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Subacute Testicular Torsion Initially Diagnosed As Epididymitis: MRI and Contrast-Enhanced Ultrasound Findings of Complete Testicular Infarction

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Abstract

Testicular torsion is a time-critical urological emergency; however, atypical and subacute presentations may mimic epididymitis and delay diagnosis. We present the case of a 19-year-old man who initially presented with gradual-onset left testicular pain and was diagnosed with epididymitis based on clinical and ultrasound findings. Despite antibiotic therapy, he re-presented five days later with worsening pain and elevated inflammatory markers. At a surgical ambulatory clinic review approximately two weeks after initial presentation, his symptoms had partially resolved, and his antibiotic course was extended. However, follow-up ultrasound at three months demonstrated a heterogeneous, solid-appearing epididymal mass and diffusely abnormal testicular echotexture, raising concern for vascular compromise. Subsequent MRI demonstrated features of hemorrhagic infarction and a whirlpool sign, while contrast-enhanced ultrasound demonstrated complete absence of intratesticular perfusion, consistent with complete testicular infarction. At this point, the patient was asymptomatic and was managed conservatively. This case highlights the diagnostic challenges of subacute torsion, the limitations of initial ultrasound, the role of advanced imaging in equivocal cases, and the importance of multidisciplinary management and long-term counseling in conservatively managed patients.

Categories: Urology, Radiology, General Surgery

Keywords: contrast-enhanced ultrasound, doppler ultrasound, epididymitis, hemorrhagic infarction, mri, scrotal ultrasound, testicular infarction, testicular torsion, vascular compromise, whirlpool sign

Introduction

Acute scrotal pain is a common clinical emergency with a broad differential diagnosis that includes testicular torsion, acute epididymo-orchitis, torsion of the testicular appendages, inguinal hernia incarceration, scrotal trauma, and idiopathic scrotal edema [1,2]. Rapid differentiation is essential, as delayed diagnosis of torsion may result in irreversible testicular ischemia and infarction [1,2]. Testicular torsion has a bimodal age distribution, with peaks in the neonatal period and adolescence, the latter having the highest incidence; young adult males also remain at risk [1,3]. Doppler ultrasound is the first-line imaging modality; however, diagnostic overlap exists, particularly in subacute or intermittent torsion, where blood flow may be preserved or only partially compromised [2,4]. Such cases may be missed initially and later present with mass-like changes on follow-up imaging, requiring further investigation to exclude malignancy [5,6]. Furthermore, gradual or intermittent symptom onset may complicate clinical recognition and delay diagnosis, increasing the risk of irreversible ischemia [1]. We present a case of subacute testicular torsion initially diagnosed as epididymitis, with delayed progression to infarction demonstrated on serial ultrasound, MRI, and contrast-enhanced ultrasound.

Case Presentation

A previously healthy 19-year-old man presented to the ED with a one-day history of left testicular pain and swelling. He was afebrile, had normal vital signs, appeared clinically well, and had a normal gait. He denied urinary symptoms, nausea, and vomiting. On clinical examination, the left testis was swollen and tender, without overlying redness or inflammation. The cremasteric reflex was normal, and capillary refill time was less than two seconds. The patient reported mild lower abdominal discomfort, but examination revealed no abdominal tenderness. The initial ED notes documented no further relevant clinical findings. Initial blood tests showed a normal white cell count ($6.7 \times 10^9/L$) and CRP below 1 mg/L. Urinalysis was unremarkable.

The case was discussed with the regional urology team by telephone immediately after the initial ED assessment, in accordance with the local pathway for suspected testicular torsion. The local assessment pathway uses the Testicular Workup for Ischemia and Suspected Torsion (TWIST) score to support clinical

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risk stratification. However, the score was not documented in the available records, and the rationale for the initial assessment cannot be established definitively. A working diagnosis of epididymitis was agreed. Based on the documented presentation, the clinical features may have suggested a low probability of torsion, although this cannot be confirmed retrospectively. Scrotal ultrasound was performed approximately 29 hours after presentation. The available records do not establish why imaging was not performed earlier or whether urgent imaging or transfer was considered.

