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ORIGINAL ARTICLE

Salvage urethroplasty using skin grafts for previously failed long-segment urethral strictures

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Abstract The aim of this study was to describe a technique using full-thickness skin grafts (FTSGs) from different parts of the body for salvage urethroplasties and the present outcomes. A total of 24 men underwent urethroplasties for strictures averaging 7.7 cm (range, 5—17 cm) in length, using FTSGs from the inner arm, inner thigh, or abdominal skin. Each of these cases had at least one failed urethroplasty. Twenty-four patients underwent surgery for 26 urethral strictures, with a mean follow-up period of 23.2 (5—44) months and a mean operation time of 140 (115—180) minutes. Reconstruction of the urethra with skin grafting was successful in 18 out of the 26 procedures during the first attempt (69%). A "redo" skin grafting was performed for the eight failed cases, with four successful procedures (50%). Overall, the success rate was 84% (22 out of 26 urethral strictures); however, the failed cases developed abscesses and later, ureterocutaneous fistulas. No hair formation from the skin grafts was seen. Skin grafts provide useful alternative graft sources for previously failed long-segment urethral strictures in which the buccal mucosae are not available or are insufficient for salvage urethroplasties with an acceptable success rate.

Conflicts of interest: All authors declare no conflicts of interest.
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Introduction

There are many studies in the literature describing surgical alternatives for the reconstruction of long-segment urethral strictures [1]. Most of these strictures are short enough to make end-to-end urethral opposition or augmentation procedures feasible; however, grafts are needed when the strictures are too long or when there was a previously failed reconstruction attempt. The buccal mucosa is the most commonly used graft source for urethral reconstructive surgery, with success rates of nearly 90% [2]. However, only about 7–10 cm of the buccal mucosa may be removed comfortably from each cheek because the harvesting of larger grafts results in higher rates of cheek contracture, as well as increased risks of motor and sensory nerve injuries in the mouth [3]. Patients with failed urethroplasties using buccal mucosae require new sources for new grafts. Therefore, this study describes a novel technique using a circumferential full-thickness skin graft (FTSG) procedure for patients with previously failed urethroplasty operations and long-segment urethral strictures.

Methods

Our data were collected between April 2011 and August 2014 from 24 patients who were diagnosed with urethral strictures. This study evaluated the results of the urethral stricture repairs performed using FTSGs and was conducted in a special group of patients who had at least one failed reconstructive procedure (mean, 1.87; 1–5). The mean age of the patients was 39.2 (18–63) years, and the mean follow-up period was 23.2 (5–44) months. These extraordinarily difficult strictures occurred most often because of gunfire injuries, traffic accidents, or other conditions causing long-segment urethral defects (Table 1).

Two of our patients had a total urethral defect, from the perineum to the penile tip, because of a previous urethral tumor resection. They each underwent a two-stage reconstruction. For the first stage, full-thickness skin grafting was performed from the perineum to the penoscrotal junction. During the second stage, grafting was performed for the distal section. Therefore, these patients were considered to have had a total of four skin graft procedures.

Strictures with lengths of <5 cm and those treated with anastomotic urethroplasties or augmented anastomotic repairs were not involved in this study. All of the patients were evaluated through cystoscopies and urethrograms prior to the procedures. A flexible cystoscope was used to identify potential bladder problems related to a long-standing suprapubic catheter (e.g., bladder stones) and to identify the distal end of the healthy urethra, which is not easy to predict using conventional urethrograms. The stricture length and location, as determined by the flexible cystoscope, were measured after exploring the stricture. Principally, the graft length was planned to be 38% longer than the measured stricture length because of the expected contracture rate [4].

The patients were placed in the lithotomy position for the bulbar strictures and in the supine position for the penile strictures. Flexible cystoscopes and metallic bougies were used to identify the placement of the healthy tissue in both the suprapubic tract and urethral meatus. Then, the skin tissue overlying the stricture was incised, and all of the previously operated on, unhealthy tissue remnants were excised. Both ends of the healthy urethra were freed from the adjacent tissues and prepared for the graft anastomosis. Extensive care was taken in the dissection of the proximal urethral end (Figure 1).

The type of operation was planned previously and discussed with the patient, while a suitable location for graft harvesting was chosen according to hair distribution and the patient's needs (Figure 2A). Inner arm, inner thigh, and abdominal skin were used as sources of the grafts, and an FTSG was harvested without subcutaneous areolar tissue, while maintaining a thick dermis. Additionally, tension was applied during the graft harvesting to avoid creating full-thickness buttonhole injuries in the skin (Figures 2B–2D). After the graft was harvested, the donor site was closed in a single suture line using a 3–0 polyglactin suture, followed by a running 4–0 polyglactin subcuticular closure. Then, the graft was tubularized over a Foley catheter (Figures 2E and 2F). Wound care was performed using a dexpanthenol pomade application every 2 days over the surgery site during the first 5 days, and then the wound was kept uncovered.

All Foley catheters were left in place for 21 days. After the catheters were removed, a flexible cystoscopy and fluoroscopic imaging were performed to ensure the viability of the graft. The patients were followed for voiding difficulties, with uroflowmetry being conducted postoperatively during the 1st week, 4th week, and 8th week and then every 3 months. In cases with serious voiding complaints or low uroflowmetry profiles, the patients were evaluated immediately using a flexible cystoscope combined with fluoroscopic imaging. The procedure was considered a failure if there was any need for surgical intervention or a need for more than one Foley catheterization.

Table 1 Etiologies and location of the uretral strictures.

Stricture	*n*
Etiology	
Traffic accident	8
Gunfire injury	6
Stone disease	4
Saddle injury	2
Hypospadias	2
Urethral tumor	2
Location	
Penile	8
Bulbar	14
Total (penile + bulbar)	2

Results

A total of 24 patients underwent surgery for 26 urethral strictures, with an average stricture length of 7.7 cm (range: 5–17 cm). A total of eight urethral strictures were located in the penile region, 14 strictures were located in the bulbar region, and two strictures were located in the penile and bulbar region. The etiologies of the strictures varied as follows: eight patients had traffic accidents, six patients