

Embolization with microcoils for urethral hemorrhage

A case report

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Abstract

Rationale: Microcoils are a permanent embolic material, and blood vessels that have been embolized by a microcoil remain occluded for a prolonged period of time. The pudendal artery is an important functional vessel for penile erection. Whether simultaneous embolization of the bilateral pudendal artery using microcoils can seriously affect penile erection has not been sufficiently studied.

Patient concerns: A 47-year-old male patient, after undergoing brain surgery, accidentally pulled out the Foley catheter causing a urethral hemorrhage. The patient was immediately treated using a new larger Foley catheter inserted under urethrosopic guidance and medication. However, massive bleeding occurred on the tenth day after the procedure.

Diagnosis: A right internal iliac angiography performed after the bleeding event demonstrated a rupture at the end of the right internal pudendal artery with the contrast agent flowing out directly from the urethra. A super selective internal pudendal angiogram showed a small amount of hemorrhage at the end of the left internal pudendal artery.

Interventions: The patient underwent interventional treatment. After the bilateral internal iliac angiography was performed, super-selective internal pudendal artery embolization with microcoils was performed. A subsequent bilateral internal pudendal angiogram did not show any abnormality.

Outcomes: During the follow up period of 2 months, the patient had no complaints of difficulty in urination or sexual dysfunction.

Lessons: Some doctors do not advocate the use of coils as embolic agents in bilateral pudendal artery lesions because of concerns over erectile dysfunction. There is rich vascular circulation in the perineum. Thus, in arterial embolization for the treatment of penile bleeding, regardless of the type of embolic material used, the key is to ensure accurate embolization to maintain good collateral circulation. This principle can help limit the occurrence of sexual dysfunction to the lowest possible levels after such procedures.

Abbreviations: CTA = computed tomography angiography, DSA = Digital subtraction angiography, KTS = Klippel-Trenaunay syndrome, MRA = magnetic resonance angiography, NBCA = N-butyl-2 cyanoacrylate, PVA = polyvinyl alcohol.

Keywords: bleeding, coil embolization, erectile dysfunction, Foley catheter

1. Introduction

Urethral hemorrhage is a clinical manifestation of intermittent or continuous bleeding from the meatus urinarius attributable to various causes, mainly including renal trauma, puncture, or tumor, urinary calculi, bladder trauma, bladder tumor, perineal

trauma, urethral stricture, urethral catheterization, arteriovenous malformation, infection of the penis, prostatic hyperplasia, and Klippel-Trenaunay syndrome (KTS).^[1-7] The treatment for urethral bleeding varies including conservative treatment involving observation and medication, mechanical compression with a

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We confirm that we have read the Editorial Policy pages. This study did not address questions about medical ethics and did not have approval from the ethics committee. This study was conducted in accordance with the Declaration of Helsinki.

Written informed consent for publication of his clinical details and clinical images was obtained from the patient.

We declared that materials described in the manuscript, including all relevant raw data, will be freely available to any scientist wishing to use them for non-commercial purposes, without breaching participant confidentiality.

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urethral catheter, urethrosopic therapy, embolization, or even open surgery with ligation of the culprit vessel.^[2–7]

Microcoils are a permanent embolic material, and blood vessels that have been embolized by a microcoil will not recanalize quickly. Moreover, the pudendal artery is an important functional vessel for penile erection. Whether simultaneous embolization of the bilateral pudendal artery using microcoils can seriously affect penile erection has not been sufficiently studied.

We report the case of a patient in coma who had a urethral hemorrhage caused by the accidental removal of the Foley catheter. Super-selective embolization with microcoils was performed in the bilateral pudendal artery after the failure of treatment with medication and urethrosopic therapy. Our technique was effective in achieving hemostasis with the preservation of the patient's sexual function.

