The Sequel of Severe Epididymo-Orchitis: Testicular Infarction and Abscess Formation Requiring Orchiectomy

Roaa Al-Hamar, MD*, Mohamed Al-Ameer, MD, Sayed Hasan Ebrahim, MD, Omran Hasan, MD, Aalaa Sayed Shubber Majed, MD

Radiology Department, Salmaniya Medical Complex, Government Hospital, Manama, Bahrain.

***Correspondence:** Roaa Al-Hamar, MD, Radiology Department, Salmaniya Medical Complex, Government Hospital, Manama, Bahrain

RHamar@health.gov.bh

Radiology Case. 2026 July; 20(7):1-9 :: DOI: 10.3941/jrcr.6064

AUTHORS' CONTRIBUTIONS

RA: Conceptualization, writing—original draft preparation.
MA: Overall supervision.
SE: surgical management of Case 1
OH: surgical management of Case 2
AM: Histopathology findings.

DISCLOSURES

The authors declare no conflict of interest, financial or otherwise, relevant to the content of this article.
CONSENT
Yes.

HUMAN AND ANIMAL RIGHTS

The ethical standards followed were in accordance with the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2008.

ABSTRACT

Epididymo-orchitis is a common intra-scrotal inflammation that affects males, with the inflammation of the epididymis often progressing to involve the testis. Moreover, acute epididymitis can be complicated by testicular abscesses or testicular infarction, which results from spermatic cord swelling and impaired blood flow-conditions that should be promptly recognized and adequately treated. The first-line imaging modality in such cases is ultrasonography with color Doppler flow. A review of the literature revealed two cases with extensive complications following epididymo-orchitis that ultimately required surgical intervention.

CASE REPORT

BACKGROUND

Epididymo-orchitis is commonly managed conservatively, but in rare instances it can progress to severe complications such as testicular infarction or abscess. These outcomes may develop quickly and are often difficult to detect without close monitoring and repeat imaging.

Color Doppler ultrasonography is essential for identifying early vascular compromise, allowing timely intervention before irreversible damage occurs. Because only a small number of similar cases have been documented, the two cases presented here contribute to the literature by demonstrating the rapid progression from typical epididymo-orchitis to infarction and abscess requiring orchiectomy. They emphasize the need for enhanced caution and careful follow-up imaging when symptoms worsen despite appropriate therapy.

CASE REPORT

Case 1

A 49-year-old male patient with a known history of Diabetes Mellitus (DM) and Hypertension (HTN) presented to the emergency department with left-sided scrotal swelling, pain, and redness for seven days. Physical examination confirmed left scrotal swelling, tenderness, and hotness. Initial blood work showed leukocytosis (26.6×10^9 L), but urine analysis and culture were not initially performed.

Imaging Findings (Case 1)

Initial Scrotal Ultrasound (US) showed increased vascularity in the left testis and epididymis with mild reactive left-sided hydrocele and scrotal wall thickening, suggestive of acute left-sided epididymo-orchitis (Figure 1). Two days later, due to

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worsening testicular pain and swelling, an urgent repeat scrotal US was performed, which revealed a hypoechoic left testis with a complete absence of blood flow on color Doppler, indicating testicular infarction (Figure 2).

Management and Follow-up (Case 1)

The patient was admitted and received analgesia, meropenem, and doxycycline. Urine analysis and culture subsequently returned negative. Given the clinical deterioration and imaging findings consistent with infarction, operative scrotal exploration was performed. The exploration revealed a pale left testis with abnormal consistency and absence of blood flow upon incising the tunica albuginea (Figure 3). An orchiectomy was performed. Histopathology confirmed focal necrosis, dense inflammatory cell infiltrates, and abscess formation (Figure 4).

Case 2

An 80-year-old male patient, known for HTN and stroke, presented with a three-week history of severe left-sided testicular pain, superimposed on five months of mild, chronic testicular pain. Physical examination revealed a swollen left testis with no tenderness and minimal local signs of inflammation. Blood work showed leukocytosis (10×10^9 L). Urine analysis showed trace leukocyte esterase and +25 White Blood Cells (WBC), and subsequent urine cultures showed growth of Escherichia coli.

Imaging Findings (Case 2)

Scrotal US showed global left-sided testicular infarction (hypoechoic) with an associated left-sided septated fluid collection (abscess), along with increased peri-testicular soft tissue vascularity (Figure 5). These findings were interpreted as severe epididymo-orchitis complicated by abscess formation and resulting infarction.

