IOSR Journal Of Pharmacy
(e)-ISSN: 2250-3013, (p)-ISSN: 2319-4219
www.Iosrphr.Org Volume 4, Issue 2(February - 2014), Pp 14-20

Tunica Vaginalis Flap as a second layer for Tubularized incised plate urethroplasty (Snodgrass method) in reoperation for hypospadias

Dr. Hazim R. Akal

FICMS (urol),Assistant professor , Dept .of surgery medical college , Thi-Qar university

Purpose:

Reoperation for failed hypospadias has been considered to be seriously bothersome because abundant penile skin doesn't tend to remain for urethroplasty or for penile shaft skin coverage.

In this study, the tubularization of incised urethral platewrapped by tunica vaginalis flap as the second layer to increase the success rate of operation and decrease the incidence of urethrocutaneous fistula.

Materials and Methods:

Between March 2008 and November 2013, 23 boys, (3.5 -18) years old, who were treated using a Tubularized Incised Plate Urethroplasty(Snodgrass method) and vascularized tunica vaginalis flap as a second layer,for previously failed hypospadias repair. The hypospadias defects included 12 (52%) distal (coronal or subcoronal), 6 (26%) distal penile and 5 (22%) mid shaft defects (three of them have residual chordee).17patients had one operation and 6 had two operation previously. all patients did not have foreskin because of the previous surgery. There was no apparent scarring of the plate.

Wound infections, meatal stenosis, and urethrocutaneous fistula were considered as treatment complications. Success rates of surgery were recorded. Failure was defined as need for re-operation.

Results:

The operation was successful in 14 out of 17 (82.3%) patients who had undergo one operation before, and 4 out of 6 (66.6%)of patients with 2 operation previously as well have sufficient outcome. Complication was observed in 5 patients. Of studied patients, 2 developed wound infection, 2 developed urethra-cutaneous fistulas, and one developed meatal stenosis. The patients with meatal stenosis and wound infection were managed conservatively.

Conclusion:

Snodgrass technique in combination with tunica vaginalis flap as a second layer is a reasonable procedure for hypospadias repair especially in reoperationwhen there is no excess skin; also it has good cosmetic appearance and acceptable complication rates. Currently,fistula formation remains the most common complication of this technique,which often needs surgical repair.

Introduction:

Hypospadias refers to incomplete urethral development due to incomplete fusion of urethral folds that results in a meatus located anywhere from the proximal glans to the perineum.

The word (hypospadias) is Greek; hypo =under, and spadias to tear off. The condition occurs in approximately 1in 150 to 1 in 300 males, making hypospadias the second most common birth defect in boys after cryptorchidism.

Recent surveys suggest that the incidence of hypospadias is increasing in industrialized countries, possibly due to environmental estrogen or antiandrogens.[(1)]

The external genitalia are initially indifferent and, in the absence of androgen, inherently develop the female phenotype. The critical time frame for phallic development is from 8 to 12 weeks gestation, when the genital tubercle elongate and the urethral plate on its ventral surface tabularizes from proximally to the tip of the glans. During this phase, the penis is curved ventrally because of the corpora cavernosa, as well as shaft skin and prepuce, develop faster on the dorsal than the ventral aspect, after 12 week gestation, androgen stimulation increases the size of the phallus. [(2)]

Hypospadias result from an arrest in these normal processes.
The incompletely tabularized urethra opens on the undersurface, the penis may curved downward, and the foreskin typically is deficient ventrally (fig.1). In a related variant, the urethral meatus may be located properly on the glans, but the ventral foreskin is lacking. Less often complete prepuce conceals the urethral defect that is detected only during circumcision.[3]

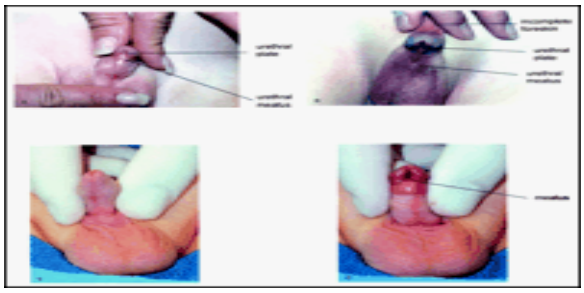


Figure 1.Varieties of hypospadias. A. In most cases, the urethral opening is on or near the glans, and the tissue that should have completed tubularization extends distally as the "urethral plate." B. With proximal hypospadias, the urethral meatus is at the penoscrotal junction, with the urethral plate extending to the glans tips. Most cases of proximal hypospadias also have ventral curvature, commonly referred to as "chordee." C. Hypospadias variant with a completely developed foreskin concealing the defect. D. When the foreskin is retracted, the meatus is noted at the corona

