

Original Research Article

Buccal mucosa versus skin graft for two-stage redo hypospadias repair: our centre experience

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ABSTRACT

Background: Repeated surgical interventions for significant problems arising from either partial or complete failure of hypospadias treatment are less likely to succeed due to extensive scarring, considerable shortening of the penis, and scarred, hypovascular skin over the penile area. We provide the outcomes of our surgical experience with staged reoperation utilizing buccal mucosa and skin grafts in the correction of hypospadias in patients with problems following multiple failed surgeries.

Methods: The study was carried out in the department of urology, Narayana Medical College and Hospital, Nellore between January 2023 to March 2025. Depending on the type of free graft used for urethroplasty, patients are divided into two groups. Group A-treated with buccal mucosa graft. Group B-treated with skin graft. Data were analyzed using SPSS version 26.0 statistical software.

Results: The results showed that regarding early complications, patients in the BMG group showed a numerically lower incidence of graft loss (0% vs. 20%), fistula (0% vs. 10%), infection (9.09% vs. 20%), and meatal stenosis (9.09% vs. 20%) compared to the skin graft group; however, these differences were not statistically significant ($p > 0.05$). At the same time, there were no reported cases of graft contracture and urethral stricture. The incidence of donor site morbidity was greater in the skin graft cohort than in the BMG cohort.

Conclusions: Our findings indicated that BMG urethroplasty was associated with reduced occurrence of postoperative problems and donor site morbidity compared to skin graft urethroplasty. Furthermore, research is necessary to validate our findings and determine the subgroup of patients who are appropriate candidates for BMG urethroplasty.

Keywords: Hypospadias, Buccal mucosa graft, Skin graft, Urethroplasty, Stricture

INTRODUCTION

Hypospadias is a congenital anomaly of the male urethra characterized by an abnormally located urinary meatus.¹ The condition includes many anomalies such as ectopic ventral urethral opening, varying degrees of chordee, ventral penile curvature, and aberrant urethral plate width.² The major objective of treatment is to restore normal aesthetic and functional characteristics. Multiple surgical techniques are recommended for the correction of hypospadias.³

Two-stage hypospadias correction is frequently needed for patients requiring revision surgery due to the limitations of one-stage repair, including related to the scarred or lack of supple tissues, poor vascularity and the delayed healing process.⁴ In cases with penile skin deficiency or residual contracture, the tissue may be considered inappropriate for harvesting. Both skin and buccal mucosal grafts serve as viable choices for inner prepuce grafting.⁵ Although BMG yielded good functional and aesthetic results, the procedure necessitates significant surgical expertise that may be lacking in numerous local settings.⁶ Conversely,

skin grafts from the groin are viable in numerous local contexts; still, they present disadvantages such as coarse hair growth and donor site morbidity.⁷ This study illustrates our expertise with BMG and skin grafts in the two-stage correction of redo hypospadias.

METHODS

This study was a prospective study. It was conducted in the department of urology, Narayana medical college and hospital, Nellore between January 2023 to March 2025 after approval from the ethical committee and obtaining

written and informed consent from the patient. The study included previously operated cases of hypospadias from all age groups that presented with different complications. Patients having submucous fibrosis of the oral cavity, other oral pathologies, severe life-threatening medical conditions, local or systemic infections, and those lost to follow-up were excluded from the study.

Depending on the type of free graft used for urethroplasty, patients are divided into two groups: Group A (11) - treated with buccal mucosa graft and group B (10)-treated with skin graft.



Figure 1 (A-D): Preoperative urethral characteristics of included patients.

Statistical analysis

Data were analyzed using SPSS version 26.0 statistical software (IBM Corp., Armonk, NY, USA). Descriptive statistics were expressed as mean $\pm$ SD for continuous variables and frequencies (percentages) for categorical variables. Chi-square test or Fisher's exact test were used to compare categorical variables between groups. A $p < 0.05$ was considered statistically significant.

The procedures were conducted in a supine position, and all patients were administered general anesthesia. Three days before surgery patients were requested to apply Betadine scrub to genitalia twice a day and do Chlorhexidine gargles twice a day.⁸ On the day of surgery, intravenous broad-spectrum antibiotics are administered.

The stage one of the procedure involved correction of chordee, the removal of the damaged ventral tissue and scarred urethral plate. The technique described by Eppley et al was used to harvest the graft from the inner cheek in the BMG group.⁹ In brief, the oral mucosa was infiltrated with a local anesthetic, and the mucosa was sharply dissected, leaving the muscle intact. The incision was then closed with a continuous suture. On the contrary, the skin group graft was taken from the inguinal region at McBurney's point. The graft was sutured onto the corporeal bodies, and a soft compression dressing that secured the graft was applied.¹⁰ We meshed the graft with 18 G needle before quilting it to the prepared bed. Dressing was changed on the 5th POD to assess graft take and fresh dressing was applied. On the 10th POD, dressing and indwelling Foley catheter were removed. All patients were called up for monthly follow up to assess graft and to plan the second stage, 6 months following first stage.

