ORIGINAL ARTICLE

De-epithelized preputial skin flap with & without fibrin glue as a covering layers in repair of anterior hypospadias by snodgrass technique : a randomized controlled study

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ABSTRACT

Key words : Hypospadias, Snodgrass, fibrin glue, TIP.

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Background : The incidence Urethrocutaneous fistula (UCF) varies from 4% to 20% in literature. **Purpose** : Is to evaluate the effect of fibrin glue (FG) to reduce fistula formation post hypospadias repair by Tubularized Incised plate (TIP) technique. **Patients and Methods**: From October 2018 to October 2019 a total of 40 patients with anterior hypospadias were randomly allocated into 2 groups 20 patients each repaired with TIP with FG in group A and TIP only in group B. **Results**: The patients ages ranged from 1 to 12 years, after 6 months of follow up, early we found one case developed hematoma in group A to 3 in group B(p=.29) ,edema in 3 cases in group A and 4 in group B(p=.67),infection in 2 cases in group A to 3 in group B(p=.63), no dehiscence in group A to 1 in group B (p=.31), no fistula in group A to 2 cases in group B(p=.14), meatal stenosis in one case in each group (p=1). **Conclusion**: Although our study does not find statistically significant benefit of adding FG to our repair, yet it is clinically important to minimize fistula formation. Larger sample is needed to clarify this issue.

INTRODUCTION

Hypospadias is a congenital abnormality occurring in 1 of 300 live births. Recent studies suggest an increase of the incidence with considerable variation in different countries [1]. The surgical goal for hypospadias repair is to construct a cosmetically appealing straight penis with a terminally situated oval meatus, which will facilitate a well-directed full urinary stream and normal coitus. Although more than 200 reported original methods of urethral reconstruction were described, the quest for an ideal procedure to minimize the complications continues. Well-known aspects of the modern hypospadias surgery (delicate tissue handling, instruments, point coagulation, and maintaining the vascularity of tissues) probably play a role in the outcome of hypospadias surgery especially in terms of complication such as Urethrocutaneous fistula and proximal stricture formation. In an attempt to minimize the fistula and overall complications, various suture materials and techniques have been tried. Few studies advocated the role of FG in various surgical problems and in hypospadias repair [2,3]. FG has the advantage of being biodegradable and it does not result in

significant inflammation, tissue fibrosis, or foreign-body reaction [4]. FG may promote angiogenesis, local tissue growth, and repair [5]. Conventional synthetic hemostatic agents, for example, cyanoacrylate, may be associated with an increased incidence of infection, fibrosis, and chronic inflammation if left in situ [6]. This study was conducted with a view to seek out the role of autologous FG in addition to the thick dartos flap in reducing the chances of fistula formation after hypospadias surgery.

MATERIALS AND METHODS:

This is a prospective study, carried out in the department of urology, Aswan University Hospital, Egypt from October 2018 to October 2019. Forty cases of fresh anterior hypospadias (glanular, coronal, sub coronal and distal penile hypospadias(DPH)), without or with mild chordee and not circumcised were selected for the study, recurrent case , moderate or marked chordee and circumcised cases were excluded. Patients were randomized into 2 groups by closed envelops. Twenty cases (group A) underwent TIP repair with de-epithelized preputial skin flap as a covering layer , performed with application of FG. The control group, group B (20 cases), underwent the same procedure without application of FG by the same surgeon. The study was permitted by the ethical committee of our institute and a written consent was obtained from the parents of the patients. The autologous FG was prepared two days pre operatively. Blood sample 3-5 ml (according to the final volume of fibrin glue needed) was taken in 2 ml of clinical grade citrate phosphate dextrose buffer, this will yields 0.5 -1 ml of fibrin glue. The blood was centrifuged at 4000*g* for 30 min and the supernatant plasma was separated. The fibrinogen concentrate was prepared from separated plasma by the biochemical method of cryoprecipitation. In this method, the plasma was immediately frozen at -80°C in a mechanic refrigerator and then the frozen plasma was put at 4°C (overnight) for 18-24 h for spontaneous thawing. Cryodepleted plasma was removed and the residual cryoprecipitate dissolved in 1-2 mL of plasma. Then the supernatant plasma was separated and 0.5-1 g of calcium gluconate has been added to it. After 30 - 45 min, the clot was formed, shaken vigorously and centrifuged at 4000*g* for 20 min, and the supernatant plasma containing thrombin was separated. 10 to 20 min before operation the fibrin clot (cryoprecipitate) was mixed with the plasma containing thrombin separated from the last step. The surgical repair was done under general anesthesia. All the cases with mild chordee was corrected just by degloving of the penile skin near the penoscrotal junction, the preputial skin is divided in to one and two thirds , then de-epithelization is done for the inner and the outer aspects of the one third of the preputial skin, this provided a thick highly vascular darots flap which used to cover the new urethra , a tourniquet is used around the base of the penis for haemostasis. After making the skin incision with the scalpel, we prefer to complete the dissection and glans wings mobilization using tenotomy scissors, taking care both to preserve vascularity to the urethral plate and sufficient thickness for the wings to be securely approximated. Tubularization is completed with a running two-layer subepithelial closure, turning all epithelium into the neourethral lumen then the fibrin glue is placed on suture line of the new urethra in group A . Then the de-epithelized preputial skin flap is used to cover and support the new urethra by suturing it to the tubularized tube (the neourethra) along the suture line, the glanular wings were sutured and closed by 6–0 polyglactin sutures, skin closure also we used subepithelial 6–0 polyglactin sutures. The same steps were done in group B except adding the FG. (Figure-1)

