

Testicular pain with normal doppler ultrasound: a diagnostic trap of intermittent torsion

Abstract

Background: Testicular torsion is a urological emergency requiring prompt surgical intervention. Doppler ultrasound is the standard diagnostic tool; however, its sensitivity is imperfect, particularly in cases of intermittent or early torsion where blood flow may be partially or transiently preserved.

Case Presentation: We report the case of a 16-year-old male presenting with acute-onset left scrotal pain. Physical examination revealed significant testicular tenderness, an elevated and horizontally positioned testis, and an absent cremasteric reflex. Doppler ultrasound demonstrated preserved intratesticular blood flow with no sonographic evidence of torsion. Given the high clinical suspicion, urgent surgical exploration was performed and revealed an intermittent torsion with a 360-degree twist that had spontaneously reduced. The testis showed early ischemic changes. Detorsion and bilateral orchidopexy were performed successfully.

Conclusion: Normal Doppler ultrasound does not exclude testicular torsion. In the context of acute scrotal pain with characteristic clinical findings, surgical exploration must not be delayed by reassuring imaging. Clinical suspicion remains the primary determinant for urgent intervention.

Keywords: testicular torsion, intermittent torsion, doppler ultrasound, acute scrotum, surgical exploration, false negative imaging

Volume 14 Issue 2 - 2026

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Received: June 15, 2026 | **Published:** July 14, 2026

Introduction

Testicular torsion is a time-critical urological emergency caused by rotation of the testis around the spermatic cord, resulting in vascular compromise and, if untreated, irreversible ischemia. The incidence is estimated at approximately 1 in 4,000 males under the age of 25, with bimodal peaks in the neonatal period and during puberty. Salvage rates are directly correlated with the duration of ischemia: when surgical intervention occurs within 6 hours of symptom onset, testicular viability exceeds 90%; this rate drops dramatically to less than 10% after 24 hours. The clinical dictum “time is testis” reflects this uncompromising reality.

Color Doppler ultrasonography has become the standard imaging modality for evaluating acute scrotal pain, offering non-invasive assessment of intratesticular blood flow and parenchymal morphology. However, its reported sensitivity for testicular torsion ranges from 80% to 98%, leaving a clinically significant margin of false-negative results. This limitation is most pronounced in two scenarios: early torsion, where ischemia is not yet established, and intermittent torsion, a recognized but under-appreciated entity in which the testis spontaneously detorts before imaging is obtained, temporarily restoring blood flow and producing a deceptively normal Doppler study.

Intermittent testicular torsion poses a particular diagnostic challenge because the window of opportunity for imaging rarely coincides with the episode of torsion. The patient may present with a history of recurrent acute scrotal pain that resolves spontaneously, often leading to delayed diagnosis, repeated emergency visits, and ultimately, preventable testicular loss. The risk of definitive complete torsion following intermittent episodes is estimated to exceed 50%.

We present a case that illustrates this diagnostic pitfall: an adolescent with classic clinical features of testicular torsion whose

Doppler ultrasound was interpreted as normal, and in whom surgical exploration was nonetheless pursued on the basis of clinical judgment alone, revealing intermittent torsion with early ischemic changes.

Case presentation

A 16-year-old male with no significant past medical or surgical history presented to the emergency department with a 3-hour history of acute-onset, severe left scrotal pain. The pain was described as sudden in onset, rated 9 out of 10 in intensity, and was accompanied by nausea and one episode of vomiting. There was no history of trauma, fever, urinary symptoms, or prior similar episodes. The patient denied recent physical exertion or sexual activity.

On physical examination, the patient appeared distressed and in moderate pain. Vital signs were within normal limits. Genital examination revealed a tender, swollen left hemiscrotum. The left testis was palpated in a high-riding position with a horizontal (bell-clapper) lie. The overlying scrotal skin appeared mildly erythematous, though without fluctuance. The cremasteric reflex was absent on the left side and intact on the right. There was no urethral discharge, and the epididymis was not distinctly palpable from the testicular body due to pain. The right testis was normal in position, size, and consistency.

Laboratory investigations, including a complete blood count and urinalysis, were within normal limits. C-reactive protein was not elevated. Color Doppler ultrasonography of the scrotum was performed urgently by an experienced radiologist. The examination demonstrated preserved intratesticular arterial and venous flow bilaterally, with no evidence of absent or reversed diastolic flow on the left side. Testicular echogenicity was homogeneous, and no epididymal thickening or reactive hydrocele was identified. The sonographic report concluded that there was no sonographic evidence of torsion.

Despite the reassuring ultrasound findings, the overall clinical presentation, notably the acute onset, the high-riding horizontally positioned testis, and the absence of the cremasteric reflex, was considered highly consistent with testicular torsion. In accordance with established surgical principles, the decision was made to proceed with urgent surgical exploration without further delay.

Intraoperatively, the left testis was approached via a scrotal midline incision. The spermatic cord was found to have a 360-degree twist consistent with torsion. Upon untwisting, the testis demonstrated a dusky, congested appearance with areas of early ischemic discoloration, (Figure 1) compatible with intermittent torsion that had undergone spontaneous detorsion prior to imaging. After a period of 5 minutes of observation following warm compress application, the testicular color returned to a satisfactory pink hue, indicating viability. Detorsion was confirmed, and bilateral orchidopexy was performed using a three-point fixation technique with non-absorbable sutures to prevent recurrence on either side. The postoperative course was uneventful, and a follow-up scrotal ultrasound performed 6 weeks later demonstrated normal perfusion and preserved testicular volume bilaterally.



