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Anatomical and Functional Outcome of Penile Skin Graft versus Buccal Mucosal Graft for Urethral Substitution in Long segment Anterior Urethral Strictures: A Prospective randomized Study

A thesis proposal submitted for partial fulfillment of MD degree in Urology

BY

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Introduction

Urethral stricture disease is a common problem faced by urologists worldwide.

The treatment of urethral strictures varies from urethral dilation to urethroplasty. It depends significantly on urethral stricture length and location, degree of spongiofibrosis, and underlying etiology.

Urethroplasty is classified into excision with primary anastomosis or augmentation urethroplasty. The direct anastomosis technique is suitable for short segment stricture (≤ 2 cm), while lengthy stricture requires substitution.**[1]**

Grafts or local skin flaps can be used to substitute the urethra. Although local skin flaps might yield equivalent results to those of grafts, flaps are associated with more complications like penile torsion, shrinkage and tissue necrosis. Moreover, harvesting a flap is technically more challenging. Therefore, grafts are preferred in substitution urethral reconstruction (UR) whenever possible.**[2]**

Numerous grafts have been described in UR: genital and extragenital skin, tunica vaginalis, bladder mucosa, colonic mucosa, buccal mucosa, lingual mucosa, and tissue-engineered grafts.

Currently, penile skin graft (PSG) and buccal mucosal graft (BMG) are the most widely used materials for substitution.**[3]**

BMG is the current gold standard for substitution urethroplasty, as it is a readily available, strong neurovascular tissue that resists infection. However, BMG harvest may be associated with donor site scarring, perioral sensory defect, and jaw opening impairment. Also, BMG harvest is contraindicated in patients with oral morbidity (e.g., oral leucoplakia, poor oral hygiene, heavy tobacco

smoking/chewing, previous irradiation, or previous BMG), and in those at high risk for general anesthesia.**[4, 5]** The possible advantages of PSG over BMG include: same operative field, shorter operation time, more familiar place for urologists, can be done with regional anesthesia, and can be used when longer grafts are needed.**[6]**

The substitution urethroplasty approach can be ventral, dorsal, lateral, or dorsolateral. Barbagli and Kulkarni have proposed unilateral mobilization of the urethra to one side with sparing of central tendon of perineum and dorsolateral placement of the BMG in order to preserve the blood supply to the urethra and maintain the neuro-vascular integrity of the bulbospongiosus muscle.**[7, 8]** Moreover, through the perineal wound the pendulous urethra is accessed by penile eversion through the wound and no incision is made on the penis except for meatotomy, this minimizes chances of wound infection and fistula formation.**[9, 10]**

Several studies were conducted to compare functional and anatomic outcomes after substitution urethroplasty with PSG and BMG for anterior urethral stricture disease. Most studies reported superior outcomes with BMG over PSG.

However, most previous studies were:

- ► Retrospective and very few were prospective randomized studies
- ► Some studies were done on lichen sclerosis cases that have an adverse effect on the PSG outcome.
- ► The follow-up duration was longer for PSG patients.
- ► Stricture length was usually longer for PSG cases.**[11]**

Study problem and hypothesis:

This study aims to compare the PSG and BMG for substitution of long anterior urethral strictures using one-sided dorsal perineal approach.

- We hypothesize that:

❶ Conducting a well-designed prospective, randomized study can help identify which technique is better than the other.

❷ Using the one-side dorsal approach can improve the outcomes of both techniques and identify their advantages and disadvantages.

Patients and Methods:

Study type: a prospective randomized interventional study.

Sampling: hospital-based sample.

Allocation: Patients will be **randomly** allocated into one of 2 groups.

Intervention Model: The 1st group: PSG cases, the 2nd group: BMG cases.
Patients in the PSG group will be compared with BMG group patients.

Randomization: Block randomization will be utilized, with a block size of 2.

Estimated Enrollment: 60 participants (30 cases in each group).

Masking: Open-label

Study Location: Al-Hussein and Sayed Galal, Al-Azhar University Hospitals, Cairo, Egypt.

Study Population

Inclusion criteria

- The study will include patients with long segment anterior urethral stricture (>2 cm).

Exclusion criteria

- Urethro-cutaneous fistula, urethral abscess or diverticulum.
- A scarred and unsalvageable urethral plate or scarred perineum.
- Lichen sclerosis (Balanitis xerotica obliterans).
- Unhealthy/unavailable buccal mucosa.

Pretreatment evaluation:

- Medical and surgical history including age, cause of stricture, presence of medical diseases like diabetes mellitus, and history of previous urethral procedures.
- The following questionnaires will be used for assessment of LUTS, sexual function and satisfaction, and oral health:
    - IPSS (international prostate symptom score).**[12]**
    - IIEF-5 Score (international index of erectile function).**[13]**
    - MSHQEJD (male sexual health and ejaculatory dysfunction questionnaire).**[14]**
    - BMG questionnaire for brief oral health status examination (BOHSE).**[15]**

- Physical examination including BMI, oral, abdominal and penile examination and presence of supra-pubic catheter.
- Laboratory investigations (urine analysis, urine culture and sensitivity, complete blood count, bleeding profile and serum creatinine levels).
- Uroflowmetry (UFM) if feasible.
- Radiologic investigations:

  # Retrograde urethrography (RGU) and micturating cystourethrography (MCU).

  # Renal and bladder ultrasound with estimation of pre and post voiding residual urine.

An informed consent will be signed by each patient.

surgical technique:

The patient will be put in lithotomy position then a midline perineal incision will be made and a distal penile skin or buccal mucosal graft will be harvested.

