

Testicular Lymphoma: Case Series. Findings in Ultrasound Mode B, Color and Spectral Doppler

Linfoma testicular: serie de casos. Hallazgos en ecografía modo B, Doppler color y espectral

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Key words (MeSH)

Testicular neoplasm
Lymphoma
Ultrasonography, Doppler

Palabras clave (DeCS)

Neoplasias testiculares
Linfoma
Ultrasonografía Doppler

Summary

Primary testicular lymphoma is an uncommon and aggressive neoplasm, with a mean age of diagnosis between 66 and 68 years, corresponding to the most common primary testicular neoplasm in those over 60 years of age and with bilateral involvement. Secondary testicular lymphoma is much more common and includes extranodal relapse after chemotherapy and primary manifestations of unknown systemic disease. The imaging characteristics of testicular lymphoma reflect a non-destructive infiltrative pattern seen in histopathological analyzes, which is reflected in its ultrasound manifestations. We present a series of cases with a confirmed diagnosis of testicular lymphoma to describe the most frequent findings in B-mode ultrasonography, color and spectral Doppler.

Resumen

El linfoma testicular primario es una neoplasia poco común y agresiva, con una edad media de diagnóstico entre 66 y 68 años, corresponde a la neoplasia testicular primaria más común en mayores de 60 años y usualmente el compromiso es bilateral. En cambio, el linfoma testicular secundario es mucho más común e incluye las recaídas extranodales después de quimioterapia y manifestaciones primarias de enfermedad sistémica desconocida. Las características imagenológicas del linfoma testicular son secundarias a un patrón infiltrativo no destructivo visto en los análisis histopatológicos, a su vez, reflejado en sus manifestaciones ecográficas. Se presenta una serie de casos con diagnóstico confirmado de linfoma testicular, para describir los hallazgos más frecuentes encontrados por ultrasonografía en modo B, Doppler color y espectral.

1. Introduction

Ultrasonography and Doppler are the diagnostic modality of choice for tumor and non-tumor scrotal pathology, therefore, it plays an important role in the diagnosis of testicular neoplasms. The following are the sonographic findings of three patients with histopathologically confirmed testicular lymphoma and some differential diagnoses that should be considered.

2. Presentation of cases

2.1 Case 1

A 70-year-old patient with a history of type 2 diabetes mellitus under management, who consulted for a 4-month clinical picture of progressive enlargement of the left testicle associated with signs of local inflammation.

He was evaluated by urology outside the institution, who considered a diagnosis of orchiepidi-

dymitis and gave antibiotic treatment with partial improvement of symptoms.

He was admitted for persistent increase in scrotal volume, induration, pain on palpation of the epididymis and local inflammatory changes.

Ultrasonography showed an enlarged left testicle of heterogeneous echogenicity with poorly delimited hypoechoic areas (Figure 1a), associated with septate hydrocele (Figure 1b). Color Doppler examination showed decreased flow with spectral Doppler curves with high resistance morphology (Figure 1c).

In view of the suspicion of testicular hematological neoplasia, a thoracic and abdominal computed tomography (CT) scan was performed, with evidence of retroperitoneal ganglionic conglomerates. Subsequently, a biopsy was performed with histopathological diagnosis of diffuse large B-cell lymphoma.

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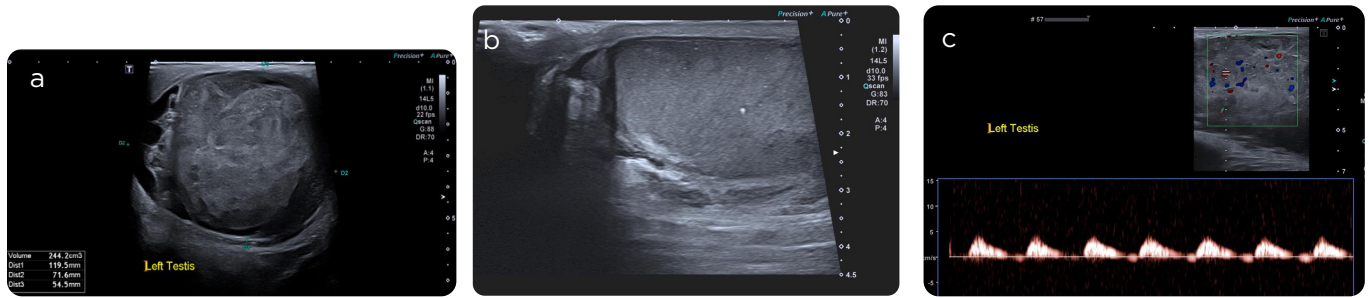


