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Traumatic urethrocutaneous fistula: Case report and literature review

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Abstract

Penile injury is fortunately fairly uncommon as it represents only about 1% to 1.6% of all trauma cases. Severe penile trauma may be complicated by urethrocutaneous fistula. A 22 year old male patient presented with urethrocutaneous fistula following severe crush injury of his penis from the rollers of a baking machine. He had penile fasciocutaneous flap urethroplasty with satisfactory outcome. Wearing loose fitting clothing while operating industrial machinery could lead to entrapment and severe genital injury.

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Introduction

Genitourinary injuries constitute less than 10% of all trauma [1]. Of all the genitourinary organs the penis is the least involved being affected in only 10–16% of genitourinary injuries [1,2]. Thus penile injuries are relatively uncommon.

Penile injuries may arise from penetrating [1], blunt [3] or iatrogenic trauma [4]. The various components of the penile

anatomy may be involved either singly or in combination and to a variable extent. Commonly described injuries are penile fracture [3] and penile amputation [5]. There may be laceration, contusion or avulsion of penile skin [6]. Urethral involvement either as contusion or laceration may result in a urethrocutaneous fistula if not identified and dealt with primarily.

The incidence of urethrocutaneous fistula complicating penile trauma is unknown. Most cases have been described in the iatrogenic setting following hypospadias surgery [4] and the urethral defects are usually small. The literature on penile crush injury is also scanty. We encountered only few reports [5,6]. In this report we present the management of a patient that presented with a large urethrocutaneous fistula following crush injury of the penis from the rollers of a baking machine.

This is perhaps the first reported case of urethrocutaneous fistula from penile crush injury occurring in such a setting. We seek to draw attention to this industrial accident and its management, with the hope that it could be prevented in the future.

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Fig. 1 The baking machine.

Case report

A 22 year old young man was referred to our urology service with a few days history of voiding urine from a defect on the ventral aspect of his penis. Further evaluation showed that he was a baker and had sustained machine injury to his phallus one week prior to presentation. Patient was wearing a pair of jeans shorts at work on the day of the incident. His jeans shorts got entrapped in the mesh rollers of the baking machine (**Fig. 1**) and patient was dragged unto the machine sustaining ventral penile crush injury. He was initially treated at a peripheral hospital where an attempt at primary wound repair was made without urinary diversion. His wound subsequently broke down a week later.

On examination he was in apparent good health except for a ventral 3 cm × 1.2 cm urethrocutaneous fistula located at the distal penile shaft, near the coronal sulcus. The ventrolateral parts of the urethra were lost leaving only the dorsal urethra. The surrounding penile skin (approx 0.5 cm) was also denuded (**Fig. 2**). The glans penis and



Fig. 2 Urethrocutaneous fistula with free passage of size 18F urethral catheter.

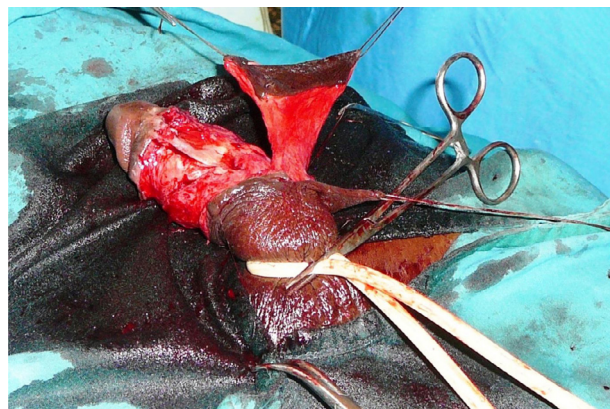


Fig. 3 Raised island penile fasciocutaneous flap ready for onlay deployment.

corpora carvenosa appeared normal. The scrotum and testes were uninvolved.

Operative management

On presentation wound swab and urine samples were taken for culture and sensitivity tests in addition to complete blood count. A suprapubic cystostomy was placed for urinary diversion and patient was started on tab ciprofloxacin 500 mg bid. The wound and urine cultures yielded no bacterial growth. This is probably because the patient had received some antibiotics before referral. The blood count was normal. Wound dressing of the fistula site was instituted and continued until the inflammatory reactions had settled and the surrounding area of denuded penile skin had healthy granulation tissue. This was confirmed by repeat wound swab and urine cultures.

Patient had urethroplasty 10 days after admission. An island fasciocutaneous flap as described by quartey [7,8] was deployed as a ventral onlay to close the urethral defect after excising surrounding scar tissue (**Fig. 3**). Prior to urethroplasty the integrity of the urethra and presence or absence of proximate strictures was ruled out by easy passage of a size 18F Foley catheter into the bladder (**Fig. 2**) followed by urethroscopy. We first degloved the penis before raising the fasciocutaneous flap. Sizing of the flap was based on the urethral defect. We aimed at a size 22F caliber urethra. Flap suturing was done with 4/0 vicryl in standard fashion as described by Quartey 0.5–1.0 cm spatulations of the ventral aspect of the proximal and distal urethral openings were done prior to suturing the flap in place to reduce the chances of stricture formation at these sites. The degloved skin was mobilized to achieve penile skin cover. A 4-inch crepe bandage were firmly applied to the phallus to reduce post operative swelling. Post operatively patient was placed on ciprofloxacin, analgesics and stilboestrol 1 mg tds (to prevent penile erections). A size 16F urethral catheter was left indwelling as a stent and removed after 21 days. The integrity of the urethra was confirmed by a normal micrurating cystourethrogram at the time of urethral catheter removal (**Fig. 4**). Subsequently the suprapubic catheter was removed. Total hospital stay was 38 days.

