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Original article

One-stage lingual augmented urethroplasty in repair of distal penile hypospadias

E. Elsayed , T. Dawod *, M. Abdalla , M. Teleb , A. Teelab , M. Omran , A. Eliwa , A. Sakr , W. Shabana , S. Khalil , L. Elbendary

Zagazig University Hospitals, Urology Department, Zagazig, Sharkia, Egypt

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Abstract

Objectives: To evaluate the outcome of augmentation of shallow urethral plate by lingual graft in repair of distal penile hypospadias.

Patients and methods: Between June 2008 and May 2011, the procedure was performed on 23 patients with mean age 2.3 years (range 1–3). All patients had distal penile hypospadias; 11 sub coronal and 12 coronal. The urethral plate was less than 8 mm in all patients and 3 of them had history of previous hypospadias surgery. All procedures were carried out under general anesthesia using 4× magnifying loupe. After penile degloving and dorsal incision of the urethral plate, the lingual graft was harvested and sutured to the edges of the incised urethral plate from the hypospadias opening to the tip of the penis. The neourethra was closed and an intervening flap was fixed over the neourethra as a barrier against fistula formation.

Results: Success rate was 87% as 20/23 patients were cured without any permanent complication throughout the follow up period. None of patients suffered meatal stenosis or required regular urethral dilatation. Three patients developed urethrocutaneous fistula, of which two closed spontaneously and one required surgical repair 6 months later. Two patients had failed procedures and delayed re-intervention was performed due to complete loss of the graft in one of them and repair disruption following infection in the other. Two patients had post-operative pain in the graft harvesting site which disappeared within days.

Conclusion: The one-stage lingual augmented urethral plate urethroplasty offers promising outcomes for repair of distal penile hypospadias with narrow urethral plate.

* Corresponding author at: Zagazig University Hospitals, Urology Department, Zagazig, Sharkia 44111, Egypt.
E-mail addresses: tamr_dawod@yahoo.com, tamr.dawod@gmail.com (T. Dawod).

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Introduction and objectives

Being reported in about 0.7% of all live male births, hypospadias is one of the most common pediatric urologic anomalies [1]. The main goal of surgical repair is to achieve a good functional, outcome with respect both to urination and sexual activity, as well as good cosmetic results. These should include straightening of the chordee (orthoplasty), transferring the meatus to the tip of the glans (meatoplasty), reconfiguration of the glans itself (glanuloplasty) and revising the abnormal prepuce [2].

Many surgical techniques have been described to gain these outcomes, with several factors found to affect the outcome of surgical repair [3]. While, in 1989, Rich et al. were the first to introduce the principle of incising the urethral plate in the midline [4], this technique was advanced in 1994 by Snodgrass who described tubularized incised plate urethroplasty (TIP) which has become a popular technique in the management of distal hypospadias [5]. However many arguments exist regarding the urethral plate characteristics and the feasibility of TIP, especially in the case of a narrow or shallow urethral plate [6,7]. Also, meatal stenosis is not uncommon after TIP urethroplasty [8]. Consequently, augmentation of the urethral plate using preputial or oral mucosal grafts has been tried to improve the results and reduce complications after tubularization of a shallow plate [9]. The use of oral mucosa in urethral reconstruction was initiated many decades ago, and it was reproduced again by Burger and associates in 1992 [10]. It has shown acceptable results, especially in complex cases with deficient local skin, poor plate characteristics or excessive scaring, and in staged procedures [11]. Lingual mucosa appears as an attractive alternative to buccal mucosa in urethral reconstructive surgery and was introduced by Simonato et al. in 2006 with good surgical outcomes and low donor-site complications [12]. The aim of the present study is to evaluate the outcome of augmenting a shallow urethral plate, using a lingual mucosal graft, for the repair of distal penile hypospadias.

