



African Journal of Urology

Official journal of the Pan African Urological Surgeon's Association
web page of the journal

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Genito-Urinary Trauma

Case report

Successful penile reimplantation and systematic review of world literature



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Received 20 July 2016; received in revised form 17 January 2017; accepted 22 February 2017

Available online 30 August 2017

KEYWORDS

Traumatic;
Penile amputation;
Reimplantation;
Psychiatric illness;
Penile transplantation

Abstract

Introduction: There is paucity of case reports that describe successful non-microscopic penile reimplantation. We report a case of a self-inflicted penile amputation in an apparently normal patient with first psychotic break.

Observation: To report on a case of successful macrosurgical penile reimplantation, discuss the etiologies, surgical techniques and outcomes of world literature on penile reimplantation and an update of current trends in penile surgery. A 40 year-old male, father of 3 children and a proprietor of a nursery school with no prior psychiatric disorder was rushed to our trauma centre following a self-inflicted total penile amputation at its base with incomplete laceration of the scrotum due to command hallucination. He was immediately resuscitated and underwent a non-microscopic penile reimplantation and scrotal closure by an experienced urologist (JEM) by reattaching the dorsal vein, urethra, corporal, fascial and skin layers. A functional outcome with respect to voiding, penile erection and cosmesis was excellent.

Conclusion: Self-inflicted penile amputation may manifest as first psychotic break in apparently normal subjects. Though microscopic neurovascular reconstruction is the gold standard, macrosurgical reimplantation of penis by an experienced surgeon in the absence of a microscope yields satisfactory results.

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Introduction

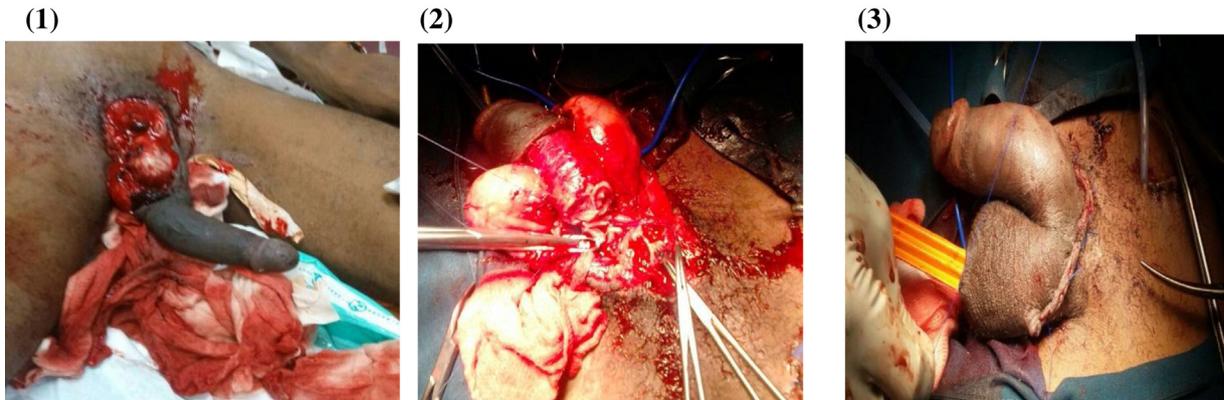
Males are prone to have external genitalia injuries more frequently than female because males are more exposed to violence or extreme exercise [1]. External male genitalia injuries can be categorized as accidental i.e during circumcision, zipper injury or penile frac-

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Peer review under responsibility of Pan African Urological Surgeons' Association.

Images of amputated penis before and after reimplantation.



Figures 1–3 (1) ER-Amputated penis. (2) Tunica albuginea closure. (3) Reimplanted penis.

ture or as traumatic in origin i.e motor vehicular accident (MVA), animal bite, gunshots, penetrating injury, strangulation injury, self-amputation, criminal, assault injury [2]. Self-emasculatation of the penis may be as a result of Klingsor syndrome (disease of self-mutilation by a psychiatric patient, often suffering from religious delusions). About 87% of penile amputations are due to an underlying psychiatric disorder [3,4]. Self-mutilation is a way of expressing and dealing with deep distress, anger, dissociation, and emotional pain in order to have self-purification [5]. However, self-purification by self-mutilation does not last very long [5]. Also self-mutilation may present an individual's first psychotic break. Historically, there was an epidemic of penile amputation by Thai women in the decade after 1970s [6].

