

The Role of Plastic Surgery in the Treatment of Recurrent and Large Penile Keloid

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Summary: Penile keloid is an extremely rare condition that most commonly occurs as a complication of circumcision. In this article, we describe a unique case of recurrent, large penile keloid formation after circumcision in an 11-year-old White boy. This was treated by surgical excision and reconstruction of penile shaft by skin graft followed by serial intradermal steroid injections. A good aesthetic outcome was achieved with no keloid recurrence during a 1-year follow-up. In addition, we extensively reviewed all available literature studies of penile keloid from 1966 to 2021 with their treatments and outcomes. We summarized all reported cases and presented them in a comprehensive table. (*Plast Reconstr Surg Glob Open* 2022;10:e4052; doi: 10.1097/GOX.0000000000004052; Published online 26 January 2022.)

Circumcision is performed in many communities around the world for either medical, ethnic, or religious reasons, and it is considered one of the most common surgical procedures performed around the world. It is a relatively safe procedure with a low overall rate of complication, which may include bleeding, infection, hematoma, and incision dehiscence. One of the rare but significant complications is abnormal wound healing and keloid formation.

Penile keloid is an extremely rare condition, with only 33 cases reported in our literature (Table 1). Herein, the authors report the first case of postcircumcision large penile keloid that was treated by surgical excision and reconstruction of the penile shaft by full-thickness skin graft followed by serial intradermal steroid injections with a satisfactory aesthetic outcome and no recurrence during one year follow-up. A review of the literature has been made, and therapeutic management options with their outcomes are discussed.

CASE PRESENTATION

An 11-year-old White boy was referred to our plastic surgery clinic due to the recurrence of penile keloid for

the third time. The patient had undergone a religious circumcision at the age of 8 months, and the parents denied early circumcision complications, including wound dehiscence or infection. Five months later, he developed the first penile keloid, which was treated only by surgical excision when he was 5 years old. The keloid recurred after a few months, and was also treated by surgical excision when he was 9 years old. The two operations were performed by a general surgeon. Unfortunately, the keloid recurred for the third time, and with a larger mass than before. There was no history of pain or pruritus, and the patient had no personal or family history of abnormal wound healing.

On examination, a large circular-shaped keloid lesion at the site of the circumcision was seen, the mass extended from the coronal sulcus to the penile shaft measuring approximately 5 × 4.5 × 4 cm in its maximum dimensions (Fig. 1). There was no erythema or tenderness.

The patient was scheduled for elective surgery under general anesthesia. Surgery was performed by a plastic surgeon. The surgical procedure involved complete circumferential excision of the keloid (See figure 1, Supplemental Digital Content 1, which showed an intraoperative view of the penis after keloid excision. <http://links.lww.com/PRSGO/B890>) with subsequent reconstruction of the penile shaft by a full-thickness skin graft from the patient's inguinal region, and care was taken to avoid tension at the suturing site (Fig. 2). Intraoperative triamcinolone acetonide injection into the wound edges also was given. The excised masses (See figure 2, Supplemental

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Table 1. Summarized Clinical Data of All Published Cases of Penile Keloids, Their Treatments, and Outcomes

