Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.elsevier.com/locate/radcr

Case Report

Successful retrograde embolization through the arch of cavernous arteries of a bilateral post-traumatic arterio-cavernous fistula: case report☆,☆☆,★,★★

Valentina Mejía-Quiñones, MD[a,b,], Tatiana Álvarez-Saa, MD[a], Julián Eduardo Grisales Gallo, MD[b], Alfonso José Holguín-Holguín, MD[c], Juan Sebastián Toro-Gutiérrez, MD[c]*

[a] *Centro de investigaciones clínicas, Fundación Valle del Lili, Av. Simón Bolívar, Carrera 98 # 18-49, Cali, Colombia*
[b] *Facultad de Ciencias de la Salud, Universidad Icesi, Cali, Colombia*
[c] *Departamento de radiología e imágenes diagnósticas, Fundación Valle del Lili, Cali, Colombia*

ARTICLE INFO

Article history:
Received 17 January 2023
Revised 27 April 2023
Accepted 1 May 2023

Keywords:
Therapeutic embolization
Bilateral arterio-cavernous fistula
Arteriography
Case reports

ABSTRACT

Penile trauma is uncommon, with an incidence of 1/175,000 cases in emergency departments worldwide. Less frequent, there may be cases of penile fracture with the penis in a flaccid state and also develop vascular lesions such as rupture of the cavernous artery, pseudoaneurysms, and arterio-cavernous fistulas. We present a case of a 32-year-old male patient with the perineum and pelvis blunt trauma after a motorbike accident with a secondary bilateral arterio-cavernous fistula treated with retrograde embolization through the arch of cavernous arteries.

Introduction

Penile trauma is uncommon, with an incidence of 1/175,000 cases in emergency departments worldwide [1]. Among the different traumatic injuries to the penis, the most frequent mechanism of trauma is blunt injuries in the erect state where they are associated with penile fracture; however, although less frequent, there may be cases of penile fracture with the penis in a flaccid state, and also develop vascular lesions such as rupture of the cavernous artery, pseudoaneurysms, and arterio-cavernous fistulas [1].

☆ Acknowledgments: The author(s) received no financial support for this article's research, authorship, or publication.
☆☆ Competing Interests: The authors declare no conflicts of interest in the publication of this article.
★ Data sharing statement: The relevant anonymized patient-level data are available via request from the authors.
★★ Ethical approval and Informed consent: The reported case was reviewed and approved, and individual patient consent was obtained following institutional guidelines. Following our institutional policies, all protected health information was removed.
* Corresponding author.
E-mail address: valentina.mejia@fvl.org.co (V. Mejía-Quiñones).
https://doi.org/10.1016/j.radcr.2023.05.001

Fig. 1 – AngioCT (A) Arterial phase, notice the early contrast filling of both corpus cavernosum more conspicuous to increase during the venous phase (B) secondary to arterial cavernous fistula (red arrowheads); note filling defects explained by clotting (blue arrowhead).

We present a case of a 32-year-old male patient with the perineum and pelvis blunt trauma after a motorbike accident with a secondary bilateral arterio-cavernous fistula treated with retrograde embolization through the arch of cavernous arteries.

Case report

We present the case of a 32-year-old male patient with no relevant history who presented to the emergency room 1 day after a motorbike accident with a contusion in the perineum and pelvis. He received initial care at another institution where fractures were ruled out and discharged.

He consulted at our institution due to an increasing hematoma in the pelvis that extended to the genitals; he reported 4/10 pain on admission and denied other symptoms. On physical examination, a hematoma was found at the level of the mons pubis of 4 cm in diameter with testicular ecchymosis on the middle dorsum of the penis and perineum that extended to the perineal area. Paraclinical were taken without anemia.

On the angiography computed tomography (angioCT) of the abdomen and pelvis, a hematoma is observed in the cavernous bodies of the penis of approximately 28 CC, and no signs of active bleeding are observed (Fig. 1).