External male genital injury by self-mutilation involves injury to the penis, the scrotum and the testicles. The type of injury varies from simple skin laceration to total amputation of the penis and laceration of scrotum and or testis as occurred in our patient.

We, therein, report a case of a self-inflicted penile amputation in an apparently normal patient who had first psychotic break and review literature on penile amputation.

Case report

A 40 year old man, father of 3 children and a proprietor of a nursery school with no prior medical history was rushed to our trauma centre following a self-inflicted penile amputation and partial laceration of his scrotum due to command hallucination from first psychotic depression. Further interrogation revealed he had been summoned by Metropolitan Authority to close down his nursery school or face demolition of his infrastructure due to unlawful citing. The directive triggered a reactive psychotic depression with command hallucination resulting in dismemberment of his penis at its base with a razor blade. He was discovered 6 h later in his washroom lying in a pool of blood. He was in haemorrhagic shock on arrival at the ER with blood pressure of 98/66 mm Hg, weak and thready pulse of 121 beats per minute. His haemoglobin level was 6.5 g/dl (reference range 11–18 g/dl). He was immediately resuscitated with intravenous fluids and haemotransfused with 2 units of whole blood and tetanus prophylaxis given. He was subsequently counseled and consented for macroscopic penile reimplantation.

The surgery was done under general anaesthesia. Prophylactic intravenous third generation cephalosporin antibiotic was given. A formal cystostomy was done to divert the urine with a 16Fr silicon catheter followed by meticulous reimplantation of the penis (Fig. 1).

We placed interrupted 3–0 monocryl sutures through the tunica albuginea of the corporal bodies on the ventral aspect and snapped them for future tying (Figs. 1 and 2). Next, we freshened and spatulated the urethra and attached it in a tension-free 360-degree fashion using interrupted 4–0 monocryl sutures over a 20Fr silicon urethra catheter. The corporal bodies were then closed in interrupted fashion using 3–0 monocryl sutures. Careful reapproximation of the tunica albuginea near the vessels on the dorsal aspect was done in order not to compromise the blood supply. Tension-free approximation of the dorsal vein then followed. Reimplantation was completed by closing the corporal bodies, fascial layers and skin (Figs. 1 and 3). The wound was then covered with povidone-soaked gauze and the scrotum elevated. His wound was complicated by partial dorsal skin necrosis which healed with continuous wound dressings. Whilst on admission, he was referred and reviewed by the psychiatrist and put on oral olanzapine 10 mg nocte and oral fluoxetine 20me nocte. He was discharged home on postoperative day 20 after clearance the by psychiatrist to continue treatment on outpatient basis. He is happy with the penile cosmesis (Figs. 2 and 4) though regrets his action. He has since been voiding well (peak flow = 21 ml/s) and has mild erection dysfunction (IIEF-5 = 17).

Discussion

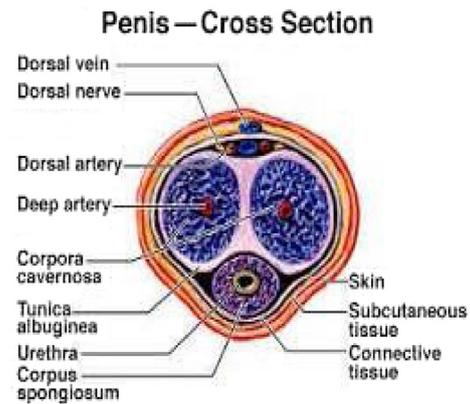
Penile amputation is a urological emergency which requires urgent surgical intervention because the associated hemorrhage can be torrential and life threatening as occurred in our patient due of the rich penile vasculature (Figs. 2 and 5). Different weapons have been utilized in penile amputation cases, which range from sharp blades, heavy machinery to projectile objects [7]. Razor blades was the most common weapon used, as occurred in our case and other reported cases [7–17]. Earlier case reports of self -penile mutilation were published in the mid 1800s and successful penile reimplantation was reported in 1926 [18].

