Penile Self-amputation

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Abstract

Background A 24-year-old man was urgently transferred from an outside institution after self-amputating his penis.

Methods The patient was suffering from a paranoid schizophrenic delusional episode. Voices told him to amputate his own penis with a utility knife. He was taken emergently to the operating room by urology and plastic surgery. Cystoscopy was performed and a 14F percutaneous suprapubic catheter was placed. The amputated distal penis and the proximal stump were debrided. The urethra, dorsal artery, and neurovascular bundles were mobilized. The distal urethra was spatulated dorsally and the proximal urethra was spatulated ventrally. The urethra was reanastomosed over a 16F Foley catheter with interrupted, 4–0 absorbable, monofilament suture. The corpora were reanastomosed with interrupted, 2–0 and 3–0, absorbable, monofilament suture. The arteries and nerve were reanastomosed. Total ischemia time was between 4 and 5 hours.

Results The patient initially developed edema, ecchymosis, and mild incisional skin necrosis from the resulting reperfusion injury. However, the penile graft successfully maintained perfusion. He was discharged 2 weeks after his injury in stable psychiatric condition. His Foley catheter and suprapubic tube remained in place for 10 weeks. A voiding cystourethrogram (VCUG) demonstrated a patent urethra without evidence of urinary leakage or stricture. At the time of his VCUG, he experienced return of distal penile sensation and partial erections.

Conclusion Penile reimplantation after self-amputation is successful if ischemic time is minimized and a multidisciplinary approach with plastic surgery and microvascular anastomosis is performed.

Keywords
- penile amputation
- microvascular anastomosis

A 24-year-old man was brought to an outside hospital emergency department by his mother after the distal three-quarters of his penis with a utility knife was completely amputated. The patient was hemodynamically stable at the time of presentation; however, he was actively bleeding from the dorsal penile arteries. Vascular clamps were placed for hemostasis, a Foley catheter was placed into the urethral stump for urinary drainage, 2 units of packed red blood cells were infused, and he was emergently transferred to our tertiary care hospital for further management. He was accompanied by his grandmother and maternal aunt. The patient reportedly suffered from a long history of depression. Additionally, he had experienced visual and auditory hallucinations, including commands to sever his own penis. He

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was not under psychiatric treatment at the time of injury; however, he self-medicated with marijuana. He was otherwise healthy, had no surgical history, and did not take any prescribed medications. On examination, he was awake and conversant. However, given his acute psychosis, he was not cognitively aware of his current situation. His amputated penile shaft accompanied his transfer, wrapped in moist gauze and maintained on ice in transit to minimize warm ischemia time ►**Fig. 1**.

The amputation itself was clean. Approximately 3 hours and 15 minutes after his injury, he was taken to the operating room by the urology and plastic surgery services for exploration and replantation of his penis.

Results

After induction of anesthesia, the urology and plastic surgery teams worked simultaneously. As described in detail later in this text, urology first prepared the native stump, while plastic surgery prepared the amputated stump. Once all services completed their respective side, they switched so that urology prepared the urologic aspects of the amputated stump and the plastics service prepared for the microneurovascular anastomosis of the proximal/native stump.

Urology began with flexible cystoscopy and a 14F percutaneous suprapubic tube was placed. Vascular control of the dorsal penile arteries was obtained with atraumatic vascular clamps. The penile stump appeared to be a clean and did not require significant tissue debridement (►**Figs. 2**, **3**).

The urethral stump and corpus spongiosum were mobilized and dissected 1 to 2 cm proximally and circumferentially off of the tunica albuginea and corpora cavernosa. This allowed sufficient mobility for a tension-free anastomosis of the eventual urethral reconstruction. Additionally, the ventral aspect of the urethra was spatulated 5 to 7 mm. Ten interrupted 5–0 monofilament, absorbable sutures were circumferentially preplaced through the urethral mucosa and corpus spongiosum. As the urology service was preparing the native penile stump, the plastic surgery service began with a back-table exploration of the amputated portion. Preparation of the vessels and nerves was performed. With the aid of loupe magnification, critical structures were carefully identified and dissected out. A maximal amount of length of these structures was provided to aid in the vascular anastomosis and nerve coaptation beyond the zone of injury. Two dorsal arteries, the deep dorsal vein, and the two main dorsal nerves were identified. Although there were no superficial dorsal veins identified, the deep dorsal artery was of adequate caliber. Additionally, it was felt that venous outflow could be maintained through the repaired corporal bodies.

