Spongioplasty and separation of the corpora cavernosa for hypospadias repair

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OBJECTIVE

To describe a surgical method (a modified Duplay technique), and its results, for hypospadias repair, developed to avoid the common complication of fistula.

PATIENTS AND METHODS

The urethroplasty was modified so that it no longer comprises a simple approximation of the urethral plate with no dissection. The inferior surface of the corpora cavernosa is exposed as far as the lateral border and to the end of the glans, allowing tension-free suturing of urethral tissues, with a lengthening effect of the intermediate plane. This corrects chordee and especially the 'bucket-handle' glans, and protects the reconstructed urethra and proximal urethra. The study included 51 children who had their hypospadias repaired over a 9-month period (mean age at surgery 20.6 months, range 1–11 years); 14 had coronal, three anterior penile juxta-coronal, 23 anterior penile, four medium penile, five posterior and two penoscrotal hypospadias.

RESULTS

All children were followed and no fistula was apparent in any with anterior hypospadias; two fistulae occurred after repair of the posterior form. The risk of fistula is therefore reduced (two in 51).

CONCLUSION

This technical modification can be used to treat all forms of distal hypospadias (glanular, glanulo-preputial, and anterior penile). It was also used for several cases of more severe hypospadias. These good results must be confirmed in a larger series of patients.

KEYWORDS

hypospadias, urethroplasty, corpora cavernosa

INTRODUCTION

Since 1986 we have corrected hypospadias mostly using a modified Duplay procedure [1], an old technique whereby the urethral plate is used to reconstruct the urethra. In the modified Duplay procedure the urethroplasty is completed using several changes that allow the correction of the associated anomalies common in hypospadias, including incision of the meatus, necessary in most cases, a long dissection of the penile skin upward from the orifice to remove cutaneous urethral adherence, mostly the cause of the penile angulation, and spongioplasty. Recently, we modified our spongioplasty technique, with the objective of reducing the risk of fistula and improving the correction of penile curvature.

PATIENTS AND METHODS

TECHNIQUE

The operation is carried out under local anaesthesia and light general sedation, starting in the same manner as the previous technique under tourniquet (maximum of 45 min) with the aid of a microsurgical lancet and magnifying lenses. The meatus is incised downwards and a urethral catheter (8 F) inserted, followed by an incision of the urethral plate on both edges, freeing the penile skin to the roots of the rim on the ventral surface (Figs 1 and 2).

The spongy tissue is incised deep enough, starting from the tip of the glans. This incision is followed on the external borders of the urethral plate then the urethra, largely upwards from the hypospadiac meatus, ceasing when the spongy tissue returns to normal around the penile urethra. This incision is carried deep enough to meet the corpora cavernosa and the dissection continued progressively from low to high and from back to front to the tip of the albuginea of the corpora cavernosa, which are exposed to the external border (Fig. 3). Thus there is a partial 'disjunction' of the corpora cavernosa, by removing the spongy tissue to expose all of the inferior surface of the corpora cavernosa up to the tip of the gland (and not just in the corona) (Fig. 4).

The urethroplasty is continued using separate sutures (polydioxanone 7/0) and the glans closed by separate Blair-Donati polydioxanone 6/0 sutures, assuring haemostasis; the last suture is held by a pair of tweezers (Fig. 5). The traction on the suture exposes the spongy bifurcations that are sutured by a 6/0 single suture, taking care to put the mooring suture in the glans so that there is complete haemostasis. This suture, because of the large lateral dissection of the spongy tissue, is placed with no tension, and should go well above the hypospadiac orifice to conceal the urethra devoid of spongy tissue until it becomes normal (Fig. 6). Before releasing the tourniquet, an erection test (by injecting with normal saline into corpora cavernosa) can be carried out (Fig. 7).

Surgery ends with preputial reconstruction; in most cases, and often requested by the family, the prepuce is rounded, which allows enough penile covering to give an aesthetic and physiological aspect. In a few cases with particularly deformed prepuces it may be necessary to carry out a dorsal-type Duhamel contra-incision or even circumcision. A haemostatic absorbent and sterile dressing is then rolled around the penis and the urethral catheter left in place for 24 h; the child is discharged after 48 h.

