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Use of the penis's own tissue for urethral reconstruction in the treatment of complications developing following hypospadias repair

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ABSTRACT

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The aim of the present study is to evaluate the results of the surgical technique applied in patients who have previously undergone several operations and who develop persistent distal hypospadias. A novel surgical technique was applied to 13 cases of persistent distal hypospadias presenting between November 2012 and January 2019. The mean age of these patients was 12.7 years (the youngest four and the oldest 21). In methodological terms, fistula formation was prevented by contracting the suture line inside the glans by means of sutures to an incision made between the glans apex and meatus. Thirteen patients underwent surgery, two of which involved complications developing in our clinic. The other 11 had been referred to our clinic from other centers. The common feature of the complications was that they were at the distal hypospadias level. Two patients had undergone two operations, and 11 more than two. Following our therapeutic technique, complete dehiscence was achieved in one patient (7%), external meatal stenosis was present in one (7%), and preoperatively existing urethral stenosis persisted in two cases. Positive results can be achieved in suitable cases of persistent distal hypospadias using the recommended technique.

Keywords:

Dehiscence
Fistula
Hypospadias surgery
Repair
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1. Introduction

Despite an increase in surgical methods and technical materials used in hypospadias surgery, complication rates still range between 6% and 30% (Beuke and Fisch, 2007; Borer and Retik, 2007). Early complications include bleeding, hematoma, and infection. Late complications include fistulae, urethral stenosis, meatal stenosis, partial or complete dehiscence, permanent curvature, and a hairy urethra. The incidences of these vary depending on the type of operation and the clinic involved, although fistulae are the most common

complication. Dehiscence (persistent hypospadias) is less common than fistula in treated hypospadias cases (Mousavi and Aarabi, 2014). Since the treatment of these cases is difficult and success rates are lower than with primary repair, accurate evaluation is required. This study involves cases indicated for the surgical technique applied. All consisted of secondary cases developing into persistent distal hypospadias with partial or complete dehiscence following hypospadias surgery.

2. Materials and methods

Thirteen were operated due to hypospadias between November 2012 and January 2019 becoming persistent distal hypospadias exhibiting partial or complete dehiscence was included in the study. The patients' mean age was 12.7 years, the youngest being four, and the oldest 21. Complete dehiscence was present in five patients (Fig. 1) and partial dehiscence in eight (Fig. 2).

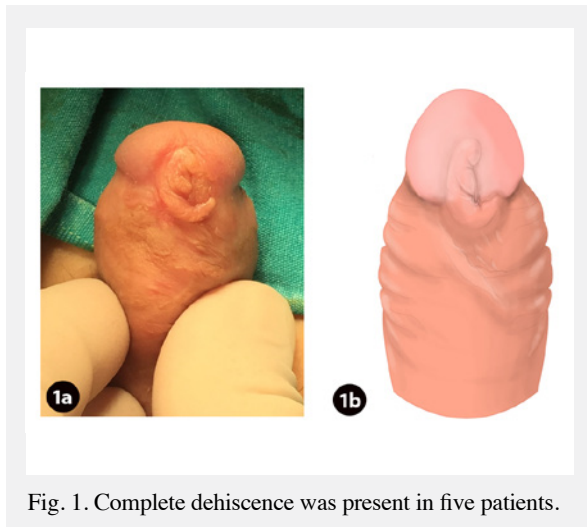


Fig. 1. Complete dehiscence was present in five patients.

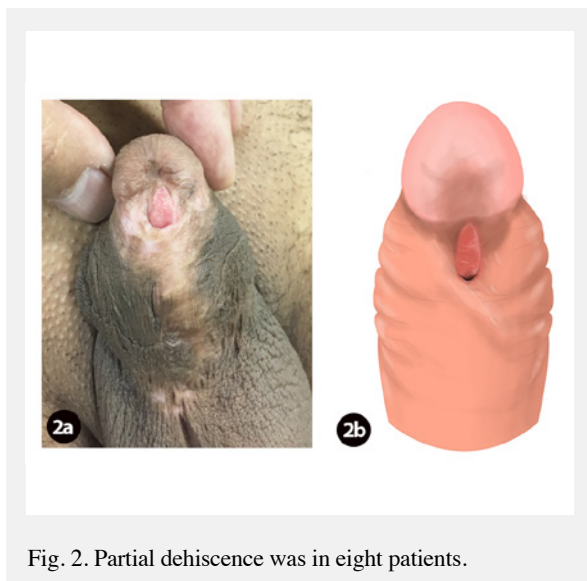


Fig. 2. Partial dehiscence was in eight patients.

