



LEARNING CURVE OF TUBULARIZED INCISED PLATE URETHROPLASTY (TIP) AND TRANSVERSE PREPUTIAL ISLAND FLAP URETHROPLASTY (TPIF): IS TIP REALLY EASY TO LEARN?

Authors: Vikesh Agrawal, Akanksha Mehra, Pawan Agarwal

Institute: Netaji Subhash Chandra Bose Government Medical College, Jabalpur, India

Background & Aims:

TIP is considered easier to learn than TPIF, leading to its widespread use despite a high complication rate (20-40%). Evaluating the learning curve based on outcomes, rather than technical ease alone, is essential. This study assesses the learning curves of these techniques in relation to complications and other outcomes.

Methods:

This prospective observational study at tertiary centre at Jabalpur, India, from August 2022 to February 2024, included 60 patients under 12 years undergoing TIP or TPIF for various hypospadias types. Excluding staged and redo procedures, a single pediatric surgeon performed all surgeries under the supervision of an experienced surgeon. Primary outcomes included procedure choice, surgical time, blood loss, complications (flap necrosis, fistula, glans dehiscence, chordee, meatal stenosis- Using Likert's scale), and overall outcomes (HOSE score). Patients were followed for at least six months. The learning curve was evaluated using Group split method and CUSUM analysis.

Results:

Thirty-seven patients underwent TIP and 23 underwent TPIF. The TIP group included distal and mid-penile hypospadias, while the TPIF group included mid-penile, proximal penile, and penoscrotal types. Blood loss and operative duration were significantly higher in the TPIF group ($p < 0.05$). Complications in **TIP vs. TPIF** included glans dehiscence (43.24% vs. 30.43%, $p > 0.05$), skin necrosis (37.83% vs. 43.47%, $p > 0.05$), fistula (24.32% vs. 17.39%, $p > 0.05$), meatal stenosis (48.64% vs. 8.69%, **$p < 0.05$**), and residual chordee (5.40% vs. 8.69%, $p > 0.05$). [Table 1] There was no significant difference in mean HOSE scores (TIP: 14.29 ± 2.03 , TPIF: 13.7 ± 1.86 , $p = 0.129$). CUSUM analysis indicated learning occurred by the 20th TIP and 16th TPIF case, with proficiency by the 28th TIP and 20th TPIF case ($p < 0.05$). [Figure 1]

Discussion & Conclusion:

TIP is technically easier but has higher complication rates (meatal stenosis, glans dehiscence and fistula), leading to a longer learning curve. This underscores the difference between technical and outcome-based learning. TIP should not be a "one size fits all" solution. Supervised learning can help overcome hesitation in adopting procedures like TPIF.

Keywords:

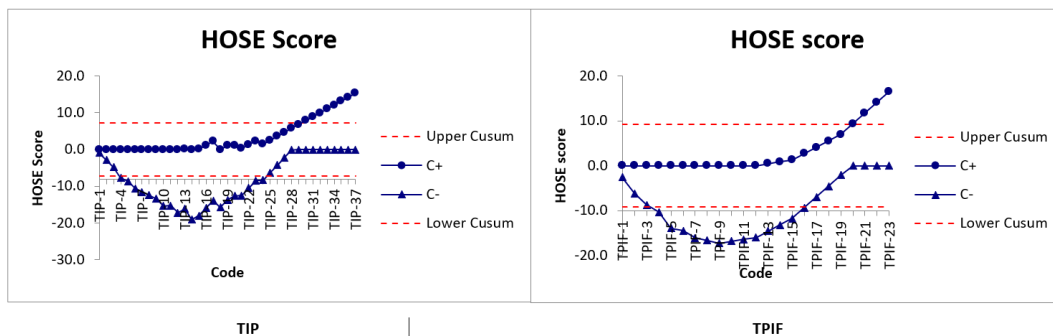
Hypospadias, Tubularized Incised Plate Urethroplasty, Duckett's Transverse Preputial Island Flap Urethroplasty, Learning Curve, Outcome