Scrotal Doppler ultrasound showed a markedly swollen, hyperemic left epididymis with preserved intratesticular vascularity (Figures 1-2). A moderate reactive hydrocele was also present. Both testes demonstrated incidental microlithiasis. The right testis was otherwise normal in size and perfusion, with a 7 mm simple cyst at the head of the right epididymis (Figure 3). The overall ultrasound findings were interpreted as consistent with acute left epididymitis. The patient was discharged with antibiotics, and follow-up at the surgical ambulatory clinic was planned for two weeks later. The initial ultrasound report recommended follow-up ultrasound at three months to confirm resolution. The available records do not establish whether this recommendation was reconsidered when symptoms persisted. He received safety-netting advice, including instructions to return if his symptoms worsened. In retrospect, the absence of urinary symptoms, normal inflammatory markers, and gradual onset in a young male should have prompted explicit consideration of torsion and an appropriate plan for reassessment if symptoms persisted or worsened.

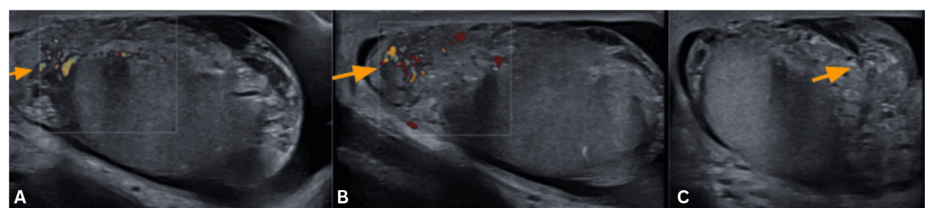


FIGURE 1: Initial ultrasound of the symptomatic left hemiscrotum

Longitudinal color Doppler views (A, B) demonstrate flow at the superior pole and marked hyperemia within the swollen left epididymal head. Grayscale image (C) shows an edematous tubular structure in the region of the epididymal body and spermatic cord complex without a twisted whirlpool sign or torsion knot configuration.

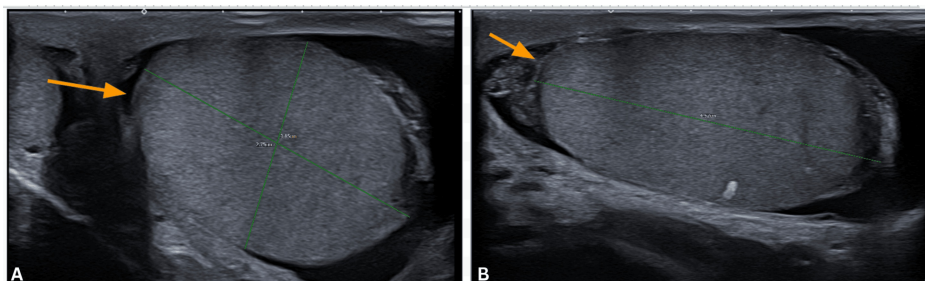


FIGURE 2: Measurement views of the left testis at initial ultrasound

Transverse grayscale view (A) shows the left testis measuring 3.58 × 2.75 cm. Longitudinal grayscale view (B) shows a testicular length of 4.52 cm.

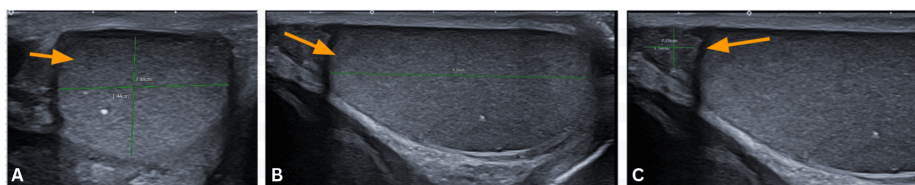


FIGURE 3: Ultrasound evaluation of the asymptomatic right hemiscrotum

Transverse view (A) demonstrates normal parenchymal echogenicity and size (2.08×1.44 cm). Longitudinal view (B) shows a normal testicular length of 4.16 cm. Longitudinal image of the superior pole (C) shows a well-defined simple cyst measuring 7.2×5.6 mm at the head of the right epididymis.

The patient re-presented five days after his initial assessment with worsening left testicular pain, although he reported that the swelling was unchanged. He denied fever, urinary symptoms, penile discharge, and preceding trauma. Clinical examination documented a hard, tender left testis with a preserved cremasteric reflex. Repeat blood tests showed a CRP of 24 mg/L. In view of these findings and the previous ultrasound, which had been interpreted as consistent with epididymitis, the patient continued to receive treatment for this presumed diagnosis. He was advised to complete his antibiotic course and was given safety-netting advice regarding worsening symptoms. No repeat ultrasound or surgical exploration was documented at this presentation. The available records do not establish why further imaging or exploration was not undertaken, or whether torsion was specifically reconsidered. Follow-up at the surgical ambulatory clinic remained scheduled as planned. Worsening symptoms and changes on examination warranted a fresh clinical assessment, regardless of the initial risk stratification and planned outpatient follow-up.

