

# Penile Strangulation: A Case Report and Novel Management Strategy

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## Abstract

**Introduction:** Penile strangulation injuries are rare but well-recognized entities in the medical literature. Prolonged edema and ischemia can lead to tissue and neurovascular damage that is sometimes irreversible.

**Aims:** The aims of this case report are to discuss a novel treatment technique in reversing the ischemia-reperfusion injury associated with a case of penile strangulation.

**Methods:** We used hyperbaric oxygen treatments in a successful attempt for penile tissue salvage after a prolonged case of penile strangulation.

**Results:** The patient was successfully treated with five ninety-minute hyperbaric oxygen treatments. He was discharged home with improved penile sensation and the ability to void without difficulty.

**Conclusion:** Post-strangulation treatment varies based on the grade of injury incurred. Typically, when severe necrosis or gangrene is present a partial or total penectomy is performed. We propose hyperbaric oxygen treatments as a novel, minimally invasive method to attempt penile sparing in such an injury.

## Introduction

Penile strangulation injuries are rare but well-recognized entities in the medical literature. Typically the device is placed for autoerotic purposes that lead to impaired venous and lymphatic drainage and subsequent edema. The resulting prolonged edema and strangulation eventually leads to ischemia and necrosis. Further compounding injury, delays in seeking treatment are common due to embarrassment. On presentation, expeditious removal of the device is paramount to preventing further ischemia and preserving functional tissue. The technique used for removal is highly dependent on the characteristics of the encompassing device.

## Aims

The literature is replete with different techniques for removal of the offending device, but there is a relative paucity of data on subsequent management of the remaining tissue. Our aim is to present a case in which novel management in the form of hyperbaric oxygen therapy resulted in the preservation of penile tissue.

## Methods

We reviewed a recent case of penile strangulation in which hyperbaric oxygen treatments were used in a successful attempt for penile tissue salvage after a prolonged case of penile strangulation.

## Main outcome measures

Our main outcomes were measured by improvement of penile sensation and preservation of penile tissue.

## Results

A 37 year old male with no significant past medical history presented to an outside hospital emergency room with the neck of a glass milk jug impacted at the base of his penis. The patient had placed butane lighter fluid in a glass milk jug, lit the fluid and placed the jug around his penis to create a vacuum. The suction caused the patient's penis and scrotum to be inadvertently captured within the glass jug. Subsequent swelling and edema occurred preventing the patient from removing the object. The patient was able to break a portion of the glass jug to relieve the vacuum but was unsuccessful in removing the constricting bottleneck around the base of his genitals. Eighteen hours after placement of the glass milk jug, the patient presented to the ER where they were successful in removing the constricting portion but significant edema and bullae were noted on the penis and scrotum. After two days of expectant management, the patient was transferred to our institution for definitive treatment.

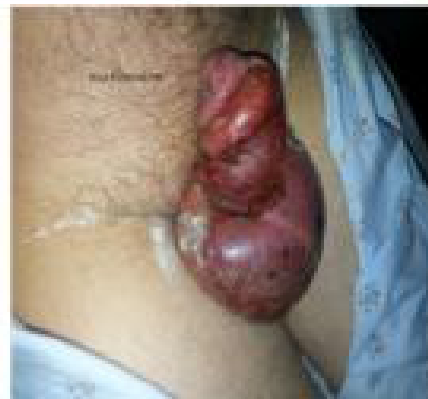
Upon presentation to our facility, more than forty-eight hours after placement of the object, his penis and scrotum were diffusely edematous and ecchymotic to the size of an eggplant. There

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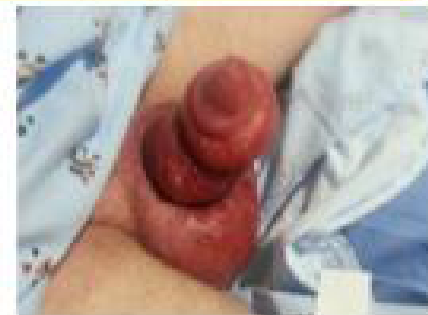
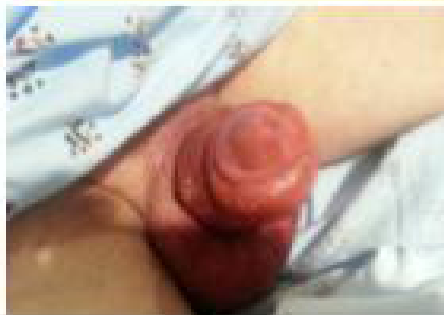
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**First Treatment:** Note significant improvement in swelling, edema and color



**Treatment 4:** Some skin sloughing with continued improvement in swelling. The patient was voiding spontaneously at this point