Table 1: Comparison of complication between TIP and TPIF by Group split method

Criteria	Group 1 (First Half)	Group 2 (Second Half)	p	Group 1 (First Half)	Group 2 (Second Half)	p
	TIP			TPIF		
Blood loss (in ml, Mean±SD)	20.27±6.52	25±8.81	0.073	24.58±11.37	32.72±15.55	0.1640
Mean duration (in minutes, Mean±SD)	83.88±20.33	78.15±16.68	0.35	95.43±23.05	92.72±22.51	0.7786
Skin Necrosis (Mean±SD Likert scale)	1.83±1.04	1.15±0.37	0.012	1.83±1.02	1.09±0.3	0.0310
Glans Dehiscence (Mean±SD Likert scale)	2.88±0.32	1.36±0.76	<0.0001	3.75±0.52	1.36±0.5	<0.0001
Meatal Stenosis (Mean±SD Likert scale)	2±1.13	1.15±0.37	0.0037	0±0	0.18±0.4	0.5091
Fistula (Mean±SD Likert scale)	1.17±1.11	1±0	0.51	1.75±1.13	1.09±0.3	0.0749
HOSE score (Mean±SD)	12.7±1.89	15.7±065	<0.0001	11.25±1.48	15.09±0.83	<0.0001

Figure 1: Mathematical Learning Curves for TIP and TPIF using CUSUM analysis vis-a-vis HOSE Score





THE GUD TECHNIQUE FOR REDOS AND CORONAL/SUBCORONAL FISTULAS: A PROSPECTIVE PHOTO-DOCUMENTED STUDY

Authors: Antonio MACEDO JR., Rafael Jordan BALLADARES, Sérgio LEITE OTTONI, Marcela LEAL DA CRUZ, Débora Laena BARROSO SACOMAN, José Renato AZEVEDO ARAUJO, Ricardo DEL DEBBIO DI MIGUELI, Ricardo MARCONDES DE MATTOS and Gilmar DE OLIVEIRA GARRONE

Affiliation: FEDERAL UNIVERSITY OF SÃO PAULO, NUPEP/CACAU PEDIATRIC UROLOGY, São Paulo, BRAZIL

Presenter: Antônio Macedo Jr.

Aim of the Study

Distal hypospadias that have failed primary repair with glans and urethral dehiscence or presenting with a coronal/subcoronal fistula represent a major challenge in pediatric urology. The previous use of dorsal foreskin in the first procedure and local fibrosis, normally impose the need for using grafts and a two-stage strategy. We have accumulated more than 6 years with the GUD technique for this population too and wanted to review our data.

Methods

We have started a prospective photo-documented cohort for all GUD repairs in June 2021. All patients underwent an appointment for medical history and surgery was proposed. We have documented each patient in three different stages: pre, intra and postoperatively. Complications and follow-up were recorded. Surgery consisted of the classic GUD repair and a silicone urethral stent was left for 5-7 days

Results

We have treated 52 patients and 15 of them were redos (28.8%). All patients were operated as outpatients. Mean age at surgery was 18.4 months with a mean number of previous surgeries of 1.3. We had one case of urethral fistula recurrence probably due to disruption of distal replacement. Complication rate was 6.6% and mean follow up is 18.7 months. We have created a full photographic database available for review and analysis of the end aspect of glans and meatus.

Discussion and Conclusions

We believe that the GUD technique for redos is the best approach for rescue of failed distal primary repairs. It has the advantage of being a single repair and no urethroplasty or fistula suture is performed nor there is need for different types of grafts nor two stage strategies.



UNILATERAL SLIT-LIKE ADJUSTED MATHIEU (UNILATERAL SLAM); A SIMPLE TECHNIQUE TO CORRECT DISTAL HYPOSPADIAS COMPLICATIONS

Authors: Mohamed Fawzy, Hanno Wirmer, Michael Sennert, Ahmed T. Hadidi

Affiliation: Hypospadias Center, Pediatric Surgery Department, SANA-Klinikum Offenbach, Germany

Aim: To evaluate the role of the Unilateral SLAM technique in correction of distal hypospadias complications.