At the surgical ambulatory clinic review approximately two weeks after initial presentation, his symptoms had improved but had not fully resolved, with mild discomfort persisting. Antibiotics were extended, and the previously scheduled follow-up ultrasound was retained in the management plan. The three-month follow-up ultrasound demonstrated resolution of the previously identified left hydrocele. However, the head of the left epididymis appeared to be replaced by a rounded, solid-appearing mass measuring approximately 25×24 mm, causing deformity of the upper pole of the left testis. The left testis appeared diffusely hypoechoic, raising the possibility of chronic inflammation or edema, although vascular compromise was also considered (Figure 4). Given the mass-like appearance and abnormal testicular echotexture, urgent MRI was recommended for further evaluation.

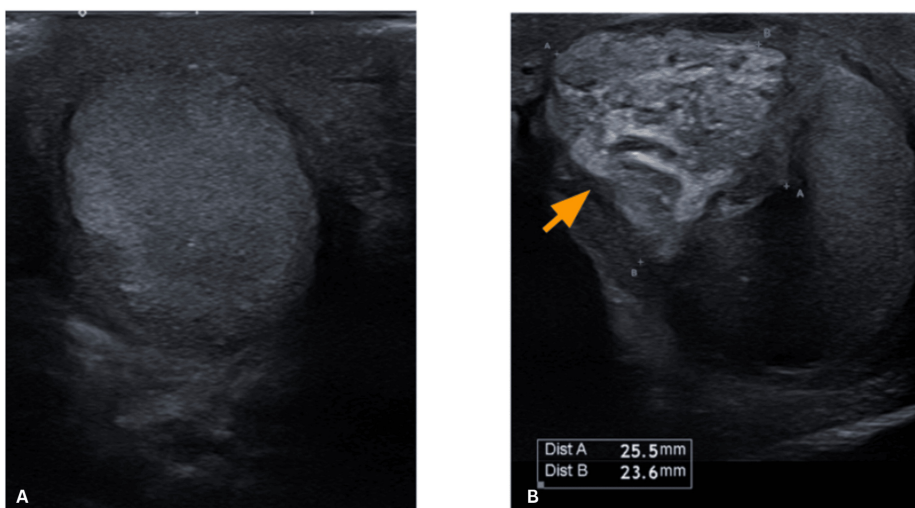


FIGURE 4: Three-month follow-up ultrasound showing a mass-like appearance of the left epididymal head

Grayscale ultrasound images show a hypoechoic left testis (A) and a rounded, solid-appearing mass replacing the left epididymal head (B), measuring approximately 25.5×23.6 mm and deforming the upper pole of the testis.

Multiparametric MRI performed using a 1.5-T scanner revealed a small left testis ($3.3 \times 2.8 \times 2$ cm) compared to a normal right testis ($4.2 \times 3.2 \times 2.6$ cm). The left testis showed uniformly low T2W and high T1W signal intensity with no post-contrast enhancement, a pattern highly suggestive of hemorrhagic infarction (Figure

5) [4]. A convoluted tubular structure measuring 1.9 × 1.7 × 1.1 cm was also identified, demonstrating similar high T1-weighted signal intensity and no enhancement; this was interpreted as the whirlpool sign [4]. Neither the epididymis nor the spermatic cord was separately delineated, in keeping with the whirlpool sign [4]. Reactive stranding and edema were also noted in the overlying scrotal skin.

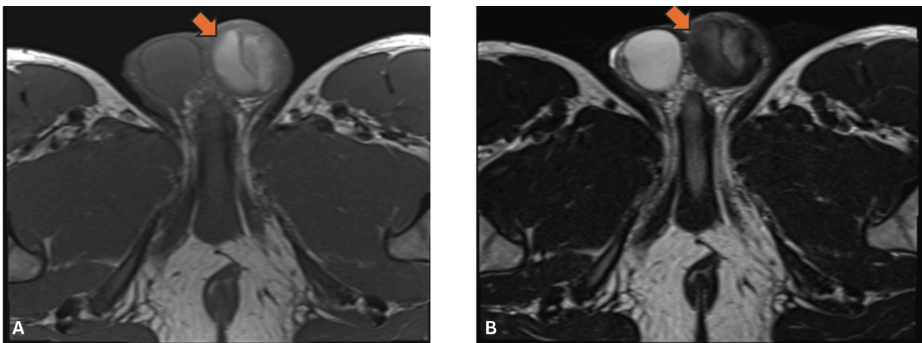


FIGURE 5: MRI features of left testicular infarction

T1-weighted (A) and T2-weighted (B) images demonstrate a small left testis with diffuse high T1-weighted and low T2-weighted signal intensity, consistent with hemorrhagic infarction.