The second stage of the surgery involved a circumferential graft incision, with no portion of the incision encroaching upon the adjacent skin. The graft was tubularized around a soft silicone catheter (8-12 Fr) utilizing 5-0 Vicryl sutures. The suture line was covered by vascularized tunica vaginalis. Dressing was changed on 5th POD. Intravenous antibiotic was given for 5 days and was switched over to oral antibiotic for five more days. Catheter was removed on 14th postoperative day. Uroflowmetry is recorded. If the meatus was found adequate and voiding with good quality urinary stream and the monthly follow-up was advised.

RESULTS

The study comprised 21 patients, 11 from buccal mucosal group and 10 from skin graft group, who had previously failed hypospadias surgery. The location of the urethral meatus was the primary determinant of the length of the graft and the success of urethroplasty.

Table 1: Preoperative characteristics of included patients.

Parameters	BMG group, (n=11) (%)	Skin graft group, (n=10) (%)	P value
Age (in years)	15.2±4.5	16.8±3.2	0.42
Previous procedures (mean)	2.3±0.8	2.1±0.7	0.56
Urethral meatus location			
Coronal	3 (27.3)	2 (20)	0.68
Subcoronal	2 (18.2)	3 (30)	0.48
Midpenile	5 (45.5)	4 (40)	0.79
Proximal	1 (9)	1 (10)	0.94

Table 2: Graft characteristics and operative details.

Parameters	BMG group, (n=11)	Skin graft group, (n=10)
Graft length (cm)	4.2±1.3	3.8±1.1
Graft width (cm)	1.8±0.4	1.6±0.3
Operative time (minutes)	145±23	132±18
Hospital stays (days)	7.3±1.2	7.8±1.4

The majority of individuals showed urethral meatus located in the midpenile area. The mean age of the included patients was comparable between BMG and skin graft groups. The majority of patients in both groups had undergone two prior procedures (72.7% vs. 60%, respectively). The median follow-up duration was 10 months in both groups. Regarding early complications, patients in the BMG group showed a numerically lower incidence of graft loss (0% vs. 20%), fistula (0% vs. 10%), infection (9.09% vs. 20%), and meatal stenosis (9.09% vs. 20%) compared to the skin graft group; however, these

differences were not statistically significant ($p>0.05$). At the same time, there were no reported cases of graft contracture and urethral stricture. The incidence of donor site morbidity was greater in the skin graft cohort than in the BMG cohort.

Table 3: Postoperative complications comparison.

Complications	BMG group, (n=11) (%)	Skin graft group, (n=10) (%)	P value
Graft loss	0 (0)	2 (20)	0.14
Urethrocutaneous fistula	0 (0)	1 (10)	0.48
Infection	1 (9.09)	2 (20)	0.58
Meatal stenosis	1 (9.09)	2 (20)	0.58
Graft contracture	0 (0)	0 (0)	-
Urethral stricture	0 (0)	0 (0)	-

Table 4: Functional outcomes and donor site morbidity.

Parameters	BMG group, (n=11) (%)	Skin graft group, (n=10) (%)	P value
Postoperative straining	1 (9.09)	3 (30)	0.28
Revision surgery required	0 (0)	1 (10)	0.48
Donor site pain (>1 week)	1 (9.09)	4 (40)	0.12
Donor site numbness	0 (0)	2 (20)	0.14
Donor site scarring	2 (18.2)	6 (60)	0.04

The BMG resulted in a reduced incidence of postoperative straining compared to the skin transplant (9.09% vs. 30%). Only one patient required revision surgery following the skin graft, whereas no cases occurred with the BMG.

Table 5: Long-term outcomes (10 months follow-up).

Outcomes	BMG group, (n=11) (%)	Skin graft group, (n=10) (%)
Successful repair	10 (90.9)	8 (80)
Patient satisfaction (excellent/good)	10 (90.9)	7 (70)
Normal voiding pattern	9 (81.8)	7 (70)
Cosmetic satisfaction	10 (90.9)	6 (60)

