

THE OUTCOME OF DOUBLE DARTOS VERSUS SINGLE LAYER FLAP IN SNODGRASS URETHROPLASTY FOR DISTAL HYPOSPADIAS REPAIR IN BASRA TRAINING CENTER OF UROLOGY

Murtadha Almusafir *, Safaa Gatea Mezban @, Murtada Faisal #

*Professor of Urology, University of Basrah-College of Medicine, @ Urology department of Al-Sadder Teaching Hospital,

Urology department of Al-Mawani' Hospital

Abstract

Hypospadias, a nomination of medical term which was derived from the Greek terms: hypo (under) and spadon (rent, fissure). It is one of the congenital abnormalities of the genitourinary tract. There are about 400 different procedures described for correction of this type of anomaly, but Tubularized Incised Plate (TIP) Urethroplasty is considered the most popular one, and there are multiple variations in this procedure to get high success rate and decrease the complications. In this study, we compare between single layer dartos flap versus double layer dorsal flaps in TIP urethroplasty.

This is to assess the outcomes of double dartos flaps versus single layer flap in TIP urethroplasty for primary distal hypospadias repair in Basrah Teaching Center regarding the success rate, and to investigate the importance of double flaps in preventing possible complications in particular, urethral fistula.

A cross sectional prospective study was done in Basra Teaching Hospital, between January 2018 to March 2020. A total of 50 boys, 2 to 10 year- old with coronal and sub coronal primary Hypospadias were treated with TIP urethroplasty (Snodgrass procedure) by one surgical team, who were referred to Basrah Teaching Hospital from private and outpatient clinics. Patients were divided into 2 groups: (group I: 25 patients) single layer Dartos flap & (group II: 25 patients) double layers of Dartos flaps. Six patients were missing during follow up, coincidentally 3 patients in each group. The mean age was 4.55 and 4.86 year for groups I, II respectively, the mean operative time was 88.81 and 91.86 minutes for group I & group II respectively. The success rate was (81%) and (86%) for group I, II respectively, with exception of complications which need re-do surgery. Urethrocutaneous fistula (UF) was developed in (22.7%) in group I, and in (4.5%) in group II. Bleeding was happened in 2 cases (9.1%) in group I and 3 cases (13.6%) in group II. Meatal stenosis was diagnosed in (9.1%) in group I and (13.6%) in group II. Glans dehiscence was seen in 1 case (4.5%) for each group. There was a significant difference between the two groups in the occurrence of UF (P = 0.001).

According to our evidence in this study, double dartos flaps is easy to be harvested, safe procedure, and represents very good choice for UF prevention. Although the number of complicated patients regarding bleeding and meatal stenosis are higher in group II than group I but they were statistically insignificant.

Keywords: Hypospadias, Urethroplasty, Tubularized Incised Plate (TIP), urethral fistula, dartos flaps.

Introduction

Hypospadias, a nomination of medical term which was derived from the Greek terms: hypo (under) and spadon (rent, fissure). It is one of the congenital abnormalities of the genitourinary tract¹. Many publications discussing this anomaly are recorded annually. There are about 400 different procedures described for correction of this type of anomaly, but TIP urethroplasty is considered the most popular one².

hypospadias is associated with three penile anomalies:

(1) Ventrally located urethral meatus anywhere between the glans penis and the perineum.

(2) penile ventral curvature (chordee).

(3) Dorsally hooded prepuce skin in association with a ventral deficiency.

The second and third penile findings are not mandatory for the diagnosis of hypospadias^{3,4}.

Many and different classifications of hypospadias have been defined and published⁵.

Hypospadias is generally classified according to the anatomical position of the ventral urethral meatus:

(1) Distal hypospadias 70 - 80%.

(2) Mid - shaft hypospadias 15 - 20%.

(3) Proximal hypospadias 5%⁶.

Aim of study

To assess the outcome of double dartos flap (DDF) versus single layer flap in TIP urethroplasty (Snodgrass procedure) for primary distal hypospadias repair in Basrah Teaching Center with regard to success rate, and to investigate the importance of double flaps in preventing possible complications in particular, urethral fistula.

Patients & Methods

Study Design: A cross sectional prospective study was done in Basrah Teaching Hospital (urological department) between January 2018 to March 2020.

Patients selection: A total of 50 boys, 2 to 10 years old with coronal and sub coronal primary Hypospadias were treated with TIP urethroplasty (Snodgrass technique) by one surgeon, who were referred to Basrah Teaching Hospital from private and outpatient clinics, patients were divided into 2 groups:

- (group I: 25 patients) single layer Dartos flap.
- (group II: 25 patients) double layers of Dartos flaps to cover the reconstructed site of neourethra.

