Congenital completely buried penis in boys: anatomical basis and surgical technique

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What's known on the subject? and What does the study add?

- Surgical correction of the congenital completely buried penis (CCBP) is a difficult challenge and there is no unanimous consensus about the surgical 'gold standard' and patient eligibility for surgery.
- In the present study, dysgenetic fundiform ligaments were found to be attached to the distal or middle shaft of the penis. This abnormality can be successfully corrected by releasing the fundiform ligament and mobilising the scrotal skin to cover the length of the penile shaft. The study shows that the paucity and traction of the penile skin and an abnormal fundiform ligament are important anatomical defects in CCBP. Dorsal curve and severe shortage of penile skin in erectile conditions are the main indications for surgical correction.

Objective

- To present our experience of anatomical findings for congenital completely buried penis (CCBP), which has no unanimous consensus regarding the 'gold standard' for surgical correction and patient eligibility, by providing our surgical technique and illustrations.

Patients and Methods

- Between February 2006 and February 2011, 22 children with a median (range) age of 4.2 (2.5–5.8) years, with CCBP underwent surgical correction by one surgeon.
- Toilet training and photographs of morning erections by parents were advised before surgery.
- The abnormal anatomical structure of buried penis during the operation was observed. The technique consisted of the release of the fundiform ligament, fixation of the subcutaneous penile skin at the base of the degloved penis, penoscrotal Z-plasty and mobilisation of the penile and scrotal skin to cover the penile shaft.

Results

- In reflex erectile conditions, CCBP presents varying degrees of dorsal curve and shortage of penile skin.
- Dysgenetic fundiform ligaments were found to be attached to the distal or middle shaft of the penis in all patients.
- All wounds healed well and the cosmetic outcome was good at 6-month follow-up after the repair.

Conclusion

- The appearance of the dorsal curve in CCBP mainly results from the traction of penile dorsal skin and the abnormal attachment of the fundiform ligament to the shaft. This abnormality can be successfully corrected by releasing the abnormal fundiform ligament and mobilising scrotal skin to cover the length of the penile shaft.

Keywords

buried penis, surgical procedure, abnormalities

Introduction

Buried penis, a congenital anomaly characterised by a normal-sized penis buried in prepubic tissue, is often of great concern to the patient and family. This anomaly may cause social embarrassment, recurrent balanitis, and difficulty voiding or secondary phimosis [1,2].

Buried penis was first classified by Crawford [3] into partial and complete types in 1977. In the partial type, the proximal half of the penile shaft is buried in the s.c. tissue and gives rise to a 'stumpy-looking' penis. In the complete type, the phallus is completely invisible and the glans is covered only by prepuce because it is buried below the abdominal wall. Others have described congenital completely buried penis (CCBP) as a phallus of normal girth and short length covered mostly by a prepuce [4,5]. The aetiology of CCBP is not clear, but the most widely accepted hypothesis is that the dartos fascia tethers the penile shaft.

Common principles of surgical procedures for CCBP are complete degloving along Buck's fascia to free the penis

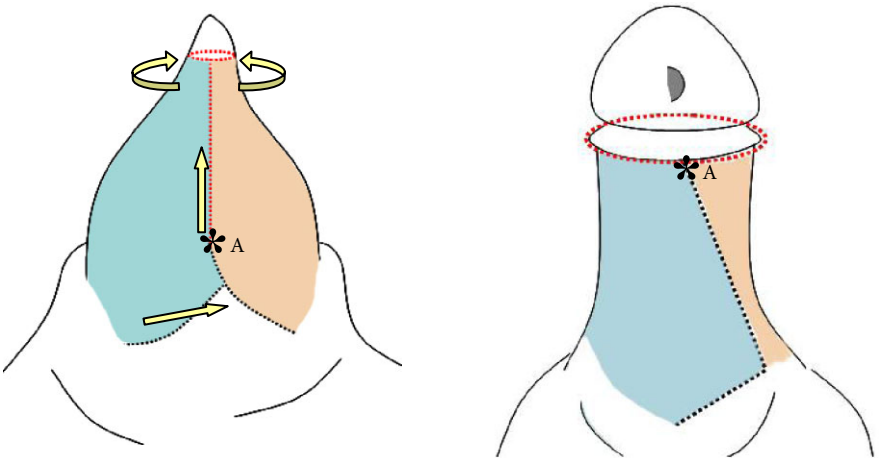


Fig. 1 Diagrammatic representation of the surgical technique. A circumferential incision was made and a cut was made in the ventral midline of the penile shaft. The length of the cut (red dotted line in left figure) was equal to the circumference of the coronal sulcus (red dotted line in right figure). Dot A in left figure was transferred to the coronal sulcus in the right figure. Arrows in left figure indicate the transposition of flaps.

from its deep tetherings, and correcting the deficiency of the penile shaft skin [2–5]. To our knowledge, not all patients need surgical correction because some completely obscured phalluses protrude well after penile erection or after standard circumcision. There is no unanimous consensus about the surgical 'gold standard' and patient eligibility for surgery. Here, we describe our technique for the correction of CCBP based on anatomical findings.