2. Case presentation

A 47-year-old Chinese man with an over 13-year history of recurrent seizures was admitted to our neurosurgery department. Magnetic resonance imaging of the brain indicated right hippocampal sclerosis. Right temporal lobe and hippocampal resection were performed under a microscope in the department of neurosurgery. On the second postoperative day, the patient complained of headaches and restlessness and pulled out the Foley catheter, causing urethral bleeding. Direct insertion of a 16F silicone catheter failed in the department of urology. Under general anesthesia, urethrosopic examination revealed a blood

clot obstructing the urethral canal. After the blood clot was removed, urethral mucosal bleeding was noted 3 cm from the urethral orifice, and a urethral mucosal laceration was found in the prostatic urethra and the membranous urethra. No obvious blood clot was found in the bladder. The bilateral orificium ureteris were clear. Finally, a 16F double chamber silicone catheter was placed along the guide wire under urethrosopic guidance.

The meatus urinarius had started bleeding intermittently while the Foley catheter was being inserted in the urethral canal under urethrosopic guidance. However, excessive bleeding akin to an eruption occurred on the tenth day after the Foley catheter insertion, and blood continued to flow from the patient's meatus urinarius. An emergency blood test showed that the thrombin time was prolonged at 23.1 seconds (normal range, 14–21 seconds) and fibrinogen level was elevated to 4.41 g/L (normal range, 1.3–3.5 g/L). There were no other abnormalities in the routine blood and other test findings. The patient consented to undergo urgent interventional therapy.

A right internal iliac angiogram showed that there was a rupture at the end of the right internal pudendal artery, and contrast agent flowed out directly from the orificium ureteris. The rupture was promptly embolized by super-selective catheterization with microcoils and a small amount of gel foam. The subsequent angiogram showed that the rupture had resolved, and other small vessels were patent (Fig. 1). A left internal pudendal artery angiogram displayed spillage of a minimal amount of contrast agent, which was embolized in a similar manner; another post-procedural angiogram revealed no abnormal findings (Fig. 2).