Once the proximal portion of the urethra and corporal bodies had been prepared by urology for reimplantation, the amputated penis was prepared. Again, the urethra and corpus spongiosum were circumferentially mobilized off of the tunica albuginea and corpora cavernosa for 1 to 2 cm. The dorsal aspect of the urethra was spatulated for 5 to 7 mm. Simultaneously, plastics evaluated the native stump, identifying the corresponding neurovascular structures in preparation for microvascular repair.

After the urethra and corpora of both the amputated penis and native stump had been prepared, as well as the neurovascular structures on both segments had been identified and mobilized, the urethral reanastomosis was begun (►**Fig. 4**).

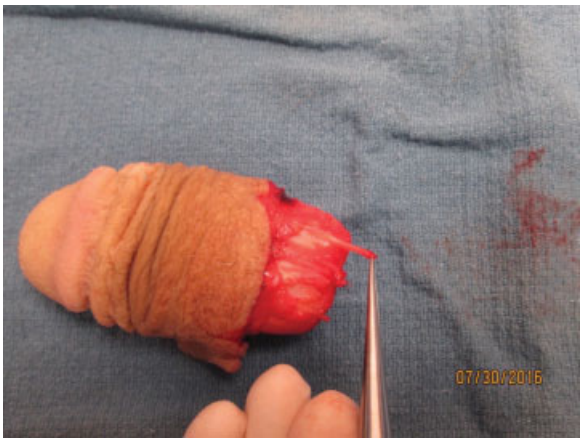

Fig. 2 Penile shaft. Neurovascular structures (two dorsal arteries, the deep dorsal vein, and the two main dorsal nerves) have been isolated and identified.

Fig. 1 Penile stump on initial evaluation. Surgical clamps placed for vascular control at the outside hospital emergency department.

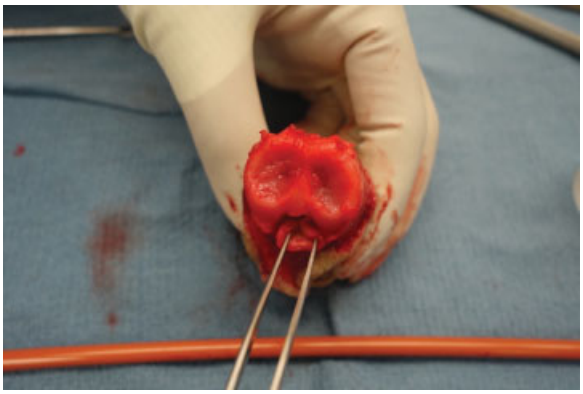

Fig. 3 Amputated penile shaft. The corpus spongiosum has been mobilized, and the dorsal aspect has been spatulated roughly 5 to 7 mm.