Pathogenesis:

Any error in masculinization theoretically could result in hypospadias and no specific defect has been found to explain the condition. The karyotype usually is normal. Subtle abnormalities in the hypothalamic-pituitary-testis hormonal axis have been reported, although subsequent pubertal development appears unaffected.[3]
Similarly, minor defects in testosterone formation, 5-alpha reductase activity and androgen receptor function have been detected.
Altered molecular process normally resulting from androgen stimulation also may play a role.
Finally genetic factors have been identified in approximately 20% of cases. The likelihood that a couple will have a boy who has hypospadias increases if the father, another sibling, or other relatives have the condition. [4]

Diagnoses and evaluation:
Most often, hypospadias is suspected at birth because of theabnormal appearance of the foreskin. Physical examination revealsthe displaced urethral meatus and also should confirm the presenceof two normally descended testicles. In more severe cases involvinga proximal meatus, the scrotum may have a deep cleft and sometimesextends along the sides of the penis to engulf it partially.In the past, such cases often were evaluated further with radiographyto detect renal anomalies. However, recognition that the arrestin penile development that creates hypospadias occurs afterkidney formation has ended that practice. In addition, renalanomalies rarely occur in patients who have hypospadias.[5]

Although hypospadias represents incomplete masculinization,typical cases are not considered evidence of intersexuality.However, most pediatric urologists recommend that a karyotype be obtained when cryptorchidism also is present.Under thesecircumstances, intersexuality is found in up to 50% of cases,especially when the urethral meatus is proximal and a testicleis not palpated. The most common abnormality is mixed gonadaldysgenesis with a 46XY, 45XO mosaic pattern. If neither testicleis felt, virilization of a female who has congenital adrenalhyperplasia must be excluded, even if the phallus is well formed. [6]

Grading scales have been proposed to classify the severity ofpenile malformation. Primary care physicians commonly dividepatients into three grades according to the position of theurethral meatus: First-degree, on the glans; second-degree,on the penile shaft; and third-degree, penoscrotal to perineal.The major shortcoming of this system is that it does not takeinto account either the extent of ventral penile curvature (so-called"chordee") or the occasional finding of a distal meatus witha

dysplastic urethra that actually represents a form of proximalhypospadias (Fig. 2).[7] Although both curvature and a poorly formedurethra often can be suspected preoperatively, the impact ofeither on surgical decision-making cannot be determined reliablyuntil correction is undertaken. This emphasizes the need foreven apparently minor hypospadias to be repaired by experiencedpediatric urologists.[7]

Figure 2. Dysplastic urethra. Although the meatus ends on the proximal glans, the distal urethra in this boy was very thin and closely adherent to the overlying skin. Under such circumstances, it may be necessary to reconstruct the entire penile urethra.

Management:

Today, most boys who have hypospadias and related variants undergosurgical correction. It has been emphasized not to circumcisethese boys, especially because some repairs incorporate preputialskin into the urethroplasty. Although most distal hypospadiascurrently are corrected by using techniques that do not requireforeskin, it still is advised not to attempt newborn circumcisionfor any boy found to have a foreskin anomaly. In the event that an apparentlynormal child who has a complete prepuce is not recognized tohave hypospadias until after circumcision, there is little causefor concern because urethroplasty still be can performed. Thefamily should be reassured, however, that a "botched circumcision"did not cause the urethral anomaly. In some cases, examinationmay suggest a small urethral meatus, but no urinary obstruction,and meatotomy is not needed as an interim step before hypospadiasrepair. In fact, no special care of the penis is needed. [8]

The need for surgery is obvious in boys who have severe hypospadiaswith a curved penis and proximal meatus. However, even a moredistal urethral opening may produce a deflected or splayed urinarystream. Furthermore, the abnormal foreskin calls attention tothe condition and may lead to ridicule in school locker rooms.Given these concerns, the ability to accomplish most surgicalrepairs in a single operation, and the excellent functionaland cosmetic results of surgery, pediatric urologists now recommendthat most boys who have hypospadias undergo surgery. [9]

Tubularized incised plate methodwas first described by Snodgrass in 1994 and has rapidly become a procedure for various types of hypospadias. The principal advantage of this technique is the excellent cosmetic appearance with the minimum scarring in theurethra. In any reconstructivesurgeries like hypospadias repair,vascularity of the repaired site is a major concern.[10]Hence, to obtain better outcome of hypospadias repair, some vascularized flaps like dartos fascia and tunica vaginalis flap were introduced. These vascularized flaps are placed onthe neourethra as the second layer. It seems that use of a vascularized tunica vaginalis flap as a second layer combined with Snodgrass procedure results in better outcome.