**Figure 1-4:** Initial Presentation 48 hours after removal of Mik Jug. Note Significant edema and bulls present secondary to both ischemis and burn injuries.  
**First Treatment:** Note significant improvement: in swelling, edema and color.  
**Treatment 6:** Some skin sloughing with continued improvement in swelling. The patient was voiding spontaneously at this point.

were scattered bullae on the shaft of the penis with minimal pain and sensation distal to the obstruction. His wounds were thought to be a combination of both burn and ischemia. The patient was able to void spontaneously, but an indwelling urethral catheter was initially placed for precautionary measures. His wounds were treated with non-occlusive Vaseline dressing and loose gauze and he was started on broad-spectrum antibiotics. Approximately 72 hours after the initial strangulation, his injury showed minimal improvement. Thus, the patient was started on a regimen of Hyperbaric Oxygen Therapy (HBOT) for the treatment of ischemic/reperfusion injury. He received a total of five ninety-minute treatments of HBOT at 2 atmospheres absolute pressure as well as dressing changes twice a day

over the next 72 hours. The patient's edema and ecchymoses began to improve and he had increasing sensation and genital pain throughout his treatments with no further complications. The progression can be seen in Figures 1-4. The patient slowly regained sensation but his erectile function was unclear. He was discharged after a nine day hospital course with scheduled follow-ups with urology and plastic surgery for possible skin grafting. However, he did not keep multiple scheduled clinic visits and, despite multiple attempts to contact the patient, he was lost to the University Hospital system.

**Discussion**

Penile strangulation is a urological emergency requiring prompt

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removal of the offending device to prevent ensuing ischemia. Strangulation augments the length and girth of the penis by impairing venous drainage from the dorsal and lateral superficial veins. With impaired venous outflow, edema distal to the strangulation makes the object difficult to remove. As the venous congestion progresses the penis receives less arterial blood flow leading to ischemia.

This ischemia can have various effects on the organ. Possible injuries include simple engorgement, ulceration, necrosis, urethral injury, and even gangrene. A grading scale has been proposed for strangulation injuries based on the injuries suffered (Table 1).

Our patient had a Grade II-III injury. He had damage to the skin with ecchymoses and bullae on the shaft. Additionally, he had

**Table 1:** A grading scale has been proposed for strangulation injuries based on the injuries suffered.

Grade	Injury to Penis <sup>2</sup>
I	Edema of distal penis w/ no evidence of skin ulceration or urethral injury
II	Injury to skin w/ no evidence of urethral injury and decreased penile sensation distal to constriction
III	Injury to the skin and urethra without urethral fistula and loss of distal penile sensations
IV	Complete division of corpus spongiosum leading to a urethral fistula and constriction of corpora cavernosa w/ loss of distal penile sensation
V	Gangrene, necrosis, or complete amputation of penis

minimal sensation distal to the injury and no evidence of urethral involvement. While Grade II injuries are common with less than 72 hours of constriction, the patient did have some skin necrosis, evidence of higher level of injury.

The primary effects of HBOT in treating traumatic injuries area ten-fold increase in plasma and tissue oxygen tensions, a 125% increase in blood oxygen content, and a three-fold increase in oxygen diffusion through tissue fluids and biologic barriers. Secondary effects include vasoconstriction, upgrading of host wound healing, and those specific to Ischemia-Reperfusion (IR). The vasoconstriction is analogous to that seen with alpha-adrenergic agents, reducing inflow by up to 20% while maintaining venous outflow, with reduction in edema and resultant oxygen availability to the tissue by diffusion distance reduction and also reduced pressure on the microcirculation. Host functions such as fibroblast activity, neutrophil oxidative killing and osteogenesis are all oxygen dependent, with no such activity when oxygen tensions decrease below 30mmHg. Specific IR effects include decreased endothelial adhesion of neutrophils, decreased pro-

inflammatory cytokines, especially IL-6 and TNF-alpha. While high concentrations of oxygen result in oxidative stress, compensatory mechanisms occur such as production of heme oxygenase-1, inducible heat shock proteins, catalase, and superoxide dismutase.

## Conclusion

Post-strangulation treatment varies based on the grade of injury incurred. Typically, partial or total penectomy occurs when severe necrosis or gangrene is present. If treatment is delayed, subsequent seeding of the blood and sepsis has been reported. Ischemia-reperfusion injuries are also of concern. Continued monitoring for the presence of necrotic tissue and need for debridement is important to further prevent injury. In order to avoid further devitalization of tissue, our patient was treated with hyperbaric oxygen therapy. Previous reports in the literature involve penectomy for similar injuries. We propose hyperbaric oxygen treatments as a novel, minimally invasive method to attempt penile sparing in such an injury. Review of previous histopathology from patients who underwent penectomy could help elucidate if hyperbaric treatments would have improved penile salvage in those patients.

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