Materials and methods: The study included 66 patients who were operated on in our centre between 2018- 2023, with minimum follow up of at least 6 months. The mean age of patients was 49.9 months (Median 36.5), mean glandular width 15.3 mm (median 15 mm). The study included: 44 children with glans dehiscence, 11 patients referred with recurrent hypospadias and 11 cases with distal fistula. These complications were encountered after different surgical techniques including TIP repair (11 patients), SLAM (21 patients), Double Y glanuloplasty (4 cases), Lateral based Onlay (13 children) and Chordee Excision & distal urethroplasty (17 patients) usually in patients with small glans.

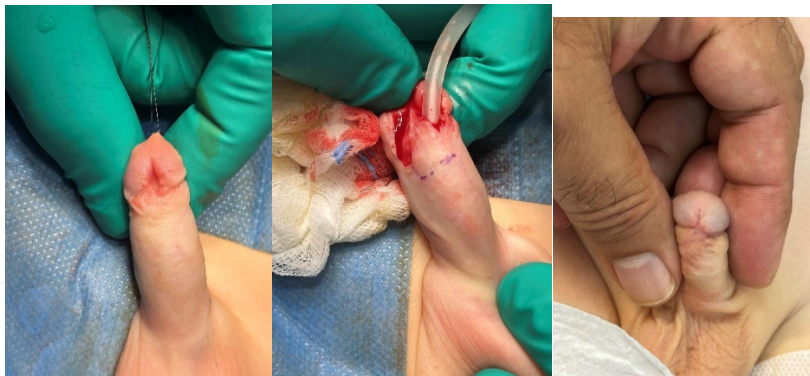
Technique: The technique is ideal in patients where the dehiscence involves one side of the glans only but can be used in other selected distal complications. The principle of the technique is to design a triangular flap with a wide base that brings the urethral meatus to the tip of the glans with a single suture line.

Results: There were 6 complications over 6 years follow up (10%). These complications included, 2 cases of meatal stenosis, 3 cases of dehiscence and 1 case of recurrent fistula.

Discussion: Glans dehiscence, meatal retraction and fistula are common complications of hypospadias repair especially in patients with small glans width. The repair of these complications is technically challenging and is associated with high incidence of recurrence. The Unilateral SLAM is simple and has the advantage that it has a wide base that brings good vascularity, single suture line and less glans tension.

Conclusion: Unilateral SLAM is simple technique that can be used in patients with distal complications due to small glans width. However, careful patient selection is important to achieve the desired outcome.

Figure 1 The indication, design and outcome of Unilateral SLAM





Topography-Guided Anatomical Reassembly for Distal Penile Hypospadias Without Chordee: A Comprehensive Illustration and Midterm Results of a Novel Approach

Author: Hamed M Seleim¹, MD, FEBPS

¹Pediatric Surgery, Tanta University Hospital, Tanta, Egypt.

Email: dr.seleimh@gmail.com

hamed.seleim@med.tanta.edu.eg

Phone: 002 01066799775

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Abstract

Purpose To provide a comprehensive illustration of the newly introduced 'topography-guided anatomical reassembly' approach, which has shown promising early results, and to report the mid-term outcomes of an extended series.

Materials and Methods This is a prospective cohort study of all patients presenting to the author's facility with distal penile hypospadias without chordee between June 2018 and January 2023. Redo cases, circumcised cases, and cases with non-preservable plates are excluded. The procedure follows the most recently introduced principle of the topography-guided anatomical reassembly approach for distal penile hypospadias, that is, the exclusive zipping-up of the unfolded spongiosal plate.

Results A subset of 97 boys met the enrolment criteria. The hypospadias meatus was coronal or sub-coronal in 35 boys, distal penile in 45 boys, and mid-penile in 17 boys. The mean age at the time of surgical correction was 8.11 months. The mean operative time was 66.7 min. After a mean follow-up of 24.2 months, five urethrocutaneous fistulae were reported: three glanular and two sub-coronal. Meatal disfigurement with downward stream deviation was reported in two more patients. Two more occurrences of meatal recession were identified, yet surgical correction was not necessary. The overall reoperation rate settled at 7%.

Conclusions The proposed topography-guided anatomical reassembly technique for distal hypospadias is simple, effective, and highly feasible at mid-term follow-up of the given series. Maintaining the integrity of well-developed penile tissues eliminates the possibility of unforgivable tissue damage and avoids the need for challenging revision procedures.