Figure 1. a) Ultrasonography image: enlarged left testicle, heterogeneous echogenicity, with poorly delimited hypoechoic areas. b) Septate hydrocele associated with the previously described testicular parenchymal changes. c) Color Doppler ultrasonography shows less flow in the infiltrated testicle and a spectral analysis with high resistance monophasic curves.

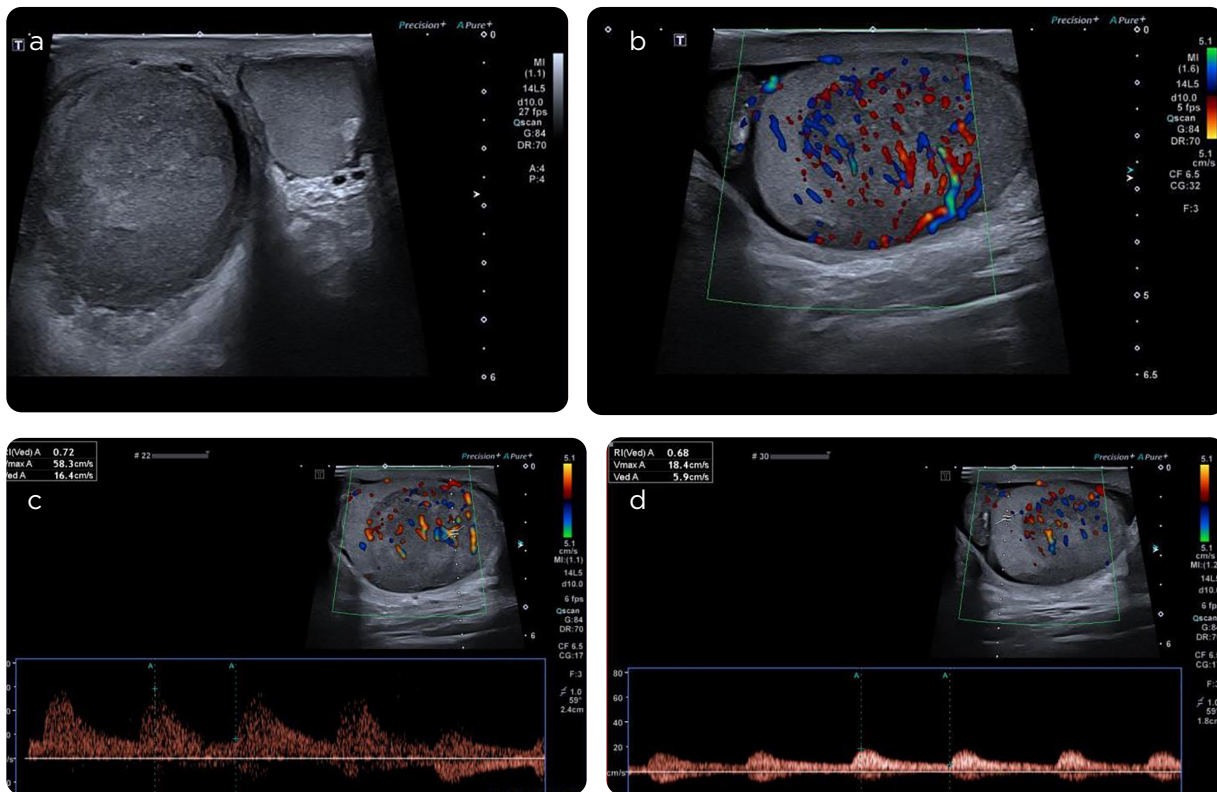


Figure 2. a) Comparative transverse image of the testicles, demonstrating enlargement of the right testicle secondary to a heterogeneous mass with poorly demarcated hypoechoic areas within. Thickening of the scrotal lining layers is observed. b) The described mass generates displacement of the normal testicular parenchyma. The normal parenchyma has adequate perfusion; the mass has increased vascularization on color Doppler examination. c) Color and spectral Doppler image demonstrating monophasic curves and high resistance indices within the mass. d) Color and spectral Doppler image in the area of displaced normal testicular parenchyma, demonstrating normal resistance indices.

