



Operative Technique

Buried penis: Classification surgical approach

Ahmed T. Hadidi*

Hypospadias Clinic, Department of Pediatric Surgery, Emma and Sana Offenbach Hospitals, Germany

ARTICLE INFO

Article history:

Received 21 July 2013

Accepted 27 September 2013

Key words:

Buried penis
 Concealed
 Trapped penis
 Webbed penis
 Surgical procedures
 Flaps
 Prepuce

ABSTRACT

Purpose: The purpose of this study was to describe morphological classification of congenital buried penis (BP) and present a versatile surgical approach for correction.

Materials and Methods: Sixty-one patients referred with BP were classified into 3 grades according to morphological findings: Grade I—29 patients with Longer Inner Prepuce (LIP) only, Grade II—20 patients who presented with LIP associated with indrawn penis that required division of the fundiform and suspensory ligaments, and Grade III—12 patients who had in addition to the above, excess supra-pubic fat.

Operative Approach: A ventral midline penile incision extending from the tip of prepuce down to the penoscrotal junction was used in all patients. The operation was tailored according to the BP Grade. All patients underwent circumcision. Mean follow up was 3 years (range 1 to 10).

Results: All 61 patients had an abnormally long inner prepuce (LIP). Forty-seven patients had a short penile shaft. Early improvement was noted in all cases. Satisfactory results were achieved in all 29 patients in grade I and in 27 patients in grades II and III. Five children (Grades II and III) required further surgery (9%).

Conclusions: Congenital buried penis is a spectrum characterized by LIP and may include in addition; short penile shaft, abnormal attachment of fundiform, and suspensory ligaments and excess supra-pubic fat. Congenital Mega Prepuce (CMP) is a variant of Grade I BP, with LIP characterized by intermittent ballooning of the genital area.

© 2014 Elsevier Inc. All rights reserved.

Buried Penis (BP) is an uncommon anomaly first described by Keyes [1] in 1919 as “an apparent absence of the penis which exists when the penis lacks its proper sheath of skin, lies buried beneath the integument of the abdomen, thigh or scrotum” [1]. Since then the terms used include buried penis [2], concealed penis [3], inconspicuous penis [4], hidden penis [5], congenital mega-prepuce [6], trapped penis [7] and webbed penis [5].

Confusion further increases with the enormous number of reports of “simple [6,8–10]” and “complex [5,11–13]” techniques described for the correction of BP. Some “simple” techniques have reported excellent results [6,8,9]. Complex techniques have been reported and some have had less satisfactory long term outcomes [5,11–14]. The controversy in the literature suggests that BP is a wide spectrum of anomalies [13]. To our knowledge, no previous report stressed the observation that Long Inner (mucosal) Prepuce (LIP) is a constant feature of congenital buried penis (BP) which we have observed.

The purpose of the study is threefold:-

- 1) to describe a practical classification based on morphological findings in patients with congenital BP,
- 2) report the constant observation of an abnormally long inner prepuce (LIP) in all children in the study presenting with BP, and

- 3) record our experience with a versatile surgical approach that can be used in all grades of BP.

1. Materials & methods

The 61 patients, with a mean age of 15 months (range: 6–48), with congenital buried penis (BP) referred from January 2000 to December 2010 were studied prospectively. Included in the study are four patients with trapped penis (defined as circumcision of a congenital buried penis). In addition, three patients presented with BP associated with intermittent ballooning of the genital area, 5 patients had a severe form of proximal hypospadias and one patient had incomplete epispadias that was first detected intra-operatively.

At operation, all patients underwent measurement of the stretched length of the penis (from the root of the penis dorsally to the tip of the glans) and the length of the inner leaf of prepuce. Further observations were made of the abnormalities of the penile fascia, ligaments and supra-pubic fat. The 61 patients underwent correction of the anomaly through a ventral midline incision.

2. Operative technique (Figs. 1, 2, 3)

Two stay sutures stretched the ventral surface of the prepuce. A ventral midline incision was made that extended from the tip of prepuce down to the penoscrotal junction. A stay suture was inserted into the tip of the glans and a size F10 urinary catheter was inserted

* Corresponding author at: Max-Planck Str.2, Seligenstadt, D-63500, Germany. Tel: +49 174 205 6905; fax: +49 6182 843 0293.

E-mail addresses: Prof.Hadidi@hypospadiacentrum.de, ahmedhadidi@yahoo.de.

