

World Journal of *Clinical Cases*

World J Clin Cases 2022 January 14; 10(2): 397-752



EDITORIAL

- 397 New trends in treatment of muscle fatigue throughout rehabilitation of elderlies with motor neuron diseases
Mohamed A

MINIREVIEWS

- 401 What emotion dimensions can affect working memory performance in healthy adults? A review
Hou TY, Cai WP
- 412 Quadrilateral plate fractures of the acetabulum: Classification, approach, implant therapy and related research progress
Zhou XF, Gu SC, Zhu WB, Yang JZ, Xu L, Fang SY

ORIGINAL ARTICLE**Case Control Study**

- 426 Methylprednisolone accelerate chest computed tomography absorption in COVID-19: A three-centered retrospective case control study from China
Lin L, Xue D, Chen JH, Wei QY, Huang ZH

Retrospective Study

- 437 Analysis of photostimulable phosphor image plate artifacts and their prevalence
Elkhateeb SM, Aloyouny AY, Omer MMS, Mansour SM
- 448 N6-methyladenine-modified DNA was decreased in Alzheimer's disease patients
Lv S, Zhou X, Li YM, Yang T, Zhang SJ, Wang Y, Jia SH, Peng DT
- 458 Inflammation-related indicators to distinguish between gastric stromal tumors and leiomyomas: A retrospective study
Zhai YH, Zheng Z, Deng W, Yin J, Bai ZG, Liu XY, Zhang J, Zhang ZT
- 469 Relationship between Ki-67 and CD44 expression and microvascular formation in gastric stromal tumor tissues
Ma B, Huang XT, Zou GJ, Hou WY, Du XH
- 477 Modified surgical method of supra- and infratentorial epidural hematoma and the related anatomical study of the squamous part of the occipital bone
Li RC, Guo SW, Liang C
- 485 Combined molybdenum target X-ray and magnetic resonance imaging examinations improve breast cancer diagnostic efficacy
Gu WQ, Cai SM, Liu WD, Zhang Q, Shi Y, Du LJ

- 492 Value of thyroglobulin combined with ultrasound-guided fine-needle aspiration cytology for diagnosis of lymph node metastasis of thyroid carcinoma

Zhang LY, Chen Y, Ao YZ

- 502 Locking compression plate + T-type steel plate for postoperative weight bearing and functional recovery in complex tibial plateau fractures

Li HF, Yu T, Zhu XF, Wang H, Zhang YQ

- 511 Effect of Mirena placement on reproductive hormone levels at different time intervals after artificial abortion

Jin XX, Sun L, Lai XL, Li J, Liang ML, Ma X

- 518 Diagnostic value of artificial intelligence automatic detection systems for breast BI-RADS 4 nodules

Lyu SY, Zhang Y, Zhang MW, Zhang BS, Gao LB, Bai LT, Wang J

Clinical Trials Study

- 528 Analysis of 20 patients with laparoscopic extended right colectomy

Zheng HD, Xu JH, Liu YR, Sun YF

Observational Study

- 538 Knowledge, attitude, practice and factors that influence the awareness of college students with regards to breast cancer

Zhang QN, Lu HX

- 547 Diagnosing early scar pregnancy in the lower uterine segment after cesarean section by intracavitary ultrasound

Cheng XL, Cao XY, Wang XQ, Lin HL, Fang JC, Wang L

- 554 Impact of failure mode and effects analysis-based emergency management on the effectiveness of craniocerebral injury treatment

Shao XL, Wang YZ, Chen XH, Ding WJ

- 563 Predictive value of alarm symptoms in Rome IV irritable bowel syndrome: A multicenter cross-sectional study

Yang Q, Wei ZC, Liu N, Pan YL, Jiang XS, Tantai XX, Yang Q, Yang J, Wang JJ, Shang L, Lin Q, Xiao CL, Wang JH

Prospective Study

- 576 5-min mindfulness audio induction alleviates psychological distress and sleep disorders in patients with COVID-19

Li J, Zhang YY, Cong XY, Ren SR, Tu XM, Wu JF

META-ANALYSIS

- 585 Efficacy and safety of argatroban in treatment of acute ischemic stroke: A meta-analysis

