



PENILE STRANGULATION DEVICES: AN ALTERNATIVE ALGORITHM TO CLAMPING AND CUTTING

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ABSTRACT **OBJECTIVES:** Penile strangulation by penile constriction devices presents uncommonly but requires urgent intervention to minimize risk of developing erectile dysfunction and penile gangrene. Non-invasive methods with use of cutting tools have been attempted successfully. However, these cutting tools are fraught with problems of availability, technical skills and risk of inadvertent organ injury. Here, a stepwise algorithm is presented for removal of these devices as an alternative to cutting.

MATERIAL AND METHODS: Within a span of one year three cases presented to the emergency room between Jan 2018 to Jan 2019 with history of use of different types of constriction device on the penile shaft. A systematic approach to reverse the pathophysiological changes arising from penile constriction was followed.

RESULTS: The constriction devices were effectively removed in all cases (without the need for any fancy equipment). Any kind of collateral damage was avoided. Patchy superficial skin necrosis was the only residual injury which manifested in the post-operative period. This healed completely with regular dressings and without any scarring.

CONCLUSION: Penile strangulation injury is of relatively rare occurrence. However, it requires emergent treatment in order to avoid delayed but significant vascular complications and erectile dysfunction. Following a systematic approach, the devices can be successfully removed avoiding the need of specific tools which are usually unavailable.

KEYWORDS : Penile Strangulation Constriction Rings Urosurgery

INTRODUCTION

Penile strangulation can occur in both children and adults. Commonly, use of thread/ hair or rubber bands cause accidental injuries in children, which can be easily managed. Adults place objects around the shaft as a means of enhancing sexual pleasure or to prolong an erection. The constricting device can reduce blood flow, cause oedema and induce ischemia; gangrene and urethral necrosis may follow in delayed presentations.

Depending on the constricting device, significant resourcefulness may be required of the surgeon for its removal. The management of strangulation device can be invasive or non-invasive. Initial attempts to remove a solid constricting device involve lubrication of the shaft and foreign body and attempted direct removal. However, edema distal to the strangulation often makes removal difficult. Plastic devices can be incised with a scalpel or an oscillating cast saw, but metal objects present a more difficult challenge. Readily available hospital equipment (ring cutters, bolt cutters, dental drills, orthopaedic and neurosurgical operative drills) may not be adequate to cut through heavy iron or steel items. The use of industrial drills, steel saws, hacksaws, saber saws, and high-speed electric drills has been reported.⁽¹⁾ On occasion, fire department and emergency medical services equipment may be required to cut through iron and steel rings. Precious time may be lost in arranging these resources. We propose a quick and effective stepwise approach based on pathophysiology (Fig.1) for algorithmically removing these rings. It requires only simple and basic instrumentation preventing risk of injury to phallus.

Figure 1: Pathophysiological effects due to penile constriction rings

MATERIAL & METHODS

The cases presented to the emergency room between Jan 2018 to Jan 2019 with history of use of a constriction device on a penile shaft.

CASE 1- Mr. X, 45 years old put on a bush (used in mechanical machine for preparing silver chains) at the root of penis for a more rigid erection. He presented almost after 6 hours with a full-fledged erection. Attempts at lubrication and sliding failed. The bush was made of

forged iron & measured 7mm X 3mm X 5mm. It was impossible to cut through without endangering the organ. (Fig. 2, 3)

