Original Article

Retrograde Progression of Inner Preputial Skin to Overcome Skin Shortage in Cases of Congenital Buried Penis

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Abstract

Aim: The aim of this study is to report our experience in the treatment of congenital buried penis using a simplified technique of retrograde progression of inner preputial skin for reconstruction and overcome skin shortage. **Methods:** This is a retrospective multi-institutional study conducted in the Department of Pediatric Surgery, I Q City Medical College and Hospital, Durgapur, West Bengal, India, and the Department of Paediatric Surgery, Rajiv Gandhi Super Specialty Hospital/Raichur Institute of Medical Sciences, Raichur, Karnataka, India, over a period of 3 years (from March 2019 to February 2022). A total of 14 cases of primary congenital buried penis were operated in the specified period. Age of the patients ranged between 8 months and 9 years. Retrograde progression of the inner preputial skin to provide coverage to the dorsal aspect of penile shaft and ventral transposition of the dorsal penile skin to cover the ventral penile shaft was used as a standard procedure for skin coverage. **Results:** All patients had good-to-excellent outcomes with uniformly improved visualisation of penile shaft post-operatively. There were no significant post-operative complications apart from mild oedema which subsided over a period of 3 weeks. Genital hygiene had significantly improved in all the patients as a result of uninterrupted urinary stream. **Conclusion:** Retrograde progression of the inner preputial skin may be used as an effective technique to provide skin coverage to the penile shaft for reconstruction of congenital buried penis. It provides good functional and cosmetic results with adequate parental and patient satisfaction with minimal complications.

Keywords: Buried penis, buried penis repair, congenital buried penis, skin deficiency in buried penis repair, surgery for buried penis

Introduction

The term concealed penis was first described in 1919 by Keyes[1] and remains an uncommon entity in children.[2] It usually presents in neonates or in obese pre-pubertal boys. Frankly evident cases are diagnosed early [Figure 1a and b] but milder cases are diagnosed when increased fat deposition in the pubic area accentuates the condition. This condition can be congenital or acquired, where it is most commonly secondary to improperly done circumcision. This condition has both functional and cosmetic implications for boys. Affected children are brought to surgeon's consultation mostly for cosmetic reasons and difficulty to maintain proper hygiene. The condition can be symptomatic, resulting in recurrent balanitis and voiding difficulties with ballooning of prepuce, urine spraying and dribbling. On physical examination, normal penile shaft is present, but the glans and shaft are not seen above the skin level. Few cases of buried penis are also associated with epispadias.[3] The timing of reconstruction is controversial and several operative techniques and their modifications have been proposed.[4] Although the condition and various surgical correction techniques have been well described,[5-7] in clinical practice, we come across these cases very infrequently and hence surgical procedures done also remain infrequent. The very fact that many surgical techniques have been proposed highlights the inadequacy of any single technique to be applicable in all cases, so each case has to be individualised and the surgical procedure modified accordingly. With this report, we aim to describe our own modification of surgical technique that is the retrograde progression of inner preputial

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skin to overcome skin shortage for management of congenital buried penis.

Methods

This is a retrospective multi-institutional study conducted in the Department of Paediatric Surgery, IQ City Medical College and Hospital, Durgapur, West Bengal, India, and the Department of Paediatric Surgery, Rajiv Gandhi Super Specialty Hospital/ Raichur Institute of Medical Sciences, Raichur, Karnataka, India, over a period of 3 years (from March 2019 to February 2022). A total of 14 cases of primary congenital buried penis were operated in the specified period. Age of the patients ranged between 8 months and 9 years. Retrograde progression of the inner peputial skin to provide coverage to the dorsal aspect of penile shaft and ventral transposition of the dorsal penile skin to cover the ventral penile shaft was used as a standard procedure for skin coverage. Four patients also had associated distal epispadias [Figure 2] which were also repaired in the same sitting.

