

Posttraumatic Penile Replantation with Minimal Skin Necrosis

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Summary: Penile amputation is a surgical emergency where practical and timely perioperative management is crucial for ensuring a successful outcome. Tenuous viability of penile and scrotal skin has been well described in the literature, with a putative mechanism attributed to the transection of distal branches of the external pudendal artery. Although the perforasomes critical to penile replantation have been debated, this case report details a patient who successfully recovered sensation and function with minimal necrosis after penile replantation. Surgically, this was facilitated by intentional drain placement, aggressive debridement beyond the zone of injury, and planned redundancies with dorsal artery/vein anastomoses via interposition grafts of the dorsal penile vessels alone. (*Plast Reconstr Surg Glob Open* 2023; 11:e5205; doi: 10.1097/GOX.0000000000005205; Published online 24 August 2023.)

Penile amputation is a surgical emergency where timely perioperative management is crucial for ensuring a successful outcome. Individual cases of penile replantation, although relatively rare, are well represented within the urology and plastic surgery literature.¹⁻⁵ Published reports have typically focused on a technical or anatomic aspect unique to each case.⁶ To our knowledge, this is the first case report to address the technical issue of concomitant loss of artery, vein, and nerve length secondary to the method of amputation or the need for intraoperative debridement. Notably, skin necrosis has historically been reported as an expected complication of penile replantation after amputation, attributed to the affected blood supply.^{6,7}

CASE REPORT

We present the case of a 23-year-old unhoused man with a history of schizoaffective disorder who was transferred to our facility after a self-inflicted complete amputation of the penis through the base and anterior scrotum. The patient additionally sustained a unilateral

hemopneumothorax with multiple self-inflicted knife lacerations to his face, chest, and abdomen. The amputated penis was transported along with the patient, with an approximate warm ischemia time of 6 hours and a cold ischemia time of 4 hours. He was found to be afebrile, with stable vital signs and a hemoglobin count of 11 g/dL, and was subsequently cleared per advanced trauma life support criteria. Once stabilized, he was immediately taken to the operating room.

Plastic surgeons and urologists jointly performed the replant. Two dorsal penile arteries, two dorsal penile veins, and two dorsal penile nerves were identified and debrided in the amputated penis (Fig. 1). Matching vessels and nerves were identified in the penile stump (Fig. 2). Noting a 1.5 cm length discrepancy in the neurovascular structures, vein grafts were harvested from the dorsum of the foot. Meanwhile, urologists placed a Foley through the amputated part and stump, as a supportive stent to facilitate urethral and corporal repairs under tourniquet. Next, interpositional vein graft reconstructions of both the right and left dorsal penile arteries and veins were performed, with resultant strong distal Doppler signals. The dorsal penile nerves were bridged with an interpositional nerve allograft (Fig. 3). The skin was closed over Penrose drains. A small scrotal hematoma was noted several hours after reaching the recovery suite, but this was manually expressible. Given the collection, anticoagulation was achieved via a low-dose heparin drip at 500 units without titration. On postoperative day 12, the hematoma persisted, and the

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Fig. 1. Amputated part of penis.

scrotal incision dehiscid, prompting return to the operating room for hematoma evacuation and revision of the closure. The patient was monitored for another 2 weeks before being transferred to an inpatient psychiatric unit. During transfer, approximately 1 month after the index surgery, his penis was well perfused, and the incision wounds healed well (Fig. 4). The Foley catheter was removed without any stricture or leak, and good urinary function was achieved.

A key aspect of the postoperative course and flap success for our patient was perioperative psychiatric care and close collaboration with psychiatry colleagues. The patient remained intubated after the index operation for several days to allow coordination of teams and careful monitoring to ensure the patient would not be able to re-amputate the penis. To this end, he was placed in soft restraints, which were continued after extubation and then weaned while undergoing intensive optimization via the psychiatry team. Through them, he was initially treated in a multimodal fashion with risperidone, paliperidone long-acting injectables, and valproic acid. Valproic acid was uptitrated to 1250-mg BID, and a daily dose of 5-mg risperidone was initiated until induction of paliperidone, which was continued through discharge.

On surveillance 1 year after the index surgery, patient-reported outcomes were assessed. Per his report, all incision wounds had healed well, and his genitourinary function had returned completely to normal. Tactile and erogenous sensation was back to baseline levels, over the scrotum



Fig. 2. Penile stump with exposed testes. Residual proximal urethra catheterized with Foley, by urologists.

along with ventral and dorsal aspects of the penis, from the glans, shaft, and base. He also reported achieving successful erections, ejaculation, and penetrative sexual intercourse.