Management and Follow-up (Case 2)

Operative scrotal exploration was carried out, which showed a significant amount of pus with liquefied necrotic seminiferous tubules (Figure 6). An orchiectomy was ultimately performed. Histopathology revealed testicular parenchyma with acute inflammatory cell infiltrates, predominantly neutrophils, and multiple areas of abscess formation (Figure 7), along with dilated and congested vascular spaces (Figure 8).

DISCUSSION

Etiology & demographics

An “acute scrotum” is a common presentation in the Emergency Room, with differential diagnoses including epididymo-orchitis, orchitis, testicular torsion, appendix of testis torsion, and incarcerated inguinal hernia [1]. It presents a diagnostic challenge to the Emergency Room Physician, Radiologist, and Urologist. Epididymo-orchitis is the most common cause of scrotal pain in adults, while testicular torsion is more common in younger age groups [3]. The infection usually arises from the genitourinary tract (bladder, urethra, prostate). Common pathogens include *Neisseria gonorrhoeae*, *Chlamydia trachomatis*, *Escherichia coli*, or *Proteus mirabilis* [4]. The inflammation typically starts in the epididymis and extends to the testis. Most patients commonly present with fever, dysuria, urethral discharge, and pain with scrotal enlargement [4].

Clinical & imaging findings

Infectious pathology is often managed conservatively [2], but severe cases can progress to complications like testicular infarction or abscess, which is reportedly rare [1]. Diagnostic procedures include physical examination, laboratory tests, scrotal US, and microscopic examination of urethral discharges. Doppler US is the modality of choice to differentiate inflammatory conditions from testicular torsion and can help avoid unnecessary surgical exploration. In acute epididymitis, sonography shows thickening and enlargement of the epididymis. The inflamed epididymis and testis show increased blood flow and coarse heterogeneous echotexture [5]. Associated findings include reactive hydrocele and skin thickening [5]. A testicular abscess is demonstrated as a complex echoic mass [4], while testicular infarction is demonstrated by the absence of blood flow on the affected side [5]. These two cases highlight the critical need for imaging follow-up: Case 1 initially showed increased flow (inflammation) but progressed rapidly to absent flow (infarction), and Case 2 demonstrated infarction complicated by a large abscess.

Treatment & prognosis

Most infectious cases respond well to antibiotic therapy. However, as demonstrated by these two cases, conservative management does not preclude the need for follow-up and reassessment if symptoms worsen. Both patients, despite appropriate initial management (antibiotics and analgesia in Case 1, identification and targeted therapy in Case 2), required orchiectomy due to the irreversible complications of infarction and abscess formation. Early recognition of warning signs of ischemia (worsening pain, change in US flow) is paramount, as early reperfusion interventions may, in some cases, salvage the testicle.

Differential Diagnoses

The differentiation of the acute scrotum is primarily achieved through color Doppler ultrasonography, as the clinical presentation can overlap significantly. Conditions to consider include testicular torsion, which is a surgical emergency characterized by absent testicular perfusion on US. Other entities include hematocele and testicular tumors, which, although less common, must be ruled out. The table below outlines key distinguishing features across various imaging modalities. In summary, testicular torsion presents with absent vascular flow on US, while epididymo-orchitis typically presents with increased flow (hyperemia). Testicular infarction, as demonstrated in our cases, is an unusual and urgent complication presenting with absent flow in a setting of prior or concomitant inflammation.

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Testicular tumors are generally heterogeneous but hypervascular on color Doppler US, distinguishing them from the avascular nature of infarction.

TEACHING POINT

Clinical presentation of persistent or worsening scrotal pain and oedema in treated cases of epididymo-orchitis should raise strong suspicion of testicular ischemia or abscess formation. Color Doppler ultrasonography is essential for immediate diagnosis, demonstrating absent flow in infarction, which mandates immediate surgical intervention.

CONCLUSION

Clinical presentation of persistent scrotal pain and oedema in cases of epididymo-orchitis should raise strong suspicion of testicular ischemia or infarction. Performing an ultrasound with color Doppler flow is a valid method for the immediate diagnosis in the emergency room of these pathologies, as early identification and intervention are paramount towards the salvage of the testicle.

QUESTIONS

Question 1: What is the most accurate sonographic feature for distinguishing testicular torsion from acute epididymo-orchitis?