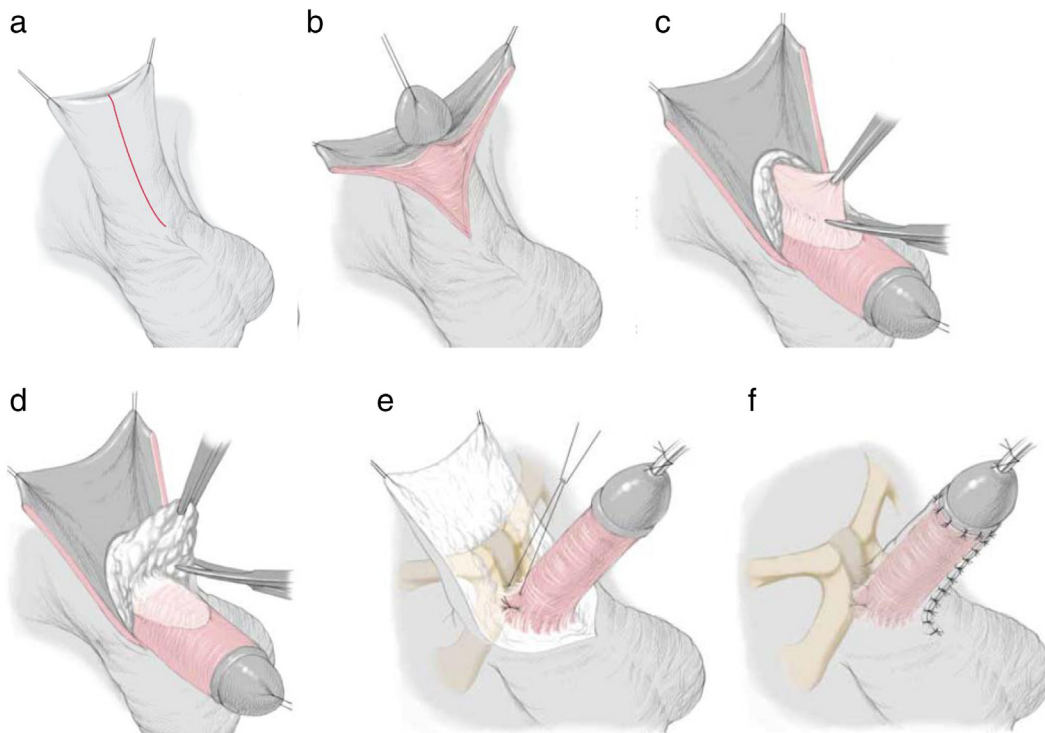


Fig. 1. The operative technique. (a) Two stay sutures and the ventral midline incision are made from the tip of prepuce down to the penoscrotal junction. (b) Stay suture at the tip of the glans. (c) A circumferential incision is made 0.5 cm from the coronal sulcus and the distal attachment of the fundiform ligament and suspensory ligaments is divided in Grade II and III. (d) Excess supra-pubic fat is excised. (e) Two sutures fix the penile fascia to the periosteum. (f) The proximal penile skin is sutured to the base of the penis and circumcision is completed.

into the bladder. The base of the penis dorsally to the tip of the glans was measured as well as the length of the inner prepuce.

Abnormal distal attachment of the fundiform and suspensory ligaments was noted by retraction of the penis after the ventral midline incision and freeing of the skin and fascia from the body of the penis. If the penis retracts inside the pubis (Grade 2) the suspensory ligament was divided in the midline. Care was taken to avoid damage to the nerves and vessels to the penis which enter the corpora of the penis at the 2 and 10 o'clock positions.

In the 12 patients with Grade 3 BP the excess suprapubic fat reduced the effect of division of the suspensory ligament. The penis was stretched caudally and the penile skin flap cranially so that the excess fat was held using mosquito forceps and excised. Bleeding was controlled using bipolar diathermy.

The tunica albuginea was fixed to the periosteum at the symphysis pubis with one non-absorbable 0-Prolene suture at 12 o'clock. Two more sutures were fixed the penis to the pubic bones at 4 and 8 o'clock. The penile skin at the base of the penis was fixed to the tunica albuginea by 4 sutures at 12, 3, 6 and 9 o'clock (Fig. 1e). The excess LIP was excised and the proximal penile skin was sutured to the mucosal collar 0.5 cm from the coronal sulcus leaving the penis with the appearance of a circumcised organ.