MRI: magnetic resonance imaging

The local multidisciplinary team (LMDT), including radiology, urology, and histopathology, discussed the case in Month 4, Week 1. The LMDT recommended urgent serum tumor markers, a face-to-face clinical review, and contrast-enhanced ultrasound (CEUS) to further evaluate the principal differential diagnoses: testicular germ cell tumor, given the patient’s age and the solid sonographic appearance [7], and segmental or global testicular infarction, supported by the high T1W signal and absent enhancement [4].

The patient was reviewed face-to-face in Month 4, Week 1, and clinical examination confirmed a hard, non-tender left testis. Tumor markers (AFP, hCG, and LDH) were measured and found to be within the reference ranges (Table 1).

Investigation	Result	Reference range
White cell count (Day 0)	6.7 × 10 ⁹ /L	4.0-11.0 × 10 ⁹ /L
CRP (Day 0)	<1 mg/L	<5 mg/L
CRP (Day 5)	24 mg/L	<5 mg/L
AFP (Month 4, Week 2)	1.5 kU/L	<7.5 kU/L
hCG (Month 4, Week 2)	Within normal limits	<5 IU/L
LDH (Month 4, Week 2)	397 U/L	240-480 U/L

TABLE 1: Laboratory investigations

AFP: alpha-fetoprotein, CRP: C-reactive protein, hCG: human chorionic gonadotropin, LDH: lactate dehydrogenase

CEUS was performed in Month 4, Week 2 and demonstrated a small, heterogeneous left testis with no detectable intratesticular vascularity on Doppler ultrasound or intratesticular perfusion on contrast-enhanced imaging. Only capsular vessels were visible, strongly supporting the diagnosis of complete testicular infarction (Figure 6).

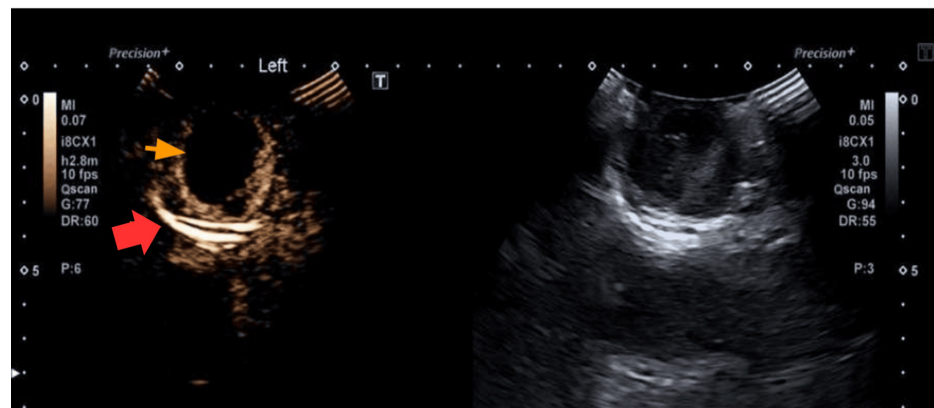


FIGURE 6: CEUS demonstrating absent intratesticular perfusion

CEUS demonstrates absent intratesticular microvascular perfusion (orange arrow) with preserved capsular vascularity (red arrow).

CEUS: contrast-enhanced ultrasound

The case was discussed again at a second urological LMDT meeting in Month 4, Week 3, with radiology input on the CEUS findings. Normal tumor markers and the complete absence of intratesticular perfusion on CEUS supported the diagnosis of complete testicular infarction, with no imaging or biochemical evidence of malignancy. The patient was therefore removed from the cancer pathway. The plan was to discuss the findings and further management options directly with the patient.