Surgical technique

Under general anaesthesia, the patient was placed in a supine position with lower limbs externally rotated at hip joints and slightly flexed at knee joints. Skin preparation was done with 10% povidone-iodine painting and the operation site exposed after draping, penoscrotal and penopubic junctions were identified by noting the changes in contour and colour of the skin. The junctions were marked with skin markers or silk sutures that acted as landmarks for creating penoscrotal and penopubic angles [Figure 3]. Skin marks for surgical incision were made along the junction of inner and outer prepuce circumferentially [Figure 4], along the median raphae ventrally extending till the proposed penoscrotal junction [Figure 5], and in the midline dorsally over the penile shaft skin extending till the proposed penopubic junction [Figure 6]. The circumferential incision was made first. With the help of traction sutures applied at the junction of inner and outer preputial skin, both these layers were separated from each other with a layer of dartos attached to each layer of skin and thus preserving the vascularity [Figure 7]. Degloving of the penis was then done till the root [Figure 8], dividing the tethering bands between the dysgenetic dartos fascia and buck's fascia if present [Figure 9]. The dorsal and ventral incisions were also completed till the proposed penopubic and penoscrotal angles, respectively. With complete exposure on the ventral aspect, a suture was placed approximating the dermis of the marked penoscrotal junction to the Buck's fascia of the corpus spongiosum [Figure 10]. Similarly, on the dorsal aspect, at the level of the previously marked penopubic angle, two sutures were placed longitudinally in the paramedian (at 2 o'clock and 10 o'clock) position over Buck's fascia of the corporal bodies (to avoid injury to the dorsal penile neurovascular bundles) [Figure 11]. These sutures were then used to approximate the skin (of the marked penopubic angle) to Buck's fascia [Figure 12]. This procedure creates apparent lengthening of the penis and prevents retraction of the shaft. The already mobilised dorsal inner prepucial skin was then pulled back retrogradely (retrograde progression) to cover the dorsal aspect of the shaft [Figure 13] and dorsal penile skin Byars' flap created earlier, was transposed ventrally to cover the ventrolateral aspect of the shaft [Figure 14]. Once the skin management was completed, the penis appeared to be apparently lengthened with distinct penopubic and penoscrotal angles [Figure 15a and b]. The urethra was catheterised and penis was dressed with non-adherent dressing with the application of minimal pressure.

The patient received IV antibiotics for 48 h (till 2nd post-operative day), the catheter and dressing were removed on 2nd post-operative day and the patient was discharged on oral antibiotics for 7 days. For patients having epispadias, repair of epispadias was done before initiating the skin management. These patients stayed in the hospital and received IV antibiotics for 5 days, following which the catheter and dressing were removed and the patient was discharged on oral antibiotics for 7 days.

Results

Patients were scheduled for first follow-up at 3 weeks. The penile length visualisation and accessibility of the penis had significantly improved, with satisfactory functional and cosmetic outcomes [Figure 16a and b]. There were no significant post-operative complications (infection, skin necrosis, torsion of penile shaft, chordee and retraction of shaft) apart from mild oedema which subsided over a period of 3 weeks. Genital hygiene had also significantly improved in all the patients as a result of uninterrupted urinary stream, resolution of urinary soiling and resolution of persistent urinary smell. The parents' satisfaction was rated at 3 weeks post-operatively at the time of follow-up, on a scale of 1–10 (1-pre-operative status of the patient and 10-genital appearance of a normal circumcised child of patient's age group), the average score given was 8/10. Subsequent follow-up was done at 3 months and 6 months.

Discussion

The term concealed penis was for the first time described by Keyes[1] in 1919 as 'apparent absence of penis'. The first successful attempt for the correction of buried penis was done by Glanz in 1968.[8] Since then, several techniques and

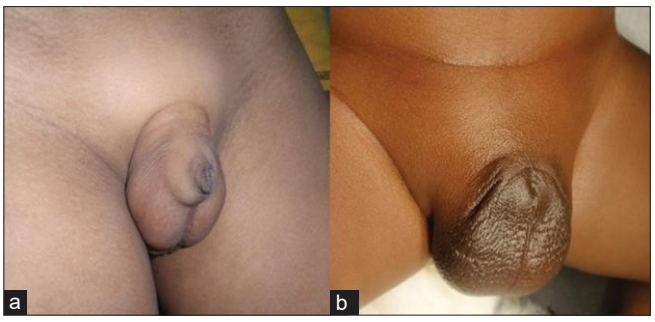


Figure 1: (a and b) Frankly evident cases of buried penis



Figure 2: Buried penis with glanular epispadias

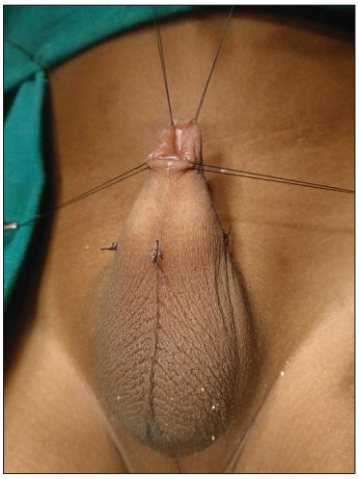


Figure 3: Penoscrotal and penopubic angles marked with skin sutures



Figure 4: Skin marked for incision along the junction of inner and outer prepuce circumferentially