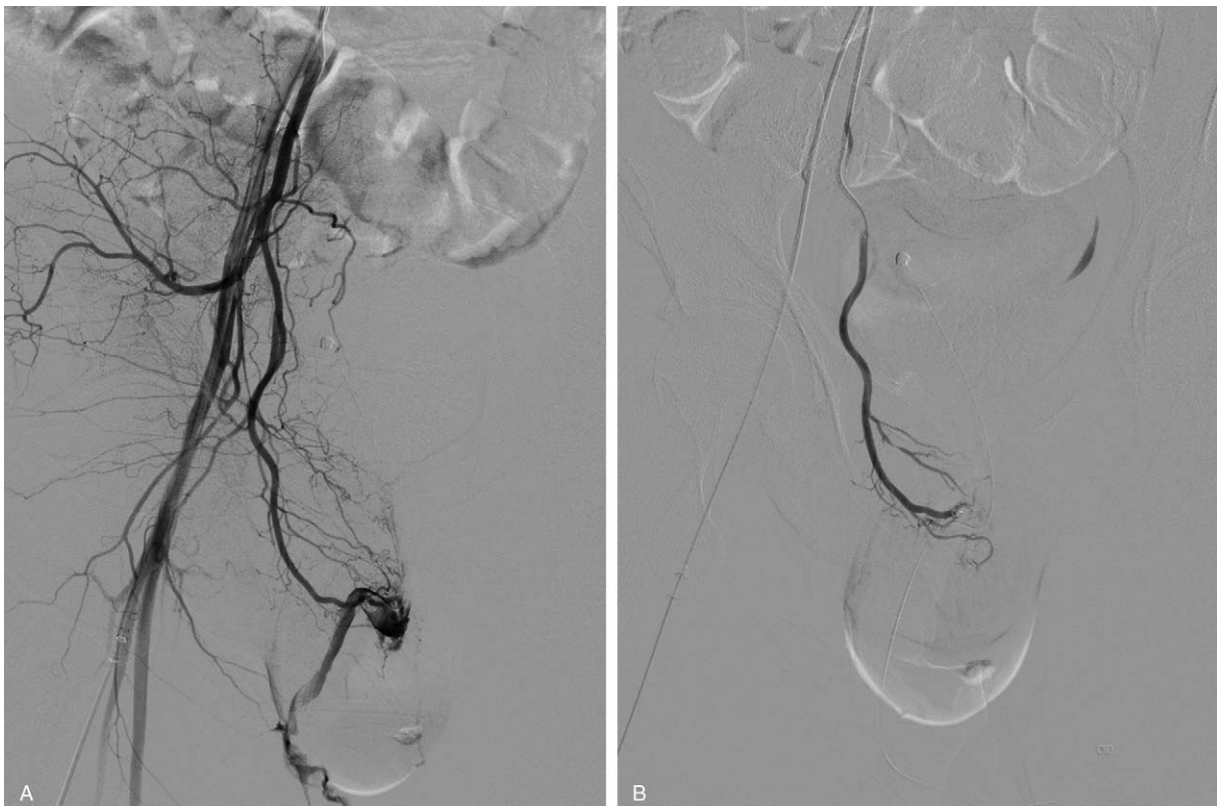


Figure 1. Angiogram of the right internal pudendal artery. (A) Superselective angiogram discovered that contrast agent spilt from the end of right internal pudendal artery. (B) Angiogram after embolism with coils and a small amount of gelatin sponge showed no signs of bleeding.