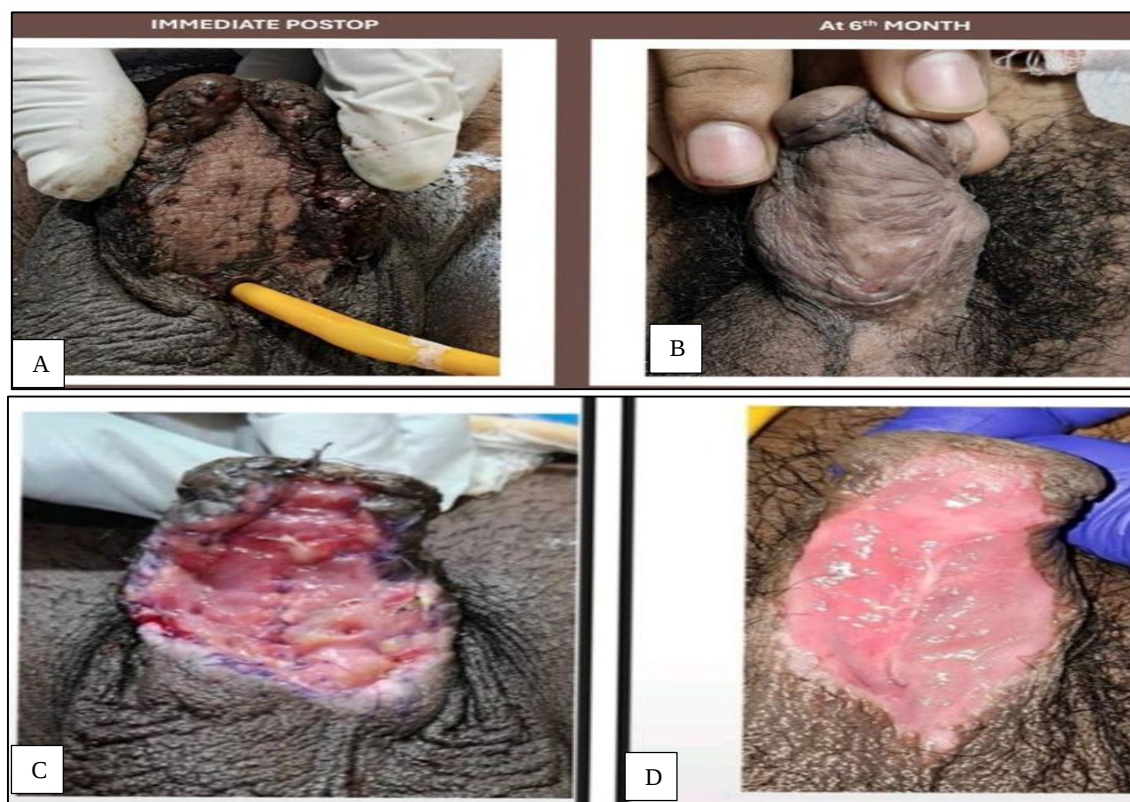


Figure 2 (A-D): Immediate and post op 6th month pictures of skin and buccal mucosal graft groups.



Figure 3 (A-E): Complications.

DISCUSSION

Secondary repair for hypospadias cripples is a challenging endeavor, as it necessitates consideration of anatomical,

functional, and aesthetic factors during urethroplasty. The penile morphology, correct meatal positioning, and standard functional capacity must be achieved, together with normal urine outflow rates, stream, and erectile

function. Aesthetic results must be considered, and donor site complications should be prevented.⁶

Patients undergoing hypospadias surgery are subject to an extensive variety of early and postoperative challenges, with risk considerably increased in those enduring several procedures. Prior findings indicated that individuals undergoing hypospadias correction may experience immediate postoperative problems, including infection, wound dehiscence, fistula formation, penile deformity, hemorrhage, and flap necrosis⁷ These complications were observed to occur with greater frequency in patients undergoing phased surgery.⁸

Prior reports indicated that BMG urethroplasty shows an acceptable postoperative safety profile, exhibiting minimal rates of acute postoperative complications; however, patients with complex strictures of the penile urethra-a common occurrence in individuals with complex hypospadias-exhibited an elevated risk of postoperative complications subsequent to BMG urethroplasty.⁹ Conversely, skin graft urethroplasty usually corresponds to an increased probability of immediate postoperative infection and fistula development.¹⁰ The current study revealed that the incidence of donor site morbidity was considerably higher in the skin graft group than in the BMG group.

Limitations

This study presents several limitations that should be acknowledged. First, the investigation was confined to a single center with a relatively small sample size (n=21), which may limit the generalizability of our findings to broader populations. Second, the follow-up period was restricted to a maximum of 10 months, which may not capture long-term complications or outcomes that could manifest later. Third, the study lacked randomization, which could introduce selection bias in treatment allocation. Fourth, the absence of standardized objective measures for cosmetic outcomes may have introduced subjective bias in result interpretation. Finally, the lack of a control group of patients who underwent single-stage repair limits our ability to compare the efficacy of two-stage procedures against alternative approaches.

CONCLUSION

Our findings indicated that onlay BMG urethroplasty was associated with reduced occurrence of postoperative problems and donor site morbidity compared to skin graft urethroplasty. Furthermore, the onlay BMG urethroplasty markedly enhanced the symptoms of urinary obstruction. Consequently, onlay BMG urethroplasty should be recommended over skin grafting in institutions efficient in onlay BMG urethroplasty. More research is necessary to

validate our findings and determine the subgroup of patients who are appropriate candidates for onlay BMG urethroplasty.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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