Role of ultrasonography with color-Doppler in diagnosis of penile Mondor's disease

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Abstract Penile Mondor's disease (superficial thrombophlebitis of the penis dorsal vein) is an uncommon and benign pathology that affects sexually active men. Although the diagnosis is made by physical examination in most patients, sonography may be required in some cases. Color-Doppler ultrasonography clearly visualizes dorsal vein thrombosis and the associated hemodynamic alterations. We describe the symptoms, the sonographic findings and treatment of this disease in a 26-year-old male with superficial thrombophlebitis of the penis dorsal vein.

Keywords Mondor's disease · Ultrasonography · Color-Doppler · Vein thrombosis

Riassunto La malattia di Mondor a livello del pene (tromboflebite della vena dorsale superficiale del pene) rappresenta una patologia non comune a carattere benigno che interessa gli uomini sessualmente attivi. Anche se la diagnosi viene fatta la maggior parte dei pazienti con l'esame obiettivo, l'ecografia viene molto spesso richiesta in aiuto in alcuni casi. L'eco Color-Doppler visualizza in maniera chiara la trombosi venosa dorsale e le alterazioni emodinamiche ad essa associate. Riportiamo la sintomatologia, i risultati ecografici e il trattamento di questa patologia in un ragazzo di 26 anni affetto da tromboflebite superficiale della vena dorsale del pene.

Introduction

Mondor's disease (MD) of the penis is a peculiar form of superficial thrombophlebitis which involves the superficial dorsal vein. It was first reported in 1939 [1] as a thrombophlebitis involving a superficial vein in the subcutaneous fat of the breast or anterior chest wall, especially in women, but the definition since 1958 includes the dorsal penile vein as well [2].

MD presents with a subcutaneous, tender, cord-like induration. The overlying skin is freely mobile, and usually does not have any inflammatory signs. Although the lesions are typically asymptomatic, some patients experience pain or discomfort, especially on palpation or during twisting and stretching movements [3]. Clinically, patients describe a feeling of tension in the area of the thrombosis that usually occur in the dorsal penis shaft, close to the sulcus coronarius, near the penis root or in the entire penis shaft [4]. We describe the symptoms, the sonographic findings and treatment of this disease in a 26-year-old male with superficial thrombophlebitis of the dorsal vein of the penis.

Case report

A 26-year-old male presented with complaints of penile pain during sexual intercourse and he had experienced this pain for 1 week. There was no evidence of fever, erectile dysfunction, hematuria, dysuria or symptoms from the lower urinary tract. His medical history was unremarkable and he denied ever being infected with a sexually transmitted disease. He denied any history of recent trauma, vigorous sexual activity or use of constrictor devices. The patient reported that he abused neither alcohol nor smoke or took any other drugs. On the physical examination, a

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Fig. 1 Longitudinal sonogram of penile shaft shows internal echogenicity, thrombus-filled superficial dorsal vein (*sdv*)

cord-like induration (0.4 cm in diameter and 4 cm in length) was palpated in the dorsal aspect of the proximal penis, extending from the pubic symphysis to the mid of penis. The overlying skin was completely intact with no erythema. Examination revealed no signs of lymphadenopathy in the groin region and a mild degree of varicocele on the left side. There were no signs of a direct or indirect hernia. Laboratory tests (complete blood count, including platelets, prothrombin, partial thromboplastin levels, urinalysis) were within normal, except for increased numbers of leukocytes ($12,000 \text{ mm}^3$). Ultrasonography (US) with color-Doppler was done to determine if the condition represented venous thrombosis. Gray-scale US revealed internal echogenicity in the superficial dorsal vein of the penis, but color-Doppler sonography failed to detect the venous flow signals in this region (Fig. 1). Color-Doppler US indicated that an enlarged superficial dorsal vein was compressing the deep dorsal vein, and no flow signals were evident in either the superficial dorsal vein or the deep dorsal vein (Fig. 2). The penis deep dorsal vein is easily displayed with color-Doppler using a low pulse repetition frequency (PRF 3–4 kHz) and running scans on the ventral side of the penis in order to avoid mechanical compression of the vein. Bilateral dorsal arterial flow signals were noted excluding expansion and thrombosis of the veins in the pelvis or legs. The diagnosis indicated superficial dorsal vein thrombophlebitis and conservative treatment was prescribed.