A. Presence of a reactive hydrocele.

B. Size and echotexture of the epididymis.

C. Scrotal wall thickening.

D. Vascularity demonstrated by Color Doppler US.

E. Homogeneous echotexture of the testicle.

Answer 1: D. Vascularity demonstrated by Color Doppler US.

Explanation: Color Doppler US is the primary imaging modality for acute scrotum. Testicular torsion is characterized by absent blood flow, while epididymo-orchitis is characterized by increased blood flow (hyperemia) in the affected structure [5].

Question 2: Testicular infarction, as a complication of severe epididymo-orchitis, is primarily caused by which mechanism?

A. Direct bacterial necrosis of the germinal epithelium.

B. Retrograde spread of infection via the vas deferens.

C. Severe inflammatory swelling leading to capsular hypertension and impaired blood flow.

D. Autoimmune destruction triggered by a bacterial antigen.

E. Concurrent rupture of the tunica albuginea.

Answer 2: C. Severe inflammatory swelling leading to capsular hypertension and impaired blood flow. **Explanation:** Severe epididymo-orchitis causes significant inflammatory swelling of the epididymis and testis, leading to increased pressure within the tunica albuginea. This condition, known as capsular hypertension, compromises arterial blood flow and venous drainage, resulting in ischemia and infarction [3].

Question 3: Which imaging finding is most indicative of a testicular abscess secondary to epididymo-orchitis?

A. Normal testicular size with a small hyperechoic focus.

B. Increased testicular size with diffuse hypervascularity and heterogeneous echotexture.

C. A complex, septated anechoic or hypoechoic mass with a hyperemic rim within the testicle.

D. Complete absence of flow in the testicle without prior history of inflammation.

E. A simple, anechoic fluid collection surrounding the testicle (hydrocele).

Answer 3: C. A complex, septated anechoic or hypoechoic mass with a hyperemic rim within the testicle. **Explanation:** A testicular abscess is formed by liquefaction necrosis and is seen on US as a complex fluid collection (anechoic or hypoechoic) often with internal septations. The adjacent viable testicular tissue and capsule show increased vascularity (the hyperemic rim) [4].

Question 4 In Case 1, the patient initially showed hypervascularity consistent with acute epididymo-orchitis but rapidly progressed to absent flow. What is the appropriate immediate clinical management upon confirmation of absent flow via repeat Doppler US?

A. Continuation of intravenous antibiotics and analgesics.

B. Discharge with oral antibiotics and follow-up in 48 hours.

C. Immediate operative scrotal exploration.

D. Administration of corticosteroids to reduce inflammatory swelling.

E. Observation in the Emergency Department for 6 hours.

Answer 4 C. Immediate operative scrotal exploration.

Explanation: Absent testicular flow on Doppler US, regardless of the cause (torsion or infarction), indicates acute ischemia requiring urgent surgical intervention. In cases of testicular infarction (as a complication of epididymo-orchitis), surgical exploration is necessary to assess viability and proceed with orchiectomy if necrosis is confirmed [2].

Question 5 What is a key difference in the pathogenesis of testicular infarction complicating epididymo-orchitis compared to typical testicular torsion?

A. Infarction from epididymo-orchitis affects younger patients, while torsion affects older patients.

B. Infarction from epididymo-orchitis is caused by inflammation-induced vessel compression, whereas torsion is caused by twisting of the spermatic cord.

C. Infarction always involves the epididymis first, while torsion affects the testis only.

D. Infarction from epididymo-orchitis is managed medically, while torsion is managed surgically.

E. Infarction is typically bilateral, while torsion is unilateral.

Answer 5 B. Infarction from epididymo-orchitis is caused by inflammation-induced vessel compression, whereas torsion is caused by twisting of the spermatic cord.

Explanation: Testicular torsion involves the twisting of the spermatic cord, which immediately occludes the blood supply.

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Infarction secondary to epididymo-orchitis (a less common complication) is a result of diffuse inflammatory swelling that elevates intratesticular pressure, leading to vessel compression, ischemia, and eventual necrosis (infarction) [3].