PREPERATION OF THE BUROW TRIANGLES WHILE DESIGNING FIRLIT'S COLLAR AND CLOSING THE PENILE SHAFT SKIN

Authors: Ali Avanoglu¹, Yasar Issi¹, Zeynep Calikli², Halil Tugtepe³

¹ Private Practice Doctor, Izmir, Turkey

² Freelance Nurse, Istanbul, Turkey

³Private Practice Doctor, Istanbul, Turkey

Abstract

Aim

In this study, we will present the creation of the frill collar and the preparation of Burrow triangles while closing the penile skin during hypospadias surgery.

Surgical Technique

We present a straightforward method for drawing the Burow triangles to create Firlit's collar and penile shaft skin. Firlit's collar is prepared according to its original description. The mucosal collar is then anchored to the penile shaft with five submucosal sutures to mark the edges of the Burow triangles. The skin is divided posteriorly to form Byars flaps. The distal edge of the incision is sutured to Firlit's collar, and the flaps are moved anteriorly. The Burow triangles are drawn on the anterior side. This technique will be presented through short videos.



MODIFIED TUBULARIZED INCISED PLATE REPAIR FOR DISTAL HYPOSPADIAS WITH AN EXTENDED URETHRAL PLATE INCISION UP TO THE GLANS TIP

Authors: TN Son, HV Bao, NTH Van

Affiliation: Saint Paul Hospital, Hanoi, Vietnam

Abstract

Aim: In tubularized incised plate repair for hypospadias (TIP), there are concerns about the risk of meatal stenosis when the urethral plate incision is extended up to the glans tip despite lacking evidence. We present our experience with modified TIP with extended urethral plate incision up to the glans tip (EUPI).

Methods: Medical records of all distal hypospadias patients undergoing our modified TIP repair with EUPI at our center from July 2016 to July 2023 were reviewed. A urethral catheter was kept for at least 7 days. All patients were scheduled for calibration of the meatus 2 weeks after discharge and were followed up regularly at the outpatient clinic.

Results: 102 patients were enrolled with a median age of 3 years (range: 1- 15 years). The median operative time was 70 minutes. The median postoperative hospital stay was 9 days. At a median follow-up of 48 months, complications were recorded in 5 patients (4.9%): urethral fistula in 3 patients (2.9 %), meatal retraction – 2 patients (2%). No patient suffered from meatal or urethral stenosis. The location of the neomeatus was nearly natural.

Discussion: The midline urethral plate incision in the original TIP has been recommended to be limited to the urethral plate and not carried into the rim of the glans at the distal margin of the plate due to concerns of meatal stenosis. However, this approach might result in a suboptimal location of the neomeatus. The results of this study showed that the EUPI up to the glans tip did not increase the rate of meatal stenosis and could give a nearly natural position of the neomeatus.

Conclusions: Our modified TIP with EUPI is safe, without incidence of meatal or urethral stenosis, and can bring the neomeatus to a nearly natural position.



Comparison of the of tubularised incised plate urethroplasty (TIPU) Versus Grafted TIPU in distal hypospadias repair with narrow urethral plate.

Authors: Mohamed Elsherbiny Ahmed M Elnashar, Moustafa ELAyyouti, Ahmad ELHattab, Adham ELSaied, Mohammed ALBishbishy, Abdelrahman Elshafey, Hesham Sheir, Mohamed Elzohiri.

Affiliation: Mansoura university-Egypt

Aim of the Study:

To compare the outcomes of TIPU and grafted TIPU in distal hypospadias cases with narrow urethral plate.

Materials and methods:

This retrospective cohort study consists of the analysis of patients whom underwent TIPU and Grafted TIPU procedures between January 2021 and December 2022.

Results:

The mean width of the urethral plate in TIPU group was 5.5 mm (range 3-8 mm) and in grafted TIPU group was 5.8 mm (range 5-8 mm). Urethral fistula was detected in 2 cases of TIPU group (8%) and similarly in 2 cases of grafted TIPU group (8%). The failure of repair occurred in 1 case (4%) of TIPU group, while occurred in 2 cases (8%) of grafted TIPU group.