Supportive care was initiated, including an administration for 400 mg of oral ibuprofen to be taken three times per day for 10 days. In addition, the patient was instructed to take daily a subcutaneous injection of enoxaparin (low molecular weight heparin, LMWH, 4,000 IU) and 400 mg of oral cefixime once a daily for 5 days. The patient was advised to abstain from sexual activity until the symptoms resolved. He was scheduled for a follow-up appointment in 1 week.

Fig. 2 Transverse color-Doppler image of penile shaft shows left dorsal artery and deep dorsal vein. Right dorsal and superficial penile vein is not visualized and no flow signals were evident in both (asterisk)

The patient returned 1 week later and reported no improvement, in fact he had about 30-min episodes of throbbing pain once or twice a day.

He was followed up in our clinic for 4 weeks, after which he reported painless erections and noticeable decrease in size of palpable cord along the dorsum of his penis.

Discussion

Penile MD, with an incidence of 1.39 %, is not only a rare disease but also an underdiagnosed disease, mostly published as case reports in the literature [5].

Penile MD can be diagnosed from information obtained during the history and physical examination. Patients complain of a cord-like induration, which is often painful, in the dorsal aspect of the penis, and this pain can be constant or episodic. The vein appears to be swollen and erythematous [6].

The pathogenesis of thrombophlebitis can be attributed to factors proposed by Virchow [7] in 1845: damage to vessel wall integrity, changes in blood flow and changes in the blood components themselves.

Therefore, the pathogenesis of penile MD is controversial and previous case studies have postulated etiologic

factors that include several predisposing factors, namely, penile trauma, excessive sexual intercourse, infection, pelvic surgery, intravenous drug injection, prolonged venous compression due to a distended bladder, tumoral mass or the use of sexual devices. Furthermore, hypercoagulability disorders, such as the deficiency of protein S, protein C and antithrombin III, are risk factors for penile MD [4, 5].

With regard to differential diagnosis, sclerosing lymphangitis and Peyronie's disease must be considered. Sclerosing lymphangitis is a noninfective acute cord-like lymphangitis of the coronal sulcus; however, the overlying skin is uninvolved and poses no erosion or ulceration.

In Peyronie's disease, there is a fibrous inelastic scar of the tunica albuginea, resulting in fibrotic plaque on the penis and causing penile deformity, including penile curvature, hinging, narrowing, shortening and painful erections.

US diagnosis of penile MD was first reported by Shapiro [8]. In that case, the Gray-scale examination showed a clot within the vein, which was distended and noncompressible. Color-Doppler examination confirmed the absence of flow within the vein.

Recently, Han et al. [9] reported that in addition to the superficial venous thrombosis, the presence of low-flow, high-resistance arterial waveforms in cavernous arteries might be suggestive of MD.

In the present case US is useful to confirm diagnosis of penile MD and to exclude the existence of any underlying mass compressing the veins; while color-Doppler US indicated that an enlarged superficial dorsal vein was compressing the deep dorsal vein, and no flow signals were evident in either the superficial dorsal vein or the deep dorsal vein.

Therefore, the enlargement of the superficial dorsal vein and the presence of perivascular edema, caused by thrombophlebitis, may cause an obstacle to the smooth flow of the deep dorsal vein.

About penile MD treatment has been proposed the several methods convergent to the recommendation of abstinence from sexual intercourse until the resolution of the symptoms. Anticoagulation with heparin or aspirin is recommended. The use of antibiotics is prophylactic or can be necessary in case of cellulites. The double role of non-steroidal anti-inflammatory drugs, provided pain relief and diminished inflammatory reaction, made them useful on a specialist's armament. In cases of insisting pain, local injected anesthetics have been used [10]. At last, in cases with no resolution, despite conservative treatment, thrombus excision is treatment of election.

However, surgery is indicated when such symptoms persist after conservative management, although the long-

term results after conservative or surgical treatment of superficial penile vein thrombosis have not been reported in the literature [4].

Conclusion

In conclusion, the Doppler US findings of thrombus without blood flow in the superficial dorsal vein and the low-flow, high resistance in the cavernosal artery may be suggestive of penile MD. Therefore, Doppler sonography is very useful in confirming the diagnosis and follow-up of penile MD, delineating the penile vascular anatomy and its variations.

Conflict of interest Lucio Dell'Atti declares that he has no conflict of interest.

Informed consent All procedures followed in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000 (5). All patients provided written informed consent to enrolment in the study and the inclusion in this article of information that could potentially lead to their identification.

Human and animal studies The study was conducted in accordance with all institutional and national guidelines for the care and use of laboratory animals.

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