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Research Paper

Oral Mucosal Graft Versus Inner Preputial Graft in Two Stage Surgical Repair of Proximal Hypospadias: A Comparative Study

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ABSTRACT:

BACKGROUND:

Proximal hypospadias is a challenging case for the urologist due to the complexity of this type of hypospadias. Many surgeons adopting two stage repair for better cosmetic and functional results. The choice of the best graft to take for the repair remains controversial. Thus we are comparing buccal versus preputial grafts for post-operative surgical and histological outcomes.

OBJECTIVE:

To compare the surgical and histological outcome of inner preputial and oral mucosal grafts when used in two-stage proximal hypospadias repair.

METHODS:

Eighteen patients underwent two-stage graft hypospadias repair: first stage, urethral plate transection, graft harvesting and placement done. They were divided into two groups; group A, oral mucosal graft group; group B, inner preputial graft group. Second stage, urethroplasty and glansplasty were done. Patients followed up for 6 months postoperatively after each stage.

RESULTS:

Eighteen patients were included. First stage: group A (8 patients) with mean age 9.7 years, 6 primary and 2 redo cases. The mean operating time was 199 minutes. Group B (10 patients) with mean age 7.4 years, 9 primary and 1 redo case. The mean operating time was 179 minutes (significant statistical difference). The graft take was successful in all cases. None had significant postoperative complication or graft contracture.

Second stage: The mean time to perform second stage was 6.7 months. The second stage was event free in 75% of patients in group A while 12.5% had distal glans dehiscence and 12.5% had small distal fistula. Group B had 80% event free while 20% of patients had distal glans dehiscence (no significant statistical difference).

Histological examination showed good vascularization and minimal fibrosis in both graft types.

CONCLUSION:

The use of these graft types had excellent outcomes in terms of graft take and event free rates and the choice of graft governed by surgeon preference, patient preference and the state of prepuce.

KEYWORDS: graft, inner prepuce, oral mucosa, proximal hypospadias, two stage.

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INTRODUCTION:

The proximal type of hypospadias considered a challenge zone to the urologist in the field of his work because of the diversity and complexity of this hypospadias type. [1]

The two-stage hypospadias graft repair is considered an appealing choice for many urologists when dealing with cases of proximal hypospadias whether primary or re-do cases as it provides superior cosmetic and functional results than single stage repair.[2]

With the diversity of graft tissues available for the urologist, the choice of which graft to choose remains controversial. The inner prepuce and the oral mucosa are the most powerful graft choices available for the urologist. [3]

Objective of this study is to compare the surgical and histological outcome of both grafts when used in two-stage proximal hypospadias repair.

PATIENTS AND METHODS:

From January 2014 to January 2017, eighteen (18) male patients (range from 21 months to 30 years) with proximal hypospadias had been treated by two – stage hypospadias repair using either oral mucosa or inner preputial graft in Surgical Specialties Hospital, Baghdad. All parents and adult patients given written informed consents for participation. We divided the study population into two groups according to graft used, **group A**, oral mucosal graft was used while **group B**, inner preputial graft used. Then cases operated for the second stage after 6 to 8 months and followed up for 6 months postoperatively.

Surgical technique:

First stage

Under general anesthesia, complete manual adhesiolysis done as a preliminary procedure. A 2-0 silk suture placed through the tip of the glans as a traction suture. Foley catheter 6 or 8 Fr was inserted. A circumferential incision for complete degloving of the penis done. (Figure 1)

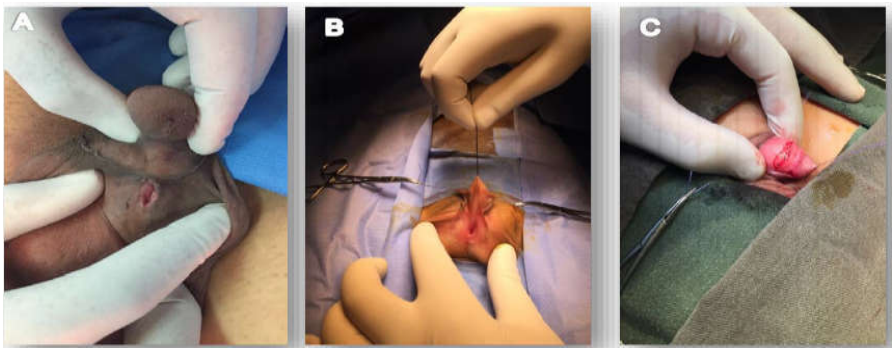

Figure 1: A. Examination under GA B. Traction suture in glans penis C. Circumferential incision