Lv B, Guo FF, Lin JC, Jing F

SCIENTOMETRICS

- 594 Biologic therapy for Crohn's disease over the last 3 decades
Shen JL, Zhou Z, Cao JS, Zhang B, Hu JH, Li JY, Liu XM, Juengpanich S, Li MS, Feng X

CASE REPORT

- 607 Novel compound heterozygous GPR56 gene mutation in a twin with lissencephaly: A case report
Lin WX, Chai YY, Huang TT, Zhang X, Zheng G, Zhang G, Peng F, Huang YJ
- 618 Patients with SERPINC1 rs2227589 polymorphism found to have multiple cerebral venous sinus thromboses despite a normal antithrombin level: A case report
Liao F, Zeng JL, Pan JG, Ma J, Zhang ZJ, Lin ZJ, Lin LF, Chen YS, Ma XT
- 625 Successful management of delirium with dexmedetomidine in a patient with haloperidol-induced neuroleptic malignant syndrome: A case report
Yang CJ, Chiu CT, Yeh YC, Chao A
- 631 Malignant solitary fibrous tumor in the central nervous system treated with surgery, radiotherapy and anlotinib: A case report
Zhang DY, Su L, Wang YW
- 643 Anesthesia and perioperative management for giant adrenal Ewing's sarcoma with inferior vena cava and right atrium tumor thrombus: A case report
Wang JL, Xu CY, Geng CJ, Liu L, Zhang MZ, Wang H, Xiao RT, Liu L, Zhang G, Ni C, Guo XY
- 656 Full-endoscopic spine surgery treatment of lumbar foraminal stenosis after osteoporotic vertebral compression fractures: A case report
Zhao QL, Hou KP, Wu ZX, Xiao L, Xu HG
- 663 Ethambutol-induced optic neuropathy with rare bilateral asymmetry onset: A case report
Sheng WY, Wu SQ, Su LY, Zhu LW
- 671 Vitrectomy with residual internal limiting membrane covering and autologous blood for a secondary macular hole: A case report
Ying HF, Wu SQ, Hu WP, Ni LY, Zhang ZL, Xu YG
- 677 Intervertebral bridging ossification after kyphoplasty in a Parkinson's patient with Kummell's disease: A case report
Li J, Liu Y, Peng L, Liu J, Cao ZD, He M
- 685 Synovial chondromatosis of the hip joint in a 6 year-old child: A case report
Yi RB, Gong HL, Arthur DT, Wen J, Xiao S, Tang ZW, Xiang F, Wang KJ, Song ZQ
- 691 Orthodontic retreatment of an adult woman with mandibular backward positioning and temporomandibular joint disorder: A case report
Yu LY, Xia K, Sun WT, Huang XQ, Chi JY, Wang LJ, Zhao ZH, Liu J

- 703** Autosomal recessive spinocerebellar ataxia type 4 with a *VPS13D* mutation: A case report
Huang X, Fan DS
- 709** Primary adrenal diffuse large B-cell lymphoma with normal adrenal cortex function: A case report
Fan ZN, Shi HJ, Xiong BB, Zhang JS, Wang HF, Wang JS
- 717** Varicella-zoster virus-associated meningitis, encephalitis, and myelitis with sporadic skin blisters: A case report
Takami K, Kenzaka T, Kumabe A, Fukuzawa M, Eto Y, Nakata S, Shinohara K, Endo K
- 725** Tension pneumocephalus following endoscopic resection of a mediastinal thoracic spinal tumor: A case report
Chang CY, Hung CC, Liu JM, Chiu CD
- 733** Accelerated Infliximab Induction for Severe Lower Gastrointestinal Bleeding in a Young Patient with Crohn's Disease: A Case Report
Zeng J, Shen F, Fan JG, Ge WS
- 741** Occupational fibrotic hypersensitivity pneumonia in a halogen dishes manufacturer: A case report
Wang M, Fang HH, Jiang ZF, Ye W, Liu RY
- 747** Using a fretsaw in treating chronic penial incarceration: A case report
Zhao Y, Xue XQ, Huang HF, Xie Y, Ji ZG, Fan XR

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The primary aim of *World Journal of Clinical Cases* (*WJCC*, *World J Clin Cases*) is to provide scholars and readers from various fields of clinical medicine with a platform to publish high-quality clinical research articles and communicate their research findings online.