Three children included in the BP grade I group had intermittent ballooning of the genital area due to urine retention. They were corrected using the same ventral midline incision. This anomaly has been referred to as congenital Mega prepuce or CMP (Fig. 3).

The four children presenting with a trapped penis (improper circumcision in BP grade I) were corrected using the same ventral midline incision. A Z-plasty was performed at the tight preputial muco-cutaneous junction to widen the tight junction.

Patients with hypospadias had the buried penis corrected as a second operation after complete correction of hypospadias using the Lateral Based (LAB) or the lateral Based Onlay (LABO) techniques

[15,16]. The epispadias was repaired using a modified Thiersch technique principle after complete degloving of the penis and the buried penis was corrected during the same procedure.

3. Results & complications (Figs. 2, 3)

3.1. Mean follow up was 3 years (range 1 to 10 years)

The mean stretched penile length in the entire series was 3.3 cm (range 2.9 to 4.5 cm). Length did not change after surgery. The inner prepuce length ranged from 2.1 to 3.8 cm (mean 2.6). In other words, the inner mucosal prepuce was almost as long as the entire stretched penile length in all the cases (Fig. 2c). The penile dartos fascia was loosely attached to the tunica albuginea in each patient.

Long Inner Prepuce (LIP) was a constant finding in all patients. Excision of the excess LIP and fixation of the skin to the base of the penis were adequate in 29 patients (grade I). The 3 children, in this grade, with buried penis associated with ballooning of the prepuce were continent and did not require further surgery.

There was abnormal attachment of the fundiform and suspensory ligaments in 20 patients (grade 2) that required division to achieve satisfactory initial results. On continued follow up it became apparent that 3 patients in grade 2 and 2 patients in Grade 3 required further surgery. This was necessary due to later partial retraction of the penis inwards.

Fig. 2 shows an interesting observation that with degloving and stretching, the penis had a length of 4.3 cm and the ratio between the glans and penile shaft was 1:2 (Fig. 2c). One year after surgery with complete healing and without stretch, the glans:penile body ratio was 1:1 in the flaccid state (Fig. 2e). With a 10-year follow up, the penis appeared shorter than normal and the glans:penile shaft ratio in flaccid state remained 1:1 (Fig. 2f).

4. Morphological findings (Fig. 4)

According to the operative findings, the patients were subdivided into 3 grades:

- Grade 1 An abnormal Long inner prepuce (LIP) was noted in all the patients. This group included the 4 patients with trapped penis and 3 patients with intermittent ballooning.
- Grade 2 There were LIP and abnormal distal attachment of the fundiform and suspensory ligaments into the midshaft of the penis (20 patients).
- Grade 3 There were LIP, abnormal distal attachment of the fundiform and suspensory attachments and excess supra pubic fat (12 patients). The 5 patients with hypospadias and the patient with incomplete epispadias are all in this grade.

5. Discussion

Two classification systems of Buried Penis (BP) have been proposed. The classification system by Crawford [2] includes 3 broad categories; concealed penis, buried penis (partial or complete) and penoscrotal webs [2]. Maziels et al. [5] described a classification consisting of 4 categories based on the mechanism of concealment; *buried penis* (due to poor skin suspension in a child or a prominent pre-pubic fat in an adolescent), *webbed penis* (penoscrotal web), *trapped penis* (the shaft of the penis is trapped in scarred pre-pubic skin usually after circumcision) and *micropenis* (a normally formed penis that is less than 2 standard deviations below mean in stretched length). The surgical technique used for correction depended on the class of the disorder.

O'Brien et al. [17] first reported a particular subgroup characterised by excess intermittent ballooning of the genital area after micturition due to urine retention. They called this subgroup of BP

