



# Proximal hypospadias with small flat glans: the lateral-based onlay flap technique

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## Abstract

**Purpose:** The lateral-based onlay (LABO) technique for patients with proximal hypospadias associated with flat glans and report of the follow-up.

**Materials and Methods:** Between January 2004 and December 2010, the LABO technique was performed in 107 patients. The principle is to use the lateral foreskin adjacent to the glans as the onlay flap. Patient age ranged between 8 months and 2 years (mean, 11 months). The records of 98 patients who maintained regular follow-up were reviewed. All the patients had proximal hypospadias with flat or incomplete cleft glans and did not have a deep chordee. Follow-up period ranged from 12 months to 8 years (mean, 32 months). A transurethral silastic catheter was used for 7 days.

**Results and Complications:** Satisfactory results were obtained in 93 patients (95%). Two children developed fistula, 2 developed glans dehiscence, and 1 child had skin prolapsing from the meatus that required excision.

**Conclusions:** The LABO technique is a reliable technique for patients with proximal hypospadias in the absence of a deep chordee. It has particular value in patients with small or flat glans. With multiple layer closure and careful attention to technical details, a low complication rate (5%) was achieved in correcting this type of proximal hypospadias.

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Proximal hypospadias remains a major challenge for the hypospadias surgeon. The lateral-based flap (LAB) [1], Koyanagi technique [2], Duckett Island flap [3], and Bracka 2-stage repair [4] are the current techniques used for proximal hypospadias with deep chordee that requires division of the urethral plate [5]. Alternative techniques for proximal hypospadias when the urethral plate could be preserved include the onlay flap [6], Thiersch technique [7], and tubularised incised plate technique [8] (TIP). A higher rate of complications is reported in patients with small, flat glans [9,10].

Experience with the lateral-based onlay (LABO) flap in patients with proximal hypospadias and small flat glans is reported. The principle of the technique is to use a narrower base (urethral plate) and deep incision in the glans to have larger and more mobile glanular wings. The narrow plate is compensated for by using part of the lateral foreskin as an onlay flap.

## 1. Patients and methods

The LABO technique was performed in 107 patients in the period between January 2004 and December 2010. Approval was obtained from the hospital ethics committee. Nine patients were lost for follow-up, and the remaining 98

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patients constitute the present cohort for this report. Patient age ranged between 8 months and 2 years (mean, 11 months). All the patients had proximal hypospadias with flat or incomplete cleft glans and did not have a deep chordee. Cutaneous chordee was corrected by skin mobilization. A transurethral silastic catheter size 10F was used for 7 days. Patients with complicated hypospadias who underwent the LABO technique are not included in the present study.

For the purpose of the study, incomplete cleft glans is identified when the glanular groove is less than 4 mm in depth. Flat glans is considered when there is no glanular groove.

## 2. Surgical technique

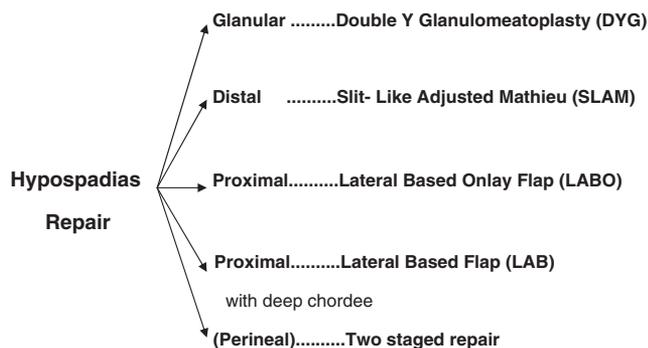
Under general anesthesia and caudal block, a traction suture of 4/0 prolene is placed through the tip of the glans (Fig. 2). A tourniquet is applied at the base of the penis, and an artificial erection test is performed.