Patients and Methods

In all, 22 patients, with a median (range) age of 4.2 (2.5–5.8) years, underwent surgical correction of CCBP by one surgeon between February 2006 and February 2011. At the first visit, non-obese children presenting with a buried penis were identified. Buried penis was defined as a normal shaft length that was completely obscured by abnormal attachment of the penile skin to the penile shaft. The suprapubic fat was compressed to best expose the penis, as well as to assess the abnormal anatomy of the phallus and penile skin. The best opportunity for evaluation was when the patients had an erection at the time of examination. Reflex erection was induced by compressing the penile root gently or during urination. If both of these methods failed, then we requested the parents to take photographs of the patients' morning erection, to determine the severity of concealment. Toilet training was advised for all patients. If the abnormal appearance did not improve after 6-month follow-up, surgical intervention was advised.

Partially buried penises, seriously obscured phalluses without obvious deficiency of penile skin after spontaneous erection, and concomitant genital anomalies, including webbed penises and trapped penises, were excluded from the study.

Surgical Technique

General anaesthesia was used in all patients, and preoperative antibiotics were given. The surgical technique included a circumferential incision on the narrow ring of the outer prepuce, followed by a cut ventrally in the midline down to the scrotum. To avoid stricture of the prepuce and facilitate the mobilisation of penile and scrotal skin, the cut length was equal to the circumference of the coronal sulcus (as indicated by the red dotted line in Fig. 1). To free the penile shaft from abnormal attachments, the skin and the tunica dartos were completely dissected off of Buck's fascia and all adhesions or chordee were resected ventrally into the peno-scrotal junction. Dorsally, dissection was carried down to the base of the penis near the pubic bones to expose the fundiform ligament (Fig. 2B,C). The fundiform ligament was attached to the distal or middle shaft of the penis in all cases, which stretched the penis. This abnormal ligament was dissected for sufficient release of the penile shaft. Extra care was taken not to damage the dorsal neurovascular bundle. Artificial erection, with normal saline solution, indicated a successful correction.

To prevent retraction of the penis, the deep fascial or dartos layer beneath the penile or scrotal skin was fixed to the lateral tunica albuginea at the base of the shaft (at the 3 and 9 o'clock positions) using 3-0 polydioxanone, followed by penoscrotal Z-plasty (Fig. 2D), which increased penile skin length. After the inner preputial skin was cut and only 5 mm remained, the inner and outer preputial skin and the median raphe incision was re-approximated with interrupted 6-0 chromic catgut suture (Fig. 2E). As shown in Fig. 1, point A in the ventral medial penis skin of the preoperative penis was transferred to the midpoint of the coronal sulcus. A compression dressing and a Foley catheter was inserted transurethrally for urinary diversion. The mean (range) operative duration was 57 (42–79) min. The catheter was removed on the third postoperative day and the patient was discharged on the next day.

Results

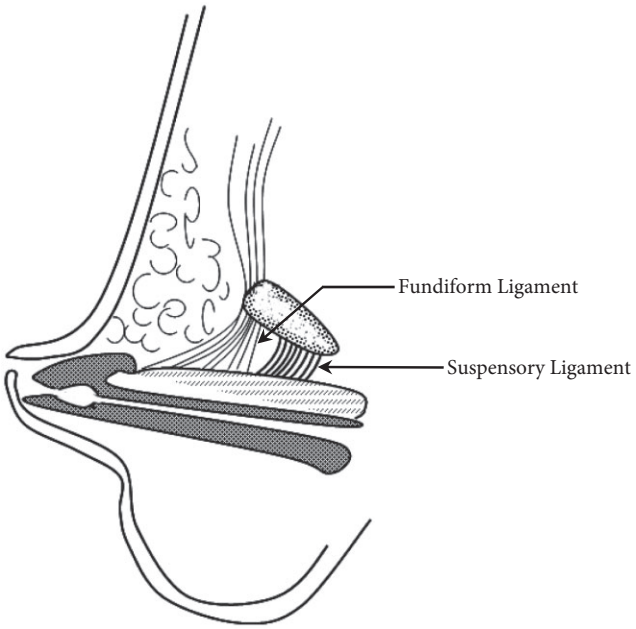
During reflex erection, patients with CCBP presented with varying degrees of dorsal curve and severe shortage of

Fig. 2 **A**, Preoperative appearance of a congenital completely buried penis. **B**, Fundiform ligament from the lateral view. **C**, Fundiform ligament from the dorsal view. **D**, Penoscrotal Z-plasty. **E**, Postoperative appearance. **F**, Appearance at 6 months after surgical correction and side view.

penile skin (Fig. 2A). In all cases, the fundiform ligament was attached to the distal or middle shaft of the penis, and the proximal ends of the ligament were attached to the midline of the pubic symphysis (Figs 2B,C and 3). After circumferential incision and release of the fundiform ligament, the corpora were fully extended with erection without residual dorsal curve.