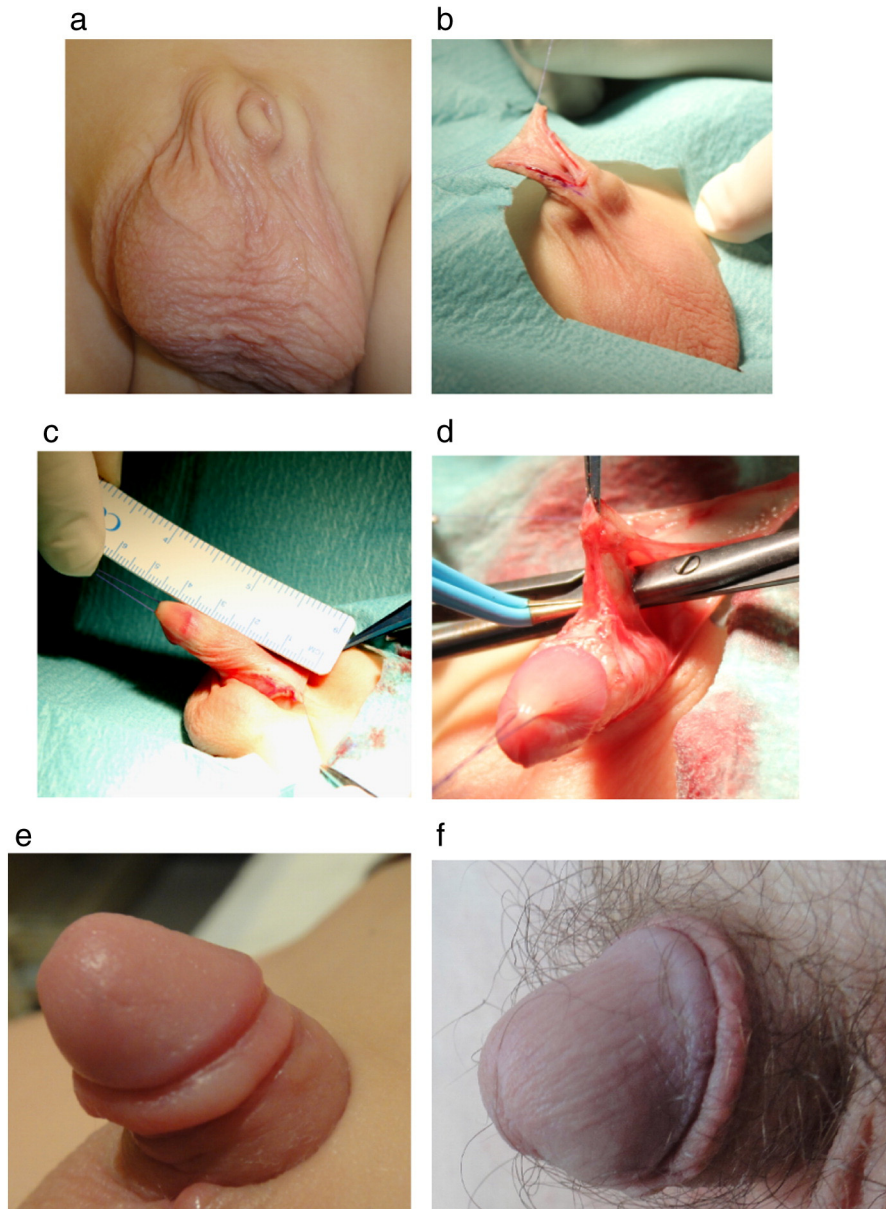


Fig. 2. The operative details. (a, b) A 3-year-old child with classic buried penis. (c) The inner prepuce is 3.5 cm long and the glans is 1 cm long. (d) The fascia and ligaments that pull the penis inwards. Notice the very satisfactory results of surgery 1 year after surgery in panel (e) compared to panel (a). However, in the flaccid state, the length of the glans seems to be equal to the length of the penile shaft. (f) The appearance after 10 years of follow up. The shaft of the penis does not appear to be much longer in the flaccid state (From Hadidi A T with permission).