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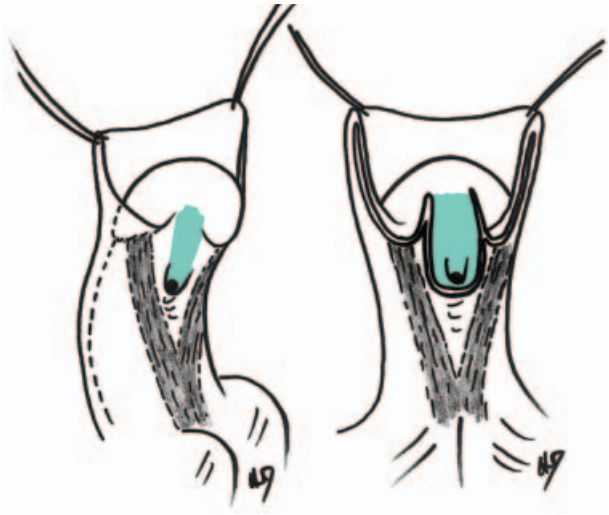

FIG. 1.
Hypospadias before dissection; the urethral plate is shown in green.

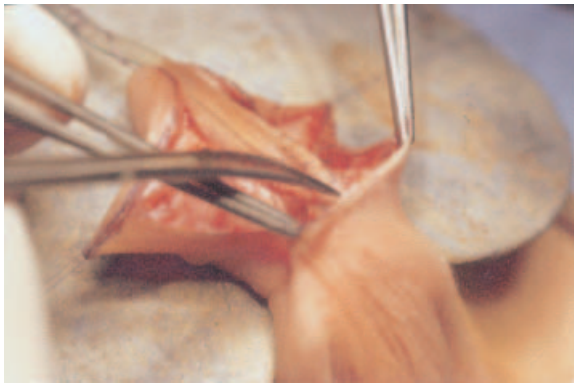

FIG. 2.
Dissection of urethrocutaneous fibrosis to the penile base.

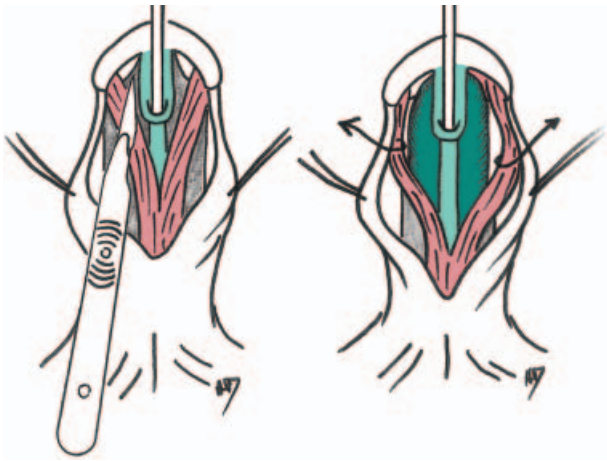

FIG. 3.
Dissection of spongy tissue from the tip of the glans to the corpora cavernosa.

RESULTS

In all, 51 children underwent this repair over a 9-month period (mean age at surgery 20.6 months, range 1–11 years; eight were 12–18 months, 24, 19–24 months, nine 24–30 months and ten more than 30 months old). Of the 51 children, 14 had coronal, three anterior penile juxta-coronal, 23 anterior penile, four medium penile, five posterior and two penoscrotal hypospadias.

In 12 children there was an additional intervention; seven circumcisions, two Duhamel plasty, two transposition of the prepuce (just to cover the skin) and one a dorsal Nesbit procedure.

The urethral catheter was removed after 24 h except in one child with anterior penile hypospadias, where it was left in for 5 days, and in three with medial penile hypospadias (7, 7, and 5 days, respectively), in one with posterior penile hypospadias (8 days), and one with penoscrotal hypospadias (6 days).

All children were followed up; no fistulae occurred in those with anterior hypospadias, but two were detected in those with the posterior form. One closed after 7 months and one was a microfistula detected by the parents in a boy with penoscrotal hypospadias. Two other boys had preputial dehiscence, for which one did not require surgery.

DISCUSSION

There are several methods for correcting hypospadias, the use of which varies depending on the type of hypospadias and the practice of each surgeon [2–7]. For many years we used the modified Duplay technique; this has been improved in the last 6 months by using a different spongioplasty. This technique allows the correction of most types of hypospadias without resorting to more complex operations such as the onlay or Duckett methods (deletion of the urethral plate).