Figure 5: Skin marked for incision along the median raphae ventrally extending till the proposed penoscrotal junction

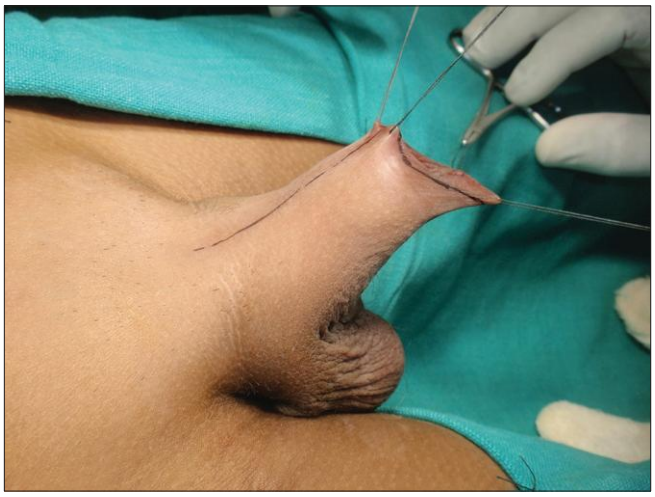


Figure 6: Skin marked for incision in the midline dorsally over the penile shaft skin extending till the proposed penopubic junction



Figure 7: Inner and outer preputial skin being separated, maintaining a layer of dartos on both sides

modifications have been proposed in the treatment of buried penis.

Two classification systems have been proposed for inconspicuous penis. The one proposed by Crawford[9]

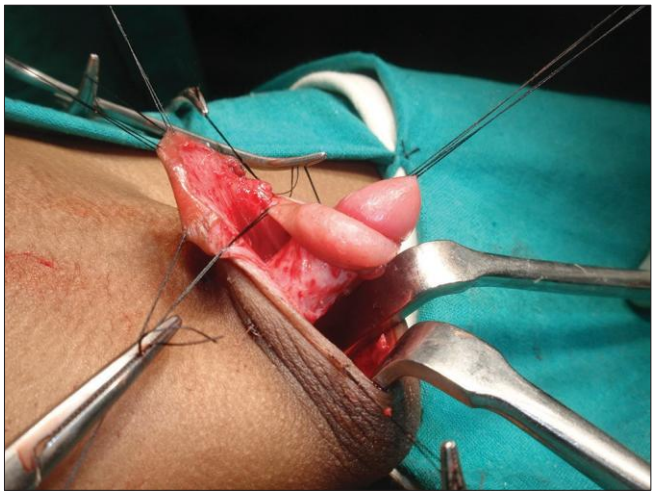


Figure 8: Complete degloving of penis done



Figure 9: Division of the tethering bands between the dysgenetic dartos fascia and Buck's fascia



Figure 10: A suture placed approximating the dermis of the marked penoscrotal junction to Buck's fascia of the corpus spongiosum on the ventral side

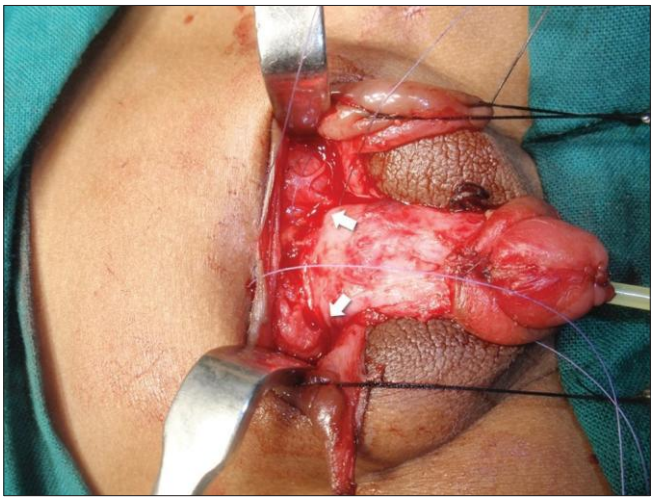


Figure 11: On the dorsal aspect, two sutures are placed longitudinally in the paramedian position (white arrows) for approximating Buck's fascia of the corporal bodies and the skin of the previously marked penopubic angles

classifies the condition as – (a) concealed, (b) buried and (c) webbed. Another system proposed by Maizels *et al*.[5] based on the mechanism of concealment proposes the following types – (a) buried, (b) webbed, (c) trapped and (d) micropenis. In cases of the buried penis, the size of the phallus is normal but it gets buried in pre-pubic tissue (fat), in cases of the webbed penis, the penis becomes enclosed in scrotal tissue, in cases of the trapped penis, the phallus gets trapped in scar tissue due to previous surgery or trauma. The term micropenis is used if the length of the penis is <2 standard deviations below the mean age when measured in the stretched state.

