

CASE REPORTS

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# Scrotal bridge flap reconstructive surgery for extensive penile paraffinoma: steps and outcomes from a single center: a case series

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## Abstract

**Background:** To describe our scrotal bridge flap technique in reconstructive surgery for extensive penile paraffinoma, a debilitating late complication of penile subcutaneous foreign material injection intended to achieve penile augmentation.

**Case presentation:** We reviewed the medical records of 10 patients who underwent reconstructive surgery with the scrotal bridge flap technique for penile paraffinoma at our center between 2016 and 2019. Complete excision of fibrotic tissue and the overlying skin was performed, and penile resurfacing was achieved by mobilizing the scrotal skin superiorly to wrap around the penile shaft, leaving a skin bridge at the median raphe. All 10 patients successfully underwent scrotal bridge flap penile reconstruction with satisfying results. The mean operation duration was 286.1 min (range 213–363 min). No immediate major complications were observed in any of the patients, and no patients required revision surgery.

**Conclusion:** The scrotal bridge flap technique is a reliable method for reconstructive surgery after the excision of penile paraffinoma.

**Keywords:** Foreign material injection, Penile paraffinoma, Reconstructive surgery, Scrotal bridge flap, Case series

## 1 Background

Penile augmentation by subcutaneous foreign material injection was previously practiced by clinicians and was first described in 1899. However, it was subsequently understood to have highly damaging late complications, hence its absence in medical practice today. Penile paraffinoma is a late complication of attempted penile augmentation. Downey et al. [1] reported 214 cases between 1956 and 2017; the majority of cases were in Korea, Eastern Europe, and Southeast Asia. However, Svensøy et al. [2] have recently shown that it is more prevalent in certain areas than previously thought, with 680 patients treated at a single center in Thailand between 2010 and 2014.

Here, we describe the scrotal bridge flap penile resurfacing technique that is used at our center to share our experience of treating this debilitating condition.

## 2 Case presentation

### 2.1 Patients

Between April 2016 and September 2019, a total of 10 patients underwent scrotal bridge flap reconstructive surgery for penile paraffinoma. All patients treated were Malays. The mean age at which the patients started foreign material injection was 26.5 years (range 15–46 years), and the mean time interval between the commencement of injections and presentation was 5.1 years (range 1–15 years). The most common symptoms were painful erection (10 patients), penile swelling with an inability to perform penetration (six patients), ulceration/infection (four patients), and difficulties with urination (three patients). All patients had extensive

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penile paraffinoma with swelling involving the penile shaft and part of scrotum and suprapubic region. Four patients had ulcers with discharge which was treated with antibiotic and daily dressing.

Penile paraffinoma is a clinical diagnosis in patients with a history of subcutaneous penile foreign material injection. Imaging or biopsy is unnecessary for diagnosis in straightforward cases [1]. We performed ultrasound imaging in one patient who denied any foreign material injection, and biopsy in two patients with chronic non-healing ulcers on top of the paraffinoma to exclude squamous cell carcinoma; however, the results of the investigative imaging and biopsy had no impact on our management approach.

All operations were performed as elective cases, and all patients were administered antibiotics prior to the operation and for 1 week postoperatively. All operations were performed by a single surgeon. Written consent was obtained from patients who had their photographs taken.

## 2.2 Operative technique

Patients were placed supine under general anesthesia. Adequate cleaning and draping were performed, exposing the target area in the usual manner, and a Foley catheter was inserted. The operation was divided into two stages. In the first stage, excision of all associated fibrotic tissue was performed, and in the second stage, penile resurfacing with a scrotal bridge flap was performed. Excision began with a circumferential skin incision just proximal to the corona and proceeded with the careful excision of fibrotic tissue together with the overlying skin. In cases wherein this was impossible because of extremely dense fibrosis, safe excision was instead meticulously performed by approaching from any area with a clear plane. The outcome was a completely denuded penile shaft down to the penile base (Fig. 1A, B).

Subsequently, we fully stretched the scrotal skin using stay sutures to avoid any redundant neo-penile skin. The flap was marked such that the height corresponded to the penile length and the width of the superior and inferior parts corresponded to the distal and proximal penile circumference, respectively. A careful skin incision was performed with 1 cm of scrotal bridge assigned at the inferior part of the median raphe (Fig. 1C). The flap, including the dartos fascia, was elevated from the underlying tunica vaginalis, thereby revealing the tunica-covered testes that were later embedded within a newly created scrotal pouch. The scrotal flap was subsequently mobilized superiorly to wrap around the penile shaft and sutured dorsally using absorbable 3/0 sutures. The proximal- and distal-end sutures were tension-free, especially proximally, to reduce the degree of postoperative neo-penile skin edema (Fig. 1D–G).

## 2.3 Outcome

The mean operation duration was 286.1 min (range 213–363 min). No immediate major complications were observed in any patient, and no patients required immediate revision surgery. Almost all patients had neo-penile skin edema (nine patients), seven patients had limited superficial skin necrosis, four patients developed surgical site infection, one patient experienced superficial wound breakdown, and one patient developed hematoma. The mean length of hospital stay was 8.8 days (range 3–20 days). One patient experienced a cerebrovascular accident approximately 1 month postoperatively and developed erectile dysfunction. Otherwise, no patients reported de novo erectile dysfunction. Two patients reported redundant neo-penile skin; however, only one patient consented to a second operation, 4 months postoperatively, to remove the redundant neo-penile skin. The mean follow-up duration was 4.5 months (range 1–12 months).

