

Penile ring entrapment – A true urologic emergency: Grading, approach, and management

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Abstract Penile rings are used to sustain erection in order to enhance sexual pleasure. They work by reducing the outflow of blood from the cavernosal tissue. However, if left for extended periods of time severe edema, urethral fistula, gangrene, and even complete loss of the distal penis can ensue, this is known as penile ring entrapment (PRE). Management poses particular challenges due to its rarity. Herein, we report our experience with three patients from our institution that presented with PRE and include a review of the approaches others have taken. We also propose a simpler and more effective grading scale to allow for easier communication between providers, as the current grading scales do not do so.

Keywords: Ischemia, penis, scrotum, trauma, urethra

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INTRODUCTION

Since ancient times, penile rings have been used to enhance sexual pleasure. They work by constricting the outflow of blood from the penis, prolonging erection.^[1-3] Different materials such as rubber bands, wedding rings, hammerheads, bullrings, and plastic bottlenecks have been used.^[3,4] Regardless of the material used, constriction should be no longer than 30 min.^[5] Prolonged constriction leads to severe ischemia and edema. If left unresolved, the penis will become necrotic and will eventually self-amputate. Urgent intervention is vital. Different treatment options have been elaborated. We report our experiences, treatment methods others have taken, and propose a newer grading scheme that will allow clinicians to swiftly and efficiently communicate the severity of this condition.

METHODS AND PATIENTS

We performed a retrospective review of charts from our institution from September 2012 to September 2018, identifying patients who presented with penile ring entrapment (PRE). We looked at patient characteristics, pattern of presentation, type of entrapment, and treatment. We also did a review of the literature to identify other treatment approaches for PRE.

RESULTS

We identified three patients who presented at our institution with PRE.

The first patient is a 60-year-old Caucasian male who presented with a ring around his scrotum and penis for 48 h. He had excessive scrotal and penile edema with minimal

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bruises at the ring location. Initial attempts to reduce scrotal and penile swelling by compression (in order to slide the ring off easier) failed. Next, we gave anesthesia for comfort and then applied olive oil around the penis and scrotum as lubrication to help with sliding. A tongue blade was inserted between the ring and penis to protect underlying tissues during sliding. Continuous compression was applied until the edema decreased enough for the ring to slide off. We were successful and all soft tissues appeared viable.

The second patient is a 28-year-old Caucasian who presented with a thick and wide wedding ring around the base of his penis for >12 h [Figure 1]. Several attempts to remove the ring in emergency department at two different hospitals failed, and finally, he was referred to our institution. He had extensive bruising and edema of the penile shaft distal to the ring. The shaft of his penis was Number on examination. Our initial attempt (with the patient under conscious sedation) to slide the ring off with compression and lubrication failed. The patient experienced such discomfort, for which general anesthesia was then induced. We then attempted needle aspiration and a release incision to decompress the corpora and decrease the swelling; however, this was not enough. Ultimately, we used a diamond-tipped Midas drill from the hospital engineering department to split the ring in half. During this procedure, a metal ruler and cold-water irrigation were used to protect soft tissues and prevent thermal injury. After ring removal, we performed flexible cystoscopy to rule out urethral injury. It revealed extensive urethral bruises, for which we placed 16 French Foley catheter [Figure 2]. The patient recovered and showed improvement at follow-up.

The third patient is a 42-year-old Caucasian male who presented with a metal washer pushed to the base of the penis. There were extensive bruises and edema distal to the washer. Attempts at twisting the ring off with lubrication were unsuccessful. Next, a vice clamp and Dremel tool were obtained from hospital maintenance. The ring was

meticulously sawed in half as wet gauze and a tongue depressor were used as a barrier to protect the skin. Vice clamps were used to stabilize the ring. There was not any evidence of nother tissue injuries.