Then the corpus spongiosum mobilized. An artificial erection achieved by saline injection to assess ventral curvature. (Figure 2)

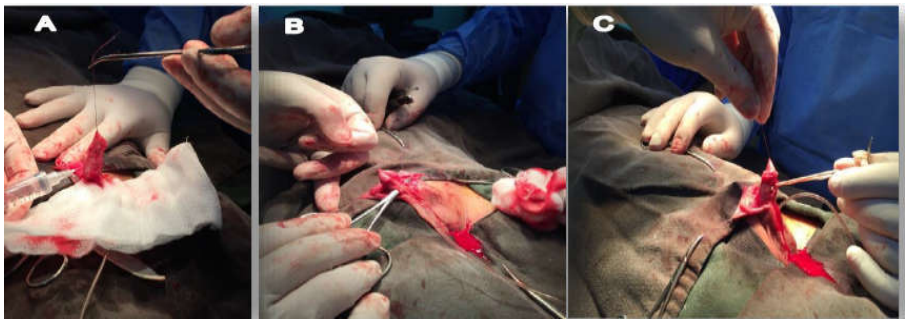

Figure 2: A. Artificial erection B&C Corpus spongiosum mobilization.

Because of significant ventral curvature associated with proximal hypospadias type, urethral plate transection done, and then the plate excised from the corpora. Multiple transverse ventral corporotomies may be also required and the intrinsic ventral curvature corrected with a dorsal plication if needed. (Figure 3). The native urethral mucosa sutured to the corpora using 6-0 Vicryl (polyglyctan) at 10, 12, and 2 o'clock. Proximal urethrostomy completed by suturing the native urethra **to penile skin or scrotum at 4, 6, and 8 o'clock.**

Figure 3 :Transection of urethral plate.

Harvesting the graft

Oral mucosal graft

Mouth rinse used pre-operatively. Nasotracheal intubation used and a self – retaining retractor put. Stenson duct identified and 4 stay sutures using Vicryl 4-0 marked arectangular graft with appropriate dimensions. Adrenaline (1/200:000) was used for hemostasis. Graft harvested extensively de-fatted over the finger and placed in warm saline until needed. The preferred site of oral mucosal graft in this study was the inner side of the cheek. (Figure 4)

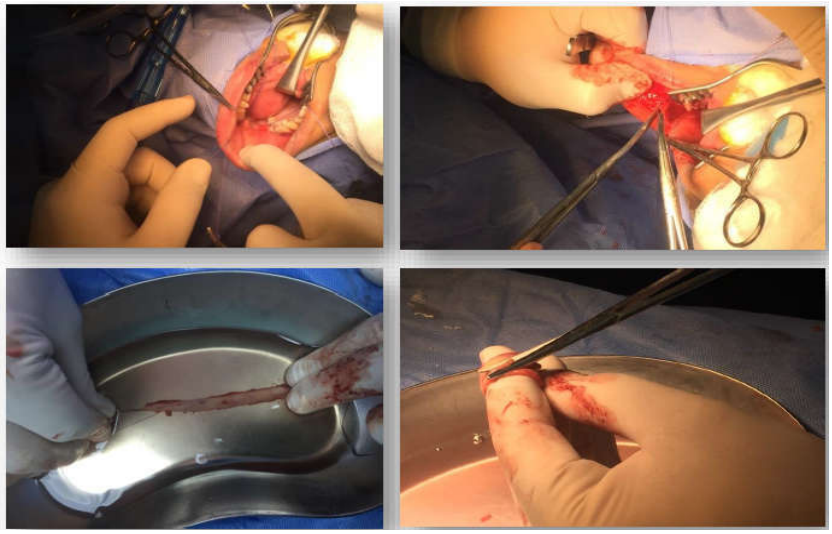

Figure 4: The steps for oral mucosal graft harvesting and defatting Inner preputial graft.

Four stay sutures placed on the marked preputial skin strip. The incision made on one side.

The graft dissected off gently and spread over a finger and residual subcutaneous tissue removed with fine scissors, so that a thin translucent skin strip created.