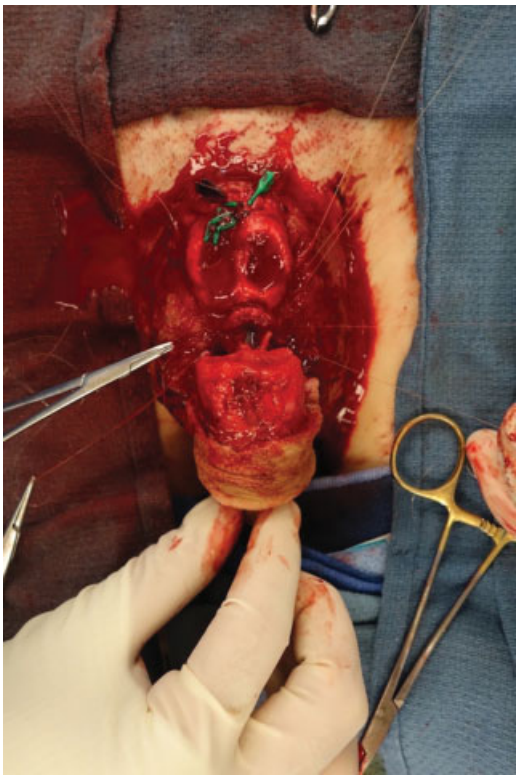

Fig. 4 Urethral anastomosis: Interrupted 5–0 monofilament, absorbable sutures. A 14F Foley catheter has been placed through the amputated penile shaft into the urethral stump.

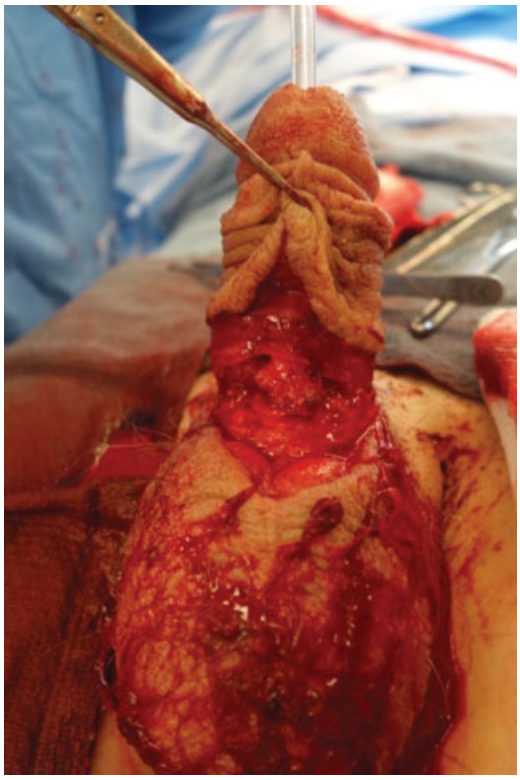

Fig. 6 Completed urethral and corporal anastomosis.

The preplaced 5–0 monofilament sutures from the proximal stump were circumferentially placed through the mucosa and corpora spongiosum of the amputated, distal urethra. Once the ventral aspect of the urethral anastomosis was complete, a 14F Foley catheter was advanced through the distal urethra, across the anastomosis, and into the bladder. The dorsal urethral anastomosis was then completed. The closure was tension free. The corpora cavernosa were then reconstructed using interrupted 3–0 monofilament (►**Fig. 5**).

The reconstructed urethra and corporal bodies provided a stable scaffold for the microvascular anastomosis. Once the vascular and nerve elements were identified and matched up, the operative microscope was brought into repair each structure sequentially. The deep dorsal vein was repaired end to end with a 3-mm coupler. The two arterial anastomoses were performed using 9–0 nylon suture in an interrupted technique. The two nerve coaptations were also repaired with 9–0 nylon suture in an interrupted epineural fashion and wrapped in a synthetic conduit (►**Fig. 6**).

Fig. 5 Microvascular anastomosis.

Buck's fascia and skin were then repaired loosely with 4–0 chromic to allow fluid egress and avoid the need for a formal drain. A strong reliable Doppler signal was marked on the amputated penile shaft distal to the anastomosis. A ViOptix monitor (Newark, CA; transcutaneous membrane oxygenation monitor) was placed. Xeroform and bacitracin ointment was applied to the incision line and a foam dressing was then constructed to keep the penis splinted to minimize disruption.