All patients had a minimum of 6-month follow-up and parents were asked to note penile erections. During follow-up visits, mild oedema and swelling on the flaps were commonly observed, which improved with time. Postoperative dorsal curve, wound infections, or significant complications were not observed in any of the cases. Parents of all the patients reported normal straight erections in the morning. All patients had cosmetically pleasing outcomes with increased visualisation of the penile shaft.

Fig. 3 Fundiform ligament and suspensory ligament in congenital completely buried penis.



Discussion

Reported observations on buried penis are strongly divergent and a consensus on patient eligibility for surgery does not exist. We noticed that not all patients with CCBP need surgical corrections. Some patients with a completely

obscured phallus protrude well after penile erection, and others need merely standard circumcision. Redman et al. [5] reported that some of the anomalies may be repaired with a tailored sleeve circumcision. Thus, we advocated surgical correction only when CCBP did not improve after toilet training. We observed 'true' CCBP manifestations in all patients with varying degrees of dorsal curve during erection. As soon as the preputial orifice and fundiform ligaments are released, the corpora will fully extend with erection. It should be emphasised that dorsal curve in this case is different from congenital dorsal penile curvature because ventral-dorsal corporal disproportion is not found in CCBP operations. From these clinical findings, we think that dorsal curve and severe shortage of penile skin in erectile conditions are the main indications for surgical correction characteristics for buried penis.

Dorsal curve appears in CCBP due to:

(i) A paucity of penile skin and traction of the dorsal skin. In the erected state, penile skin is stretched from the pubic skin dorsally and from the scrotum ventrally. The scrotal skin is ascended to the middle shaft, whereas the dorsal skin is virtually fixed to the prepubic skin without an opportunity to extend.
(ii) Abnormal attachment of the fundiform ligament. The suspensory apparatus of the penis consists of the fundiform ligament, the suspensory ligament proper, and the arcuate subpubic ligament [6]. The fundiform ligament consists of the dartos facial fibres extending from Scarpa's fascia of the abdomen onto the penile shaft. The suspensory ligament proper bridges the symphysis pubis and the tunica albuginea of the corpora cavernosa.

Alter et al. [7] observed an abnormal anatomical structure in patients with true buried penis, described as 'thick abnormal dysgenetic dartos facial bands' tethering the corporal bodies proximally. In the present study, the bands were attached to the distal or middle shaft of the penis, while the proximal ends attached to the midline of the pubic symphysis in all cases. Moreover, the suspensory ligaments were exposed after dissecting these bands. We did not find any similar tethering bands in patients with hypospadias. These anatomical findings add to our speculation that the 'dysgentic bands' are merely the fundiform ligaments, which is consistent with Crawford's [3] description. Hence, we suggest that the fundiform ligament should be explored and the abnormal attachment be dissected during CCPB correction. The function of the suspensory ligament is to support and maintain the erect penis in an upright position during sexual intercourse [8,9]. Therefore, the suspensory ligament should be protected to prevent penile instability during adult life.

The surgical technique used in the present series combined previously described methods, e.g. complete degloving of the penile shaft, release of anomalous dartos attachments, and reconstruction of the normal penoscrotal angle [1,10–12]. To widen the narrow ring of prepuce, a circumferential incision was initiated and a cut was made in the ventral midline of the penile shaft. Alter and Ehrlich [13] stated that a longitudinal incision made along the penile and scrotal raphe, followed by penoscrotal Z-plasty at the penoscrotal junction, increased ventral penile skin length. However, some surgeons rotate flaps or use grafts to correct sparse shaft skin [12,14], and use preputial flaps or unfurling methods to cover the shaft skin defect [4,11]. We performed penoscrotal Z-plasty in our technique because the scrotal skin flap has a dual blood supply and a rare chance of developing flap necrosis. In addition, the procedure lengthened the penile shaft adequately and resulted in a cosmetically satisfactory penoscrotal angle, as well as avoided perioperative oedema in the transposed inner prepuce [12]. The present patients had no necrosis or wound dehiscence of the penile skin.

In conclusion, in the present study, we showed that the paucity and traction of the penile skin and an abnormal fundiform ligament are important anatomical defects in CCBP. The modified technique resulted in a favourable short term outcome for patients with CCBP. As all of the present patients were prepubertal, a long-term follow-up and a multicentre study are indicated before a general recommendation of this technique can be considered.

Acknowledgements

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Conflict of Interest

None declared.

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Abbreviation: CCBP, congenital completely buried penis.