Two-stage tubularized cutaneous island flap in secondary hypospadias reconstruction

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ABSTRACT

Introduction: Recurrent hypospadias is one of the most important surgical challenges waiting to be resolved. The objective of the present work is to report on the results of two-stage urethroplasty to correct secondary hypospadias.

Materials and methods: Patients presenting with recurrent or secondary hypospadias underwent urethral reconstruction.

Results: Sixteen patients presenting with recurrent hypospadias were operated on using tubularized island flaps taken from the residual prepuce in two-stage interventions with time between stages. Complications were fistulas, meatal stenosis and anastomosis contracture.

Discussion: The main problems in secondary hypospadias treatment are residual chordee and poor quality of scarred tissue. Two-stage repair with a delay between stages involves 4 basic principles: to improve vascularity, time of delay, circular catheter and to avoid urinary flow during the first stage. These principles promote adequate cicatrization with minimal retraction of the neourethra, reduced complications and easy reproducibility.

Key words: hypospadias, urethroplasty, cutaneous flaps.

RESUMEN

Introducción: El hipospadias recidivante constituye uno de los retos más importantes por resolver. El objetivo del presente trabajo es dar a conocer los resultados obtenidos mediante una uretroplastia en dos etapas para corregirlo.

Material y métodos: Se sometieron a reconstrucción uretral los pacientes que presentaban hipospadias recidivantes o secundarios.

Resultados: Se operaron 16 pacientes con hipospadias recidivantes con colgajos en isla tubularizados del prepucio residual en dos etapas y tiempo de retardo. Las complicaciones fueron fistulas, estenosis del meato y de la anastomosis.

Discusión: Los principales problemas en el tratamiento del hipospadias secundario son el encordamiento residual y la mala calidad de los tejidos cicatrizados. Practicar la reparación en dos etapas con retardo obedece a cuatro principios básicos: mejorar la vascularidad, tiempo de retardo, sonda sin fin y evitar el flujo urinario durante la primera etapa. Con todo ello se promueve una adecuada cicatrización con mínima retracción de...
INTRODUCTION

Hypospadias reconstruction continues to be a serious surgical problem with reports of postoperative complications in 50% of cases. Among the most common are urethrocutaneous fistula, meatal stenosis, urethral stricture, urethral diverticuli and the less frequent but more serious complication of loss of form.1 The degree of difficulty increases when the patient has had previous operations and there is poor quality tissue. Recommended reconstruction techniques in patients who have had various interventions is variable. Free grafts and prepuce flaps have been suggested.2-4 Results have improved though complications still exist.

The authors present their experience with recurrent or secondary hypospadias reconstruction in which neourethras are formed from residual foreskin in two stages.

MATERIALS AND METHODS

Over a 3-year 8-month period in the Pediatric Urology Service of the Centro Médico La Raza, secondary hypospadias patients underwent urethral reconstruction. Inclusion criteria were patients who had redundant residual foreskin with preservation of the superficial dorsal vascular trunk and a period of more than 6 months since their last intervention. Patients with injured superficial dorsal vascular trunk of the penis were excluded from the study. The evaluated variables were: age at the time of operation, modality and number of previous interventions, location of the meatus, residual ventral curvature and postoperative complications. Follow-up was from 6-38 months.

SURGICAL TECHNIQUE

The same two-stage surgical technique was performed on all patients. In the first stage a rectangle the length of the urethral defect was outlined. The defect was tubularized over an 8Fr silastic catheter with two suture lines, the first of which was 7 zero polyglycolic acid continuous running suture and the second was separate stitches of the same material (Images 1 and 2). The tube was then freed together with its vascular pedicle from Buck’s fascia and said flap was returned again to its original site.

Then a rectangle of the same length was outlined on the skin covering the neourethra. The epidermis and the cuticular circulation were cut and stitches with 7 zero vicryl were placed at the cuticular cut level, forming the anastomosis with the mucocutaneous edges (Image 3). A 6 or 8Fr silastic circular catheter was left in place for 3 months and an 8-10Fr Foley transurethral catheter was removed 3 days after surgery (first stage).

Palabras clave: hipospadias, uretroplastia, colgajos cutáneos, México.
The second stage was carried out 3 months later. A cut was made over the scar from the first-stage intervention. The urethral tube and its vascular pedicle were freed as described by Duckett. It was broken ventrally and anastomosed to the native urethra with 6 zero vicryl separate stitches. Finally, adjacent dartos or scrotal fat was interposed over the suture lines (Images 4, 5 and 6). Six or seven zero vicryl was used for the meatus, the same as in the cutaneous anastomosis. Transurethral catheter was left in place for 10 days and a splint was placed as an external cover made from adhesive bandage and was removed 5 days after the operation. Once the catheter was removed a program of meatal dilatation with thermometer was carried out every 24 hours for 2 months (Images 7 and 8).