Complication of hypospadias surgery:

Early Complications[34]	Late Complications

Wound Infection Poor Wound Healing Edema Acute Bleeding and Hematoma	Fistula Stricture Diverticulae Residual Chordee Meatal Stenosis BXO

Complications may occur after any reconstructive surgery. The most common problem after hypospadias repair is urethrocutaneous fistula. Usually these are small and can be closed at a secondary operation 6 months later. Stenosis of the new urethral meatus or stricture of the urethroplasty should be suspected if there is difficulty voiding or a very small and forceful stream. Occasionally, the repair dehisces and must be redone after the tissues heal. Another complication is formation of a urethral diverticulum, which is seen as ballooning of the urethra during voiding. (11)

The incidence of complications varies according to the severityof hypospadias and the technique employed for repair. Generally,fewer than 8% of patients undergoing distal hypospadias surgeryexperience problems; complications may be more frequent whenthe original meatus was located at the penoscrotal junctionor more proximally. Between 5% and 20% of boys who have theseconditions experience problems leading to another procedure.However, even children who require additional surgery becauseof complications generally achieve good functional and cosmeticoutcomes. (12)

It is worth emphasizing that increasing attention has been givento improving cosmetic results of hypospadias surgery duringthe past 20 years. Prior to that time, some questioned the needto bring the urethral meatus to the tip of the glans; the primaryconcern was to create a functional urethra that allowed theboy to void while standing. Pediatric urologists now realizethat the urinary stream is difficult to direct if the meatusis not positioned properly, and patients are more likely tobe dissatisfied with the outcome if the glans does not appearnormal. Therefore, the desired outcome of today's proceduresis a functional penis that appears only to have been circumcisedor, when the foreskin is preserved and repaired, never to haveundergone surgical repair (Fig. 3). (13)

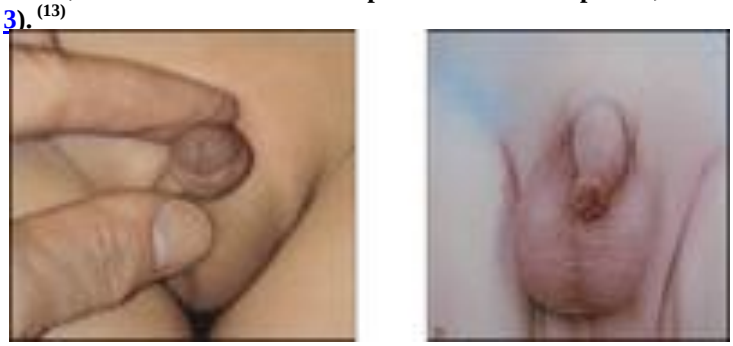


Fig.3 Post-operative appearance .A .with circumcision, note the normal appearing meatus at the tip of the glans. B. with foreskin reconstruction, creating a penis that looks as though no surgery was performed.

Aim of the Study

The aim of the study is to evaluate the results of tunica vaginalis vascularized flap as a second layer with tubularized incised plate (TIP) urethroplasty (Snodgrass method) in reoperation for patient with distal or midpenile hypospadias. The study discusses patient selection, complications, and the final outcome.

Patients and Methods

Between March 2008 and November 2013, 23 boys, (3.5 - 18) years old, who were treated using a Tubularized Incised Plate Urethroplasty(Snodgrass method) and vascularized tunica vaginalis flap as a second layer, for previously failed hypospadias repair in Al-Hussain teaching hospital.

The hypospadias defects included 12 (52%) distal (coronal or subcoronal), 6 (26%) distal penile and 5 (22%) mid shaft defects (three of them have residual chordee).17 patients had one operation and 6 had two operation previously. all patients did not have foreskin because of the previous surgery. There was no apparent scarring of the plate.

