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## Penile and scrotal strangulation by stainless steel rings in an human immunodeficiency virus positive man: A case report

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### Abstract

#### BACKGROUND

Penoscrotal constriction devices are either used as autoerotic stimuli or to increase sexual pleasure or performance by maintaining an erection for a longer period, and a variety of metallic and non-metallic objects are used. On the other hand, penile strangulation is a rare urologic emergency that requires prompt evaluation and intervention to prevent long-term complications. The goal of treating penile incarceration is to remove the foreign object as soon as possible. On the other hand, removal can be very challenging, and often requires resourcefulness and a multidisciplinary approach.

#### CASE SUMMARY

A 47-year-old man who has sex with men was transferred to our hospital for persistent phallodynia and scrotal pain, accompanying swelling due to strangulation by stainless steel rings. His medical history included acquired immunodeficiency syndrome. One day prior, he had put three stainless steel rings on his penis and scrotum before sexual intercourse. After sexual intercourse, he was unable to remove them, due to swelling of his penis and scrotum. The swelling persisted, and he felt pain in the affected area the next day, then he was transferred to our hospital by ambulance. The emergency department found that his penis and

scrotum were markedly engorged and swollen. We established a diagnosis of penile and scrotal strangulation by stainless steel rings. We unsuccessfully attempted to cut the rings using a cutter, then requested a rescue team *via* emergency medical service. They cut through each ring in two places, using an electric-powered angle grinder, and successfully removed all of the pieces. Finally, he was discharged and went home.

## CONCLUSION

We report the first case of penile and scrotal strangulation by stainless steel rings in an human immunodeficiency virus positive person.

**Key Words:** Penile strangulation; Stainless steel ring; Human immunodeficiency virus; Urologic emergency; Management; Case report

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**Core Tip:** Penoscrotal constriction devices are either used as autoerotic stimuli or to increase sexual pleasure or performance by maintaining an erection for a longer period, and a variety of metallic and non-metallic objects are used. On the other hand, penile strangulation is a rare urologic emergency that requires prompt evaluation and intervention to prevent long-term complications. The goal of treating penile incarceration is to remove the foreign object as soon as possible. On the other hand, removal can be very challenging, and often requires resourcefulness and a multidisciplinary approach. Here, we report the first case of penile and scrotal strangulation by stainless steel rings in an Human immunodeficiency virus-positive person.

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## INTRODUCTION

Penoscrotal constriction devices are ordinarily used either to increase sexual performance or pleasure, or as an autoerotic stimulus, by helping the wearer to maintain an erection for longer[1-3]. These devices comprise various objects, both metallic and non-metallic[2,4]. However, there are potentially dangerous results that can come from constricting the penis with objects for autoerotic purposes[4]. Though uncommon, penile strangulation represents a urologic emergency, necessitating prompt evaluation and intervention in order to avoid long-term complications[2,3,5-8]. Among these, penile strangulation with concomitant scrotal entrapment by a steel ring is an extremely rare urological emergency, requiring immediate medical intervention[1]. Strangulation has been reported with such varied objects as hair tourniquets, plastic rings, and steel rings[7]. To date, there has been no report of penile strangulation by stainless steel rings in a human immunodeficiency virus (HIV)-positive man; we therefore report this case, together with a brief review of the literature.

## CASE PRESENTATION

### Chief complaints

A 47-year-old man was transferred to our hospital for persistent phallosodynia and scrotal pain, accompanying swelling due to penile and scrotal strangulation by stainless steel rings.

### History of present illness

One day prior, he had put three stainless steel rings (one 8 mm thick with a 45 mm inside diameter, weighing 64 g; one 7 mm thick with a 45 mm inside diameter, weighing 37 g; and one 5 mm thick with a 45 mm inside diameter, weighing 24 g) on his penis and scrotum before sexual intercourse. After sexual intercourse, he was unable to remove them, due to swelling of his penis and scrotum. The swelling persisted, and he felt pain in the affected area the next day. He went to a clinic to request help, but the physician was unable to remove them. His pain and swelling persisted, and he called an ambulance and was transferred to our hospital.