Six patients were missing during follow up, coincidentally 3 patients in each group. The parents were informed about the general aspects of the surgery including risks and complications, the parents then signed an informed consent form.

A full medical and surgical history were recorded; clinical examination was performed. Investigations include (renal function tests, urinalysis, new imaging including ultrasonography of urinary system was optional done accordingly, urine culture and sensitivity if positive urinalysis was detected, in addition to the routine preoperative investigations, were performed), pre-operative antibiotics were given in selected cases (patients with a history of infection e.g.: UTI, tonsillitis) with completion the duration of follow up starting at 1, 3, and 6 months.

Inclusion criteria: Patients with coronal and sub coronal distal primary penile hypospadias who are candidates for Snodgrass TIP urethroplasty.

Exclusion criteria: Include, history of failed urethroplasty, history of circumcision, severe penile curvature which might need urethral plate excision for correction.

Surgical steps: After placing traction suture through the glans, a circumferential subglandular skin incision was carried out around dorsally,

complete degloving done, any ventral curvature if present, was corrected. The mid line incision was made through urethral plate, two parallel incisions were done along the junction of glans wings to the urethral plate, and the glans wings were elevated laterally, then suitable silicone urethral catheter was passed into the bladder, the urethral plate is tubularized by subcuticular closures of 5/0 vicryl suture.

Monolayer Dartos flap Coverage (group I)

A suitable dartos flap was harvested and rotated ventrally to cover the front of the neourethra, and fixed to the contralateral fascial layers and glandular tissue beneath the glans wings using superficial 5/0 Vicryl stitches.

Double-Layer Dartos flaps Coverage (group II)

A vascularized dartos flap was dissected from the dorsal preputial and shaft skin, wider flap bisected in the midline to form two well-vascularized rectangular wings, the right wing was rotated laterally from the right side to cover the neourethra, It was stitched to the periurethral tissue using 5/0 vicryl sutures. The left wing was then rotated laterally from the left side to overlap the right wing, it was sutured to the periurethral tissue and to the external surface of the right dartos wing using the same suture material, the glans wings closures were completed by 5/0 mattress sutures over the overlapped double dartos covering flaps, dorsal penile skin was bisected in midline to cover the ventral defect so that the final appearance look like the circumcision.

A dressing was placed postoperatively for (3- 7) days for good hemostasis. Trimethoprim-sulfamethoxazole either (co-trimoxazole 240 mg/5 mL) BID or (co-trimoxazole 480 mg tablet) BID, was given as a post-operative antibiotic for six days. Ibuprofen (40 mg/kg TDS), was prescribed as an oral analgesic agent.

Most of the patients were discharged from hospital after (1- 2) days, whereas others stayed beyond 48 h due to postoperative complications. Catheters were removed at postoperative day 7. Children were followed for a period of 6 months.

Statistical analysis: The data had been calculated by using (SPSS version 24) SOFTWARE.

P values were estimated and considered statistically significant at $P < 0.05$. Statistical analysis and comparisons between the groups were done using the chi-square test.

Results

This study included a total of 50 patients, divided randomly by even and odd system into 2 groups:

- Group I: 25 patients with single layer repair with odd numbers.

- Group II: 25 patients with double layer repair with even numbers.

Six patients were missed during follow up, coincidentally 3 patients for each group. So, 44 patients

have been included in the statistics calculations. The mean age was 4.55 and 4.86 year for groups I, II respectively, both groups were comparable in terms of meatal location, group I had 8 cases coronal and 14 cases sub coronal, group II had 10 and 12 cases for coronal and sub coronal respectively, the mean operative time was 88.81 and 91.86 minutes for group I & group II respectively, table 1.

Table 1: Demographic distribution data of the involved patients.

		Group1	Group2	
Age		Mean	4.559	4.868
		SD*	2.0234	2.2531
		SD*. Error Mean	0.4314	0.4804
Age groups	2-5 yrs	Count	14	12
		% within Groups	63.60%	54.50%
	6-8 yrs	Count	7	8
		% within Groups	31.80%	36.40%
	9-10 yrs	Count	1	2
		% within Groups	4.50%	9.10%
Type	Coronal	Count	8	10
		% within Groups	36.40%	45.50%
	sub-coronal	Count	14	12
		% within Groups	63.60%	54.50%
Operative time in minutes		Mean	88.8182	91.8636
		SD*	6.46335	6.46084
		SD*. Error Mean	1.37799	1.37746

*Standard deviation

The success rate was dependent on cosmetical, functional acceptance and complications that have been treated by conservative measures, it was

(81%) and (86%) for group I, II respectively, with exception of complications which need redo surgery, table 2.