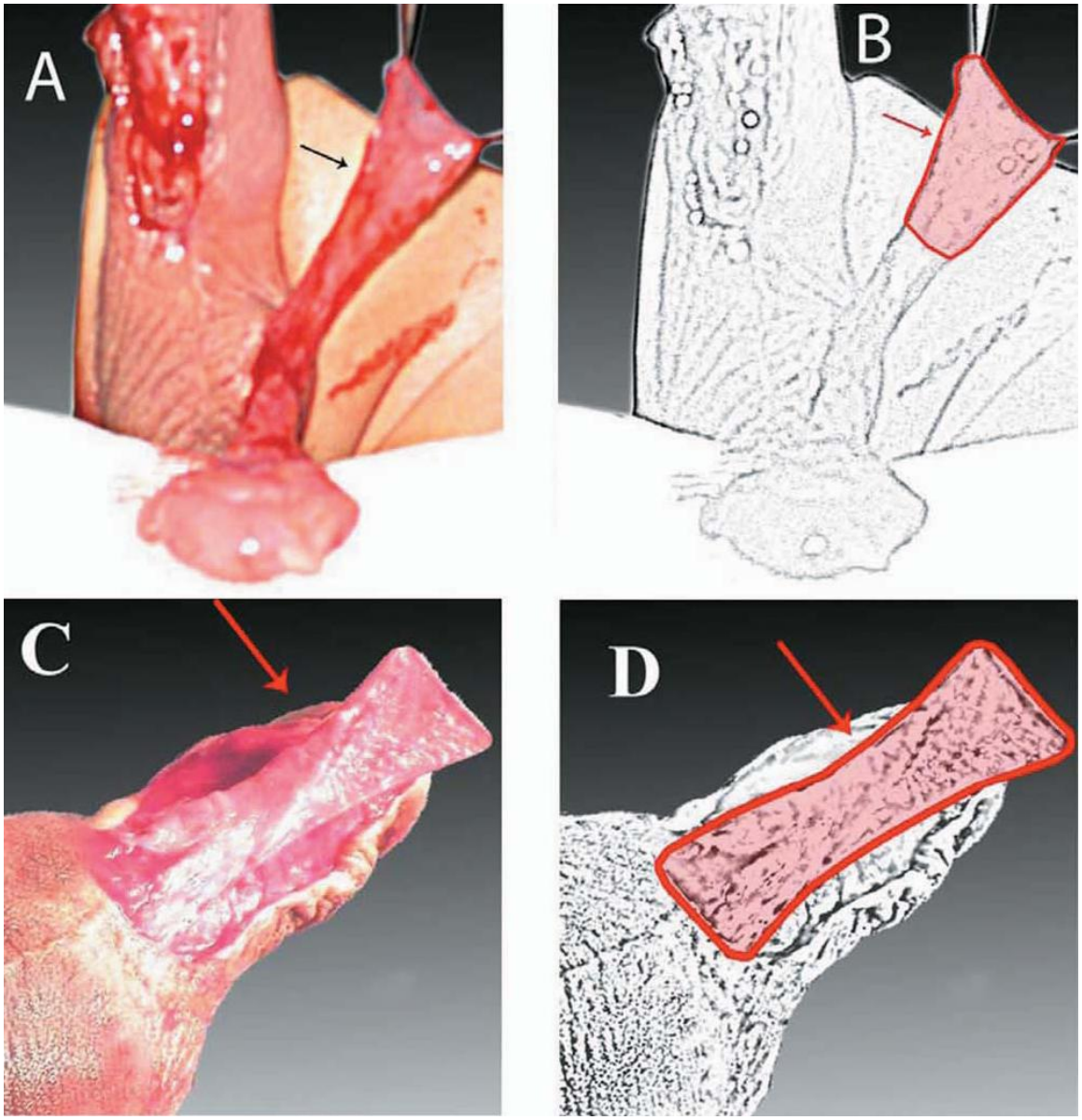
All the patients underwent Tubularized IncisedPlate supported by tunica vaginalis flap. Fivepatients received pre-operative androgen therapy,which was administered as testosterone enanthateinjection (2 mg/kg) for 2 to 5 weeks before theoperation.
We followed up the patients every 3 months forthe first year, every 6 months thereafter, andwhenever a patient experienced a problem. Wecalled the patients if they did not show up for thefollow-up.
A need for repeat surgical intervention duringthe follow-up was considered as a failure. Woundinfections, development of meatal stenosis, scrotaldisorders, and urethrocutaneous fistula wereregarded as surgical complications.