General anesthesia was used in all cases. An incision of a suitable depth for urethral catheter installation was first made from the apex of the glans to the site of the meatus (Fig. 3). Next a 5/0 or 4/0 (depending on the size of the penis) polyglactin suture was applied to join the incision, meatus, and glans (Fig. 4). This suture was left long for subsequent urethral stent fixation. The dehiscence on either side of the glans were then sutured. A 10, 12 or 14 F urethral catheter was used, depending on the width of the urethra. A flap was prepared with the flip-flap technique to close the ventral dehiscence.

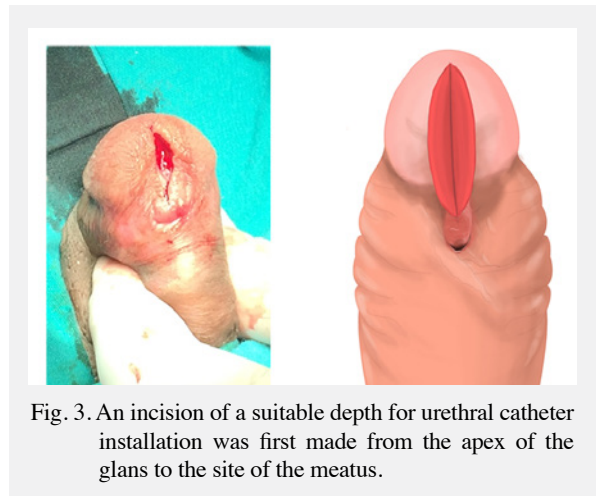


Fig. 3. An incision of a suitable depth for urethral catheter installation was first made from the apex of the glans to the site of the meatus.

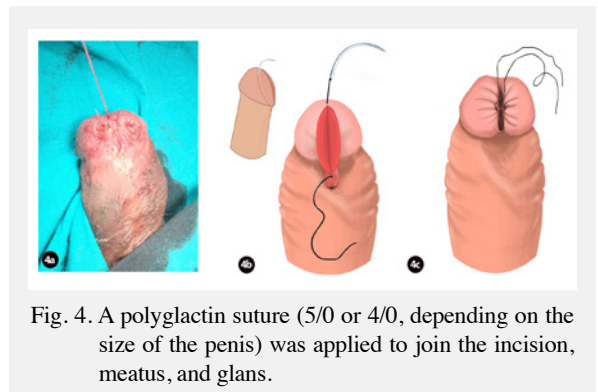


Fig. 4. A polyglactin suture (5/0 or 4/0, depending on the size of the penis) was applied to join the incision, meatus, and glans.

The circumcision line was completed as far as the dorsal aspect, and the penile skin was degloved (Fig. 5). Parallel longitudinal incisions were performed from the meatus to the distal aspect to form the posterior urethral wall (Fig. 6). In order to provide easier closure of the glans, the glandular wings were dissected as far as possible laterally. The flap was then reversed and sutured distally using 7/0 and 6/0 polyglactin, and the urethral tip was constituted by suturing to the dehiscence on the sides (Fig. 7).

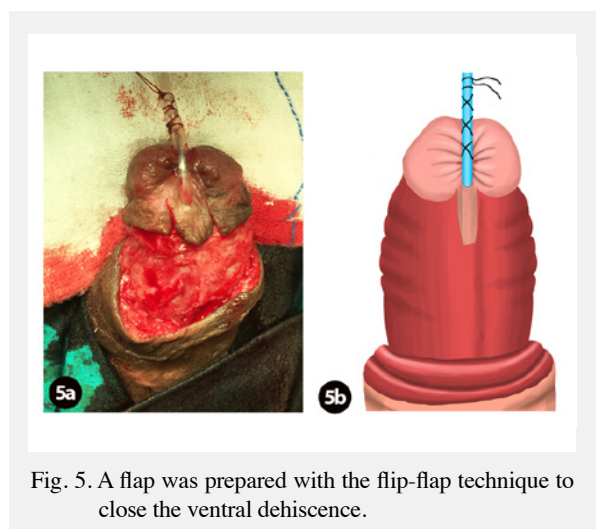


Fig. 5. A flap was prepared with the flip-flap technique to close the ventral dehiscence.

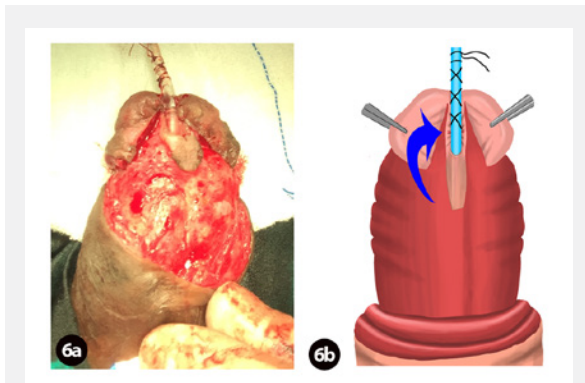


Fig. 6. Parallel longitudinal incisions were performed from the meatus to the distal aspect to form the posterior urethral wall.