Table 2: Success rate for each group.

	Total No	No of success cases	Success rate %
Group 1	22	18	81%
Group 2	22	19	86%

Urethrocutaneous fistula (UF) was developed in 5 patients (22.7%) in group I, the fistula was small and 3 cases treated by surgical intervention, and 2 cases was treated conservatively and healed spontaneously, UF was developed in 1 patient (4.5%) in group II, the fistula was happened in same patient who suffered from surgical site infection postoperative and treated with continued antibiotics for 2 weeks and change dressing daily, the fistula was treated by surgical intervention. Bleeding was happened in 5 cases (11.4%) for both groups, 2 cases (9.1%) in group I and 3 cases (13.6%) in group II, all cases was treated conservatively with tight dressing except one case in group II was treated

by surgical exploration. Meatal stenosis was diagnosed in 2 patients (9.1%) in group I and 3 patients (13.6%) in group II, all cases in both groups were treated conservatively by frequent dilatation, glans dehiscence was seen in 1 case (4.5%) for each group, the management for both groups was redo surgery.

The differences between the two groups in the bleeding, meatal stenosis, glans dehiscence, wound infection, UTI were statistically non-significant.

There was significant difference between the two groups in the occurrence of UF (P = 0.001), summarized in table 3.

Table 3: Surgical complications for both groups

			Group1	Group2	Total	P value
UF*	No	Count	17	21	38	
		% within Groups	77.30%	95.50%	86.40%	
	Yes	Count	5	1	6	0.001
		% within Groups	22.70%	4.50%	13.60%	
Bleeding	No	Count	20	19	39	
		% within Groups	90.90%	86.40%	88.60%	
	Yes	Count	2	3	5	>0.05
		% within Groups	9.10%	13.60%	11.40%	
Meatal stenosis	No	Count	20	19	39	
		% within Groups	90.90%	86.40%	88.60%	
	Yes	Count	2	3	5	>0.05
		% within Groups	9.10%	13.60%	11.40%	
Glans dehiscence	No	Count	21	21	42	
		% within Groups	95.50%	95.50%	95.50%	
	Yes	Count	1	1	2	>0.05
		% within Groups	4.50%	4.50%	4.50%	
Wound infection	No	Count	19	19	38	
		% within Groups	86.40%	86.40%	86.40%	
	Yes	Count	3	3	6	>0.05
		% within Groups	13.60%	13.60%	13.60%	
UTI**	No	Count	20	20	40	
		% within Groups	90.90%	90.90%	90.90%	
	Yes	Count	2	2	4	>0.05
		% within Groups	9.10%	9.10%	9.10%	

*Urethrocutaneous fistula

**Urinary tract infection

Discussion

The first TIP procedure for distal type hypospadias was described by Snodgrass⁷, which carried very good functional and cosmetic results. The success rate of this procedure depends on multiple facts that the urethral plate is a normal healthy tissue with muscle support and very good blood supply. The exact causes of fistula remain unknown. Shape of urethral plate, technical errors, local infection, poor tissue healing and distal obstruction may play a role in fistula formation⁸.

Retik et al, in 1994 was first described the use of dartos flap in TIP urethroplasty⁹. Dorsal dartos flap is well vascularised layer which use to cover the reconstructed neurthra. Ventral dartos flap, scrotal dartos flap and tunica vaginalis flap have been describing in special considerations as in redo operation or circumcised child¹⁰.

Kamal et al, 2005, the first one has reported a Double dartos flaps(DDF) to protect the neourethra, who reported that covering the neourethra with DDF was superior to single flap to prevent fistula development. Kamal et al, UF has developed in 2 patients in single layer dartos flap (2/54) (3.7%), and no fistula in 42 patients double dartos flaps (0/42)(0%)¹¹.

Balkan and Yildiz et al. UF has developed in 4 patients in single layer dartos flap (4/29) (13.8%), and no fistula in 45 patients double dartos flaps (0/45)(0%)¹².

Savannelli et al find 5 cases of UF in single layer dartos flap (5/65) (7.7%), and no fistula in double layer (0/40) (0%)¹³.

Erol et al. in a prospective randomized study confirming that double symmetrical dartos flap to cover the neourethra decrease the fistula rate to 0%¹⁴.

