

Pitfalls in Imaging for Acute Scrotal Pathology



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Introduction

Differentiation among the many clinical situations that can present with acute scrotal pain is a significant diagnostic problem in clinical practice. A firm diagnosis is often difficult based on clinical history and physical examinations alone, and imaging is usually requested for this purpose. However, imaging findings alone may not clarify the diagnosis as imaging studies have to be interpreted in close correlation with clinical information and with knowledge of the possible pathologic situations underlying the clinical presentation of the specific patient.

In this article we describe and discuss the most common problems encountered when performing diagnostic studies for acute scrotal symptoms and the solutions for, possibly, avoiding them.

Testicular Torsion

In patients with testicular torsion ultrasonographic (US) findings vary with time and with the number of twists of the spermatic cord, and both these factors have to be taken into account when performing the study.

Time from beginning of symptoms is important information that has to be obtained from the patient before starting the study.

Early after onset of symptoms, the torsed testis may appear to be of normal volume and echogenicity at US imaging. It takes about 4-6 hours to see it become swollen and hypo-echoic, whereas a heterogeneous structural pattern can be observed at about 12 hours (Fig. 1).

Time is also a critical factor for the demonstration of hyperemia within paratesticular tissues and the scrotal wall at color Doppler. This finding, in fact, is related to the dilatation of superficial vessels in an attempt to open collaterals to the testis and it takes time, usually a few hours, to become visible.¹⁻³

The degree of torsion is the other important factor that affects imaging findings.

In patients with acute painful scrotum, if absence of identifiable intratesticular flow is used as the only diagnostic criterion of torsion at color Doppler ultrasound, an 86%-94% sensitivity, nearly 100% specificity, and 97% accuracy is obtained.^{4,5} Thus, 6%-14% of patients with torsion have a false negative Doppler evaluation. Most of these patients have a low-degree torsion of the spermatic cord. There is only closure of the veins and lymphatics within the spermatic cord whereas the arteries still remain patent so that arterial flow signals are still visible within the affected testis.⁶⁻⁸

Arterial testicular flow signals can be present principally near the hilum, but occasionally also in a more peripheral distribution, with variable waveform characteristics depending on the severity of torsion. The clue is detection of asymmetry or number of color Doppler flow signals visible in the affected and contralateral testes. On the symptomatic side, detection of monophasic waveforms, increased resistance index with decreased diastolic flow velocities, or diastolic flow reversal, are all signs of ischemia caused by swelling and edema, which is occluding the venous flow (Fig. 2).

Many cases of low-degree torsion are recognized only after careful examination of the morphologic characteristics of the spermatic cord. Direct visualization of the twisted portion of the spermatic cord as a funicular mass, or noting an abrupt change in the course, size, and shape of the spermatic cord are helpful in making the diagnosis. Twisting occurs just outside the external inguinal ring, at a varying distance above the testis, or posterior to the testis. Demonstration of the funicular vessels wrapping around the central axis of the twisted spermatic cord, described as the "whirlpool sign," is a highly suggestive sign of low-degree torsion. Moving the probe in cranio-caudal direction along the axis of the spermatic cord facilitates the identification of this sign.⁹

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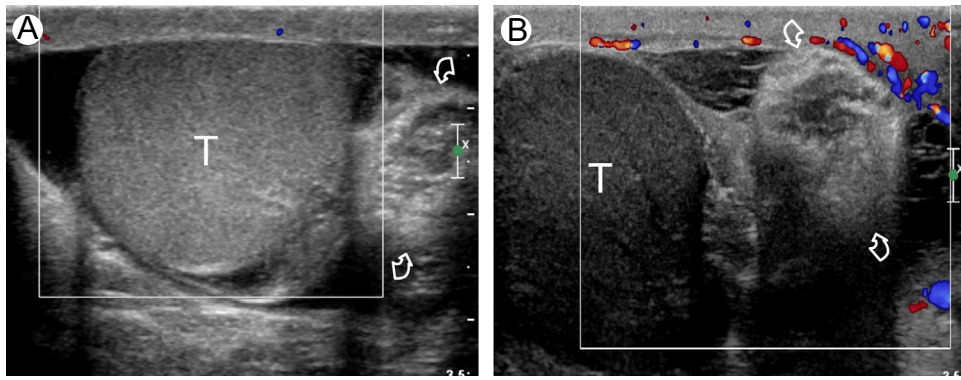