Patients and methods

Between June 2008 and May 2011, 23 patients with distal penile hypospadias were subjected to one-stage lingual augmented urethroplasty. All procedures were carried out under general anesthesia using a 4× magnifying loupe. After preparing the genitalia and draping, the urethral plate was measured, and only patients with a shallow urethral plate of less than 8 mm in width were included in the study. Penile degloving was started by a coronal incision 3 mm from the mucocutaneous junction and 5 mm proximal to the hypospadiac opening. After completing penile degloving and achieving penile straightening, two incisions were made to create glans wings, and the length and width of the urethral plate were measured using a ruler. A midline incision was made in the urethral plate, and then the lingual mucosal graft was harvested carefully using both blunt and sharp dissection. Care was taken to spare the sublingual salivary ducts (Fig. 1). The lingual defect was closed with 4/0 absorbable sutures to shorten healing time. The graft edges were sutured to the midline incision in the urethral plate using 6/0 vicryl sutures (Fig. 2). Urethroplasty was then completed by tubularizing the edges of the urethral plate over a 6-Fr. catheter using 6/0 vicryl sutures. After creating a second layer coverage using dartos in 15 or tunical flap in 8 patients, skin closure was done. The patients were discharged after 24 h with the urethral catheter left indwelling for 2 weeks. The patients were seen again on the 5th post-operative day for dressing

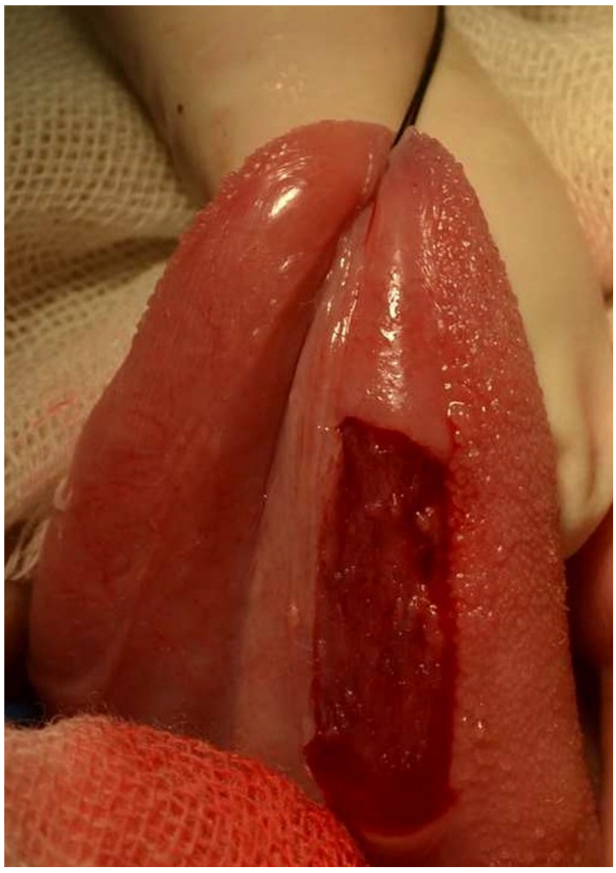

Figure 1 Lingual mucosal graft harvesting.

and on the 14th day for catheter removal. They were then followed up one month postoperatively and after that in 3-month intervals. Each visit included observation of the esthetic appearance, the graft viability and possible complications (such as fistula or meatal stenosis), as well as the shape and force of the stream.

Results

The mean age was 2.3 ± 0.5 (range 1–3) years. In 11 patients, hypospadias was subcoronal, while it was coronal in 12. Three

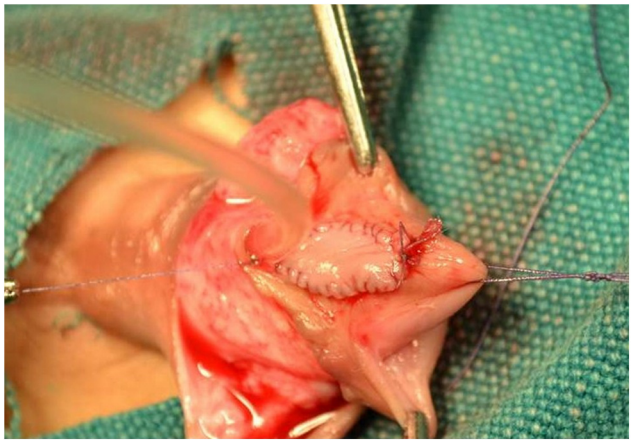

Figure 2 Urethral plate augmented with lingual graft.

