

## COMPARATIVE STUDY BETWEEN TUBULARIZED INCISED PLATE URETHROPLASTY AND DISTALLY FOLDED ONLAY FLAP IN TREATMENT OF ANTERIOR HYPOSPADIAS

*Mohamed M.Seleem, Medhat K. Abd El-Aziz, Saad A. El Kady, Mohamed K. Yossif.*  
Urology Department, Zagazig University Hospitals, Egypt.

### ABSTRACT

**Introduction & Objectives:** Hypospadias is one of the commonest congenital anomalies. The only treatment of hypospadias is surgical repair of the anatomical defect. Tubularized incised plate urethroplasty (TIPU) is currently accepted as the procedure of choice for distal hypospadias repair. The onlay island flap urethroplasty has found application in a wide variety of hypospadiac conditions because it is straight forward, reliable and provides excellent results. The aim of our study is to make a comparative study between tubularized incised plate urethroplasty and distally folded onlay flap in treatment of anterior hypospadias.

**Material & Methods:** This prospective study was carried out at Urology Department Zagazig University from April 2009 to December 2011. It included 50 patients with anterior hypospadias (coronal, subcoronal or distal penile), either primary or recurrent cases. Patients were randomly allocated into two groups, the 1st group [group A] included 25 patients operated with TIP urethroplasty, and the 2nd one [group B] included 25 patients operated with distally folded onlay flap urethroplasty.

**Results:** The mean age was 6 years for group A and 6 years and 6 months for group B. The mean operative time was 70 minutes and 90 minutes in primary cases for group A and group B respectively, while it was 87.5 minutes and 105 minutes in recurrent cases for group A and group B respectively. The overall reoperation rate either for early or late complications was 8/25 (32%) in group A and 5/25 (20%) in group B.

**Conclusions:** TIP urethroplasty is a standard technique for repair of distal penile hypospadias however distally folded onlay flap urethroplasty is an alternative option with lower complication rate and better cosmetic appearance especially in cases with small glans size.

**Keywords:** TIPU, distally folded onlay flap

### INTRODUCTION

**H**ypospadias is one of the most common congenital anomalies occurring in approximately 1 of 200 to 1 of 300 live births. Hypospadias is defined by an abortive development of the urethral spongiosum and ventral prepuce along with an arrest in the normal embryological correction of penile curvature <sup>[1]</sup>.

The only treatment of hypospadias is surgical repair of the anatomical defect. The fact that more than 300 different operations are described in the literature is a testament that treatment has not been perfected or standardized <sup>[2]</sup>.

Determining the appropriate technique depends on several factors including meatal location, appearance of meatus and glans, presence or absence of chordee, quality of ventral skin coverage, quality of the intact urethra and the patient's circumcision status <sup>[3]</sup>.

Tubularized incised plate urethroplasty (TIPU) described in 1994 by Snodgrass is currently accepted as the procedure of choice for distal hypospadias repair <sup>[1]</sup>. Urethral fistula rates of up to 10% are reported in the literature <sup>[4]</sup>. Although the initial description did not highlight the importance of interposing dartos tissue between the neourethral suture line and the ventral skin closure, several subsequent descriptions of the procedure by

Snodgrass and others do stress the importance of providing a barrier layer to decrease fistula rates.

The onlay island flap urethroplasty has found application in a wide variety of hypospadiac conditions because it is straight forward, reliable and provides excellent results. Initially it was used only for anterior hypospadias without chordee. More recently its application has been extended to more proximal cases in which there is a well developed urethral plate and little or no chordee after release of skin tethering <sup>[5]</sup>.

Excellent cosmetic and functional results had been reported with different modifications of the onlay technique. The entire inner prepuce for urethral reconstruction and as an extra soft tissue covering the suture lines to prevent fistula formation. The technique of double onlay preputial island flap and the split in situ onlay flap has been described to overcome the problem of severely deficient ventral skin and to minimize the incidence of fistula formation <sup>[6]</sup>.

The aim of our study is to make a comparative study between tubularized incised plate urethroplasty and distally folded onlay flap in treatment of anterior hypospadias.