Regardless of the type of hypospadias, the glans is flattened at its inferior surface because the urethral plate is not tubularized and there is spongy tissue from each side of the external border [8]. Above the ectopic urethral orifice the urethra is visible for a few millimetres to a few centimetres. Once the usual urethroplasty is completed a single suture brings together the spongy tissue which covers the corpora cavernosa in front of the urethra, with no additional dissection to allow recovery of the urethral layer. Thus we modified the spongioplasty with three goals; to improve the correction of penile curvature; to give the glans a more rounded appearance; and to reduce the risk of fistula.

In our experience on 586 Duplay procedures between January 1986 and May 2000, there

were 46 fistulae (7.5%) of which 10 were in patients who had had several interventions; considering just those patients treated for the first time, this is 6.3%. Eight fistulae did not require surgery and 38 did (eight requiring two interventions). This proportion is similar to those observed with other types of urethroplasty, especially with the Mathieu procedure.

The new technique of spongioplasty allows a better quality of the intermediate layer, with the objective of preventing fistulae. In the anterior form (40 boys) no fistula occurred, especially in the corona, which is the usual main location. The fistulae that did occur were at the base of the urethroplasty, perhaps where the covering by the spongy tissue was insufficient. The spongioplasty must always cover the area of urethroplasty, while covering the transparent portion of the urethra until the bifurcation with the spongy tissue.

The correction of penile angulation is not always completed with a simple dissection of the penile skin (in our series of 586 Duplay repairs, 16 Nesbitt procedures were necessary). Up to 20 years ago, the bifurcated spongy tissue (Buck's fascia) was considered responsible for the curvature and was resected. Most authors, particularly Beaudoin *et al.* [9] proposed a reconstruction with the dissection of spongy tissue up to the external side. We modified this technique so that the internal side of the spongy tissue is dissected, to obtain a tension-free intermediate layer. This modification allows the penile curvature to be treated with the dissection of the inferior surface of the corpora cavernosa. The major goal is to cover the corona, which is the major area of fistula.

The correction of penile curvature and 'bucket-handle' glans is obtained with this technique using; (i) a suture in the midline of the divided spongy tissues, with an increase in the size of the glans (Fig. 8a); (ii) repositioning of the glans on the corpora cavernosa, possible with the dissection of spongy tissue (Fig. 8b). This increases the size of the penis and the glans.

In conclusion, the Duplay procedure and spongioplasty with separation of the corpora cavernosa allows the correction of almost all types of hypospadias. The risk of fistula is limited and the correction of penile curvature is easier. This spongioplasty will be useful for the intermediate layer in other urethroplasties (e.g. Mathieu). The good results must be confirmed with a larger series.

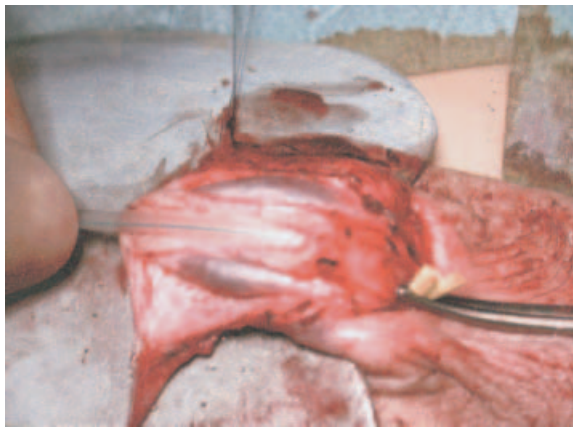

FIG. 4.
Separation of the corpora cavernosa to expose them until the tip of the glans.

FIG. 5.
The immediate result of urethroplasty before spongioplasty.

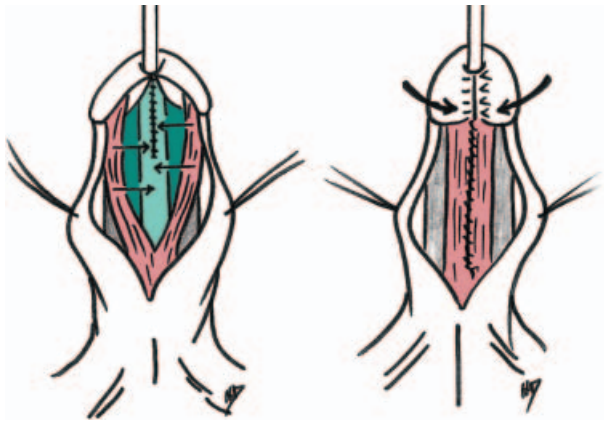

FIG. 6.
Spongy tissue is used to re-cover the urethroplasty.

