

A practical approach for the correction of iatrogenic penile skin loss in children: Scrotal embedding technique

Çocuklarda iyatrojenik penil deri kaybını düzeltmek için pratik bir yöntem: Skrotal gömme tekniği

Orhan Ziylan¹, Ömer Acar¹, Burcu Celet Özden², Tzevat Tefik¹, M. İrfan Dönmez¹, Tayfun Oktar¹

ABSTRACT

The aim of this particular study is to determine the efficacy of scrotal embedding technique in children with overly deficient penile shaft skin, which takes advantage of the rich vascular supply of the scrotal layers and provides adequate tissue coverage. We give the operative and clinical details of two consecutive cases for which we preferred scrotal embedding technique to replace deficient penile skin. The mean operative time for the first and second stages was 72.5 and 52.5 min, respectively. Intraoperative and postoperative courses and convalescences were uneventful. The patients were hospitalized for a mean duration of 2 days. After a mean follow-up of 29 months, cosmetic and functional results were satisfactory. Scrotal embedding technique should be considered as a feasible surgical alternative while reconstructing the penile shaft in iatrogenic cases with overly deficient shaft skin.

Keywords: Iatrogenic; penile skin deficiency; scrotal embedding; tissue coverage.

ÖZET

Penis shaftı derisinin ileri derecede azalmış olduğu çocuklarda skrotal katmanların zengin damarsal yapısının yardımıyla doku defekti onarımı için kullanıldığı skrotal gömme tekniğinin etkinliğini göstermek. Penil deri yokluğu nedeniyle skrotal gömme tekniği uygulanan iki hastanın klinik ve ameliyat detayları verilmiştir. İlk ve ikinci ameliyatlara için ortalama süre sırasıyla 72,5 ve 52,5 olan hastaların operasyon sonrası nekahat dönemleri sorunsuz geçti. Hastaların ortalama yatış günü 2 gün idi. İki hastanın ortalama 29 aylık takibi sonrasında kozmetik ve fonksiyonel sonuçlar gayet iyiydi. İleri derecede penis shaftı derisi kaybı durumlarında skrotal gömme tekniği uygun bir cerrahi alternatif olarak kullanılabilir.

Anahtar kelimeler: İyatrojenik; penil deri kaybı; skrotal gömme; doku kapsama.

¹Department of Urology, İstanbul University İstanbul Faculty of Medicine, İstanbul, Turkey

²Department of Plastic, Reconstructive and Aesthetic Surgery, İstanbul University İstanbul Faculty of Medicine, İstanbul, Turkey

Submitted:
02.01.2015

Accepted:
26.01.2015

Available Online Date:
18.06.2015

Correspondence:
Tayfun Oktar,
E-mail: tayfunoktar@hotmail.com,
tayfuno@istanbul.edu.tr

©Copyright 2015 by Turkish Association of Urology

Available online at
www.turkishjournalofurology.com

Introduction

Penile skin deficiencies in children are usually the result of radical circumcision.^[1] Removing too much penile skin may induce the formation of a circumferential scar tissue that pulls the penis proximally. The penis eventually becomes trapped in the suprapubic fat pad.^[2] The true incidence of penile denudation and associated entrapment is unknown because available data consists of sporadic observations at single centers. Although it is a rarely encountered clinical condition, it may cause hygienic problems, voiding difficulty, and sexual dysfunction. Moreover, it may lead to psychological distress in patients and their parents.

Many different surgical techniques have been described to correct penile skin deficiency. However, data are scarce regarding the optimal approach for children who have a persistent deformity despite previous treatment attempts and for those who have an excessive cutaneous deficiency. This study aimed to determine the outcome of scrotal embedding technique (SET), which is a two-staged procedure, to correct penile skin loss in children who underwent previous unsuccessful surgical and/or nonsurgical interventions.

Case presentations

In our department, the two-staged SET was performed in two children.

Case 1

A 13-year-old child presented with a buried and rotated penis. He underwent circumcision ten years ago, and the penile shaft was “buried” under the suprapubic fat pad because of overly resected shaft skin. Following circumcision, he underwent three unsuccessful operations. The application of a graft harvested from the thigh (five years ago) and removal of scar tissues (three and two years ago, respectively) did not yield satisfactory cosmetic results. On physical examination, the penile shaft was partially trapped under the suprapubic adipose tissue. Approximately a quarter of the penile skin was extragenital, and the penile shaft was almost completely covered by scar tissue. The penis was curved to the left, and the glans penis was twisted 45° in counterclockwise direction (Figure 1a).