At the last follow up which was 3 months after discharge he was voiding well, had normal erections and the cosmetic appearance of the penis was satisfactory.



Fig. 4 Post operative micturating cystourethrogram showing unobstructed flow of urine.

Discussion

Penile injuries occur in 1.0–1.6% of all trauma cases [1] making penile injuries fortunately fairly uncommon. The penis may be injured from penetrating trauma [1]-gunshot wound, stab injuries, human and animal bites, iatrogenic trauma-penile surgery [4], penile instrumentation and urethral catheterization and blunt external trauma [3] as in road traffic accident, machine injuries [5], coital injuries [9] and forcefully bending the erect penis to achieve detumescence [10]. Thermal injuries have also been described [11]. The severity of the injury is determined by the magnitude of the force applied to the penis. While most injuries to the penis are due to blunt trauma [12], penetrating injuries from firearm and stab injuries cause the most severe damage [6]. The degree of tumescence is also important in determining injury severity; The flaccid penis being less prone to injury than the erect penis [6]. Penile injuries especially penetrating injuries are usually associated with injury to nearby structures such as the upper thighs, pelvic bones and pelvic viscera such as the bladder, prostate and rectum. These associated injuries are critical to defining overall morbidity and mortality.

The incidence of urethrocutaneous fistula complicating penile trauma is not defined in the literature. Most reported cases are iatrogenic and are sequel to hypospadias surgery [4]. Severe crush or penetrating injury with urethral involvement can easily result in a urethrocutaneous fistula following the sloughing of dead and devitalized tissue. With respect to injury mechanism, the looseness and laxity of genital skin is said to have a protective role, generally allowing the skin to deform and slide away from a potential point of contact. However, this laxity of genital skin has also been noted to become a liability in machinery injury. This is because once rotating or suction devices grab hold of any part of the genital skin, the rest

of the penile and scrotal skin can be trapped and avulsed [5,6]. The clothing is usually first entrapped especially if they are loose fitting clothing, such as in our index patient who was wearing a pair of loose fitting jeans shorts.

Initial management of patients with severe crush injuries of the penis involves urinary diversion by suprapubic cystostomy at the time of presentation. This should be followed by careful debridement of dead and devitalized tissue. Preoperative or intraoperative urethrography is useful in defining the extent of urethral involvement [1]. Our index patient presented with a fully developed fistula. He had no urinary diversion and no attempt was made to determine the extent of urethral involvement by the referring physician. Rather an attempt at primary repair of a severe penile crush injury was made. This scenario of delayed referral and attempt to manage purely urological problems by non urologists is not uncommon in a resource poor environment such as ours. At the time of presentation the urethral fistula was already well defined and we did not consider a urethrogram necessary at this stage. A suprapubic urinary diversion was done to enable patient void freely and also to allow for resolution of inflammatory reaction at the fistula site. At the time of definitive repair, urethroscopy was done to assess the urethra. We also noted easy passage of a size 18F Foley catheter through the external urethral meatus into the bladder (Fig. 2).

Closing a large urethral defect such as in our index patient can be a major challenge for the reconstructive urologist. We achieved this by mobilizing a distal island of penile fasciocutaneous flap. This was used as a ventral onlay flap to close the urethral defect over a stenting size 16F Foley catheter. Penile skin cover was achieved by mobilizing the rest of the penile skin to cover the penis. Use of penile fasciocutaneous flaps for urethral reconstruction have been described by Quarley [7,8] and McAninch [13]. They are based on the axial superficial blood supply in the dartos fascia of the penis. The flaps are versatile and can be deployed as ventral or dorsal onlay to cover any length of anterior urethral defects. They can also be tubularized and sufficient length can be mobilized to replace the entire urethra with good functional and cosmetic results. We followed standard technique as described by Quarley and others [13,14]. Proper sizing of the flap is important to avoid diverticula formation. We aimed at a 22F urethra. The width of the flap was determined by measuring the length of the urethral defect. The height of the flap was determined by subtracting the width of the residual urethra from the expected circumference of a 22F urethra (approximately 23 mm). All the measurements were done using strips of chromic catgut suture.

Certain complications may be expected with this type of repair [14]. These include dehiscence of the penile skin cover, post operative alterations in penile skin sensation, recurrent urethrocutaneous fistula, diverticula formation with associated post micturition dribbling and stricture formation at the proximal or distal urethral openings. The most worrisome are recurrent fistula and stricture formation. Recurrent fistula formation can be prevented by meticulous suturing technique and avoidance of overlapping suture lines while stricturing can be prevented by adequate spatulations as was done in this index patient. If strictures occur despite this they can be managed by direct vision internal urethrotomy (DVIU) or dilatation if short or urethroplasty for longer strictures approximately 1.0–2.5 cm [14]. Onlay repairs have been shown to be more successful than flap tubularization for urethral replacement. Carney and McAninch [14] reported an initial success rate of 87% with onlay repairs in 54

patients and long term success rate of 98% after one additional procedure.

Our patient had an uneventful post operative period. He had satisfactory wound healing with good cosmetic appearance of the penis. Micturating cystourethrogram done on 21st post operative day was normal (Fig. 4). Patient is still being followed up. At the last visit which was at 3 months after discharge he still maintained normal voiding and had normal erections.

Conclusion

Severe penile crush injuries can follow entrapment of clothing in baking machinery. Persons operating such machinery should be aware of this. They should avoid wearing loose fitting pants or clothing that can easily get caught in the machinery. Primary care physicians should be encouraged to refer promptly all cases of genital injury to centres with urologists.

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