

A Rare Case Report of Spontaneous Thrombosis of the Deep Dorsal Vein of Penis

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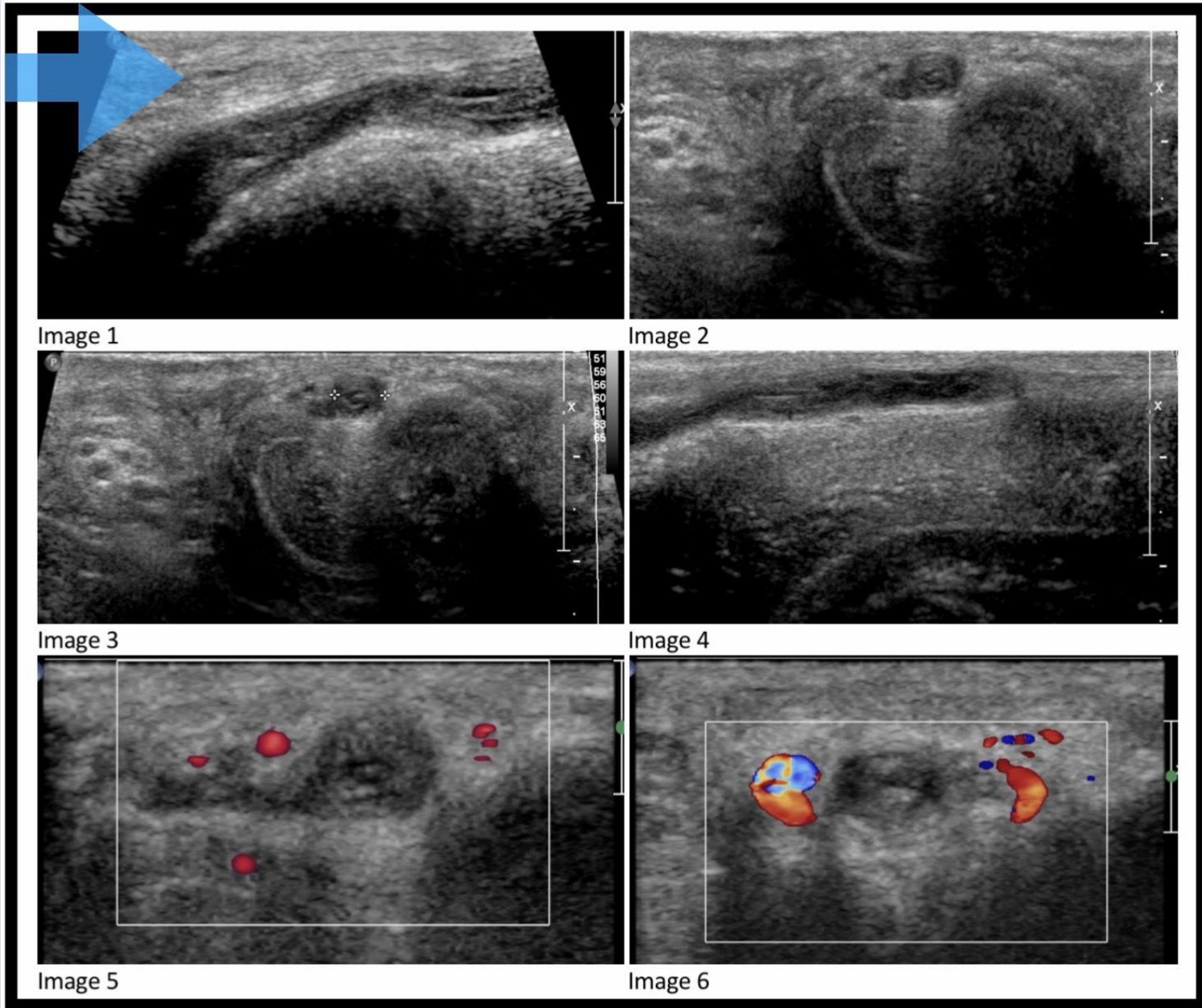
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Case History

A 51 year old male patient was referred from Primary Care for ultrasound scan of the testes and penis, with a two week history of a firm, painless, palpable lump at the base of his penis. The clinical history was unclear with possible sources of minor trauma from rugby football or rolling over on an erection when asleep. Relevant PMH included previous vasectomy, with no erectile dysfunction or voiding symptoms. There was no history of major trauma, DVT or thrombophilia.