Surgical Technique:
Under general anesthesia, after placing staysutures, according to the traditional Snodgrasstechnique, one midline deep incision was carriedout in the urethral plate from hypospadicmeatus to the glans penis. Then, by another 2parallel incisions, tubularized urethroplasty wascompleted over a silicon urethral catheter(8-12 F according to the penile size and patient'sage). Thereafter, the testis was delivered via aseparate scrotal incision and a vascularized tunicavaginalis flap was harvested and transferred to thesite of surgery through a subcutaneous tunnel.
Care was taken to make a wide tunnel to avoidcompression of flap pedicle. Scrotal dissection wasdone gently with paying attention to completehemostasis. Ventral side of the urethra wascovered by serosal layer of tunica vaginalis flap.
The penile skin was then sutured with 5-0 or 6-0vicryl sutures.

Following repair, the child may have a urethral stent that drains urine into the diapers for several days to allow healing of the urethroplasty before resumption of normal voiding. During this time, antibiotics are prescribed to reduce the likelihood of urinary tract infection. Recommendations regarding pain management, dressings, and bathing vary among patients. Families can be reassured that most patients who undergo surgery during the preferred timeframe do not experience substantial postoperative discomfort. Urethral catheter was removed 5 to7 days after the surgery (Figure).

DISCUSSION:
Surgery for hypospadias is continuously evolving, implying that no single technique is considered perfect. The use of interposition tunica vaginalis vascularised flaps is well documented in the literature.Several different surgical methods have beenproposed to achieve normal appearing peniswith low complications rates in the treatment ofhypospadias. Some of these techniques use thepenile skin while some other methods use extrapenile tissues, including the buccal mucosa, theskin graft, and the tunica vaginalis as a flap orgraft.[14]Snodgrass procedure or Incised PlateUrethroplasty is a method with high successrate ;(however, urethrocutaneus fistula is acommon complication following this technique. To decrease the rate of this complication, a Tunica Vaginalis Flap in Urethroplastyvascularized tissue is applied as a second layerbetween the neourethra and the skin coverage.[15]Dorsal flap is a tissue that has been used for theneourethra coverage to improve the outcome;however, this technique sometimes results inpenile torsion or chordee An alternative technique is the use of tissuessuch as dartos fascia of ventral side of the penis.Furness and Hutcheson reported a success rateof 98% for this method and of 109 patients,only 2 developed fistulas. A study in Turkeydemonstrated better cosmetic results usingmucosal collars. In that study, fistula and meatalstenosis rates were 8.3% and 14%, respectively.[16]It should be noted that fascia is not alwaysavailable to be used as a second layer. In ourA, B: A vascularized tunica vaginalis flap (arrow) is harvested through a scrotal incision. C, D: Tunica vaginalis flap (arrow) covers theneourethra.Tunica vaginalis is another tissue that can beused as a second layer in hypospadias repair.specially in re-operation as far there is no excess skin which made preparation of dorsal based dartosflap difficult.

Advantages of this flap are its availability andexcellent vascularity. Furthermore, because thistissue is far from the penis, it is not affected bythe penis disorders. Besides, acceptable outcomeshave been achieved from the use of tunica vaginalis flap for repair of urethrocutaneus fistula.In another study, the success rate with tunicavaginalis flap was 100% without a significantcomplication.[17]



A, B: A vascularized tunica vaginalis flap (arrow) is harvested through a scrotal incision.
C, D: Tunica vaginalis flap (arrow) covers theneourethra.

In a study by Snow andcolleagues, most of the post tunica vaginalis flapcomplications were related to scrotal hematomaand abscess, while the rate of 5% was reportedfor urethrocutaneus fistula.[17] Therefore, Snowand associates has recommended tunica vaginalisflap as a second layer for primary hypospadiasrepair. In our study, the rate of fistula was highercompared to their study. This could be due tothe use of microscope by Snow and colleagues.By performing complete hemostasis, anatomicaldissection, and well dressing of the scrotal region,we did not encounter scrotal complications.In an Indian study, Snodgrass method alongsidedartos fascia was used in 20 patients and tunicavaginalis flap in 29 patients as a second layer forhypospadias repair.[18] After urethral catheterremoval, 20% and 10% urinary leakage wasobserved in dartos fascia and tunica vaginalisgroups, respectively. The rate of urinary leakagewas higher than fistula rate in our study.
Interestingly, in the above-mentioned study,placement of a urethral catheter (urethral recatheterization)for another 7 to 10 days resulted inurinary leakage improvement as well as preventionof permanent fistula formation. In contrast, thosesubjects in whom a dartos fascia has been used asthe second layer, urethral re-catheterization couldnot prevent permanent fistula formation. Since wedid not use urethral re-catheterization, we couldnot comment on this subject.