Doppler ultrasound is ordered, and an alteration in the architecture of the tissue is identified due to the presence of a hematoma measuring 2.2 × 1.5 × 1.7 cm surrounding the cavernous artery, which in the color Doppler evaluation presents turbulent flow and in spectral Doppler evaluation show increase in velocities of up to 172.7 cm/s and IR of 0.53, adjacent to the cavernosal artery, another vascular structure with arterial flow and rates of up to 270.5 cm/s and RI of 0.64 was identified, indicative of a fistula. Another hematoma measuring 1.0 × 1.2 × 1.9 cm was placed in the proximal third of the right corpus cavernosum. The cavernous artery has typical characteristics in color and spectral Doppler evaluation, with a velocity of 32.9 cm/s and a resistance index of 0.63 (Fig. 2).

Urology considers the patient not a candidate for surgery and is discussed with interventional radiology, who takes the patient to arteriography.

Pelvic arteriography technique

After asepsis and antisepsis, a puncture of the right common femoral artery was performed. Five French introducers and 5 cobra catheter French with hydrophilic guidewire 150 cm selectively catheterize the left internal iliac artery and later the trunk former. With an excelsior S L 10 microcatheter, the left internal pudendal artery is supraselective catheterized. With microwire, it is possible to advance toward the artery of the left corpus cavernosum. An arterial branch is observed that produces a high-flow cavernous artery fistula; supraselective catheterization of this branch that feeds the fistula is achieved. Embolization is performed with two 2 mm × 2 cm coils with good angiographic results.

Control angiography shows that the left cavernous artery communicates at the head of the penis with the right cavernous artery, which leads to a branch that produces another arterio-cavernous fistula on that side. A retrograde catheterization is performed via the dorsum and head of the penis; it is possible to reach the branch that feeds the cavernous artery fistula on the right side (Fig. 3).

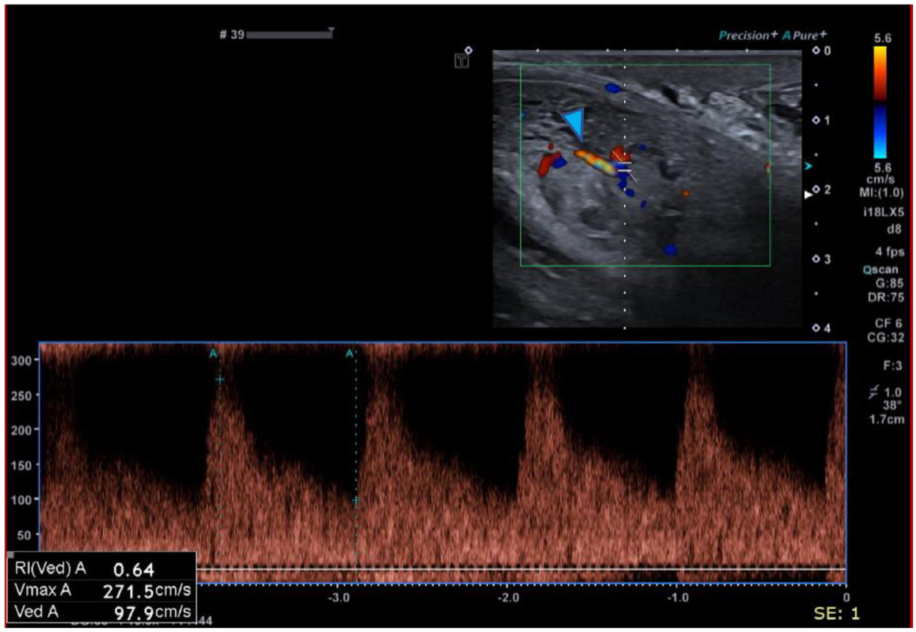

Fig. 2 – Doppler ultrasound of the penile vessels shows the arterio-cavernous fistula's site with the turbulent flow and an increase in peak systolic velocity of up to 271.5 cm/s in the Doppler specter analysis.