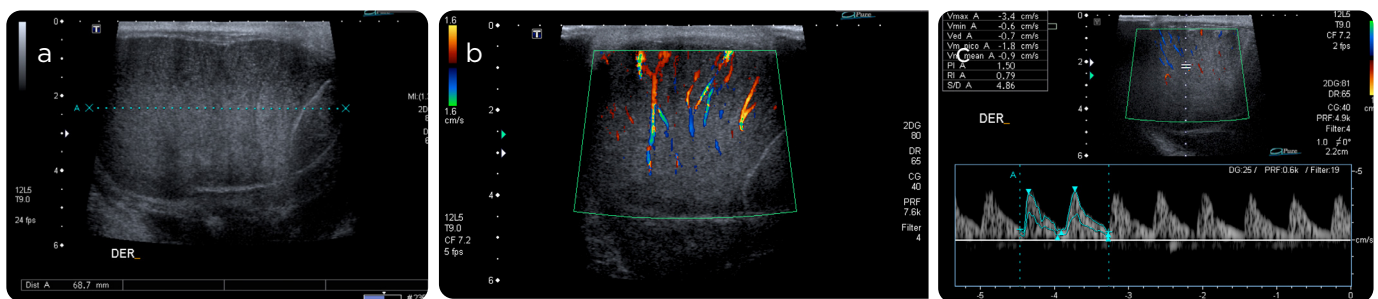


Figure 3. a) The transverse ultrasound image shows the enlarged right testicle, heterogeneous echogenicity, with hypoechoic parallel bands. b) Color Doppler examination shows a generalized increase in flow. c) The spectral Doppler examination shows monophasic curves of high resistance, with a value of 0.79 indicated in the box to the left of the image.

2.2. Case 2

A 67-year-old male patient with a history of malignant large cell hematolymphoid neoplasm with a high degree of malignancy. He consulted for a clinical picture of 10 days of evolution, with sensation of mass in the right testicle, painless and without local inflammatory signs.

Ultrasound showed thickening of the testicular lining layers and enlargement of the right testicle, due to a heterogeneous echogenic mass with poorly demarcated hypoechoic areas (Figure 2a). This mass caused displacement of the normal testicular parenchyma, which has normal perfusion; the described mass has increased flow on color Doppler scanning (Figure 2b).

Spectral Doppler analysis of the vascularization of the mass showed monophasic curve and high resistance indices (Figure 2c). In the area of normal testicular parenchyma, the morphology and resistance indices are low (Figure 2d).

2.3. Case 3

A 22-year-old male patient with no relevant history. He consulted for clinical symptoms of 2 months of evolution of painless enlargement of the right scrotal volume. Testicular ultrasound was performed with the following findings:

Right testicle increased in size, heterogeneous echogenicity, with hypoechoic parallel bands (Figure 3a). Diffuse increase in flow on color Doppler scan (Figure 3b) and spectral Doppler analysis showed monophasic curves of high resistance (Figure 3c).

Additionally, in the parenchyma of this testicle an avascular zone well delimited by an irregular echogenic septum was observed (figures 4a and 4b), attributable to focal infarction.

Diffuse thickening of the spermatic cord was also identified, which is of heterogeneous echogenicity and there is no evidence of masses. After color Doppler analysis, scarce flow was identified (Figure 5). Histopathological diagnosis of non-Hodgkin's lymphoma was confirmed.

3. Discussion

Testicular tumors are classified according to their histology into germ cell tumors (seminomatous and non-seminomatous), stromal and miscellaneous. Testicular lymphoma is included in the miscellaneous category along with leukemia, sarcomas and vascular tumors, among others (1).

