Emergency Bulletin
Hong Kong College of Emergency Medicine

Priapism – an uncommon male emergency condition

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Priapism means prolonged penile erection more than 4 hours that is not associated with sexual arousal[1]. Though high-flow non-ischemic priapism (e.g., after spinal cord injury) rarely requires treatment, ischemic priapism is a true urological emergency due to risk of irreversible erectile dysfunction. The condition is rarely encountered in emergency department, occurring in only 0.73 per 100,000 men per year[2]. However, we as emergency physician should remain vigilant in recognizing the importance of timely management and referral for appropriate specialist treatment due to its high likelihood in causing irreversible penile ischemia and subsequent erectile dysfunction. A case of young gentleman presented to emergency department with recurrent priapism is illustrated below.

Mr. L was an 18-year-old gentleman with a past medical history of obesity (body mass index 31 kg/m^2), fatty liver, hypertension and allergic rhinitis. His medication list included cetirizine, fluticasone nasal spray and olopatadine eye drops. He presented to the emergency department at midnight for persistent painful penile erection since waking up at 10 am for 18 hours. He performed masturbation once in the morning but no detumescence (subsidence of erection) was achieved and there was increase in pain. He denied any mechanical injury. He did not complain of any fever, dysuria, hematuria, or retention of urine. Physical examination showed an erect penis with no cyanosis or paraphimosis. There was no tenderness in bilateral testes or the abdomen. His blood pressure was 181 / 104 mmHg and his pulse rate was 71/min.

After admission to urology ward, penile aspiration to corpus cavernosa under dorsal penile block with local anesthetic was performed. It yielded 400 ml dark red blood and blood gas analysis confirmed venous blood with pH 7.25, pCO2 6.9 kPa and pO2 5.9 kPa. No detumescence was achieved. He subsequently received a total of 9 doses of intra-cavernosal injection of phenylephrine 0.25 mg every 5 minutes and only mild detumescence was achieved. Urgent placement of Winter's shunt allowing flow of blood between engorged corpus cavernosa and spongiosum was performed under local anesthesia in operation room. After surgery, there was some residual rigidity over the proximal cavernosal body but overall detumescence was achieved and pain has resolved. The patient refused further T-shunt procedure to clear residual clots to achieve complete flaccid state and was discharge after 2 days of hospital stay.

Unfortunately, his problem recurred in 1 month. He re-attended the emergency department and was admitted to the urology ward for three times over that month. For each episode he was successfully treated with penile aspiration and intra-cavernosal phenylephrine injection. He was started on oral sildenafil. Medical workup for underlying cause showed normal complete blood count, renal and liver function test,

hemoglobin profile, lactate dehydrogenase and G6PD test. Urine toxicology was negative apart from sildenafil. Early contrast CT abdomen & pelvis and MRI spine were arranged. Eventually, surgical cavernosospongiosum T-shunt was performed under spinal anesthesia on his latest admission. Complete detumescence was achieved and he was discharged uneventfully.

Priapism

Pathophysiology

Priapism occurs when there is prolonged penile erection with failure of detumescence. There are two main types, ischemic (low flow) or non-ischemic (high flow). Ischemic priapism happens when there is decreased venous outflow causing prolonged raised cavernosal pressure. Decreased arterial inflow due to pressure resistance causes a painful compartment syndrome with increasing hypoxia and acidosis in cavernous tissue. Penile ischemia eventually occurs causing progressive irreversible necrosis and fibrosis of corpus cavernosa in 24-48 hours. 90% of men with ischemic priapism lasting more than 24 hours has permanent erectile dysfunction[3]. Most cases are idiopathic, but it can be caused by hematologic disorders such as hemoglobinopathy (especially sickle cell disease, thalassemia), leukemia, inherited thrombophilia and amyloidosis. Rarely, G6PD deficiency can cause priapism due to hemolysis, endothelial injury and nitric oxide depletion causing reduced venous outflow. Medications associated with priapism are listed in Table 1.

