

## Miscellaneous

# Results of Buccal Mucosal Graft Urethroplasty in Complex Hypospadias

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### ABSTRACT

**Introduction:** Urethral reconstruction in complex hypospadias poses a significant challenge. We report our experience using buccal mucosa to repair complex hypospadias.

**Materials and Methods:** From February 2001 to September 2003, 16 urethral reconstructions were performed using buccal mucosal graft. Twelve of the patients had previously failed urethroplasties, while the other 4 had perineal or scrotal hypospadias. Grafts were harvested from the lower lip. Onlay grafts were used in 8 cases, and tubularized grafts were used for the others.

**Results:** After 14 to 27 months' follow-up, 11 of 16 (69%) patients developed complications, including meatal stenosis in 2 (12.5%), urethral stricture in 5 (31%), and urethrocutaneous fistula in 4 (25%). No oral complications were seen, and all of the urethroplasty complications were managed successfully.

**Conclusion:** Urethroplasty using a buccal mucosal graft may be accompanied by a relatively high complication rate, which is more common in patients with tubularized graft; however, all complications can be managed successfully. We believe that urethroplasty using buccal mucosal graft in complex hypospadias is an acceptable treatment modality.

**KEY WORDS:** hypospadias, urethra, buccal mucosa

### Introduction

Patients requiring urethral reconstruction, who have a paucity of usable genital tissue, present a considerable technical challenge to reconstructive surgeons. Most of these patients require a free tissue graft for neourethra construction. Previously, extragenital skin from the groin, inner arm, posterior auricle, or bladder mucosa were used in urethral reconstruction; however,

short- and long-term follow-up have indicated that they are far from ideal replacements.<sup>(1,2)</sup>

Another potential source for such grafts is the buccal mucosa. Humby is credited as being the first person to use buccal free grafts for urethroplasty in 1941,<sup>(3)</sup> but it was Burger and coworkers who popularized the use of buccal mucosal free grafts for hypospadias repair in recent decades.<sup>(4)</sup> In our center, buccal mucosal free graft was not used in hypospadias repair prior to this study. Herein, we present our experience with the use of buccal mucosa for repairing complex hypospadias.

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## Materials and Methods

From February 2001 to September 2003, 16 buccal mucosal grafts were used in 16 patients (mean age,  $10.25 \pm 3.42$  years; range, 4 to 20 years) to repair complex hypospadias. Twelve patients (75%) had a history of multiple previous failed hypospadias repairs (5 of them had undergone 3 previous urethroplasties, 4 had undergone 2 previous urethroplasties, and 3 had undergone 1 previous urethroplasty). The remaining 4 patients had perineal or penoscrotal hypospadias associated with a paucity of genital skin and no history of a previous operation (fresh cases).

The procedure and probable complications were discussed with the patients, and the operation was performed after patients had given written, informed consent.

The repair was started with conventional correction of the chordee. The actual urethral gap was measured after this correction. The chordee was corrected as much as possible before buccal mucosal was graft harvested to minimize the interval between removal and implantation of the graft. Depending on the status of the urethra, the abnormal segment might be excised entirely, or the urethral plate could be saved for subsequent onlay of the graft.

Mucosa was harvested from the inner surface of the lower lip. Free mucosal margins of the lip were not sutured together. Excised mucosa was trimmed by sharp dissection to remove any excessive submucosal tissue or salivary glands to decrease the natural tendency toward elastic retraction.

In 8 patients (50%) whose hypospadias was repaired with the urethral tube, the harvested graft was placed over an appropriately sized urethral catheter with the mucosa inward and tubularized with a running inverted 6-0 polyglactin suture. A wide spatulated anastomosis was performed with 6-0 polyglactin suture between the neourethra and the recipient urethra.

