

BUCCAL MUCOSA GRAFT AND LOCAL TISSUE FLAP IN COMPLEX HYPOSPADIAS REPAIR: ONE STAGE VERSUS TWO STAGES

By

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ABSTRACT

Introduction: Urethral reconstruction in complex hypospadias (either severe primary or crippled) poses a significant challenge. We report our experience using buccal mucosa onlay grafting with local tissue flap (tunica vaginalis or dartos) as a second layer coverage of the neourethra to repair complex hypospadias in one stage Vs two stages.

Materials and Methods: We prospectively evaluate 32 patients with complex hypospadias who underwent ventral onlay buccal mucosa graft urethroplasty with local tissue flap (tunica vaginalis or subcutaneous dartos flap) as a second layer coverage of the new urethra in Zagazige university hospitals in-between August 2008 and April 2011. Repair done in one stage for 20 pts (group one) (8 primary, 6 crippled, 6 fistulae) and in two stages for 12 pts (group two) (8 primary, 4 crippled). Tunica vaginalis flap used in 18 cases and subcutaneous dartos flap which used in 14 cases. Follow up ranged from 6 to 30 months. Early and late Complications reported, analyzed and compared between both groups. Minor and major complications managed conservatively and those failed need reoperation. Reoperation rates in both groups used as the failure rate.

Results: early complications (Edema, Bleeding & hematoma, Infection, Catheter problems, Glans dehiscence, Wound dehiscence, Fistula and graft loss) were 19 in 6 patients in group one and 11 in 4 patients in group two. Late complications (meatal stenosis, urethral stricture, graft contracture and residual chordee) were 7 in 4 patients in group one and 6 in 3 patients in group two. The overall Reoperation was 9/32 (28.125%), 6 patients (30%) in group one and in group two needed only for 3 patients (25%) for fistula closure, meatoplasty, orthoplasty and VIU. No donor site complications reported.

Conclusions: Buccal mucosa appears to be a durable source of nongenital tissue for urethral replacement. Onlay buccal mucosa urethroplasty for complex hypospadias repair is of good results obtained with both in one stage or two stage repair with better results in two stage approach.

INTRODUCTION

Hypospadias is the most common penile congenital anomaly ⁽¹⁾ and the second most common congenital malformation in males, occurring in approximately one in 125 live male births ⁽²⁾.

Patients with severe proximal defects and those with failed previous repairs often require difficult reconstructive procedures with relatively high complication rates, ⁽³⁾.

Urethral reconstruction for primary and secondary hypospadias is best done using local penile and preputial tissues ⁽⁴⁾.

Infrequently, local tissue is inadequate to provide both skin cover and reconstruction of the neourethra. This is usually encountered after previous surgical failure has led to tissue loss and scarring

and only rarely in cases of untreated severe hypospadias ⁽⁵⁾. The use of buccal mucosa as urethral substitute material was first suggested by Humby in 1941⁽⁶⁾, and has been reintroduced by *Burger, R A. and his group* since in 1992⁽⁷⁾.

Various factors have contributed to the acknowledgement of buccal mucosal grafts (BMGs) as an ideal substitute for the urethra, including easy accessibility and manual handling, resistance to infection, compatibility with a wet environment, a thick epithelium and a thin lamina propria, allowing early inosculation and good medium-term results which are at least comparable with full-thickness skin grafts⁽⁸⁾.

Materials and Methods: 32 Patients included in this study divided in

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two groups. The 1st group operated in one stage including 20 patients (8 primary, 6 crippled, 6 fistulae) and the 2nd group operated in two stages including 12

patients (8 primary, 4 crippled) in the 1st stage correction of associated genital anomalies done followed by urethroplasty 6 months later.



Peno-scrotal hypospadias with Peno-scrotal transposition &chordee



Crippled Peno-scrotal hypospadias with scarred urethral plat &deficient skin

In group one, 10 patients (50%) had 15 genital anomalies 8 pts had penile chordee (40%), 3 pts (2 in fistula and 1 in crippled cases) had only penile chordee and 2 pts (1 primary and 1 crippled) had both chordee and penile rotation, one with oblique inguinal hernia and two with undescended testis. One pt had mild form of penoscrotal transposition and inguinal hernia and only one patient had penile rotation.

In the group two, 12 patients (100%) had 19 genital anomalies. 7 pts (58.33%) had penile chordee 5 had only penile chordee, 1 associated with penoscrotal transposition with bifid scrotum and one with penile rotation. One patient had isolated mild penoscrotal transposition. One had penile rotation, one with bifid scrotum and two cases of isolated penile rotation were present.