The patient was kept in the postanesthesia care unit for 24 hours with manual clinical examinations every hour by skilled nursing. The nurses evaluated the color, temperature, Doppler signal, and ViOptix reading of the amputated penis. In addition, he was kept NPO during the first day in the event of early microvascular complications and the need for an emergent return to the operating room. On the second postoperative day, his diet was advanced and nurse monitoring was spaced out to every other hour. On the third postoperative day, he was allowed to eat a regular diet without caffeine or chocolate and nursing checks were spaced out to every four hours. During the patient's early course, there was difficulty maintaining a ViOptix signal. This was attributed to his severe postoperative edema and ecchymosis. On the third postoperative day, the probe was removed and manual Doppler signals

were followed for microvascular assessment. He was kept on bedrest for 5 days, maintained on daily aspirin, and given subcutaneous heparin 5,000 units three times daily for venous thromboembolism prophylaxis. Based on his self-injurious behavior, a 1:1 sitter was present at all times during his hospitalization. He was seen by psychiatry, social work, spiritual care, case management, nutrition, and occupational and physical therapy.

Wound care included daily Xeroform gauze around the incision line. The foam splint was removed on postoperative day 5. After that time, he was placed in loose mesh underwear with ample padding to reduce compression and maintain elevation. There was a small area of anterior skin epidermolysis at the base, which was managed conservatively with local wound care including bacitracin ointment, Adaptic (Systagenix: Gatwick, West Sussex, United Kingdom), and gauze.

The patient was maintained on nitrofurantoin prophylaxis for optimal wound healing. He was ultimately discharged from the medical floor to the inpatient psychiatric unit where he was stabilized on an atypical antipsychotic and antidepressant medication regimen (►**Figs. 7–9**).

Ten weeks after his injury, the patient underwent a voiding cystourethrogram (VCUG). This demonstrated patency of his urethra without urethral stricture. There was no evidence of urethral anastomotic leak. He was beginning to experience

Fig. 7 Postoperative day 6. Significant edema and ecchymosis consistent with reperfusion injury. The distal penis remained warm with strong Doppler signals.

Fig. 8 Ten weeks after reconstruction.

fullness of his penis, consistent with partial erections. He developed some return of sensation to the distal penis. His Foley catheter and suprapubic tube were both removed.

His most recent follow-up appointment was at 7 months after surgery. He had no wound healing issues or contracture. His scar was barely visible and supple. Even a small area along the ventral surface which was left to granulate has healed very well. He was able to urinate and control his stream normally. Additionally, he was able to initiate and maintain an erection through self-stimulation. He has even been able to ejaculate during masturbation. Understandably he has voiced concern over sexual intercourse and damaging his repair. One interesting postoperative issue is that the 3-mm venous coupler, used to repair the dorsal vein, was palpable beneath his skin during his 7-month follow-up appointment. There was no evidence or concern for skin loss or erosion, but it is an issue to observe over time because this device cannot be removed.

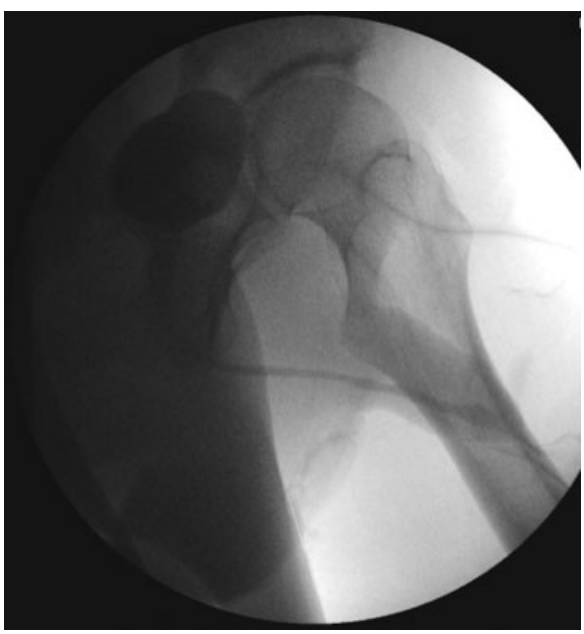

Fig. 9 Voiding cystourethrogram demonstrating urethral patency and no evidence of leak.