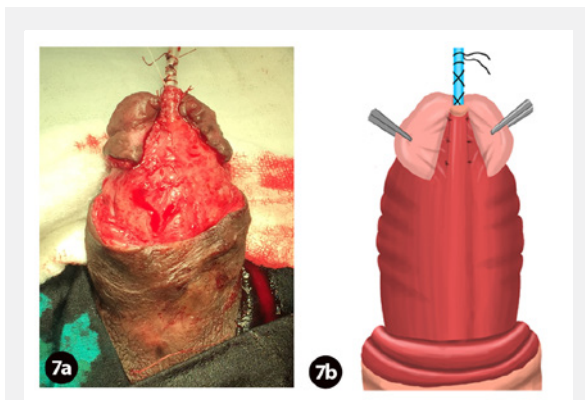


Fig. 7. The urethral tip was constituted by suturing to the dehiscence on the sides.

A sling suture was applied to the tip of the flap to create an external meatus. In order to close the glans, subcutaneous support sutures were first applied, followed by closure with a matrix suture with 5/0 and 4/0 polyglactin (Fig. 8).

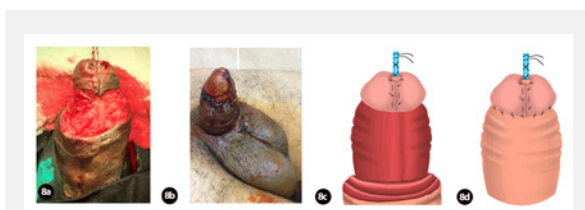


Fig. 8. The urethral tip was constituted by suturing to the dehiscence on the sides.

The external meatus as formed with the help of sutures to the tip of the flap. The circumcision line was closed with 5/0 and 4/0 polyglactin. The penis was then covered with a self-adhesive bandage (Coban). In order to avoid compression of the ventral suture line, the urethral catheter was fixed to the abdominal wall with sticking plaster. Broad-spectrum intravenous antibiotic therapy was initiated one hour before surgery

and maintained until the third day. Oral antibiotics were applied from the third day until removal of the urethral catheter. The bandages were opened on the third day postoperatively in the absence of bleeding or soakage. The urethral catheter was removed on day 10. Urine cultures were performed preoperatively and on the 50th day and first month postoperatively. Patients were followed-up for 20 months.

3. Results

Thirteen patients underwent surgery, two due to complications occurring in our own clinic, while the other 11 were referred due to complications from other centers. The common characteristic of the patients was distal hypospadias, and chordee was also present in two subjects. Two patients had previously undergone two operations, and the remaining 11 more than two. Moderate stenosis was observed in the penoscrotal region during urethral catheter insertion in two patients. Mean period of catheterization was eight days, and mean period of hospital stay was six days. Existing preoperative stenosis in two patients persisted in the postoperative period, and fistula developed in the proximal aspect of the previous stenosis in one case. External meatus stenosis also developed in one case (7%). Urethral dilation was applied to these patients. External meatotomy was subsequently required in the cases of external meatus stenosis. One case was opened completely due to infection in the postoperative period (7%) in one patient, who was aged 16. One patient was re-treated one year subsequently using the same technique. One of the cases with chordee improved with resection. Dorsal plication was performed on the other. Although cosmetic results satisfactory to the family and the physician were achieved in the majority of cases; these were not obtained in one case. This was due to this patient having previously undergone a large number of operations. Penile reconstruction surgery was subsequently performed in this case, and the desired patient and physician satisfaction was achieved.

4. Discussion

The repair of hypospadias complications may be difficult due to the low quality of surrounding tissue arising from impairment of normal vascularity. The most commonly encountered complications are fistulae and urethral stenosis (Mousavi and Aarabi, 2014). Both single and multi-stage therapeutic methods are available for the repair of these. The inadequate nature of the surrounding tissue and mobilization problems in the repair of these complications make treatment using standard methods difficult (Beuke and Fisch, 2007; Mousavi and Aarabi, 2014). The repair of these complications is complex due to the absence of foreskin following first hypospadias repair or due to broad scar tissue formation in previous operations.