Placing the graft: The graft quilted in the midline to the corpora with 6-0 Vicryl at regular intervals to stabilize the graft on the wound bed and the penile skin sutured to the lateral aspect of the graft. (Figure 5)

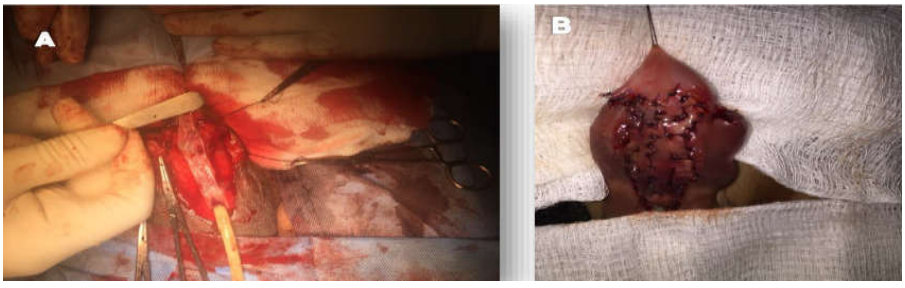

Figure 5: A. placement of graft to graft bed B. quilting sutures placed.

Dressing with β-silesterol (Mebo™) applied. Postoperative Foley catheter used for urinary drainage for average 7 days. Intraoperative single dose antibiotic was used.

Follow up

Patients examined daily during the first week then weekly in the first month and then monthly up to 6 months post operatively. The graft assessed for graft take and degree of graft contracture.

Second stage

After a period of 6 to 8 months, a U – shaped incision of the graft and out skirting the native urethral opening made. Scar junctions and any surplus graft width excised. Tubularization around 6 Fr Nelaton catheter (COOK medical ™ urethral stent) done for pre-pubertal boys (or 14 Fr silicone catheter for adult patients) by subcuticular interrupted suturing. A vascularized dartos flap applied as a second (waterproofing) layer then Glansplasty done (Figure 6). The Nelaton catheter fixed to neo-meatus by Vicryl 6-0 sutures. Dressing with β-silesterol (Mebo ™) applied. Intraoperative single dose antibiotic used. Catheter removed on average of 7 days postoperatively.

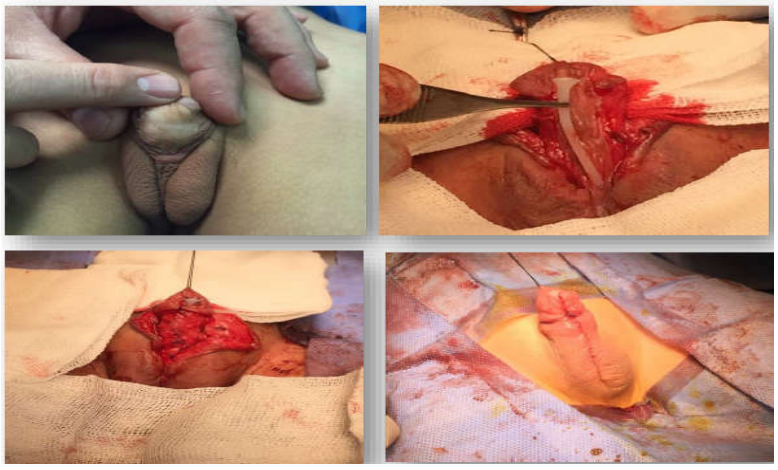

Figure 6: Steps of 2nd stage repair.

Follow up

The patients reviewed at daily bases in first week and then weekly during the 1st month, then a follow up visit scheduled at 3 months and 6 months postoperatively. During the follow up visit, the parents (or the patient if old enough) asked about the urinary stream, ease of voiding, voiding difficulties, assuming special position during voiding and overall satisfaction about the final penile shape. Then, the meatus inspected for its shape and meatal stenosis whereas the metal sound calibration (8 Fr for pre-pubertal boys and 14 Fr for adult patients) used for the objective detection of stricture. Success defined as the presence of a vertical slit-like anatomically positioned meatus, a normal urinary stream, and a satisfactory cosmetic appearance.

Histological Examination

The histological specimens put in formalin-based solution. Hematoxylin and Eosin staining was done and examination using a standard light microscope under 10X and 40X magnification power done.

RESULTS:

A total number of eighteen (18) patients enrolled in this study. The studied patients were divided into two groups:

Group A, were those patients for whom an oral mucosal graft was used (No. = 8, (44.4%)) while for those other (No. =10, (55.6%)) patients, an inner preputial graft was used (**Group B**)

Oral Mucosal graft group

The total number of patients was eight (44.4%). (Table 1) The mean age was 9.7 years (with a range of age from 1.9 to 30 years) (Table 1). According to the type of presentation, six (75%) patients were primary cases while other two (25%) cases were re-do cases, after previously failed hypospadias repairs (Table 1)

Of those patients, none of them experienced significant donor site pain or hematoma and all of them resumed oral intake few hours postoperatively. The mean operating time was 199 minutes (with a range of 180 – 225 minutes). (Table 1)

Inner preputial graft

The total patients were 10 (55.6%).The mean age was 7.4 years (with a range of age from 3 to 20 years) (Table 1). Of these patients, nine (90%) patients were primary cases while only one (10%) was a re-do cases (Table 1). The mean operating time was 179 minute (with a range from 160 – 210 minute) (Table 1). The graft took successfully in all (100%) of the enrolled patients. No significant graft contracture recorded and neither required re-grafting procedures in both groups (Table 1).