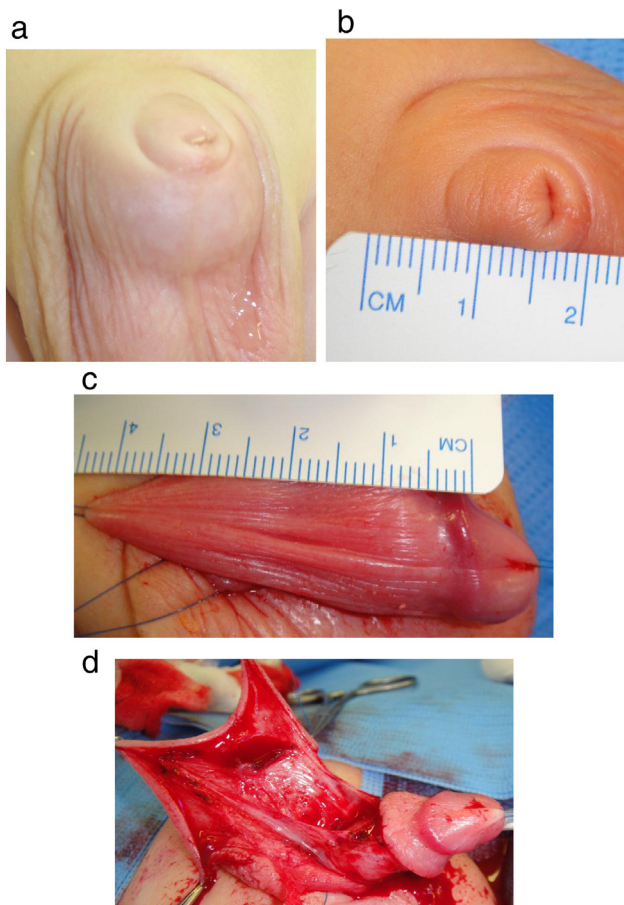


Fig. 3. BP Grade I, referred to as “Congenital Mega Prepuce (CMP). (a) Notice the valve like mechanism at the preputial orifice with ballooned Mega Inner Prepuce (MIP) and urine drops at the scrotum. (b) Note the very little outer prepuce and dorsal penile skin (7 mm unstretched) and the ballooned MIP covered by scrotal skin and abdominal wall skin. (c) After retraction of the foreskin, notice that the inner mucosal prepuce is 4 cm long (stretched). (d) There is loose fascial attachment (From Hadidi A T with permission).

“Congenital Mega Prepuce” (CMP). Shenoy [7] and Ferro [3] believed that CMP is a different entity from BP and the plan of surgical management should be different.

However, careful examination of the cases reported by O’Brien and others (Gwin [18] Philip [19], Shenoy [7], Ferro [3], Alexander [6]) as well as 3 personal cases (Fig. 3) shows that it is actually the inner prepuce that is in excess (LIP) (Fig. 3c) and that the outer penile skin and outer prepuce are barely enough to cover the penis during surgical correction. Interestingly, these patients did not have phimosis and the intermittent ballooning was in fact due to a valve-like mechanism [3]. Therefore, it seems more appropriate to include them in Grade I BP and not as a separate group or a new malformation.

It is interesting to note the contrasting observations of different authors in their description of the morphology of BP. Crawford [2] described “a distinct fibromuscular layer, tethering the shaft to the abdominal wall and resembling dartos muscle. When excised or incised it allowed the penis to occupy its normal relationship to the abdominal wall”. Wollin et al. [11] stressed the abnormal skin mobility over the shaft of the penis. Reported observations are strongly divergent, ranging from abnormal attachments of tissue resembling the tunica dartos, which tethers the shaft to the abdominal wall, to “an insufficient attachment of the dartos fascia and penile skin to Buck’s fascia” [2,10,11]. Redman [9] on the other hand did not observe any abnormalities of tunica dartos or any tethering bands in his personal series of 31 boys.

In the 61 boys in this series we observed the uniform finding of an abnormally long inner prepuce (LIP). The abnormal mobility of the

penile skin and fascia was a constant finding in all the boys. Abnormal attachment of fundiform ligament (Fig. 2d) and suspensory ligament was a variable finding in 32 boys (grade 2, 3). This is in contrast to Summerton et al. [20] who suggested that redundant inner prepuce is not present in buried penis.

A report of stretched penile length measurements in a useable table has been compiled by Elder [21]. Measurements of penile length for age have been reported as 3.9 ± 0.8 cm at 0 to 5 months, 4.3 ± 0.8 cm at 6 to 12 months and 4.7 ± 0.8 cm at 1 to 2 years. Donahoe [22] and Radhakrishnan [23] reported that with the buried penis anomaly the corporeal and glanular size and development are normal, and the penis is of normal size. Redman [9] observed in his study on 31 boys with a mean age of 12 months that the penile shaft itself is short (mean 3.1 cm). Penile measurements in patients with a “visually deficient penis” have been recommended. However, no other series of children with a buried penis has included these data [24].

In this study, the mean stretched penile length was 3.3 cm (range 2.9 to 4.5 cm), with the mean age of 15 months (range 6–48). In the five patients that were followed for longer than 5 years the penis appeared shorter than expected (Fig. 2f).