### PATIENTS AND METHODS

This study was conducted prospectively in Urology Department, Faculty of Medicine, Zagazig

University Hospitals during the period between April 2009 and December 2011, including 50 patients with anterior penile hypospadias (coronal, subcoronal and distal penile), either primary or recurrent cases, selected from patients attending at our outpatient clinic.

Patients were divided into two groups, the 1st group [group A] included 25 patients operated with TIP urethroplasty, and the 2nd one [group B] included 25 patients operated with distally folded onlay flap urethroplasty.

Inclusion criteria included anterior hypospadias either primary or recurrent (previously failed repair once with good quality of penile skin and/or residual prepuce). Exclusion criteria included glanular hypospadias, circumcised patient with deficient preputal skin.

Preoperative evaluation included full history taking, clinical examination (general and local), laboratory investigations (urinalysis, complete blood count (CBC) and coagulation profile) and radiological investigations (voiding cystourethrography for patients with symptoms suggesting urethral stricture).

The local examination focused on penile size (normal or micropenis), prepuce (present or circumcised), penile condition (chordee, rotation, nearby skin and deformity), meatus (site and size), urethral plate quality (good or poor), scrotum (normal or hypoplastic, presence of transposition [partial or complete] and presence of incomplete fusion), gonads (normal or undescended, palpable or impalpable) and other non-genital anomalies (urological or non-urological).

Intraoperatively evaluation was carried out reporting size of the penis (average or small), position of the urethral meatus before release of chordee (coronal, subcoronal or distal penile), position of the urethral meatus after release of chordee if present, quality of the urethral plate (good or poor), curvature (present or not, significant [ $>30^\circ$ ] or not [ $<30^\circ$ ] and corrected by (degloving only, plication or grafting), calibration of urethral meatus and proximal urethra and penile skin and its availability for penile coverage (available or deficient).

Operative technique:

**For group A:** A circumferential incision is made 5mm proximal to the meatus. The penis is then degloved, chordee are corrected, if present and glans wings are created. The urethral plate is widened by a midline incision along its entire length. The urethra is closed over 6 Fr. stent using 6-0 vicryl. The dorsal

preputial skin is split into two halves. One half of the split prepuce is de-epithelialised, brought over the entire distal urethra and sutured to the depths of the glanular incisions using 6-0 vicryl. The glanular wings and mucosal collar are then closed in the midline. The other half of the split prepuce is then rotated and the skin edges are then approximated with 6-0 vicryl.

**For group B:** Parallel longitudinal incisions demarcating the urethral plate are made, extending from the tip of the glans to a point just proximal to the hypospadiac meatus. A transverse incision across the skin and overlying the urethra completes the U-shaped incision. A circumferential incision 5-7 mm proximal to the coronal margin is extended from each longitudinal incision and the penile shaft is degloved. We harvest the transverse island preputial flap 1cm longer than the length of the urethral plate, the dissection of the flap is carried down to the penopubic junction to avoid penile torsion. Then, the flap is rotated to be sutured to the edges of the urethral plate using 6/0 polyglactin. The proximal part of the flap is sutured to the native urethral opening. The distal end of the flap is folded back upon itself to be sutured to the glandular wings on both sides with 6/0 polyglactin. The urethra is stented with 6-8 French catheters for 7 days.

The esthetic results of this procedure were evaluated separately by single surgeon and by the parents. The evaluation focused on five points: shape of the meatus, straightness of penis, color matching of flap, contour of glans and urine flow.

Each point was given score 1 if poor, 2 if satisfactory, 3 if good. So the net result is total score from 5 to 15. Final evaluation was 5-8 poor, 9-11 satisfactory and 12-15 good.

Follow up of the patients was performed weekly for 1 month and then monthly for 6 months postoperatively. At each visit we evaluated urethral and skin integrity, penile straightness, meatal appearance, and flow of urine.

## RESULTS

This study included 50 patients with anterior hypospadias (coronal, sub coronal or distal penile) either primary or recurrent who all fulfilled the inclusion and exclusion criteria. Patients were divided randomly into two groups, the 1st group [group A] included 25 patients operated with TIP urethroplasty, and the 2nd one [group B] included 25 patients operated with distally folded onlay flap urethroplasty.