Case Study	Patient Age	Ethnicity	Etiology	History of Keloid	Treatment	Recurrence
1 Parsons ¹	8 y	Black African	Scratshed penile skin after trauma	No	First: surgical excision only, recurred after 9 mo Second: surgical excision with external radiation Surgical excision only	No for 5 mo follow-up Yes (after months)
2 Kõrmõczy ²	44 y	White	Laceration and burn to the penis	Not reported		
3 Warwick and Dickson ³	12 y	Sierra Leone (African)	Circumcision	Yes (patient's axilla)	Intralesional injections by triamcinolone acetate	—(Only reduction in mass size and pruritus)
4 Gürünlüoğlu et al ⁴	12 y	White	Circumcision	Yes (inguinal region)	Intralesional injections by triamcinolone acetate	—(Only reduction in mass size and pruritus)
5 Gürünlüoğlu et al ⁵	13 y	White	Circumcision	No	Intralesional injections by triamcinolone acetate	—(Only reduction in mass size and pruritus)
6 Gürünlüoğlu et al ⁵	56 y	White	Penoscrotal hidradenitis suppurativa	Yes (patient's axilla)	Surgical excision only	Not reported
7 Eldin ⁶	6 y	Egyptian	Circumcision	Not reported	Surgical excision with reconstruction of the suprapubic region and penile shaft by a thin split-thickness skin graft followed by silicone gel sheet at the sites of the scars	No for 6 mo follow-up
8 Mastrolorenzo et al ⁷	32 y	Black African	Electrocauterization for condylomata acuminata	No	Surgical excision followed by topical use of fluocinonide acetamide gel	No for 1 y follow-up
9 Bekerecioglu et al ⁸	13 y	Not reported	Circumcision	No	Surgical excision followed by triamcinolone acetate injections	No for 1 y follow-up
10 Erdemir et al ⁹	15 y	Not reported	Circumcision	No	Surgical excision followed by steroid injection	No for 1 y follow-up
11 Isken et al ¹⁰	10 y	White	Circumcision	Not reported	First: surgical excision only, recurred after months Second: surgical excision with pre and postoperative topical steroid	No for 2 y follow-up
12 Lokhande et al ¹¹	9 y	Indian	Circumcision	No	Surgical excision followed by steroid injections and silicone gel sheets at the wound site	No for 1 y follow-up
13 Demirdover et al ¹²	3 y	White	Circumcision	No	Intralesional injection of triamcinolone acetamide followed by surgical excision. Then, silicone gel sheet and topical steroid	No for 1 y follow-up
14 Xie et al ¹³	32 y	Chinese	Circumcision	Yes (patient's deltoid and abdominal wall)	Intralesional steroid injections followed by surgical excision. Then intralesional triamcinolone acetamide injections, constant pressure by tubular elastic net dressing, silicone film.	No for 11 mo follow-up
15 Xie et al ¹³	10 y	Chinese	Circumcision	No	Surgical excision followed by intradermal triamcinolone acetamide injections, constant pressure by tubular elastic net dressing, silicone film.	No for 6 mo follow-up
16 Xie et al ¹³	12 y	Not reported	Circumcision	No	Surgical excision followed by intradermal triamcinolone acetamide injections, constant pressure by tubular elastic net dressing, silicone film.	No for 6 mo follow-up
17 Yong et al ¹⁴	1.5 y	African	Circumcision	No	Surgical excision with reconstruction via advancement of the local tissues.	No for 3 y follow-up
18 Cimpolat et al ¹⁵	9 y	Turkish	Circumcision	No	Surgical excision followed by triamcinolone acetate injections	No for 1 y follow-up
19 Ozinko et al ¹⁶	1 y	Nigerian	Circumcision	Not reported	Intralesional injections by triamcinolone acetate	—(Only reduction in mass size)
20 Ozinko et al ¹⁶	2 y	Nigerian	Circumcision	Not reported	Surgical excision followed by triamcinolone acetate injections	Yes, re-excised + triamcinolone
21 Sanal et al ¹⁷	13 y	White	Circumcision	No	Surgical excision followed by intralesional triamcinolone acetate injection and silicone gel sheet application	No for 2 y follow-up
22 Alyami et al ¹⁸	2 y	White	Phalloplasty	No	Intralesional injections by triamcinolone acetamide	No for 3 y follow-up
23 Alyami et al ¹⁸	3 y	African	Phalloplasty	No	First: surgical excision only, recurred after 3 mo Second: silicone gel for scar massage	—(Only reduction in mass size)

(Continued)

Table 1. (Continued)

Case Study	Patient Age	Ethnicity	Etiology	History of Keloid	Treatment	Recurrence
24	Alyami et al ¹⁸ 2 y	African American	Phalloplasty	No	Surgical excision followed by triamcinolone acetate injections	No for 2 y follow-up
25	Alyami et al ¹⁸ 8 y	Asian	Hypospadias repair	Yes (patient's chest)	Surgical excision with reconstruction by a postauricular graft	Recurred after months
26	Alyami et al ¹⁸ 7 y	Not reported	Hypospadias repair	Yes (postauricular area)	Surgical excision with reconstruction by a postauricular graft	Recurred after months
27	Alyami et al ¹⁸ 13 y	Not reported	Circumcision	Yes (patient's shoulders)	Surgical excision and intraoperative dexamethasone injection	No for 3 y follow-up
28	Cappuyns et al ¹⁹ 13 y	African	Circumcision	Yes (patient's chest, shoulders, and back)	Surgical excision followed by triamcinolone acetate injections	No for 3 y follow-up
29	Buick et al ²⁰ 2 y	African	Circumcision	No	Intralesional triamcinolone acetate injections followed by surgical excision	No for 6 mo follow-up
30	Guler et al ²¹ 7 y	White	Circumcision	No	Intralesional triamcinolone acetate injections followed by surgical excision. Then silicone gel sheet and topical steroid application	No for 1 y follow-up
31	Hamzan et al ²² 14 y	Asian	Circumcision	Yes (patient's ear)	Surgical excision followed by triamcinolone acetate injections	No for 6 mo follow-up
32	Abdelhalim et al ²³ 2.5 y (identical twin)	White	Circumcision	No	Surgical excision followed by topical steroid application	No for 6 mo follow-up
33	Abdelhalim et al ²³ 2.5 y (identical twin)	White	Circumcision	No	Surgical excision followed by topical steroid application	No for 6 mo follow-up
34	Alzeerelhouseini et al (current study) 11 y	White	Circumcision	No	Surgical excision followed by topical steroid application First: surgical excision only, recurred after 3 mo Second: surgical excision only, recurred after 4 mo Third: surgical excision with reconstruction of the penile shaft by skin graft followed by intra-dermal triamcinolone acetate injections	No for 1 y follow-up



Fig. 1. Circular-shaped large penile keloid extended from the coronal sulcus to the shaft of the penis.

