031-1035.
25. Palmer LS, Palmer JS, Franco I, et al. The “long Snodgrass”: Applying the tubularized incised plate urethroplasty to penoscrotal hypospadias in 1-stage or 2-stage repairs. *J Urol*. 2002;168:1748- 1749
26. Braga LH, Pippi Salle JL, Lorenzo AJ, et al. Comparative analysis of tubularized incised plate versus onlay island flap urethroplasty for penoscrotal hypospadias. *J Urol*. 2007;178:1451-1456
27. SujjantararatP, Chaiyaprasithi B. Comparative Outcome Between Transverse Island Flap Onlay and Tubularized Incised Plate for Primary Hypospadias Repair. *Asian J Surg*. 2009 Oct;32(4):229-33. doi: 10.1016/S1015-9584(09)60399-7.
28. Snodgrass W, Lorenzo A. Tubularized incised-plate urethroplasty for proximal hypospadias. *BJU Int*2002;89:98–100.
29. Patel RP, Shukla AR, Snyder HM 3rd. The island tube and island onlay hypospadias repairs offer excellent long- term outcomes: a 14-year follow-up. *J Urol* 2004; 172: 1717–19.
30. Elder JS, Duckett JW, Snyder HM. Onlay island flap in the repair of mid and distal penile hypospadias without chordee. *J Urol* 1987; 138: 376–9.