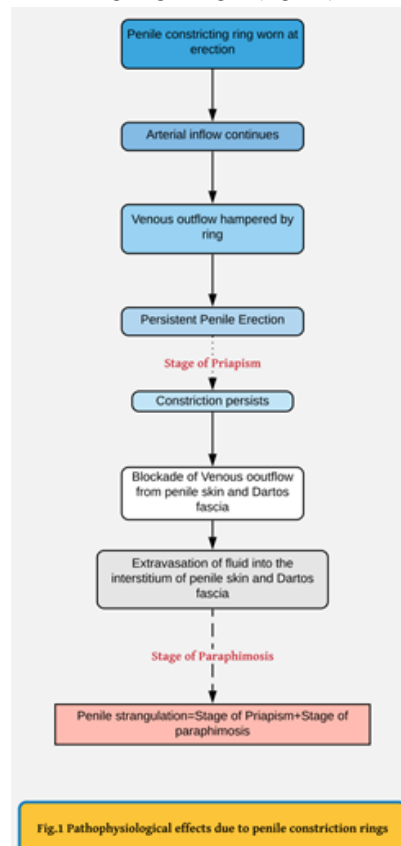




Figure 2: A kind of penile constriction device worn by patient



Figure 7: A kind of penile constriction device worn by patient

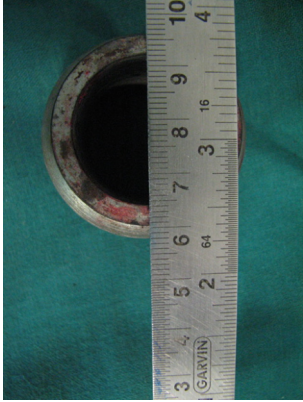


Figure 3: Dimension of the constriction device

CASE 2- Mr Y, 28 years old had worn a ball bearing to prolong the duration of erection. This was stuck at the root of the penis. He presented after 36 hours later with dehiscence and penile edema. The skin had become dusky. A 16 Fr foley catheter was easily passed. The ball bearing was made of stainless steel and measured 8mm X 2mm X 4mm dimensions. Possibility of cutting through the bearing was ruled out. (Fig. 4, 5)



Figure 4: A kind of penile constriction device worn by patient



Figure 5: Dimension of the constriction device

CASE 3- Mr. Z, 24 year old with impaired mental abilities had put on a simple metal ring at penile root. This patient presented after 7 days. The penis was flaccid with considerable penile skin edema. There was patchy superficial skin necrosis and a foley catheter could not be passed. Earlier attempts to cut the ring in previous health facility had failed. (Fig.6, 7)



Figure 6: A kind of penile constriction device worn by patient

All three cases were thoroughly evaluated for surgical fitness. After due informed consent and prognostication, they were taken up under spinal anaesthesia in the operating room. A systematic approach with following steps was followed (fig.8) to reverse the pathophysiological changes.

- STEP 1- REDUCING THE ERECTION:** (Akin to treating priapism)
- STEP 2- REDUCING THE PENCIL EDEMA:** (Akin to treating paraphimosis)
- STEP 3- REDUCING THE TISSUE BULK**