Hadidi[10] classified buried penis into three grades according to morphological findings: Grade I patients with longer inner prepuce only, Grade II patients who presented with longer inner prepuce associated with indrawn penis that required division of the fundiform and suspensory ligaments and Grade III patients who had in addition to the above, excess suprapubic fat.

Buried penis can be congenital or acquired. Various aetiologic factors have been proposed to explain congenital buried penis. Recent literature favours dysgenetic dartos tissue[2] with abnormal attachments proximally and to the dorsal cavernosum. A prominent pre-pubic fat pad is also a common primary factor, in addition to dysgenetic dartos fascia. Some studies found dysgenetic fundiform ligaments to be attached to the distal or middle shaft of the penis leading to the condition.[11] Secondary buried penis (acquired type) may be the result of an overzealous circumcision, with subsequent cicatricial scar (trapped penis), a large hernia or a hydrocele repair. Another possible cause of buried penis in the adult is genital lymphedema. This may be idiopathic, iatrogenic (from prior surgery) or acquired due to filariasis.

The timing of surgical repair of concealed penis is controversial; some prefer to defer surgical correction until school age[12] while others advocate surgical intervention in infancy,[13-15] and state that early surgical correction is important so that

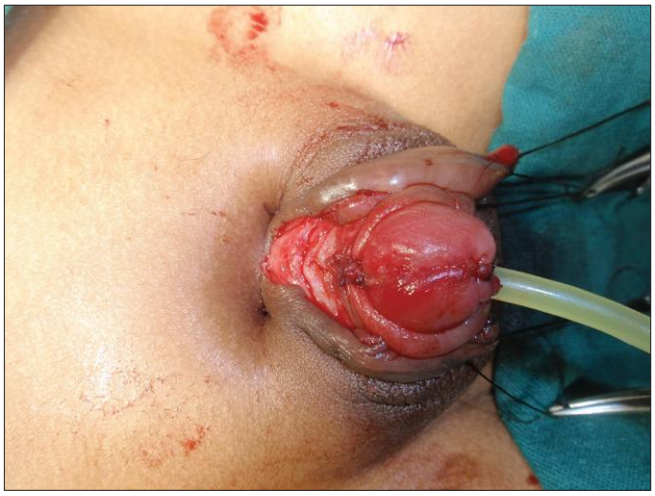


Figure 12: Penopubic angle created after tying the paramedian sutures

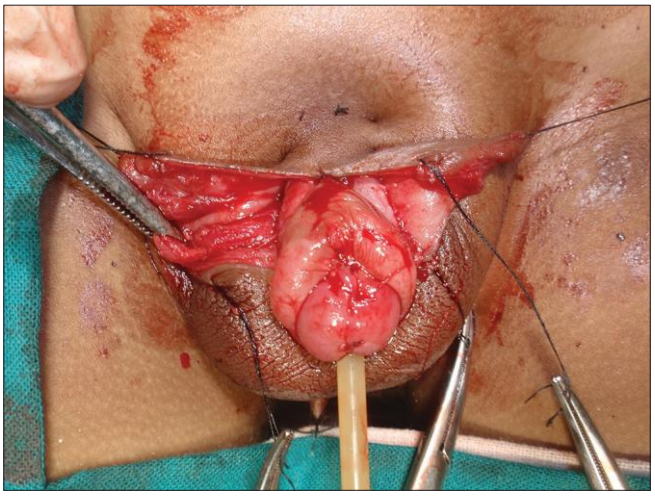


Figure 13: Retrograde progression of the dorsal inner preputial skin to cover the shaft

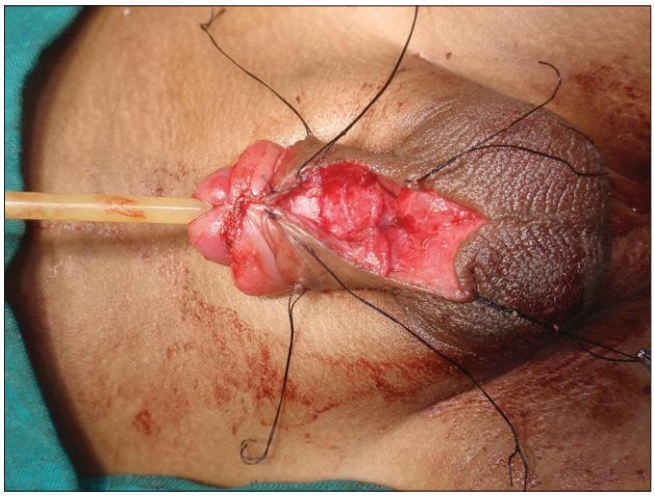


Figure 14: The divided dorsal skin is transposed ventrally to cover the ventro-lateral aspect of the shaft

