

Case Report

Management of High-Flow Priapism: A Case Report and Review

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Abstract : A case of high-flow priapism was presented. Diagnosis was based on the history of painless and persistent erection for 20 days. Cavernous blood gas showed arterial type. The arteriocavernous fistula was detected by either a perineal duplex Doppler ultrasonography or an internal pudendal arteriography. The treatment of choice was selective embolization with a good result and no immediate complication. Detumescence was noticed within 10 days. Follow up of perineal and penile duplex Doppler ultrasonographies showed no turbulent flow and low inflow of cavernous blood. Erectile function partially recovered at 2 months after the treatment.

เรื่องย่อ : การรักษาภาวะอวัยวะเพศแข็งตัวค้างแบบไม่ปวด : รายงานผู้ป่วย 1 ราย และบททบทวนวารสาร

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รายงานผู้ป่วยภาวะอวัยวะเพศแข็งตัวค้างแบบไม่ปวด ได้รับการวินิจฉัยโดยอาศัยประวัติที่มีอวัยวะเพศแข็งค้างโดยไม่เจ็บปวดเป็นเวลา 20 วันก่อนมาโรงพยาบาล การตรวจค่าความดันก๊าซและความเป็นกรดเป็นด่างในเลือดที่ได้จากเนื้อเยื่อพองน้ำของอวัยวะเพศชาย แสดงค่าต่าง ๆ ใกล้เคียงกับค่าของเลือดที่ได้จากเส้นเลือดแดง ซึ่งบ่งชี้ว่าผู้ป่วยมีภาวะอวัยวะเพศแข็งตัวค้างแบบไม่ปวด จากการตรวจพิเศษโดยใช้เครื่องความถี่สูงแบบสองสปีบริเวณฝีเย็บและการฉีดสีผ่านเส้นเลือดที่ไปเลี้ยงอวัยวะเพศ พบว่ามีการรั่วของเลือดจากเส้นเลือดแดงเข้าสู่เนื้อเยื่อพองน้ำของอวัยวะเพศ การรักษาในผู้ป่วยรายนี้เลือกใช้ การใส่สารเจลโฟมเข้าไปอุดกั้นเส้นเลือดที่มีปัญหาอย่างเฉพาะเจาะจง ซึ่งได้ผลดีและไม่มีภาวะแทรกซ้อนในระยะต้น ภาวะอวัยวะเพศแข็งตัวค้างได้ลดลงเป็นปกติภายใน 10 วันหลังจากการรักษา การตรวจติดตามผู้ป่วยหลังได้รับการรักษาโดยใช้เครื่องความถี่สูงแบบสองสปีตรวจบริเวณฝีเย็บและที่ลำของอวัยวะเพศ แสดงถึงขนาดของรอยโรคที่ลดลงและไม่มีภาวะรั่วของเลือดเข้ามาในบริเวณนั้นแล้ว ในขณะที่ปริมาณของกระแสเลือดที่ไหลเข้าสู่เส้นเลือดหลักของอวัยวะเพศต่ำกว่าเกณฑ์ปกติ หลังให้การรักษา 2 เดือนอวัยวะเพศสามารถแข็งตัวได้แต่ยังไม่เต็มที่

INTRODUCTION

Priapism is a rare disease. It has been documented for long time that priapism is a painful persistent penile erection without sexual desire. Recently, another form of priapism was established. It is classified as a high-flow priapism, a persistent penile erection without pain. High-flow priapism is much less than the classical type, low-flow priapism. There has never been reported of high-flow priapism in Thailand. The differentiation between 2 types of priapism is based on their pathogenesis. Low-flow priapism is caused by venous occlusion. On the other hand, high-flow priapism is caused by arteriogenic defect. We present a case report of high-flow priapism and review the literature of diagnosis and management.

CASE REPORT

A 34 year-old man had a blunt perineal trauma resulting from a motorcycle accident, which lasted for 21 days. He had slight pain at the perineum. One day after injury, he had a persistent pe-

nile erection without sexual emotion. His penile erection persisted for 20 days.