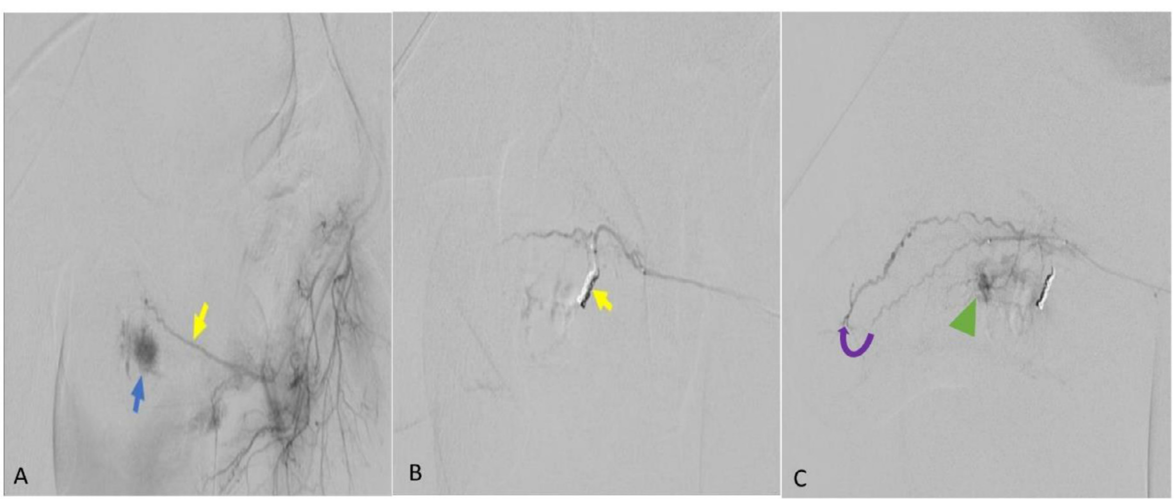

Fig. 3 – (A) Penile arteriography with digital arterial subtraction (DSA) shows a branch from the left cavernous artery (yellow arrow) with vascular blush (blue arrow), confirming the arterio-cavernous fistula. (B) Arteriography made after coil placement (yellow arrow) in the left arterio-cavernous fistula notes the disappearance of the vascular blush previously described with the preserved flow on the cavernous artery. (C) Arteriography from the left cavernous artery demonstrated a second arterio-cavernous fistula on the right side (green arrowhead), demonstrating a second arterio-cavernous fistula on the right side for transpeneal communication via glans (purple arrow).

Once positioned with the microcatheter in the right cavernous artery, an attempt is made to supraselectively canalize the branch that feeds the fistula on this side, but this is not possible due to the tortuosity and probably due to the angle of entry to this branch which goes in the opposite direction by the retrograde route described, however, these fistulas generally and as was seen in the Doppler current high velocities; Therefore, and taking advantage of this characteristic, embolization with particles (PVA 355-500 microns) was decided in the hope that this embolism agent would travel primarily toward the fistula branch and simultaneously preserve the rest of the cavernous artery, as indeed happened and was verified in the control angiographies (Fig. 4).

The arterial introducer was removed by manual compression without complications. No immediate procedural complications were reported.

After the procedure, the patient was discharged 3 days later without ischemic or urinary complications.