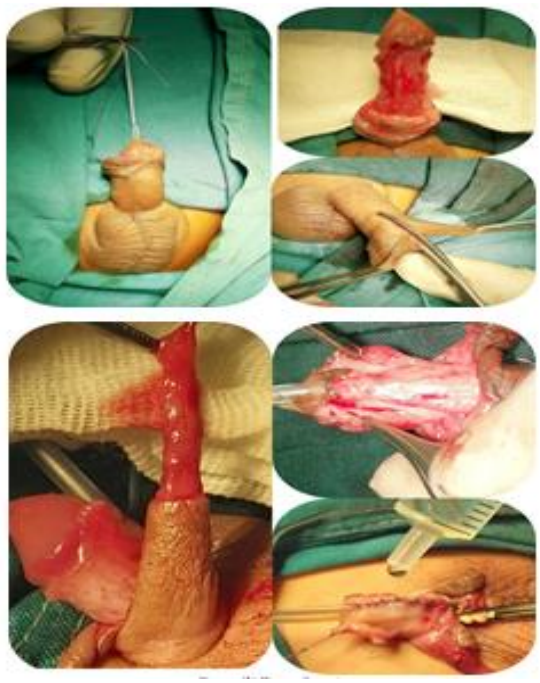

Figure (1) Steps of repair

Follow up

Early post operative evaluation and follow up for 48 h to early diagnose post operative edema ,bleeding and hematoma. Most of the patients were discharged from the hospital at the second day post operative to return for the first visit of follow up after another 3 days to remove the dressing (fifth day post operative)

and checked for persistent edema, hematoma, infection or dehiscence. Alcohol 70% spray was used for cleaning and as an strong antiseptic material, the urethral catheter was removed in most of them at the fifth day post operative and the others at the seventh day . The next visit was after one week after catheter removal to check for infection , persistent edema or early fistula .

The next visit was after 2 weeks, after one month , after 2 months and after 6 months

The items of assessment in each visit included

1- Degree and duration of postoperative edema

2- Presence of complications e.g. infection, fistula, meatal stenosis or complete disruption of the repair

3-Evaluation and assessing the cosmetic appearance of the penis and meatal orientation using the Hypospadias Objective Penile Evaluation (HOPE) score. [7]

RESULTS:

From October 2018 to October 2019 (40) children were included in this study with age ranging from 1 year to 12 years.