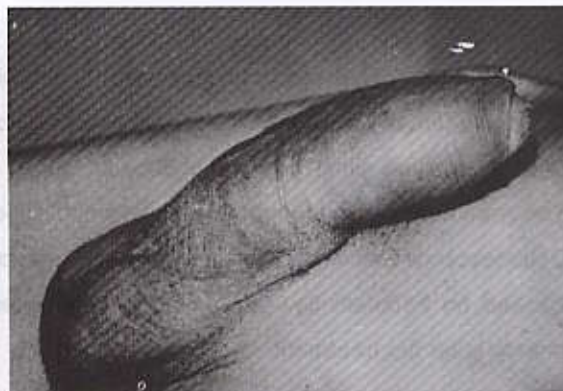


Figure 1. Supine position: shaft of penis is rigid, while the glans is flaccid.

Physical examination showed that the shaft of penis was rigid without pain, while the glans was flaccid (Figure 1). The other parts of external genitalia and results from digital rectal examination were normal. Cavernous blood aspiration was bright red. The blood gas analysis of cavernous blood revealed arterial values (Table 1). These clinical features

Table 1. Cavernous blood gas analysis compared to artery and vein.

Parameter	Cavernous	Artery	Vein
pH.	7.416	7.434	7.394
pCO ₂	37.7	35.5	42.3
pO ₂	71.0	89.4	31.4
O ₂ sat.	94.6	97.1	59.7



Figure 2. Ultrasonogram: hypoechoic lesion with turbulent flow



Figure 3. Left internal angiogram: arterio-cavernous fistula.

strongly indicated high-flow priapism. Perineal duplex Doppler ultrasonography revealed hypoechoic lesion with turbulent flow at the crus of the left corpus cavernosum (Figure 2). The digital subtraction angiography of the left internal pudendal artery revealed arterio-cavernous fistula at the left cavernous artery (Figure 3). These investigative findings confirmed the diagnosis.

The patient was firstly treated by compression with cold pack as a conservative treatment. Unfortunately, this method failed to achieve detumescence. Thus, the patient was treated by selec-

tive embolization of the left internal pudendal artery with Gelfoam particles. Detumescence was complete on the tenth day after embolization. The follow up of perineal duplex Doppler ultrasonography revealed a decrease in the size of the hypoechoic lesion and turbulent flow disappeared. In addition, peak systolic velocity of cavernous arteries was decrease. Two months after treatment, his erectile function was partially recovered. The patient could successfully masturbate. However he failed to have sexual intercourse. Long-term follow up has been continued monthly.

DISCUSSION

Priapism is a persistent penile erection unrelated to sexual desire. Lue et al. reported 2 types of priapism; low-flow or veno-occlusive type and high-flow or arteriogenic type. Low-flow priapism is caused by an obstruction of cavernous blood outflow. Waste products such as CO_2 and lactic acid are increased in the cavernous sinus. After 6 hours, the cavernous tissue will be ischemic and always cause pain. The patients usually seek medical treatment within 6 – 24 hours because of pain. On the other hand, high-flow priapism usually occurs after perineal or penile trauma. There is a fistula between the cavernous artery and the cavernous sinus that cause an increasing of cavernous blood inflow. There is no retention of waste products or ischemia. Thus, pain rarely occurs². However, the patients will experience discomfort because of prolonged erection. The patients usually delay coming to the hospital because they are not concerned with this condition. The onset of high-flow priapism varies between 4 hours to 1 week after perineal trauma^{3,4,5}. The duration of priapism before admission depends on the patient's degree of concern. The longest duration of 36 years was reported by Hakim et al. This patient went to the hospital because of sexual dysfunction, not priapism⁶.

Several investigators have constructed many hypotheses of high-flow priapism. Riccardi et al supposed that the cavernous arterial segment is compressed against a bony prominence of the pelvis whenever blunt perineal trauma occurs. This causes ischemic injury to the cavernous arteries. The necrosis segment of arteries causes a blow out

with unregulated outflow into the corpus cavernosum. In addition, the normal hemostatic mechanisms of vasospasm and vasoconstriction are unable to control the outflow. The high flow state produces a sustained dilatation of corporeal sinuses.⁶ Interestingly, Witt et al questioned why the unilateral cavernous arterial defect caused bilateral cavernous erection. They suggested that the injured vessel might release the vasodilating substance, Nitric oxide, which plays an important role in high blood inflow into both sides of the corpus cavernosa.⁷

Diagnosis of high-flow priapism is based on history and physical examination. Relevant history is persistent penile erection without pain for days and perineal trauma. The diagnosis should be confirmed with cavernous blood gas analysis, perineal duplex Doppler ultrasonography and digital subtraction angiography of internal pudendal artery⁵.