The mean age was 6 years for group A and 6 years and 6 months for group B. Positive family

history for hypospadias was found in 6 patients (12%), 4 in group A (16 %) and 2 in group B (8 %), three for brother, two for father and one for other family member (cousin). The associated genital anomalies for both groups are shown in table (1).

Five patients (20%) in group A and 6 patients in group B (24%) had previous operations for hypospadias repair. Release of the chordee may or may not change the site of hypospadiac meatus. The distribution of urethral meatus pre- and intra-operatively is shown in table (2).

The mean operative time was 70 minutes and 90 minutes in primary cases for group A and group B respectively, while it was 87.5 minutes and 105 minutes in recurrent cases for group A and group B respectively.

Early urethroplasty complications are shown in table (3) while late complications are shown in table (4). Conservative management succeeded to treat many of the early complications decreasing their number. For example dressing removal and application of another compressive one to stop oozing in cases of hemorrhage, frequent change of dressing and changing the antibiotic for treatment of infection, Non-steroidal anti-inflammatory drugs and treatment of infection if present for cases with edema, and catheter wash if it is blocked by encrustations.

Fistulae are treated with regular dilatation, if associated with distal obstruction, up to 6 months and if failed to close, two layers closure is applied 6

months later. For meatal stenosis regular dilatation 2-3 times daily by parents or by himself for adult patients and every week in our outpatient clinic is performed. Two cases responded to regular dilatation, one with urethral stricture and one with fistula which closed spontaneously. Those failed to respond to regular dilatation were re-operated after 6 months by meatoplasty. Urethral stricture was treated by regular dilatation and if failed VIU was done. Concerning flap and skin slough, any devitalized part of the flap or skin was debrided. If a small raw area was present it was allowed to granulate and re-epithelialize. Complete flap loss needed re-operation 6 months later.

For Residual chordee orthoplasty was done after 6 months if it is significant (>30°) or associated with other complications that needed re-operation. Wound dehiscence was managed by removing any devitalized or necrotic tissue preceding any surgical repair. A small raw area was allowed to granulate and re-epithelialize with frequent dressing and local application of antibiotic spray to keep the wound clean.

The overall reoperation rate either for early or late complications was 8/25 (32%) in group A and 5/25 (20%) in group B. Regarding cosmetic appearance of the penis postoperative, the penis was evaluated 1 month and 5 months postoperatively by single surgeon and by the parents. The total score given by the doctor and the parents are shown in table (5).

**Table (1):- Associated genital anomalies.**

| Associated anomalies | Group A | Group B | Total |
|----------------------|---------|---------|-------|
| Penile chordee       | 9       | 6       | 15    |
| Undescended testis   | 2       | 1       | 3     |
| Inguinal hernia      | 1       | 1       | 2     |
| <b>Total</b>         | 12      | 8       | 20    |

**Table (2):- Distribution of urethral meatus pre-operatively and intraoperatively.**

| Type of hypospadias | Group A      |                | Group B      |                |
|---------------------|--------------|----------------|--------------|----------------|
|                     | preoperative | intraoperative | preoperative | intraoperative |
| <b>Primary</b>      |              |                |              |                |
| Coronal             | 9            | 8              | 10           | 9              |
| Subcoronal          | 9            | 10             | 7            | 8              |
| Distal penile       | 2            | 2              | 2            | 2              |
| <b>Recurrent</b>    |              |                |              |                |
| Coronal             | 3            | 2              | 4            | 3              |
| Subcoronal          | 1            | 2              | 1            | 2              |
| Distal penile       | 1            | 1              | 1            | 1              |

**Table (3):-Early urethroplasty complications.**

| Total                          | Group A |           |       | Group B |           |       |
|--------------------------------|---------|-----------|-------|---------|-----------|-------|
|                                | Primary | Recurrent | Total | Primary | Recurrent | Total |
| <b>Edema</b>                   | 3       | 2         | 5     | 1       | 2         | 3     |
| <b>Bleeding &amp; hematoma</b> | 2       | 2         | 4     | 2       | 1         | 3     |
| <b>Infection</b>               | 2       | 1         | 3     | 2       | 2         | 4     |
| <b>Catheter Problems</b>       | 1       | -         | 1     | -       | 1         | 1     |
| <b>Wound dehiscence</b>        | 1       | 1         | 2     | -       | 1         | 1     |
| <b>Flap loss</b>               | -       | -         | -     | 1       | 1         | 2     |
| <b>Fistula</b>                 | 3       | 1         | 4     | -       | -         | -     |
| <b>Total</b>                   | 12      | 7         | 19    | 6       | 8         | 14    |

