

Perineum-based Pediculated Scrotal Flap for Reconstructive Urethral Surgery

Hee Jong Jeong

Department of Urology, Wonkwang University College of Medicine, Iksan, Korea

Herein, we describe a perineum-based pediculated scrotal flap procedure for urethral reconstruction. A scrotal tubular flap was used as a substitute to correct a proximal penile urethral stricture in case 1. In case 2, a scrotal island patch was performed to treat an iatrogenic penile urethral injury. In both cases, the urethral catheter was removed on postoperative day 14 with simultaneous normal voiding cystourethrography. The excellent axial vascularization of this perineum-based pediculated scrotal flap procedure allows successful urethral reconstruction, regardless of extension, location, and etiology.

Keywords: Scrotal flap; Urethral stricture; Posterior urethra

INTRODUCTION

In the developed world, gonococcal strictures are rare and most strictures today are either iatrogenic or idiopathic. Iatrogenic causes include urethral catheterization, cystoscopy, transurethral resection of the prostate (TURP), and surgery for hypospadias [1].

In most patients for whom urethrotomy or dilatation is inappropriate, or in whom it has failed, urethroplasty is usually the only curative option. Perineum-based pediculated scrotal flaps have always offered the best long-term results after surgery for long, complex urethral stenosis. Vascularization of the skin forming the neourethra remains patent at all times, because the axial circulation is constructed over a vascular pedicle that runs along the longitudinal axis of the flap [1,2].

Due to the contiguity of the scrotal and perineal skin with bulbar and membranous segments, this skin has been widely used in different urethroplasty techniques with anatomical understanding of the arteries that supply the skin of these areas. We encountered 2 cases in which the perineum-based, pedicu-

lated scrotal flap with double-axial vascularization produced good results when used for reconstructive urethral surgery.

CASE REPORT

A 62-year-old man from Mongolia visited Wonkwang University School of Medicine and Hospital with a cystostomy tube. His past medical history included a TURP 3 years previously for benign prostatic hyperplasia. A proximal penile urethral stricture had developed after the previous TURP. At the first visit, the patient had normal vital signs, and his blood tests showed a hemoglobin value of 13.0 g/dL and serum creatinine of 0.80 mg/dL. The results of a urine analysis were normal, and the results of urine culture tests were negative. A retrograde urethrogram showed an approximately 2 cm sized stricture in the proximal penile urethra (Fig. 1A).

The surgery was performed with the patient under spinal anesthesia in the lithotomy position. First, a rectangular 3 cm sized flap was drawn on the stretched skin of the posterior scrotal face, centered over the mid raphe, for tubular urethroplasty

Corresponding author: Hee Jong Jeong

Department of Urology, Wonkwang University School of Medicine and Hospital, 895 Muwang-ro, Iksan 570-974, Korea

Tel: +82-63-859-1332 / Fax: +82-63-842-1455

E-mail: uro94c@wonkwang.ac.kr

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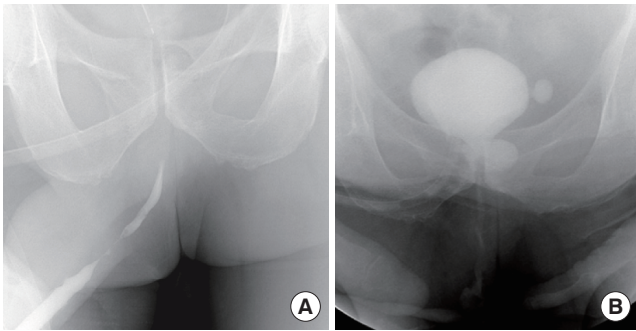


Fig. 1. Tubular urethroplasty for post-transurethral prostate resection stenosis. (A) Preoperative retrograde cystourethrogram showing a long segmental stricture on the proximal penile urethra. (B) Postoperative voiding cystourethrogram showing nearly normal urethra with prostatic fossa and small bladder diverticulum.

