

Evaluation of the use of a specially designed saw to remove penis rings at the emergency department

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Abstract

Objective: Penile strangulation is a rising problem in emergency departments (ED) and can cause serious medical issues. The removal of a penile ring requires immediate action, but is a difficult task. In this study an in-house specialised designed saw to safely remove penis rings is evaluated.

Materials and Methods: To evaluate the use of the penis ring saw we used information from our maintenance management software to evaluate the amount of malfunctions. The evaluation of the experiences in the ED were based on semi-structured interviews with ED employees and with the mechanical engineers that developed and maintain the saw.

Results: Since 2013 seven jobs were found regarding to a defect of the saw. All defects were broken saw blades. Four emergency care department employees and two instrumentmakers were interviewed. All four are pleased with the saw, because it improves patient safety during removal of the penis ring. The two instrument makers agree with the ED nurses that the saw is an improvement compared to the previous used solutions. Possible improvements were also suggested.

Conclusion: A specialized saw was designed and developed for the removal of penis rings. This saw offers a safe and standardized way to remove the penis rings.

Keywords: Evaluation, penile strangulation, penis ring removal, specialized saw

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INTRODUCTION

Penile strangulation is a rising problem in emergency departments (ED) and can cause serious medical issues.^[1] Strangulation may be caused by a wide variety of objects of different sizes and materials and is usually associated with an attempt to improve sexual pleasure and/or to maintain an erection for a longer period. Strangulation of the penis may result in vascular compromise leading eventually to gangrene.^[2] The removal of a penile ring requires immediate action, but is a difficult task. Puvvada

et al.^[3] describe a flowchart for the different approaches in the removal of a penis ring. A variety of techniques are available to deal with penile strangulation:^[4] String technique, cutting technique, aspiration technique and surgical techniques. For the cutting technique special equipment is required, which is often not available at the ED. The ring cutter which is normally used for removing rings is not suitable for removing most of the penile rings, because they are thicker and made of other, tougher materials, such as stainless steel.^[5,6] Different methods

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are used at hospitals to remove the ring, e.g., with the aid of a device originally used in the dental or orthopaedics department,^[6-12] or with tools normally used at a technical department or even the fire department.^[5,13-19] The choice of the tools used is depending on the availability of tools, the inventiveness of the personnel and the material and size of the penis ring.

At our ED the mechanical engineering department was mostly called for these cases. During night shifts, the mechanical engineers are not available in-house and had to be called at home or the fire department was called. Removal of the penis rings was done using different kind of equipment, e.g., an hydraulic shear, an angle grinder or other technical gear. The impact on the emergency care department was huge. It costed a lot of time to remove the penis rings and mostly two people were needed, one to handle the equipment and one for cooling. Patient safety was not secured with these methods.

As far as we know there is currently no commercially available device to safely remove penis rings. Therefore our instrumentmakers designed a specialised saw to safely remove the penis rings. This saw is used since 2013 at our hospital. In this study we evaluated the use of a prototype of this saw.

MATERIALS AND METHODS

In 2013 a specialised saw to remove penis rings was developed at our mechanical engineering department. This saw consists of circular saws, a clamping device, a compressed air motor and a metal plate to be placed between the penis and the ring.

To evaluate the use of the penis ring saw we used information from our maintenance management software (retrospectively) to evaluate the amount of malfunctions. Because the saw is still in the prototyping phase it is not categorized as medical instrument in our maintenance management software. We therefore performed an extraction of our maintenance database based on the search term “cockring.”

The evaluation of the experiences in the ED were based on semi-structured interviews with ED employees that have the most experience with the saw and with the mechanical engineers that developed and maintain the saw. The questions asked in the semi-structured interview included questions regarding how often they removed a penis ring, what equipment they used to remove the ring, what the advantages and disadvantages were of this method, if

they succeeded in removing the ring and if they had tips to improve the specially designed saw.

A penile strangulation is not registered separately in our hospital information system, therefore the amount of penis ring removals is based on the numbers from the interviews and on the amount of saw blades ordered.

This study was approved by our local medical ethics committee.

RESULTS

Twenty-four jobs were found in the maintenance information system based on the search term “cockring.” The first job was from 2000 and concerned the first recorded question from the ER regarding the development of specialized equipment to remove penis rings. Some simple tools were designed, but with this tools the aid of the mechanical engineers was still needed to remove the penis rings. In 2009 a start was made with the design of the penis ring saw, but it was not until 2013 before the first prototype was ready for use. This was mainly due to lack of personnel resources. Since 2013 seven jobs were found regarding to a defect of the saw. All defects were broken saw blades. Next to this, three jobs regarding the requested assistance were recorded.

