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Testicular torsion, a time challenging urological emergency: A literature review

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Abstract

Testicular torsion is one of the urological emergencies that are frequently seen in daily practice, particularly in the emergency department, is testicular torsion, requiring immediate prompt scrotal investigation. The timely diagnosis of testicular torsion is greatly aided by a complete history, the presence of a painful and enlarged testis, and testicular imaging. The outcome of the testicles can be impacted by variables such as the degree of testicular torsion at the time of exploration, patient characteristics, and varied time exploration.

Keywords: Testicular torsion; Urology; Emergency; Managements; Morbidity.

1. Introduction

Testicular torsion (TT) is defined as the twisted spermatic cord that causing the ipsilateral testicle to decrease its blood supply. It is one of urological emergencies that frequently found in emergency room, with high morbidity rate. Sudden scrotal pain is a pathognomonic sign of testicular torsion, particularly in young ages. Favorable prognosis for testicular torsion can be achieved with prompt and early diagnosis and managements.

2. Epidemiology

All age groups are susceptible to TT. Although it primarily affects young males in a bimodal manner with peaks in the perinatal and pubertal ages, adults are more likely to be affected than was previously thought, with a peak incidence between 13-14 years old (1-3). The incidence rate being about 1 in 4,000 males under the age of 25 (4).

3. Etiology

The underlying cause of TT is typically difficult to identify. Nonetheless, there are several variables that could increase a patient's risk of TT, such as genetics, environment, past trauma, and the bell-clapper deformity (2). Regarding environmental factors, TT is known to be associated with cold temperatures, and an overactive cremasteric reflex. When compared to other seasons, the incidence of TT was noticeably higher in the winter. Anomalies such as cryptorchidism, ectopic testis, and anatomical malformations like bell clapper are linked to TT, as well environmental and traumatic variables. However, TT also emerged on its own, devoid of any clear risk factors that would have contributed. Additionally, bell-clapper deformity, which commonly manifests in adolescence due to the testes' rapid expansion during puberty, which can cause the testis to flip and twist, is frequently noted in TT patients (5).

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4. Pathophysiology

The tunica vaginalis (TV), which leaves a bare space posteriorly, reflects at both poles of the testis during proper investment. A strong capsule made of three layers encloses the testis itself: the outermost layer is called the visceral TV, the middle layer is called the tunica albuginea, and the innermost layer is called the tunica vasculosa (6). TT occurs when a twisted of the testicle along the spermatic cord causes venous congestion and inadequate artery inflow, which eventually results in ischemia (1). Mainly, TT is caused by the testicle's and the tunica vaginalis' improper or missing fixation. The spermatic cord is located in the tunica vaginalis, which generally attaches to the posterolateral portion of the testicle. A lack of fixation or an aberrant fixation might cause the testicle to twist along the spermatic cord. There are two types of torsion associated with the condition: intravaginal and extravaginal torsion. An anomaly with the tunica vaginalis attachment, most frequently a high attachment known as the bell clapper deformity, that permits the spermatic cord to rotate and twist inside the tunica vaginalis is called intravaginal torsion, which commonly occurs in adolescents and young adults (1,7), while the extravaginal torsion commonly occurs in neonates, when the tunica vaginalis and spermatic cord twist caused by unattachment of tunica vaginalis to the gubernaculum. This could happen a few weeks or months before birth and about 50% of testicular torsion in infancy occurs prenatally (1,5).

5. Clinical Presentation

When assessing a patient for the possibility of testicular torsion, a complete medical history is crucial. Sudden unilateral scrotal pain is a common symptom of testicular torsion. The pain is characterized by not positional and could be continuous or intermittent. Age, the abrupt onset of severe unilateral testicular pain lasting less than 24 hours and being linked to one or more of the following symptoms—nausea, vomiting, scrotal swelling, testicular tenderness, erythema, a high riding testicle (Brenzel sign), and retraction of the scrotal skin (Ger's sign)—are important historical features that may raise the suspicion level. However, a testicular torsion cannot be ruled out in a period of pain that lasts longer than 24 hours (2,9).

One of the most notable findings in testicular torsion is the asymmetrically high-riding testis with a horizontal lay caused by the shortened spermatic cord. However, case studies indicate that only about 50% of testicular torsion cases present this symptom. This suggests that while the sign may be particular when it is present, it may not be sensitive enough to rule out torsion when it is not.

Testicular torsion is more likely if elevating the scrotum does not reduce the pain (negative Prehn's sign), although testicular torsion is not excluded by a positive Prehn's sign. Testicular torsion may also result in the absence of the cremasteric reflex, which is the pinching or stroking of the upper thigh skin that causes the ipsilateral testis to rise through muscular contraction. This clinical sign has demonstrated notable clinician variability and might be challenging to elicit. Research indicates that in the diagnosis of testicular torsion, the absence of the cremasteric reflex may have a sensitivity and specificity of less than 90%. Due to this significant discrepancy, it cannot be used as a stand-alone diagnostic or screening tool (9).