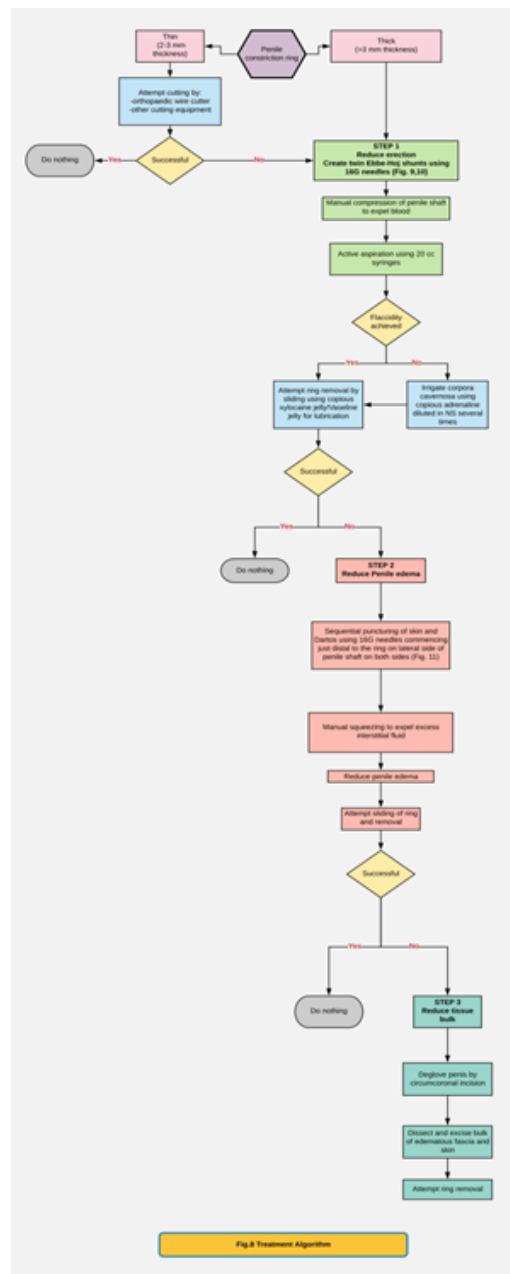


Figure 8 Treatment Algorithm

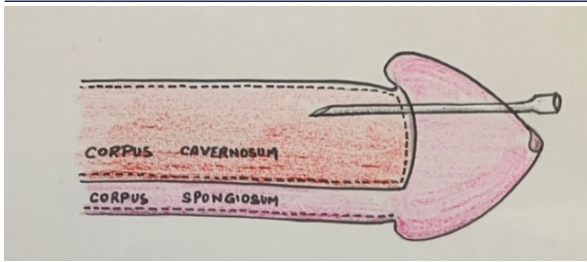


Figure 9: Creation of Ebbe-Hoj shunts



Figure 13: Successfully removed constriction device

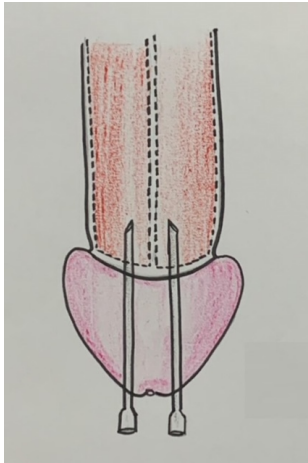


Figure 10: Creation of Ebbe-Hoj shunts

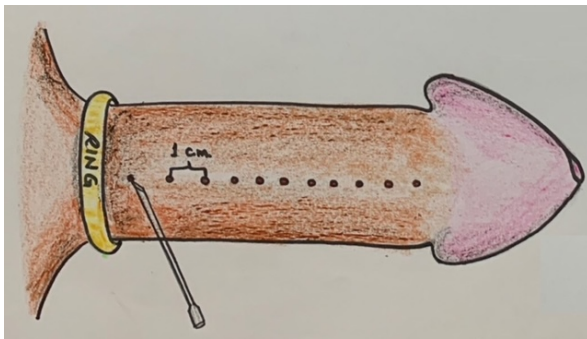


Figure 11: Penile shaft skin puncture technique

RESULT

The constriction devices were effectively removed in all cases (fig12,13). There was no requirement of any fancy equipment to cut through the devices. At the same time all collateral damages arising from mechanical cutting, thermal injury from heat produced during cutting etc. were avoided. The only residual injury which manifested in the immediate post-operative period was that of patchy superficial skin necrosis. This healed completely over the next few days with regular dressings and without any scarring.

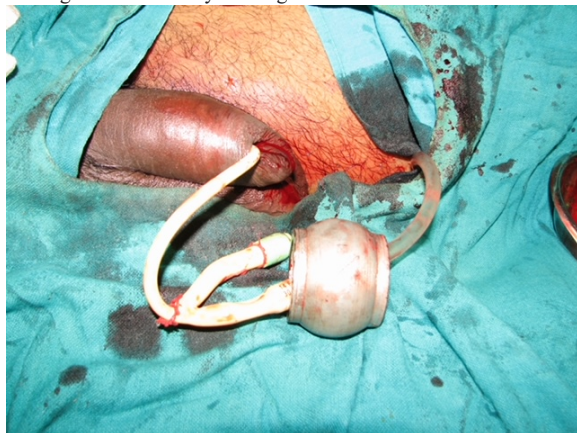


Figure 12: Successfully removed constriction device

DISCUSSION

Use of penile constriction devices for enhancing erections and/or sexual gratification is a well-known phenomenon. A variety of types of metallic and non-metallic constriction devices have been used, ranging from simple plastic rings to rubber bands, hair, hammerheads, soft drink bottles, and, most frequently, various metal rings.⁽²⁻³⁾ Occasionally these devices result in penile strangulation. The device cannot be removed as a result of ensuing oedema and a priapism kind of state. Each case has an individual presentation and its removal can pose great challenge. There is no one universal method described for their removal.

The severity and ensuing complications of strangulation injury vary and depend on factors including type of device used; degree of constriction, and most importantly the time elapsed until presentation. In order to have a systematic treatment approach, it becomes necessary to develop a universally accepted grading system for these injuries. An attempt to develop such a system of grading penile injuries was made by Bhat et al. They developed a grading system for penile injuries and divided them into five categories ranging from penile edema to gangrene.⁽⁴⁾

According to Broderick et al. in a study using colour Doppler ultrasonography, penile incarceration > 30 minutes may result in penile ischemia.⁽⁵⁾ Therefore, regardless of the treatment option, the main objective is removal of the constricting device to restore venous and lymphatic drainage and arterial inflow, preserving the organ's anatomy and functionality. This approach must be delivered urgently since prolonged placement of constriction devices is considerably more likely to result in high-grade injuries. Despite this, the mean time that elapses from application of device to presentation is usually more than 8 hours. The main reasons for this delay are patient shame and psychiatric disorders.