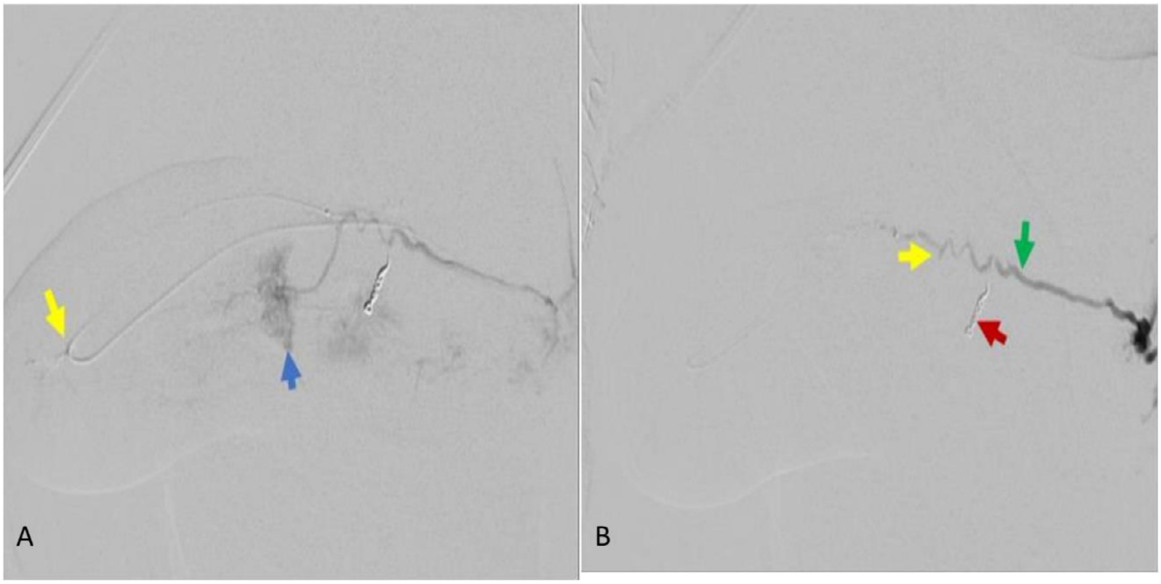

Fig. 4 – (A) Supraselective angiography of the right cavernous artery via the retrograde trans penile route (yellow arrow) confirming the right arterio-cavernous fistula (blue arrow). (B) Control arteriography after administration of microparticles on the arterio-cavernous right side, with satisfactory obliteration of the arterio-cavernous fistula (yellow arrow) and preservation of flow in the right cavernous artery (green arrow). Note the embolization coils of the obliterated left arterio-cavernous fistula (red arrow).

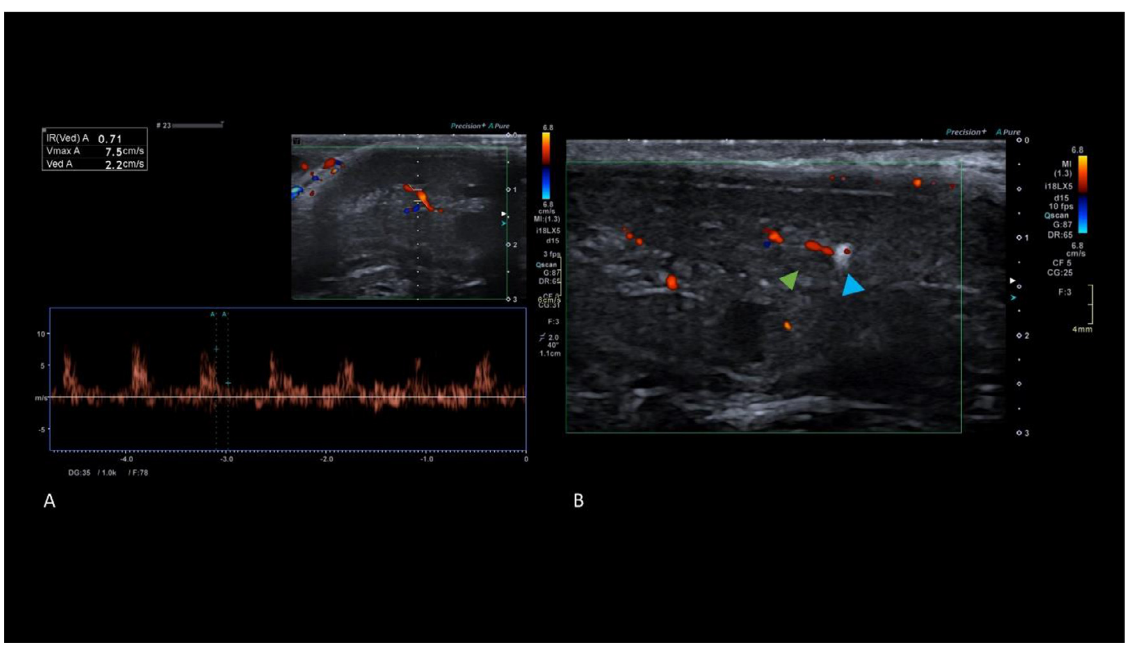

Fig. 5 – (A) Control penile Doppler ultrasound showing peak systolic velocity within normal limits. (B) Note the presence of the coil (blue arrowhead) placed in the previous angiography with flow present beyond the coil (green arrowhead).

Doppler ultrasound of the penis was performed 3 months after the procedure, with normal velocity of the left cavernous artery and the coil placed in the previous arteriography (Fig. 5). Clinical evolution was satisfactory without erectile dysfunction, ischemia, or urinary symptoms.

Discussion

Penile trauma is rare, and rupture of the cavernous artery associated with arterio-cavernous fistula is even more occasional [1]. Nonpenetrating blunt injuries of the penis in the flaccid state usually occur from perineal trauma, where the base of the penis is crushed against the pubic bone. There is typically bilateral intracavernous hematoma, which usually respects the tunica albuginea. However, the main complication of this entity is high-flow priapism [1,2].