**Table (4):- Late urethroplasty complications.**

| Complications             | Group A |           |       | Group B |           |       |
|---------------------------|---------|-----------|-------|---------|-----------|-------|
|                           | Primary | Recurrent | total | Primary | Recurrent | Total |
| <b>Meatal stenosis</b>    | 3       | 2         | 5     | -       | -         | -     |
| <b>Urethral stricture</b> | 1       | 1         | 2     | -       | 1         | 1     |
| <b>Residual chordee</b>   | 2       | 1         | 3     | 1       | 1         | 2     |
| <b>Total</b>              | 6       | 4         | 10    | 1       | 2         | 3     |

**Table (5): total score of the esthetic appearance given by the doctor and parents.**

|              | Group A |         | Group B |         | Total  |         |
|--------------|---------|---------|---------|---------|--------|---------|
|              | Doctor  | Parents | Doctor  | Parents | Doctor | Parents |
| Poor         | 1       | 0       | 1       | 1       | 2      | 1       |
| satisfactory | 4       | 6       | 5       | 4       | 9      | 10      |
| Good         | 20      | 19      | 19      | 20      | 39     | 39      |
| Total        | 25      | 25      | 25      | 25      | 50     | 50      |

**DISCUSSION**

Hypospadias is the most common penile congenital anomaly <sup>[7]</sup>, and the second most common congenital malformation in males, occurring in approximately one in 125 to one in 300 live male births <sup>[8]</sup>.

Although TIP urethroplasty has gained popularity in the repair of distal penile hypospadias, some authors prefer using an onlay flap, especially in cases of a small phallus with narrow plate or conical glans, which make tubularization difficult.

In our study we made a comparative study between TIP urethroplasty as a standard technique for repair of anterior hypospadias and distally folded onlay flap as a modification for onlay urethroplasty.

Our study involved 50 patients divided randomly into two groups 25 patients each. The first operated by TIP urethroplasty, and the second operated by distally folded onlay flap urethroplasty.

Our study proved that the incidence of fistula was lower in patients who were operated by distally folded onlay flap urethroplasty in comparison to those operated by TIP.

Jiang et al, 2003 had done their study about folding and everting the distal end of flap on 16 patients with mean age of 15 years <sup>[9]</sup>. They reported their results as follows: one patient with fistula, one patient with urinary tract infection. The fistula occurred at the anastomotic site between the hypospadiac meatus and the proximal end of the neo-urethra and was successfully closed by primary surgical procedure. No stenosis was noted in all the cases. The new meatus permitted a straight and strong urinary stream and had a cosmetically fine appearance. Fifteen patients were followed up for a mean of 2 years (range: 6 months to 4 years) without other complications. Fifteen patients have been very pleased with the results and 1 case was lost to follow-up.

Abdel Moniem, 2004 had done a study on distally folded onlay flap urethroplasty as a new technique for repair of hypospadias <sup>[10]</sup>. He did his study on 28 patients with mean age of 12 years old.

Seventeen patients were primary, and 11 patients were recurrent.

He reported in his results that in 26 patients an excellent cosmetic appearance of both the penile shaft and glans was achieved with a slit-like or elliptic neo-meatus resulting in a good urine stream satisfying both the patients and their parents. Partial disruption of one side of the suture line and urethro-cutaneous fistula were reported in one patient each. These two complications were corrected surgically with good results.

Ehab et al, 2010 performed a study about evaluation of distally folded onlay flap urethroplasty in repair of distal penile hypospadias <sup>[11]</sup>. They did their study on 36 patients with mean age of 3.2 years old. Twenty eight patients were primary, and 8 patients were recurrent. They reported that none of the patients suffered meatal stenosis but there were two cases of urethro-cutaneous fistula (5.6%). One case closed spontaneously during follow up while the other required surgical repair 6 months later. Regarding the esthetic scoring system for meatal orifice, straightness, color matching, and contour regularity, the results were good for 32 patients (88.8%), satisfactory for 4 patients (11.2%), and no patient had a poor esthetic appearance .