Table 1. Medications associated with priapism

Anti-psychotics	Chlorpromazine, risperidone, clozapine, quetiapine
Anti-depressant	Bupropion, fluoxetine, lithium
Anti-hypertensive	Alpha blockers, propranolol, hydralazine
Anti-coagulant	Heparin, warfarin
Recreational drug	Cocaine, marijuana, alcohol
Vasoactive drug	Prostaglandin E1

Non-ischemic priapism, also known as arterial or high-flow priapism, occurs much less commonly and only constitute 5% of cases. It happens with the presence of a fistula between the cavernosal artery and corpus cavernosum causing persistent high inflow of arterial blood, often the consequence of blunt penile trauma. Other rare causes include acute spinal cord injury, iatrogenic injection or procedure, congenital arteriovenous malformation[4]. Non-ischemic priapism is not an emergency as cavernous blood is well oxygenated. It is often painless, less than fully rigid and 62% will resolve spontaneously without treatment[5].

Evaluation

Important patient history should include presence or severity of pain, duration of erection, prior episodes, current medication or substance abuse, history of hematological disease, recent penile or perineal trauma. Physical examination on the genitalia, perineum and abdomen should be carefully performed to look for penile rigidity, signs of trauma or malignancy. If perineal compression results in erection detumescence, 'compression sign' is positive and non-ischemic priapism is suggested.

Penile aspiration yields blood from corpus cavernosa for blood gas analysis. Ischemic priapism is suggested if the color of aspirated blood is black and the blood gas analysis shows hypoxemia, hypercapnia and acidemia. On the other hand, non-ischemic priapism is suggested if color is red and the analysis shows normal level of oxygen, carbon dioxide and pH (Table 2).

Table 2. Corporal blood gas analysis for priapism

	pO2 (mmHg)	**pCO2 (mmHg)**	**pH**
Ischemic priapism	≤40	≥60	≤7.25
Non-ischemic priapism	≥60	≤40	>7.25

Ultrasound of penis can also differentiate the two types by absence or increased Doppler blood flow signals in ischemic and non-ischemic priapism respectively. It may also detect

structural changes such as arterial fistula, pseudo-aneurysm or other anatomical deviation[6]. Medical consultation for hematological workup and urine toxicology screen for substance abuse and psychoactive drug are required. Pelvic magnetic resonance imaging (MRI) with gadolinium contrast demonstrated 100% sensitivity in identifying non-viable corporal smooth muscle and predict future erectile dysfunction[7].

Management

Initial conservative management such as observation, cold or warm compression, exercise, masturbation, oral analgesics are unlikely to be successful and should not delay definitive therapy[6]. The first line intervention is decompression with penile aspiration.

Firstly, perform dorsal penile block by injecting 1-5 ml of 1% lignocaine (without adrenaline) to the 10 and 2 o'clock positions at the base of penis below the pubic symphysis, avoiding the neurovascular bundle in the midline (Fig.1). The needle should be inserted around 3-5 mm deep to the space just beneath the Buck's fascia, in order to anaesthetise the dorsal penile nerves. Then insert a 19- or 21-gauge butterfly needle into either side of the penile shaft at again 10 or 2 o'clock positions, and deep into the corpus cavernosum, to perform cavernosal blood aspiration (Fig.2 and Fig.3). The aspiration should be continued until bright red blood returns or when detumescence is achieved. In case the blood is too viscous to aspirate, irrigation with normal saline can be performed.

If detumescence is not achieved, proceed to intracavernosal injection of sympathomimetic drug to promote contraction of cavernous smooth muscle and permit venous outflow. Use of phenylephrine, a highly selective alpha-adrenergic agonist with minimal risk of systemic cardiovascular side effect, has 86% successful rate in detumescence in a retrospective small-scale study[8], and the risk of erectile dysfunction was also lower. 0.1-0.5 mg of phenylephrine diluted in 1 ml normal saline is injected into one side of corpus cavernosum and can be repeated every 3-5 minutes until symptom resolution. The maximal dose is typically 1 mg. Watch out for systemic side effects such as hypertension, headache and cardiac arrhythmia.

