Contrast-enhanced ultrasound evaluation of testicular syphilis: a case report

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Introduction

Syphilis is a chronic bacterial infection caused by Treponema pallidum that is endemic in low-income countries and occurs at lower rates in middle-income and high-income countries [1]. The disease may occur in any organ, including the testis, where it is commonly mistaken for malignancy [2]. It can also determine the development of orchitis, testicular abscesses or gums [3,4]. We present the case of a 39-year-old man with multiple bilateral subcentimetric hypoechoic lesions, which showed rapid wash-in and early wash-out at contrast-enhanced ultrasonography (CEUS).

Case report

A 39-year-old man presented for urological examination with mild testicular discomfort. The patient had a negative medical history. Early imaging workup was B-mode grayscale ultrasound (US) (iU22; Philips machine, 5-12 MHz linear probe), followed by Doppler US, showing multiple bilateral subcentimetric hypoechoic lesions, with soft edges, and predominantly peripheral color Doppler signals with low resistive index (fig 1a-d). Moreover, there was a modest amount of hypoechoic hydrocele. In strain elastography the lesions were hard, showing a high strain ratio of about 2 with respect to the surrounding parenchyma (fig 1e,f). Immediately after, with the same equipment, the patient underwent a CEUS examination, using low mechanical index (MI=0.06; focus positioned...
behind the region of interest) after administration of contrast agent (SonoVue, 2.4 ml, Bracco SpA, Milan, Italy, followed by flushing with 10 ml of saline). The lesions showed rapid wash-in and early wash-out (fig 1g,h). Perfusion software was then used to estimate the perfusion pattern (VueBox 6.0, Bracco Suisse, Geneva, Switzerland) [5]. This quantitative software analyzes the temporal sequence of the images. Time-intensity curve (TIC) was extracted from a region of interest (ROI) within the lesion (ROI diameter 1 cm; size: 0.79 cm²). Another ROI was selected in the normal parenchyma, and finally the TIC curves were compared. The lesion showed a time-to-peak (TTP = time needed to reach peak enhancement) and a peak enhancement (PE) respectively 21.2 seconds and 12.7 dB (fig 1i,j). These features were suspicious for malignant lesions. Therefore, the patient underwent some laboratory tests, as αFP, hCG and LDH, which were negative. Re-examining the medical history in depth, eventually the patient reported to radiologists and urologists that some weeks before he had suffered a low-grade fever, skin rash, and bilateral inguinal lymphadenomegalias. These symptoms led to the suspicion of syphilis. The patient, previously reticent, after repeated requests, admitted recent sexual promiscuity, and subsequent positive serology confirmed this hypothesis. He immediately started antibiotic therapy, and three months later testicular ultrasound showed a lesion size reduction (fig 1k).

**Discussion**

There are not many cases of testicular syphilis assessed by means of ultrasound examination described in the literature, and in no case was the evaluation carried out using advanced ultrasound techniques. CEUS is useful in the discrimination between testicular cysts and parenchymal tumors, as it can discriminate enhancing focal testicular lesions from nonenhancing ones, potentially identifying lesions without a malignant potential [6]. This advanced US technique could be particularly useful in testicular tumors smaller than 15 mm, which may not show flow on color Doppler US, and thus may be misinterpreted as benign lesions [7]. Moreover, according to EFSUMB guidelines, CEUS results in discriminating between benign and malignant solid testicular lesions are promising [8]. As reported by Isidori et al, quantitative scrotal CEUS is a noninvasive diagnostic tool that could improve the differential diagnosis and individualized management of small testicular lesions (STLs), which

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**Fig 1.** Grey-scale showed multiple bilateral subcentimetric hypoechoic testicular lesions with soft edges (a), which showed predominantly peripheral vascularization and at color-Doppler ultrasonography (b,c) and low resistive index (d, RI = 0.40). At strain elastography the lesions were hard, showing a high strain ratio (SR = 1.96) with respect to the surrounding parenchyma (e,f). The lesions showed hypervascularization at contrast-enhanced ultrasonography, with wash-in (g) and subsequent wash-out (h), respectively at about 15 and 30 seconds. Contrast time-intensity curves of investigated lesion (green) and healthy parenchyma (yellow) show lesion peak enhancement (12.7 dB), its rapid time to peak (21.2 sec) and subsequent wash out (i,j). The multiple bilateral subcentimetric hypoechoic testicular lesions showed substantial size reduction at grey-scale ultrasonography performed three months later (k).
are frequently defined as lesions smaller than 10 mm in maximum diameter [9,10]. In particular, CEUS rapidity of wash-in and washout were the parameters that best differentiated malignant from benign tumors, with a typical prolonged washout observed in Leydig cell tumors [9]. However, both qualitative and quantitative CEUS analyses overlap between different histological types, and quantification of CEUS of testicular tumors currently remains a research tool [8]. As reported by Drudi et al [11], CEUS qualitative analysis, based on contrast enhancement pattern, during the arterial and venous phases, did not allow the discrimination of Leydig cell tumors from seminoma. On the other hand, quantitative analysis of time-intensity curves (TICs) demonstrated that three parameters presented statistical significance: wash-in rate (WiR), PE and TTP [11].

Therefore, the wash-in and wash-out features of the multiple STLs reported in this case are suspicious for malignant ones. When multiple concurrent testicular lesions are detected, the most frequent testicular diseases that must be taken into account in the differential diagnosis are certainly primary and secondary testicular lymphoma, bilateral synchronous germ cell tumor, metastasis, tuberculosis and sarcoidosis. This case report reminds us that testicular syphilis also could determine bilateral testicular lesions, and that these lesions can all be STLs. Moreover, this case report underlines the necessity to try to be as accurate as possible concerning the clinical history of patients, who are sometimes reticent, in order to obtain correct clinical information that could help to evaluate a lesion etiology. What is more, as syphilitic testicular lesions can be either single or multiple, it may be useful to include syphilis laboratory tests within the examination protocol for the assessment of all testicular lesions, STLs too. This could be useful in order to reach the correct diagnosis, institute appropriate antibiotic treatment and avoid surgery in patients with positive serology.

This case report could be particularly useful in order to remind us of the possibility of this diagnosis, particularly as in North America and Europe syphilis incidence has increased dramatically in the past decade and probably will continue to rise, especially among high-risk groups. Therefore, the possibility of coming across such lesions in the near future could increase, and it would be desirable to try as much as possible to avoid surgery for such lesions.

References