Digital Content 2, which showed the large penile keloid after excision. (<http://links.lww.com/PRSGO/B891>) were sent for histopathological review which revealed irregular, thick, dense collagen bundles consistent with the diagnosis of keloid.

The patient was discharged home on postoperative day 1 without complications. A series of intradermal corticosteroid injections (1 ml of triamcinolone acetonide 40 mg/ml) were given every 4–6 weeks for a period of 6 months. In addition, a silicone gel sheet was placed at the skin graft donor site for nearly 4 months to prevent further keloid formation.

The patient was followed up regularly for 1 year in the clinic, during which time there was a small elevated scar at the suture site only but without itching, redness, or any sign of keloid recurrence (**Fig. 3**).



Fig. 2. Intraoperative view after reconstruction of the penile shaft by a full-thickness skin graft.



Fig. 3. Appearance at 1-year follow-up with a satisfactory aesthetic outcome and no keloid recurrence.

DISCUSSION

A keloid is an abnormal proliferation of scar tissue that forms following dermal injury. It is characterized by fibroblastic proliferation and excessive collagen deposition. It is commonly seen in areas such as the sternum, shoulders, posterior neck, and earlobes.¹² Penile keloid is an extremely rare condition even in those with keloid tendency. Patients typically present with a disfiguring mass that may lead to pressure and functional complications like abnormal micturition and difficult sexual intercourse.^{12,19}

Many factors such as skin tension, darker pigmented ethnicity, and genetic predisposition are parameters that play a major role in keloid development. Trauma is also considered a risk factor for keloid formation.¹⁷ Some studies reported cases of penile keloid formed after trauma although they had undergone circumcision years earlier without keloid development, and the question of why a keloid formed after one type of injury but not after another in the same location and same individual is still unclear.⁵

Table 1 summarizes the characteristics of all published cases of penile keloid from 1966 to 2021 with their treatments and outcomes. By analyzing the data of all reported cases (34 cases), we found that the average age of presentation is about 12 years with 31% (nine of 29) having a previous history of keloid formation in different areas. The causes of penile keloid were circumcision in 25 patients (73.5%), surgery in five patients (14.5%), trauma in three patients (9%), and infection in one patient (3%).

Surgical excision, intralesional steroid, silicone gel sheets, pressure therapy, and radiotherapy could be possible options for keloid treatment. However, radiation is inappropriate for the treatment of penile keloids due to the close proximity to the testes. It is also impractical to apply prolonged and sustained pressure to the penis.^{21,23}

According to our literature (Table 1), surgical excision or steroid injections were the most common single modality approach used for penile keloid treatment. However, excision resulted in keloid recurrence in 100% of reported cases, and steroids alone can only decrease the size of the mass and eliminate symptoms like pruritus. Surgical excision followed by steroid application was the most common multimodal approach for penile keloid treatment with recurrence in one of 23, and it seems to be the most effective approach for penile keloid treatment.

In the case of large penile keloid formation, a skin graft might be used to achieve a satisfactory aesthetic outcome, especially in the presence of a well-trained plastic surgeon. However, keloid formation at the donor site is possible. Alyami et al reported two cases of penile keloids, which were treated by excision and reconstruction via postauricular skin graft without maintenance therapy like steroid injections or silicone sheet. A few months later, keloids appeared in both the postauricular and penile areas.¹⁸ However, Eldin et al reported a case of a huge penile keloid that was treated by excision and reconstruction followed by silicone sheet application to both excision and skin graft donor sites with a 6 month recurrence-free period.⁶ In our case, steroid injection was used as maintenance therapy at the excision site, and a silicone sheet was used at the donor site with no evidence of keloid formation during 1 year follow-up. So in the case of skin graft utilization, preventive measures like steroid injections or silicone sheets should be applied to both excision and skin graft donor sites to prevent further keloid formation.

CONCLUSIONS

Penile keloid is an extremely rare condition even in those with keloid tendency. Besides, treatment of this condition is a clinical challenge, with keloid recurrence being the most feared complication. However, surgical excision followed by steroid injections seems to be the most effective treatment with a low recurrence ratio when compared with the single-modality treatment. Moreover, skin grafting might be used in the case of a large penile keloid, with the maintenance therapy applied to both excision and donor sites.

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