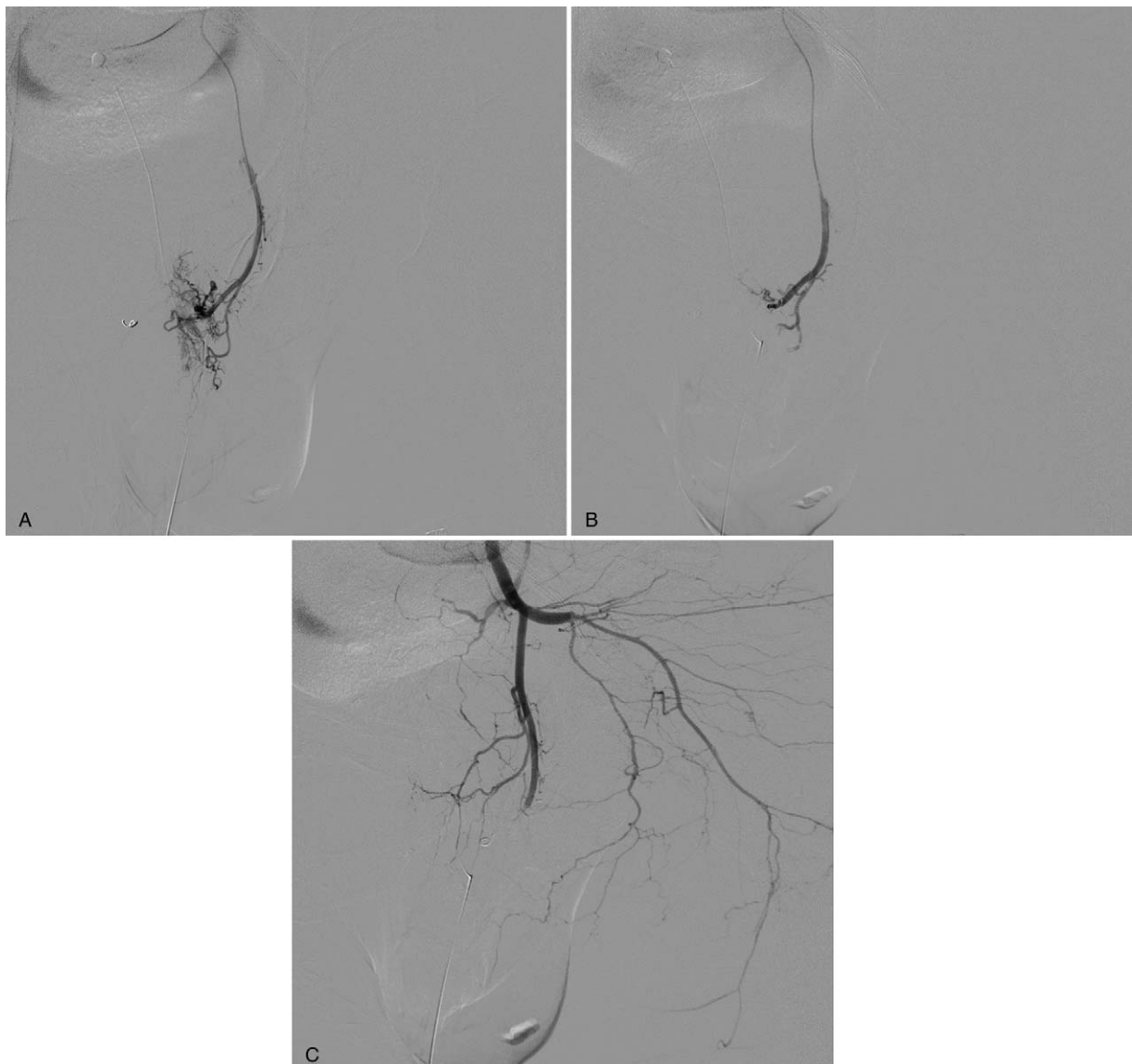


Figure 2. Angiogram of the left internal pudendal artery. (A) Supraselective angiogram discovered that contrast agent spilled from the end of left internal pudendal artery. (B) Supraselective angiogram after embolism with coils and a small amount of gelatin sponge showed no signs of bleeding. (C) Angiogram of the left internal pudendal artery showed rich collateral circulation.

After the interventional therapy, the patient's urine cleared, the meatus urinarius showed no blood, and the temperature and color of the penis indicated no abnormality. A week later, the Foley catheter was removed, and 2 days later, the patient was discharged. During the follow up of 2 months, the patient's urinary function was unremarkable, and he did not complain of erectile dysfunction.

This is a case report, and thus, approval from the ethics committee was not obtained. Written informed consent for the publication of his clinical details and accompanying images was obtained from the patient.

3. Discussion

Conservative treatment for urethral hemorrhage mainly includes the administration of hemostatic drugs, suspending anticoagulants and antiplatelets, and antibiotics to prevent infection, and

blood component transfusion to normalize the blood coagulation function and correct anemia.^[1] During the early stages of treatment, drug therapy is efficacious in patients with long-term use of anticoagulants or antiplatelet agents and urethral bleeding caused by the insertion of a urethral catheter. Moreover, drug therapy is also effective in patients with KTS and intermittent urethral bleeding caused by other factors.^[1] The insertion of a urethral catheter to promote hemostasis is effective in early stages of bleeding. Some patients with urethral bleeding can be treated by urethroscope and it can also identify the specific cause and location of the bleeding.

In theory, selective arterial ligation may be a better treatment; however, the blood vessels intended for ligation are often difficult to detect and identify. In 1 published report, a patient with massive bleeding caused by an arteriovenous malformation of the penile urethra was successfully treated by open surgery.^[2] In contrast, interventional embolization is a better choice for severe,

refractory urethral hemorrhage.^[5,6,8] In our case, a 16F double cavity silica gel urethral catheter was reinserted under urethroscope guidance along the guide wire after urethral hemorrhage. Minimal intermittent bleeding was noted from the meatus urinarius with the hemostat also being used. Ten days later, however, massive bleeding occurred, and the patient recovered after prompt intervention.

Accurately identifying the culprit blood vessels is the key to successful treatment. More than 50% of patients with urethral hemorrhage have a clear change in the overflow and accumulation of the contrast agent when digital subtraction angiography with contrast medium is performed. In some patients, the diagnosis may be missed because of extensive ruptured vessels or no hyper-selective angiography being performed. Therefore, for

patients with clinical symptoms, hyper-selective angiography should be performed. Computed tomography angiography (CTA) and magnetic resonance angiography (MRA) are effective for the preoperative diagnosis of urethral hemorrhage,^[9] and thus, patients should be aggressively examined using CTA or MRA preoperatively if feasible (Fig. 3).