Statistical analysis

The statistical analysis shows significant statistical difference (P<0.05) between oral mucosal graft and inner preputial graft regarding the operating time.

Table 1: Characteristics of first stage repair according to graft type used.

	Oral mucosal graft	Inner preputial graft	P-Value
Number (%)	8(44.4%)	10(55.6%)	0.868
Mean age (year)	9.7	7.4	0.508
Primary case	6	9	0.693
Re-do case	2	1	0.684
Mean operating time	199	179	0.012*
Graft take	100%	100%	--
1st stage complication	None	None	--

P value <0.05 (statistically significant difference)

Second stage:

The mean time to perform second stage was 6.7 months (with a range from 6 to 8 months).

Oral mucosal graft

The second stage was an event- free in 75% of patients. One patient (12.5%) had distal glans dehiscence and one patient (12.5%) presented with small distal fistula (occurred in a re-do case). (Table 2) and (Figure 7)

Inner preputial graft

The event – free rate was 80% while two (20%) patients had distal glans dehiscence (Table 2) and (Figure 7)

Statistical analysis

The statistical analysis shows no significant difference (P>0.05) between oral- mucosa and inner preputial- graft groups regarding their complications rates

Table 2: The rates of 2nd stage complications in hypospadias patients according to graft type used.

Graft	Distal glans dehiscence	Fistula	no complication	Total	P-value
Oral mucosa	1(12.5%)	1(12.5%)	6(75%)	8	0.978*
Inner prepuce	2(20%)	0	8(80%)	10	
Total	3(16.7%)	1(5.6%)	14(77.8%)	18	

P – Value >0.05 (Statistically not significant)

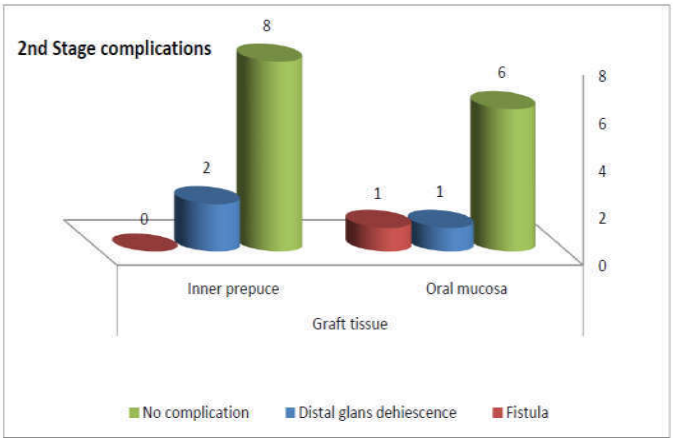

Figure 7: Show rate of 2nd stage complications Histological analysis.

The histological examinations of a biopsy samples that randomly taken from one patient from each group have showed an excellent vascularization and minimal fibrosis in both types of grafts suggesting very good graft take. (Figure 8 and 9).