DISCUSSION

A penile ring is typically used to restrict the outflow of blood from the penis to prolonged erection and enhance sexual pleasure.^[1-3] Wearing the ring for extended periods of time will lead to penile ischemia and strangulation. Eventually, the patient will experience severe edema, necrosis, urethral fistula, gangrene, penile amputation, and even death.^[6,7]

Patients tend to present late in their condition due to embarrassment.^[6] Our experience was similar; unfortunately, delaying clinical intervention results in increased risk of the aforementioned complications of PRE.^[8]

The primary goal of management in these cases is to restore blood supply to the penis while preserving the integrity of penile and urethral tissue. Success depends on what method is used to remove the ring. There are multiple treatment approaches (sliding, cutting, and surgery) that have been reported in the literature; surgeons have used different tools depending on what is at their disposal and their experience [Table 1]. Cystoscopy may be performed after the intervention to assess the level or urethral injury.

Treatment options

1. Sliding: Sliding should be used as an initial approach. This is the safest way to preserve underlying tissue. Various lubricants have been reported such as Salvon and even olive oil. If the ring is slid, the surgeon must first compress the edematous tissue and then provide traction. This method was reported to be successful by



Figure 1: Patient 2 before treatment



Figure 2: Patient 2 after treatment

Table 1: Summary of case reports on penile ring entrapment

| Reference | Age | Description of penis | Duration, ring material | Treatment method |
|---|---------------|--|--|---|
| Our patient-1 | 60 | Penis and scrotum, with edema | 2 days, metal | Olive oil was applied and ring was slid off |
| Our patient-2 | 28 | Penis, marked edema with bruise | 12 h, metal | Ring was cut by diamond tip Midas drill |
| Our patient-3 | 42 | Penis, edema | Metal | Ring was cut via dermal tool using |
| Sawant <i>et al.</i> ^[3] | 70 | Penile edema without gangrene | 2 months, rubber | Rubber band was cut |
| Sawant <i>et al.</i> ^[3] | 23 | Penis, with distal edema and circumferential ulcer | 24 h, rubber | Band was cut |
| Sawant <i>et al.</i> ^[3] | 42 | Mid penile shaft band with distal edema | 18 h, metal | Ring was cut using stout scissors |
| Sawant <i>et al.</i> ^[3] | 35 | Base of penis, with marked penile edema | 4 days, metal | Ring was cut by K-wire cutter |
| Alkhureeb ^[1] | 30 | Base of penis, penile edema, urinary retention | 8 h, metal | Bone cutter- fail Lateral corporotomy (surgery) to reduce edema, then ring was slid distally to the glans, then using proline 0 on glans, ring was removed |
| Nuhu <i>et al.</i> ^[2] | 60 | Penis, complete penile gangrene | 1 day, metal nut | Cystotomy and penile amputation with perineal urethrostomy (surgery) |
| Paonam <i>et al.</i> ^[9] | 47 | Penis, marked edema | 2 days, metal | Ring was cut by micrometer wheel-shaped bur |
| Nason <i>et al.</i> ^[10] | Not specified | Penoscrotal edema | 7 h titanium | Bone cutter - fail Fire brigade department used an electric axel driver to cut the ring |
| Liu <i>et al.</i> ^[11] | Not specified | Preputial edema | Unknown time, PET bottle | Bottle removed with persistent suture traction and lubrication (sliding) |
| Sharma <i>et al.</i> ^[4] | 37 | Edema, areas of discoloration near base of penis | 5 days, metal | Ring was slid over penis by applying gentle traction over skin |
| Patel <i>et al.</i> ^[12] | 43 | Edema of penis and scrotum | 1 day, metal | Industrial bolt cutters to cut the ring |
| Agu <i>et al.</i> ^[6] | 26 | Penile shaft edematous, mildly tender, cold, sensate, and engorged | 23 h, stainless steel ring | Penile shaft made slippery with salvon and advanced forward via sliding |
| Wu <i>et al.</i> ^[13] | 45 | Ring placed at base of genitalia, extensive penoscrotal edema | 48 h, metal ring | Ring slide off with vascular slings |
| Sathesh-kumar <i>et al.</i> ^[14] | 50 | Root of scrotum, penoscrotal edema | 2 days, metal ring | Ring cut with pedal cutter from fire department |
| Patel <i>et al.</i> ^[15] | 45 | Not mentioned | 6 months, 2 metal-ringed hose clamps | Wire cutters from the orthopedic set were used to cut the metal clamps |
| Baruah <i>et al.</i> ^[16] | 17 | Gross penile edema with impaired penile sensation distal to ring | 17 h, metallic ring made of alloy | Ring was slide off |
| Geraniotis ^[7] | 45 | Penis was incarcerated at base of penis | 1 week, Barbell retaining (steel) ring | Gas driven nonsurgical drill used to cut the ring |