In the second group in our study, who were operated by distally folded onlay flap urethroplasty, all patients developed neither fistula nor meatal stenosis.

Regarding our esthetic scoring system, the results were good for 20 patients with percentage of 80% and satisfactory for 4 patients 16%, and poor in one patient 4%.

Abdel Moniem, 2004 in his study concluded that distally folded onlay flap urethroplasty is easy and versatile with excellent cosmetic and functional results and of low rate of complications when used for the repair of distal and mid-shaft hypospadias in either virgin or redo cases. It should also be considered as a salvage procedure when other techniques are not feasible options.



Jiang et al, 2003 pointed that distally folded onlay flap urethroplasty as a modification of onlay technique has the following advantages. Firstly, the neo-orifice was partially covered by the inner layer of the prepuce or the skin of dorsum penis other than the suture line of the skin incision as described in previous surgical procedures. So the clot will not stick to the edge of the smooth neo-orifice and is easily cleared away. As a result, the infection rate will be decreased.

Secondly, with this method the neo-orifice was not an anastomotic stoma as in the classical surgery, so that scar formation and contraction may be avoided. Meanwhile, the modified technique could maintain a normal appearing meatus as retraction of the neo-orifice back to the corona is prevented.

Finally, the two glans wings were not directly juxtaposed onto the ventral surface of the neo-urethra. Therefore, stenosis induced by compressing the distal neo-urethra may be avoided.

Although the overall results remained excellent, a little bulky appearance of the neo-orifice was found in 1 out of the 3 pre-adolescent patients.

In our study, the operative time in TIP urethroplasty was about 70 minutes in primary cases, and about 87.5 minutes for recurrent cases, while it was 90 minutes in primary cases, and 105 minutes in recurrent cases in cases operated with distally folded onlay flap urethroplasty, so TIP operation is shorter in duration in comparison to distally folded onlay flap urethroplasty.

The incidence of fistula was 16% in patients operated by TIP, and was 0% in patients operated by distally folded onlay flap urethroplasty. The low incidence of fistula may be due to the laterally placed sutures lines as well as the use of robust pedicles with excellent blood supply.

The incidence of meatal stenosis was 20% in patient with repair via TIP urethroplasty, but was 0% in patients with repair via distally folded onlay flap urethroplasty. This is due to that the neo-stoma in distally folded onlay flap urethroplasty is not on anastomotic stoma, but by reflection of the flap backward. Also, no chance for accumulation of blood blots and secretions which are responsible for orifice stenosis.

Also, in our study there are 12 patients with small glans size, and 6 patients in every group. It was noticed that the cosmetic appearance of those with small glans and operated by distally folded

onlay flap was much better than those 6 patients with small glans size and operated by TIP urethroplasty.

Regarding the shape of the meatus, it was vertically oriented slit like in patient operated by TIP urethroplasty, but in patient with distally folded onlay flap sometimes slit like and sometimes flat shape or horizontal.

Jiang and his collages had mention in their study that a distally folded onlay flap maintains a normal appearing meatus with no risk of retraction of the new urethral opening<sup>[9]</sup>.

### CONCLUSION

TIP urethroplasty is a standard technique for repair of distal penile hypospadias however distally folded onlay flap urethroplasty is an alternative option with lower complication rate and better cosmetic appearance especially in cases with small glans size.