Frank [25] raised a provocative question in an editorial comment on 3 studies describing the management of the buried penis: “Why do our adult urologist colleagues not see this condition in the older patient?” surmising that the condition corrects itself at puberty. Possible explanations include; that the adult urologists probably diagnose BP in adults as a congenitally short penis or as a hidden penis due to excess supra-pubic fat, or because the condition is very rare and is usually corrected during childhood. Another explanation may be that adult patients with BP learn to live with the condition and do not seek medical advice as does happen with many adults with complicated hypospadias who learn to live with the complication and lost hope of surgical correction (personal communication).

Shenoy et al. presented a comprehensive review of the different surgical techniques reported in literature for the correction of BP [7]. Several surgical options have been proposed for BP correction including multiple Z plasty [26], suction lipectomy [27], fixing of the suprapubic skin to the pubis to define the penile angle [5,28], Preputial unfurling [22], and the use of preputial island flaps [11,29]. Redman [30] used the inner preputial skin (mucosa) to cover the shaft of the penis. Frenkl et al. [8] concluded that the number of fixation sutures used did not affect the recurrence rate. However, the surgical procedure used to correct CP did not significantly alter the long term outcome (Herndon [13]). Alexander [6] et al. described the Ventral V plasty technique in which they use a V flap from the inner preputial mucosa to compensate for deficiency in the outer preputial and penile skin to cover the penis [6].

The preservation of the entire internal preputial layer, congenitally disposed around the entire shaft as described by Redman [9] and as shown in Fig. 2c, was considered risky by Ferro [3] for fear of lymphatic stasis due to the deep fasciae dissection. This author agrees with Ferro and believes that covering the penis with inner mucosal prepuce is cosmetically less satisfactory.

Experience with hypospadias showed that the ventral midline incision heals with minimal scarring and usually looks like the “median raphe” normally present on the ventral surface of the penis (personal communication). This is one major advantage of using this midline incision in Buried Penis (BP). The other advantage is that the surgeon can tailor the amount of excess inner preputial layer to be excised according to the need in each individual child.

As with many other reports in the literature, this series has limitations. The mean follow up period was 3 years and only 5 patients maintained follow up longer than 6 years and the results are based on the subjective evaluation by parents and surgeons. Long-term outcomes along with patient satisfaction from a cosmetic and functional point of view are needed.