### 2.1. Patients' selection

Careful assessment of the penis is performed. The author algorithm for hypospadias management is shown in Fig. 1; the author performs the double Y glanuloplasty technique in patients with glanular hypospadias and long mobile urethra [11]. Patients with distal or midpenile hypospadias had the slit-like adjusted Mathieu technique performed [12]. Patients with proximal hypospadias and deep chordee that required division of the urethral plate underwent the LAB [1]. The degree of glans clefting (grooving) is evaluated. Patients with proximal hypospadias with no or superficial chordee associated with small, flat glans had the LABO technique performed. When the native urethral meatus was narrow, it was incised proximally to create a wide spatulated meatus (23 patients).

### 2.2. Ventral degloving

Because chordee in hypospadias involves the ventral aspect of the penis only, degloving was limited to the ventral aspect of the penis. This is important to preserve the deep fascia and blood supply to the LABO flap. Seven patients



**Fig. 1** Algorithm showing the author's plan of management of hypospadias.

had proximal hypospadias associated with penile torsion. In those 7 patients, complete degloving was carried out after mobilization of the LABO flap.

### 2.3. Flap design

The limits of the urethral plate are outlined. Attention is given to create large glanular wings, and the urethral plate could be outlined as narrow as 3 mm in width. The narrow urethral plate was compensated by a wider flap from the lateral foreskin. At the distal end of the urethral plate, the 2 borders converge toward each other [12] to allow for more mobility of the glanular wings to wrap around the neourethra and to have a slit-like meatus free of sutures.

The LABO flap is outlined as shown in Fig. 2A. For right-handed surgeons standing on the right side of the patient, the flap is easier to obtain from the left side. The medial border is at the left foreskin mucocutaneous junction, adjacent to the glans. The width of the flap is designed according to the width of the urethral plate with the help of an appropriate-sized catheter and stay sutures. The flap is designed in a way to have a wide base.

Incision in the glans region begins at the coronal sulcus using a scalpel or sharp scissors and continued distally very deep into the glans in such a way to create large, mobile glanular wings. Stay sutures at the foreskin help orientation. Proximally, the LABO flap is elevated using sharp scissors taking care to include dartos fascia with the flap. The lateral foreskin is mobilized carefully maintaining the deep fascia and blood supply to the designed flap.

### 2.4. Urethroplasty

A tourniquet is applied at the base of the penis. A stitch fixes the apex (A) of the LABO flap to the urethral plate 2 mm from the tip of the incision (A') to keep the meatal edges free of any sutures and to have a smooth, near normal meatus [11,12] (Fig. 2B). The right (medial) border of the left foreskin is sutured to the left border of the urethral plate in a continuous mattress manner using 6/0 polyglactin (Fig. 2C). The LABO flap is turned over the appropriate size catheter (Fig. 2D). The appropriate width of the LABO flap is confirmed after completing the left border suture line. Only then is the left border of the flap incised. The right suture line starts 2 mm proximal to the meatus to have the final urethral meatus free of sutures (Fig. 2E). Urethroplasty is completed using 6/0 polyglactin on a cutting needle in a continuous subcuticular suturing manner (Fig. 2F). A small V is excised from the apex of the LABO flap (inset).

### 2.5. Protective intermediate layer

A protective intermediate layer from the scrotal dartos/tunica vaginalis is routinely used to cover the urethroplasty (Fig. 2G).

## 2.6. Meatoplasty and glanuloplasty

The 2 edges of the final meatus are sutured together to the centre of the V creating a slit-like meatus using polyglactin 7/0 single stitch. No other sutures are required for the meatus. The glanular wings are approximated using polyglactin 7/0 transverse mattress interrupted sutures. The remaining wound is closed using continuous mattress polyglactin 7/0 stitches (Fig. 2H).

The remaining skin of the penis and foreskin was fashioned to provide ventral skin coverage of the penis. This is not always easy depending on the width of the flap used in the urethroplasty.

## 2.7. Urine drainage

A transurethral silastic catheter is retained for 7 days.