A summary of the patient's clinical course, including the initial presentation, subsequent investigations, multidisciplinary discussions, and follow-up assessments, is provided in Table 2

Date	Event
Day 0	ED presentation with a swollen, tender left testis and a preserved cremasteric reflex; WCC and CRP normal; discussed with the regional urology team by telephone.
Day 1	Ultrasound performed showing a hyperemic left epididymis with preserved intratesticular flow; discharged on antibiotics.
Day 5	Re-presented with worsening pain; left testis documented as hard and tender, with preserved cremasteric reflex. CRP 24 mg/L. Treated as ongoing epididymitis; no repeat ultrasound or exploration documented.
Day 16	Surgical ambulatory clinic; partial symptom resolution; antibiotics extended.
Month 3	Three-month follow-up ultrasound; 25 × 24 mm mass-like enlargement of the epididymal head with diffuse testicular hypoechogenicity.
Month 3, Week 4	Multiparametric MRI: hemorrhagic infarction and whirlpool sign demonstrated.
Month 4, Week 1	First LMDT; tumor markers, CEUS and face-to-face review recommended.
Month 4, Week 1	Face-to-face review; hard, non-tender left testis confirmed.
Month 4, Week 2	CEUS; complete absence of intratesticular perfusion confirmed.
Month 4, Week 3	Second LMDT; infarction confirmed; tumor markers normal, removed from cancer pathway.
Month 5	Urology outpatient review; conservative management and orchidectomy discussed.
Month 9	Second urology review; surgery deferred; discharged to GP with open referral.

TABLE 2: Clinical timeline
CEUS: contrast-enhanced ultrasound, CRP: C-reactive protein, ED: emergency department, GP: general practitioner, LMDT: local multidisciplinary team, MRI: magnetic resonance imaging, WCC: white cell count

During the urology outpatient clinic review in Month 5, conservative management, elective left orchidectomy with prosthesis insertion, and the potential role of prophylactic contralateral orchidopexy were discussed in detail. The patient expressed a preference for eventual orchidectomy but wished to defer the procedure because of his university commitments, and a further appointment was arranged. At his Month 9 review, he was preparing for examinations and felt that proceeding with surgery would cause significant stress at that time. He was therefore discharged back to his GP with an open referral to urology should he wish to proceed with orchidectomy in the future.

Discussion

The clinical differentiation between acute epididymitis and subacute or intermittent testicular torsion remains a diagnostic challenge [1,2,5,6]. As demonstrated in this case, Doppler ultrasound may be falsely reassuring in subacute torsion [2,4-6]. Although epididymitis typically produces increased epididymal perfusion, testicular perfusion may also be increased when orchitis is present. In testicular torsion, intratesticular blood flow may be reduced or absent; however, preserved intratesticular Doppler flow does not exclude torsion, particularly in cases of partial or intermittent torsion or evolving vascular compromise [2,4]. Similarly, although the absence of the cremasteric reflex is a recognized clinical sign of torsion, its presence does not reliably exclude the diagnosis [3].

At initial presentation, the gradual onset, preserved cremasteric reflex, and preserved intratesticular Doppler flow may have contributed to the working diagnosis of epididymitis. The local TWIST score pathway provides a framework for initial risk stratification. The absence of urinary symptoms and normal initial inflammatory markers did not strongly support an infectious cause, although these findings do not exclude epididymitis. Importantly, a low TWIST score does not definitively exclude torsion, and clinical reassessment remains essential when symptoms persist or worsen.

The re-presentation five days later with worsening pain and a hard, tender testis represented an important opportunity to reconsider the diagnosis and investigate possible ongoing vascular compromise. A high index of suspicion for torsion must be maintained even when initial imaging is reassuring, particularly when

symptoms fail to resolve as expected with conservative treatment [1,5,6].

Whether earlier surgical exploration would have resulted in testicular salvage cannot be determined retrospectively from the available records. Testicular viability following torsion depends on factors including the duration and degree of spermatic cord twisting and the extent of vascular compromise [3]. Although earlier diagnosis and intervention generally offer the best opportunity for salvage, the precise point at which irreversible infarction occurred in this case is unknown [2,3]. This case therefore highlights the importance of maintaining clinical suspicion for torsion and obtaining urgent urological assessment when the diagnosis remains uncertain, rather than relying on preserved intratesticular Doppler flow alone [2,3].

This case also raises important healthcare system considerations. The regional urology team provided specialist input by telephone, in accordance with the local pathway for suspected testicular torsion. The interval before initial imaging highlights the importance of clear pathways for timely imaging and specialist assessment when testicular torsion cannot be confidently excluded [1,2]. Furthermore, at the re-presentation five days later with worsening symptoms and altered examination findings, the records do not document a repeat urology consultation or reassessment of the working diagnosis. The available records do not show whether re-referral was considered. This highlights the importance of reassessment and renewed specialist consultation when symptoms persist or worsen.