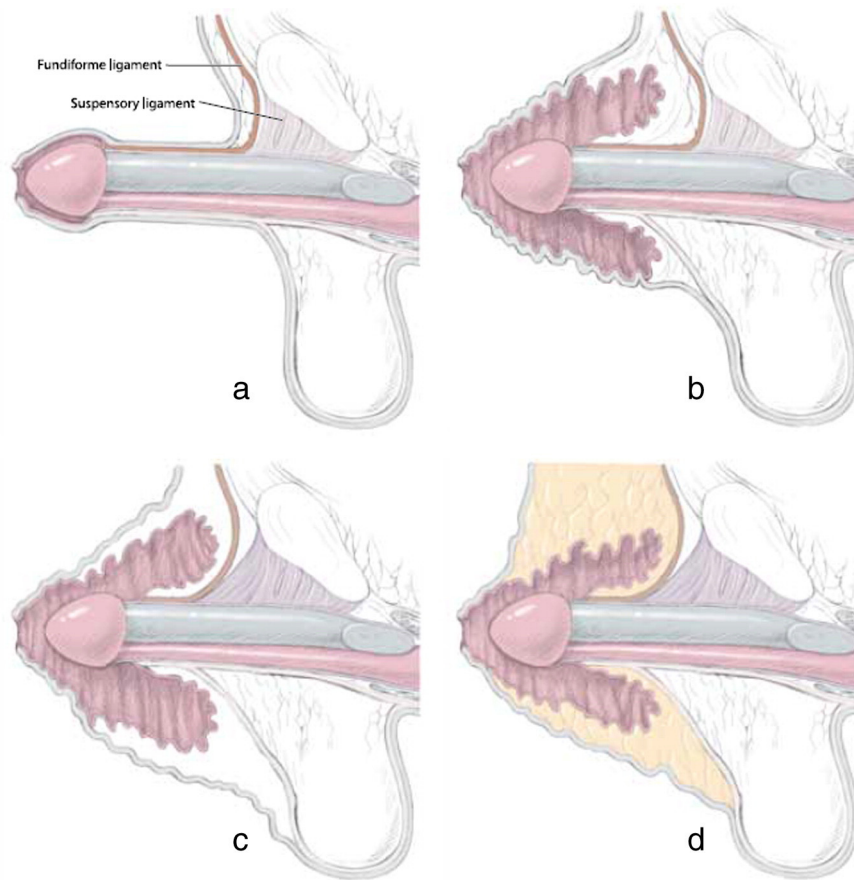


Fig. 4. Morphological classification of Buried Penis. (a) Normal penis with normal length of penile shaft, Normal Inner prepuce length (less than 1.5 cm), normal dartos fascia and normal attachment of the fundiform and suspensory ligament. (b) Grade I: abnormally long Mega Inner Prepuce (MIP) and loose dartos fascia attachment. (c) Grade II includes patients with MIP, loose dartos fascia attachment and abnormal distal attachment of fundiform and suspensory ligaments. (d) Grade III is characterised by excess supra-pubic fat deposition in addition to the above (from Hadidi A T with permission).

Buried penis is a rare congenital anomaly with the largest series in literature including less than 80 patients distributed over several specialized centres during a 15–20-year period [8,10,28]. In fact the total number of cases (with different inclusion criteria) reported in literature until 2011 is 868 cases [31]. It is time to try to avoid confusing terms in literature:

Buried Penis (BP) (Fig. 4) may be defined as “an apparent absence of the penis characterized by an abnormally long inner prepuce (LIP). It is a rare congenital anomaly with a wide spectrum of presentation that can be classified into 3 grades as previously mentioned; Grade I: characterized by Longer inner prepuce (LIP) and loose attachment of skin and fascia to the corporal body. Grade II: has LIP and abnormal distal attachment of the fundiform and suspensory ligament. Grade III: characterized by LIP, distal attachment of the suspensory ligament and abnormal excess distribution of suprapubic fat.

Congenital Mega Prepuce (CMP): used to describe patients presenting with intermittent ballooning of the genital area; should in fact be included in Grade I BP.

Concealed (hidden or inconspicuous) Penis (CP): could be reserved for acquired conditions presenting later in life due to abnormal excess fat accumulation in the genital area.

Webbed penis or penoscrotal web is a different entity from BP as the anomaly involves only the inferior penoscrotal junction and the penis is not truly buried. The surgical correction is different than BP and can be achieved by a V shaped midline incision that

drops the scrotal skin down away from the penis. Circumcision is not necessary in this condition.

Trapped penis is a term usually used to describe poorly designed circumcision in a child with a buried penis BP and presents with a penis retracted behind the circumcision scar in a buried penis. Satisfactory results are obtained again through a ventral midline incision. Special care has to be taken as in those children there are very limited skin and preputial inner mucosa which may be needed to eventually cover the penis.

One controversial issue in literature is the ideal age for surgery; Shapiro [28] stated that boys with a buried penis are conscious of the problem even before puberty and that with persistent concealment of the penis the child's later psychological development would be improved by correcting the problem earlier rather than later. Herndon showed in his long term study that the parents thought that surgery is almost uniformly successful in toddlers and less often successful in adolescents. Ferro [3] and Philip [19] recommended correction as soon as the diagnosis is made, in order to resolve both the dysuria and the cosmetic anomaly. Shenoy [7] asked the families of seven patients with BP and the parents preferred to perform surgery at an age when they can discuss the problem with the child and before he goes to secondary school. We agree with Casale [13] that the correction of concealed penis should be performed after the child is walking and abdominal fat has diminished.

Another controversial issue is “Should circumcision be performed as a routine procedure during the surgical management of BP? Based on the constant finding of LIP in all the cases of BP, we

believe that circumcision needs to be performed to excise the excess inner mucosa. We have encountered partial necrosis of the inner preputial mucosa in one child with severe rotation where the author has tried to preserve the foreskin after correction of rotation. In contrast, the foreskin can be preserved in webbed penis which is not associated with LLP and requires a different surgical approach.