## 2.8. Dressing

All patients had a standard dressing in the form of gentamicin local ointment, gauze, and adhesive tape that compresses the penis, gauze, and catheter against the lower abdominal wall and allows the free mobility of the patient [12]. The dressing was removed at the time of removal of the transurethral catheter, and the penis was left exposed. If the dressing became wet with urine or blood, the dressing was changed using a similar standard dressing. Broad spectrum antibiotics (second-generation cephalosporin) were used for one week. Paracetamol and ibuprofen suppositories and syrup were routinely used for pain relief as required.

The standard follow-up protocol in the hypospadias center includes examination after 3 months, 12 months, and every 2 years until the age of 15 years. Patients living long distance and fail to attend for follow-up were contacted by e-mail and telephone using a structured questionnaire [13]. Follow-up period ranged from 12 months to 8 years (mean, 32 months). Nine patients were lost to follow-up.

The results were assessed by an independent outpatient nurse. Results were considered satisfactory when the boy achieves an apical slit-like meatus at the tip of the glans penis, single forward stream, unimpeded voiding, good cosmesis, and no need for secondary surgery for the urethra. Uroflowmetry was performed in toilet-trained children (21 patients). Peak flow within 2 SDs was considered normal.

### 2.8.1. Important technical points

- The caliber of the neourethra was designed to be the same size or slightly larger than the normal proximal urethra. The standard protocol is to use a catheter size Ch 10 or larger.
- Occasionally, the hypospadias meatus is narrower than the normal proximal urethra owing to the presence of a

rather circular fibrous ring and should be incised to avoid stenosis at the proximal end of the neourethra.

- The first step in the urethroplasty is to suture the distal end of the flap to the end of the glans 2 mm from the tip (A to A') (Fig. 2B). This helps to have only 1 stitch at the meatus at 6 o'clock position.
- The suturing of urethroplasty should start few millimeters proximal to the original meatus. This helps to have the knot proximal and away from the neourethra.
- The left border of the urethroplasty is sutured first before cutting the lateral border of the flap that will constitute the right border of the urethroplasty to ensure having the appropriate width of the LABO flap.
- As suturing is performed in a continuous subcuticular manner, a cutting needle is easier to go through the dermis as is the case with the classic subcuticular closure of skin incisions.

## 3. Results and complications

Ninety-eight of the patients have been followed up; the remaining patients are from long distances and have not responded to communications, which are poor in some areas (Figs. 3 and 4). Follow-up period ranged from 12 months to 8 years (mean, 32 months). Satisfactory results were achieved in 93 patients (95%). Two patients developed fistulae, 2 children had glans dehiscence, and 1 child developed prolapsing skin outside the meatus 2 years after the urethroplasty. The fistula was closed routinely after 6 months. A second intermediate layer was always used to protect fistula closure. The 2 children with dehiscent glans had meatoglanuloplasty performed successfully 6 months after the first operation. The child with prolapsed skin had the prolapsed skin excised as an ambulant procedure 2 years after the first surgery.

Uroflowmetry was performed in 21 toilet-trained children, and the peak flow was within 2 SDs in 16 patients and flat in 5 patients. Those 5 patients are clinically free of symptoms, and ultrasound of the urinary bladder did not show thickened bladder wall suggestive of distal obstruction.