In the remaining 8 patients (50%), the graft was used in onlay fashion, one side of it was sutured to the urethral strip using a running 6-0 polyglactin suture and trimmed in situ over an appropriately sized urethral catheter. The repair was completed by suturing the contralateral mucosal margin to the other edge of the plate. Skin coverage was done after interposing a

dartos flap and completing glenoplasty. In all patients, the urethral catheter served as a urinary drain and also as a stent within the graft, and it was removed on the seventh postoperative day. Penile dressings were removed on the third postoperative day. All patients received 7 days of cephalosporin as a prophylactic antibiotic. To minimize postoperative gastrointestinal discomfort, a regular diet was instituted on the third postoperative day.

Patients were reexamined 1 day, 2 weeks, and 1 month after catheter removal, and then again in 6 months. During follow-ups, retrograde urethrogram or urethral calibration was done, if needed.

## Results

Median follow-up was 23 months (range, 14 to 27 months). Overall, complications occurred in 11 of 16 patients (69%), 2 occurred in the patients with a first repair and 9 were in redo cases. Seven of the complications developed in tube grafts and 4 others occurred in onlay grafts. Two patients (12.5%) developed meatal stenosis, necessitating meatoplasty, and 4 others (25%) developed a small urethrocutaneous fistula at the proximal part of neourethra (all in the onlay graft method). All fistulas were successfully repaired with delayed closure, 6 to 12 months later, on an outpatient basis. Five patients (31%) developed full-thickness urethral strictures, lengthened 2-5 mm on follow-up. Four of them developed midneourethral strictures, which were managed with external stricturotomy without applying any free graft, and were closed successfully 1 year later. Of the 2 complicated cases among the first repairs, 1 was a stricture at the site of the anastomosis of the neourethra to the native urethra, and the other was a case of urethrocutaneous fistula; the former was managed successfully by excision of the stricture and reanastomosis.

The sole complication among the onlay graft urethroplasties was urethrocutaneous fistula. No other complications were seen with this method.

The overall complication rate in the patients with primary urethroplasty by buccal mucosa was 50% (2 of 4), whereas it was 75% (9 of 12) in those with "redo" hypospadias ( $P = 0.547$ , Fisher exact test).

No oral complications were seen, and all oral wounds healed completely in 8 weeks.

## Discussion

Several choices are available for urethral reconstruction with a concomitant lack of available genital tissue, which occurs most commonly in children or adults with multiple previous failed attempts at hypospadias repair. Full-thickness skin from non-hair-bearing skin of the groin, buttocks, and upper arm has been used with early success, but significant complications, such as stricture formation, graft shrinkage, and scarification of the donor site, have been reported in studies with longer follow-ups.<sup>(1,5,6)</sup> The use of bladder mucosa may be difficult in children with a previous bladder operation, chronic cystitis, or even long-term suprapubic cystostomy. Bladder mucosal grafting also may be a challenging procedure in patients with neurogenic dysfunction, whose bladder walls have become thickened and trabeculated. Besides the complexity of harvesting, the major drawback with bladder mucosa is related to the neomeatus, which tends to prolapse in an exfoliative fashion.<sup>(2,7-9)</sup>

Humby was the first to report the use of buccal mucosa for repair of hypospadias, about 60 years ago.<sup>(3)</sup> Subsequently, Duckett<sup>(10)</sup> and Burger<sup>(4)</sup> separately presented their series with relatively low complication rates in late 1980s, and since then this technique has been revived. These authors found that in comparison with penile skin, buccal mucosa has a thicker epithelium and a thinner lamina propria, so that inosculation and revascularization of the graft would be easier than that of other grafts. Apart from these, abundant vascularity in the submucosal layer of the buccal mucosa graft also promotes its neovascularization. This is an accessible, non-hair-bearing material, and the intraoral donor site guarantees an excellent cosmetic result.

In agreement with many other reports, our overall complications of urethral reconstructions with buccal mucosal graft were relatively high (69%). These are categorized in 3 major problems:

1- Urethral stricture: Neourethra stricture, especially at the site of the anastomosis, is quite acceptable in virtually any procedure to repair hypospadias, including those using buccal mucosal grafts. In this study, we had a stricture rate of 31%, which is comparable with similar series: Metro,<sup>(11)</sup> Andrich,<sup>(12)</sup> and Duckett<sup>(10)</sup> had 23%, 45%, and 17% stricture rates in their series (Table 1). It should be

mentioned that this study was the report of our first experience and logically, one would expect higher urethral stricture rates.