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Using a fretsaw in treating chronic penial incarceration: A case report

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Abstract

BACKGROUND

Penial incarceration (PI) is a rare situation. It is usually caused by a foreign object which strangulates at the base of the penis. PI may derive from pranks, sexual demand, mental disease, or intention to prohibit urinary disease. Generally, these situations are emergent and immediate treatments are needed. Cases of chronic PI are less reported, and their treating methods are yet to be discussed.

CASE SUMMARY

We reported a case on treating a 73-year-old male who had PI with a metallic hoop for three months. After multidisciplinary consultation, the operation was performed successfully with the help of a fretsaw. Despite the chronic strangulation, the prognosis of the patient was satisfying. To the best of our knowledge, this case was rare and precious as it featured the longest strangulating time, which might enlighten the treating process of future PI cases. Also, we have reviewed and summarized major published cases to encapsulate appropriate approaches when facing diverse strangulation situations.

CONCLUSION

The selection of surgical tools depends on the material of the strangulating objects, the availability of equipment, and the severity of the penial damage. The urination function may not be affected after three months of incarceration as in our case, whilst prudent preoperative measures and multidisciplinary evaluations are always essential. Although using a fretsaw is comparatively slow, it is safe and feasible to treat metallic penial incarceration.

Key Words: Penial incarceration; Chronic penial strangulation; Fretsaw; Surgical treatment; Literature review; Case report

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Core Tip: Penial incarceration (PI) is a rare clinical situation. We report a case of chronic PI, where a multidisciplinary task force was established for surgical strategy planning. We adopted the orthopedic fretsaw to split the metallic hoop. The patient reported no complications one year after the surgery. As the treatment of PI has not been summarized yet, we also performed a mini review of the literature regarding the treating approaches under certain circumstances. This case was unique because it featured the longest reported strangulating time, and it offered some first-hand experience on treating chronic penial incarceration.

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INTRODUCTION

Penial incarceration (PI) is a rare clinical situation that was firstly reported in 1755[1]. It is usually caused by a foreign object that strangulates at the base of the penis[2]. PI may derive from pranks, sexual demand, mental disease, or intention to prohibit urinary disease[1]. In most cases, the strangulating objects would block venous and arterial blood supply and result in ischemic necrosis. Hence, PI usually requires immediate intervention to save the penis function[1,3]. Depending on the material and hardness, strangulating objects can be either metallic or non-metallic[4]. Studies report that PI is usually caused by non-metallic foreign objects in younger patients, such as hair and rubber bands. In contrast, in elderly patients, metallic foreign objects are more likely to be found[5].

Herein, we report a rare case of a patient with chronic PI for three months. The strangulation was treated by operation successfully, and the patient's penial function was not affected. Published approaches on evaluating and treating PI are reviewed, and our experience on this case is shared.

CASE PRESENTATION

Imaging examinations

No specific imaging examination was taken for diagnostic purposes as the diagnosis was not ambiguous.

Laboratory examinations

Nothing abnormal was shown in the laboratory examinations.

Physical examination

Physical examination demonstrated a swollen penis at the distal end of the metallic ring, no skin necrosis or numbness was reported, nor stinky odor was smelt. This copper hoop was 40 mm in the external diameter, with a 10 mm width and a 2 mm thickness (Figure 1).

A close physical examination found that the metallic hoop could be rotated slightly at the incarceration location. However, it could not be removed directly whatsoever. The patient's vital sign was stable.

Personal and family history

The patient had no markable personal and family history.

History of past illness

The patient reported multiple comorbidities, including diabetes, high blood pressure (up to 190/110 mmHg), and coronary heart disease with four stents implanted. The patient took aspirin and clopidogrel routinely for secondary prevention purposes.



Figure 1 Preoperative view of the penis.

History of present illness

The patient reported that he "accidentally" put the copper hoop in his penis three months ago, and it was challenging to be taken off. As there was no acute pain, bleeding, or any other uncomfortable symptoms at that moment, he decided to do the self-observation rather than visit the emergency department. During his observation period, he found that his penis gradually became swollen, and thereafter the urination gradually became arduous. After three-mo-long consideration, he decided to visit the outpatient department of our medical center on his own.

Chief complaints

A 73-year-old man visited the outpatient department of our hospital with a copper hoop strangulating around the base of his penis.