Under general anesthesia with and patient in supine position, two teams working simultaneously to decrease anesthesia time and leaving urethroplasty team to concentrate in his job.

The harvesting of buccal mucosa from the lateral cheek was done with a

technique similar to that described by Eppley et al⁽⁹⁾ using an intraoral retractor and infiltrating the graft area with 1:200,000 epinephrine. The outlined graft is sharply dissected and removed, leaving the muscle intact. The donor site is carefully examined for bleeding. The graft length varied from 2.4 to 12.5 cm, which was 20% more than the urethral plate defect length (2-10.4 cm) fig 1 (a&b). The harvesting site is closed with 5-0 polyglactin continuous suture. Any fat or minor salivary glands harvested with the graft carefully removed to enhance graft survival.

In group two in the first stage correction of associated anomalies done. For those with chordee still present after degloving fig (2) dorsal tunica albuginea plication at 12 o, clock as the Baskin & Lue⁽¹⁰⁾ modification of the technique described by Baskin & Duckett⁽¹¹⁾. While for those with bifid scrotum and penoscrotal transposition, correction done by a procedure similar to that described by Glenn and Anderson⁽¹²⁾ in addition to tubularization of the bifid scrotum by Thiersche Duplay technique⁽¹³⁾.

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In both groups buccal mucosal onlay urethroplasty then carried out starting by a few millimeters incision of the original meatus, to avoid post operative urethral stricture that commonly occurs in this site, then the tip of the graft fixed to the meatus with 6-zero poliglecaprone sutures over a polyurethane catheter for both stenting and bladder drainage then completing the repair with continuous running sutures fixing the graft to both urethral plate wings till near the meatus fig (3).

Second layer coverage of the neourethra was then secured over the urethra extending it to the deep groove

under the glans wings. Tunica vaginalis flap used in 18 cases (11in group one &7 in group two) or subcutaneous dartos flap which used in 14 cases (9 in group one &5 in group two) as a second layer fig (4) a&b.

Finally, skin coverage was done, by using the prepuce by Bayer flap technique, or by approximation of the penile skin in the ventral surface of the penis. Urethral stents extended to the bladder as a urethral catheter to compress it for 7 to 10 days fig (6).

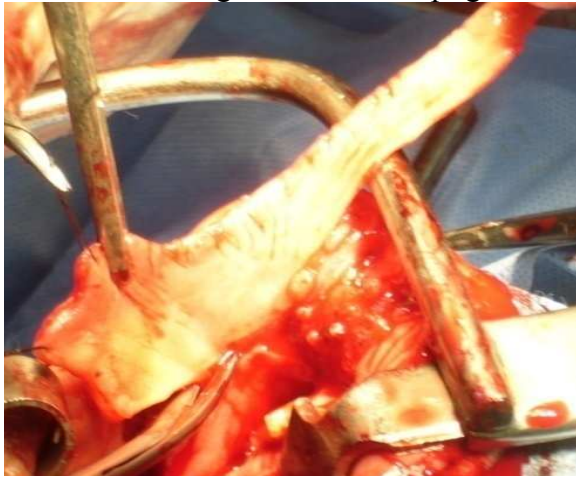


Fig (1,a) Harvesting the buccal mucosal graft



Fig (1,b) Buccal mucosa graft after harvesting



Fig (2) Penis with penoscrotal hypospadias after degloving

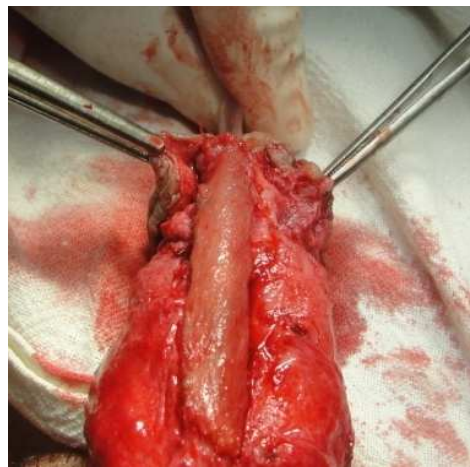


Fig (3) Ventral onlay buccal mucosa graft urethroplasty completed

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Fig (4,a) Tunica vaginalis flap



Fig (4,b) Ventral dartos flap



Fig (5) Glanuloplasty & meatoplasty



Fig (6) Final appearance in crippled case

Fistula cases were associated with distal obstruction, incision made from the fistula to the tip of the glans creating hypospadias.