Testicular lymphoma has an incidence between 1-9% of all testicular tumors and is the most frequent in men over 60 years of age. It is an aggressive neoplasm with a poor prognosis; most of them are non-Hodgkin's lymphoma (1-4). This neoplasm is characterized by infiltration of the epididymis, spermatic cord, scrotal skin and retroperitoneal lymph nodes. There may also be extreme systemic dissemination to the contralateral testis, central nervous system (CNS), lung, pleura, soft tissues and Waldeyer's ring (5-7).

Risk factors have not been clearly documented; however, a history of cryptorchidism, trauma and recurrent orchitis have been proposed in some case series (5). The only established risk

The only established risk factor is HIV infection; these patients have a higher risk of developing aggressive extranodal non-Hodgkin's lymphoma, including testicular lymphoma, which also appears at an earlier age (8).

Three types of presentation of testicular lymphoma have been documented:

- Primary extranodal: very rare, most cases are diffuse large B-cell variant (6, 7).
- Extranodal relapse after chemotherapy: usually in aggressive lymphomas, such as Burkitt. The testicle is a "sanctuary organ" thanks to the blood-gonad barrier, which inhibits the accumulation of chemotherapeutic agents. This phenomenon has been described most frequently in children with acute lymphoblastic leukemia; however, it has also been documented in patients with lymphomas (2, 9).
- Primary manifestation of unknown systemic disease.

The clinical presentation is varied, most patients consult for unilateral or bilateral testicular enlargement, which may be painless or associated with pain and sensation of mass (3, 6). B symptoms are uncommon and when present are highly suggestive of systemic disease, which is present in 20-30% of patients (8).

Histologically, it is described that testicular involvement by lymphoma, unlike other testicular neoplasms, has an infiltrative growth pattern with tumor cells that surround and compress the seminiferous tubules and normal testicular vessels, which is reflected in its echographic manifestations (4, 6).

Testicular involvement by lymphoma in ultrasonography has variable manifestations, as shown in previous cases. It includes lesions that can be unifocal or multifocal with low echogenicity, diffuse increase in testicular size with heterogeneous or decreased echogenicity, with or without septa and without apparent mass (6, 10, 11). The epididymis and spermatic cord may also be involved. Histopathological studies have shown that 63% of patients with leukemia or lymphoma have involvement of the epididymis and 40% have involvement of the spermatic cord; however, its ultrasonographic appearance has not been adequately described (4, 6).

When analyzed with color and spectral Doppler, focal lesions usually show increased vascularization and when there is diffuse testicular involvement there is generalized testicular hypervascularization, with high or borderline resistance indexes (4, 6, 10). It is suggested that this last finding may be useful in the differentiation of other etiologies.

Staging is similar to that of any other non-Hodgkin's lymphoma, in most institutions the Ann Harbor classification is used and a lumbar puncture should be included due to the high tropism to the central nervous system (7).

3.1 Differential diagnoses

There is overlapping of imaging findings of different tumor and non-tumor pathologies of the testis, for example, infarcts, hematomas, orchitis and other primary testicular tumors, which may also appear as hypoechoic or heterogeneous masses, with or without flow on Doppler analysis. Therefore, it is imperative to perform an adequate clinical correlation to make a proper diagnostic orientation in the patient who presents with testicular pain, enlargement or local inflammatory changes.

The infarct may present diffusely, as an enlarged, heterogeneous or hypoechoic testicle, or as a focal heterogeneous or hypoechoic lesion that may or may not have wedge morphology; both with absence of flow after color Doppler analysis (Figure 6) (1).