Table (1) age of study groups

Age	Mean ± SD	P value
Group A	4.5±2.8	0.54
Group B	6.5±3.2	

Table (2) types of hypospadias

Types of hypospadias	**group A**	**group B**
DPH	7 (35%)	5 (25%)
coronal	4 (20%)	5 (25%)
subcoronal	6 (30%)	6 (30%)
glanular	3 (15%)	4 (20%)

Table (3) presence of chordee in each group

	chordee	
	no chordee	**mild chordee**
Group (A)	14	6
Group (B)	12	8
Total	26	14
P value	0.507	

Table (4) blood loss and operative time

	Group	**Mean ±SD**	**P value**
Blood loss	(A)	6.0±1.1	0.538
	(B)	6.3±1.18	
Blood loss	no chordee	5.8±1	0.003
	mild chordee	6.9±1	
operative time	(A)	63.75±3.72	0.091
	(B)	65.80±3.75	
operative time	no chordee	64.31±3.61	0.299
	mild chordee	65.64±4.19	

Table (5) the early and late post operative complications

complications	**With fibrin glue group A**	**without fibrin glue group B**	**P value**
hematoma	1(5%)	3(15%)	.292
edema	3(15%)	4(20%)	.677
infection	2(10%)	3(15%)	.633
fistula	0(0%)	2(10%)	.147
catheter slippage	3(15%)	3(15%)	1.0
catheter block	2(10%)	2(10%)	1.0
meatal stenosis	1(5%)	1(5%)	1.0
wound dehiscence	0(0%)	1(5%)	.311

Table (6) the success and failure rates (6 months out come)

	Group (A)	Group (B)	P-value
Success rate	20(100%)	17(85%)	.072
Failure rate	0(0%)	3(15%)	.072

Table (7) HOPE score pre and post-operative for each group

		Mean ± SD	P value
Group A	Pre	35.15±7.22	0.0001
	Post	58.65±2.27	
Group B	pre	36.60±8.34	0.0001
	post	57.60±4.04	

Post op.	Group A	58.65±2.27	0.318
	Group B	57.60 ±4.04	

DISCUSSION

Snodgrass described an additional layer to cover the neourethra by subcutaneous tissue dissected from the dorsal preputial layer after performing the dissection between two layers of prepuce and the outer skin was used to cover the penile shaft. However, this dissection between the two layers of prepuce requires skill, and in addition, the vascularity of the outer skin layer may be compromised. To avoid this dissection between the two layers of prepuce, we did a variation for this technique where the dorsal prepuce is divided into two unequal halves (one-third and two-third) and a flap is obtained by de-epithelization of the inner and the outer layers of the one-third portion of the asymmetrically divided prepuce a result of thick tissue of preputial dartos flap .This variation of the technique avoids the overlapping of suture lines of neourethra and outer skin. The advantage of this method is the ease of dissection and absence of risk of loss of blood supply to the dorsal skin. However, the cosmoses is not optimal because of the soft tissue of the preputial layers on the ventrum of penile shaft. There are various studies where vascularized flaps have been used to cover the neourethra in Snodgrass repair with good functional and cosmetic outcome[8-10] Despite the use of flaps in the repair of hypospadias, the urethrocutaneous fistulae continue to occur in 5–16% of the cases[11,12]. In the present study, the fistula rate was zero- 10 % , which is comparable to the various reported series.

The application of fibrin glues in urology mainly relates to its sealing power. Ambriz-González et al [13] concluded that the incidence of urethrocutaneous fistula after hypospadias surgical repair can be reduced by applying fibrin sealant over the site of surgery and the suture lines. Dodat [14] used fibrin glue in various pediatric urological procedures and stated that it probably helps in reducing fistula formation. The local hemostatic effect seems to be very useful in urethroplasty for hypospadias. Its application in vesical, ureteral, or urethral sutures probably prevents fistulae. In present series we observed that postoperative edema was seen in 3 cases (15%) in group(A) vs 4 cases (20 %) in group(B), which was lower than other reported series. Kinahan and Johnson **[15]** in their series (Mustardé repair) observed that postoperative edema was significantly