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FIGURES

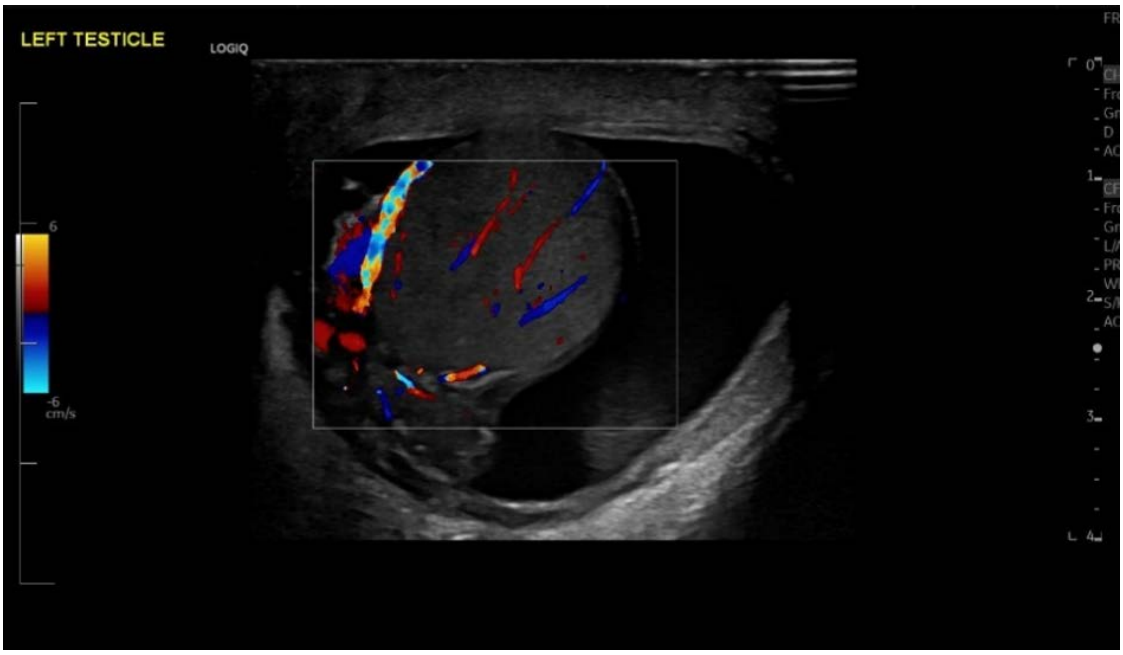

Figure 1: 49-year-old male, Acute left-sided epididymo-orchitis.

Findings: Color Doppler US demonstrates increased vascularity in the left testis and epididymis with mild reactive left-sided hydrocele and scrotal wall thickening.

Technique: Scrotal Color Doppler US.

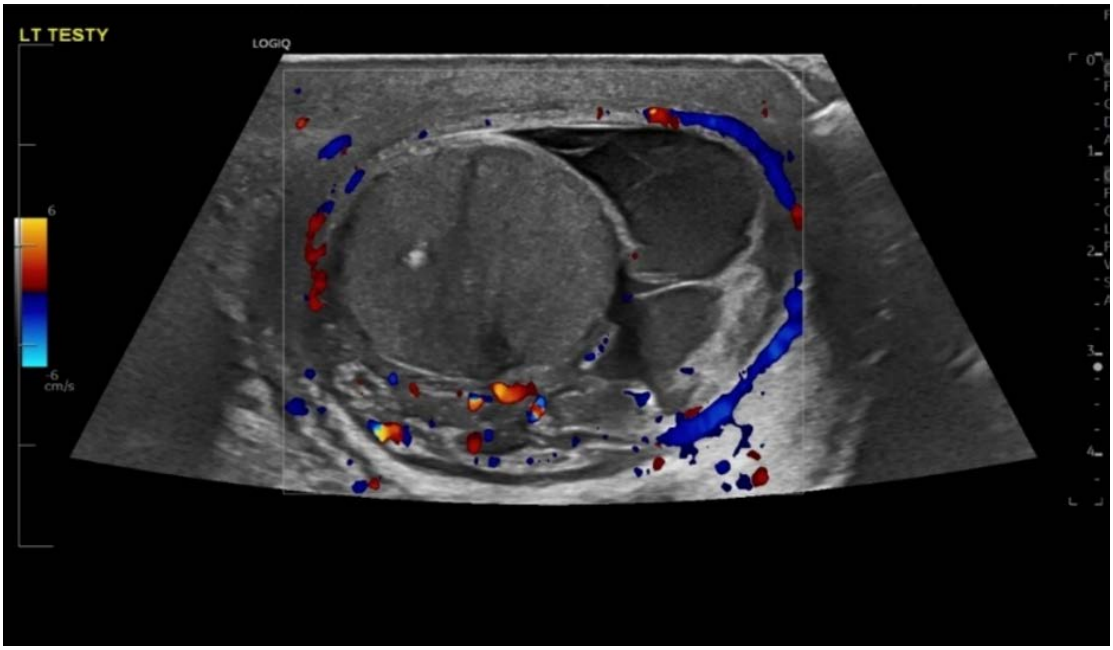

Figure 2: 49-year-old male, Testicular infarction secondary to epididymo-orchitis.