The duration of torsion and the spermatic cord's degree of rotation determine the severity of ischemia. Intermittent torsion is defined by intermittent, brief-duration testicular pain that resolves on its own; complete torsion is defined by twisting that is 360° or more and the lack of intratesticular flow on a color Doppler. When there is partial or incomplete torsion, the degree of torsion is less than 360° with residual intratesticular perfusion (10,11).

6. Evaluation

When a patient presents with acute scrotal pain, the Testicular Workup for Ischemia and Suspected Torsion (TWIST) score may help in clinical decision making (1). TWIST attempts to facilitate the decision making and enable rapid triaging according to physical findings (12). This score is indicative of a basic examination that less experienced professionals might conduct, as it only measures five criteria. Testicular swelling (2 points), firm testicles (2 points), high-riding testicles (1 points), lack of cremasteric reflex (1 points), and nausea/vomiting (1 points) are among the parameters (13). Also, there are five risk stratification systems were explored, including the Barbosa (0–2, 3–4, 5–7) and Sheth (0, 1–5, 6–7) scoring systems, to obtain sensitivity, specificity and area under the receiver operating curve. The most accurate risk stratification system was Barbosa (0-2, 3-4, 5-7), with an AUC of 0.924 (95% CI: 0.865, 0.956). Barbosa showed favorable sensitivity in low-risk patients (0.984), facilitating rule out of torsion, and favorable specificity (0.975) in high-risk patients, facilitating urgent surgical exploration. A score of 0–2 is deemed low risk and is associated with a 100% negative predictive value for torsion. In general, ultrasonography and urological consultation are not required in patients in this category. A score of 3–4 is deemed intermediate risk and warrants ultrasonography

and possible urological consultation, whereas a score of 5 or more is classed as high risk and is associated with a 100% positive predictive value for testicular torsion. Patients in this category do not require ultrasonography but rather urgent urological consultation and surgery with a view for testicular salvage (12,14). TWIST is an effective tool for suspected testicular torsion and is appropriate for widespread adoption. The Barbosa scoring system is reliable and reduces reliance on scrotal ultrasound. TWIST may make it possible for emergency physicians and surgical units to communicate risks clearly once it is well-established. Moreover, TWIST's practical implementation is straightforward.

Signs/Symptoms	Points
Hard/tenderness of testis	2
Swelling	2
Nausea/vomiting	1
Absent cremasteric reflex	1
High riding testis	1

Figure 1 Five criteria from the history and clinical examination in TWIST score

Color Doppler ultrasonography of the testis is widely used for fast examination in the diagnosis of TT (15). This imaging is a relatively accurate diagnostic tool for TT; prior meta-analyses have demonstrated a sensitivity and specificity of 0.86 and 0.95, respectively, increasing to 0.92 and 0.99 with a positive “whirlpool sign” (spiral-like appearance of the twisted spermatic cord) (12). However, waiting for and obtaining imaging constitutes a time delay, which may prolong ischemic time and reduce testicular viability; additionally, the accuracy of ultrasound is operator dependent, and outcomes can vary depending on sonographer proficiency. Color Doppler ultrasonography allows simultaneous real-time display of tissue morphology in gray-scale and color-encoded characteristics of blood flow. It has a diagnostic accuracy of 95% in testicular torsion (16).

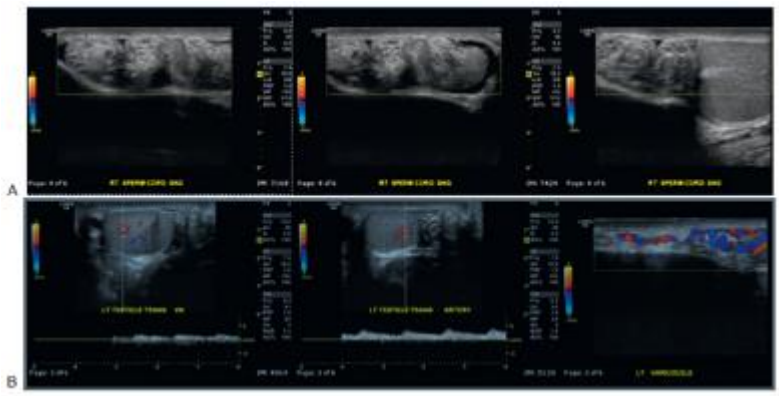

Figure 2 Scrotal doppler ultrasonography showed “whirlpool sign”

7. Managements

The time window for possible salvage and survival of a torsed testicle is commonly thought to be 6 to 8 hours. However, survival of torsed testicles with or without subsequent atrophy is known to occur outside that critical time window. (17). Manual detorsion of the testis is an old maneuver described both in adults and children. In 1893, manual detorsion was initially reported as a way to instantly relieve pain and reverse ischemia. Manual detorsion performed by rotating the testicles in the opposite direction of the torque, to return the testicles to their initial position. It is typically performed via the “opening the book” maneuver (18). The detorsion was probably successful if the pain reduced afterwards. Rotating in the opposite direction is the necessary detorsion technique if the pain worsened. Despite the EAU Guideline on Pediatric Urology suggests that such a maneuver should be attempted in all patients if possible, few data are available about the success rate and clinical and imaging characteristics to predict the success of manual detorsion (19). When there was no edema and the patient's presentation was delayed by fewer than six hours, manual detorsion offered safe and effective emergency management for juvenile testicular torsion. This method should be made available to many people as quickly as feasible after being identified as a temporary rescue (20).

