Testicular ultrasound in acute scrotal pain - beyond testicular torsion

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Learning objectives

• To acknowledge ultrasound findings suggestive of testicular torsion.
• To identify alternative causes of acute scrotal pain in emergency department, other than testicular torsion.
• To recognize findings on ultrasound indicating these alternative causes, such as infection, abscess, tumor, hydrocele, varicocele.
• To characterize incidental findings on testicular ultrasound, such as cysts and calcifications.
Background

Ultrasound is the most used imaging technique when evaluating acute scrotal pain in the emergency department. The most common causes of acute scrotal pain are torsion of the spermatic cord and acute epididymitis / epididymo-orchitis [1]. Although main concern is frequently about testicular torsion, which demands early identification and adequate management, other alternative causes must be considered. Differential diagnosis of scrotal pain include epididymitis or epididymo-orchitis, abscess, hydrocele, varicocele, neoplasm, among others. Incidental findings, such as cysts or calcifications, are not infrequent and should be accordingly characterized.
Findings and procedure details

Ultrasound plays an important role in the evaluation of acute scrotal pain, mostly to detect or exclude signs of testicular torsion.

In fact, testicular torsion is an important cause of acute scrotal pain, mainly in prepubertal males. [1] Sonographic findings (fig. 1) include an enlarged testicle, which is hypoechoic compared with the contralateral side, heterogeneous (later finding), with absent or significantly decreased blood flow, often with reactive hydrocele and scrotal skin thickening. [1-3] Color Doppler ultrasound is essential to confirm or exclude testicular torsion. [2]. In early torsion, the testicle may appear normal at ultrasound [2].

However, most testicular ultrasounds performed in our center as investigation of acute scrotal pain do not show signs suggesting testicular torsion.

• If not testicular torsion… what then? What are the alternative causes?

The purpose of this exhibit is to characterize some of the most common ultrasound findings when evaluating patients presenting with acute scrotal pain. Besides testicular torsion, we will access other important scrotal conditions (epididymo-orchitis, abscess, hydrocele and varicocele).

Epididymitis and/or orchitis

The most common cause of acute scrotal pain in postpubertal men is epididymitis. [1] Ultrasound shows thickening and enlargement of the epididymis, with low echogenicity (occasionally high echogenicity due to hemorrhage), heterogeneous echotexture and increased blood flow (figs. 2-3). Reactive hydrocele and skin thickening may also be present and support the diagnosis.[1, 4]

Epididymo-orchitis implies extension of inflammation to the testicle, which will also appear hypoechoic, enlarged and with increased blood flow (figs. 4-5). Isolated orchitis may also occur. [1]

Hypervascularity is a well-established criterion for the diagnosis of epididymo-orchitis and may be the only finding. [4]

Abscess
Testicular abscesses are usually a complication of epididymo-orchitis [1]. On ultrasound, findings of epididymitis or epididymo-orchitis with a central region of liquefaction and lack of blood flow suggest abscess formation (fig. 6). [2] Abscesses appear as a fluid-filled mass with hypoechoic or mixed echogenic areas and may rupture, causing a pyocele or fistula.

**Hydrocele, hematocoele and pyocele**

Accumulation of fluid between the layers of the tunica vaginalis may also be a cause of scrotal pain. [5] Hydrocele (accumulation of serous fluid) is seen as an anechoic collection with occasional low-level echoes (figs. 7-8). It may be congenital or acquired, in the presence of epididymo-orchitis, testicular torsion or neoplasm.

Hematocoeles and pyoceles present on ultrasound with internal septations and loculations (figs. 9-11).

Hematocoeles (accumulation of blood) can result from trauma, surgery, tumors or torsion. The sonographic appearance of hematocoeles depends on its age: acute hematomas present with high echogenicity; later, it undergoes liquefaction and may appear cystic. [3, 4]

Pyoceles (accumulation of pus) is usually caused by a ruptured abscess.

**Varicocele**

A varicocele is a collection of abnormally dilated and tortuous veins of the pampiniform plexus. On ultrasound, a varicocele appears as anechoic serpiginous structures, measuring more than 2 mm in diameter, located at the upper pole of the testicle and head of the epididymis (figs. 12-13).

**Incidental findings**

Incidental findings, such as cystic lesions or calcifications, are not infrequent when performing testicular ultrasound and although they are not usually responsible for acute scrotal pain, they require clinical correlation and, eventually, further follow-up.

Well-defined, anechoic lesions with thin and smooth walls are considered simple cysts (fig. 14) and can be managed conservatively. [1, 4, 6-7] Benign cystic lesions include intratesticular simple cysts, tubular ectasia, epidermoid cyst, tunica albuginea cysts, intratesticular varicocele, abscess and hemorrhage. [1, 6] On the other hand, testicular...
tumors may undergo cystic degeneration from hemorrhage or necrosis,\cite{1,8} so the distinction between benign or malignant characteristics becomes of crucial importance.

Testicular microlithiasis (figs. 15-16) remains a controversial subject regarding its significance and association with malignancy \cite{1,4,9-13}.
Fig. 1: Left testicle slightly hypoechoic and with no detectable blood flow, suggesting testicular torsion.

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Fig. 2: Epididymitis: enlarged and heterogenous epididymis.

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Fig. 3: Epididymitis: hypervascul arity

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Fig. 4: Epididymo-orchitis: testicle with marked heterogeneity.

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**Fig. 5:** Epididymo-orchitis: hypervascularity.

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Fig. 6: Testicular abscess.

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Fig. 7: Hydrocele

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Fig. 8: Hydrocele

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**Fig. 9:** Hematocele: multiple internal echoes and septations.

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**Fig. 10:** Hematocele: multiple internal echoes and septations.

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**Fig. 11:** Hematocele: multiple internal echoes and septations.

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**Fig. 12:** Varicocele: anechoic serpiginous structures with caliber above 2 mm

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Fig. 13: Varicocele: anechoic serpiginous structures with caliber above 2 mm

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Fig. 14: Simple cyst incidentally discovered in a patient with acute scrotal pain.

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Fig. 15: Testicular calcifications incidentally discovered in patients with acute scrotal pain.

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Fig. 16: Testicular calcifications incidentally discovered in patients with acute scrotal pain.

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Conclusion

Ultrasound provides accurate information and plays an important role in differential diagnosis of acute scrotal pain.

Besides testicular torsion, other conditions can be associated with acute scrotal pain, such as infection/inflammation, hydrocele, and varicocele, among others.

Incidental findings are not uncommon in testicular ultrasound and demand adequate manage and correlation.
References


