Novel treatment (new drug/intervention; established drug/procedure in new situation)

Penoscrotal entrapment: a safe, innovative technique for removing metal constricting devices

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Summary

Penoscrotal entrapment is a rare urological emergency that requires urgent treatment to avoid penile ischaemia and subsequent erectile dysfunction. Non-metallic and thin metallic objects are easily removed via cutting, while thick metallic constricting devices require specialist saws or motorised cutters, all of which may be difficult to locate in the emergency setting. We report a case of a 45-year-old patient who presented with a 48-h history of gross penoscrotal oedema secondary to entrapment by a thick metal ring (internal diameter 55 mm, external diameter 74 mm and thickness 19 mm). The positioning, thickness of the ring, delayed presentation and extensive oedema meant its removal was especially challenging. We improvised a simple, three-step technique (aspiration, strapping and sling) which enabled the metal ring to be removed without the need for specialist equipment. We would encourage others to employ this safe technique in an emergency setting.

BACKGROUND

Penile entrapment by various constricting devices is a rare phenomenon. First described in 1755, it is practised mainly to enhance sexual performance by prolonging erections and for auto-erotic purposes.¹ There can sometimes be a psychiatric element involved. We report an even rarer case where not only the penis but the entire scrotum was incarcerated within a thick metal ring. Due to the position, thickness of the ring and a 48-h delay in seeking medical treatment, this resulted in extensive oedema of the genitalia. Consequently, there was no space between the scrotum and the ring to allow for cutting or removal of the ring by conventional methods.

CASE PRESENTATION

A 45-year-old patient presented to the emergency department with a thick metal ring placed at the base of the external genitalia, incorporating both the penis and the entire scrotum (figure 1). It had been in situ for 48 h and attempts to remove it by the patient and his partner had been unsuccessful. The ring was deeply impacted upon resulting in pain, extensive oedema and paraesthesia of the entire penis and glans. Despite the pain he was still able to pass urine and on presentation the bladder was empty. Local anaesthetics were administered as a penile block to relieve pain.

The extent of the oedema meant that there was no space between the genitalia and the metal ring to allow manipulation for manual removal. The size of the ring: internal diameter 55 mm, external diameter 74 mm and thickness 19 mm meant that it was also not amenable to cutting.

TREATMENT

As a result, the patient was taken to theatre for removal of the ring under general anaesthesia. We devised a three-step

technique to do this. The first step was to reduce the penile oedema via 'aspiration', whereby Winter's procedure (figure 2) was performed using a 16-gauge tricut biopsy gun. A biopsy was also taken and sent for histology. Trapped blood was then aspirated from the base of the corpora using a 14-gauge needle on a syringe. The second step involved a 'strapping' technique: a ribbon gauze bandage, reinforced with overlying adhesive tape, was used to apply constant serial pressure to the penis from the root of the penis to the glans (figure 3). This was left in situ to reduce the oedema.

Next, applying the same principle, the scrotum was serially strapped in the same way to reduce the oedema. Using a 14-gauge needle, a few stab punctures were made at the penoscrotal junction to aid further removal of the interstitial fluid which had collected in the scrotum. The

Figure 1 Thick metal ring impacted at the base of the external genitalia, incorporating both the penis and scrotum. Note extensive oedema as the ring had been in situ for over 48 h.

Figure 2 Performing Winter's procedure using 16 gauge trucut biopsy gun.

'strapping' was left for 5–10 min to allow the oedema to reduce before the ribbon gauze was removed and restrapping was applied. This process was repeated four times.

The aforementioned two steps successfully reduced the swelling, creating just enough space between the ring and the scrotum to allow for manipulation. The final 'sling' step involved slinging five well-lubricated vascular tapes under the ring and placing them evenly around its circumference (figure 4). Three assistants, each holding two tapes, used these to apply a controlled upward traction on the ring. The main surgeon further facilitated this by placing his fingers under the ring to apply an upward traction while using both thumbs to push the scrotum downwards through the ring. With a lot of patience and perseverance, the ring was successfully removed after approximately 60 min (figure 5). Postprocedure the patient was catheterised.

OUTCOME AND FOLLOW-UP

As the patient was HIV positive he was reviewed by the HIV team and prescribed 48 h of prophylactic parental antibiotics prior to discharge. Histology of the cavernosal

Figure 3 'Serial strapping technique': ribbon gauze reinforced with overlying adhesive tape is used to apply constant pressure to the penis to reduce oedema.

Figure 4 'Sling technique': vascular tapes were used to apply upward traction on the ring facilitating its removal.

tissue was unremarkable. At 3-month follow-up, his voiding was satisfactory with no associated erectile dysfunction.

DISCUSSION

Penoscrotal strangulation by a constricting device is a surgical emergency. It is a rare presentation requiring urgent treatment. A wide variety of objects have been described. In children typical objects include rubber bands, thread or hair while in adults the use of rings, nuts, bottles and pipes have been reported.¹ It is often seen in the context of hyper-sexuality or to enhance erectile function, especially in association with erectile dysfunction, psychiatric illness or due to side effects of antidepressant medications.