There is no consensus on the classification of external genitalia injuries because of the diverse nature of injury mechanism. Rashid

The reconstructed penis 4-months after surgery



Diagram of a cross section of the penis



Figures 4 and 5 (4) Four-months after penile reconstruction. (5) Diagram of a cross section of the penis (source-google image).

et al. reported the classification of male genitalia injury by anatomical location [19]. Type I injury includes distal portion of the penis with proximal part of the penis being preserved. Type II injury includes severe injury on shaft of penis with penile crus being preserved. Type III injury includes the injury when urethral catheterization is necessary with external urethral part being preserved. Type IV injury, as in our case include injuries that requires a suprapubic cystostomy [19]. This classification, however, could not reflect injury mechanism by penetrating or strangulation.

Penile amputation requires immediate surgical intervention without elaborate investigations due to the accompanying blood loss. However, flexible urethroscopy may be necessary in certain cases for evaluation of the proximal urethra and bladder integrity to rule out associated injuries. Doppler studies or penile *plethysmography* may also be done after reimplantation to assess penile blood flow and erectile function.

A systematic review of the literature revealed approximately 80 cases reported worldwide of penile self-amputation from 1966 to 2007, with at least 30 successful penile reimplantation [20,21]. The weapon utilised, underlying reason, ischemia time, operative measures undertaken, and postoperative complications and erectile dysfunction of various traumatic penile amputation case reports published in the literature are compared with our case report in Table 1. Exclusion criteria were non-English publication, those in which reimplantation was not attempted or not done and those for which operative details and complication were not stated. One limitation of published case in literature is the lack of objective assessment of the postoperative voiding and erectile dysfunction.

Riyach et al. published their successful macrosurgical reimplantation of an amputated penis by approximation of only the corporal bodies and urethra without any attempt at neurovascular bundle reconstruction and yet reported excellent voiding and erection. They, therefore, concluded that the corpus spongiosum may have a role in arterial supply, venous drainage and penile erection [8]. In our case, we repaired only the dorsal vein, urethra and corporal bodies due to lack of a microscope and yet had satisfactory results. We are, therefore, convinced that the corporal bodies may serve as a conduit for penile blood flow.

To date, there are no specific guidelines for the treatment of severe penile injury because the injury mechanism is complex and multifaceted. However, the primary goal for the surgeon managing penile amputation is to achieve normal-like appearance, reduce functional damage such as erectile dysfunction and sensory loss, and minimise the postoperative sequelae.

Early reimplantation of the amputated phallus is the gold standard. The amputated penis should be transported to the hospital wrapped in saline-moistened gauze and placed in a sealed plastic bag which is stored in ice slush “bag in bag”.

If reimplantation fails or not possible due to penile loss, then a neophallus can be constructed by harvesting a graft or flap. A variety of local skin flaps can be used for penile skin cover but anterolateral thigh flap and radial forearm flap are in vogue. These flaps, however, lack stiffness and will eventually need revision with a prosthetic devices for persistent erectile dysfunction. Many authors believe that the best cosmetic results are obtained with the use of skin grafts. In particular, full-thickness skin grafts (FTSG) guarantee superior results to their split thickness counterpart since they heal with less contracture and therefore, preserve the physiological girth and length expansion during erection [22].

Closure of the penile stump and suprapubic urine diversion or perineal urethrostomy is an option if reimplantation or phalloplasty is impossible. Delayed phalloplasty or penile transplantation could be offered later.