MULTIDISCIPLINARY EXPERT CONSULTATION

Aspirin and clopidogrel had been ceased seven days before the operation. Both the cardiology department and anesthesia department regarded the risk to anesthesia as acceptable for surgery. Firefighters stated that they had no experience in handling such cases.

Dentists suggested that the fixed dental drill might be an alternative, as they had previously tested its efficiency and feasibility on a stainless-steel nut. It could cut a 1 mm deep gap on the nut within 25 s, let alone the softer copper hoop in this case. However, since the head of the dental drill was easily destructed, this plan was eventually abandoned.

Considering the familiarity with available equipment in the operating room, we also invited several scrubbing nurses for surgical instrument preparation. The fretsaw, which had been commonly used in the field of orthopedics and neurosurgery, was recommended.

FINAL DIAGNOSIS

The final diagnosis of the presented case is chronic PI with a metallic hoop.

TREATMENT

We wrapped the distal penis with a bandage preoperatively to alleviate regional edema and placed a thin catheter between the penis and the hoop as a retraction. The catheter was pulled out intraoperatively, and then a condom was cautiously placed. Nevertheless, because of the edema of the prepuce, we failed to take the hoop off by hand, even with lubrication.

Therefore, penile aspiration was performed to reduce the edema. Meanwhile, we exploited a pincher to fix the hoop, an intestinal spatula to protect the underlying skin, as well as sterile water for cooling secondary heat damage. A video clip of the surgical procedure could be found online as the *Supplementary Material*. The foreign object was finally removed after 100 min of fretsaw cutting (Figure 2). There was scarcely any bleeding during the surgery. A urinary catheter was indwelled in case of temporary dysuria. The catheter was withdrawn and the patient was discharged in good condition two days after surgery.

OUTCOME AND FOLLOW-UP

There were no complications like dysuria, erectile dysfunction, urinary irritation, or urethral fistula through telephone follow-up on the exact time of one month and one year after surgery.

DISCUSSION

PI is an urgent situation. If treated untimely, it can result in devastating consequences, as the persistent constriction might lead to genital vascular occlusion, further causing skin loss, urethral-cutaneous fistula, erectile dysfunction, and even penile loss[6]. Given that no particular tool has been designed for relieving the strangulation, and occasionally the patient is too old with severe comorbidities, a multidisciplinary team, sometimes including firefighters, physicians, and scrubbing nurses, is suggested to be established.

Albeit cases of penial strangulation and its treatments had been sporadically reported, there are no universal treating protocols due to the differences in patients' status, strangulating objects, and medical conditions. Various objects could induce the strangulation of the penis. Based on the material, they could be roughly classified as metallic and non-metallic[7]. Trivedi *et al*[3] suggested that the duration of incarceration was an essential factor affecting the prognosis. Namely, suppose the penile strangulation cannot be relieved in time, it may lead to irreversible ischemic necrosis, gangrene of the penis, even penile self-amputation, urethral fistula, and penile erectile dysfunction.

As far as we are concerned, the penis injury can be divided into different grades, varying from edema, skin loss, urethral fistula to complete amputation[8], that is: Grade 1: simple distal prepuce edema without penile skin ulcer or urethral injury; Grade 2: skin injury and cavernous compression, penile prepuce edema, accompanied by decreased sensation, but no urethral injury; Grade 3: urethral injury, loss of distal penile sensation, but no urinary fistula; Grade 4: the rupture of the cavernous urethral body and result in urinary fistula, further compression of the penile cavernous body with loss of sensation; and Grade 5: necrosis or spontaneous disconnection of the distal end of the penis. In our experience, anti-infection and decompression are basic principles to deal with such cases. At the same time, the severity of strangulation is mainly related to the foreign object itself, such as hardness, size, and smoothness. More specifically, when the surface between the incarcerating object and the penis is not smooth or too tight, the penis would present acute edema, ulcer, and even necrosis. However, long-term strangulation may only cause edema of the prepuce and local skin superficial ulcer when the incarceration is not severe, rather than penial necrosis and urinary fistula. This situation might be partial because, at this time, penial and urethral cavernous bodies are shielded from edematous skins.