DISCUSSION

Given the initial debridement and resulting deficit in length of neurovasculature, vein autograft and nerve allograft were incorporated. This being typically an injury with a large surface area of open wound and high risk of hematoma formation, low-dose heparin drip is the only anticoagulation used in the early postoperative period. At 1 month and 1 year after the procedure, the penile replant remained well perfused with returning sensation.

Tenuous viability of penile and scrotal skin has been previously discussed with a putative mechanism attributed to the transection of distal branches of the external pudendal artery⁷ that microsurgery cannot recapitulate. Techniques to provide subsequent coverage have been described, including skin grafts or local flaps (such as a bipedicle scrotal flap).⁸ In our literature review of 54 cases, 40 had microsurgical repair. Of this subset of patients, 78% experienced various degrees of penile or scrotal necrosis, with no clear correlation to the number or artery and vein repairs. Twenty percent of these repairs under microscope involved the use of grafts, but all but one described issues with skin necrosis as well. Each case

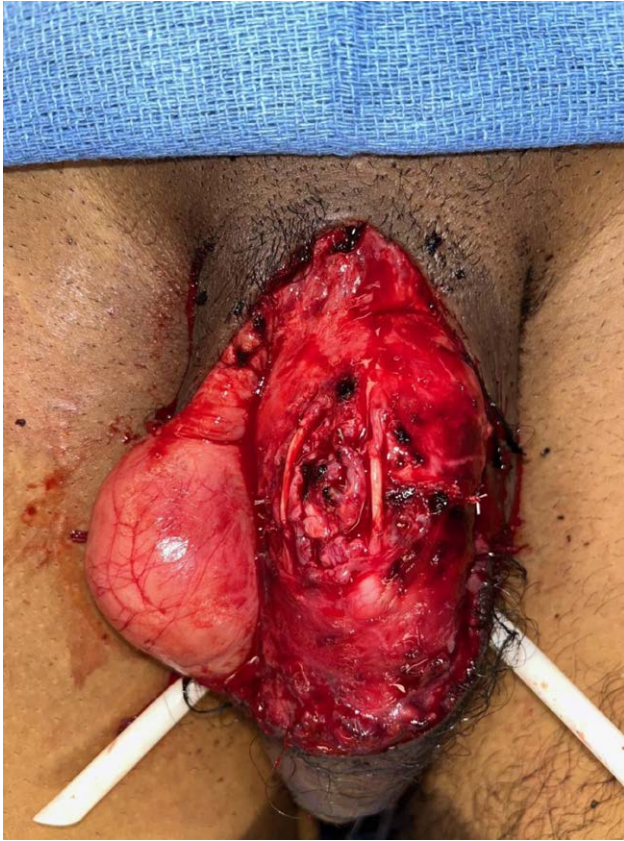


Fig. 3. Completed microsurgical repair of the left and right dorsal artery, vein, and nerves with interposition vein grafts and cadaveric allograft, respectively. The image displays the wound bed immediately before re-approximation of the tunica albuginea and external skin. The amputated part is partially tacked to the stump via skin sutures along ventral and lateral aspects.



Fig. 4. Three weeks postoperative examination demonstrating robust healing and viable penile and scrotal skin.

had an identifiable etiology: vessel thrombosis,^{9,10} lack of available vein targets due to burn,¹¹ only one artery and vein,^{12,13} and no artery repair.¹⁴ In the case discussed above, despite a scrotal hematoma, there was only minimal loss of skin, with sparing of the penile shaft and scrotum after the index procedure in the setting of complex reconstruction involving two veins and arteries. Given these findings, it appears likely that perfusion from the dorsal arteries alone is sufficient to supply the perforasomes of the penile and scrotal skin, contrary to previous descriptions. Aggressive debridement beyond the zone of injury and interpositional grafts are essential techniques to bridge the resulting gaps between proximal and distal ends of the neurovascular structures. Notably, focus on the initial debridement is either cursory or completely omitted in previous studies, and in most cases, fewer than two repairs of both inflow and outflow were performed.

CONCLUSIONS

Although the perforasomes critical to penile replantation have been debated, this patient was reported to have successfully recovered sensation and genitourinary/sexual function with minimal necrosis, using intentional

drain placement, aggressive debridement beyond zone of injury, and planned redundancies with dorsal artery/vein anastomoses via interposition grafts of the dorsal penile vessels alone.

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DISCLOSURE

The authors have no financial interest to declare in relation to the content of this article.

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