## 4. Discussion

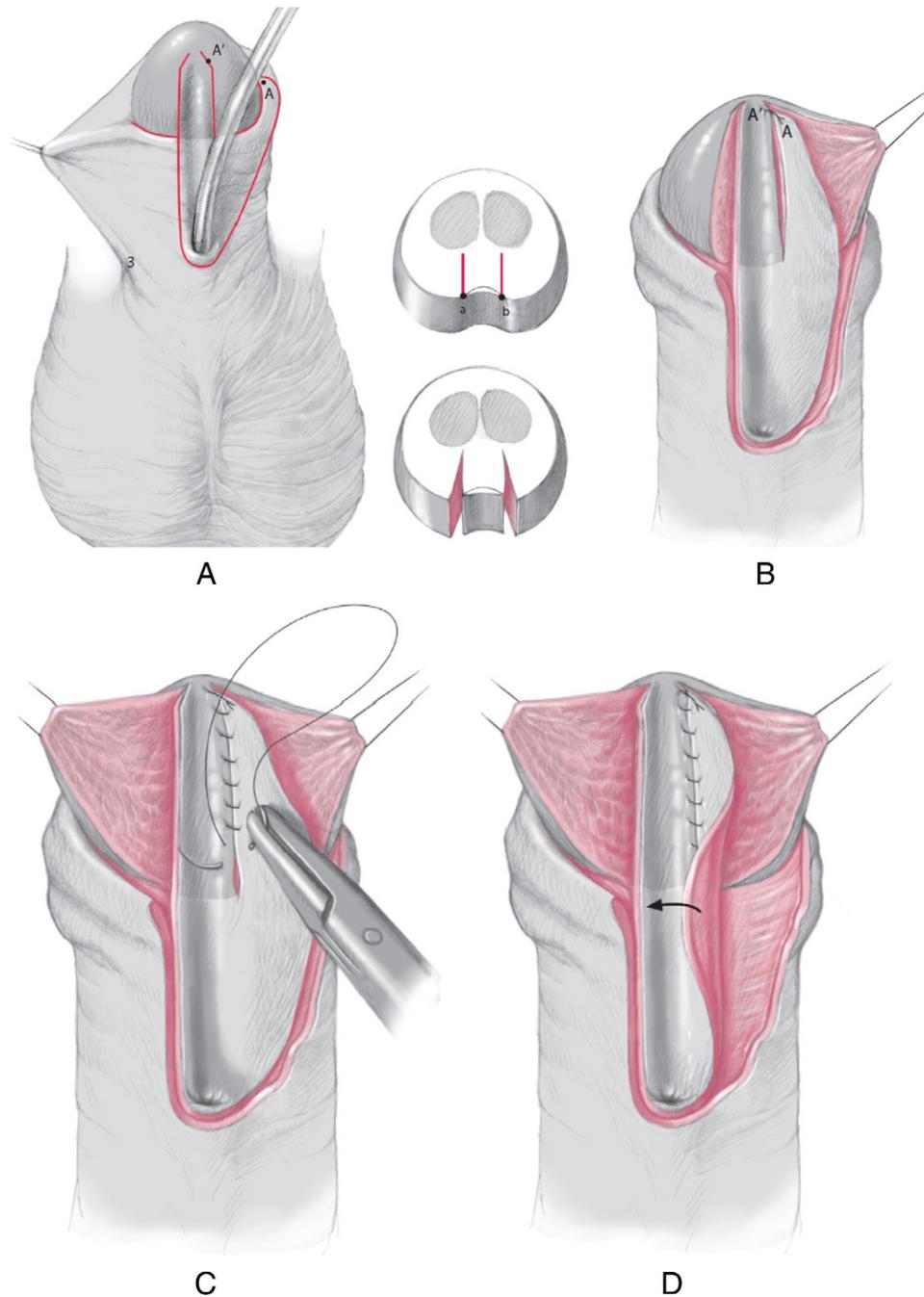
Surgical correction of proximal hypospadias is technically demanding and remains a major challenge for the experienced hypospadias surgeon. The situation becomes more challenging when the child has a small flat glans.

Common techniques for proximal hypospadias when the urethral plate could be preserved include the onlay flap [6], Thiersch technique [7], and TIP [8]. A higher rate of complications is reported in patients with small or flat glans [9,10].

The onlay flap from the dorsal preputial skin is a good technique for proximal hypospadias without deep chordee that requires incision of the urethral plate.