The interventional therapy opted for in this case involved a hyper-selective embolization of the hemorrhaging branch of the internal pudendal artery, similar to the interventional treatment used in post-traumatic high flow in penile erectile syndrome. Oztürk et al discussed the application of embolization materials and believe that the incidence of erectile dysfunction was lower with the use of internal perineal artery embolization with autologous blood clots; however, the recurrence rate of vascular

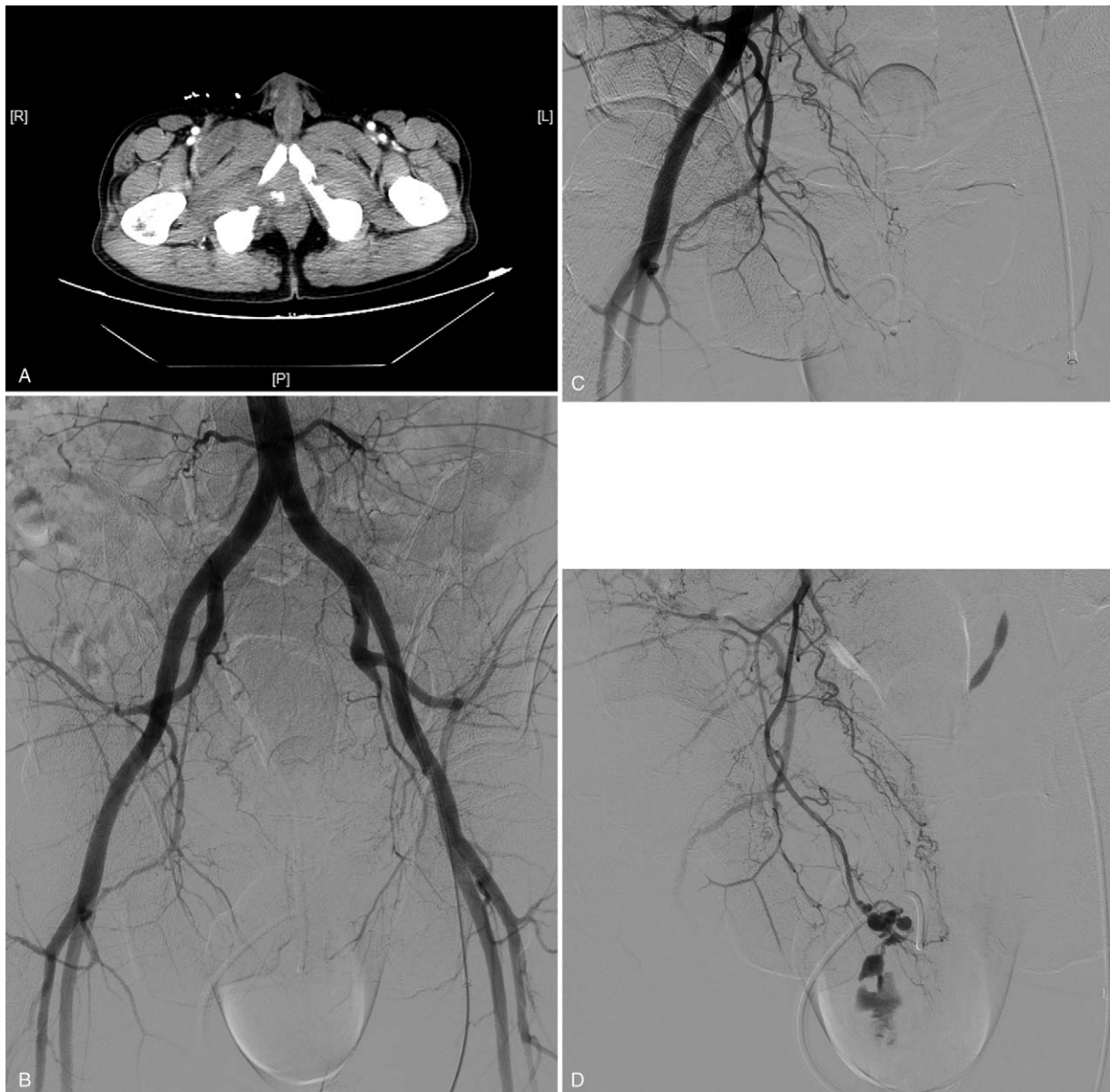


Figure 3. The CT and angiograms of a patient showed rupture of the end of the right internal pudendal artery caused by trauma. (A) An abnormal enhancement point in the pelvis was present. (B) Angiogram with pigtail catheter placed in aorta abdominalis found that right internal pudendal artery was normal. (C) Angiogram with Cobra catheter placed in right common iliac artery showed that the end of right internal pudendal artery was broken off. (D) Superselective angiogram discovered that contrast agent spilled from the end of right internal pudendal artery.

recanalization disease is higher after clot autolysis, and the scope of vascular embolism is difficult to control accurately.^[8] Gelatin sponge, similar in nature to autologous blood clots, is also used as a temporary embolic material. Polyvinyl alcohol (PVA) is a permanent embolic material with a low associated recurrence rate. However, there is a prevalent concern regarding the erectile function with the application of PVA.^[8]

Similarly, N-butyl-2 cyanoacrylate (NBCA) glue embolization can also have the effect of permanent embolism. However, there is a risk of gluing the microcatheter tip to the artery during the procedure if it is not withdrawn in a timely fashion. Moreover, when using NBCA, the occlusion site and extent cannot be controlled as accurately as is possible with microcoils. Hence, the use of NBCA demands experience and extreme care. Microcoils can be positioned very accurately, allowing either embolization of the feeding arteries or selective occlusion of the pseudoaneurysm. There is a theoretical risk of erectile dysfunction if the treatment has been performed via occlusion of the cavernosal arteries with coils, especially in bilateral lesions. Therefore, Öztürk et al refrained from using coils as a bilateral embolic agent in their study.