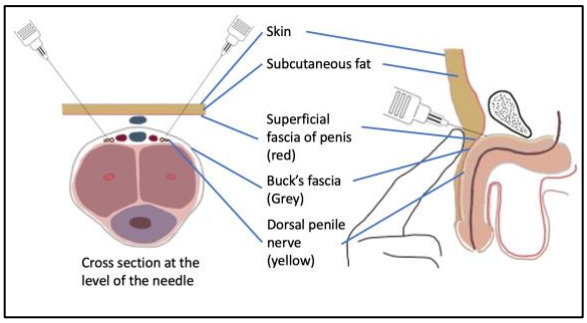

Fig. 1 The dorsal penile block
The dorsal penile nerves can be blocked at the base of the penis deep to the fascia while avoiding the midline to prevent damage to the dorsal vessels

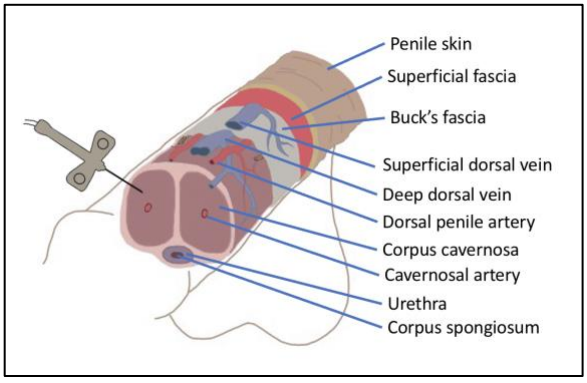

Fig.2 Decompression with penile aspiration
The 19-gauge needle is inserted into the corpus cavernosum

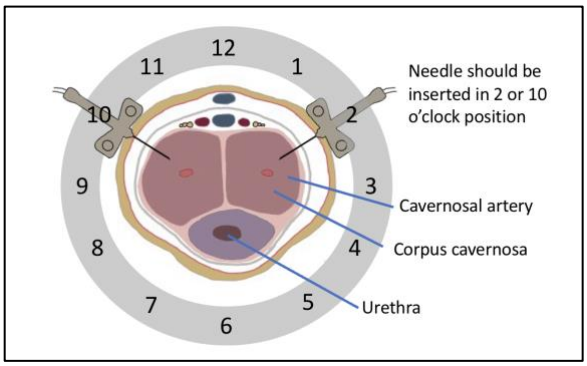

Fig.3 Site of needle insertion
The needle should be inserted at the 10 or 2 o'clock positions

Multiple medications have been suggested to prevent further priapism episodes, such as PDE5 inhibitors, 5 alpha reductase inhibitors, terbutaline[9]. However, most studies were deemed small and of poor quality according to the American Urology Association in its 2022 guideline on diagnosis and management of priapism[10]. There is some evidence that PDE-5 inhibitors such as sildenafil (an agent for treatment for erectile dysfunction) may be beneficial in reducing recurrent priapism occurrences when taken daily without sexual stimulation[11]. The rationale behind the therapy is to modulate the molecular aberrations associated with recurrent priapism, by restoring the balance of nitric oxide, one of the principal mediators in penile erection. The treatment regime is different from that used for treating erectile dysfunction.

Surgical shunting is achieved by creating an iatrogenic fistula between the corpus cavernosum, spongiosum, glans penis or penile veins with a needle or scalpel, resulting in evacuation of blood trapped within corpora. Additionally, surgical tunneling can be performed by using surgical dilators to facilitate further drainage of ischemic clotted blood, which achieved detumescence in 100%, 34% and 0% of cases treated before 24 hours, beyond 48 hours and beyond 96 hours respectively in a study[12]. Lastly, implantation of penile prosthesis can be considered in patient who have developed erectile dysfunction or untreated priapism more than 36 hours in which risk of erectile dysfunction is very high.

Management of non-ischemic priapism is mostly conservative with observation and perineal compression as majority of the cases are self-limiting with no ischemic consequences. Patients with persistent bothering tumescence can be offered percutaneous fistula embolization by experienced interventional radiologist, which gives an 85% success rate of detumescence and 80% retained functional erection[13].

Learning objectives

1. Priapism is a prolonged penile erection without detumescence for more than 4 hours.
2. It is important to recognize ischemic type of priapism which may lead to irreversible complications.
3. For ischemic priapism, timely decompression by penile aspiration is necessary to prevent irreversible penile ischemia and erectile dysfunction.
4. Do not delay the definitive treatment by attempting conservative management such as compression, masturbation or analgesics.
5. Be familiar with the workup for priapism, as well as the treatment and prevention of the condition.

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