Operative time ranged from 60 minutes to 110 minutes with mean of 81.5 minutes. In group one it ranged from 70-110 (mean 84m), with time of graft harvesting ranged from 15 to 23 minutes. In group two in 2ND stage it ranged from 60 to 100 minutes (mean 79) with time of graft harvesting ranged from 18 to 27 minutes.

Follow up in group one ranged from 6 to 30 months with mean of 20 months while in group two it ranged from 6 to 24 months with mean of 17 months.

Conservative management carried out for early complications as following. For edema NSAIDS used, for bleeding changing the dressing with compressive one in addition to anti bleeding drugs, for infection frequent changing the dressing

with application of local antibiotic spray and for both glans and wound dehiscence frequent dressing and treatment of infection if present. For late complications conservative management was regular dilatation for both meatal stenosis and urethral stricture.

RESULTS

Mean patient age was 6.5 years (range 8 months to 23 years). Early complications (Edema, Bleeding & hematoma, Infection, Catheter problems, Glans dehiscence, Wound dehiscence, Fistula and graft loss) was 30 occurred in 10 patients (31.25%). In group one, 18 complications occurred in 6 patients (30%). In group two, 4 patients (33.33%) complicated by 11 early complications as shown in the table one. Among these 6 complicated cases in group one, 4 cases need reoperations for glans dehiscence and graft loss, wound dehiscence and fistula closure. But in group two among those 4 patients with

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early 11 complications only 2 patients need reoperation for glans dehiscence, wound dehiscence and fistula closure. The other cases respond to conservative management.

Where late complications (meatal stenosis, urethral stricture, graft contracture and residual chordee) occurred as following, in group one 6 late complications occurred in 4 patients (20 %). Where in group two 6 complications occurred in 3 patients (25%) as shown in table (2). In group one 3 patients need reoperations for meatal stenosis, urethral stricture and residual chordee >30, one of

them reoperated also for early complications, so reoperation needed in group one for 3 early complications, 2 for late complications and 1 for both early and late complications and in group two only one patients need reoperations for meatal stenosis and urethral stricture as shown in table (2).

Reoperation procedures were fistula closure in 4, meatoplasty in 3, VIU in 2 and orthoplasty in 2.

From table (3) the overall reoperation rate was (28.125%), 6/20 (30%) in group one and 3/12 (25%) in group two.

Table (1):- early complications in both groups.

Complications	Group one	Group two
Edema	4	3
Bleeding & hematoma	2	-
Infection	2	2
Catheter problems	2	1
Glans dehiscence	2	2
Wound dehiscence	2	1
Graft loss	1	-
Fistula	3	2
Total	18	11

Table (2):- late complications in both groups.

Complications	Group one	Group two
Meatal stenosis	3	2
Urethral stricture	2	2
Residual chordee	2	2
Graft contracture	-	-
Total	7	6

Table (3):- reoperation rate

	Group one		Group two		Total	
	Number	Percent	Number	Percent	Number	Percent
Primary	2/8	25%	2/8	25%	4/16	25%
Crippled	2/6	33.33%	1/4	25 %	3/10	30%
Fistulae	2/6	33.33%	-	-	2/6	33.33%
Total	6/20	30 %	3/12	25 %	9/32	28.125%

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DISCUSSION

-Urethral reconstruction for primary and secondary hypospadias is best done using local penile and preputial tissues. However, in a number of patients there is a paucity of local tissue to use for reconstruction, usually due to complications from previous hypospadias surgery.

The use of buccal mucosa as urethral substitute material was first suggested by Humby in 1941 (Humby, 1941) ⁽⁶⁾, and has been reintroduced by Burger, R A. and his group since in 1992 (Burger. et al. 1992) ⁽⁷⁾.

In this study 32 patients underwent onlay buccal mucosal graft with second layer coverage of the neourethra with either tunica vaginalis flap or subcutaneous dartos flap. Follow up ranged from 6 to 30 months (mean 24months).

The results of this study shows that early complications occurred in 10 patients (31.25%) and late complications occurred 6 patients (18, 75%). The reoperation rate (which used as a failure rate) was 9/32 (28,125%). This reoperation rate is nearly the same as that reported by Yerkes et al. 1999 (29%) ⁽¹⁴⁾. Higher than that of Fichtner et al.2004 (24%) ⁽¹⁵⁾, that of Schoreder et al. 2010 (22.4%) ⁽¹⁶⁾, far away from that of Amukele et al. 2005 (12%) ⁽¹⁷⁾. But it is less than that of Metro et al. 2000 ⁽¹⁸⁾, Nelson et al. 2005 ⁽³⁾, and Irani et al. 2005 ⁽¹⁹⁾ those reported (50%), (51%) and (50%) respectively.

