SUCCESSFUL MACROVASCULAR PENILE RE-IMPLANTATION AFTER TRAUMATIC AMPUTATION IN A YOUNG MALE

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ABSTRACT

Penile amputation is an uncommon occurrence that arises from acts of self-mutilation, unintentional trauma, or deliberate assault. In recent advances, multiple reconstructive techniques provide excellent outcomes for penile re-plantation. Here, we present a case of successful penile re-plantation and urethroplasty following 24 hours of ischemia in a 22-year-old male with complete urethral injury and a partially amputated penis. As far we know , this is one among the longest documented ischemia time for successful macrosurgical penile re-plantation. After 6 weeks of penile re-plantation, the patient recovered well and showed normal urination, erectile function, return of sensations, and satisfactory cosmetic outcome. Penile amputation injuries should be managed in a specialist center with expert urological and plastic surgeons of micro/macrosurgical reconstruction. The main aim of this study is to evaluate the treatment regimen and prognosis of macrosurgical re-plantation of penile stump.

Keywords: (Traumatic amputation, longest documented ischemia, complete urethral injury, Macrovascular reconstruction)

Traumatic penile amputation is an uncommon surgical emergency. Despite the availability of repair techniques documented in the literature, the reasons for replantation failure remain poorly elucidated and documented. A systematic analysis of 80 cases spanning from January 1996 to May 2007 [11] revealed that only 37.5% of cases resulted in successful replantation. The primary causes of penile amputation include self-harm, accidents, circumcision, assault, and animal attacks. Presented here is the case of a 22-year-old male who underwent a successful penile replantation, accompanied by a discussion on recent advancements in the treatment of this condition.

A 22-year-old male patient arrived at our hospital's emergency department with a traumatic amputation of the penile shaft and complete amputation of the urethra caused by a work-related machine injury.

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The plastic and aesthetic surgery department referred him to urology for urethroplasty, as they declined to perform penile reimplantation due to the patient's late presentation with 24-hour ischemia time after injury. A suprapubic catheter was inserted for urinary drainage. Upon examination, the penile skin distal to the amputated area was found to be viable, with the dorsal skin flap of up to 2mm intact. The corpora cavernosa, corpus spongiosum and spongy urethra were completely severed. The patient received resuscitation, broad-spectrum antibiotics, and tetanus prophylaxis in the emergency department. Once all baseline and preoperative tests were completed, the patient was transferred to the operating theater for wound exploration and replantation of penis.

The patient was admitted through the emergency department and had an Ultrasound scan of Abdomen, Pelvis and genital region. All baseline investigations were done. A traumatic amputation of penile shaft was seen on examination with obvious findings. No other injuries were detected.

- Penile Amputation
- Penile Contusion
- Penile Fracture
- Traumatic Avulsion of Penis
- Zipper Injury to Penis

The patient was shifted to the operation theater for surgical intervention and penile replantation. On initial look, the shaft area of ventral surface of penis, almost 5cm from root of penis was lacerated with complete laceration of urethra , corpora cavernosa and corpus spongiosum

and intact skin of upto 2mm at dorsal surface. The wound was irrigated with warm saline mixed with heparin before suturing, and a 14Fr silicone catheter was inserted into the bladder through the penile urethra. Wound was approximated and a 6-point urethral end-to-end anastomosis was performed using Vicryl 4.0, followed by suturing of the corpora cavernosa and corpus spongiosum with vicryl 3-0. Skin was stitched using Vicryl 2-0 with interrupted sutures. Care was taken to avoid damaging to the surrounding tissues, and a pressure bandage was applied. No signs of necrosis were observed during or immediately after the surgery. The wound was dressed with paraffin gauze and antibacterial ointment. Intraoperative images can be seen in Figures 1A and 1B. The total operative time was 2 hours and 15 minutes. Post-surgery, broadspectrum intravenous antibiotics and painkillers were given. The patient underwent examinations every 6 hours for up to 36 hours then 12 hourly till 6th day post operatively. Although the skin color at the suture site darkened, the distal end of the penis remained viable with normal skin color. The patient was discharged from the hospital on the 6th day after the surgery. Upon the 1-week follow-up examination, necrosis of the penile skin at the suture line was observed, while Doppler Ultrasound scan revealed preserved capillary filling. The catheter was extracted on the 10th day post-surgery, and the patient experienced no issues with urination. After 6 weeks, during the subsequent follow-up, the penile skin appeared normal with a slight dark line at suture area, also the patient confirming full wound recovery along with satisfactory erectile function, sensation, and urine flow. Figures 2A and 2B display images of the wound captured during the follow-up appointments.