### History of past illness

His medical history included acquired immunodeficiency syndrome, treated with one tablet daily of bictegravir sodium

emtricitabine tenofovir alafenamide fumarate, with the following data as measured two weeks prior: HIV-1 ribonucleic acid (RNA) was below the lower detection threshold, with CD4<sup>+</sup> T lymphocyte readings of 421/mm<sup>3</sup>.

### Personal and family history

The patient was a single man who has sex with men. The patient did not have any allergies. The patient also did not have any family histories.

### Physical examination

The patient was 177 cm tall and weighed 72 kg (body mass index: 23.0). Upon arrival at the emergency department (ED), his vital signs were abnormal: Blood pressure was 170/109 mmHg, heart rate was 85 regular beats/min, body temperature was 36.7°C, oxygen saturation was 97% in room air, respiratory rate was 14/min, and his Glasgow Coma Scale score was 15 points (E4V5M6). A physical examination revealed that his penis and scrotum were markedly engorged and swollen (Figure 1). On the other hand, nothing else abnormal was detected upon physical examination, including skin and neurological findings.

### Laboratory examinations

No laboratory examinations was performed.

### Imaging examinations

No imaging examinations was performed.

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## FINAL DIAGNOSIS

At this point, we established a diagnosis of penile and scrotal strangulation by stainless steel rings.

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## TREATMENT

We initially tried to cut the rings using a cutter, but ultimately failed. We then requested a rescue team *via* emergency medical service. They immediately came to our hospital and cut through each ring in two places, using an electric-powered angle grinder, and successfully removed all of the pieces; the procedure took 50 minutes, and the duration from putting the rings on to cutting them off was 64 h (Videos 1 and 2).

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## OUTCOME AND FOLLOW-UP

After cutting, red sores were found where the rings were attached, but we determined that no intervention was necessary (Figure 2). Finally, he was discharged and went home without any prescriptions. We didn't follow-up this patient.

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## DISCUSSION

Penile strangulation with concomitant scrotal entrapment by steel rings is an exceedingly rare urological emergency, necessitating immediate intervention[1]. In addition, the patient was HIV-positive, which should be regarded as cause for extreme caution. We present the first case of penile and scrotal strangulation by stainless steel rings in an HIV-positive man. Consequently, in scientific arena, there is value in reporting this event.

Regarding the epidemiology of penile strangulation, there exists a Spanish study of penile strangulation by rings, in which the mean subject age was 45.4 years old (range: 24-82); the rings were metallic in 84% of cases and non-metallic in 12%; the reason for attaching the strangulating ring was prolonged sexual activity in 36% of cases, masturbation in 12% of cases, due to a psychiatric disease in 12% of cases, due to alcoholism in 8% of cases, and due to accidents and/or incontinence in 8% of cases[5]. The evolution time of strangulation ranged from 2 h to 14 days, with a median mean time of 51 h[5]. The rings were cut using shears in 34.7% of cases and with a saw in 17.3% of cases, and the urologist involved did not require collaboration in 68% of cases[5]. Another study was done in the United States to determine patterns in penis-ring-related injuries treated at EDs: 49.8% of the patients were ages 30-49, and the most common types of injuries they presented with were ring(s) stuck on the penis or scrotum (75.3% of cases), edema (29.9%), pain (18.7%), and contusion or abrasion (7.6%)[9]. In an estimated 81.9% of these injuries, the patient was treated or examined at the ED, then sent home[9]. We also found a case of penile strangulation by a metal ring affecting an 81-year-old Japanese man, whose stated intent was to control sex drive[10].

Regarding the mechanism, strangulation using one of these devices results in penile vascular congestion, causing swelling and, eventually, gangrene of the penis distal to the constricting device[7]. In this case, the patient put on three stainless steel rings, making it easy for strangulation to occur.





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**Figure 1 In the emergency department.** A: View from the right side of the patient. His penis and scrotum were markedly engorged and swollen due to three stainless steel rings; B: View from below. His penis and scrotum were markedly engorged and swollen due to three stainless steel rings.



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**Figure 2 After cutting the three stainless steel rings.** A: Each ring was cut in two locations, using an electric-powered angle grinder, and successfully removed from the patient; B: Red sores were found where the rings were attached (arrows).