PET: Polyethylene terephthalate

other authors.^[4,6,11,13,16] We performed this method and were successful with one of our patients. However, we were unsuccessful in two of our patients. This method is safest and quickest but clearly is not suitable for all cases

2. Cutting: Cutting seems to be the next suitable option after sliding has been attempted. Cutting appears to be a highly sought out method by many surgeons.^[3,9,10,12,14,15,17] Various tools have been used to cut the ring such as a micrometer wheel-shaped bur, stout scissors, K-wire cutter, DerMel, bone-cutting clamp, and an electric axel driver.^[3,9,10] We successfully used a diamond-tipped Midas Drill and Dremel tool. However, if cutting is sought out, it is very important to protect the underlying tissue from mechanical and thermal injury. We used cold saline irrigation to prevent thermal injury and a tongue depressor to protect the skin and underlying tissue
3. Surgery: With failure of other approaches, surgical options may be needed. Lateral corporotomy to

release edema and facilitate subsequent removal with lubrication, as performed by Alkhureeb *et al.*, is one surgical approach.^[1] We resorted to a limited surgical approach in order to drain fluid from the corpora and skin, our thinking was this would allow the penis to become more compressible. However, we found this to be of little help. Nuhu *et al.* experienced and extreme case of penile gangrene and performed a cystotomy and perennial urethrosotomy.^[2] Fortunately, we did not experience such an intense and rare case.

Grading of penile entrapment

There are different classifications of penile entrapment that have been reported [Table 2]. Sawant *et al.* embrace a grading system originally described by Bashir and El-Barbary, which focuses on the consequences of penile strangulation and urethral injury not easily visible by examination.^[3,19] Another grading system published by Bhat *et al.* utilizes penile sensation in its classification. This, however, could be misconstrued by patient anxiety

Table 2: Summary of grading system

| System | Grade 0 | Grade 1 | Grade 2 | Grade 3 | Grade 4 | Grade 5 |
|-------------------------------------|--------------------|--|--|---|---|------------------------|
| Sawant <i>et al.</i> ^[3] | No urethral injury | Partial division of corpus spongiosum + urethrocutaneous fistula | Complete division of corpus spongiosum + constriction of corpus cavernosum | Gangrene and amputation | | |
| Bhat <i>et al.</i> ^[16] | | Edema distal to penis | Grade 1 + decreased distal penile sensation | Grade 1 + loss of distal penile sensation | Grade 3 + complete separation of corpus cavernosa | Gangrene or amputation |
| Ours | | Superficial injury with distal edema | Injury to corpora or urethra | Gangrene, amputation, fistula, or separation of corpora | | |

and delivery of anesthesia by other providers prior to urologic assessment.^[16] Regardless, both require detailed information that would be obtained accurately after the intervention.

We are proposing a revised grading system that is simpler to communicate, effective, and more pertinent to the problems surrounding PRE. Grade 1 is superficial tissue injury with distal edema. Grade 2 is any deep tissue injury involving the corpora or urethra assessed by examination, and Grade 3 is tissue loss, gangrene, separation of the corpora, or fistula. This grading scale is simple, depends mainly on clinical examination, and is easy to adopt by any emergency physician or urologist.

CONCLUSION

PRE is a rare, true urologic emergency that can lead to penile amputation. Management should be urgent and directed toward removing the ring while protecting underlying tissue. Treatment is based on the severity of the presentation and the tools at the physician's disposal. A grading system is helpful in communicating the degree of injury between health-care providers, but it is necessary that it is simple, quick, and easy to communicate. We feel we have achieved this goal.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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