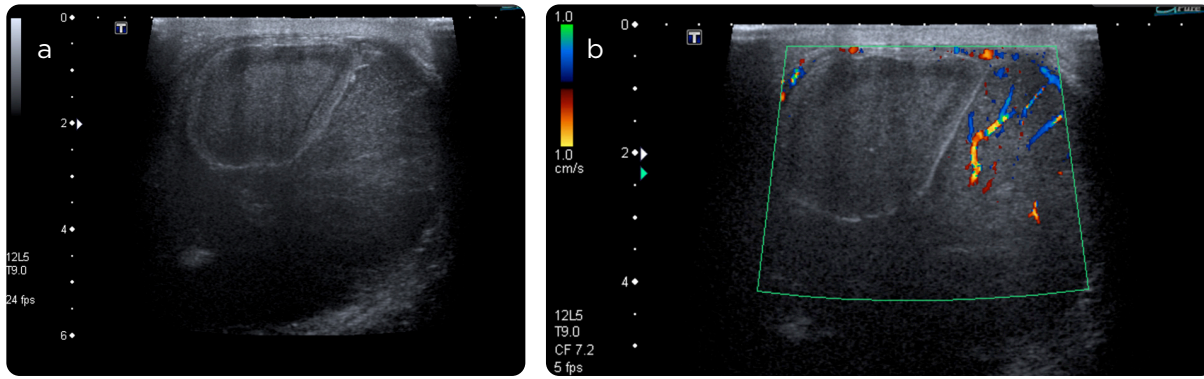


Figure 4. a) In the ultrasonography of the same patient in Figure 3, with diffuse testicular lymphoma, an isoechoic area is identified, well delimited by an irregular echogenic septum. b) Color Doppler examination confirms the avascular area, attributable to focal infarction.

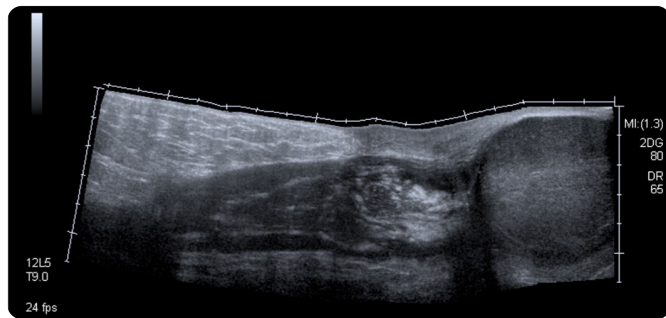


Figure 5. Panoramic image of the spermatic cord showing diffuse thickening and heterogeneous echogenicity due to neoplastic involvement.

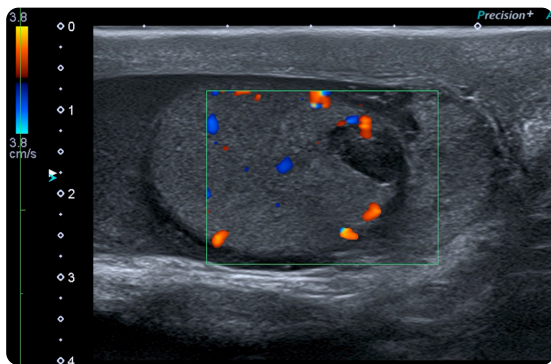


Figure 6. Post-traumatic testicular pain. Longitudinal image of the left testicle showing a hypoechoic area, well delimited and without flow on color Doppler examination compatible with infarction.

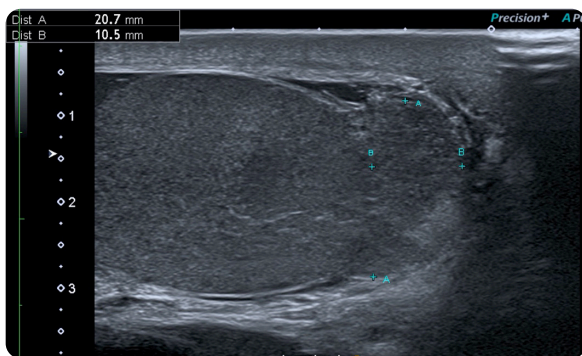


Figure 7. Acute hyperechoic hematoma in the inferior pole of the testicle after blunt trauma, associated with discontinuity of the tunica albuginea.