Four emergency care department employees and two instrumentmakers were interviewed. Experience as ED nurse ranged from 3 to 21 years. All four ED nurses had experience with the removal of penis rings, ranging from 2 to around 25 in total. None of them knew the exact amount of penis rings removals at the ER department, considered numbers varied between one every 2 months, to 3 every month. All four had experience with the specially designed saw. Two of them worked already at the department before the development of the saw and therefore also had experience with removing the rings without the saw. All four are pleased with the saw, but they also see disadvantages of the saw. The main advantages named were: There is a device to remove the rings, improved patient safety (no possibility to cut the penis itself thanks to the safety mechanisms), faster then other solutions and less complications. The main disadvantages named were: Too heavy, for some rings the saw doesn't work (especially when the rings are too wide), the saw blades break quite often, it still takes quite a lot of time, it is difficult to position and maintain the saw in the right position or it is necessary to cool the saw which takes an extra employee., The main required solutions were: Other/stronger motor, lighter design, other design of the saw which makes it possible to approach the penis

from above instead of from the side. All nurses mentioned that it is necessary to handle the saw with care. It is very important to position the saw correct to minimize friction between the saw blades and the penis ring.

The two instrument makers both were involved in the designing and developing of the prototype saw. Both agree with the ED nurses that the saw is an improvement compared to the previous used solutions. Possible improvements were also suggested. Replacing the compressed air drive with electric drive would make it possible to increase the motor power and easier to adjust the power during the procedure. The saw could be made more user friendly, e.g., tightening the clamping mechanism requires quite a lot of force, as a result of which the saw sometimes is not properly secured resulting in shift and/or pry of the saw blades. This could be improved by changing the clamping mechanism. The saw is also quite heavy, which is due to the low budget during the development of the saw. New techniques make it possible to use a lighter motor. Another possible improvement would be to make the changing of the sawblades more easy so the users could replace them, instead of needing the assistance of an instrumentmaker. Especially outside office hours this would speed up the removal of the penis rings. Changing the design of the saw to make it possible to approach the ring under a different angle would also improve user friendliness. Both instrumentmakers also stated the importance of training of the users of the saw.

The most common defect of the saw is breakage of the saw blades. Every year around 10–20 new saw blades were ordered.

New opportunities were also called, especially making the saw multi-purpose to make it useful for different kind of applications such as the removal of titanium (finger) rings, penis rings, and other clamping problems, such as handcuffs. This would increase the use cases and thereby increase the competence of the users.

Based on the amount of numbers called in the interviews and the amount of new saw blades ordered each year, we guess that an amount of 20–30 penis rings is removed every year at our hospital.

DISCUSSION

In literature a number of case reports are published, describing the removal of penis rings. All different kinds of tools were used to remove the penis rings, but in none of the hospitals specialized tools designed for the removal

of penis rings were available. All the tools used have different disadvantages, the most important one being patient safety. In Abd El Salam *et al.*^[7] the removal of the penis ring was done by using a bone cutting forceps. The ring was removed, but minor skin abrasions from the bone cutting forceps usage required administration of antibiotics for 5 days to avoid infection. In our hospital the admittance of antibiotics isn't standard care after removal of penis rings. Banyra *et al.*^[15] describe the use of an angle grinder and a mechanical diamond-tooth circular saw. In both cases a metal plate was placed between the ring and penile tissues to protect the penis from the cutting blade. The metal plate is not secured to the saw, which makes movement of the plate independent of the saw possible. In other case reports plastic or wooden objects were placed between the penis and the ring.^[5,6,17,20] Other disadvantages of the use of an angle grinder are the electrical safety especially in combination with the necessity of cooling during grinding (it is a nonmedical tool and will therefore not fulfil the normal safety guidelines of the IEC60601).

In Eaton *et al.*^[8] the Gigli saw was used to remove a penis ring. Although it offered a safe and rapid removal in their case it is not useful in all circumstances, because it cannot successfully cut through harder metals such as hardened or stainless steel.

Often different techniques are used before successful removal is reached,^[5,21] thereby elongating the time to removal. In some hospitals different tools are used for every specific patient case, based on preference of the surgeon on duty, the equipment available or the material of the penis ring.^[22] Patel *et al.*^[14] showed an overview of 9 case reports with the removal technique and the time to presentation at the ER.

Our saw combines the clamping device, a metal piece to place between the penis and the ring and the saw. Therefore patient safety is increased. ED nurses know which device has to be used to remove the rings and are trained to use the saw. Therefore no time is wasted to discuss the treatment options and test different kind of devices.

The device still needs some improvements, but the removal of the penis rings is improved by using this device.

Sarkar *et al.*^[23] describe a modified string method which they prefer above the cutting technique and Wu *et al.*^[24] describe a three-step technique (aspiration, strapping and sling) which enabled the metal ring to be removed without the need for specialist equipment. In our patient cases aspiration is not a suitable treatment because usually the

swelling has been lasting for >24 h and clots have occurred in the cavernous bodies, making aspiration hardly works. The same arguments are valid for the strapping and sling techniques.