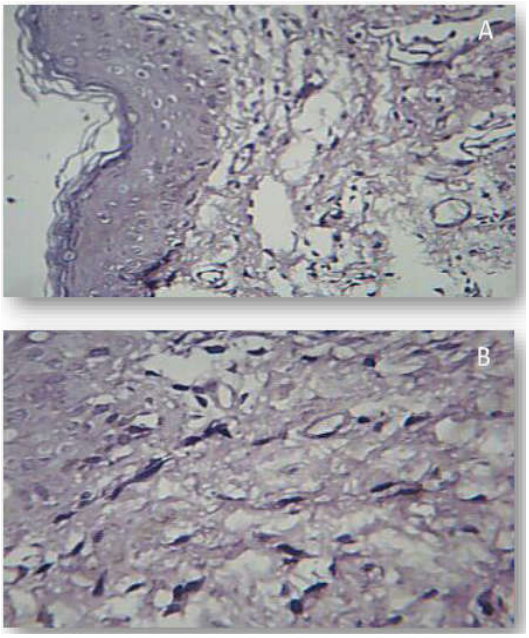

Figure 8: Show 10X magnification of biopsy sample

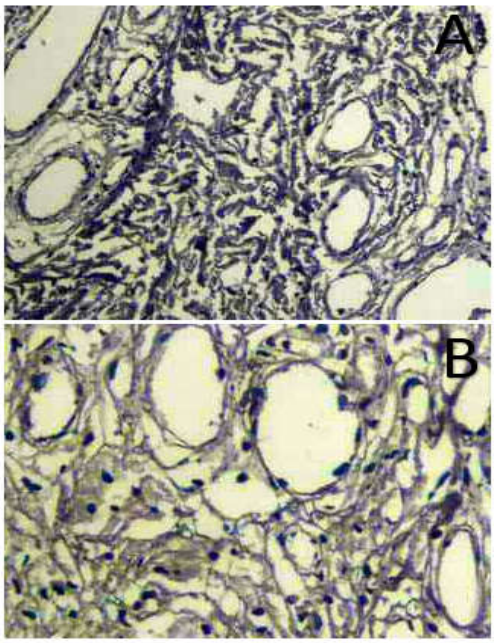

Figure 9: Show 40X magnification of biopsy sample.

DISCUSSION:

Regarding the mean age of each group, results are compatible to two other studies conducted by Cruzdiaz and associates [3] (9.6 years) and with Leslie and co-workers [4] (7 years) while are in disagreement with Ferro and his co-researchers [1] (1.3 years) and Faure and his working group [2] (15 months).

The high mean of age of patients may be attributed to the ignorance trend among their parents as well as the patients or poverty that preclude the parents to pursue medical care for their affected sons [5].

Regarding the first stage complications, the results supported by similar findings of Cruzdiaz *et al* [3] and this may be attributed to several important factors such as the meticulous dissection, avoidance of Stensons duct, careful hemostasis and advancing learning curve.

Regarding the mean operating time for each group, These results could be attributed to that in the oral mucosal graft repair, the change of operating field to donor site and the new draping and dressing which where all have adding an extra time for that repair operation and was clearly attributed to that observed statistical significant difference.

Regarding graft take, the results of oral mucosal group are similar to Johal *et al* [6] (100% of oral mucosal graft) and by Faure *et al* [2] (100% of oral mucosal graft) whereas it was higher than Tahmeedullah *et al* [7] (88.3% of oral mucosal graft cases), Leslie *et al*[4] (87%), and Snodgrass *et al* [8] (90%). On the other hand, the inner preputial graft group results were in agreement with Ferro *et al*[1] (100%) and Johal *et al*[6] (100% of preputial graft) but were higher than Tahmeedulla *et al* [7] (95.3% of preputial graft) and Faure *et al* [2] (94% of preputial- graft).

These results might be attributed to many factors: First, the graft bed preparation, second, the meticulous graft harvesting and extensive defatting. Lastly, the graft fixation by multiple quilting sutures and fenestrations.

Regarding the histological examination, the results were similar to Mokhles *et al* [9] who have taken these biopsies from oral mucosal grafts and Leslie *et al* [10] from preputial grafts.

Regarding the second stage complications, the oral mucosal graft group event free rate was comparable to Johal *et al* [6] (82%) and was higher than Leslie *et al* [4] (66%). In addition, the present result of fistula rate is comparable to those reports published by Snodgrass *et al* [8]

(14.6%) and was higher than Cruzdiaz *et al* [3] (7.5%). This could be attributed to that the patients who developed fistula were a re-do cases and that despite an excellent graft taking and the 2nd covering layer during 2nd stage repair, there is still less ability for tissue healing.

Regarding the inner preputial graft group event free, the results were comparable to Ferro *et al* [1] (73.8%). In addition, other complications were higher than Ferro *et al* [1] (11.7%). The complication of distal glans dehiscence related mainly to the glans size (less than 14 mm) [11]. Other causes include proximal meatus location and revision surgery for prior glans dehiscence[12]. Unfortunately, in this study, no measurement of glans size was done.

In this study, and on comparing both groups, these current findings are in agreement with those by Tahmeedulla *et al* [7].

According to the mentioned results earlier, both graft types have showed comparable outcomes in terms of graft take, first stage complication rates, histological analysis and 2nd stage event free rates. In addition, the oral mucosal graft had higher operating time, higher fistula rate and the need to change the operating field to harvest the graft while inner preputial grafts were of highly advantageous in these aspects. However, when inner prepuce was lacking (due to previous hypospadias repair or circumcision), in cases of balanitis xerotica obliterans or when preputioplasty was requested, as such the oral mucosa was the preferred choice for grafting them.

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