Table 1 Donor and recipient site complications.

Complication	Number
Meatal stenosis	0
Fistula	3 (13%)
Slurred speech	2 (8.7%)
Loss of graft	1[a] (4.3%)
Disruption (Infection)	1[a] (4.3%)

[a] Both patients underwent delayed re-intervention.

patients had a history of previous hypospadias surgery. The mean operative time was 103 ± 15.6 min. The follow-up period ranged from 18 to 36 (mean 25.4 ± 3.8) months. The success rate was 87%; 20/23 patients were cured without any permanent complication throughout the follow-up period. None of the patients suffered meatal stenosis or required regular urethral dilatation. Three patients developed urethrocutaneous fistula, two of which closed spontaneously, while one required surgical repair 6 months later. Delayed re-intervention was necessary in two patients, due to complete graft loss in one patient and due to repair disruption following infection in the other. Two patients suffered from slurred speech which disappeared within days (Table 1).

Discussion

Despite the popularity of the tubularized incised plate (TIP) procedure, some pediatric urologists consider it unsuitable for patients with a narrow plate [13]. Extra-genital tissue, including oral mucosa, is frequently needed for substantial augmentation of the urethral plate in patients with scarcity of local tissue or a narrow, inelastic or unhealthy urethral plate, especially after previous hypospadias surgery [14]. The width of the urethral plate can greatly affect the outcome of hypospadias repair. Holland and Smith reported in their study on 48 patients that all cases of urethral fistulae and meatal stenosis occurred in patients who had had a preoperative urethral plate width of less than 8 mm [6]. In view of previously published studies and our experience with the repair of distal penile hypospadias with a narrow plate, we have been looking for alternative procedures for augmentation, using either a distally folded onlay flap [15] or one-stage lingual mucosa graft urethroplasty, even though Snodgrass et al. denied an effect of urethral plate characteristics on the complication rate after TIP [16]. The term "Snodgraft" was then introduced; it represented the logical progression of the original TIP operation, integrating an inlay graft into the dorsal incision rather than leaving it to epithelialize [14]. Kolon and Gonzales described the technique of one-stage urethroplasty using an inner preputial-based dorsal inlay graft, and their results were very satisfactory with none of the patients developing stricture, fistula or diverticulum [17]. The "Snodgraft" technique was also described by Asanuma and associates in 2003, and they reported urethrocutaneous fistula in one patient, while none of the patients developed meatal stenosis or stricture of the neourethra [9]. Silay et al. who used the same technique reported urethrocutaneous fistula in 10 (9.8%) patients and no meatal stenosis or diverticulum [18]. In comparison, three patients of our study (13%) developed urethrocutaneous fistula, while none developed meatal stenosis or needed regular urethral dilatation. These results show that there is a place for the "Snodgraft" technique in repair of hypospadias, provided the selection criteria listed by Ferro are met; these include an abnormal glans, a flat urethral groove or a long spongiosum defect [19]. The indication for "Snodgraft" in our study was a narrow plate of less than 8 mm.

We used the lingual mucosal graft since it has many advantages as described by Simonata and co-workers: it is harvested easily, it is resistant to infection and allows for easy imbibition, inosculation and revascularization due to its tissue characteristics (thick epithelium, high content of elastic fibers, thin lamina propria and rich vascularization). In addition, it causes no problems at the site of harvesting other than slight oral discomfort [12]. The harvested lingual graft should be 20% longer than the urethral defect. Moreover, wider grafts facilitate tension-free anastomosis with resultant non stenotic repair [19]. The technique is associated with minimal donor-site complications such as pain, scarring, contracture, sensory numbness and salivary changes [20]. Also, a decrease of only 9.5% of the mean length of the lingual mucosal graft happens postoperatively, compared to 10% decrease for other oral mucosal grafts, 20% for bladder mucosa and 40% for skin grafts [21]. We noticed pain and discomfort in two patients (9%), which disappeared within days.

Conclusion

One-stage lingual graft urethroplasty offers promising outcomes for the repair of distal penile hypospadias with a narrow urethral plate.

Conflict of interest

The authors have no conflict of interest to declare.

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