Discussion:

Some authors reported that healing of the incised urethral plate resulted in a fibrosed strictured neo-urethra. The concept of grafting the incised plate emerged to treat these drawbacks as the grafted plate leaves no raw area that may be the cause of neo-urethral stricture if healing occurred by fibrosis not epithelialization. The incidence of urethral stricture following TIP urethroplasty in distal hypospadias had been reported to be 1.3%.

Conclusion:

Grafting the urethral plate had no added benefit to the original TIP urethroplasty regarding the incidence of meatal stenosis and urethral stricture complications. The operative time was significantly longer in grafted TIP group. Snodgrass urethroplasty keeps its position as a standard operation in repair of distal hypospadias without chordee.



Comparative Study Between Early and Delayed Removal of Urethral Stent after Tubularised Incised Plate Urethroplasty in Distal Hypospadias

Authors: Mohamed Elsherbiny MD, Hosny AlmEldin, Mohamed Elzohiri MD, Yousef Naiem MD, Mohamed El-Ghazaly MD, Hesham Sheir MD

Affiliation: Mansoura university-Egypt

Aim of the study

To compare the early and delayed removal of urethral stent in the repair of distal hypospadias regarding hospital stay and postoperative complications.

Methods:

This study includes 42 patients with distal hypospadias repaired by the tubularized incised plate technique. They were divided randomly into 2 groups; where the urethral catheters were assessed for early removal after 48 hours in group A, and they were removed on the 5th postoperative day in group B.

Results:

Early removal of the urethral stent was feasible in 84% of cases, whereas it was delayed to the 5th postoperative day because of oedema in 3 cases and hematoma in 1 case. Postoperative hospital stay was significantly shorter in group A cases with a mean of 3.74 days versus 5.86 days in group B (P value < 0.001). Postoperative complications were comparable in both groups with overall complications rate of 28.6% and 23.8% in group A and B respectively (P= 0.726).

Discussion:

The current study examined the feasibility of early catheter removal within 2 days after hypospadias repair, considering postoperative significant oedema or hematoma as indications for delaying catheter removal. Accordingly, catheters could be removed early in the majority of cases (84%). This agrees with many studies that reported effective early stent removal or even stent free repairs

Conclusion:

Early removal of urethral stent after repair of distal hypospadias is applicable in the majority of cases with significantly shorter hospital stay and without increase in the incidence of postoperative complications.



Comparative study between (TIP) urethroplasty & Onlay penopreputial flap urethroplasty (Mansoura modification of Unilateral Koyanagi technique) in management of hypospadias cases without chordee

Authors: Sherif Medhat, Adham Elsaied, Hesham Sheir, Khaled Ismail, Mohamed El Gazaly waly

Affiliation: Mansoura university children hospital, Mansoura, Egypt

Abstract:

Background: TIP is popular for repair of hypospadias, however, its outcome is questionable in cases with narrow urethral plate. Unilateral Koyanagi's technique is a modification by using a unilateral instead of a bilateral paramental foreskin flap with preservation of the pedicle as well as the lateral blood supply. This technique showed encouraging results on distal hypospadias. This study aims to compare both techniques regarding operative time, complications, and functional outcome.

Methods: This is a prospective randomized comparative study performed from May 2018 to September 2020. It included 60 patients, divided randomly into 2 groups; where TIP repair performed in group A and unilateral Koyanagi in group B. Both groups were compared regarding operative time, postoperative complications, and voiding pattern. Moreover, the relation between the preoperative urethral plate width and the postoperative outcome was studied in both groups.

Results: Mean operative time was 92.7 minutes in group A versus 106.4 minutes in group B ($P < 0.001$). Success rate was 83.4% after TIP versus 80% after unilateral Koyanagi ($P = 0.74$). There were no significant differences between both groups regarding complications. However, meatal stenosis was 5 times higher in group A ($P = 0.19$), urethrocutaneous fistula showed double incidence in group B ($P = 0.67$). The preoperative width of urethral plate correlate with postoperative caliber of the neourthra and with the postoperative incidence of meatal stenosis in group A, but there were no such correlations in group B.

Conclusion: Unilateral Koyanagi's repair shows comparable postoperative outcome to Tubularized Incised Plate technique, in spite of being more complicated with longer operative time.

Key words: Hypospadias, TIP, Unilateral Koyanagi, Urethral Plate.