Patients often present with pain and swelling of the genitalia, accompanied by dysuria, urinary retention and paraesthesia of the penile skin. Depending on the duration of incarceration there can also be ulceration and necrosis of the skin; more frequently associated with use of plastic rather than metal constricting devices.² Rarely, systemic complications such as pyelonephritis, acute kidney injury, postobstructive diuresis and sepsis have also been reported.³ Interestingly, a positive correlation between

Figure 5 Thick metal ring is successfully removed.

time of incarceration and length of hospital stay has been noted.⁴ Embarrassment is often quoted as the main reason for the delay in seeking medical advice. To date there has only been one fatal case related to penile entrapment: an elderly gentleman who developed multiorgan failure secondary to septic shock.⁵

Urgent removal is indicated to restore normal penile vascularity, micturition and preserve erectile function. Various techniques have been described in the literature for the removal of such constricting devices. These are determined by the type and size of the object, time since the strangulation, grade of injury, availability of appropriate cutting devices, as well as expertise available. In situations where prompt removal is not possible due to lack of equipment or expertise available, urgent referral to a specialist urology centre is warranted to prevent irreversible damage to the genitalia.

Removal of objects by cutting is the most common method described in the literature. Obtaining an appropriate cutting device in the emergency room on an urgent basis may not always be feasible. Giggle saws, bone cutters and motorised tools used by dentists, orthopaedic and plastic surgeons have been used with success. The fire-fighting services with their specialist saws and metal cutters have also been employed in certain cases.⁶ Cutting thick metallic rings is tedious and may be associated with potential mechanical and thermal injury to the penis. Instruments such as metal tongue blades and laryngoscope blades have been used in unorthodox ways to provide protection to the skin during the sawing process.^{7,8} Other potential hazards include fine foreign body implantation from sparks generated during cutting, as well as potential injury to the operator and assisting staff when operating such machinery.

One of the main challenges in removing constrictive devices is the amount of associated oedema. Corporeal aspiration can be employed as a safe method for reducing this swelling. Aspiration of blood from the engorged penis reduces the congestion and improves circulation. This can be further facilitated by performing Winter's procedure where a distal corpora cavernosal shunt is created using a trucut biopsy gun. This is important not only as a means of reducing oedema but also because progressive arterial insufficiency following initial venous occlusion can lead to irreversible damage to the penis.⁹ The 'string technique' and its modifications have also been successfully adopted by many. This involves winding a silk string around the shaft of the penis to reduce oedema and allow the device to be removed.¹⁰ However, passing a string beneath the constricting ring can be difficult in an oedematous penis. Our case demonstrates an alternative method for reducing swelling, especially when both the penis and scrotum are involved.

The three-step technique we employed uses a combination of corporeal aspiration and serial strapping to reduce the oedema, followed by use of vascular slings to facilitate movement of the ring. This obviates the need for motorised cutting instruments. Even if such instruments were available, cutting through such a thick metallic ring (as in our case) would have been an almost impossible task. Considering the rarity of encountering penile or penoscrotal entrapment and the wide variety of objects that can be used, these cases have to be assessed on an individual basis. Our case demonstrates the need for both

innovation and common sense to manage seemingly difficult clinical situations in a safe manner.

Learning points

- Penile and penoscrotal entrapment is a urological emergency associated with serious complications such as skin ulceration, penile necrosis, erectile dysfunction, urinary dysfunction, multiorgan failure and very rarely death.
- To avoid such complications, prompt removal of the constricting device is warranted. This can prove especially challenging when the constricting device is made of thick metal and there is incarceration of the tissues.
- In such circumstances we have to be flexible in our approach. Many different techniques for removing metal rings have been reported, most of which involve cutting of the ring. However, this relies on specific or specialist tools being readily available within the hospital and risks serious iatrogenic injury to the penis. Such instruments also require a certain amount of space between the skin and the ring to be operated safely.
- The technique we devised involves reducing tumescence of the penis via Winter's procedure and cavernosal aspiration, 'serial strapping' of the penis and scrotum to reduce the oedema, followed by the 'sling technique' to remove the ring itself. Our technique does not rely on the availability of specialist tools and, unlike many techniques described previously, can be employed in both penile and penile-scrotal entrapment. Nor is it likely to cause any iatrogenic damage to the penis. It is for these reasons we consider it a safe technique and would encourage others to consider it in an emergency setting.

Competing interests None.

Patient consent Obtained.

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Please cite this article as follows (you will need to access the article online to obtain the date of publication).

Wu X, Batra R, Al-Akraa M, Seneviratne LN. Penoscrotal entrapment: a safe, innovative technique for removing metal constricting devices. *BMJ Case Reports* 2012;10.1136/bcr-2012-006466, Published XXX

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