On examination, the presenting lump palpated as a “cord like” swelling at the root of the penis. Grey scale ultrasound with a high frequency linear transducer demonstrated a linear hypo-echoic structure with low level internal echoes and variable undulating outline (Image 1), round in cross section (Image 2), incompressible and measuring 5mm in diameter (Image 3), which was demonstrated to mid shaft of penis (Image 4). Application of power (Image 5) and colour Doppler (Image 6) showed no flow internally within the linear structure, plus the presence of two vessels with arterial signal at either side of this structure.

The structure was anterior to the corpus cavernosa on the dorsal aspect of the shaft of penis with arteries at either side. This was therefore thought most likely to represent a thrombosis of the **Deep Dorsal Vein of the Penis**.



Ultrasound of the testes showed some evidence of non-specific mild inflammation on B-mode and colour Doppler to the right testis. A subsequent urological referral and contrast CT scan of the abdomen and pelvis showed no abnormality of the vasculature and no evidence of malignancy. The patient has been referred to Haematology for thrombophilia screening and to determine if anticoagulation or anti-platelet therapy is required. The outcome of this is still pending. At this time the palpable abnormality still remains present (3months).

Discussion 1

There are many case reports of thrombosis of the superficial dorsal vein of the penis, also known as Mondor’s disease, often associated with traumatic fracture of the erect penis, but thrombosis of the **deep dorsal vein** of the penis is much more unusual.¹

Ultrasound for soft tissue lumps is commonplace in every radiology department and a case such as this could cross any Ultrasound Practitioners list. This case documented a spontaneous presentation of venous thrombosis of the **deep dorsal vein** of the penis, presenting as a palpable lump via the General Practitioner and we have described the differentiating factors, related to anatomy, to clinch the diagnosis.

There is a wealth of literature to describe the risk factors related to true deep vein thrombosis as opposed to superficial vein thrombophlebitis in the extremities, but in this area the guidance is unclear due to the low numbers of reported cases that have been described and investigated. There are reported relationships with thrombophilia,² trauma³ and infection,⁴ but spontaneous thrombosis is rare. While no therapy is required for superficial vein thrombosis, unless there are other risk factors for venous thromboembolism, complete or segmental penile thrombosis has been treated with fibrinolytics and anticoagulation.⁵

The **deep dorsal vein** drains the glans, corpus spongiosum and distal two-thirds of the corpora cavernosa. A relationship between deep vein thrombosis and deep penile thrombosis therefore would seem logical and anticoagulation, as for these disorders may be applicable to deep penile vein thrombosis. As with peripheral deep venous thrombosis, one could postulate a connection with occult malignancy, especially considering the anatomy of the venous drainage into the vesical and prostatic plexuses in the retro-pubic space, as seen with deep dorsal vein thrombosis secondary to prostatic abscess.⁶

To date there have been very few case reports in the literature of thrombosis of the **deep dorsal penile vein** and rarely apparently spontaneous, unrelated to either infection, trauma or thrombophilia. This makes this case also extremely rare, but thus also important. No treatment recommendations have been made to date, leaving the current management on a case by case basis.

Conclusion

Our patient appeared to develop the condition of **deep dorsal vein thrombosis** spontaneously, with only a very weak history of trauma. It is important for primary care providers to be aware of penile Mondor’s disease to be able to effectively diagnosis, manage, and counsel the patient without extensive and costly evaluation or treatment. However a thorough history and inexpensive ultrasound scan can provide a clear diagnosis and differentiate easily between Deep Dorsal Vein Thrombosis (DDVT) and Mondor’s Disease, allowing more careful consideration of the causal aetiology with DDVT.

