CASE REPORT

Abnormal deep dorsal vein resulting in veno-occlusive erectile dysfunction

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SUMMARY

A 59-year-old man with a 6-year history of erectile dysfunction presented to the andrology outpatient clinic. Multimodality assessment with ultrasound, MRI venography and fluoroscopic venography demonstrated an aberrant emissary vein arising from the corporal bodies causing venogenic erectile dysfunction. Selective coil embolisation of the collateral vein resulted in an almost immediate and sustained improvement in his erections.

BACKGROUND

Veno-occlusive erectile dysfunction (ED) is often poorly investigated, with conventional imaging techniques often failing to identify a single causative target vessel. Patients are often usually treated with invasive surgery. In this case, a multimodality imaging assessment was able to identify a single abnormal draining vein. Catheter venography and coil embolisation of the vein then allowed a minimally invasive treatment, which resulted in a significant improvement in ED.

CASE PRESENTATION

A 59-year-old man presented with a 6-year history of worsening ED which was unresponsive to type V phosphodiesterase inhibitors and was unable to achieve sufficient tumescence for intercourse. The patient had a history of right-sided femoral vein thrombosis and a background of polymyositis. On clinical examination there was no palpable penile lesion, features of Peyronie's disease or visible dilated vascular structures.

INVESTIGATIONS

His hormonal profile was normal, with a testosterone level of 11.8 nmol/L.

His International Index of Erectile Function (IIEF) questionnaire scored 20/30 (mild ED).

Doppler ultrasound was carried out with intracorporeal injection of 20 µg of alprostadil.

He achieved only a 50% erection.

Normal peak systolic velocities of 47 and 39 cm/s in the right and left corpora, respectively, were achieved which excluded an arteriogenic cause. There was, however, marked continuous forward end diastolic velocity of up to 10 cm/s in both corporal cavernosal arteries suggestive of veno-occlusive dysfunction (figure 1).

An MRI penis showed no corporal lesion or fibrosis. There was however a large, abnormal

collateral deep dorsal vein that communicated with the right, long saphenous vein (figure 2).

A subsequent diagnostic cavernosogram was carried out. No significant increase in intracavernosal pressure was demonstrated, and on instillation of contrast there was immediate mild opacification of the prostatic venous plexus as well as a very large right-sided dorsal penile vein (previously seen on MRI) with only mild tumescence (figure 2). This confirmed both the diagnosis of veno-occlusive dysfunction and a potential causative vessel.

DIFFERENTIAL DIAGNOSIS

ED is defined as the inability to achieve or maintain an erection sufficient for satisfactory sexual performance. The aetiology is varied and can be grouped into either being psychogenic or organic. ED is often multifactorial and a single cause is difficult to identify. Organic causes include: inflammatory, mechanical, vascular (arteriogenic or venogenic), neurogenic or endocrine. History and blood tests effectively excluded endocrine, mechanical and psychogenic/neurogenic causes. The findings of the initial Doppler ultrasound were in keeping with a veno-occlusive cause.

TREATMENT

The patient declined the standard surgical treatment of venous ligation/stripping, opting for a minimally invasive endovascular option. A number of small case reports have described endovascular treatment.

Figure 1 Ultrasound Doppler image. Spectral trace from the right crus cavernosal artery 15 min after 20 µg of intracavernosal alprostadil has been administered. The waveform demonstrates a normal arterial inflow (PSV 46 cm/s) but persistent low resistance (EDV 9 cm/s), which is suggestive of veno-occlusive dysfunction. EDV, end diastolic velocity; PSV, peak systolic velocity.

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Figure 2 Top left and right: MRI T2 weighted images in coronal (left) and axial (right) section. White arrows indicate the aberrant dorsal penile vein branch. Bottom: spot image from cavernosogram, which clearly demonstrates the same aberrant vein filling with contrast (black arrow).

In this case, a retrograde approach was undertaken rather than an antegrade approach via the dorsal vein of the penis.

A right internal jugular approach was used and a 5Fr Berenstein catheter was inserted to the right saphenofemoral junction. The origin of the target vessel was identified, and this was subselectively catheterised with a microcatheter. Position in the abnormal draining vein was confirmed on venography and the vein was embolised with four platinum coils (8 and 10 mm MicroNester—Cook Medical) (figure 3).

OUTCOME AND FOLLOW-UP

Following the procedure, the patient reported immediate improvement in his erections, with 100% erections with a half dose of sildenafil (IIEF 27/30). Follow-up MR penis and Doppler at 6 weeks and at 6 months demonstrated fibrosis of the embolised vein and continued improvement in his erectile function (IIEF 26/30). At 8 months, there is some reduction in the potency of his erections.