Distal penile injuries tend to be more technically difficult particularly with vascular anastomosis due to smaller vessels. Microsurgical revascularization of the distal penis has the best outcomes and therefore recommended. If meticulous microvascular repair is not feasible, penile and erectile tissues ischemia often develop and penile fibrosis ultimately sets in and eventually contributes to severe erectile dysfunction [20]. The consensus in contemporary literature clearly acknowledges that microsurgical revascularization and approximation of the penile shaft structures provide early and adequate restoration of penile blood flow with the best outcome of penile reimplant survival, erectile and voiding

Table 1 A comparison of our case with a list of English publication of penile amputation.

| Author | Weapon used | Reason | Sample size | Ischemia time (h) | Suprapubic diversion | Urethral anastomosis (primary/staged) | Corpora closure | Use of loupe | Sequelae | Erectile function (IIEF)/penile sensation |
|--------------------------------|-------------|----------------------|-------------|-------------------|----------------------|---------------------------------------|-----------------|--------------|--|---|
| Raheem et al. [7] | Blade | Substance-induced | 1 | >6h | Yes | Primary interrupted | Yes | Yes | Acute kidney injury | Partial |
| Riyach et al. [8] | Blade | Criminal assault | 1 | 6h | NS | Primary interrupted | NS | No | Partial skin necrosis | Decrease penile sensation |
| Leygold and Rivera-Servano [9] | Blade | Psychiatric disorder | 1 | 12h | Yes | Primary, inferior epegastric bypass | Yes | Yes | Partial skin necrosis | NS |
| El Harrach et al. [10] | Blade | Psychiatric disorder | 1 | 5h | Yes | Primary interrupted | Yes | No | NS | Erectile dysfunction |
| Li et al. [11] | Blade | NA | 109 | 6h | NS | Primary interrupted | Yes | NA | Partial skin necrosis, fistula formation | NS |
| Roche et al. [12] | Blade | Psychiatric disorder | 1 | 6h | Yes | Primary interrupted | Yes | Yes | Partial skin necrosis | NS |
| Tazi et al. [13] | Blade | Traumatic amputation | 1 | 4h | NS | Primary interrupted | Yes | Yes | NS | NS |
| Salem and Mostafa [14] | Blade | Traumatic amputation | 1 | 2h | NS | Primary continuous | Yes | Yes | Skin necrosis | NS |
| Chon et al. [15] | Blade | Traumatic amputation | 1 | 10h | NS | Staged | Yes | Yes | Skin necrosis | NS |
| Landström et al. [16] | Blade | Psychiatric disorder | 1 | 9h | NS | Primary interrupted | Yes | Yes | Skin necrosis | Spontaneous erection |
| Darewcz et al. [17] | Blade | Psychiatric disorder | 1 | 10h | NS | Primary | Yes | Yes | Skin necrosis | NS |

NA—not applicable, NS—not stated.

Table 2 Outcomes between macro and microsurgical repair

| Outcomes | Macrosurgical repair | Microsurgical repair |
|----------------------|----------------------|----------------------|
| Penile blood flow | Satisfactory | Excellent |
| Erectile function | Adequate | Satisfactory |
| Voiding function | Satisfactory | Satisfactory |
| Cosmesis | Satisfactory | Satisfactory |
| Penile sensation | Decreased | Satisfactory |
| Penile skin necrosis | High | Low |
| Fistula formation | High | Low |

functions [20,23,24]. Outcomes between macro and micro surgical repair is shown in Table 2.

Recent advances in penile transplantation also called genitourinary vascularized composite allograft (GUVCA) transplant is a promising novelty. Though we should be cautiously optimistic about the success of penile transplantation, it expands our compendium of surgical armamentarium. Immunosuppression, donor issues, recipient's and or spouse psychological problems are important challenges to address.

Measures of assessment of successful penile reimplantation outcomes are variable and limiting due to the variability in the factors affecting successful penile re-implantation, availability of resources and skills, and also differences in the interpretation of success by patient or physician. Most common complications reported are skin necrosis, decreased penile skin sensation, erectile dysfunction, urethral stricture and fistula formation.

Conclusion

Penile amputation is a rare and devastating injury caused by multifaceted factors. Though microscopic neurovascular reconstruction is gold standard, non-microscopic surgical reimplantation by an experienced surgeon in a poor-resource setting yields satisfactory results for proximal penile amputation. With current increase in transgender surgeries, outcomes in phalloplasty for unsalvageable penis will improve.

Informed consent

Informed consent obtained from patient

Conflict of interest

None declared.

Acknowledgement

The authors would like to thank the patient for his consent and co-operation for this publication.

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