In a retrospective study, Braga et al [14] reviewed the records of 72 consecutive patients with penoscrotal hypospadias and compared the outcome of 35 patients who underwent TIP and 40 patients who underwent an

onlay repair. In both groups, the repair was done around a catheter size 8F. The overall complication rates were 60% and 45% for the TIP and onlay, respectively. A plateau uroflow curve vs normal bell curve was observed in 16



**Fig. 2** The LABO technique. A, The LABO technique design: A U-shaped incision is outlined. The 2 parallel incisions go very deep into the glans and converge as shown to have a slit-like meatus. The left incision stops at the coronal sulcus and continues distally in the prepuce at the mucocutaneous junction and constitutes the medial border of the LABO flap. The flap is designed to have a wide base as shown in the figure. B, Flap mobilization: The right incision is deepened starting near the coronal sulcus. Apex suture: The tip of the medial border of the LABO flap (A) is sutured to the urethral plate 2 mm proximal to the edge (A'). C, Urethroplasty: The medial border of the LABO flap is sutured to the left edge of the urethral plate. D, The LABO flap is turned over the catheter. E, The second apex stitch is fixed 2 mm from the tip of the urethral plate incision. F, Urethroplasty is completed on the right side. A triangle is removed from the tip of the flap to help having a slit like meatus. G, A second intermediate layer is used from the scrotal dartos/tunica vaginalis. H: Glans and skin closure: The glanular wings are approximated around the new urethra, and the penile skin is closed. Notice that the new meatus has 1 stitch only at 6 o'clock (From: Hadidi AT with permission).