lower with application of fibrin glue; it was 29% and 42%, respectively, for the glue group and the non glue group and fistula rate of 13% and 38% in the glue and non-glue groups, respectively for proximal penile hypospadias. Their hypothesis is that early postoperative edema occurs because of unrecognized microscopic leak in the tissue spaces in between the suture line, which may latter lead to fistula formation. This seems that the fibrin glue may has a role in wound healing by forming an additional layer over the urethral tube, sealing the minute cervices present between the suture and hence reducing the edema formation after surgery. These data suggest that fibrin improves the wound healing .In our study there was no fistula in group A (0%) as compared to group B (10 %). Incidence of fistula formation was less in the glue group, and the difference was statistically insignificant. Also, these data suggest that fibrin glue help in preventing fistula formation after hypospadias surgery, although does not eradicate it completely. Meatal stenosis was observed in 1 case (5%) in group A. The incidence of meatal stenosis in group B was also 5% , in group A it was due to scab formation which was managed by scab removal ,careful cleaning and dilatation (no surgical intervention was needed) but in group B it was in addition to fistula in one case . Meatal stenosis usually results from the retraction of the meatus or scab formation after surgery or it may occur because of faulty technique (too many sutures applied for meatoplasty or sutures are applied tightly or deeper glans tissue is used for meatoplasty). Snodgrass diagnosed meatal stenosis in only one of 426 consecutive distal TIP repairs with follow-up**. [16]** Blood loss was more in group (B) than group (A) with p value .508 which is statistically insignificant but the blood loss was more in cases with mild chordee than those with no chordee with P value .003 which is highly significant; it may be due to the extended degloving to the penoscrotal junction to correct the chordee. Mild penile hematoma reported in 1 case in group (A) but reported in 3 cases in group (B) which was statistically insignificant .Those cases improved completely within 2 weeks .Infection reported in 2 cases in group (A) but reported in 3 case in group (B) which was statistically insignificant , it was mild infection in all cases and resolved by daily dressing except in one case which complicated to complete wound dehiscence. In the current study the Success rate was in 20 patients (100%) with no failure in group (A) In comparison to group (B) in which Success rate was in 17 patients (85%) and failure rate was in 3 patients (15 %) in form of glandular dehiscence in one patient (5%) and subcoronal fistula reported in another 2 patients (10%) ,The success rate and failure rate data between group (A) group (B) was statistically insignificant table (6) . In 2015, a meta analysis of complication rates of TIP repair in published results in 3621 patients whom underwent distal hypospadias repairs with (TIP). The most common problems were fistulas (5.7%) and meatal stenosis (3.6%). **[17]** But in our study fistula rate in group (B) was (10 %) . Glans dehiscence reported only in 1 case in group (B) but not reported in group (A). Snodgrass had reported glans dehiscence in 9 patients from 551 patients operated with TIP**.[18]** · El-Sherbiny et al. had reported glandular disruption in 3% and Elicevik et al. reported 4% glandular disruption with two-layer closure of the glans **[19,20].** Snodgrass found that this complication occurred in only 4% of distal versus 15% of proximal cases, despite repairs being done by the same surgeon using the same sutures and operative technique**[21].**Snodgrass noted several years ago that his rate of glans dehiscence appeared higher than others reported. Snodgrass had one urethrocutaneous fistula from 33 cases repaired with (TIP**) [22]**

Table (8) fistula rate in sondgrass repair in various studies

Author	Year	*n*	Fistula rate (%)
Oswald **[23]**	2000	30	3.3
Imamoglu **[24]**	2003	32	12.5
Guo **[25]**	2004	36	8.3
Moradi **[26]**	2005	15	13
Germiyanolu **[27]**	2006	76	16

Regarding the HOPE score **[7]** by comparing our study to the other studies Sarah krull, et al reported that The HOPE-Score was assessed preoperatively for 79 boys, postoperatively for 66, and after all necessary surgeries for 21 patients. Mean HOPE-Score reached 30.2 ± 5.9 before surgery, 42.2 ± 6.1 after primary surgery, and 43.7 ± 3.4 after all necessary surgeries. A significant correlation between the HOPE-Score and the severity of hypospadias before surgery was observed. The boys with glanular hypospadias scored significantly higher (36.3 ± 5.4) than those with distal (29.6 ± 4.4) and proximal hypospadias (21.1 ± 3.5). Furthermore, a significant correlation between the HOPE-Score and the outcome after hypospadias repair was observed. Patients who needed no reintervention after primary hypospadias repair scored significantly higher postoperatively (45.1 ± 5.4) than those who needed a second (40.8 ± 4.2) or more than two surgeries (36.9 ± 7.4) **[27].** so our results are better than described in previous studies .

Conclusion although our study does not find statistically significant benefit of adding fibrin glue to our repair, yet it is clinically important to minimize fistula formation. Larger sample are needed to clarify this issue.

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