If a historical cause is unclear, an extensive workup is probably only warranted if there is significant concern for a hyper-coagulability disorder or cancer, both of which can be evaluated with an appropriate review of systems, family history and physical examination. Extensive or invasive treatment can be options for patients whose symptoms fail to resolve with conservative therapy within 6 months or who have severe symptoms that affect their daily lives.

Practitioners involved in scanning soft tissue lumps should be aware of how to make this rare, but interesting differential diagnosis.

Anatomy

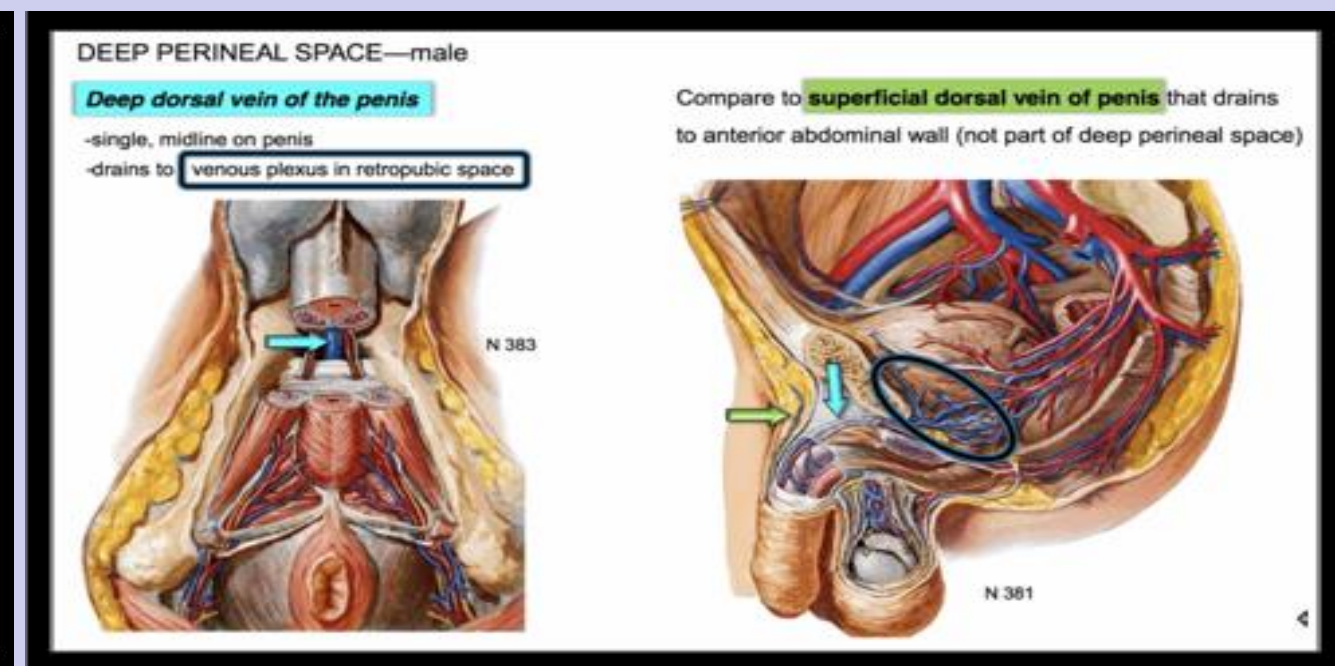
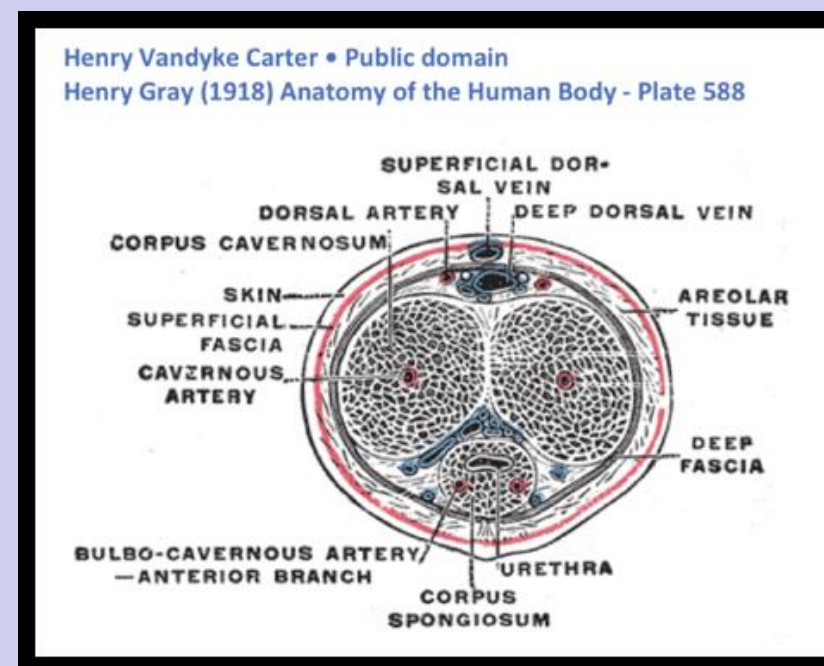
Due to the position of the two arteries imaged at either side of the vein, the accurate identification of anatomy was made possible, identifying thrombosis of the DEEP dorsal vein of the penis within the boundary of the deep fascia, as opposed to the superficial dorsal vein, which lies outside this fibrous sheath.