### REFERENCES

- 1- Cheng, EY, Vemulapalli SN, Bradley P et al. (2002): Snodgrass hypospadias repair with vascularized dartos flap: The perfect repair for virgin cases of hypospadias. *J. Urol.*; 168: 1723-1728.
- 2- Baskin LS (2001): Hypospadias: A critical analysis of cosmetic outcomes using photography. *BJU*; 87: 534-539.
- 3- Zaontz MR and Dean GE (2002): Glanular hypospadias. *Urol Clin North Am*; 29: 291-29
- 4- Snyder CL, Evangelidis A, Hansen G et al. (2004): Management of complications after hypospadias repair 10.1016/j.urology..11.03.
- 5- Joseph DB and Perez LM (1999): Tunica vaginalis onlay urethroplasty as a salvage repair. *J Urol*; 162: 1146-1147.
- 6- El-bakry A (1999): Complications of the preputial island flap-tube urethroplasty. *BJU Int*; 84: 89-94.
- 7- Fredell L, Kockum I, Hansson E et al. (2002): Heredity of hypospadias and the significance of low birth weight. *J Urol*; 167: 1423-1427.
- 8- Manson JM and Carr MC (2003): Molecular epidemiology of hypospadias: Review of genetic and environmental risk factors. *Birth. Defects Res A Clin Mol Teratol*; 67:825-36.
- 9- Jiang R, Chen JH et al. (2003): Folding and everting distal end of graft flap to reduce orifice stenosis following onlay urethroplasty. *Asian J Androl*; 5:159-161.
- 10- Abdel moniem AM et al. (2004): Distally folded onlay flap: A new technique for repair of hypospadias. *African journal of urology Vol. 10 No. 4 (2004)*.
- 11- Ehab ER, Khalil S, Abdelsamad KA et al. (2010): Evaluation of distally folded onlay flap in repair of distal penile hypospadias. *Journal of pediatric urology*; 8: 103-107.

## دراسة مقارنه بين عملية شق ولف الشريحه الإحليلية على شكل أنبوبي وعملية طى الجزء البعيد من الرقعه المغطيه فى علاج حالات الإحليل السفلى الأمامى

ان الإحليل السفلى يعتبر من أكثر العيوب الخلقية انتشارا ما بين الأطفال الذكور حديثى الولادة ويعرف الإحليل السفلى بوجود فتحة مجرى البول على السطح الأمامى للقضيب.

ويبقى الحل الوحيد لتصليح الإحليل السفلى هو الحل الجراحى وإذا ما عرفنا أن هناك أكثر من ٣٠٠ عملية جراحية لتصليح الإحليل السفلى فان هذا يعنى أنه لا توجد عملية مثاليه تفى بكل الأغراض المرجوه كتصليح الانحناء الموجود بالقضيب ويجعل الفتحة فى مقدمة القضيب وبشكل جمالى وتجميل رأس القضيب لتكون مخروطية الشكل.

وقد قمنا بعمل دراسة على ٥٠ حالة من حالات الإحليل السفلى الامامى و المترددة على عيادة المسالك البولية بمستشفيات جامعة الزقازيق و تم تقسيمهم عشوائيا الى مجموعتين كل منهما تضم ٢٥ حالة و قد تم عمل عملية شق و لف الشريحة الإحليلية على شكل انبوبي للمجموعة الاولى و عمل عملية طى للجزء القاصى من الرقعة المغطيه لحالات المجموعة الثانية و قد تم عمل مقارنة بين العمليتين بعد متابعة لحالات المجموعتين لمدة ٦ شهور و قمنا بتسجيل النتائج الخاصة بالمجموعتين من حيث معدل حدوث المضاعفات و زمن العملية و الناحية الجمالية من خلال اخذ رأى جراح واحد و كذلك رأى الوالدين.

وقد انتهت المقارنة الى ان عملية طى الجزء القاصى من الرقعة المغطيه هى الحل الامثل فى حالات الإحليل السفلى الامامى فى حالة صغر حجم رأس العضو الذكرى و هى ايضا الحل الأفضل فى حالات صغر حجم الشريحة الإحليلية من حيث العرض أو العمق.

كما تبين عدم حدوث اى حالات ناصور بولى او ضيق فى فتحة مجرى البول الجديدة فى حالات المجموعة الثانية وهذا بسبب ان الفتحة الجديدة تكون واسعة و فرصة حدوث ضيق فيها تكاد تكون منعدمة.

وعليه فاننا نوصى بعمل عملية طى الجزء القاصى من الرقعة المغطيه فى حالات العضو الذكرى ذو الرأس الصغير و كذلك فى حالات صغر حجم الشريحة الإحليلية من حيث العرض أو العمق وكذلك فى الحالات المرتجعة اذا ما توافر غشاء جيد لعمل الرقعة حيث ان معدل حالات الناصور البولى اقل بكثير فى هذه الحالات عن مثيلاتها فى حالات شق و لف الشريحة الإحليلية على شكل انبوبي.