Approaches such as buccal mucosa, hairless skin grafts, the dartos layer flap, bladder mucosa, lyophilized human dura, and in vitro cultured urethral epithelial urethroplasty are employed in different centers in the treatment of these complications (Hendren and Crooks, 1980; Romagnoli et al., 1990; Garat and Villavicencio, 1991; Hübner et al., 1991; Olsen et al., 1992; Brock, 1994; Kinkead et al., 1994). The question of which method should be preferred to treat this difficult condition is still controversial. The general approach individualizes the patient following careful evaluation. However, the buccal mucosa or bladder mucosa is generally used. Barbagli et al. achieved an 82% success rate with the use of buccal mucosa (Barbagli et al., 2016), while another study reported 22% graft contracture in patients treated using buccal mucosa (Myers et al., 2012). Although hypospadias repair using the bladder mucosa graft is not popular, it can also be employed. Li et al. reported 87.6% success and a 12.4% complication rate in unsuccessful hypospadias patients (Li et al., 1995), while severe meatus stenosis, graft contracture, and fistula formation were observed in the long term with bladder mucosa use in another series (Romagnoli et al., 1990; Olsen et al., 1992; Kinkead et al., 1994; Duckett et al., 1995; Myers et al., 2012; Barbagli et al., 2016). Bladder mucosa is occasionally used today in contrast to buccal mucosa use. Since these cases have previously been operated, difficulties are sometimes experienced with standard methods because of insufficiency of surrounding tissue and mobilization problems caused by scar formation. The approach described in this study would seem to be the option of choice if appropriate penile skin conditions are established.

Tubularized incised-plate (TIP) urethroplasty, described by Snodgrass, is another technique involving the penile skin in these cases (Snodgrass, 1994; Li et al., 1995; Saleh, 2007; Mousavi, 2008). The TIP urethroplasty method is widely employed by several surgeons in treating primary hypospadias patients. However, due to its application in selected cases, there is still significant debate concerning its use in hypospadias complication repair (Snodgrass and Lorenzo, 2002). Urethral stenosis was reported following hypospadias complication repair with the TIP method, and urethral dilation was required. Meatal stenosis occurred in only one of our cases. Improvement was not achieved with urethral dilation in that case, and external meatotomy was performed. A very small fistula also developed proximally to the stenosis in one case with previous urethral stenosis. The urethral catheter was removed on the sixth day due to obstruction, and a fistula developed 20 days following catheter removal. The catheter was reinserted and left in place for ten days. The patient urinated normally following removal of the catheter. The glandular wings were dissected as far as possible

laterally in order to prevent urethral and meatal stenosis. Care was taken during closure of the glans to ensure comfortable movement of the stent. The tip of the flap was used by being reversed over the glandular wings, producing an external meatus comparable to the original. The urethral catheter was left in place for ten days in these secondary cases.

Another important complication observed in the TIP method is urethral fistula. This was not observed in any of our cases, although complete dehiscence due to infection occurred in one case. This patient was successfully treated using the same method one year later. We attribute the absence of fistula in the 13 cases in which our method was applied to the short suture line. In order to reduce the suture line, we transferred the suture to the incision extending from the apex of the glans to the meatus and the suture line inside the glans. As a result, fewer sutures were applied to the lateral part of the flap we reversed. When the glans is closed, these sutures generally remain beneath it, and we observed that in the absence of severe infection no glans dehiscence occurred and no fistula developed. In addition, care was taken to ensure that the glans was of sufficient size in the cases in which we applied this technique. The aim in this proposed technique is to move the urethra inside the glans and to provide a cosmetically regular penis, and we think that this will not be possible in the case of a small glans.

Sufficient tissue for repair purposes is not present in the majority of these patients. One part of existing tissues may lack healthy vascularization and tissue supply. In addition, some tissues in which surgery has been applied are not sufficiently elastic. The penis may also assume a complicated appearance due to inadequate surgeon experience and skill. Care was taken to ensure a regular penile appearance in our cases, and this was successfully achieved in all but one case. In this problematic case, the penile skin had been very poorly used in previous operations. However, we achieved a cosmetic penile appearance by performing subsequent reconstruction.

The technique described here is quite simple. The suture applied to the incision between the apex of the glans and the meatus and the suitable wings formed on both sides of the glans permit comfortable stent insertion. The depth of this incision must be arranged so that the urethral stent can be easily inserted and also for easy closure of the glans. Closure of the glans in two layers prevents both dehiscence of the glans and also fistula development.

In conclusion, surgical procedures all have various advantages and disadvantages. Surgical difficulties and postoperative problems encourage surgeons to look for easier and practicable methods. Our experience shows that the proposed approach can achieve positive results in appropriate cases of persistent distal hypospadias.

Conflict of interest

The author declares his individual contribution to this paper. And the author declares that he has no conflicts of interest.

Ethical approval

All procedures performed in studies involving human participants were in accordance with the ethical

standards of the institutional research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent

Informed consent was obtained from individual participants included in the study.

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