ONE-STAGE CORRECTION OF PROXIMAL HYPOSPADIAS AND PENOSCROTAL TRANSPOSITION

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**Background and Purpose:** Total correction of proximal hypospadias and penoscrotal transposition (PST) is a challenge to surgeons. Staged operation is usually recommended because the blood supply to the neourethra or the skin covering the penile shaft may be severed during scrotoplasty. This paper describes results obtained using a new technique for total correction, which preserves the blood supply to the neourethra in a one-stage operation.

**Patients and Methods:** Between July 1998 and March 2000, five boys (mean age 4 yr) with proximal hypospadias and PST underwent total correction in a one-stage operation. The urethral meatus of these patients was located at mid shaft in one, at the penoscrotal junction in two, and at the scrotum in two. Hypospadias was repaired using the Snodgrass procedure and PST was corrected using the Ehrlich and Scardino technique. Radical bulbar urethra dissection and tunica albuginea plication were used to correct penile curvature in all five cases. The urethral stent was removed on the seventh or eighth postoperative day. The meatus was then dilated using the cone tip of an ophthalmic ointment tube two or three times per day for 2 to 4 weeks. Postoperative urinary flow was observed in the outpatient clinic.

**Results:** The mean follow-up period was 11.2 months. There was no postoperative fistula. One patient had postoperative meatal stenosis that was successfully treated by dilation. Postoperatively, the penile base was well above the scrotal rugae and the meatus was at the tip of the glans in each patient. The postoperative urinary flow was straight in all patients.

**Conclusion:** Combining Snodgrass hypospadias repair and Ehrlich and Scardino PST repair in a one-stage operation preserved the blood supply to the neourethra and achieved excellent functional and cosmetic results.

Penoscrotal transposition (PST) is usually associated with a more severe form of hypospadias. To prevent compromising the blood supply to the neourethra or the skin covering the penile shaft, scrotoplasty is usually deferred until the hypospadias repair is completed [1, 2]. The preputial flaps used in the onlay island flap (OIF), transverse preputial island flap (TPIF) urethroplasty, and other modifications rely mainly on the blood supply from the dorsum of the penile base [1]. The blood supply of the Snodgrass neourethra comes from both the subcutaneous tissue beneath the urethral plate and the secondary layer coverage of subcutaneous tissue from the prepuce [3]. A deep circumferential incision all around the penile base is described in the Glenn and Anderson scrotoplasty [4]. This may lead to devascularization of both the penile shaft skin and preputial flap. Ehrlich and Scardino described a modification that preserves a wide strip of skin at the dorsal base of the penis in order to preserve the vascularization of the subcutaneous tissue of the penis [5]. Thus, it seems reasonable to combine the Snodgrass hypospadias repair and the Ehrlich and Scardino modification of PST repair into a one-stage operation. The functional and cosmetic results of this one-stage correction are assessed and discussed in this paper.
Patients and Methods

From July 1998 through December 2000, five patients with proximal hypospadias and PST (Fig. 1) underwent repair in a one-stage operation. The penis was circumcised and degloved. Artificial erection of the penis was tested with normal saline in each case. Radical bulbar urethral dissection removed all possible subcutaneous or fascial adhesions to the corpus cavernosum [6]. Tunica albuginea ligation then corrected residual chordee in all five patients. The hypospadias was repaired by the Snodgrass technique (Fig. 1B) [3]. The key procedure is a midline incision on the urethral plate allowing the plate to be tubularized.

The edge of scrotal rhugae was marked and incised. In four patients, the continuity of skin and subcutaneous tissue between the mons pubis and the dorsum of the penile base was preserved and the PST was corrected as described by Ehrlich and Scardino (Fig. 1C) [5]. In the other patient, a rectangular area of epidermis was excised from the dorsum of the penile base towards the mons pubis while dermis and vessels of the

Fig. 1. A) The scrotal meatus, as shown by the examiner’s fingers separating the two halves of the scrotum, is demonstrated preoperatively in a 13-year-old boy. The extension of the scrotal folds is higher than the penile base. B) After completion of the Snodgrass urethroplasty. C) Excellent cosmetic results for the external genitalia. The continuity of the skin between pubis and penis is preserved (arrow). D) Postoperative appearance of the external genitalia. The meatus is on the tip of the glans and the penile base is well above the scrotal rhugae.
The penile skin was then re-approximated to the skin of the mons pubis. The PST was then corrected using the Ehrlich and Scardino method. The vessels of the subcutaneous tissue of the penile shaft were well preserved during these procedures (Fig. 2). An 8-F feeding tube was used as a urethral stent for boys under 2 years of age and a 20-F feeding tube for the 13-year-old boy whose proximal urethral caliber was 24-F. The urethral stent was removed 7 to 8 days later. To prevent meatal stenosis, the cone tip of a tube of an ophthalmic ointment, for example Erythrocyn® (Erythromycin stearate, Oasis, Taipei, Taiwan) for younger children and Latycin® (Tetracycline hydrochloride, Puudeng, Taipei, Taiwan) for older ones, was used to dilate the meatus two or three times daily for 2 to 4 weeks. Urinary flow and/or flowmetry were observed in the outpatient clinic 3 months after the operation.