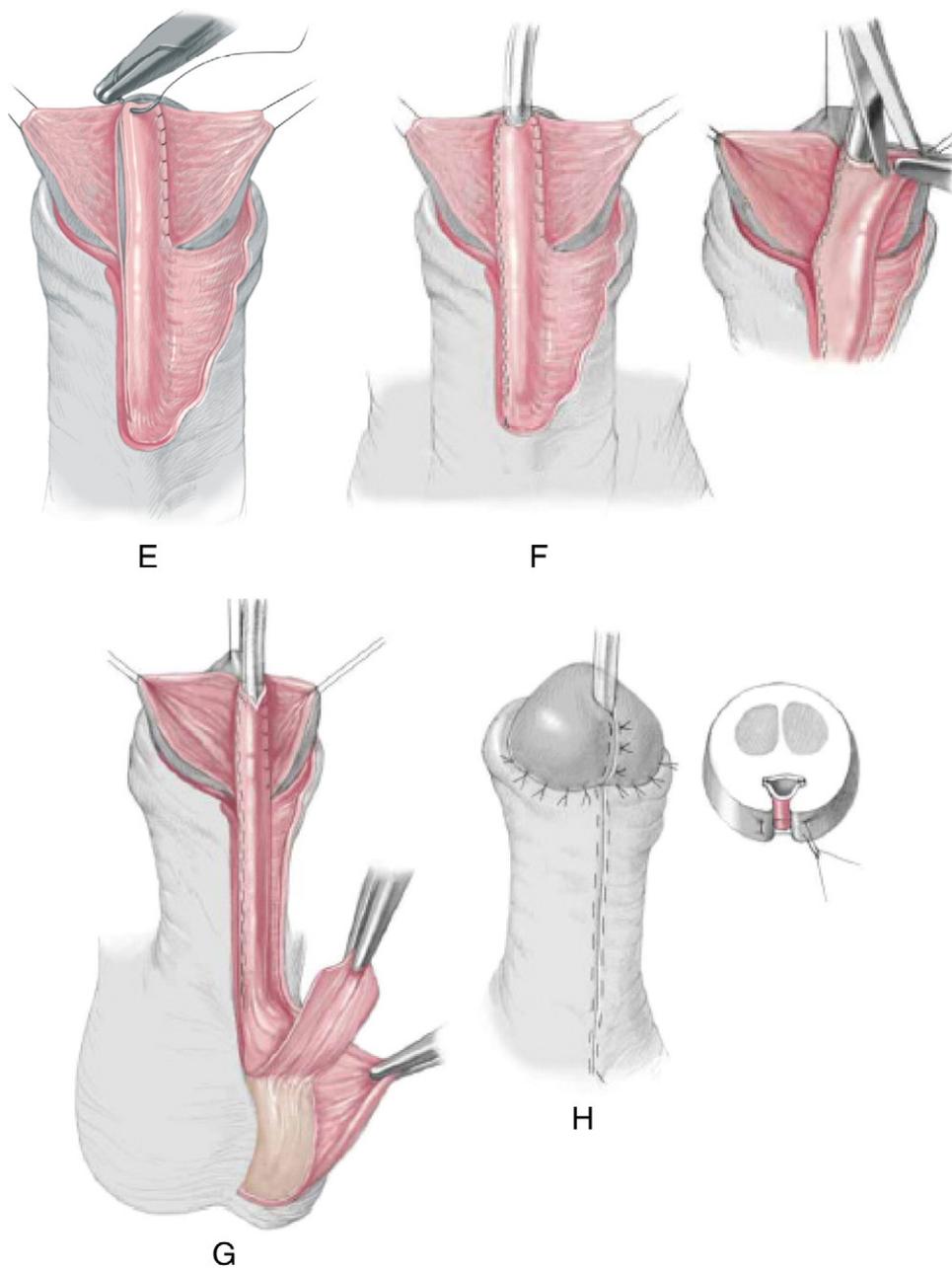
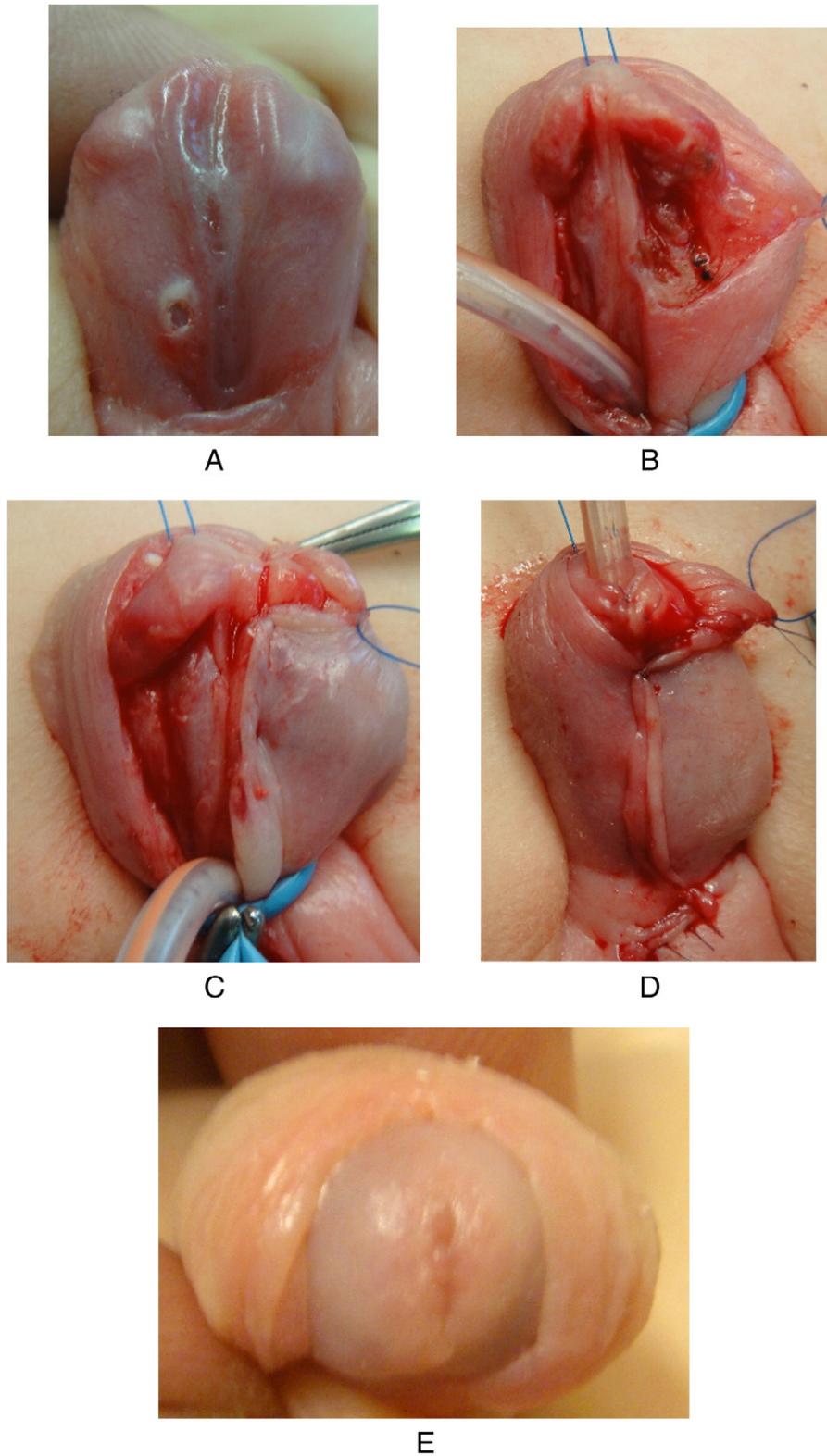