Generally, the treatment attempts we take should minimize the trauma to local tissues[9]. Applying lubricating oil with appropriate traction to remove foreign objects directly is preferred. For those with severe incarceration and noticeable swelling, penis piercing could be performed. The piercing sites could be either the edematous skin, the subcutaneous skin, or the penial and urethral cavernous body when necessary[10].

For less-likely removable strangulating objects, direct cutting is recommended. Under these circumstances, the hardness and thickness of the material should be taken into consideration. For non-metallic incarcerations, such as hair tourniquet syndrome [11], rubber bands for disease prevention[2], plastic bottles for sexual entertainment [12], or seal rings[13], the treatments are reported to be comparatively more straightforward. However, as the strangulating objects had a certain degree of deformability, it is crucial to restore the deformed penis after removing the strangulating objects. Due to the metallic hoop's hardness and thickness, treatments on metallic incarcerations are

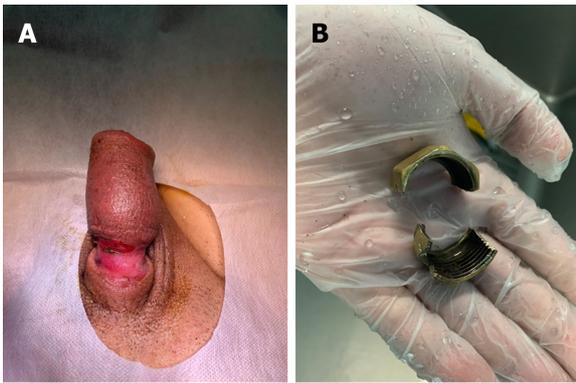


Figure 2 A: Penis after the removal of strangulation; B: A view of the cut hoop.

more complicated. Previous literature mentioned various surgical tools, mostly from orthopedics and dentistry, such as motor-operated emery wheel machine, metal cutter, grinder, hacksaw, fretsaw, industrial-grade steel bolt cutters, and marble cutting tool [4,14,15]. In extreme cases such as strangulation by axletree[16] or hammerhead, cautious planning is needed before violent cutting. The heat originating from the persistent cutting procedure could cause burn injury even with additional irrigation. Subsequently, the operation might be performed in a de-gloving way[16], which can be decomposed into three steps: (1) De-gloving the skin distal to the strangulated area till the coronal part; (2) Moving the constrictive object towards the distal end; and (3) Suturing the edge of the skin back.

Extra operations are required in exceptional situations, such as PI with shallow ulcerations or urinary tract fistulae. Ulceration indicates the necrosis of penial skin or partial corpus cavernosum. Thereafter, the necrotic part needs to be debrided first. However, if the wound defect is too large to be sutured, a skin graft with radial forearm flap neophallus might be required. If deep necrosis is found in the urethra, partial or entire penectomy might be necessary[9,17,18].

There were three main benefits of using a fretsaw in this case. First, compared with a dental drill and other electric equipment, the initiation, cessation, and alteration of cutting direction could be adjusted more responsively when deploying a fretsaw. Second, there would be no inertia and electric sparks because hands drove the fretsaw. Last but not least, because the cutting direction was from the inner layer to the outer surface, the accidental injury caused by the damage of the metal structure would be avoided.

Nevertheless, the cutting efficiency of using a fretsaw is comparatively low, as it is purely powered by hands. Continuously cutting for several minutes is tiring, and thereafter loss of controllability might occur. Same as other methods, thermal damage could not be avoided. Hence, an assistant must continuously spray normal saline with a syringe to cool the metal surface.

Several limitations should be noted. First, due to the rarity of PI, more cases are awaiting to be summarized to increase credibility and generality. Specific consideration should be taken regarding patient status, the degree of edema, and the material of the incarcerating object. Systematic reviews are called for to establish higher-level evidence. Second, specific steps, in this case, could be optimized, such as a bacterial culture could be performed in case of severe postoperative skin infection, and the postoperative daily observation of the wound might be better recorded.

CONCLUSION

In conclusion, the selection of cutting tools depends on the strangulating object and the availability of equipment. Meanwhile, the concrete operation also relies on the severity of penial damage. The urination function may not be affected after three months of incarceration like in this case, but prudent measures and sufficient preparations should be taken preoperatively. Even though using a fretsaw in treating PI is comparatively less efficient, it is feasible and safe.

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