Cavernous blood aspiration of high-flow priapism is bright red blood. The cavernous blood gas will reveal PaO_2 , PaCO_2 , O_2 saturation, and pH as same as the arterial values. This test can confirm diagnosis of high-flow priapism. Importantly, perineal duplex Doppler ultrasonography, which is a noninvasive investigation, is used to detect the fistula lesion. The patient should be in frog-leg position, and the scrotum is lifted. The ultrasound probe is placed on the perineum. This procedure will show the arterio-cavernous fistula, hypoechoic lesion with turbulent flow at base or crus of corpus cavernosum. Hakim et al studied the accuracy of the duplex Doppler ultrasonography compared to the angiography. There is 100% sensitivity and 73% specificity respectively in diagnosis. Nevertheless, a digital subtraction angiography of the internal pudendal

artery is the gold standard for diagnosis of arterio-cavernous fistula. It demonstrates cavernous arterial blush, leakage of contrast media from the cavernous artery to the sponge tissue of corpus cavernosum in the arterial phase.⁸ In some patients, the fistula has feeding vessels from bilateral internal pudendal arteries. Selective angiography may not demonstrate the entire course of the disease. Thus, a flush aortogram is recommended before selective angiography because it will show vessels in both sides of pelvic cavity.

There are several management techniques for high-flow priapism. The objective is composed of correct diagnosis, reversing the erection to resting state and restoration of the erectile function.

Expectant treatment: Several investigators reported spontaneous detumescence while the patients were waiting for interventions^{5,6,9}. Some reports showed the success using mechanical treatment of cold-pack compression under ultrasonographic guide^{4,10}. However, the larger fistula needs intervention.

Medical treatment: The role of alpha adrenergic agonist drugs used intracavernously for high-flow priapism is unclear. They may cause systemic side effects, especially in the cardiovascular system. However, there have been reports of successful treatment with alpha-adrenergic drugs.^{2,11,12}

Surgical treatment: Two types of surgical procedures are conducted to manage high-flow priapism; selective arterial ligation of feeding vessel^{6,13} and intracorporeal dissection⁴. Selective arterial ligation causes permanent obstruction of cavernous blood inflow, which may cause gangrene and permanent erectile dysfunction. Intracorporeal

dissection is an extensive destruction of cavernous sponge tissue and tunica albuginea. This may cause Peyronie's disease and erectile dysfunction. Because of these complications, surgical treatment is not a good option for management of high-flow priapism.

Radiological intervention: Selective embolization has become the treatment of choice for high-flow priapism. Embolization is done at the cavernous or internal pudendal artery with absorbable particles, such as blood clot,^{7,8,14,15} Gelfoam or gelatin¹⁶. The goal of embolization is temporary occlusion that allows healing of the injured vessel to close fistula. After the particles are absorbed, cavernous blood inflow is regained. Erectile function can be restored. If embolization fails, it can be repeated without severe complications. If there are feeding vessels from bilateral internal pudendal arteries, a bilateral embolization should be done. Ji et al reported that erectile function was restored in cases of bilateral embolization.¹⁷

The patients should be followed up with history, physical examination, penile and perineal duplex Doppler ultrasonography monthly. History is a subjective data of success and restoration of erectile function. Perineal duplex Doppler ultrasonography can reveal whether arterio-cavernous fistula persists. Penile duplex Doppler ultrasonography is used to reveal the level of peak systolic velocity of cavernous artery that indicates adequacy of arterial blood inflow for penile erection⁵.

CONCLUSION

High-flow priapism is a very rare disease. Diagnosis is based on a history of painless pri-

apism. Cavernous blood gas analysis, perineal duplex Doppler ultrasosography and digital subtraction angiography of internal pudendal artery are the further investigations to demonstrate the arterio-cavernous fistula. The treatment of choice is selective

embolization with absorbable particle. The patient should be followed up with history, physical examination, perineal duplex Doppler ultrasonography and penile duplex Doppler ultrasonography to evaluate success of treatment and erectile function.

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