



PEDIATRIC TESTICULAR TORSION UNVEILED: COMPREHENSIVE NARRATIVE ANALYSIS

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ABSTRACT

Testicular torsion, a critical urological emergency, poses the risk of testicular loss, emerging as the most significant acute scrotal condition. The bell clapper deformity, characterized by inadequate testicular attachment to the tunica vaginalis, augments testicular mobility, creating a predisposition to torsion. The resulting twisting of the spermatic cord leads to venous compression, edema, and eventual ischemia due to arterial occlusion. Neonatal torsion follows an extravaginal pattern, with two peak incidences, notably during puberty. Clinically, patients experience sudden, intense testicular or scrotal pain, often accompanied by nausea and vomiting. Diagnosis primarily relies on clinical findings, supported by the TWIST score, and, in equivocal cases, scrotal Doppler ultrasound. Management entails immediate urological consultation, with surgical interventions such as detorsion and orchiopexy for viable torsion or orchiectomy for nonviable cases. Manual detorsion before surgery can salvage the testicle, and the debate over the necessity of bilateral orchiopexy persists. Appendiceal torsion, common in boys aged 7 to 12, is clinically diagnosed, managed with analgesia and scrotal support, with surgery (appendage removal) considered for persistent pain. Intermittent testicular torsion presents as acute, sharp pain with rapid self-resolution, recurring intermittently in boys. In a review, 26 percent experienced nausea or vomiting, and 21 percent reported nocturnal pain. Physical signs include mobile testes, anterior epididymis, or a bulky spermatic cord. Clinical and radiographic evaluations may be normal, emphasizing the need for follow-up on recurrent or worsening pain. Ultrasound, while up to 75 percent sensitive, often shows normal findings, underscoring the diagnosis's clinical nature. Immediate follow-up is crucial, and a seven-day reassessment is recommended if initial evaluations are unremarkable. Awareness of intermittent torsion aids timely intervention, preventing complications and ensuring optimal care for affected individuals.

KEYWORDS : Testicular Torsion, Scrotum, Orchiopexy, Doppler Ultrasonography, Pediatric Urology.

INTRODUCTION

Testicular torsion is a urologic emergency, especially prevalent in males under 25, affecting approximately one in 4000 individuals annually. Intravaginal torsion, responsible for 90 percent of cases, often results from a congenital processus vaginalis malformation.

While more common in neonates and postpubertal boys, testicular torsion can occur at any age, with 39 percent of hospitalized cases found in men aged 21 and older. Adult patients experiencing acute scrotal pain during hospitalization exhibit a significant prevalence of 25 to 50 percent for testicular torsion. Notably, the condition's occurrence in children warrants distinct consideration. Recognizing its epidemiology is crucial for prompt diagnosis and intervention, given the potential severe consequences associated with testicular torsion (1,2).

METHODS

For this narrative review on testicular torsion, a systematic search strategy incorporating both controlled vocabulary terms (Medical Subject Headings - MeSH) and free-text keywords was employed.

The search aimed to identify relevant articles published from inception to the present, covering various aspects of testicular torsion. Key search terms included "testicular torsion," "intravaginal torsion," "scrotal pain," and related variations. Boolean operators (AND, OR) were utilized to refine the search and capture a comprehensive range of literature. Language restrictions were not imposed to ensure inclusivity and access to diverse perspectives.

This review is built upon a meticulous analysis of 15 selected references, providing a robust and evidence-based exploration of testicular torsion, its epidemiology, clinical features, and management strategies.

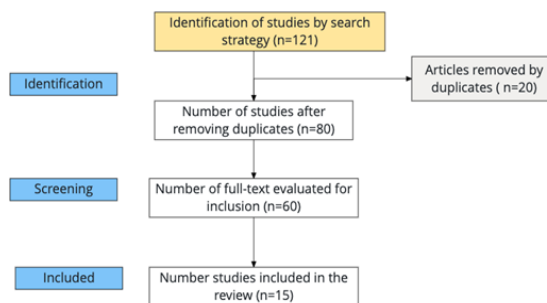


Figure 1. PRISMA.

Clinical Features

Testicular torsion, a critical urological emergency, carries the risk of testicular loss, making it the most significant acute scrotal condition. The bell clapper deformity, marked by inadequate testicular attachment to the tunica vaginalis, increases testicular mobility, creating a predisposition to torsion. The resultant twisting of the spermatic cord leads to venous compression, edema, and eventual ischemia due to arterial occlusion. Neonatal torsion follows an extravaginal pattern, while the condition exhibits two peak incidences, with a higher occurrence during puberty. Clinically, patients experience sudden, intense testicular or scrotal pain, often accompanied by nausea and vomiting. The pain may radiate to the lower abdomen, with a common presentation of awakening with scrotal pain. Physical examination reveals edematous, tender, and elevated testes, along with an absent cremasteric reflex. A reactive hydrocele may be present, emphasizing the importance of a complete genito-urinary examination in males with abdominal pain (3).

Despite its potential utility, Prehn's sign lacks reliability in distinguishing torsion from other conditions in children. This

comprehensive overview underscores the multifaceted clinical manifestations of testicular torsion, essential for accurate diagnosis and timely intervention to prevent testicular loss. Prompt recognition and intervention are crucial to salvage testicular function and prevent complications. The urgency of seeking medical attention for sudden-onset scrotal pain cannot be overstated, as delayed management may result in irreversible damage. Increased awareness, timely clinical evaluation, and a high index of suspicion contribute to improved outcomes in the management of testicular torsion, ensuring optimal care for affected individuals (4).