The patient was hospitalized for a total of six days. Following the surgery, close monitoring was conducted for the initial 24 hours, and subsequently every 12 hours for the next 48 hours. Intake/output charting was meticulously maintained, in addition to strict monitoring of vital signs. The wound was carefully assessed for any signs of discoloration, changes in penile skin color, turgor, viability, capillary refill time, and temperature. After six days, the patient was discharged with a treatment regimen of intravenous antibiotics and painkillers and daily wound care. Upon discharge, the wound was inspected, revealing skin discoloration at the suture site, although the distal end of the penis exhibited normal temperature and skin color, indicating viability. The patient was instructed to change the dressing daily using Paraffin Gauze and Polymyxin B ointment. Follow-up appointments at the Out-patient-department (OPD) were scheduled on a weekly basis. The urethral catheter remained in place for 10 days post-surgery. The patient reported a successful recovery, with the return of sensations and full erection occurring six weeks after surgery.

The occurrence of penile amputation is infrequent, with limited literature available on its immediate management. These injuries necessitate collaboration between urological and plastic surgeons who are skilled in performing complex reconstructive procedures [1] to achieve satisfactory outcomes [2]. The first recorded case of macroscopic penile reattachment was documented in 1929 by Ehric. Initially, penile reattachment was carried out for traumatic injuries using macro-surgical techniques, involving the removal of all necrotic tissues, approximation of related structures, and the application of a slip graft to cover the penis [3]. In cases where a microsurgical unit is not accessible or transfer time may exceed 24 hours, a macro-vascular or corporal reattachment technique can be utilized, although the risk of failure and skin necrosis is higher [7]. Factors influencing positive outcomes include the extent and nature of the injury, duration of warm and cold ischemia, expertise of the surgical team, and the equipment utilized. As per the guidelines of the British Association of Urological Surgeons regarding the management of such injuries, the success of reattachment is dependent on the duration of warm and cold ischemia. Reattachment can be attempted within 24 hours of the injury, allowing for 4 hours of warm ischemia time and 16 hours of cold ischemic time. Beyond this timeframe, the success rate significantly decreases [1]. The unique vascular supply of the penis enables favorable outcomes without vascular re-anastomosis in cases of incomplete penile reattachment [9]. A case of incomplete penile reattachment was reported by Riyach et al., utilizing non-microsurgical techniques where the deep penile arteries and superficial deep dorsal vein were left unrepaired. The results were positive, with a normal-looking penis, ejaculation, erection, and preserved sensation [10]. Microscope-assisted anastomosis and dorsal repair are considered the gold standard technique [6]. The first microsurgical re-plantation was reported by Cohen in 1977 [4], involving the re-anastomosis of the dorsal penile vein, penile arteries, and dorsal nerves, crucial for successful replantation. Microsurgical repair is linked to improved erectile function, reduced risk of urethral stricture, and fistula formation. A review

by Kochakarn in 2000 of upto 100 cases indicated that both microsurgical and macrosurgical approaches yielded positive outcomes following penile replantation, even with ischemia times of up to 24 hours. The outcome of the procedure yielded satisfactory results, as it successfully achieved both adequate cosmesis and restoration of erectile function. However, the assessment of successful penile replantation has been challenging due to the wide variation in outcome measures, which hinders the clear definition of success in reattaching an amputated penis [8]. Nevertheless, certain factors are crucial in determining the success of the procedure, including the presence of viable tissues with a reasonable aesthetic outcome, the ability to urinate through the penis, and the restoration of sexual function. Several complications have been reported, including skin necrosis, decreased penile skin sensation, urethral strictures, erectile dysfunction, and urethral fistulae [6]. In a study conducted by Li et al, which involved 109 cases of penile replantation using the macrosurgical technique, it was found that 51% of patients experienced erectile dysfunction and urethral stricture as common complications. Postoperatively, the administration of broad-spectrum antibiotics, vasoactive agents, and diethylstilbestrol has been reported, and in some cases, phototherapy treatment has also been utilized. However, the use of diethylstilbestrol is limited due to the higher risk of inadequate blood supply to the graft.