Different diagnostic methods can diagnose arterio-cavernous fistula, with ultrasound being the modality of choice due to its sensitivity, easy access, low cost, and lack of invasiveness [2]. In patients with recent trauma, ultrasound shows a hypoechoic area with well-circumscribed margins in the cavernous body, with evidence of color Doppler flow coming from the injured cavernous artery, which is turbulent and with high velocities at the site of the fistula [3]. In the angioCT study, it is possible to observe the rapid filling of the cavernous bodies in early arterial phases due to the increase in flow velocities generated by the fistula; at the same time, it is possible to observe filling defects in the cavernous arteries due to the presence of hematomas or lesions in these vascular structures. In digital subtraction angiography, we directly follow the arterio-cavernous fistula represented as a vascular "*blush*" of arborescent appearance, showing the distribution of the lesion in real-time and the filling characteristics with the administration of the contrast medium [1,3,4].

Among the treatment options, different methods have been described, ranging from observation depending on the size of the fistula or symptomatology to open ligation of the internal pudendal arteries, microsurgical closure of the fistula, with the risk of leading to erectile dysfunction, or superselective endovascular embolization of the affected artery. This treatment has taken great relevance in the last decade due to its significant advantages compared to other methods, such as shorter recovery time, shorter hospital stays, lower rate of complications, and the benefits of a minimally invasive procedure. However, it requires a high knowledge of anatomy, adequate preintervention planning, high use of contrast and radiation doses, and a longer time in the ward. It is, therefore, advisable to look for other intraprocedural alternatives that reduce the use of contrast media, radiation, anesthesia time, and room time and speed up embolization during the procedure [3,5]. Embolization materials vary, ranging from gel foam (gelatin sponge), to particles, coils, bucrylate, onyx, or autologous clots with different success rates. Currently, coils are recommended for their ability to embolize accurately and safely, to preserve the rest of the healthy vessel; on this occasion, coils were used at the same time and on the same side both for the left fistula and particles for the right arterial cavernous fistula through retrograde catheterization through the arch of cavernous arteries of the right cavernous artery which is an approach not yet described in the literature according to our search, this technique avoids displacement into the right internal iliac artery decreasing radiation times of staff and patient, reduce the amount of contrast, anesthesia time, and shortening the procedure considerably [4,5].

As a limitation associated with the procedure, it was not possible to superselectively catheterize the arterio-cavernous fistula, so the high-flow characteristic evidenced by ultrasound was used for embolization using microparticles which were sent from the tip of the catheter and sequestered by the fistula, which had a higher flow velocity than the cavernous artery.

Conclusion

Retrograde catheterization through the arch of cavernous arteries of the contralateral cavernous artery from one side at the same time may be an acceptable approach that benefits procedure times as well as resources and the impact of the amount of radiation and contrast on the patient.

Patient consent

The reported case was reviewed and approved, and individual patient consent was obtained following institutional guidelines.

REFERENCES

[1] Cozzi D, Verrone GB, Agostini S, Bartolini M, D'Amico G, Pradella S, et al. Acute penile trauma: imaging features in the emergency setting. Radiol Med (Torino) 2019;124(12):1270–80.

[2] Williams AB, Lax LG. A rare case of post-traumatic high-flow priapism requiring endovascular salvage with bilateral super-selective micro coil embolization. J Surg Case Rep 2021;2021(3):rjab077.

[3] Bertolotto M, Quaia E, Mucelli FP, Ciampalini S, Forgács B, Gattuccio I. Color Doppler imaging of posttraumatic priapism before and after selective embolization. RadioGraphics 2003;23(2):495–503.

[4] Lazinger M, Beckmann CF, Cossi A, Roth RA. Selective embolization of bilateral arterial cavernous fistulas for posttraumatic penile arterial priapism. Cardiovasc Intervent Radiol 1996;19(4):281–4.

[5] Gandini R, Spinelli A, Konda D, Reale CA, Fabiano S, Pipitone V, et al. Superselective embolization in posttraumatic priapism with glubran two acrylic glue. Cardiovasc Intervent Radiol 2004;27(5):544–8.