Discussion

Fortunately, penile amputation is a rare event. Waterhouse and Gross reported only three penile amputations in a review of 10,660 trauma admissions.[1] Other reports have described penile amputation resulting as a complication during circumcision, injury from marital disagreement, war-injured patients, and self-amputation during a psychotic episode. Currently, there are more than 50 articles describing replantation with the vast majority being case reports. Bhanganada et al describe an "epidemic" in Thailand in the 1970s whereby a Thai wife, humiliated by her husband's marital indiscretions, would wait for him to fall asleep and then amputate his penis with a kitchen knife. Roughly 100 of these cases occurred between 1973 and 1980.[2]

Successful microvascular penile replantation was first described in the late 1970s at the Massachusetts General Hospital after a 21-year-old man severed his penis with a straight razor. Prior to this case report, the penis was either not reattached (and the urethral stump was simply matured), or replantation was performed without vascular anastomosis. However, without a vascular anastomosis, these patients generally suffered significant penile skin loss, urethral stricture and fistula formation, and complete loss of sensation.[3] Eighteen patients who did not undergo a vascular anastomosis demonstrated the difficulties and high complication rate associated with this technique. Fourteen of 18 patients developed some form of skin loss; the majority of whom (10 of 18) had some loss of both the skin and glans.[1] Penile blood supply arises from the internal pudendal arteries. This continues distally as the common penile, cavernosal, and dorsal arteries. The cavernosal artery provides erectile function and the dorsal artery supplies the penile skin. Although this dual arterial system communicates with each other, anastomosing the cavernosal arteries alone is not enough to perfuse the skin and glans alone. This can result in significant skin necrosis.[4] Furthermore, in anatomic studies, it has been demonstrated that although the dorsal artery supplies the distal shaft skin, the external pudendal artery also plays a major role in shaft skin perfusion. This is a very difficult blood supply to reestablish due to the diminutive size and branching pattern of these arteries. Therefore, skin necrosis is commonly seen even after microvascular anastomotic techniques. In fact, skin necrosis has been found to be as high as 77% following replantation.[5,6] Following revascularization, edema is a common finding. Mineo et al reported the use of medicinal leeches to decrease venous congestion.[7] In the case of our patient, leeches were not used. Although there was a large amount of postoperative edema and ecchymosis, this was expected based on the nature of the injury and the ischemia time. The vein repair was widely patent as assessed via Doppler signal, indicating that the venous anastomosis was of more than sufficient caliber to support the recovering tissue. As such, leeches were not utilized as there was no venous insufficiency. In regards to return of sensation, it is possible to have return of sensation at 10 weeks. Although nerve regeneration occurs at variable rates, the typical rate for nerve regeneration and axon sprouting is roughly 1 mm/d (or 2–3 cm per month) after a latency period of approximately 1 month. This rate of growth is variable depending on the patient's age and overall medical status. Therefore, at 10 weeks postinjury, sensation would have returned to an area 4 cm distal to our coaptation. Nerve regeneration may be monitored on physical examination with an advancing Tinel's sign or by tapping over the nerve to elicit a tingling sensation. Our patient in particular experienced a positive Tinel's sign beyond the area of anastomosis, suggesting ongoing reinnervation. Maximal improvement in sensation may be expected roughly 1 to 2 years after his injury.

Last, a recent review evaluated 74 articles describing penile amputation in 106 patients, most often secondary to self-mutilation or trauma. Full sensation returned in roughly 70% of patients, normal erection in 77.5% of patients, and vast majority (97.4%) reported recovery of good urinary function. Skin necrosis commonly occurred in 54.8% of patients. Although there was no standardization across patients, it appears that coaptation of multiple nerves and the anastomosis of multiple vessels, in particular the superficial dorsal artery, is associated with improved sensation, sexual, and urinary outcomes.[8]

Conclusion

Penile reimplantation after self-amputation is successful if ischemic time is minimized, and a multidisciplinary approach with plastic surgery and microvascular anastomosis is performed.

Funding
None.

Conflict of Interest
None.

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