Pediatric Case Report

Complete Penile Amputation During Ritual Neonatal Circumcision and Successful Replantation Using Postoperative Leech Therapy

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Circumcision is the most common surgical procedure in males in the United States, and minor complications are not uncommon. Major complications like partial penile amputations have been reported with successful replantation. Complete penile amputations in adult males have been described, and successful replantation has been reported with increasing success. We report a case of complete penile amputation at the penopubic junction using a Mogen clamp in a 7-day-old neonate with replantation using postoperative leech therapy. To our knowledge this is the first time leech therapy has been used postoperatively for neonatal penile amputation.

CASE REPORT

Penile amputation is a rare injury. Microvascular replantation was first described in 1977 by Cohen et al., after which microvascular replantation of the dorsal arteries, veins, and nerves became the standard repair technique for penile amputation. The first reported case of clinical leech therapy in an adult patient after penile amputation was in 1996 because of postoperative venous congestion. Therapeutic use of leeches can be traced back nearly 2000 years. In BC 50, clinical hirudology was used to treat a variety of conditions. Galen, the personal physician of Marcus Aurelius, used medicinal leeches for bloodletting under the premise that disease was an imbalance of the bodily humors and their use did not decline until the end of the 19th century. Leeching returned to modern medicine in 1981 when French microsurgeons applied them to fingers after digital microvascular replantation, an indication for which leech therapy is still often used. Urologic indications are less common but should be recognized by urologists as a legitimate option for venous congestion after penile replantation in all age groups.

A 7-day-old neonate presented to the emergency room of a tertiary care children’s hospital less than 1 hour after his penis was amputated during ritualistic circumcision. The injury was the equivalent of a total penectomy. The amputated penis was transported in cool moist gauze and then was transferred into sterile heparinized-saline soaked gauze by the operative team. The patient was in the state of hemorrhagic shock upon arrival. He was emergently brought to the operating room for resuscitation at which point crystalloid and packed red blood cell transfusions were initiated. The urology team obtained hemostasis by initially degloving the corpora cavernosa proximally to create a small penile stump, allowing application of a tourniquet. The plastic surgery team examined the amputated penis under the operating microscope, placing a dorsal silk suture on the shaft skin in midline for orientation. Two dorsal arteries were identified and dissected free from surrounding tissue; the veins and nerves were not visualized. The urology team performed a spatulated end-to-end urethral anastomosis over a 6F Foley catheter. Anastomosis of the corporal bodies was completed using interrupted absorbable sutures to align the corporal tissue. Buck fascia and tunica albuginea were connected using interrupted absorbable sutures. The plastic surgery team performed microvascular anastomoses of the bilateral dorsal arteries with Ethilon (Ethicon, Johnson & Johnson) interrupted sutures using the operating microscope (Fig. 1A). No veins or nerves were...
identified during the microvascular repair despite heparin irrigation of the arteries and surrounding tissues. Skin closure at the base of the penis was completed with interrupted Monocryl sutures (Ethicon, Johnson & Johnson); also used were four quadrant Prolene sutures (Ethicon, Johnson & Johnson) to identify the anastomotic edge, should skin necrosis occur. A dorsal slit of the prepuce was performed to facilitate examination of the glans postoperatively. The penis appeared pink and viable at the end of the case (Fig. 1B).

