Just the facts: assessment and management of testicular torsion in the emergency department

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Clinical scenario

A 16-year-old male presents with sudden onset, severe, right testicular pain after soccer practice. During his 4 h of pain, he experienced nausea with emesis, but denies fever, dysuria, penile discharge, or sexual activity. On examination, the patient has significant tenderness to palpation, a hard and swollen testicle, and edema of scrotal skin.

Is testicular torsion only a concern in the pediatric population?

Testicular torsion primarily affects pubertal teenagers with an estimated yearly incidence of 3.8 per 100,000 for males younger than 18 years old [1]. However, a 2-year U.S. nationwide medical records review found that up to 14% of all cases occur in adults. Importantly, adults > 50 years old had the lowest salvage rates of any age group, with significantly higher delay in presentation for adult patients [2].

What are the presenting symptoms of testicular torsion, and can they predict the likelihood of torsion?

Classically, testicular torsion presents with sudden onset, severe, unilateral scrotal pain, often accompanied with nausea and vomiting. Symptoms may appear at rest, after waking from sleep, physical activity, or trauma to the testicles. An emergency department (ED)-based review of those with acute scrotum found the following increased the likelihood ratio of testicular torsion: duration of less than 24 h (OR 6.66; 95% CI 1.54–33.33), nausea and/or vomiting (OR 8.87; 95% CI 2.6–30.1), abdominal pain (OR 3.19; 95% CI 1.15–8.89) [3]. However, intermittent testicular torsion can present with short lived, self-resolving episodes of severe testicular pain. Up to 20% of patients may present with abdominal or flank pain alone, without localization to the testicle and/or scrotum [4]. Thus, any male patient with abdominal or flank pain should undergo evaluation of the testicles.

What are the presenting signs of testicular torsion and can they predict the likelihood of torsion?

Patients with testicular torsion will often have an enlarged, high riding testicle with a horizontal lie. A torsed testicle will invariably have pain to palpation and usually be harder or larger than the contralateral normal testicle. After examining the normal cord first, palpation of a twisted spermatic cord may reveal a hard 'knot' that is tender at the point of torsion. In advanced torsion, skin color change (redness) or induration of the skin may occur. While cremasteric reflexes are normally absent or diminished, a normal cremasteric reflex cannot exclude testicular torsion. One study suggests that up to 40% of patients with torsion demonstrate a cremasteric reflex [5].

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What is the TWIST score and what is its role in the ED?

The TWIST (Testicular work-up for Ischemia and Suspected Torsion) score is a 7-point scale that can be used to assess probability of testicular torsion [5]. Clinical parameters include:

- Nausea/vomiting (1 point)
- Testicular swelling (2 points)
- Hard testis (2 points)
- Absent cremasteric reflex (1 point)
- High riding testis (1 point)

The original derivation was performed in a study with a small sample size. However, it has subsequently been validated in multiple pediatric and adult populations. High scores of 6–7 having a near perfect positive predictive value (PPV) of torsion, and in these cases if there is a long period of pain (> 6 h), direct surgical exploration rather than ultrasound confirmation of diagnosis should be considered [6- “available in Online supplement”]. To date, no study has found torsion in patients with a score of 0, and multiple studies report no torsions in patients with scores under 2. Two prospective acute scrotal pain studies using the TWIST score identified 1.6–4% of patients with a score of 1–2 with torsion; these were exclusively pre-pubertal patients or patients with a history of intermittent pain or suspected

torsion-detorsion [6, 7- “available in Online supplement”]. As such, ultrasound is recommended for pre-pubertal children who often have an atypical presentation, for intermediate scores (3–5), or with early presentation where ultrasound confirmation can be obtained without delays to care. Clinical judgment should supersede the use of the TWIST score in atypical presentations such as torsion-detorsion and confounding yet critical diagnoses (i.e., testicular tumors).

What imaging modality can be utilized to confirm the diagnosis?