Findings: Color Doppler US shows complete absence of flow in the left testis (arrow) with increased vascularity of the peri-testicular soft tissue (hyperemia).

Technique: Scrotal Color Doppler US.

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Figure 3: 49-year-old male, Operative view post-infarction.

Findings: Intraoperative photograph showing a pale left testis with abnormal consistency, confirming infarction. **Technique:** Operative photograph during scrotal exploration

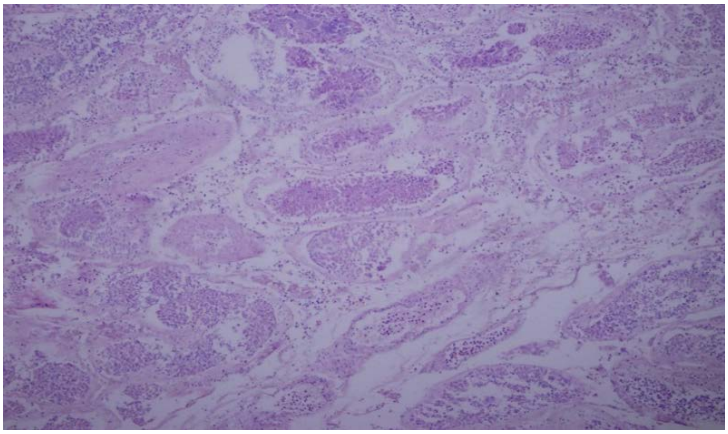

Figure 4: 49-year-old male, Histopathology post-orchiectomy.

Findings: Microscopic image showing necrotic seminiferous tubules with sloughing of the cells within the lumen (Hematoxylin-eosin, original magnification 10X).

Technique: Histopathology.

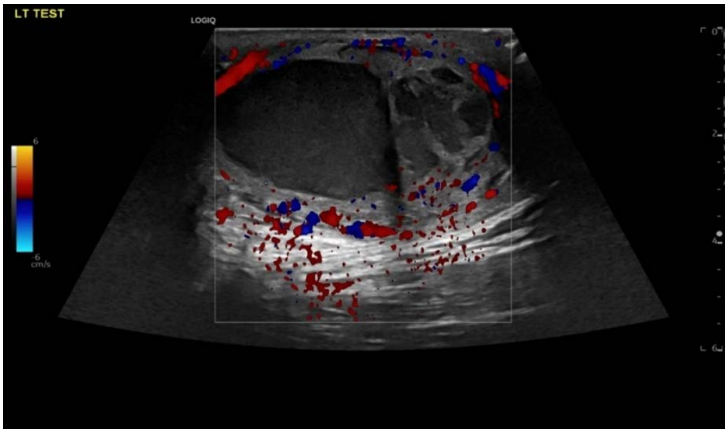

Figure 5: 80-year-old male, Testicular infarction and abscess secondary to severe epididymo-orchitis.

Findings: Doppler US shows a hypoechoic, infracted left testis with a left-sided septated fluid collection (abscess) and increased peri-testicular soft tissue vascularity.

Technique: Scrotal Color Doppler US.

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Figure 6: 80-year-old male, Operative view of testicular abscess.

Findings: Intraoperative photograph showing the left testis draining a significant amount of pus after incising the tunica albuginea (greenish-yellow material).

Technique: Operative photograph during scrotal exploration.

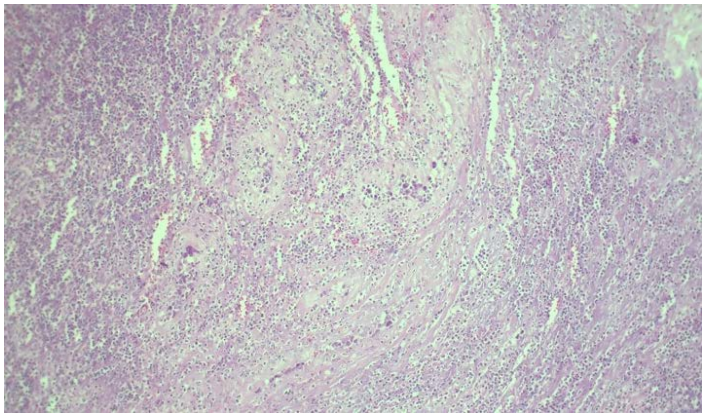

Figure 7: 80-year-old male, Histopathology post-orchiectomy.