Fig. 2 (continued)

(66.7%) of 24 children who underwent TIP repair and 7 (33.3%) of 21 who underwent onlay repair. Fistula location varied significantly between the 2 groups, with proximal fistulae occurring in 11 (73.3%) of 15 TIP repairs vs 2 (25%) of 8 onlay repairs.

The LABO technique is presented as a technique of particular value in patients with small, flat glans. It is probably easier to perform because the flap is used from the ventral aspect of the penis without the need of extensive mobilization as is the case with the classic transverse preputial onlay flap.

Hadidi [1] reported his experience with the LAB flap for proximal hypospadias and deep chordee. There is always a search on how to improve the functional and cosmetic outcome and reduce hospital stay and complications. One would expect that 1 suture line (LAB flap) is less liable to complications than having 2 suture lines (LABO flap). This is not the case in clinical practice, and the LABO has fewer complications than the LAB flap. The low complication rate of 5% is probably also related to the careful selection of patients because proximal hypospadias without deep chordee usually indicates a better developed and well-vascularized



**Fig. 3** The LABO flap technique in a 12-month-old boy with proximal hypospadias. A, A proximal hypospadias without deep chordee. Notice the incomplete cleft glans, the narrow irregular urethral plate, and the smegma mass that was removed at the beginning of operation. B, After incision of the plate and mobilization of the LABO flap. C, The left suture line of the urethroplasty was completed. D, The appearance after completion of urethroplasty around a catheter size 10F and skin closure. E, The appearance 1 year after surgery, during the follow-up visit.



**Fig. 4** The LABO flap design in a 10-month-old infant with penoscrotal hypospadias without deep chordee (confirmed by erection test). Notice the very narrow irregular urethral plate and incomplete cleft glans.

urethral plate. In addition, a transurethral catheter for 1 week was found adequate because this technique is associated with less edema than the LAB technique.

Uroflowmetry was carried out in 21 toilet-trained children after LABO repair. Five children had a flat curve, although they did not have any clinical symptoms of obstructive voiding, and ultrasound on the bladder did not show increased bladder wall thickness. The significance of uroflow after hypospadias repair remains uncertain [10].

Snodgrass et al [8] reported a complication rate of 13% of the TIP technique in proximal hypospadias. In another publication by the same author, he reported a 15% glans dehiscence rate [9]. Eassa et al [15] reported a 35% complication of TIP in proximal hypospadias. Long-term follow-up studies of the TIP technique reported a complication rate reaching 66% in proximal hypospadias [16]. Other long-term follow-up studies of the TIP technique in proximal hypospadias showed functional obstruction and marked reduction in urine flow rate in most patients included in the study [17].

The LABO flap was associated with low morbidity and low complication in the short-term follow-up (mean, 32 months). Long-term follow-up is being carried out to assess the functional and cosmetic outcome after puberty.

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