CONCLUSION

Overall, tunica vaginalis flap is a good option that should always be kept in mind in redo complicated cases ofhypospadias. When the local tissues seem to bescared, it offers a second-layer cover that is properlyvascularized, virgin and with mostly any length thatmight be needed.

However, further refinement of this techniquecould lower the complication rate. Carefuldissection of the scrotum and attention tohemostasis can reduce scrotal complications aswell. Currently, fistula formation remains themost common complication of this technique,which often necessitates re-operation.

References:

[1] Bruno Leslie a, Luiz L. Barboza a, Petrus O. Souza.Dorsal tunica vaginalis graft plus onlay preputialisland flap urethroplasty: Experimental studyin rabbits Journal of Pediatric Urology Company. July 2008.09.003.

[2] Dhua, Anjan Kumar; Aggarwal, Satish Kumar; Sinha, Shandip; Ratan, Simmi K.Soft tissue covers in hypospadias surgery: Is tunica vaginalis better than dartos flap?Journal of Indian Association of Pediatric Surgeons . Jan-Mar2012, Vol. 17

[3] Kadian YS, Rattan KN, Singh J, Kajal P, Tunica vaginalis: an aid in hypospadias fistula repair: our experience of 14 cases. Afr J paediater surg. 2011 May- Aug;8(2):164-7

[4] Shankar KR, Losty PD, Hopper M, Wong L, Rickwood AM. Outcome of hypospadias fistula repair. BJU Int. 2002;89:103–5.

[5] Handoo YR. Role of tunica vaginalis interposition layer in hypospadias surgery. Indian J Plast Surg. 2006;39:152–6.

[6] Routh JC, Wolpert JJ, Reinberg Y. Tunneled tunica vaginalis flap is an effective technique for recurrent urethrocutaneous fistula following tubularized incised urethroplasty. J Urol. 2006;176:1578–80.

[7] Snodgrass WT. Editorial comment. J Urol. 2007;178:1456.

[8] Chatterjee US, Mandal MK, Basu S, Das R, Majhi T. Comparative study of dartos fascia and tunica vaginalis pedicle wrap for the tubularised incised plate in primary hypospadias repair. BJU Int. 2004;94:1102–4.

[9] Baccala AA, Jr, Ross J, Detore N, Kay R. Modified tubularized incised plate urethroplasty (Snodgrass) procedure for Hypospadias repair. Urology. 2005;66:1305–6.

[10] Mizuno K, Hayashi Y, Kojima Y, Tozawa K, Sasaki S, Kohri K. Tubularized incised plate urethroplasty for proximal Hypospadias. Int J Urol. 2002;9:88–90.

[11] Guralnick ML, Al-Shammari A, Williot PE, Leonard MP. Outcome of Hypospadias repair using the tubularized, incised plate urethroplasty. Can J Urol. 2000;7:986–91.

[12] Singh RB, Pavithran NM. Partially de-epithelialized preputial flap (triangular soft tissue flap): An aid to prevent coronal urethrocutaneous fistulae. Pediatr Surg Int. 2003;19:551–3.

[13] Gurdal Mesut, Karaman M Ihsan, Kanberoglu Hüseyin, et al:Tunica vaginalis reinforcement flap in reoperative Snodgrassprocedure. Pediatr surg int. 19 : 649-651, 2003.

[14] Singh R, Pavithran N: Tunica vaginalis interposition flap inthe closure of massive disruption of the neourethral tube(macro urethrocutaneous fistula. Pediatr surg int. 20: 464-466,2004.

[15] Uday S, Manas M, Supriyo B, et al: Comparative study ofdartos fascia and tunica vaginalis pedicle wrap for thetubularized incised plate in primary hypospadias repair.BJUInt. 94:1102-1104, 2004.

[16] Shehata S: The use of spongioplasty in hypospadias repair.Presented at 21st Annual Meeting of the Egyptian PediatricSurgical Association (EPSA) in collaboration with 5th PanAfrican Pediatric Surgical Association (PAPSA), Alexandria,Egypt. 16-18 November, 2005.

[17] Snodgrass WT, Elmore J: Initial experience with staged buccalgraft (Bracka) hypospadias reoperations. J Urol. 172:1720-1724, 2004.

[18] Zargooshi Javaad: Tube-onlay-tube tunica vaginalis flap forproximal primary and reoperative adult hypospadias. J Urol.171: 224-228, 2004.