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High-flow priapism treated with superselective transcatheter embolization using polyvinyl alcohol particles

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Abstract

Objectives: Priapism is a persistent erection of the penis not associated with sexual stimulation. High-flow priapism is caused by unregulated arterial inflow, usually preceded by perineal or penile blunt trauma and formation of an arterial-lacunar fistula. We present a case of high-flow priapism in a 13-year-old patient managed with polyvinyl alcohol particles.

Methods: After obtaining informed consent of the parents of the minor, diagnosis was made with penile Color Doppler Ultrasound and confirmed with flush angiography. Selective arterial embolization was performed with the use of polyvinyl alcohol particles.

Results: Complete detumescence was achieved without compromising the patient's erectile function.

Conclusions: The use of permanent occlusive agents like polyvinyl alcohol particles for embolization shows good occlusion rates compared to temporary agents. More studies are needed to find the safer and better agent for the treatment of high flow priapism without compromising erectile function.

Keywords

Arterial embolization, polyvinyl alcohol particles, high-flow priapism, arterial-lacunar fistula, interventional radiology

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Introduction

Priapism is defined as a persistent erection of the penis or clitoris that is unrelated to sexual desire or stimulation.[1] According to its pathophysiology, priapism can be classified as low-flow priapism (LFP) or high-flow priapism (HFP).

LFP is a medical emergency caused by a veno-occlusive pathology that leads to an intra-corporeal hypoxic-ischemic phenomenon with end-stage corporeal necrosis and progressive fibrosis.[2] These changes are responsible of the erectile dysfunction (ED).[2] Common etiologies are hematopoietic malignancies, hypercoagulable states, and use of intrapenile vasoactive drugs. HFP is usually caused by perineal or penile blunt trauma that causes an injury to the cavernosal artery with formation of an arterial-lacunar fistula. HFP is not a medical emergency since venous outflow remains intact.[2] For this type of priapism, selective transcatheter arterial embolization is one of the favorite current treatments.[3,4]

History and physical examination are enough to make the diagnosis, nonetheless some authors consider the hemodynamic evaluation essential with cavernous blood gas analysis and/or penile color Doppler ultrasound (PCDUS), as these can aid in the differentiation between LFP and HFP.[5]

We report a case of a 13-year-old boy with a post-traumatic priapism successfully treated by percutaneous transcatheter embolization with the use of polyvinyl alcohol (PVA) particles.

Case report

A 13-year-old boy presented to our Hospital with a 48 h persistent, painless erection after sustaining a straddle injury while riding his bicycle. On physical examination, the penis was tumescent without bruising; complete erection of both cavernous bodies and flaccidity of the corpus spongiosum were noted. The PCDUS revealed increased pulsatile flow from the cavernosal artery toward the right cavernous body, consistent with HFP.

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Figure 1. Right femoral angiography of a 13-year-old boy with a leak from the right cavernosal artery to the right corpus cavernosum.

Interventional radiology (IR) was consulted. Informed consent was obtained from the mother to perform arteriography and selective occlusion of the lesion under general anesthesia. Access was performed through the right femoral artery using a 5F introducer sheath, and thereafter, a 5F catheter (Radifocus® Optitorque™; Terumo Corporation, Tokyo, Japan) was introduced. Flush angiography allowed to identify a right cavernosal artery fistula of the pelvis (Figure 1). A 2.7F micro-catheter (Progreat® micro-catheter system; Terumo Corporation) was introduced via the 5F catheter to access the arteriovenous fistula and selective catheterization of the internal iliac artery (IIA) was performed.

A test injection of contrast through the micro-catheter demonstrated free flow without vasospasm or occlusion. A superselective transcatheter embolization using PVA particles of 300–500 μm achieved complete penile detumescence (Figure 2). The procedure was stopped when the blood flow through the fistula markedly decreased, and a post-procedure selective angiography confirmed occlusion of the lesion (Figure 3).

No complications were presented during or after the procedure, and at 2-week follow-up, patient reported normal morning erections and no abnormalities whatsoever.

Discussion

HFP is the less common form of priapism, with recognition often delayed because it presents itself as a painless partial erection that can increase rigidity with sexual stimuli, and sometimes it may self-resolve.[5] According to this, several authors advocate for a conservative management of HFP, where clinical surveillance[6] plus ice applied to the perineum or site-specific perineal compression can be used.[5,7] These treatment options have been proved to be successful, but