As the diagnosis of **deep** versus **superficial** vein thrombosis was dependent on the accurate identification and imaging of the vascular anatomy, the position of the two dorsal arteries became vital. In retrospect, changing the transducer or using a gel stand off to demonstrate the compressed and normal superficial dorsal vein may have added a further degree of elegance to the imaging series. A hint of the superficial vein can be seen on the left of Image 1 (**wide arrow**).

Arterial Supply

The Dorsal Artery of the Penis is a branch of the internal pudendal artery which ascends between the crus penis and the pubic symphysis. After piercing the inferior fascia of the urogenital diaphragm it passes between the two layers of the suspensory ligament of the penis, and runs forward on the dorsum of the penis to the glans, **where it divides into two branches, which supply the glans and prepuce.**

On the penis, the dorsal artery lies between the dorsal nerve and **deep dorsal vein**, the nerve being on its lateral side. It supplies the integument and fibrous sheath of the corpus cavernosum penis, sending branches through the sheath to anastomose with the deep artery of the penis. The internal pudendal artery also gives rise to the deep or cavernous artery of the penis, which supplies the ipsilateral corpus cavernosum.



Venous Drainage

These comprise of the superficial dorsal vein and the **deep dorsal vein** of the penis.

Superficial Dorsal Vein

The superficial dorsal vein of the penis drains the prepuce and skin of the penis, then after running backward in the subcutaneous tissue, inclines to the right or left and opens into the corresponding superficial external pudendal vein, a tributary of the great saphenous vein, which drains to the anterior abdominal wall. Viewed in the cross section of the penis it is located just deep to the skin and superficial fascia, within the areolar tissue (between the superficial fascia and deep fascia).

In contrast to the **deep dorsal vein**, it lies outside the deep fascia known as Buck’s fascia. It is possible for the vein to rupture, which presents in a manner similar to penile fracture.