In current study, UF has developed in 5 patients in group I (5/22) (22.7%), and 1 case in group II (1/22) (4.4%), which is statistically significant. UF was diagnosed after one month of operation in same child who was developed surgical site infection postoperatively treated by daily changing dressing and antibiotics covering for 2 weeks, we believe that the UF was happened as a complication of infection due to frequent changing of dressing and disrupting of skin stitches lead to weakening the second dartos layer, the fistula was treated by redo operation 6 months later.

Tubularized incised plate urethroplasty was de-

scribed a dorsal transverse island of dartos tissue used as flap¹⁵. Later on, Snodgrass transposed it ventrally in a buttonhole fashion to cover the neourethra¹⁶.

Djordjevic et al, reported no fistula in 126 cases undergoing the TIP urethroplasty using additional coverage to ventral single layer flap by dorsal dartos flap is transposed to ventral side by button hole fashion¹⁷.

In current study, 2 layers of flap provide good protection from fistula because they have good blood supply and rich with nutrients, and if perforation or weakening occurs in one layer during dissection the second layer will cover the defect.

Nguyen and Sondgrass¹⁰, described that operative technique such as tubularization of neourethra too far distally plays an important role in future stenosis and fistula formation. In current study, the incised plate was tabularized over the Foley's catheter with a one-layer running subepithelial (5-0 vicryl suture), tubularization of the urethral plate was extended to the mid-glans only to obtain a slit like wide meatus, thus avoiding late meatal stenosis and fistula formation.

Meatal stenosis is a second most common complication after TIP urethroplasty. Lorenzo and Snodgrass¹⁸, suggested that regular meatal dilatation is not mandatory after TIP urethroplasty because this complication often develops as a result from a technical error such as not deeply incise the plate and tubularized the plate too far distally. Elbakry¹⁹ recommended that continuous urethral dilatation is very important for preventing meatal stenosis and UF by relieving adhesions between both sides of the incised plate.

In current study, Meatal stenosis was diagnosed in 2 patients (9.1%) in group I and 3 patients (13.6%) in group II, all 5 cases in both groups were treated conservatively by frequent dilatation.

Bleeding is another common complication of hypospadias repair, a significant hematoma is a dangerous which may cause infection and/or devascularization of flaps and graft, and failure of the surgical procedure. The most common causes of bleeding are inadequate hemostasis, trauma to the corpus cavernosum, bleeding from the resected corpus spongiosum for chordee correction. Bleeding can be avoided by several measures like applying a tourniquet at the base of penis, using

bipolar electrocautery and Adrenaline solution (1:100,000) is also helpful for hemostasis ²⁰.

In current study, s. Bleeding was happened in 5 cases (11.4%) for both groups, 2 cases (9.1%) in group I and 3 cases (13.6%) in group II, all cases was treated conservatively with tight dressing except one case in group 2 was treated by surgical exploration.

Elbakry ¹⁹ confirmed that the dartos flap should not be used because it hinders tension-free closure of the glans flaps and increases the risk of glans dehiscence.

In current study, glans dehiscence was seen in 1 case (4.5%) for each group, the management for both groups was redo surgery.

Another compromising problem is wound dressing. There are a wide variety of dressings described in hypospadias surgery, from compressive dressing with cast immobilization, adhesive biomembrane dressing, to the complete absence of dressing ²¹.

Savage et al ²², supposed that the advantages of dressing are decreased swelling, wound disruption, and improved hemostasis. In contrast, there are also disadvantages of dressing after hypospadias repair, such as ischemia due to compression, infection, and pain during dressing removal.

In this study, we used a compressive dressing for (3- 7) days to reduce the risk of bleeding and provide good hemostasis, as its in agreement with Shenoy NS et al study ²³, and El-Karamany TM et al study ²⁴.

Conclusion

- Tubularized incised plate urethroplasty remains most popular surgical intervention for treatment of distal hypospadias repair with good functional and cosmetic results, most of the complications were minor and treated conservatively.
- Neourethral covering with symmetrical well vascularized double dorsal dartos flaps represents a very good choice of UF prevention after TIP urethroplasty for distal hypospadias.
- Double darts flaps is easy to be harvested, safe procedure.
- Although the number of complicated patients are higher in group II than group I but there were statistically insignificant.
- We need more detailed studies with larger patients' sample to assess of DDF efficacy.