^[8] Chen et al reported a case of bilateral internal pudendal artery-urethral fistula formation due to a pseudoaneurysm that was successfully embolized with microcoils.^[6] Thus, we believe that it is important to be accurate while performing embolization.

In the diagnosis and treatment of urethral hemorrhage, CTA and MRA may be helpful. Interventional diagnosis and treatment should be considered first because this approach is characterized by minimal invasion, precision, and effectiveness. In addition, an appropriate embolic material should be selected and microcoil could be an option to ensure effective embolization with preservation of sexual function.

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References

- [1] Lei H, Guan X, Han H, et al. Painless urethral bleeding during penile erection in an adult man with Klippel-Trenaunay syndrome: a case report. *Sex Med* 2018;6:180–3.
- [2] White JT, Baverstock RJ. Eruption of blood: arteriovenous malformation of the penile urethra. *Can Urol Assoc J* 2017;11:E32–4.
- [3] Kondo H, Yamada T, Kanematsu M, et al. Embolization for massive urethral hemorrhage. *Abdom Imaging* 2007;32:262–3.
- [4] Huang TY, Huang CN, Lee YC. Life-threatening urethral bleeding induced by a pseudoaneurysm of the obturator artery. *Urology* 2013;82:e43–4.
- [5] Hoffer EK. Transcatheter embolization in the treatment of hemorrhage in pelvic trauma. *Semin Intervent Radiol* 2008;25:281–92.
- [6] Chen J, Wang S, Wu D, et al. Bilateral internal artery-urethral fistula formation by pseudoaneurysm. *Acta Orthop Traumatol Turc* 2015;49:456–548.
- [7] Barratt RC, Bernard J, Mundy AR, et al. Pelvic fracture urethral injury in males—mechanisms of injury, management options and outcomes. *Transl Androl Urol* 2018;7(Suppl 1):S29–62.
- [8] Öztürk MH, Gümüş M, Dönmez H, et al. Materials in embolotherapy of high-flow priapism: results and long-term follow-up. *Diagn Interv Radiol* 2009;15:215–20.
- [9] E-Assmy A, Hekal IA, Abou-E-Ghar ME. Use of magnetic resonance angiography in diagnosis and decision making of post-traumatic, high-flow priapism. *ScientificWorldJournal* 2008;8:176–81.