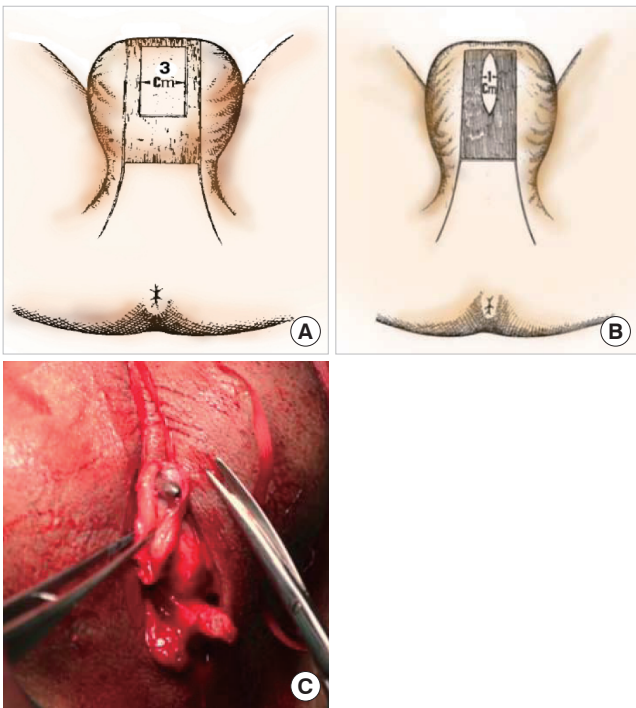


Fig. 2. Perineum-based pediculated scrotal flap. (A) Flap design on the posterior scrotal face and profile of the central skin patch used to reconstruct the urethra. (B) Central cutaneous island is created before raising the flap. (C) Segmental urethrectomy with both healthy urethral ends on a long penile urethral stricture.

(Fig. 2A). The skin strip was tubularized on a 16 Fr catheter with 5-zero absorbable continuous polyglycolic acid sutures and the avoidance of skin eversion. A second plane was made by suturing above the outer edges of the flap with interrupted polyglycolic acid sutures, and the tube was formed by a thick muscu-

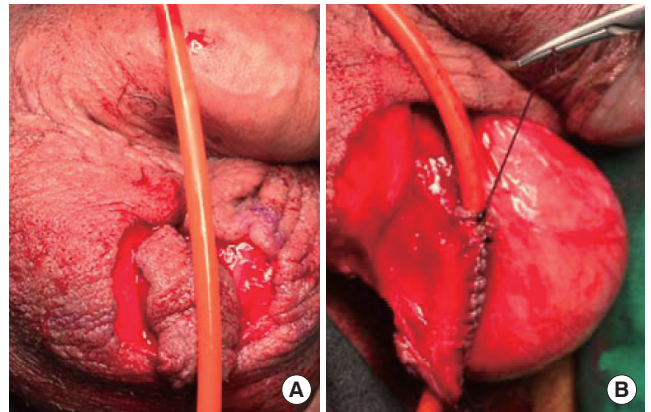


Fig. 3. Tubular urethroplasty flap configuration. (A) A central skin patch is placed on a partially de-epithelialized biaxial scrotal flap. (B) Dual-plane tubularization of the patch over a 16 Fr catheter after raising the flap.

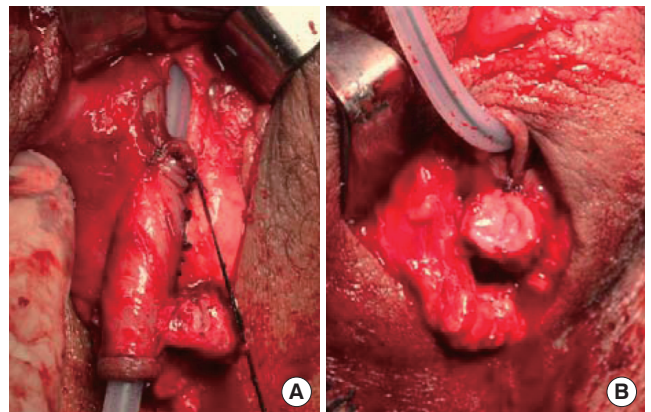


Fig. 4. Segmental substitution with tubular urethroplasty on proximal penile urethra. (A) Segmental urethrectomy and approach of the swinging flap. (B) Interposition and anastomosis of the tubular flap.

locutaneous wall (Fig. 3). Following segmental urethrectomy (Fig. 2C), the tubularized flap was interposed by rotating it 135 degrees on its perineal scrotal base, which inverted its 2 ends. Proximal and distal anastomoses with the healthy urethra were performed with 5-zero absorbable interrupted sutures (Fig. 4).

There were no complications, and no abnormal blood test results were noted after the surgery. A 16 Fr Foley catheter was kept in place for 2 weeks, and a voiding cystogram performed 2 weeks after the surgery showed no leaking of contrast media around the urethra (Fig. 1B). The patient returned home after removal of the Foley catheter and experienced subsequent symptoms of an overactive bladder for which he was prescribed anticholinergics.