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REFERENCES

1 Mege JL, Pelizzo G, Dubois R, Arcache J, Carlioz P, Dodat H. Modified Duplay technique in the treatment of anterior hypospadias: Immediate and long term results in 321 cases and review of literature. *Prog Urol* 1999; **9**: 1136–47

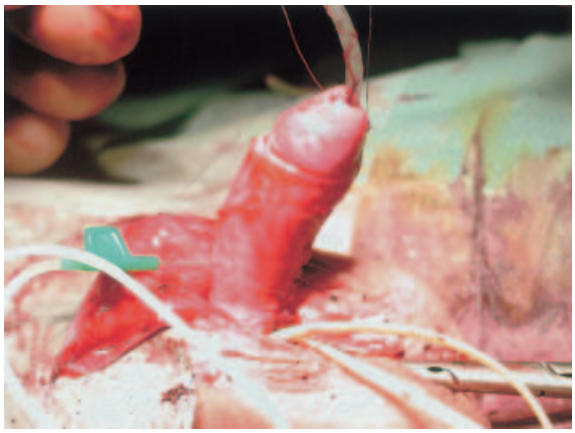

FIG. 7.
The erection test after urethroplasty-spongioplasty.

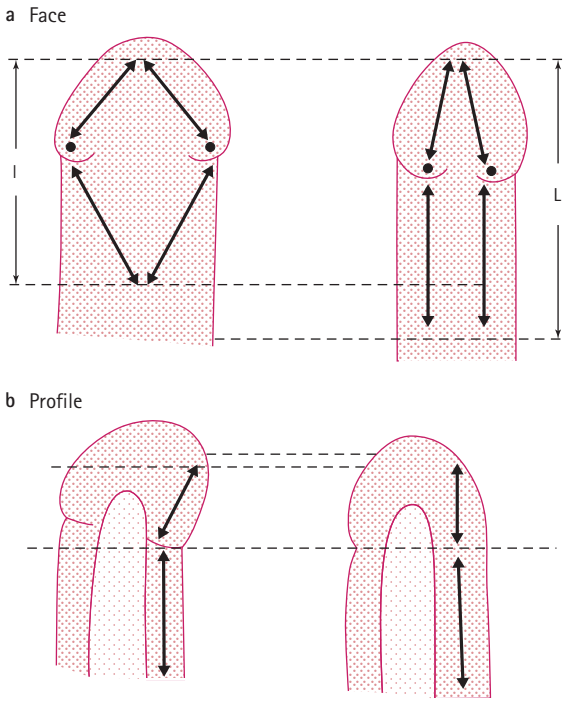

FIG. 8.
***a,** Midline suture of the spongy tissue. **b**, Increase in the size of penis and glans with spongy tissue dissection and urethrocutaneous fibrosis.*

2 Belman AB. Hypospadias update. *Urology* 1997; **49**: 166–72
3 De Sy WA, Hoebeke P. General considerations on hypospadias. *Ann Urol (Paris)* 1996; **30**: 158–9
4 Goepel M, Otto T, Kropfl D, Rubben H. Recent considerations for hypospadias repair. results of 252 operations from 1990. *Eur Urol* 1996; **29**: 63–6
5 Monfort G, Di Benedetto V, Meyrat BJ. Posterior hypospadias: the French operation. *Eur J Pediatr Surg* 1995; **5**: 352–4
6 Paparel P, Mure PY, Margarian M, Feyaerts A, Mouriquand P. Current approach to hypospadias in children. *Prog Urol* 2001; **11**: 741–51
7 Stock JA, Hanna MK. Distal urethroplasty and glanuloplasty procedure: results of 512 repairs. *Urology* 1997; **49**: 449–51
8 Baskin LS, Erol A, Li YW, Cunha GR. Anatomical studies of hypospadias. *J Urol* 1998; **160**: 1108–15
9 Beaudoin S, Delaage PH, Bargy F. Anatomical basis of surgical repair of hypospadias by spongioplasty. *Surg Radiol Anat* 2000; **22**: 139–41

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