The interval between the initial presentation and follow-up imaging warrants consideration, as persistent or worsening symptoms may necessitate earlier clinical reassessment rather than adherence to a routine imaging schedule. Although earlier imaging may have identified the evolving abnormality sooner, this cannot be established retrospectively.

The mass-like appearance on the three-month follow-up ultrasound raised concern for malignancy and other potential diagnoses [7]. The accompanying diffuse hypoechogenicity of the left testis also raised the possibility of vascular compromise, prompting urgent MRI. The literature on atypical and delayed testicular torsion presentations is limited to small case series and reports, reflecting the rarity of this diagnostic scenario [5,6]. Wang et al. described three cases in which prolonged epididymitis progressed to testicular infarction, with preserved intratesticular flow on initial Doppler imaging in all cases, closely mirroring the diagnostic trajectory seen here [5]. Similarly, Rhudd et al. reported a case of epididymo-orchitis with initially reassuring Doppler findings that subsequently progressed to testicular infarction on re-presentation, further highlighting that reassuring initial Doppler findings do not exclude subsequent or evolving vascular compromise [6]. These reports show how inflammatory and ischemic changes can produce atypical imaging appearances and complicate the differentiation of infection, infarction, and neoplasia [5,6,8,9].

Multimodality imaging was important in establishing the diagnosis in this case. MRI provides detailed soft-tissue characterization and can demonstrate the whirlpool sign, representing twisting of the spermatic cord, which strongly supports testicular torsion [4]. CEUS is particularly useful for assessing indeterminate testicular lesions by providing real-time visualization of intralesional perfusion and helping distinguish viable from non-perfused tissue. Parenti et al. described the complementary roles of Doppler ultrasound, MRI, and CEUS in assessing suspected segmental testicular infarction, demonstrating the value of combining anatomical and perfusion-based imaging findings [10-12]. In this case, capsular vascularity was preserved despite complete absence of intratesticular perfusion. Perilesional rim enhancement has also been described in subacute segmental testicular infarction [10-12]. The timing of CEUS in this context is also worth noting. In this case, it was performed about four months after symptom onset, but earlier CEUS in clinically stable patients with highly equivocal findings or subacute presentations may help clarify perfusion and inform management [10-12]. However, it should never delay immediate surgical intervention in clear acute presentations [1,3].

It is also important to distinguish complete from segmental testicular infarction; segmental infarction involves only part of the testis and may, in selected cases, be managed conservatively [13]. In the present case, imaging demonstrated complete absence of intratesticular perfusion, consistent with global rather than segmental infarction. By the time the diagnosis was established on subsequent imaging, the affected testis demonstrated complete infarction, and the management discussion therefore centered on conservative management versus elective orchidectomy.

As a single case without surgical or histopathological confirmation, this report illustrates the diagnostic challenges of this presentation but cannot establish the diagnostic performance of individual imaging modalities or support generalizable management recommendations.

Conservative management of radiologically confirmed testicular infarction requires careful counseling regarding potential testicular atrophy and possible effects on fertility and semen parameters [14,15]. The possibility of subsequent orchidectomy should also be discussed. These considerations must be balanced against the risks of elective orchidectomy. For young patients undergoing orchidectomy, the option of a testicular prosthesis may also be discussed when cosmetic appearance is a concern [7]. The possibility of an underlying bell-clapper deformity and contralateral orchidopexy should also be considered when surgical

exploration is undertaken [16].

In this case, subsequent urological consultations discussed conservative management, elective orchidectomy with prosthesis insertion, and the potential role of contralateral orchidopexy. The patient's decision to defer orchidectomy highlights the importance of shared decision-making and individualized counseling regarding the potential benefits, risks, and uncertainties of each management option, along with appropriate follow-up and safety-netting arrangements.

Conclusions

Subacute testicular torsion can mimic epididymitis, particularly when symptoms persist or worsen despite treatment. Preserved intratesticular Doppler flow and a preserved cremasteric reflex do not reliably exclude torsion. When torsion is suspected, urgent urological assessment is essential; if the diagnosis remains equivocal and immediate intervention is not indicated, short-interval clinical reassessment and repeat ultrasound should be considered rather than routine imaging at three months. Follow-up mass-like changes may mimic testicular neoplasia, and MRI and CEUS can provide complementary anatomical and perfusion information in selected cases. For patients managed conservatively following testicular infarction, counseling should address the uncertainties regarding testicular function and fertility, the potential need for orchidectomy, and an appropriate route back to specialist care.

Additional Information

Author Contributions

All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

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Disclosures

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