Testicular ultrasound with evaluation of doppler flow is the first line imaging modality; however, imaging should not delay emergent surgical consultation and evaluation. Ultrasound may reveal an enlarged, hyperemic testicle, increased echogenicity, and abnormal doppler flow when compared to the contralateral side (Fig. 1a, b). A twisted spermatic cord with spiral pattern throughout its length, known as the whirlpool sign pattern is diagnostic, with the highest reported sensitivity and specificity of any finding (Video <https://www.dropbox.com/s/awhphtr0m57zzhf/Testicular%20Torsion%20-%20202.mp4?dl=0>). Sensitivity for torsion using doppler ultrasound is > 86%, with specificity approximating 90% [8- “available in Online supplement”]. Unfortunately, point-of-care ultrasound performed by emergency clinicians is not as reliable [9- “available in Online supplement”]. Due to limitations and risk of missing the diagnosis, cases where

Fig. 1 **A** Patient with 4-h history of testicular pain. Enlarged right testicle, absent flow, homogeneous echotexture compared to left. **B** Patient with advanced torsion. Enlarged testicle with no flow, heterogeneous echotexture and thickened scrotal wall compared to left

there is high suspicion or partial torsion is suspected may require specialist evaluation.

What is the immediate management of testicular torsion?

Testicular torsion is a surgical emergency, and once diagnosis is confirmed by ultrasound or deemed highly suspicious, urgent surgical consultation should be obtained. Prompt surgical intervention (< 6 h) results in testicular salvage in 90–100%, whereas only 10% of cases presenting at 12–24 h were found to have a viable testicle [10- “available in Online supplement”]. Accelerated care of torsion pathways have been shown to decrease time from ED triage to surgery and lower orchiectomy rates [11- “available in Online supplement”]. For pediatric patients, EDs can consider torsion pathways advocating for excluding torsion in patients with TWIST score of 0 and avoidance of ultrasound delays in cases with high risk of torsion (TWIST Score 6–7), especially with > 6 h of pain (Fig. 2) [6- “available in Online supplement”].

Surgical repair consists of detorsion of the affected testicle and bilateral orchiopexy given the risk of contralateral torsion. In cases of an advanced torsion, orchiectomy is often performed due to testicular non-viability. If significant

delays to surgery exist, for example working in a remote rural setting, manual detorsion can be attempted by rotating the testicle in an open book fashion (towards the ipsilateral thigh). Manual detorsion success, seen as resolution of pain with normal exam, should be confirmed with ultrasound. Manual detorsion should be aborted if perceived difficulty with attempt or visibly increasing pain is present due to possibility of aggravating degree of torsion. Manual detorsion should be attempted with caution and should not be routinely attempted if surgical resources are available.

Case conclusion

The patient is noted to have a TWIST score of 4, antiemetics and analgesics are provided to the patient, and urology is consulted. The right testicular ultrasound reveals an enlarged testicle, normal echogenicity, and whirlpool sign of the spermatic cord but decreased arterial waveform. The urology specialist evaluates the patient and the ultrasound and takes the patient to the operating room.

Fig. 2 Diagnostic algorithm for testicular torsion in pediatric patients with acute scrotum (not validated in adults). (Reproduced with permission: Sheth et al. J Urol. 2016 Jun;195(6):1870–6.)

Key points

- 1) Although testicular torsion usually affects pubertal teenagers, adult males make up a significant proportion of cases and have a worst prognosis due to delay in presentation.
- 2) Any male patient regardless of age, with unilateral scrotal pain, abdominal or flank pain should have a testicular exam to assess for testicular torsion.
- 3) Normal cremasteric reflex cannot exclude testicular torsion.
- 4) In pubertal patients with a high TWIST score (6–7) and a long period of pain (> 6 h), direct surgical exploration rather than ultrasound confirmation of diagnosis should be considered.
- 5) Ultrasound has a high sensitivity and specificity for testicular torsion and should be combined with clinical suspicion to rule in/out the diagnosis.
- 6) Testicular torsion is a surgical emergency, and once diagnosis is confirmed by ultrasound or deemed highly suspicious, urgent surgical consultation should be obtained for surgical detorsion.

Supplementary Information The online version contains supplementary material available at <https://doi.org/10.1007/s43678-021-00189-6>.

Declarations

Conflict of interest The authors have no conflicts of interest to declare.

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