RESULTS
In the period from April 2002 to April 2006, 16 cases of secondary hypospadias were reconstructed. Patient age was from 3-15 years with a mean of 5 years. The number of previous interventions was from 1-3 and the mean was 2. The meatus was located at the mid-penis in 12 patients and at the proximal penis in 4 patients. Residual ventral curvature presented in 3 cases, requiring modified Nesbitt plication. Defect length varied from 1.5-5 cm and the mean was 2.9 cm. Urethral plate urethroplasty had been carried out on 5 patients, meatal base flap in 3 patients and MAGPI-type corrections in 2 patients. The type of previous intervention could not be identified in 6 patients. Complications presented in 5 patients, two of which were urethrocutaneous fistula. There was 1 case of meatal and anastomosis stenosis, 1 case of proximal anastomosis stenosis and 1 patient presented with complete loss of the proximal anastomosis when the catheter was accidentally removed the second day after the operation.

One fistula closed spontaneously 2 months after the procedure and the other required surgical closure. Stenosis was resolved with dilatation under general anesthesia with no problems. The case of total loss of urethroplasty is awaiting repeat surgery. The rest of the patients presented with adequate aesthetic aspect, a corrected penis and uniform urinary stream.

DISCUSSION
Hypospadias complication repair continues to be a surgical challenge. Among these, the most severe is partial or total loss of the neourethra. In secondary hypospadias the surgeon is confronted with the problems of poor tissue quality, ventral curvature and cicatization fibrosis. The most popular techniques for resolving these problems involve the use of oral, bladder and preputial grafts. Although complications such as fistula, urethral or meatal stenosis and even total loss of form are less frequent nowadays, they still represent a surgical challenge in urological reconstruction. Through the Snodgrass principle, primary reoperations or free graft
application once the plate has been incised (Snodgraft) have been carried out with better results than those obtained with tubularized free grafts.2,3 The authors of this article have used tubularized oral mucosa grafts in one- or two-stage repair and results have been better when the process was two-stage.3,5

In the present study two-stage hypospadias repair using residual prepuce was performed. There are four fundamental principles in this technique: 1, vascularity obtained through the superficial dorsal trunk so that there is sufficient neourethra irrigation; 2, surgical delay to determine the establishment of independent circulation and thus improve irrigation when cuticular circulation of the skin is cut and the urethral tube is freed; 3, leaving the circular catheter for 3 months so it acts as a splint, maintaining the caliber of the neourethra and 4, avoiding the secondary trauma of urinary flow over suture lines, including those of the anastomosis, during the cicatrization period of the urethroplasty, to reduce fibrosis.6

After the first stage, patients can carry out normal activities and spontaneously urinate through the native urethra. At this stage it is important to verify the existence of residual ventral curvature, visualizing the degree of angulation so that the length of the new urethral tube can be adjusted and the possible necessity of dorsal plication can be assessed. The patients described here requiring dorsal plication had a curvature angle of 25-30 degrees.7 For penile rectification modified Nesbitt plication was employed, freeing and protecting the neurovascular network. This technique is also used by Dean, in order to preserve maximum irrigation and innervation of the penis.8,9

The most important aspect of the technique described here is protecting vascularity and assuring flap viability. For example, Converse utilized management delay in patients with penile problems and in the present cases this delay improved and guaranteed urethral neovascularity. In the authors’ opinion, this is not achieved in one-stage reconstruction.10 Soutis proposed an island flap of penile skin with the Duckett technique in one stage in which there was a 25% complication rate involving diverticuli, stenoses and fistulas that required a second surgery.11,12 In the present series complications required minor procedures such as meatal or urethral dilatation. Surgical fistula closure was required in only one case.

The Snodgrass technique continues to be an excellent alternative and the best results have been reported in primary hypospadias.13 Today, Snodgrass
and Shanberg have utilized this technique with a complication rate under 25% in patients with previous surgeries when the urethral plate was not damaged and vascularity was intact.\textsuperscript{2,14} In the cases reported here in which this technique had been used initially, it was not possible to repeat it, given that the urethral plate was fibrous and there was insufficient diameter in some cases.

The use of interposing adjacent tissues between suture lines has reduced the fistulization percentage, especially in patients with severe hypospadias.\textsuperscript{15} The need to improve the percentage of good repair results in cases where there is deficient tissue and doubtful vascularity has led to procedure innovation and improvement that is backed by the physiological principles of other techniques. In the authors’ opinion there will be better results with the procedure proposed here in patients who meet the above-mentioned criteria.

**CONCLUSIONS**

Secondary hypospadias reconstruction utilizing tubular island flaps with residual prepuce or penile skin in two stages improves results with a minimum of complications. Delay between stages improves and guarantees flap neovascularity by prolonging transference time. In addition, this is a technique that is easily reproducible.

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