The patient was transferred to the neonatal intensive care unit intubated to minimize movement, which could compromise graft stability. The patient was kept on intravenous cefazolin (50 mg/kg/day), with bacitracin ointment applied to the penis 3 times daily. To prevent platelet sludging within the graft and dorsal arteries, one-fourth tablet baby aspirin was administered daily in solution via a nasogastric feeding tube. Aggressive blood transfusion was avoided to prevent red blood cell sludging, observing a goal hemoglobin level of 10-11 gm/dL. On postoperative day (POD) 1, signs of venous congestion were evident; the penile shaft and glans were swollen, dusky, warm, and bled dark blood when punctured with a needle. The plastic surgery and urology teams together decided to use medicinal leech therapy to alleviate venous congestion related ischemia. Antibiotics were switched to cefepime (50 mg/kg/day) to cover leech oral flora. The penis was cleaned and draped using Vaseline gauze (Kendall, Covidien) to prevent leech migration and attachment off the graft; this also involved constant monitoring by the nursing staff and parents. One to 2 leeches were applied and were allowed to feed until engorged, at which point they willingly detached and were placed by nursing staff in an alcohol solution. Leeches were never re-used. New leeches were replaced every 15 minutes—1 hour continuously through POD 3, after which time they were used symptomatically as the glans or corporal bodies became engorged (Fig. 2A,B). Leech therapy was continued for 1 week. The patient required several blood, fresh frozen plasma, and platelet transfusions during the course of leech therapy, maintaining an international normalized ratio of ≤1.5 and platelet count between 50,000 to 100,000. On 2 occasions, 6-0 Vicryl sutures (Ethicon, Johnson & Johnson) had to be placed at leech sites after detachment for active bleeding, which could not be controlled with firm pressure. At the termination of leech therapy, the glans was pink and viable but the shaft skin appeared ischemic and was beginning to desquamate. The baby was extubated on POD 9. Superficial shaft skin necrosis was managed conservatively with dressing changes. Therapeutic dose antibiotics were switched to twice daily oral amoxicillin.

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Figure 1. (A) Microvascular anastomosis of the left dorsal artery under the surgical microscope using 10× magnification and using 10-0 Ethilon sutures. (B) Post—penile replantation appearance in the operating room. The glans was viable and Doppler ultrasonography examination confirmed good arterial signal at the end of the case.

Figure 2. (A) The penile shaft and glans are dusky from venous congestion on postoperative day 1. Two leeches were continuously placed until venous congestion was relieved. (B) After 1 day of leech therapy, there was a significant decrease in the engorgement of both penile shaft and glans. The dorsal shaft skin also reveals a leech site with ongoing bleeding after leech detachment because of the local anticoagulant effect of hirudin. This helped to prevent further venous congestion but did necessitate blood transfusion.
On POD 30, a voiding cystourethrogram was performed, without fistula or stricture, therefore the urethral catheter was removed. Prophylactic antibiotics were discontinued shortly thereafter. The patient was discharged home on POD 32 voiding spontaneously with a viable penis (Fig. 3A) and nearly entirely epithelialized penile shaft. Initial outpatient follow-up at 6 weeks post injury revealed a strong urinary stream, no evidence of urethrocutaneous fistula, and completely epithelialized shaft skin, which had healed by secondary intention. Between 2 and 3 months of age, the patient’s mother reported noticing early morning erections. At an age of 8 months, the penis looked quite normal, and a strong urinary stream was observed by the urology team (Fig. 3B).

COMMENT

Hypovolemic shock should be suspected after penile amputation and consequently aggressive resuscitation should commence immediately. The infant in this case report presented in shock despite entirely appropriate triage and transport to the operating room within 1 hour of injury. Ongoing transfusion requirements should be expected after penile replantation with the use of leech therapy, and parents must be appropriately counseled. Three factors contribute to high bleeding risk during medicinal leech therapy: the leech’s salivary hirudin (a potent medical anticoagulant), antihistamines (vasodilators), and hyaluronidase (which allows the anticoagulant to spread throughout the wound or graft). Additional risks of leech therapy include leech migration, anemia, need for blood product transfusions, inherent transfusion risks, and local soft tissue or graft infection. Aeromonas species, specifically Aeromonas hydrophila, pose the highest risk, and are common flora in the mouths of leeches. Additional reported opportunistic organisms include Serratia marcesens, Aeromonas sobria, and Vibrio fluvialis. Current uses of medicinal leech therapy in urology are in adult penile amputations and surgical penile reconstruction. Also, it is currently used in postoperative care for digital amputation, salvage of avulsed lips in plastic surgery, and head and neck reconstructive surgeries.

CONCLUSION

Complete penile amputation and replantation in the neonatal population is extremely rare. Microvascular revascularization is the gold standard for optimal outcome; however, in the setting of a 7-day-old, the delicacy of microvascular repair may seem intimidating. We believe, with the assistance of sufficient magnification, neonatal microvascular penile replantation is still possible. We report the first case of penile replantation for complete penile amputation with arterial microvascular anastomosis and the use of postoperative leech therapy for venous congestion.

REFERENCES