## 3 Conclusions

Patients with penile paraffinoma may present with various symptoms, most commonly due to penile pain that is chronic, intermittent, or occurs during erection. They may similarly present with penile deformity, infection, phimosis or paraphimosis, voiding complaint, gangrene, and although rare, squamous cell carcinoma [1, 2]. The granulomatous reaction caused by the foreign material could be localized to part of the penis or be extensively involving the entire penile shaft, suprapubic and scrotal areas.

Once complications occur, treatment involves the complete excision of the foreign material alongside the overlying skin, due to the recurrent nature of the disease should any residual foreign material be left behind. Simple excision and primary suturing are adequate in limited instances of the disease; however, in cases of extensive penile paraffinoma involving the entire penile shaft, both with and without extension to the suprapubic region or scrotum, treatment is achieved by radical excision of the fibrotic tissue, alongside the overlying skin, and penile resurfacing to cover the skin defect [1, 2].

Penile resurfacing is performed either with a graft or scrotal flap. Scrotal flaps have the advantage of being readily available, relatively extensible, and of a color similar to the penile skin compared to a skin graft. However, they have disadvantages, such as being unsuitable for patients with very small underdeveloped scrotum, presence of suture line at the ventral and dorsal sides of the penile shaft, and the problem of hair growth at the neo-penile skin. The use of a bilateral scrotal flap, and its alteration, is the most commonly reported technique



**Fig. 1** Performing penile resurfacing surgery for extensive penile paraffinoma using the scrotal bridge flap technique. (A) Penile paraffinoma involving the entire penile shaft; (B) Radical excision of fibrotic tissue resulting in a denuded penile shaft; (C) Scrotal flap markings corresponding to the previously measured penile length [L], circumference of the proximal penile shaft [P], and circumference of the distal penile shaft [D]. A 1-cm scrotal bridge is assigned at the median ventral-inferior raphe; (D) The flap is elevated and advanced to cover the penile shaft; (E) The flap is wrapped around the penile shaft and sutured dorsally; (F, G) Dorsal and ventral views of the immediate result. (H) The result after 5 months. (I) The result after 1 year in another patient who underwent a similar procedure

for scrotal flap surgery [3–5]. The bilateral scrotal flap is called so because it basically uses two scrotal flaps, taken lateral to the penile shaft and inferiorly toward the median raphe, and each flap is raised superiorly and wrapped around the penile shaft with two T-style

anastomoses at the distal end of the penile shaft, ventrally and dorsally. We believe that in cases of extensive penile paraffinoma, especially when it involves the entire penile shaft and part of the scrotum or the suprapubic area, using our technique would provide healthier scrotal flap

than using the bilateral scrotal flap technique wherein the pivot point is close to the penile base (where the foreign bodies were excised). Similarly, our technique would only produce one T-style anastomosis at the distal end of the penile shaft dorsally, and this could reduce the risk of skin necrosis compared to two T-style anastomoses dorsally and ventrally in the original bilateral scrotal flap. In a study by Shin et al., all patients who underwent the original bilateral scrotal flap-based reconstruction developed delayed wound healing, and four patients (20%) had skin necrosis.

These 10 cases are a slightly larger series than the four cases previously described by Salauddin et al. [6]. Otherwise, to the best of our knowledge, this technique had never been previously described in detail or published in any other literature. The outcomes of these cases are encouraging, with no cases of full-thickness flap necrosis requiring revision. Seven patients had limited superficial skin necrosis, which was treated conservatively. We identified four patients with surgical site infection, three of whom initially presented with penile ulceration and infection and had received prior treatment. This suggests that in cases of infected penile paraffinoma, the foreign material itself could still harbor infective microorganisms, even after the infection has been clinically resolved. Two patients had redundant neo-penile skin, stressing the need for meticulous measurement and stretching of the scrotal skin during flap elevation. In our series, we did not assess the degree of hair growth on the neo-penile skin. Remarkably none of the 10 patients reported any discomfort or dissatisfaction due to hair growth. In our opinion, this could be because Malays generally do not have significant scrotal hairs. A limitation of this case series is the short duration of follow-up with only two patients being followed up until 12 months after the operation.

In conclusion, the scrotal bridge flap technique is a reliable method for reconstructive surgery after the excision of penile paraffinoma. No immediate major complications were observed in any patients, and no patients required immediate revision surgery.

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#### Authors' contributions

HG conceived the project and provided the study material. SS and MK performed literature review and wrote the manuscript. All authors read and approved the final manuscript.

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#### Availability of data and materials

The dataset used and/or analyzed during the current study is available from the corresponding author on reasonable request.

#### Declarations

#### Ethics approval and consent to participate

This case study is registered with the Malaysian National Medical Research Register, Research ID: 60956, and ethics approval was not required. Informed written consent to participate was provided by all participants.

#### Consent for publication

Written consent was obtained from the patients for publication of this case series and accompanying image. All study participants are age 18 and above.

#### Competing interests

The authors declare they have no competing interests.

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