There are many reports of different devices that have been used as well as techniques and suggestions for their removal.^(6,7) The approach of choice depends on the type of the constricting device, degree of injury, and available equipment.⁽¹⁾ Penile aspiration could serve as the simple first step to reduce edema and provide more space to release the device.⁽⁸⁾ Katz et al. described a new non-invasive technique, the "pseudo-pulley" method, which involves the passage of four straight Nitinol hydrophilic guide wires to remove a penile constriction device.⁽⁹⁾ If non-invasive removal is not possible, an object may be cut or sawed off. Nonelectric cutting tools should be reserved for smaller and softer objects such as hair, plastic bottle rings, and smaller metal rings.⁽¹⁰⁾ Unfortunately, there are some reports of iatrogenic injury caused by these devices.⁽¹¹⁾ Horstmann et al. reported the successful removal of a 3.6-cm long piece of heavy metal tubing using an angle grinder.⁽¹²⁾ In cases when all other extraction techniques have failed and there exists devitalized or gangrenous tissue, penile degloving and amputation can be employed.⁽¹⁾

Depending on the severity of the injury caused by the constriction device, post-extraction complications can occur. Penile edema is the most common complication seen after constrictor extraction, with spontaneous resolution through reestablishment of venous and lymphatic drainage. Patients developed penile edema with spontaneous resolution within 10 days. In exceptional cases, large penile edema can limit penile arterial blood flow, so colour Doppler ultrasonography may aid in determining the vascular patency.⁽¹³⁾

Lost or decreased penile sensation is an uncommon complication arising from the use of penile constrictor. It is probably related to the compression of the penile innervation exerted by the foreign body as well by the decrease of blood inflow in the affected area.

CONCLUSION

Penile strangulation is a rare urological emergency whose treatment must be immediate through the extraction of the foreign body, avoiding vascular impairments that can lead to serious complications. Most patients present with low-grade injuries and use penile constrictors due to erectile dysfunction. There are some treatment options, but depending on the case, their removal can be challenging. The use of specific tools for achieving penile release from constrictors is a fast, safe and effective method. Patients with urinary retention may require urinary diversion.

REFERENCES

1. Silberstein J, Grabowski J, Lakin C, Goldstein I. Penile constriction devices: case report, review of the literature, and recommendations for extrication. *J Sex Med.* 2008;5(7):1747–1757.
2. Singh I, Joshi MK, Jaura MS. Strangulation of penis by a ball bearing device. *J Sex Med.* 2010;7:3793–3797.
3. Jiatao J, Bin X, Huamao Y, Jianguo H, Bing L, Yinghao S. Removal of a long PVC pipe strangulated in the penis by hot-melt method. *J Sex Med.* 2011;8:627–630.
4. Bhat AL, Kumar A, Mathur SC, Gangwal KC. Penile strangulation. *Br J Urol.* 1991;68:618–621.
5. Broderick GA, McGahan JP, Stone AR, White RD. The hemodynamics of vacuum constriction erections: assessment by color Doppler ultrasound. *J Urol.* 1992;147:57–61.
6. Eaton SH, Dickstein RJ, Wiygul JB. Novel use of the Gigli saw for management of penile entrapment. *J Sex Med.* 2009;6:595–597.
7. Noh J, Kang TW, Heo T, Kwon DD, Park K, Ryu SB. Penile strangulation treated with the modified string method. *Urology.* 2004;64:591–591.
8. Chang SJ, Chiang IN, Hsieh JT, Liu SP. Extrication of penile constriction device with corpora aspiration. *J Sex Med.* 2009;6:890–891. author reply 891-2.
9. Katz DJ, Chin W, Appu S, Harper M, Vukasin F, Tay YK, et al. Novel extraction technique to remove a penile constriction device. *J Sex Med.* 2012;9:937–940.
10. Greenspan L. Tourniquet syndrome caused by metallic bands: a new tool for removal. *Ann Emerg Med.* 1982;11:375–378.
11. Brock S, Kuhn W. Removal of constricting bands using the Dremel drill. *Acad Emerg Med.* 1999;6:1182–1183.
12. 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;7:3798–3801.
13. Schuster G, Stockmal P. Genital incarceration with metal rings: their safe removal. *Tech Urol.* 1999;5:116–118.