The reoperation rate in group one (one stage repair) was 6/20 (30%) less than that in the group two (two stages repair) which was 3/12 (25 %). which is more than that of Fichtner et al. 2004 ⁽¹⁵⁾ in their 35 pts operated in one stage (20%) and that for the 14 cases operated in two stages (21%).

Barbagli et al. 2006 ⁽²⁰⁾ reported the same success rate (82%) in both one stage and two stages which are better than that in this study.

Urethrocutaneous fistula occurred in 5 patients (15,625%) with their distribution

as following, 3 in group one (15%) and 2 in group two (16,67%), 2 occurred with tunica vaginalis flap 2/18 (11, 11%) and 3 with subcutaneous dartos flap 3/14 (21,4%) and 3 in 16 primary cases (18,75%), 2 in 10 crippled cases (20%) and non in fistula cases. One fistula case in group one responds to conservative management with the other 4 cases need reoperations for closure (12.5%). these fistula rates are nearly equal to that of Hensle et al. 2002 ⁽⁴⁾ (14.3%) better than that of Yerkes et al. 1999⁽¹⁴⁾ (29%) and Irani et al. 2005 ⁽¹⁹⁾ (25%). where it is worse than that of Metro et al. 2000⁽¹⁸⁾ (0%), Fichtner et al. 2004⁽¹⁵⁾ (6.1%), Nelson et al. 2005 ⁽³⁾ (11.6%), Amukele et al. 2005⁽¹⁷⁾ (3.6%) and Schoreder et al. 2010⁽¹⁶⁾ (3.5%).

Meatal stenosis occurred in 5 cases, 3 in group one and 2 in group two, 3 in primary, 2 in crippled and non in fistula cases. One case in each group responds to meatal dilatation leaving only 3 cases (9.375%) for meatoplasty. This rate is near to that of Schoreder et al. 2010 (8.2%) ⁽¹⁶⁾, better than that of Metro et al. 2000 (14.3%) ⁽¹⁸⁾ And Nelson et al. 2005⁽³⁾ (11.6%) but it is worse than that of Fichtner et al. 2004⁽¹⁵⁾ (4.08%) and that of Yerkes et al. 1999 ⁽¹⁴⁾, Hensle et al. 2002 ⁽⁴⁾, Amukele et al. 2005 ⁽¹⁷⁾ and Irani et al. 2005 ⁽¹⁹⁾ all reported 0% meatal stenosis.

Stricture urethra occurred in 3 cases (9,375%), 1 in group one (5%) and 2 in group two (16.67%), the all 3 cases were primary cases. One case respond to regular dilatation leaving 2 cases (6.25%) which respond will for VIU with no case need urethroplasty. These rates is better than that of Metro et al. 2000⁽¹⁸⁾ (42.8%) and that of Nelson et al. 2005⁽³⁾ (14%), near to that of Fichtner et al. 2004⁽¹⁵⁾ (6.1%), worse than that of Amukele et al. 2005⁽¹⁷⁾ (3.6%), Schoreder et al. 2010⁽¹⁶⁾ (3.5%) and that of Yerkes et al. 1999⁽¹⁴⁾, Hensle et al. 2002⁽⁴⁾ and Irani et al. 2005⁽¹⁹⁾ which reported (0%) stricture urethra.

Residual chordee occurred in 4 cases (12, 5%), 2 in group one (10%) and 2 in

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group two (16,67%). The two cases in group one need orthoplasty as the residual chordee was > 30 while the two cases in group two the residual chordee was <30 so no intervention done.

Graft loss occurred only in one fistula case that complicated by complete wound dehiscence. This is near to that of Hensle et al. 2002⁽⁴⁾ (5.7%).

No graft contracture occurred as we harvested the graft with a 20% more length than the urethral defect to overcome that problem that can occurs.

CONCLUSIONS

Buccal mucosa appears to be a durable source of nongenital tissue for urethral replacement. Onlay buccal mucosa urethroplasty for complex hypospadias repair is of good results obtained with one stage or two stages repair with better results in two stage approach. Also good results obtained in primary, crippled and fistulae cases with better results in primary cases. The addition of a second layer coverage to the newly formed urethra either tunica vaginalis flap or subcutaneous dartos flap is important to decrease fistula formation and to add a new vascularity helping imbibition and inosculation of the onlay buccal mucosa graft.

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