Results

The clinical characteristics of these patients are summarized in the Table. The mean age of the five patients was 4.0 years. The penile base and mons pubis was barely or clearly visualized in complete or incomplete PST, respectively.

The follow-up period ranged from 8 to 13 months (mean, 11.2 mo). The operation time ranged from 5.2 to 7.4 hours (mean, 6.1 hr). The results of treatment are summarized in the Table. There was no postoperative fistula in this series. One patient had postoperative meatal stenosis, which was simply managed by meatal dilation. Postoperatively, the penile base was well above the scrotal rhugae and the meatus was at the tip of the glans in each patient. This gave the external genitalia a normal appearance (Fig. 1D). The urinary flow was straight without spraying in all patients. Urinary flowmetry was normal in the 13-year-old boy.

Discussion

One-stage correction combining the Snodgrass urethroplasty [3] and the Ehrlich and Scardino PST repair [5] achieved excellent cosmetic and functional results in patients with proximal hypospadias and PST. Traditionally, a staged correction of such an anomaly is recommended [1, 2]. The success rates of various types of proximal hypospadias repair are around 80% [1, 8–11]. It is such a difficult task that a staged operation for penoscrotal or scrotal hypospadias is recommended [8–10]. PST associated with proximal hypospadias makes total repair of this anomaly even more complicated because the blood supply to the neourethra may be severed during scrotoplasty. However, a one-stage correction of proximal hypospadias with PST may be performed if the blood supply to the neourethra is not compromised during the scrotoplasty [10].

The dual blood supply of the Snodgrass neourethra is one of the main factors responsible for its success in one-stage correction of this anomaly. Its high success rate and simplicity have made it widely accepted for the treatment of both distal and proximal hypospadias [3, 11, 12]. Another advantage of the Snodgrass procedure is that the openings of the neourethra are vertical and on the tip of the glans [3, 11, 12]. The Ehrlich and Scardino PST repair further preserves the vascularity of the preputial subcutaneous tissue. Thus, the risk of jeopardizing the vascularity of the neourethra during correction of PST is decreased. On the contrary, the OIF or TPIF neourethra is reconstructed from a preputial flap that relies on the vessels coming solely from the dorsum of the penile base [1]. During scrotoplasty, any injury to these vessels may compromise the results of hypospadias repair. This may explain in part why most surgeons using the OIF or TPIF repair will recommend a staged operation for PST associated with hypospadias [1, 2]. The Koyanagi-Nonomura one-stage bucket repair is another option to treat severe hypospadias and PST simultaneously [12, 13]. The blood supply of the Koyanagi-Nonomura neourethra relies completely on the parameatal flap, rather than the preputial flap.
nourished by vessels from the dorsum of the penile base [12]. However, a 33 to 50% fistula rate was reported in the Koyanagi-Nonomura repair of proximal hypospadias with and without PST [13, 14].

To improve the cosmetic results of PST repair, several modifications had been reported [15–17]. Kolligian et al made a skin hole above the dorsal base of the penis. The penis was then pulled upward through the skin hole. Correction of hypospadias was done as a second-stage operation [17]. To achieve better cosmesis, Gosalbez et al reported a modification of the Ehrlich and Scardino method by excision of a rectangular area of skin above the mons pubis [7, 10]. Then, hypospadias may be repaired as a one- or two-stage operation. Both techniques strive to eliminate the dorsal depression of the penis and to give the appearance that the penile shaft is inserted higher in the mons pubis. In most patients, the cosmetic results of the Ehrlich and Scardino modification of PST repair were excellent [5]. If the immediate cosmetic results in Ehrlich and Scardino scrotoplasty are not acceptable, we recommend the Gosalbez modification.

In conclusion, combining Snodgrass hypospadias repair and Ehrlich and Scardino PST repair in a one-stage operation preserved blood supply to the neourethra and achieved excellent functional and cosmetic results.

References