- A macro-surgical technique without microsurgical vessel repair is able to restore normal urinary function in a patient with penile amputation and complete urethral injury.
- Skin necrosis following penile replantation is a frequently encountered complication that can be effectively treated through proper wound care and debridement.
- Penile re-plantation should be attempted, even after 24 hours of ischemia , despite lower success rates.

Patients consent for use of data for publication:
I Farman resident of Nowshehra hereby consent to publish my particulars for research purposes and I do not have any objection.

Sign and Signature:

Authors contributions:

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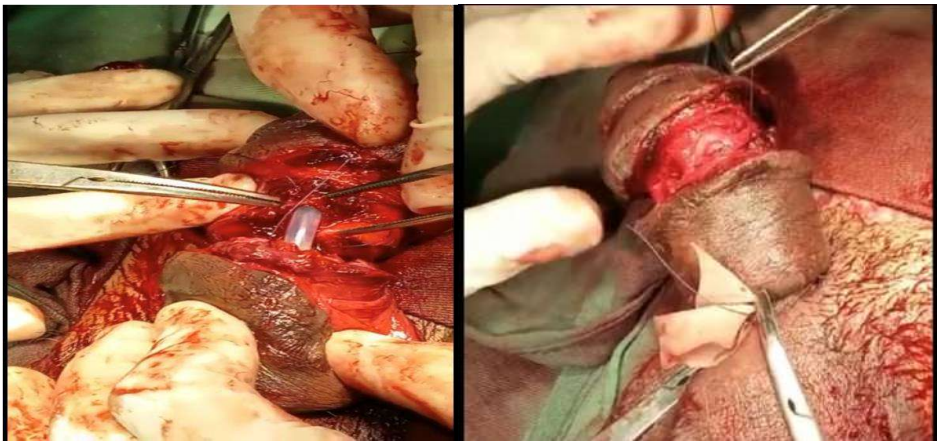

Figure 1A, 1B: Intra-operative images

Figure 2A, 2B: Post-operative and Follow-up images

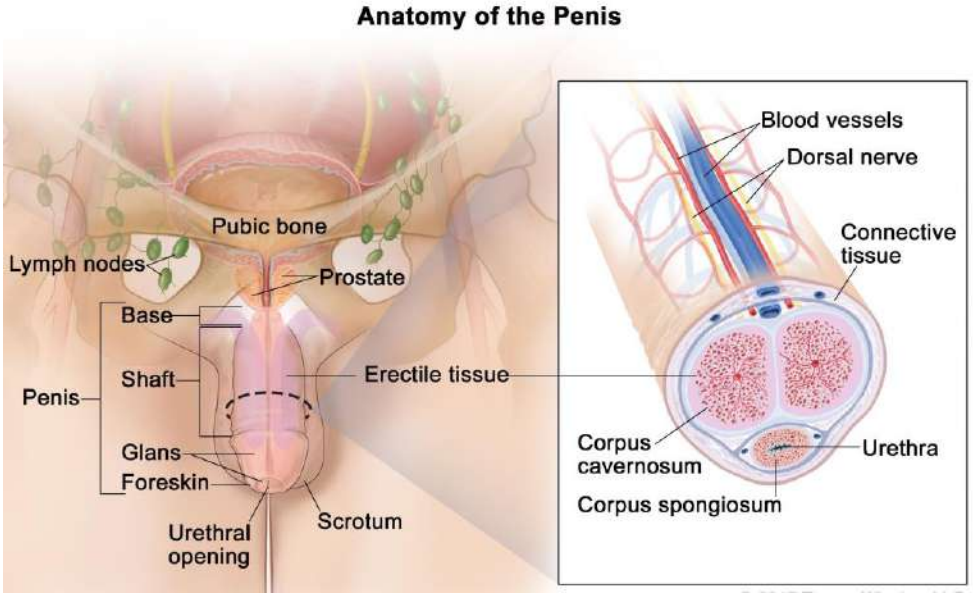

Figure 3: Anatomy of the penis

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