Abstract We report a new method of repair of exstrophy-epispadias complex (EEC) at a second stage by using flaps from the skin between the penis and scrotum (the clitoris and labia majora in females) used in seven patients. The non-pigmented skin between the penis and scrotum in males or a band of skin between the clitoris and labia majora in female is mobilized in two flaps, which are rotated superiorly. Five patients were treated primarily by this method and two patients at the time of secondary reconstruction. There were six boys and one girl. Two patients were post-pubertal, one male and one female. Follow-up (6–12 months) revealed good cosmetic and functional results. If EEC is repaired in a single stage, the entire pelvic diaphragm is visualized from inside and the sphincters can be reconstructed around the bladder neck. This procedure gives better exposure of attachments of the corporal bodies to the pubic rami, allowing easier mobilization. The bulbospongiosus muscle can be reconstructed. A normal penoscrotal relation is achieved in male patients. The root of the scrotum, which is splayed out and wide, narrows. Rotation of the flaps superiorly normalizes the symphyseal area. In female patients the appearance of the mons pubis is satisfactory. In post-pubertal children the pubic hair distribution appears normal.

Keywords Exstrophy of bladder · Flaps in bladder exstrophy · Exstrophy-epispadias complex

Introduction

In all cases of reparative surgery in which the defect is congenital, the aim of surgery should be to restore the parts to their normal relation as nearly as possible. The best operation is one that reverses the condition of accident-in-utero. Bladder exstrophy is a rare congenital anomaly with an estimated incidence of 1 in 10,000 to 1 in 50,000 live births [1–3].

No attention has been drawn to the normally-pigmented skin bridge interposed between the penile shaft and scrotum, dissociating the two structures, in all cases of exstrophy-epispadias complex (EEC). In female patients this skin dissociates the clitoris from the labia majora, displacing the labia laterally. Relocating the bridge in its normal position in the symphyseal region not only normalizes the appearance, but also gives good exposure for the repair of EEC. The corpora can be mobilized easily from the pubic rami and reapproximated in the midline with medial rotation over the ventralized urethral tube. We report seven cases operated upon by this technique with good cosmetic and functional results.

Materials and methods

This procedure was done in seven patients (age limit of 1–16 years). In five cases it was done at the time of the second stage, the first stage being primary closure of the bladder with an osteotomy. In two patients, one male and one female, this procedure was done after all stages were completed and the cosmetic and functional result was poor. One of the latter was a post-pubertal boy in whom the pubic hair grew downward and medially and met in the midline under the penis.

Flaps of normally pigmented skin are marked; the upper margin is at the junction of the penis and the lower margin at the junction of the scrotum. The medial margin is the midline raphe (Fig. 1A). The superior incision is extended, encircling the root of the penis and the upper lip of the urethral meatus. A urethral strip of adequate size is then marked on either side of the midline (Fig. 1B). The flaps are raised on either side, exposing the root of the corpora cavernosa and their attachment to the ischiopubic rami (Fig. 1C). The penis is degloved in a reverse fashion. The penile skin receives its blood supply from the coronal side. This exposes both corpora cavernosa along their entire length with their attachment to the rami. The corpora can now be dissected from the rami under direct vision, preserving their blood and nerve supply as they emerge from Alcock’s canal. Scar tissue on the superior aspect may be bothersome;
this dissection gives additional length to the penis, and now both corpora can be easily approximated in the midline.

A urethral strip is dissected off the corporal bodies using sharp and blunt dissection, freeing the corpora on their medial aspect. Now the blood supply to the strip comes from the glans and proximal urethra, which can be seen to expand in a bulbous fashion. Fibers of bulbospongiosus muscle can be identified and wrapped around the bulb to give more resistance. The urethral strip is now tubularized along with its bulbospongiosus with interrupted 5–0 sutures. At the glans end, triangular pieces of mucosa are excised on either side and tubularization of the strip is completed to the tip of the glans. The raw edges of the glans are approximated in the midline with one or two rows of mattress sutures of 4–0 or 5–0 vicryl (Fig. 1D). The tubularized strip is then pushed ventrally and the corporal bodies are approximated in the midline, covering the entire length of the urethra, using 5–0 prolene sutures (Fig. 1E). The preputial skin is now unfolded by dissecting between the two layers (Fig. 1F), which straightens the penile skin in toto (Fig. 1G). A midline cut is taken in the ventral skin on the proximal side, with which the skin flaps can be rotated dorsally without tension (Fig. 1H). The apex of this cut is sutured to the midline scrotal raphe (Fig. 1I). This will pull the penis downward, giving a normal penoscrotal angle. The rotated flaps are stitched superiorly, giving additional skin in the symphyseal area (Fig. 1J and K). This prevents scar contracture, which might pull the penis upward at a later date.

A compression foam dressing was placed around the penis for 5 days. A urinary catheter or suprapubic urinary diversion was done.

Fig. 1. A Flaps marked on normally pigmented skin between penis and scrotum. B Incision encircles root of penis and urethral strip of adequate size is marked. C Raising flaps exposes attachment of corpora cavernosa to ischiopubic rami and bulbospongiosus muscle. D Urethral strip tubularized. E Corpora cavernosa approximated in midline over ventralized urethral tube. F Preputial skin unfolded. G Straightening of penile skin in toto. H Midline cut taken in penile skin on ventral aspect at proximal side. I Apex of cut (a') sutured to midline scrotal raphe (a). J, K Normally pigmented skin flaps rotated superiorly and sutured in symphyseal area.