Diagnosis

Diagnosing testicular torsion is predominantly a clinical endeavor. Clinicians should promptly engage a surgeon with pediatric urologic expertise when clinical findings strongly indicate torsion. The TWIST score, derived from factors such as nausea or vomiting, testicular swelling, a hard testis on palpation, a high-riding testis, and an absent cremasteric reflex, serves as a valuable diagnostic tool. A score of ≥ 5 suggests torsion, while ≤ 2 excludes it. Prospective validations consistently report high discrimination, supporting the notion that early surgical consultation is warranted based on clinical suspicion, bypassing reliance on imaging alone (5).

In cases where clinical findings are equivocal, obtaining a color Doppler ultrasound of the scrotum is recommended. This imaging technique can reveal decreased testicular perfusion, which is indicative of torsion. Although the sensitivity and specificity of Doppler ultrasound may vary, it remains the preferred diagnostic tool over nuclear scans.

The Doppler ultrasound can discern crucial details such as testicular and epididymal size, scrotal fluid, scrotal wall thickening, enlarged appendix testis, twisting of the spermatic cord, and arterial flow in the testis and epididymis (6,7).

While Doppler ultrasound is highly valuable, particularly when performed by a well-trained and experienced operator, it may have limitations in cases of small prepubertal testes with lower blood flow. Additionally, scrotal ultrasounds may occasionally exhibit present but diminished blood flow to the testis and epididymis, or even increased blood flow to the epididymis due to reperfusion after spontaneous or manual detorsion. Therefore, a careful consideration of clinical history and physical examination alongside an awareness of potential imaging limitations is crucial in the diagnostic process (8).

Management

The management of testicular torsion requires immediate consultation with a urologist, regardless of the diagnostic method employed—whether clinical or radiographic. The primary interventions for a viable torsed testicle involve surgical detorsion and fixation (orchiopexy), whereas orchiectomy becomes necessary if the testicle is deemed nonviable. The decision is time-sensitive, with viability rates contingent on the duration of torsion.

Typically, detorsion within 4 to 6 hours ensures 97 to 100 percent viability, while detorsion after 12 and 24 hours sees viability rates of 20 to 61 percent and 0 to 24 percent, respectively. Surgery should not be delayed based on clinical estimates of nonviability, as intermittent or partial torsion may render testicles salvageable even with prolonged symptoms (9).

Bilateral orchiopexy is commonly performed, although its necessity has been debated. Some studies report higher postoperative complications associated with immediate contralateral orchiopexy. However, long-term risks of recurrent testicular torsion do not significantly differ between

immediate contralateral orchiopexy and ipsilateral scrotal exploration alone (10).

Manual detorsion, attempted before surgery when immediate operative care is not feasible, can increase the likelihood of testicular salvage. Successful manual detorsion has shown a testicular salvage rate of 97 percent, emphasizing its value in patients awaiting surgical correction. This procedure involves rotating the testicle within the scrotum, outward towards the thigh, with potential relief of pain and return of arterial flow, as confirmed by Doppler ultrasound. Surgical exploration remains necessary after manual detorsion to address potential partial torsion and perform orchiopexy to prevent recurrence (11).

In neonatal testicular torsion cases, management considerations differ and are discussed separately. Neonatal testicular torsion often involves extravaginal torsion and requires prompt surgical evaluation, as delays can result in testicular loss. Surgery may include detorsion and orchiopexy, and the contralateral testis should also be evaluated (11,12).

Torsion of the appendix testis

Torsion of the appendix testis or appendix epididymis, commonly occurring in boys aged 7 to 12, presents with sudden-onset scrotal pain. Physical examination reveals a nontender testicle and a palpable, tender mass, often at the testicular poles. In some cases, gangrenous tissue may manifest as the "blue dot sign." The cremasteric reflex may be normal, and Doppler ultrasound or nuclear scan shows normal or increased blood flow. Diagnosis is primarily clinical, with imaging aids if necessary. Management involves supportive care with analgesics and scrotal support, while surgery (appendage removal) is considered for persistent pain, excluding the need for contralateral exploration (13).

Intermittent testicular torsion

Intermittent testicular torsion manifests as acute, sharp pain with rapid self-resolution, recurring intermittently in boys. In a review, 26 percent experienced nausea or vomiting, and 21 percent reported nocturnal pain. Physical signs include mobile testes, anterior epididymis, or a bulky spermatic cord. Clinical and radiographic evaluations may be normal, emphasizing the need for follow-up on recurrent or worsening pain. Ultrasound, while up to 75 percent sensitive, often shows normal findings, underscoring the diagnosis's clinical nature. Immediate follow-up is crucial, and a seven-day reassessment is recommended if initial evaluations are unremarkable. Awareness of intermittent torsion aids timely intervention, preventing complications and ensuring optimal care for affected individuals (14,15).

CONCLUSION

Testicular torsion, a urological emergency, demands swift recognition and intervention to avert severe testicular loss. Clinical features, including sudden scrotal pain, guide diagnosis, with the TWIST score aiding assessment. Immediate urological consultation is crucial for both clinical and radiographic diagnoses. Management involves surgical interventions like detorsion for viable testicles and orchiectomy for nonviable ones. Manual detorsion enhances salvage chances. Neonatal cases necessitate prompt surgical evaluation. Torsion of the appendix testis, common in boys aged 7 to 12, is clinically managed, with surgery reserved for persistent pain, showcasing a nuanced approach for optimal outcomes.

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