Figure 1 Intraoperative appearance of the left testis showing congestion and bluish discoloration consistent with intermittent testicular torsion and early ischemic changes.

Discussion

Color Doppler ultrasonography is widely regarded as the first-line imaging modality in the evaluation of acute scrotal pain. Under these conditions, sensitivity has been reported to be as high as 86% in the diagnosis of testicular torsion.¹ However, these figures are subject to significant variability depending on operator expertise, equipment quality, patient body habitus, and, critically, the timing of the examination relative to the torsion event.²

The fundamental limitation lies in the pathophysiology of intermittent torsion. In this entity, the spermatic cord undergoes torsion that subsequently unwinds spontaneously, either partially or completely, before the patient reaches imaging. As blood flow is restored to the affected testis, Doppler signals return to near-normal or even reactive hyperemic levels, producing a pattern indistinguishable from epididymo-orchitis or a non-torsion cause of scrotal pain. In a landmark study, Pepe et al.³ documented false-negative Doppler studies in up to 20% of surgically confirmed torsion cases, with intermittent torsion representing the predominant mechanism. Furthermore, in the early phase of complete torsion, particularly within the first 2 to 4

hours, venous outflow obstruction may precede arterial compromise, resulting in residual arterial signals that mislead the examiner.

This case exemplifies the diagnostic vulnerability inherent to Doppler ultrasonography. The sonographic findings were reported as normal by an experienced radiologist, yet the intraoperative findings were unequivocal: a 360-degree cord twist with visible ischemic changes to the testicular parenchyma. The discordance underscores a critical principle: a normal Doppler study does not exclude torsion and should never be used as a definitive argument against surgical exploration when the clinical picture is compelling.

The physical examination remains the cornerstone of torsion diagnosis. Three findings carry particular diagnostic weight and should heighten suspicion irrespective of imaging results: the high-riding testis, the horizontal (bell-clapper) lie, and the absence of the cremasteric reflex. The cremasteric reflex, elicited by light stroking of the inner thigh, is mediated by the L1-L2 spinal segments and results in ipsilateral testicular elevation. Its absence in a patient with acute scrotal pain has a sensitivity approaching 100% for torsion in some series, though it is not perfectly specific. In combination with sudden-onset pain in an adolescent male, this triad constitutes a surgical emergency until proven otherwise.²

Clinical scoring systems, such as the TWIST score (Testicular Workup for Ischemia and Suspected Torsion), have been proposed to stratify patients into low-, intermediate-, and high-risk groups based on physical findings including testicular swelling, hard texture, elevated position, absent cremasteric reflex, and nausea or vomiting.⁴ Patients with high TWIST scores have a positive predictive value for torsion exceeding 96% and should proceed directly to surgical exploration without imaging. Imaging is most valuable in the intermediate-risk group, where it may aid in distinguishing torsion from other causes of acute scrotal pain. Importantly, even in the intermediate group, imaging should not delay surgery if clinical deterioration occurs.

The concept of “time is testis” has been well validated in the urological literature. Testicular salvage rates decline predictably with increasing duration of ischemia: greater than 90% with detorsion within 6 hours, approximately 50% between 6 and 12 hours, and as low as 10% beyond 24 hours.² These figures highlight the devastating consequences of diagnostic delay, whether attributable to patient hesitation, emergency department triage errors, or, most critically, over-reliance on negative imaging to defer surgical decision-making.

In intermittent torsion specifically, the risk of future complete torsion is substantial and may occur without warning. Published literature documents spontaneous resolution in up to 50% of torsion episodes, but this should not be interpreted as a favorable outcome, since each recurrence carries the cumulative risk of permanent ischemia.⁵ Bilateral orchidopexy at the time of surgical exploration is therefore the standard of care, as the anatomical predisposition (bell-clapper deformity) that enables torsion on one side is typically present bilaterally.⁶

The management algorithm for acute scrotal pain should be guided primarily by clinical assessment. When clinical features strongly suggest torsion, the operating room should be the next destination, not the radiology suite. Imaging occupies a complementary, not determinative, role in this decision pathway. Emergency physicians and urologists must be educated that a normal Doppler study does not exclude the diagnosis and that the cost of an unnecessary negative exploration, namely wound pain and a brief hospital stay, is far less than the cost of a missed torsion: permanent testicular loss, infertility, and medicolegal liability.

This case further reinforces the importance of documenting the absence of the cremasteric reflex as a critical examination finding. In our patient, this sign, in conjunction with the bell-clapper position and the acuity of onset, was sufficient to override the false reassurance of normal imaging. Surgical exploration confirmed the clinical suspicion and enabled organ-preserving intervention.

Conclusion

This case illustrates a well-recognized but underappreciated clinical pitfall: normal Doppler ultrasonography does not exclude testicular torsion, particularly in the context of intermittent episodes. Clinical findings, including acute-onset scrotal pain, a high-riding horizontally positioned testis, and an absent cremasteric reflex, must remain the primary determinants of the decision to perform urgent surgical exploration. Imaging plays a supportive role but should never delay definitive intervention when clinical suspicion is high. Surgeons and emergency physicians must maintain a low threshold for scrotal exploration in this setting, as the salvageability of the affected testis is directly proportional to the speed of diagnosis and surgical correction. The adage remains clinically absolute: when in doubt, explore.

Conflicts of Interest

The authors declare no conflict of interest.

Ethical approval

Written informed consent was obtained from the patient's legal guardian for the publication of this case report and any accompanying images.

Ethics approval and consent to participate

The ethics committee of the Faculty of Medicine of Rabat has given us its agreement. Informed and verbal consent to participate in the study was provided by our patients. The reference number is not applicable.

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