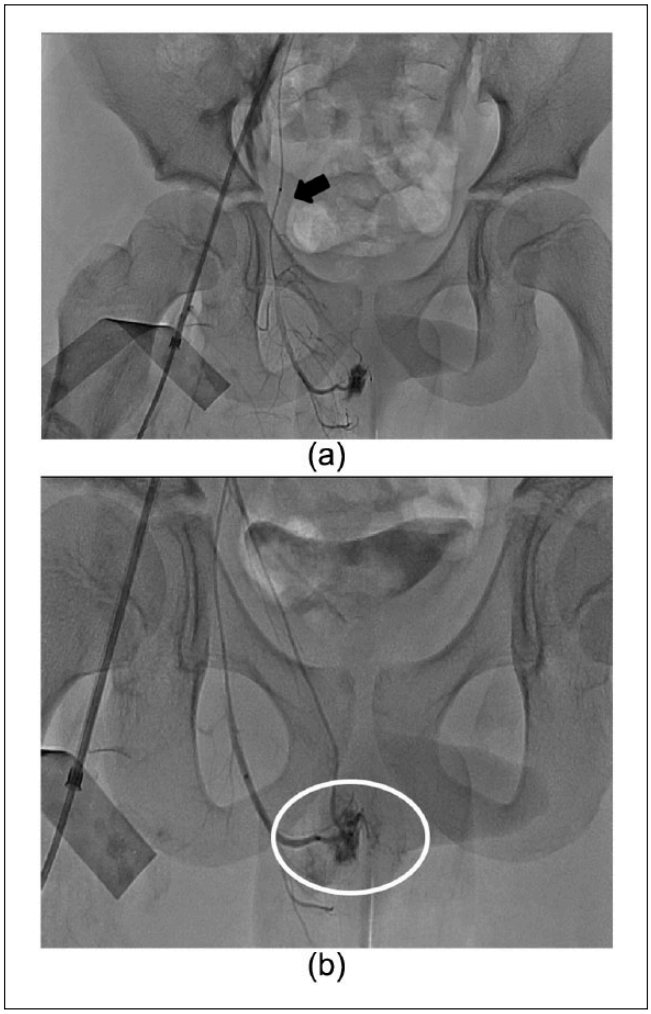

Figure 2. Right femoral angiography: (a) superselective catheter traveling to the right cavernosal artery (arrow) and (b) embolization with PVA particles (circle).

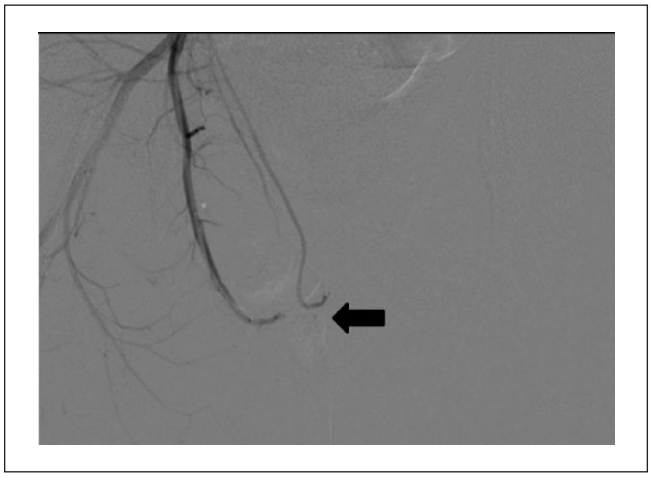

Figure 3. Right internal iliac artery angiography. After embolization with PVA particles, there is disappearance of the fistula (arrow).

have been related to patient discomfort[5] and complications like progressive loss of erectile potency.[7] While invasive methods like arterial ligation can offer better and more immediate resolution, this is related to higher rates of ED compared with recently developed minimally invasive radiological methods.[8]

Materials that can be used for the embolization can be classified as temporary occlusive: autologous blood-clot,[9] gel foam; or permanent occlusive: metal micro-coils,[3] *N*-butylcyanoacrylate, or PVA particles.[10] In 2003, the American Urological Association (AUA) guideline on the Management of Priapism based on the literature up to 2001 favored the use of temporary occlusive agents, as these had equal success (74% vs 78%) but lesser incidence of ED (5% vs 39%).[11]

Kojima et al. published reviewed 96 cases of selective arterial embolization for HFP. Temporary occlusive agents alone were used in 33 patients, with improvement of priapism and erectile function in 28 (84.8%) and 32 (97%), respectively; while permanent occlusive agents were used in 63 patients, with improvement for the same outcomes in 63 (100%) and 61 (91.5%). A significant difference was observed in the rate of priapism improvement ($p=0.0016$) but not for erectile function normalization ($p=0.164$) with the use of permanent agents.[12] In a case series published by Tonseth et al., eight patients with a diagnosis of HFP were treated with selective arterial embolization using permanent occlusive agents (PVA, fiber micro-coils, or both) and evaluated using the International Index of Erectile Dysfunction (IIEF-5) prior and after embolization. The mean IIEF-5 value pre-treatment was <22 in all patients (mean score, 11.9). After embolization, six had an improved score (three of them >22), one no change, and one reduced score (mean score, 17.5).[13] Langenhuijsen et al.[14] report the case of a 39-year-old man with a bilateral HFP due to bilateral arteriocavernous fistula who was treated with bilateral selective embolization using coils, with improvement in erection rigidity, spontaneous erections, sexual intercourse, and resolution of pain. Some authors state that the use of temporary agents for embolization is associated with some risk of fistula recanalization,[15] maybe because the damage already done to the endothelium may not have enough time or capacity to heal by the time the temporary occlusive agent has dissolved.

To our knowledge, this is the first case where the use of PVA particles embolization in HFP is described thoroughly.[10,16] This may be due to the rare incidence of this pathology. Complications have been reported with PVA particles, such as excessive tissue ischemia due to the selection of small particles (PVA < 100 µm),[17] and in cases with bilateral fistula, authors recommend restriction of the procedure to one side to diminish the risk of permanent impotence, penile gangrene, or gluteal ischemia.[14] Even so, PVA particles are considered to lead to more durable occlusion, are relatively inexpensive, easy to use, and are associated with low complication rates.[13,18] These reasons make it the agent of choice at our institution.

Regardless of the embolic agent used, it is important to note that impotence is a common complication that can be mainly related to the priapism itself,[19] making it hard sometimes to judge the benefits these treatments can have in improving penile function.

Conclusion

HFP does not compromise penile venous outflow, thus not making it a medical emergency. Treatment with expectant management has variable resolution rates and selective arterial embolization has become the preferred treatment by many. The use of permanent occlusive agents like PVA for embolization shows good occlusion rates compared to temporary agents. More studies are needed to find the safer and better agent for the treatment of HFP.

Declaration of conflicting interests

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Ethical approval

Our institution does not require ethical approval for reporting individual cases or case series.

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Informed consent

Written consent was obtained from the minor patient's legally authorized representative, in addition to patient assent.

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