DISCUSSION

The arterial blood supply to the deep structures of the penis comes from the internal pudendal artery, a branch of the anterior trunk of the internal iliac artery. Classically, this divides into the dorsal penile, cavernosal and bulbar arteries.

Whereas penile venous drainage occurs via two systems: the superficial and deep venous systems. The superficial system drains the skin and adjacent tissues via the superficial dorsal vein, which most commonly drains into the long saphenous vein. The deep system drains the cavernous bodies and the glans penis.

Figure 3 Selected images from embolisation. Top image: Vertebral catheter seen in right long saphenous vein. Microcatheter within the deep dorsal vein branch identified in figure 2. Bottom image: Embolisation coil deployed. No contrast refluxes into the deep dorsal penile vein.

The emissary veins perforate the tunica albuginea, ultimately draining into the deep dorsal vein, to drain the cavernous bodies and corpus spongiosum. Alongside the deep dorsal vein, there is a pair of cavernous veins and two pairs of para-arterial veins which also drain the deep system.¹²

Organic ED is most commonly due to a vascular aetiology, with veno-occlusive dysfunction being most frequently demonstrated (up to 85%).³ Where there is a so called ‘venous-leak’, it can be difficult to confirm the diagnosis on imaging with cavernosography having variable reported sensitivity and specificity. In some published series, only 25%–50% had abnormal emissary vein(s) demonstrated on cavernosography,^{4–6} with others demonstrating abnormal veins in 80%⁷ and with advanced CT cavernosography up to 95%.⁸

Furthermore, enhancement of the normal emissary veins on cavernosography can be seen in men with normal erectile function.⁹

Due to the subjectivity of the test, complex anatomy and relative paucity of literature on cavernosography, it cannot be determined what proportion of ‘venous-leak’ is due to a single collateral vessel. From our institution’s extensive experience, this case represents <1%. Most of cases of veno-occlusive dysfunction are due to smooth muscle or tunica albuginea disease rather than a leaking vein. True venous leak is a rare thing, however,

we may be missing the diagnosis of many cases because they are not being investigated.

The two most common procedures for penile venous surgery have been venous ligation and venous stripping. Venous ligation can involve the ligation of specific leaking veins identified on cavernosography or the non-specific ligation of the deep dorsal vein, its tributaries and occasionally the crural veins.^{10 11} Venous stripping is a more invasive procedure.

Short-term results for venous surgery are good with sustained improvement at 6 months in approximately 75% of patients; however, long-term benefits more than 2 years are generally not sustained with 50%–75% with refractory symptoms with venous ligation^{12 13} and 25% at 18 months in venous stripping surgery.¹⁰

Several minimally invasive embolisation techniques have been described: some using liquid embolics¹⁴ and others a combination of liquid and coil embolisation.^{15 16} The rates of recurrent ED ranged from 30% to 60% at approximately 1 year.

Patient's perspective

I couldn't be happier with the treatment I've received, and in particular with the imaging team, you've all been so friendly and helpful.

Not specific to yourselves but I felt there was a lack of shared medical data. For instance it may have helped me if (the hospitals) had online access to my GP medical records, my personal notes were inadequate and I couldn't remember key information when needed.

I really appreciated being included in the introduction at the start of the procedure I felt included and valued.

The discussion during the procedure surprised me a little, it registered with me the complexity and artistry involved in guiding a wire from a hole in my neck.

I would like to have had a monitor to view the proceedings but I appreciate that others may not, as well as the associated costs for something not strictly necessary.

Learning points

- Erectile dysfunction (ED), secondary to veno-occlusive causes, is a common diagnosis, but a specific causative vein is rarely demonstrated.
- Doppler ultrasound can suggest the diagnosis, but workup with cavernosography, and sometimes MRI, is required.
- Retrograde catheter venography is achievable and allows therapeutic endovenous treatment of veno-occlusive ED in such cases.

In this case, a single abnormal deep dorsal penile vein was identified on imaging and successfully embolised to treat venous leak causing ED. Simultaneous intraoperative ultrasound and venography ensured accurate placement of the embolising agent given the proximity to the deep femoral system.

Contributors MH and CBvS wrote the original draft. AR edited the draft manuscript and helped consent the patient in clinic. MW and CBvS carried out the procedure. MW edited the manuscript.

Competing interests None declared.

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