In the second case, a 45-year-old man visited our hospital with a penile urethral avulsion injury. A penoplasty with the goal of penile augmentation had previously been performed in a private clinic. A proximal penile urethral injury was found after the surgery. At the first visit, the patient had normal vital signs, and on physical examination, the caliber of the 1 cm urethra was observed to be reduced by about half in the proximal penile urethra. The blood tests showed a hemoglobin value of 14.2 g/dL and a serum creatinine of 0.93 mg/dL. The results of urine analysis were normal and a culture of the urine was negative. The surgery was performed under spinal anesthesia with the patient in the lithotomy position. First, a 1 cm skin island was drawn for Island-patch urethroplasty in the center and midline of the biaxial flap (Fig. 2B). The whole injured urethra was exposed on the ventral face, and the edges were sutured with the island patch with the use of 5-zero absorbable interrupted sutures.

There were no complications, and no abnormal blood test results were noted after the surgery. A 16 Fr Foley catheter was kept in place for 2 weeks, and a voiding cystogram performed 2 weeks after the surgery showed no leaking of contrast media around the urethra. The patient returned home after removal of the Foley catheter, and he has experienced no lower urinary tract symptoms for 6 months.

DISCUSSION

Treatment of urethral stricture diseases includes numerous reconstructive surgical techniques. The urologist must be familiar with all of these different techniques to be able to deal with any type of urethral stricture. The choice of reconstructive technique depends on the stricture length, degree of spongiosclerosis, and the surgeon's preference and experience. However, in case of long stricture, using grafts for reconstruction is probably a more popular method than flaps for urethroplasty. Various graft materials have been used including buccal mucosa, full-thickness skin, bladder mucosa, ureter, saphenous vein. Flap urethroplasty can also be done using either penile or scrotal skin. As prospective or control studies are lacking for grafts or flaps, there is no consensus about the best option [1].

A perineum-based pediculated scrotal flap is a 3 cm wide rectangular shape along the scrotal raphe. The longitudinal axis of the flap is centered on the midline. This position permits reconstruction of a urethral lesion, which may extend from the bulbomembranous portion to the urethral meatus, without any

torsion or stretching of its double vascular pedicle. Because of the anatomical contiguity, excellent tissue availability, and tolerance of contact with urine owing to the abundance of sebaceous glands, the perineum-based scrotal flap seems to be a good option for urethroplasty [2-5].

The scrotal arterial network is mainly composed of the 2 superficial perineal arteries on the posterior scrotal face and the 2 inferior external pudendal arteries on the anterior scrotal face. Scrotal skin, dartos, external spermatic fascia, cremasteric fibers and fascia, internal spermatic fascia, and the scrotal septum are included in the flap; however, the tunica vaginalis is excluded [6].

Before raising the flap, a central cutaneous strip is drawn onto it, in a wide manner, and long enough to reconstruct the damaged urethra; de-epithelialization is performed around it. The de-epithelialization ensures maximal reticular vascularization of the skin flap and preserves the continuity of the circulation levels. Undermining the skin destroys the integrity of reticular and segmental vascular anastomoses and, therefore, must always be avoided [2-5].

It is advisable to not complete de-epithelialization in the central base of the patch until urethroplasty is almost complete so as to be able to dispose of excess length, if required. Thus, a longitudinal central skin patch is obtained that rests on a wide biaxial scrotal flap and permits 3 types of urethroplasty: tube substitution, island patch, and total urethroplasty [2].

Anastomotic stenosis due to persistence and progression of spongiosclerosis in the apparently healthy urethra, the development of pouches, and pseudodiverticulum can be observed in scrotal flap urethroplasty. The pouch is always adjacent to the distal anastomosis and unrelated to stenosis [2-5].

The whole anterior urethra from the bulbomembranous portion to the meatus can be reconstructed with a long central skin patch drawn on the perineum-based pediculated scrotal flap, which is extended on the anterior and posterior scrotal faces [7].

In conclusion, this perineum-based pediculated scrotal flap can be used in many ways. It can be adapted to any type of stenosis regardless of extension, location, and etiology, because it reaches any segment of the urethra without tension, twisting, or stretching. Owing to its excellent vascularization, the risk of complications from insufficient blood supply to the reconstructed segment, such as fistulas and restenosis due to ischemic retraction, is minimal.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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