References

- [1] Keyes Jr EL. Phimosis, paraphimosis, tumors of the penis. Urology. New York: Appleton; 1919. p. 649.
- [2] Crawford BS. Buried penis. Br J Plast Surg 1977;30:96.
- [3] Ferro F, Spagnoli A, Spyridakis I, et al. Surgical approach to the congenital – megaprepuce. J Plast Reconstr Aesthet Surg 2006;59:1453–7.
- [4] Bergeson PS, Hopkin RJ, Bailey Jr RB, et al. The inconspicuous penis. Pediatrics 1993;92:794.
- [5] Maizels M, Zaontz M, Donovan J, et al. Surgical correction of the buried penis: description of a classification system and a technique to correct the disorder. J Urol 1986;136:268–71.
- [6] Alexander A, Lorenzo AJ, Salle JLP, et al. The ventral V-plasty: a simple procedure for the reconstruction of a congenital megaprepuce. J Pediatr Surg 2010;45:1741–7.
- [7] Shenoy MU, Rance CH. Surgical correction of congenital megaprepuce. Pediatr Surg Int 1999;15:593–4.
- [8] Frenkl TL, Agarwal S, Caldamone AA. Results of a simplified technique for buried penis repair. J Urol 2004;171:826–8.
- [9] Redman JF. A congenital syndrome of a short penile shaft and a paucity of penile shaft skin. J Urol 2005;173:1714–7.
- [10] Cromie WJ, Ritchey ML, Smith RC, et al. Anatomical alignment for the correction of buried penis. J Urol 1998;160:1482–4.
- [11] Wollin M, Duffy PG, Malone PS, et al. Buried penis. A novel approach. Br J Urol 1990;65:97–100.
- [12] Boemers TML, De Jong TpvM. The surgical correction of buried penis: a new technique. J Urol 1995;154:550–2.
- [13] Casale AJ, Beck SD, Cain MP, et al. Concealed penis in childhood: a spectrum of etiology and treatment. J Urol 1999;162:1165–8.
- [14] Herndon CDA, Casale AJ, Cain MP, et al. Long-term outcome of the surgical treatment of concealed penis. J Urol 2003;170:1695–7.
- [15] Hadidi AT. Lateral based flap: a single stage urethral reconstruction for proximal hypospadias. J Pediatr Surg 2009;44:797–801.
- [16] Hadidi A. Proximal hypospadias with small flat glans; the lateral based only (LABO) flap technique. J Pediatr Surg 2012;47:2151–7.
- [17] O'Brien A, Shapiro AMJ, Frank JO. Phimosis or congenital megaprepuce? Br J Urol 1994;73:719–20.
- [18] Gwinn JL, Lee FA, Haber K. Radiological case of the month. Unusual presentation of phimosis. Am J Dis Child 1974;128:835–6.
- [19] Philip I, Nicholas JL. Congenital giant preputial sac: case reports. J Pediatr Surg 1999;34:507–8.
- [20] Summerton DJ, McNally J, Denny AJ, et al. Congenital megaprepuce: an emerging condition – how to recognize and treat it. BJU Int 2000;86:519–22.
- [21] Elder JS. Abnormalities of the genitalia in boys and their surgical management. In: Walsh PC, Retik AB, Vaughan Jr ED, Wein AJ, editors. Campbell's urology, 8th ed., vol. 3. Philadelphia: W. B. Saunders Co.; 2002. p. 2334–52 [sect. XXII, Chapter 66].
- [22] Donahoe PK, Keating MA. Preputial unfurling to correct the buried penis. J Pediatr Surg 1986;21:1055–7.
- [23] Radhakrishnan J, Razzaq A, Manickam K. Concealed penis. Pediatr Surg Int 2002;18:668–72.
- [24] Bloom DA. Management of the 'concealed' penis. Dialog Pediatr Urol 1993;16:1–7.
- [25] Frank TD. Editorial comment. BJU Int 2000;86:526.
- [26] Kubota Y, Ishii N, Watanabe H, et al. Buried penis: a surgical repair. Urol Int 1991;46:61–3.
- [27] Horton CE, Vorstman B, Teasley D. Hidden penis release: adjunctive suprapubic lipectomy. Ann Plast Surg 1987;19:131–4.
- [28] Shapiro SR. Surgical treatment of the "buried" penis. Urology 1987;30:554–9.
- [29] Kojima Y, Hayashi Y, Maruyama T, et al. Correction of completely buried penis using the modified preputial island pedicle flap method. J Pediatr Surg 1999;34:1524–6.
- [30] Redman JF. A technique for the correction of penoscrotal fusion. J Urol 1985;133:432–3.
- [31] Lardellier-Reynauda F, Varlet F, Francois M, et al. Congenital buried penis in children. Prog Urol 2011;21:642–50.