The goal of treating penile incarceration with a circular foreign body is to remove the foreign object as soon as possible, and to avoid incurring any secondary damage[11]. In many cases, rapid intervention and removal of the foreign body is sufficient for patients to need no further intervention[8]. However, removing these devices can be very challenging, and often requires resourcefulness and a multidisciplinary approach, particularly when removing steel rings[1,4,8]. The clamping and cutting methods are non-invasive, fast, and effective, and result in few complications, suggesting that they could be applied for penile strangulation treatment at all levels[11]. However, clamping could prove insufficient for a hard metal ring, and because the cutting method takes longer, it could increase the risk of unnecessary harm to the penile skin, urethra, and cavernous body[11]. Other options include prepuce edema decompression and the thin tube-coiling method, which have the advantages of minimal invasiveness, simple operation, and no need for special tools, making them suitable for penile strangulation injuries, but they can also cause penile skin injuries and potentially even postoperative erectile dysfunction[11]. Furthermore, though an invasive procedure, surgical resection is an option in cases of severe penile strangulation[11]. Section of a metal ring requires precision instruments[5]. If local equipment proves inadequate for urgent penile ring removal, collaboration between traumatologists, firefighters, and/or rescue team members is recommended[5,6,12]. In our case, the rings were removed using an orthopedic bolt cutter to cut each ring in two places, with a malleable retractor as a “backing” to prevent any iatrogenic injuries to the penis[7]. The fire department assisted, using an electric-powered angle grinder to facilitate removal of the ring, because standard medical equipment (orthopedic saws, and bolt and bone cutters) had proven inadequate[3]. In addition, under emergency conditions, a dental handpiece can prove useful as a tool for the removal of a strangulating penile ring[13].

Penile incarceration has the potential to develop into severe clinical consequences, and any delay could cause irreversible complications to arise[1,8]. In addition, the development and management of necrotizing cellulitis, following use of a penile constriction ring, has been described[14]. Serious injuries of this sort can prove highly distressing to patients, and many cases necessitate focused counseling in order to address cosmetic-outcome-related concerns[14]. In this case, a multidisciplinary approach was required, which involved requesting a rescue team, as well as using an electric-powered angle grinder to cut and remove the rings. Fortunately, owing to a rapid multidisciplinary approach and

management, we were able to remove the rings with no complications.

For healthcare personnel, biohazard accidents represent a significant potential health risk[15]. Some of the most common occupational accidents at hospitals are healthcare worker injuries caused by sharp instruments[16]. The instruments used can potentially be contaminated with blood, and could therefore present a risk of infection with bloodborne pathogens, including hepatitis B, hepatitis C, and HIV[15,16]. More specifically, the most common medical workplace risks are believed to be from exposure to blood splashes and to needle stick injuries[17]. According to a World Health Organization report, over 59 million healthcare workers worldwide are exposed to biological hazards, and roughly 10% of cases of HIV in healthcare workers are caused by needle stick injuries[17]. For this reason, healthcare workers should all be aware of how to manage needle stick injuries[16]. For example, in the event of a needle stick injury, immediate medical intervention such as rinsing and disinfection the wound and/or skin contamination is necessary, but it is also crucial to promptly determine immune status, and, when appropriate, follow up with postexposure prophylaxis [16]. In this context, “preventive measures” include both reducing the number of needle stick injuries through improved work organization and by using needle devices that have safety features, as well as reducing the risk of infections by wearing safety gloves[16]. In this case, the patient’s HIV-1 RNA was below the lower detection threshold, meaning that the transmission risk was extremely low even in the event that a healthcare worker were to be injured by a sharp instrument during management of the patient. Nonetheless, health workers cannot be too careful when it comes to preventing occupational infections.

This case study has a limitation: It only reviews a single case report and case series of penile strangulation by rings. Therefore, the actual situation and nature of the disease may differ from the results of the literature review, as a result of reporting bias. Additional studies are needed to further evaluate the impact of other materials on clinical presentation, treatment patterns, and outcomes of penile strangulation. In addition, to better understand this rare case, we should have performed a follow-up with this patient.

## CONCLUSION

We present the first case of penile and scrotal strangulation by stainless steel rings in an HIV-positive man. Penile incarceration is a urologic emergency with potentially severe clinical consequences, and any delay could lead to irreversible complications. Therefore, the goal of treating penile incarceration is to remove the foreign object as soon as possible. However, removal can be very challenging, and often requires resourcefulness and a multidisciplinary approach.

## FOOTNOTES

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