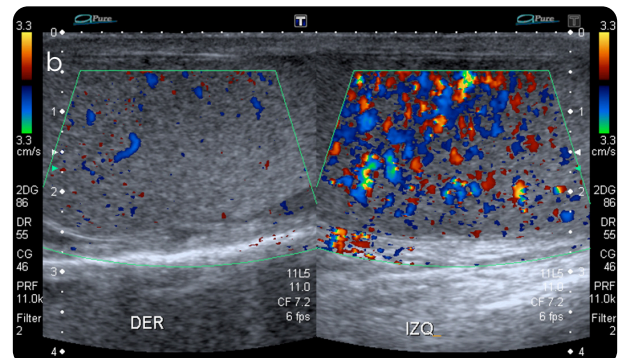
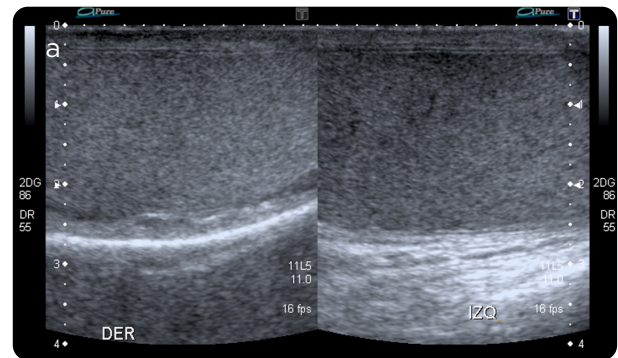


Figure 8. a) Comparative ultrasound of both testicles, showing the diffuse alteration of the echogenicity of the left testicle, without evidence. b) Color Doppler examination shows a marked increase of vascularization in the testicle with the alterations described in B-mode, in a patient with orchiepididymitis.

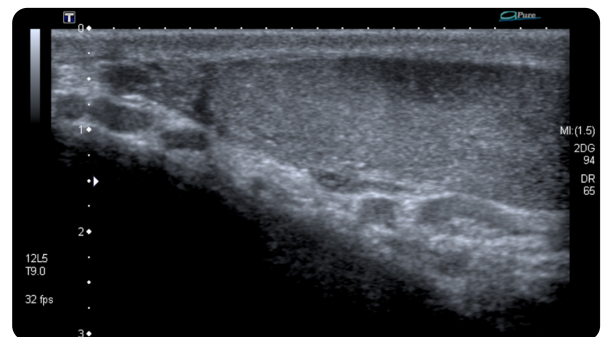


Figure 9. Ultrasound image of the right testicle of a 41-year-old patient, in which a hypoechoic, homogeneous and well-delimited mass is identified in an atrophic testicle. Histopathological study confirms germ cell tumor, seminomatous.

In case of testicular hematoma, the patient usually consults for post-traumatic testicular pain associated or not with increased scrotal volume. It may or may not be associated with rupture of the tunica albuginea; when the latter is present, the patient should undergo urgent surgery. The main usefulness of ultrasound in testicular trauma is to rule out testicular rupture, with a sensitivity and specificity of 100% and 65%, respectively (12, 13). The appearance of the hematomas will depend on the time elapsed since the trauma, in the case of hyperacute or acute hematomas they can be isoechoic or heterogeneous, with mass effect, without flow with color Doppler analysis, in an enlarged testicle. Chronic hematomas are hypoechoic. Increased peripheral flow may be found in cases of hematoma infection and may be associated with hydrocele or hematocele (Figure 7) (1, 12, 13).

Other tumors should also be considered as differential diagnosis, of which germinal tumors represent the largest group of all testicular tumors. The first place is occupied by seminomatous tumors, which represent 35-50 % of all germinal tumors (15, 16). They usually manifest as painless masses of long evolution. They can vary in size from a few centimeters to masses that replace the entire testicle.

Due to cellular uniformity, they are usually homogeneously hypoechoic masses, although larger tumors can be heterogeneous (Figure 9). They rarely present calcified areas, echogenic areas or cystic spaces; they can be lobulated or present as contiguous nodules. They present bilaterally in up to 2% of patients. After color Doppler analysis, an increase of the flow in its interior can be seen (15, 16).

4. Conclusion

In daily clinical practice, the imaging findings of testicular infiltration by lymphoma are nonspecific and may be indistinguishable from other benign or malignant entities that involve the testicle; however, the visualization of the findings described in patients with known diagnosis of lymphoma and older than 60 years with bilateral involvement, as well as a chronic and mostly painless course, may reflect infiltrative involvement by this entity.

Correlation with the patient's clinical history, therefore, is critical to differentiate tumor pathologies from non-tumor pathologies and to avoid unnecessary surgeries.

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Received for evaluation: May 18, 2020

Accepted for publication: August 27, 2020