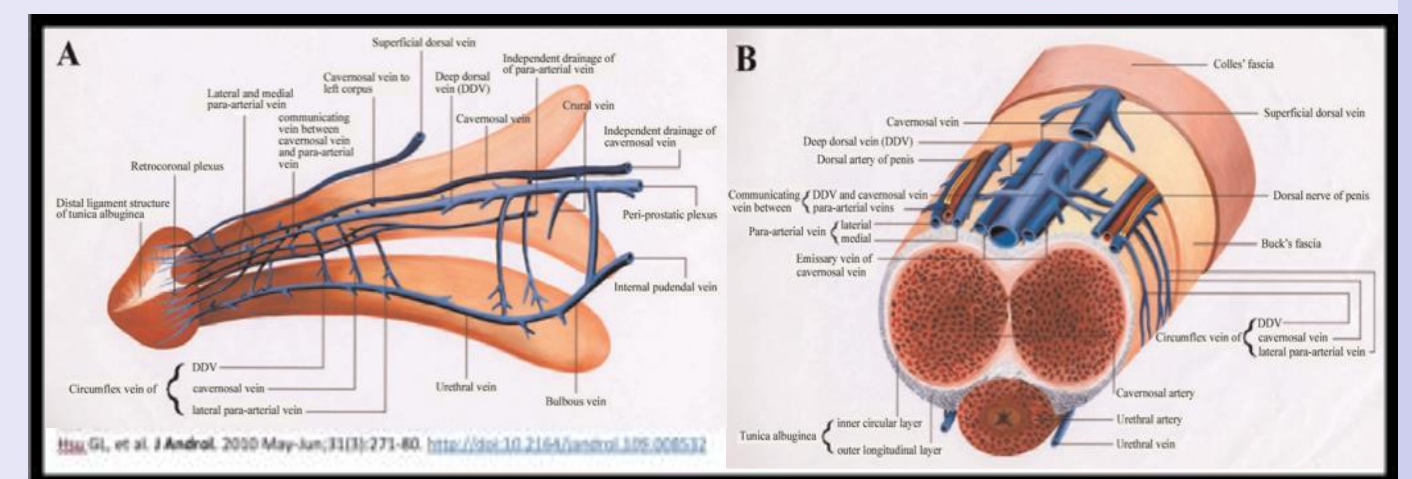
Deep Dorsal Vein

The deep dorsal vein of the penis lies between the deep (Buck’s) fascia of the penis and the tunica albuginea which surround the corpus cavernosa. It receives the blood from the glans penis and corpora cavernosa penis and courses backward in the middle line between the dorsal arteries; near the root of the penis it passes between the two parts of the suspensory ligament and then through an aperture between the arcuate pubic ligament and the transverse ligament of the pelvis, and divides into two branches, which enter the vesical and prostatic plexuses in the retro-pubic space. The **deep dorsal vein** also communicates below the pubic symphysis with the internal pudendal vein. The venous drainage is then via the internal iliac vein to the IVC.

Discussion 2

Detailed studies of penile venous anatomy⁷ have shown evidence of additional deep dorsal veins (DDV) to those classically described in the standard literature, including a cavernosal vein (CV) coursing along each corpus cavernosum all the way distally to the glans and draining directly into the Santorini’s plexus and two sets of para-arterial veins (PAVs). When the DDV system had been totally removed as a result of penile vein stripping surgery for erectile dysfunction, the additional deep veins were found to become an important route for venous drainage of the penis. The accessory deep penile veins were found to have a pivotal role in determining a rigid erection. More recently this detailed knowledge of the accessory **deep dorsal veins** has revised the modern approach to surgery.⁸

Penile Mondor’s disease, or thrombophlebitis of the superficial dorsal vein of the penis, is a relatively uncommon but potentially anxiety-inducing, self-limiting condition that is said should be easily recognisable by any primary care practitioner.⁹ It typically presents with a cord-like mass and pain to the dorsal penis and has a myriad of causes, including trauma, excessive sexual activity, excessive exercise, or malignancy.



However, most of the case reports of Penile Mondor’s disease have typically made a clinical diagnosis only, without any imaging. A differentiating clinical sign sometimes seen is induration of the skin overlying the thrombosed superficial dorsal vein. As the typical clinical presentation of a “cord-like mass and pain to the dorsal penis” is similar to our case,¹⁰ we can begin to postulate that perhaps **deep dorsal vein thrombosis** may not in fact be that rare, but simply under diagnosed due to lack of the differentiating imaging and therefore under reported.

The deep dorsal vein is after all more closely anatomically related to the fragile tunica albuginea, usually involved in acute penile fracture and associated with Mondor’s disease. Other reasons for under reporting could include, social fear/stigma, lack of significant morbidity or spontaneous resolution of symptoms.

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