Case 2

A 2-year-old child who underwent circumcision five days earlier in another center presented with a necrotic lesion not completely covering the glans penis and subcoronally projecting downward. Hyperbaric oxygen treatment was applied, and some improvement was observed in the necrotic glanular lesions. However, a ring-like scar tissue, which was formed during the healing process, proximally retracted the penis. Eventually, the penile shaft was partially concealed within the suprapubic fat pad.

Surgical technique

Both patients were scheduled for two-staged penile reconstruction. During the first stage, the penile shaft was transposed through the intrascrotal tunnel. The penis was released from the intrascrotal tunnel during the second stage. Operations were carried out under general anesthesia with the patient in supine position. Prophylactic second generation cephalosporins were intravenously given during the induction phase of anesthesia. Operative details are described below.

First stage

A longitudinal traction suture was placed deep into the glans penis. Following subcoronal circumferential incision, the penile skin was completely degloved down to the penopubic junction. The scar tissue was excised from the extragenital skin. Afterward, a transverse incision was made in the lower part of the scrotum, and an intrascrotal tunnel was created between the skin and dartos layer. Then, the penis was embedded under the scrotal skin and was drawn through the distal opening of the tunnel. Three sutures were placed between the scrotal skin and distal penile skin to ensure “penile scrotalization” (Figure 1b).

Second stage

The second stage was carried out six weeks after the initial operation. After bilaterally incising the scrotal skin at the penile base, the skin around the penis was separated from the remaining scrotal skin (Figure 1c). While doing that, a dog-ear incision

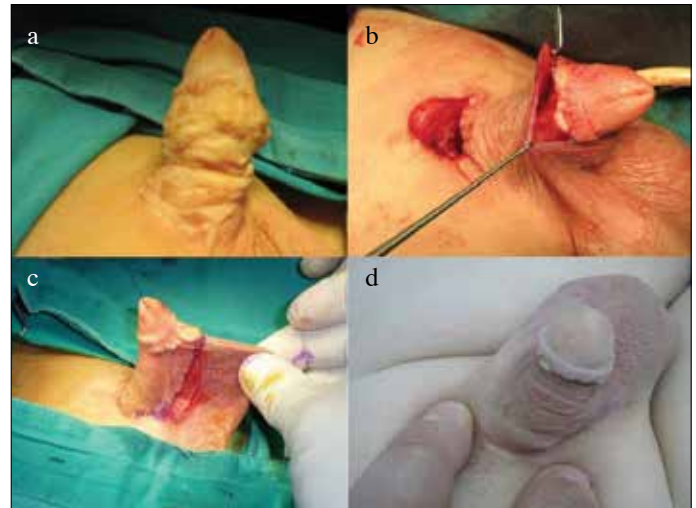


Figure 1. a-d. Rotated and twisted penile shaft covered by scar tissue (a). Penile shaft transposed through the intrascrotal tunnel (b). Liberation of scrotal skin layer (c). Post-operative image of the first case (d)

was made to preserve natural the testicular contour. The scrotal skin defect was closed by longitudinal sutures. The wound was covered by a loose compressive dressing.

Results

The operative duration was 80 and 55 min for the first and second stages of the initial case, respectively. Stage 1 and 2 of the second case lasted 65 and 50 min, respectively. The clinical courses were devoid of any intraoperative and perioperative complication. Convalescences were uneventful. They were hospitalized for a mean duration of two days. After a mean follow-up duration of 29 months, the cosmetic and functional results were satisfactory (Figure 1d and Figure 2a-d).

Discussion

Burns, various traumas, infections, lymphatic malformations, dermatological illnesses, and surgeries are among the most important causes of penile skin defects.^[3] Although the true incidence is not known, circumcision may be regarded as the primary etiologic factor underlying penile skin deficiencies. Especially in countries where circumcision is accepted as a religious obligation, children with superficial penile denudation should be questioned about the operative details (timing, surgical method). Penile skin loss, which is most likely the result of excessive cutaneous resection during circumcision, may also cause the penis to become trapped in the suprapubic adipose tissue.^[4] This concealment may lead to secondary phimosis, recurrent balanitis, voiding problems, sexual dysfunction, and social embarrassment.^[5]



Figure 2. a-d. Initial image of the second case (a). Photo taken after hyperbaric oxygen therapy (b). Post-operative image (after the second stage) (c). Final image of the second case (d)

Maizels et al.^[5] proposed a classification system for concealed penis. It consists of three distinct subtypes, including buried, webbed, and trapped penis. Congenital buried penis is the result of dysgenetic dartos fascial bands or vestigial cloacal veil remnants retracting the phallus into the suprapubic fat pad. Excessive suprapubic adipose tissue and inadequate attachment of the penile skin to the shaft may contribute to these underlying disorders.^[5] Iatrogenic cases in children commonly result from radical circumcision. Excessive resection of the foreskin without fixation of the penile skin to the Buck's fascia can result in deficient penile shaft skin, which worsens the condition and leads to scarring.