Findings: Microscopic image showing mixed inflammatory cell infiltrates and abscess formation (Hematoxylin-eosin, original magnification 10X).

Technique: Histopathology.

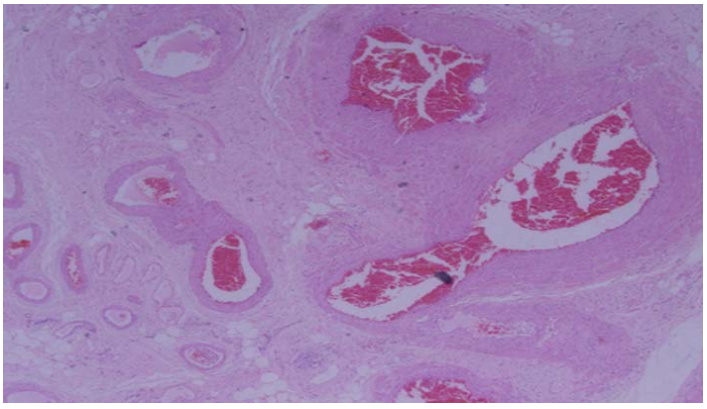

Figure 8: 80-year-old male, Histopathology post-orchiectomy, focusing on vascular changes.

Findings: Microscopic image showing dilated and congested vascular spaces (Hematoxylin-eosin, original magnification 4X).

Technique: Histopathology.

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Summary Table

Table 1: Summary of Clinical and Radiologic Findings in Two Cases of Epididymo-Orchitis Complicated by Testicular Infarction and Abscess

Patient/Feature	Age/Gender	Pre-existing Conditions	Initial Presentation	Initial US Finding	Follow-up US Finding	Final Treatment	Histopathology
Case 1	49 / Male	DM, HTN	7 days scrotal pain, swelling, redness	Increased vascularity (Epididymo-orchitis)	Absent blood flow (Infarction)	Orchiectomy	Necrosis, abscess, inflammation
Case 2	80 / Male	HTN, Stroke	3 weeks severe pain (on background of chronic pain)	Infarction, septated fluid collection (Abscess)	N/A (Immediate exploration)	Orchiectomy	Abscess, acute inflammation, congested vessels

Differential Table

Table 2: Differential Imaging Features of Acute Scrotal Pathologies

Diagnosis	X-Ray	Ultrasound (US)	CT	MRI
Testicular Torsion	Often normal.	Enlarged testis, absent blood flow on Color Doppler.	Normal or enlarged testis with no enhancement.	Low signal T1, high signal T2, restricted diffusion, no enhancement.
Epididymo-Orchitis	Often normal.	Enlarged epididymis/ testis, increased blood flow (hyperemia) on Color Doppler.	Enlarged testis, enhancement after contrast.	High signal T2, enhancement.
Testicular Infarction (Complication)	Often normal.	Enlarged, heterogeneous testis, absent blood flow on Color Doppler.	Non-enhancing area within the testis.	Focal area of non-enhancement (key finding).
Testicular Abscess (Complication)	May show scrotal gas (rare).	Complex, anechoic/ hypoechoic septated mass with thickened, hyperemic rim.	Low-attenuation fluid collection with rim enhancement.	Low signal T1, high signal T2, rim enhancement.
Testicular Tumor	Often normal.	Solid, heterogeneous mass, typically hypervascular on Color Doppler.	Focal mass with variable enhancement.	Variable signal depending on histology; focal mass.
Hematocele	Often normal.	Fluid collection between tunica layers, may be septated/complex if chronic.	High-attenuation fluid collection (acute blood).	Variable signal depending on age of blood products.

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KEYWORDS

Testicular infarction; Epididymo-orchitis; Scrotal abscess; Color Doppler Ultrasonography; Orchiectomy

ABBREVIATIONS

DM = Diabetes Mellitus
HTN = Hypertension
US = Ultra Sound
WBC = White Blood Cell

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