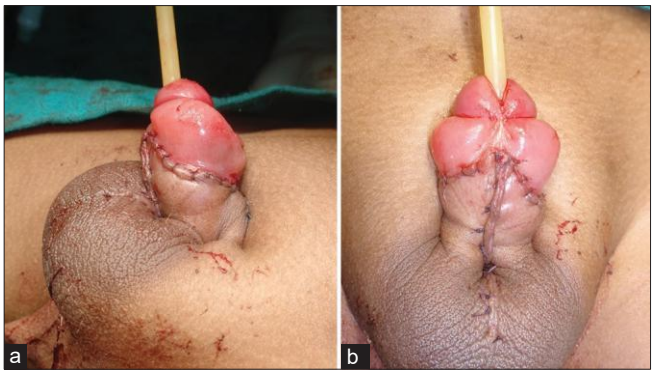


Figure 15: (a and b) Completed procedure with distinct penopubic and penoscrotal angles

the child is able to void while standing during the period of toilet training.[16]

Several operative techniques and their modifications have been used to treat buried penis depending on the cause and surgeon's experience. Maizels *et al*.[5] used a suprapubic approach to incise the suspensory ligament of the penis and perform lipectomy of the suprapubic fat pad. The dermis and subcutaneous tissue at the base of the penis were anchored to the periosteum of the pubis. Casale *et al*.[2] completely degloved the penis to its base with fixation at the penoscrotal angle. Reconstructive techniques were then used depending on the length of shaft skin. The technique described by Wollin *et al*.[17] included complete degloving of the penis with dissection of the abnormal ventral dartos attachments. An island pedicle flap of inner preputial skin was created and transposed to the ventral penile shaft through a buttonhole made at the base of the pedicle. Cromie *et al*.[18] made a circumferential incision 1 cm from the corona to ensure adequate skin coverage over the penile shaft. They also advocated incising the scarred circumferential band vertically long enough to release it. Buck's fascia was sutured to the dermis of the penile skin at the 10 and 2 o'clock positions, at the penoscrotal junction and the mid shaft using absorbable suture. Frenkl *et al*.[19] used a circumferential subcoronal incision and the penis was degloved to the penopubic junction using Buck's fascia as the plane of dissection. The subcutaneous tissue at the base of the shaft was fixed to Buck's fascia at the 3 and 9 o'clock positions.

In our modification of the procedure, we have utilised retrograde progression of inner preputial skin to cover the dorsum of the penile shaft, thus overcoming the skin shortage. The outer preputial skin is then slit in the midline to provide coverage to the ventrolateral aspect of the penile shaft. The inner preputial skin remains viable, even after separation from the outer preputial skin and advancement, through its dual blood supply from the dartos and also from the glans.[20] Penopubic and penoscrotal angles are created by approximating the dermis to Buck's fascia at dorsal and ventral aspects. In our cases of the congenital paediatric buried penis, we have observed that the skin is never deficient. With the judicious use of the inner preputial skin, we can always attain adequate coverage of the apparently lengthened penile shaft.

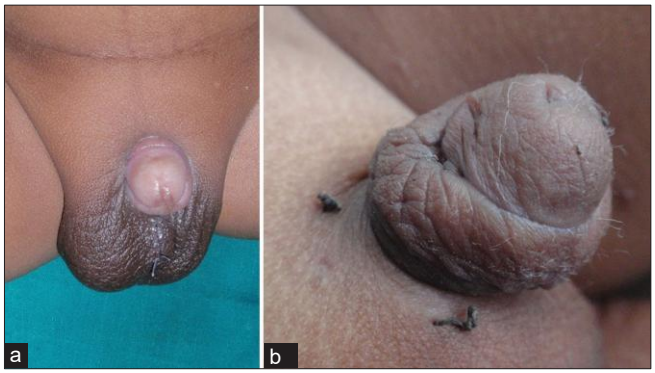


Figure 16: (a and b) Appearance at 3 weeks with satisfactory functional and cosmetic outcomes

Conclusion

Retrograde progressive mobilisation of inner preputial skin may be used as an effective technique to provide skin coverage to the penile shaft for the reconstruction of congenital paediatric buried penis. It provides good functional and cosmetic results with adequate parental and patient satisfaction with minimal complications.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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