Figure 1 High-degree testicular torsion in two men presenting with right acute scrotal pain for 4 hours (A) and 48 hours (B), respectively. Intratesticular flow signals are absent in both patients. Twisting of the spermatic cord (curved arrows) is appreciable medially to the testis (T). The testis displays normal echogenicity in early torsion, and only few vessels are visible within the scrotal wall (A). At surgery, testis was viable (not shown). In the long-standing torsion the testis (T) is enlarged, markedly hypoechoic, and hyperemia of the paratesticular tissues is recognized (B). At surgery, testis was necrotic. (Color version of figure is available online.)

Postinflammatory Testicular Ischemia

Epididymo-orchitis is the most common cause of acute scrotal pain in adults and represents at least 75% of all inflammatory scrotal disease processes. Complications include abscess, testicular ischemia, and pyocele formation. In postinflammatory testicular ischemia, engorgement of the epididymis and testis produces venous outflow obstruction and, eventually, impairment of the arterial blood supply and tissue ischemia. In absence of aggressive medical treatment with antibiotics and anti-inflammatory drugs the disease may progress to segmental or global testicular infarction.⁸

In uncomplicated epididymo-orchitis, the testis and epididymis are hypervascular. In contrast, in patients with post-inflammatory ischemia, vascularity of the affected testis is reduced compared to the contralateral one.¹⁰ Furthermore, intratesticular arteries may show high-resistance signals, and even diastolic flow reversal.¹¹ These findings have to raise concern for low-degree testicular torsion; clue to the diagnosis is the clinical history of inflammation, as well as the failure to

visualize the twisting of the spermatic cord. Contrast-enhanced ultrasonography (CEUS) provides an excellent evaluation of testicular perfusion in these patients in differentiating necrotic from viable, hypoperfused testes,¹²⁻¹⁵ and showing segmental infarcted areas (Fig. 3). During follow-up it is possible to monitor the efficacy of medical therapy by showing restoration of normal parenchymal vascularization or progression to global infarction or even abscess formation.

Posttraumatic Testicular Torsion

Testicular torsion is a rare consequence of scrotal trauma that requires immediate surgical intervention.¹⁶ Clinical manifestations and US appearance are similar to those of nontrauma-related torsion, but the diagnosis is often missed because the pain is incorrectly ascribed to the trauma. Furthermore, the structural and vascular changes within the testis at color Doppler interrogation are misinterpreted as a consequence of edema and hemorrhage of posttraumatic origin.

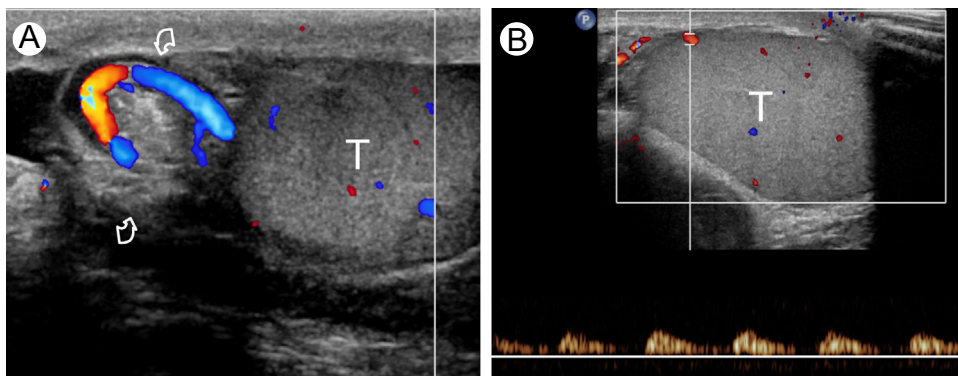


Figure 2 Low-degree testicular torsion. (A) Color Doppler interrogation of the spermatic cord shows vessels with whirlpool course at the level of the twisting of the spermatic cord (curved arrows) consistent with low-degree torsion. (B) Spectral Doppler analysis shows high resistance flows. T: testis. (Color version of figure is available online.)

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