Buccal graft harvest Using a marking pen, the graft well be outlined 2.5 cm wide and as long as is required. Bupivacaine 0.5% with epinephrine will be injected underneath the graft for good analgesia and intraoperative hemostasis. The graft

will be then incised and dissected off of the buccinator muscle, while avoiding Stensen's duct. The defect will be left open to close by secondary intention, as it is less painful. The graft will be pinned out and defatted/thinned on the back table. It will be kept in saline until the time of implantation. **[16]**

Penile skin graft harvesting: PSG will be obtained by a circumferential distal penile incision and harvesting the graft from the lateral distal penile shaft in a transverse or longitudinal direction subcoronally. The subepithelial tissue of graft will be thinned to the level of the dermis and tailored as necessary.**[17]**

The pendulous urethra will be accessed by penile eversion through the perineal wound. The urethra will not be separated from the corporal bodies on one side and will only be mobilized from the midline on the ventral aspect to beyond the midline on the dorsal aspect (Figure 1A). The anterior urethra will be opened on the dorsolateral aspect (Figure 1B). The free graft will be sutured to the opened urethral edge and graft will be quilted on the ventral tunica of the corporal bodies (Figure 1C). Thereafter, the free edges of graft and opened urethra will be closed over a 14 Fr silicone catheter (Figure 1D). A surgical drain will be put if needed. **[18, 19]**

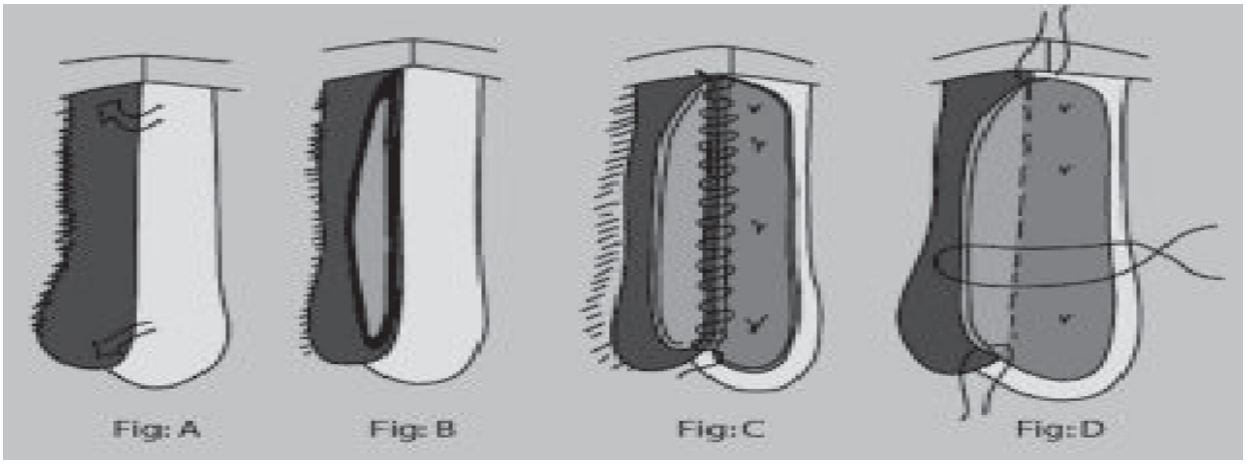

Figure 1: (A) Mobilization of urethra beyond midline dorsally, (B) Dorsal uethrotomy, (C) Graft sutured to medial urethral margin, (D) Free margin of the graft sutured to lateral urethral margin.**[19]**

The complications will be graded using the modified Clavien-Dindo classification system.**[20]**

FOLLOW UP: The follow up period will be at least 6 months

The patients will be treated with broad spectrum IV antibiotics for 48–72 h, which will be followed by oral antibiotics until catheter removal. The patients will be also treated with analgesics, bladder antispasmodics, stool softener, and diazepam to help prevent erections.

The patients will be discharged after the drain is removed, if it was put, usually within 2–3 days after surgery.

They will be followed up at the clinic after 1 week for wound assessment. Another visit will be scheduled 30 days after surgery where the urethral catheter will be removed and a voiding urethrogram will be taken.

A 3 monthly follow-up visits thereafter will be scheduled for assessment of LUTS with performing simple uroflowmetry, treatment satisfaction and sexual function.

The follow-up will rely mainly on patient symptoms (subjective diminished force-of-stream, UTI, urinary retention, etc.), while diagnostic procedures such as urethroscopy and/or retrograde urethrogram will be done selectively.

OUTCOME

Anatomic (Objective): Urethral patency will be evaluated by

- ✓ Uroflowmetry, and
- ✓ Urethrography.

Functional (Subjective): LUTS, sexual function, and satisfaction. Through:

- ✓ IPSS (international prostate symptom score).**[12]**
- ✓ IIEF-5 Score (international index of erectile function).**[13]**
- ✓ MSHQEJD (male sexual health and ejaculatory dysfunction questionnaire).**[14]**
- ✓ USS-PROM (patient reported outcome for urethral stricture surgery).**[21]**

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