

Successful Revascularization in Post- traumatic Subtotal Penile Amputation With a Prolonged Warm Ischaemia Time(WIT) of 14 hours: A Case Report

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ABSTRACT

Post-traumatic complete or subtotal amputation of the penis is a very rare surgical emergency and is usually caused by self-mutilation during an acute psychotic episode, accidents, as a circumcision complication, criminal assault and animal attacks. Among all these causes, self inflicted and accidental injuries cover a large portion of this form of penoscrotal trauma and assault being a very uncommon cause. Here, we report a case of a 26 year-old man who sustained subtotal penile amputation following a criminal assault and underwent successful revascularization after a total warm ischemia time (WIT) of around 14 hours.

Keywords: Traumatic; Penile amputation; Replantation

INTRODUCTION

In the field of surgery, penile amputation is an infrequent emergency that needs to be addressed immediately in order to maximize functional outcome and to minimize the psychological morbidity associated with it. The common causes of this rare injury are self-mutilation during an acute psychotic episode (Klingsor's syndrome), accidental trauma, violence and criminal assault.^[1] With advent of micro neurovascular techniques, the surgical management of such injuries has changed from the previous unavoidable penectomy to successful reimplantation.^[2] Ehrlich et al. were the first to report the penile replantation using a macro surgical technique in 1929. However the first successful penile replantation by microsurgical techniques involving the repair of vessels and nerves was reported in 1977 by Cohen and Tamai et al.^[3,4] Presently there is no universally accepted regime regarding the surgical management of patients with penile amputation because of lack adequate literature.^[5] The surgical experience and available literature describing the favorable outcomes of penile replantation, especially after incomplete amputation

Case Report (ISSN: 2834-5673)

is too little. In our patient we tried to evaluate the surgical treatment approach as well as the results of revascularization in subtotal penile amputation with a warm ischemia time of around 14 hours.

CASE REPORT

A 26-year-old unmarried male, laborer by profession, with no significant past medical and psychiatric history presented to the emergency department (ED) of our hospital with partially amputated penis 11 hours after sustaining the injury, following a criminal assault. The patient had diffuse penile bleeding from the wound and severe pain (Figure 1). Immediately after the patient arrival, trauma resuscitation protocol including airway, breathing, and circulation assessment was performed according to latest ATLS guidelines. After securing a IV line with a grey cannula, patient was given optimal analgesia to control pain, intravenous fluids, antibiotics and a blood sample was taken for laboratory tests including hematology, blood grouping and cross match and serum chemistry. Patient also received tetanus prophylaxis. To control the profuse bleeding in emergency room, initially manual compression was applied followed by the application of hemostatic sutures (Figure 2). However the hemodynamics of the patient was maintained with a pulse rate of 90 beats per minute with a blood pressure of 110/60 mmHg. After pain control, the patient was examined for the injury and findings of deep wound through the dorsum of the penis just distal to the penopubic junction, with diffuse bleeding from the wound were found. However the extent and the depth of the injury was not evaluated precisely because of bleeding upon releasing the manual compression. The dorsal skin over penis including glans was deeply congested with egg plant deformity of the shaft the penis. The scrotum and both the testicles were found to be intact. Laboratory tests were within normal values with a hemoglobin value of 13.20 g/dl. After taking a consent for surgery, the patient was urgently shifted to emergency operation theatre for assessment of the injury and the required surgical intervention. The patient was placed in the supine position and underwent general anesthesia with orotracheal intubation, jointly operated by teams of urology and plastic surgery. The part was sterilely prepped and draped. Saline irrigation of the wound was done to remove the blood clots to enable proper assessment of the depth of the injury. On surgical exploration, complete transection of corpus cavernosal bodies including superficial and deep dorsal veins, dorsal and deep arteries, the nerves and partial rupture of corpus spongiosum, with completely intact urethra, were found. (Figure 3). A 16 F Foley's catheter was passed through without any resistance. The two corpora cavernosae and the corpora spongiosum bodies were repaired using vicryl 5-0 interrupted suture. The dorsal vessels, including arteries and veins, and the nerves were identified. After flushing the with heparinized saline with a concentration of 100 U / ml, the veins from the amputated part were found to have adequate flow and were repaired end to end using 9-0 nylon suture, interrupted. We have not repaired any artery as just after flushing the vessels with heparinized saline there was satisfactory venous outflow from the amputated part indicating sufficient intact arterial inflow possibly because of unsevered corpus spangiosum. Intra operatively, just after the microscopic venous repair the penile congestion begin to improve on table. Epineural end to end repair of the nerves was done with 9-0 nylon suture, interrupted. Severed Dorsal fascia was repaired using vicryl 4-0 interrupted suture. All the micro neurovascular structures were repaired under operative microscope with magnification of 8X. Skin was repaired using vicryl 4-0 interrupted suture. Multiple fish mouth incisions were made on the congested dorsal penile surface and these incisions were soaked with heparin plegets to facilitate it's decongestion. As the venous flow was reestablished within 3 hours after receiving the patient in emergency department thereby further increasing the warm ischemia time by 3 hours to a total warm ischemia time (WIT) of 14 hours. A antigravity penile splint was

Case Report (ISSN: 2834-5673)

used to avoid the dependent position of the penis thereby facilitating the venous return and improve the venous congestion. The heparin plegets were changed every 8 hourly for first 3 days. Postoperatively the patient was advised bed rest for 5 days. Monitoring for penile vascularity was done by clinical assessment hourly for first 48 hours followed by 4 hourly for next 72 hours .Administration of intravenous broad-spectrum antibiotics(BSA) ,patient controlled analgesia (PCA) and unfractionated heparin 5000 IU subcutaneously every 8 hourly were given for first five postoperative days . On the 3rd postoperative day the dressing was changed (**Figure 4**) and patient was discharged on 7th postoperative day and advised to follow up outpatient patient department (OPD). Around 5 months after surgery, the patient reported feeling of sensation to glans penis and gradual recovery of spontaneous penile erection.