Primary suturing, skin grafting, and local flaps may be used to correct penile skin defects. If the phallus is partially or completely embedded in the suprapubic adipose tissue, additional interventions may be necessary. These may include scar release, graft application, penile or scrotal Z-plasty, dorsal tacking of the suprapubic dermis, and removal of the suprapubic adipose tissue.^[6-10] In order to achieve a successful surgical result, the penis must be freed from any tethering or webbing, and sufficient penile skin coverage has to be provided. Additionally, the proximal penile skin has to be fixed to the underlying fascia to prevent the penis from pulling down and out of the shaft skin.^[11] Cases with deficient penile skin constitute a real therapeutic challenge even for the most skilled surgeons. In severe cases, this deficiency may necessitate the use of rotational flaps or grafts for tissue substitution.^[12] However, these procedures are technically demanding and require a thorough understanding of anatomical details and reconstructive principles.

The scrotum is an ideal substrate for providing skin coverage because it stretches easily and is pliable, making it useful for

penile shaft coverage. Additionally, scrotal layers receive blood from several vessels. The dartos fascial layer beneath the penile and scrotal skin contains interconnecting circulation originating from the deep and superficial external pudendal vessels and internal pudendal vessels. The external pudendal arteries originate from the femoral artery, continue as the anterior scrotal arteries, and send branches to the dorsal penis. The scrotal posterior surface is supplied by the superficial perineal artery, which is a branch of the internal pudendal artery.

Owing to its blood supply, tissue characteristics, and anatomical proximity to the phallus, it can be considered as a readily available vascular bed, which may replace deficient penile skin once the penile shaft is temporarily harbored within. Zhao et al.^[12] used scrotal skin flaps to reconstruct partial penile defects resulting from circumcision, animal bite, and tumor dissection. Besides optimal cosmetic results, they reported retained sensory and erectile function in all their patients. They also mentioned the importance of scrotal skin flaps having a dual blood supply. Branches of the external and internal pudendal arteries supplying the scrotal wall connect with each other and form the vascular network of the scrotal skin. Thus, the skin flaps can survive because of the fascial vessel network, and flap necrosis rarely develops.^[12] These findings highlight the importance of scrotal vasculature particularly when used for reconstructive purposes.

There are few data about SET in the literature. In a review article, Kelemen et al.^[13] evaluated different surgical techniques in patients with penile deformities and tissue deficiencies. They observed the best cosmetic results with skin replacement via temporary embedding of the penis in the scrotum. Zucchi et al.^[14] used this technique for 10 adult patients with buried penis. They reported satisfactory cosmetic and functional results after a median follow-up of 20 months. The median visual analog scale score for patient satisfaction was 97. Additionally, the patients enrolled in this study considered the relatively thicker scrotal skin to be better than the native skin in terms of cosmetic appearance.

Our patients were suffering from excessively deficient shaft skin. Radical circumcision and non-healing ischemic necrosis were the reasons for this deficiency and hence, the buried appearance of the phallus. Temporary transposition of the penis into the scrotal tunnel provided adequate coverage for the skin defect. After dissecting the penile shaft off the tunnel, direct closure of the skin defects was possible. The eventual cosmetic result was satisfactory in both our patients.

For pediatric penile skin deficiencies mainly because of excessive resection during circumcision, scrotal embedding is advantageous because it provides elastic, thick, and vascular skin coverage. The small sample size and short follow-up period are the main limitations of our study. However, for surgeons who have limited experience in reconstructive penile surgery and for

those dealing with refractory, iatrogenic cases with local skin deficiency, SET may represent a viable surgical alternative.

SET may be used while reconstructing the penile shaft in iatrogenic cases with an overly deficient shaft skin. Buried penis and ischemic necrosis of the glans penis, which persisted after conservative and/or surgical treatments, were the indications to proceed with SET in our series. A two-staged approach, which takes advantage of the scrotal vasculature and surgical easiness, may be more definitive while dealing with iatrogenic, refractory penile skin deficiencies. Further studies enrolling a higher number of patients and providing longer follow-up data are needed in order to more precisely assess the efficacy of this technique.