CONCLUSION

A specialized saw is designed and developed for the removal of penis rings. This saw offers a safe and standardized way to remove the penis rings.

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Conflicts of interest

There are no conflicts of interest.

REFERENCES

- Dell'Atti L. Penile strangulation: An unusual sexual practice that often presents an urological emergency. *Arch Ital Urol Androl* 2014;86:43.
- Osman M, al Kadi H, Al Hafii R. Gangrene of the penis due to strangulation by a metallic ring. *Scand J Urol Nephrol* 1996;30:77-8.
- Puvvada S, Kasaraneni P, Gowda RD, Mylarappa P, Manasa T, Dokania K, *et al.* Stepwise approach in the management of penile strangulation and penile preservation: 15-year experience in a tertiary care hospital. *Arab J Urol* 2019;17:305-13.
- Fhima A, Lahouel N. Successful removal of a penile constriction wedding ring in a rural area. *S Afr Med J* 2016;106:1088-9.
- Greenspan L. Tourniquet syndrome caused by metallic bands: A new tool for removal. *Ann Emerg Med* 1982;11:375-8.
- Horstmann M, Mattsson B, Padevit C, Gloyer M, Hotz T, John H. Successful removal of a 3.6-cm long metal band used as a penile constriction ring. *J Sex Med* 2010;7:3798-801.
- Abd El Salam MA, Gamal A, Elenany H. Bone cutting forceps: A safe approach for saving strangulated penis. *Case Rep Med* 2016;2016. Article ID 1274124. <http://dx.doi.org/10.1155/2016/1274124>.
- Eaton SH, Dickstein RJ, Wiygul JB. Novel use of the Gigli saw for management of penile entrapment. *J Sex Med* 2009;6:595-7.
- Etetafia MO, Nwajei CO. Successful removal of strangulating metal penile ring using a dental handpiece. *BMJ Case Rep* 2014;2014.
- Lu Y, Tan TW, Lau KW. Successful removal of a penoscrotal constricting ring in a 49-year-old male. *Asian J Urol* 2017;4:262-4.
- Paonam S, Kshetrimayum N, Rana I. Penile strangulation by iron metal ring: A novel and effective method of management. *Urol Ann* 2017;9:74-6.
- Suttle TK, Palmer B, Heinlen JE, Roth CC, Reiner WG, Frimberger D. Successful removal of a penile constriction ring in a 14-year-old male. *Adv Urol* 2009;2009. Article ID 916507. doi:10.1155/2009/916507.
- Shukla P, Lal S, Shrivastava GP, Singh LM. Penile incarceration with encircling metallic objects: A study of successful removal. *J Clin Diagn Res* 2014;8:NC01-5.
- Patel NH, Schulman A, Bloom J, Uppaluri N, Iorga M, Parikh S, *et al.* Penile and scrotal strangulation due to metal rings: Case reports and a review of the literature. *Case Rep Surg* 2018;2018. Article ID 5216826. <https://doi.org/10.1155/2018/5216826>.
- Banyra O, Sheremeta R, Shulyak A. Strangulation of the penis: two case reports. *Cent European J Urol* 2013;66:242-5.
- Nason GJ, Abdelsadek AH, Foran AT, O'Malley KJ. Multidisciplinary emergent removal of a metal penoscrotal constriction device. *Ir Med J* 2017;110:536.
- Santucci RA, Deng D, Carney J. Removal of metal penile foreign body with a widely available emergency-medical-services-provided air-driven grinder. *Urology* 2004;63:1183-4.
- Sathesh-Kumar T, Hanna-Jumma S, De Zoysa N, Saleemi A. Genitalia strangulation – Fireman to the rescue! *Ann R Coll Surg Engl* 2009;91:W15-6.
- Zhang J, Wang X, Li Z, Zhang J, Zhang X, Xing N. Penoscrotal strangulation caused by a steel ring: A case report. *Sex Med* 2017;5:e131-3.
- Ichaoui H, Sallami S, Samet A, Bokal Z, Touinsi H. Strangulation of the penis by a metallic ring: Prevention is better than cure. *Case Rep Urol* 2018;2018. Article ID 1725752. <https://doi.org/10.1155/2018/1725752>.
- Peay J, Smithson J, Nelson J, Witucki P. Safe emergency department removal of a hardened steel penile constriction ring. *J Emerg Med* 2009;37:287-9.
- Perabo FG, Steiner G, Albers P, Müller SC. Treatment of penile strangulation caused by constricting devices. *Urology* 2002;59:137.
- Sarkar D, Gupta S, Maiti K, Jain P, Pal DK. Penile strangulation by different objects and its removal by the modified string method: Management of four cases with review of literature. *Urol Ann* 2019;11:1-5.
- 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.