Figure 1: Pre-operative photo showing penile injury and application of the digital pressure to control the bleeding



Figure 2: Pre-operative photo showing penile injury with congestion of the penile dorsal skin and in situ hemostatic sutures.



Figure 3: Intra- operative photo showing subtotal amputation with egg plant deformity of the shaft of the penis and intact penile urethra.



Figure 4: Post- operative photo showing a healed sutured wound and a viable penis.

DISCUSSION

Among the surgical emergencies, penile amputation is not common one.^[1] The etiology is varied with the majority of cases due to self-mutilation secondary to psychiatric disorders which accounts for about 87% of all cases. Klingsor's syndrome is amputation of penis by the patient himself secondary to underlying psychiatric disorders involving religious delusions, substance abuse, and isolation from or neglect by society. The extent of penile injury ranges from minimal skin laceration to total amputation.^[7,8] A handful of reported cases arise from accidental industrial trauma, masturbatory trauma, and assault by other person.^[2,9] In our case report the etiology was a criminal assault. In 1929 using a non- microsurgical method penile replantation was first performed by Ehrich, involving surgical excision of all non-viable tissue, repair of the transected tissues and application of split thickness skin graft (STSG) to cover the post debridement penile raw. Unfortunately the patient developed glans hematoma as immediate complication. After 2 years patient had urethral stricture and micro phallus however the penile shape was normal with retained function.^[10] Later on after a decade the first microsurgical penile replantation was reported by Cohen.^[5] Between 1966 to 2007 around 30 successful penile replantation surgeries performed were reported upon conducting a literature review.^[11] In 2017, Morrison et al. studied 106 patients ,who had underwent penile replantation , in a systematic review and concluded that the procedure is safe and effective.^[5] In last five years Liu et al. (2019) reviewed 13 published case reports of penile amputation and showed that gross contamination or prolonged ischemia time are not the factor affecting the penile replantation outcome , unless the injury sustained was severe.^[6] Due to the limited available literature, heterogeneous surgical techniques and post-surgical protocols with no standardization, penile replantations still pose a great challenge to surgeons.^[6] Penile amputation can be classified into complete and incomplete based on the severity of injury.^[12] However there is no clear definition regarding incomplete amputation. The incomplete amputation with survival of vessels and nerves has a better prognosis compared to those with neurovascular damage.^[6]

The critical factor that has a bearing on the success in penile replantations are the reestablishment of the blood flow by early anastomosis of penile vessels and nerves.^[6] The inherent advantage with micro neurovascular techniques is the very precise and healthy anastomosis of vessels or coaptation of structures, which yields in better outcome in the form of recovery of tactile sensation and control of sexual function and indirectly leading to better patient satisfaction. A very meticulous anastomotic repair of cavernosal arteries and dorsal structure resulted in recovery of erectile function as reported by Jezior et Al.^[11] Unlike in total penile amputation, in subtotal penile type some authors proposed to attain good results without attempting blood vessels re-anastomosis.^[12] In our patient, we repaired all the neurovascular cut structures except the arteries. Microsurgical procedures ensures very precise

Case Report (ISSN: 2834-5673)

vascular repair which establishes early and adequate penile blood flow resulting in better outcome in the form of erection, ejaculation and voiding stream during micturition.^[9]

The results of penile replantation are assessed subjectively both by the surgeon and the patient and there is no objective assessment tool.^[11] The subjective criteria comprises the post replantation survival of penis, adequate urinary stream, cosmetic appearance and recovery of sensation and erection.^[2,5] Injury related factors like ischemia time duration, etiopathogenesis and severity of the injury and procedure related factors like microscopic repair yield better outcome.^[5,11] Like for any limb amputation, in penile amputation as well 'golden period' of 6 hours is expected to yield good outcome however acceptable recovery has been achieved after microsurgical procedures with ischemia time exceeding 10 hours.^[6] Surprisingly, promising results have been reported after 16 hours cold ischemia or injuries of exceeding 24 hours.^[12,13,14] In our case report though the total warm ischemia time exceeded 14 hours but the immediate post operative results were acceptable.

The limitations of our case report is the lack of long-term follow up to know the end results and the development of any late post operative complications like penile shortening, chordae etc., as our patient did not attend our OPD probably because of Covid pandemic, besides there are no standardized and validated methods to quantify our results.

CONCLUSIONS

Penile amputation is a surgical emergency with varied etiologies. Our case report further adds to the little available literature related to management of subtotal penile amputation with partial spongiosal injury as most of the available cases reported till date comprise of total amputation. Need of the hour is to establish well-validated penile trauma algorithm with multidisciplinary teams involving, urologists, plastic surgeons as well as other healthcare providers to optimize the management of such devastating injuries.

CONFLICTS OF INTEREST: None **FINANCIAL SUPPORT:** None

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Case Report (ISSN: 2834-5673)

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