References

1. Schroder A, Stein R, Melchior S, Fisch M, Riedmiller H, Thuroff JW. Hypospadias. *Urologe A* 2006;45(Suppl 4):204–8.
2. Nuhoglu B, Akgül KT, Ayyıldız A: Re: Mi- roslav L. Djordjevic, Sava V. Perovic, Zoran Slavkovic and Nenad Djakovic. Longitudi- nal dorsal dartos flap for prevention of fistula after a Snodgrass hypospadias procedure. *Eur Urol* 2006; 50:53–57.
3. Kamal BA: Double dartos flaps in tubularized incised hypospadias repair. *Urology* 2005; 66:1095–1098.
4. Holland A, Smith G. Effect of the depth and width of the urethral plate on tubularized incised plate urethroplasty. *The Journal of urology*. 2000;164(2):489-91.
5. Snodgrass WT: Tubularized incised plate (TIP) hypospadias repair. *Urol Clin North Am* 2002;29: 285–290.
6. Snodgrass WT, Bush N, Coş N. Tubularized incised plate hypospadias repair for distal hypospadias. *Journal of pediatric urology*. 2010;6(4):408-13.
7. Snodgrass WT: Tubularized incised plate urethroplasty for distal hypospadias. *J Urol* 1994; 151:464–465.
8. Erol A, Baskin LS, Li YW, Liu WH: Anatomical studies of the urethral plate: why preservation of the urethral plate is important in hypospadias repair. *BJU Int* 2000; 85:728– 734.
9. Retik AB, Mandell J, Bauer SB, Atala A: Meatal based hypospadias repair with the use of a dorsal subcutaneous flap to prevent urethrocutaneous fistula. *J Urol* 1994; 152:1229– 1231.
10. Nguyen MT, Snodgrass WT, Zaontz MR: Effect of urethral plate characteristics on tubularized incised plate urethroplasty. 2004; 171:1260–1262.
11. Kamal BA: Double dartos flaps in tubularized incised hypospadias repair. *Urology* 2005; 66:1095–1098.
12. Bakan V, Yıldız A: Dorsal double-layer dartos flap for preventing fistulae formation in the Snodgrass technique. *Urol Int* 2007;78: 241–244.
13. Savanelli A, Esposito C, Settini A: A prospective randomized comparative study on the use of ventral subcutaneous flap to prevent fistulas in the Snodgrass repair for distal hypospadias. *World J Urol* 2007; 25:641–645.

14. Erol A, Kayikci A, Memik O et al. Single vs double dartos interposition flaps in preventing urethrocutaneous fistula after tubularized incised plate urethroplasty in primary distal hypospadias: a prospective randomized study. *Urol Int* 2009; 83:354–358.
15. Snodgrass WT, Nguyen MT. Current technique of tubularized incised plate hypospadias repair. *Urology* 2002; 60:157–162.
16. Snodgrass WT. Snodgrass technique for hypospadias repair. *BJU Int* 2005; 95:683–69.
17. Djordjevic ML, Perovic SV, Slavkovic Z, Djakovic N: Longitudinal dorsal dartos flap for prevention of fistula after Snodgrass hypospadias procedure. *Eur Urol* 2006; 50:53–57.
18. Lorenzo AJ, Snodgrass W: Regular dilatation is unnecessary after tubularized incised plate hypospadias repair. *BJU Int* 2002;89: 94–97.
19. Elbakry A: Tubularized-incised urethral plate urethroplasty: is regular dilatation necessary for success? *BJU Int* 1999; 84:683– 688.
20. Elbakry A, Shamaa M, Al-Atrash G. An axially vascularized meatal based flap for the repair of hypospadias. *Br J Urol*. 1998; 82:698–703.
21. El-Sherbiny M, Hafez A, Dawaba M, Shorrab A, Bazeed M. Comprehensive analysis of tubularized incised-plate urethroplasty in primary and re-operative hypospadias. *BJU international*. 2004;93(7):1057-61.
22. Van Savage JG, Palanca LG, Slaughenhaupt BLJTJou. A prospective randomized trial of dressings versus no dressings for hypospadias repair. 2000;164(3 Part 2):981-3.
23. Shenoy NS, Kumbhar VV, Shenoy YR, Sharma DB. Outcome of hypospadias repair-stentless versus stented repair. *International Surgery Journal*. 2016;3(4):2167-72.
24. El-Karamany TM, Al-Adl AM, Omar RG, Aal AMA, Eldakhakhny AS, Abdelbaki SAJU. A critical analysis of stented and unstented tubularized incised plate urethroplasty through a prospective randomized study and assessment of factors. 2017;107:202-8.