2- Meatal stenosis: We had a 12.5% (2 of 16 cases) incidence of meatal stenosis, which is most likely due to ischemia. Frequent meatal dilation will avoid narrowing, but since most of our patients were adolescents, poor compliance with meatal dilation program may have contributed to this complication. In previous reports, the rate of meatal stenosis is different. Burger and colleagues used buccal mucosa in 6 patients, of whom 1 developed meatal stenosis (17%).<sup>(4)</sup> Meanwhile, Duckett and coworkers,<sup>(10)</sup> Metro and coworkers,<sup>(11)</sup> Caldamone and coworkers,<sup>(9)</sup> Burger and coworkers,<sup>(4)</sup> and Ricabonra and coworkers<sup>(13)</sup> reported 28%, 17%, 9%, 17%, and 41% meatal stenosis in their series, respectively.

3- Urethrocutaneous fistula: As mentioned previously, most of our patients had multiple previous failed urethroplasties, and the graft bed had local scarring with poor vascularity. Thus, urethrocutaneous fistula could be anticipated. In our series, we had 4 fistulas (25%) which is comparable with that in the studies of Duckett,<sup>(10)</sup> Bugar,<sup>(4)</sup> and Yerkes<sup>(14)</sup>, who reported fistula rates of 6%, 50%, and 38%. The only complication following the onlay graft procedure was fistula formation. All fistulas were in the proximal part of the neourethra. Therefore, it seems that our series is similar to others with regard to patients' population and the variety of complications.

There was no case of meatal exuberance. Our overall complication rate was relatively high (69%), and all of the cases needed reoperation. Fifty-five percent of reoperations were simple closure of urethrocutaneous fistula or meatotomy, and the rest were more extensive.

Well-vascularized tissue for covering the neourethra is essential for taking a free graft. Many of our patients had multiple previous attempts of reconstruction. Subsequently, using buccal mucosa as a salvage technique in the most complicated cases may be associated with a higher complication rate, as a result of poor tissue quality and unavailable well-vascularized tissue for adequate coverage of neourethra after multiple repairs. Although the rates of complications were relatively high, not only these were comparable with similar reports, but many of them also were managed by simple

interventions, such as internal urethrotomy for stricture, meatotomy for meatal stenosis, and simple closure of a fistula. Therefore, the occurrence of such complications is not such a disappointment. No differences were apparent with regard to success and complication rates among patients with a positive history of previous hypospadias surgery and those without such a history. This may be due to the selection of patients with more proximal hypospadias, in whom there is inadequate prepuce for repair. This also shows the complex nature of these patients.

Finally, it is noteworthy that when the buccal mucosa is harvested from the cheek, potential injury to the Stenson's duct would be expected, especially when the urologist is not so familiar with the anatomy of the oral cavity. Herein, we harvested buccal mucosa from the lower lip. This simple modification not only maintains the efficacy of the original procedure, but it eliminates potential injury to the Stenson's duct. Thus, it is suitable for surgeons who are not familiar with oral cavity anatomy, especially in their first cases.

### Conclusion

For urethroplasty, our preference is always to use local tissue. On the other hand, recent popularization of Tubularized Incised Plate (TIP) Urethroplasty has obviated the need for using free graft tissues in many cases. This procedure, however, is not suitable for complex cases such as multiple previous failed urethroplasties. In such cases, buccal mucosa tissue provides an alternative source for graft material. It can be used in carefully selected patients. Careful and realistic counseling of patients is necessary. Onlay grafts are preferable where the urethral plate may be preserved. However, in many complex cases, complete resection of previously constructed urethral segments is inevitable.

Due to the complex nature of patients treated with buccal mucosal graft urethroplasty, complications are not unexpected but each complication can be managed with somewhat simple intervention(s).

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