Informed Consent: Due to its retrospective nature, consent is not required.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept - O.Z., T.O., B.C.Ö.; Design - T.T., Ö.A.; Supervision - O.Z., M.İ.D., T.O.; Materials - O.Z.; Data Collection and/or Processing - O.Z., T.O., M.İ.D.; Analysis and/or Interpretation - O.Z., B.C.Ö., Ö.A., T.T.; Literature Review - T.O., M.İ.D., Ö.A.; Writer - T.O., M.İ.D.; Critical Review - O.Z., T.O., B.C.Ö.; Other - Ö.A., T.T.

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study has received no financial support.

Hasta Onamı: Retrospektif bir çalışma olduğundan onam alınmamıştır.

Hakem Değerlendirmesi: Dış bağımsız.

Yazar Katkıları: Fikir - O.Z., T.O., B.C.Ö.; Tasarım - T.T., Ö.A.; Denetleme - O.Z., M.İ.D., T.O.; Malzemeler - O.Z.; Veri toplanması ve/veya işlemesi - O.Z., T.O., M.İ.D.; Analiz ve/veya yorum - O.Z., B.C.Ö., Ö.A., T.T.; Literatür taraması - T.O., M.İ.D., Ö.A.; Yazıyı yazan - T.O., M.İ.D.; Eleştirel İnceleme - O.Z., T.O., B.C.Ö.; Diğer - Ö.A., T.T.

Çıkar Çatışması: Yazarlar çıkar çatışması bildirmemişlerdir.

Finansal Destek: Yazarlar bu çalışma için finansal destek almadıklarını beyan etmişlerdir.

References

1. Radhakrishnan J, Reyes HM. Penoplasty for buried penis secondary to "radical" circumcision. *J Pediatr Surg* 1984;19:629-31. [\[CrossRef\]](#)
2. Casale AJ, Beck SD, Cain MP, Adams MC, Rink RC. Concealed penis in childhood: a spectrum of etiology and treatment. *J Urol* 1999;162:1165-8. [\[CrossRef\]](#)
3. Chu CC, Chen YH, Diao GY, Loh IW, Chen KC. Preputial flaps to correct buried penis. *Pediatr Surg Int* 2007;23:1119-21. [\[CrossRef\]](#)
4. Perovic SV, Djordjevic MLJ, Kekic ZK, Djakovic NG. Penile surgery and reconstruction. *Curr Opin Urol* 2002;12:191-4. [\[CrossRef\]](#)
5. Maizels M, Zaontz M, Donovan J, Buschnick PN, Firlit CF. 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. Joseph VT. A new approach to the surgical correction of buried penis. *J Pediatr Surg* 1995;30:727-9. [\[CrossRef\]](#)
7. Cromie WJ, Ritchey ML, Smith RC, Zagaja GP. Anatomical alignment for the correction of buried penis. *J Urol* 1998;160:1482-4. [\[CrossRef\]](#)
8. Hinman F. Surgical management of microphallus. *J Urol* 1971;105:901-4.
9. Gillett MD, Rathbun SR, Husmann DA, Clay RP, Kramer SA. Split-thickness skin graft for the management of concealed penis. *J Urol* 2005;173:579-82. [\[CrossRef\]](#)
10. Alter GJ, Ehrlich RM. A new technique for correction of the hidden penis in children and adults. *J Urol* 1999;161:455-9. [\[CrossRef\]](#)
11. Herndon CD, Casale AJ, Cain MP, Rink RC. Long-term outcome of the surgical treatment of concealed penis. *J Urol* 2003;170:1695-7. [\[CrossRef\]](#)
12. Zhao YQ, Zhang J, Yu MS, Long DC. Functional restoration of penis with partial defect by scrotal skin flap. *J Urol* 2009;182:2358-61. [\[CrossRef\]](#)
13. Kelemen Z. Reconstructive surgery of penile deformities and tissue deficiencies. *Orv Hetil* 2009;150:1023-9. [\[CrossRef\]](#)
14. Zucchi A, Perovic S, Lazzeri M, Mearini L, Costantini E, Sansalone S, et al. Iatrogenic trapped penis in adults: New, simple 2-stage repair. *J Urol* 2010;183:1060-3. [\[CrossRef\]](#)