Patients are nevertheless encouraged to undergo the gold standard diagnostic and treatment for testicular torsion in order to prevent recurring torsion. Orchidectomy and orchidopexy are among these procedures. If the testicle is still viable, orchidopexy is performed with the intention of realigning and stabilizing the testicle to prevent further twisting. Testicles that have undergone necrosis are removed via an orchidectomy, also known as testicular excision. Management of testicular torsion should be carried out within <6 hours after onset (21).

An emergency requiring prompt surgical investigation of the scrotum is testicular torsion. The viability of the afflicted testis is gravely threatened if the ischemia lasts longer than four hours. Additionally, it has the potential to seriously harm the testis on the other side. Younger patients have better testicular salvage, probably because their spinal cords have twisted less. The effects of warm ischemia time are significant within six hours following torsion. When compared to a descended testis, the salvage rate for an undescended testis suffering torsion is incredibly low, with an orchiectomy rate of 60–70%. Manual testicular detorsion is carried out during scrotal examination, and the testis' vitality is assessed. (21,22).

8. Differential Diagnosis

The differential diagnosis of testicular torsion is broad. Various scrotal-related pathologies may clinically mimic testicular torsion and present with an acute scrotum. These include scrotal cellulitis, gangrene, edema, scrotal abscess, and fat necrosis secondary to trauma. Pathology of surrounding structures such as rupture of the tunica albuginea, spasm of the cremasteric muscle, torsion of the spermatocele, hydrocele and pyocele may also present with an acute scrotum

Torsion of the testicular appendages, polyorchidopathia, trauma, ischemic necrosis, tumour-related bleeding, mumps orchitis, testicular infarct, and myofibroblastic pseudotumor are among the testicular disorders that can mimic testicular torsion. Conditions affecting the spermatic cord that can mimic testicular torsion include an infarcted spermatic chord, hematoma, and thrombophlebitis associated with varicocele. Additionally, a number of systemic conditions may manifest with symptoms similar to those of testicular torsion. Henoch-Schonlein purpura, thromboangitis obliterans, polyarteritis nodosa, and familial Mediterranean fever are a few of them. Testicular torsion can also be mimicked by abdominal and retroperitoneal pathologies such as incarcerated strangulated hernia, pancreatic tumor, hemoperitoneum, acute appendicitis, and infrequently, adrenal hemorrhage in newborns (8).

The most frequent mimics of testicular torsion are epididymoorchitis and twisting of the testicular appendages. The table below provides a description of these disorders' clinical features. An acute scrotum can arise from torsion of any of the four testicular appendages: the vas aberrans (organ of Haller), the paradidymis (organ of Giraldes), the appendix testis (remnant of the paramesonephric duct), and the appendix epididymis (remnant of the mesonephric duct), especially in children (2).

Table 1 Clinical characteristics that accompanying scrotal pain

Condition	**Characteristics**
Testicular torsion	Sudden asymmetrical scrotal pain
	Scrotal edema
	Fever, nausea, vomiting
	Negative Prehn’s sign
	Brunzels sign
	Ger’s sign
	Absence of cremasteric reflex
	Acute onset of symptoms
	Blue dot sign observed through scrotum

Testicular appendix torsion	Usually present in young boys
	History of trauma may be is present
	Tenderness in the upper pole
Epididymo-orchitis	Presents usually after puberty in sexually active person
	Scrotal edema
	Positive Phren's sign
	Epididymal tenderness

9. Prognosis

The likelihood of a torsed testis remaining viable is inversely proportional to the duration between symptom begin and detorsion. A published study of 1140 patients indicated that the risk of requiring orchiectomy was 5%, 20%, 40%, 16%, and 90% at 0-6, 7-12, 13-18, 19-24, longer than 24, and longer than 48 hours after symptom onset, respectively.

When findings are suspicious for spermatic cord torsion, emergent scrotal exploration is required with the goal of the patient getting to the operating room within 4 hours of onset of pain (23).

The testis salvage rate approaches 100% in patients who undergo detorsion within 6 hours of the start of pain. However, there is only a 20% viability rate if torsion persists >12 hours; and virtually no viability if torsion persists >24 hours (18). Testicular viability significantly decreases 6 hours after the onset of symptoms (2). The duration of symptoms prior to detorsion and the degree of twisting is crucial prognostic factors determining the extent of testicular damage and its potential for salvageability (24). Early surgical intervention with detorsion (mean torsion time less than thirteen hours) was found to preserve fertility (25).

However, we determined that age was related to the risk of testicular loss. In infancy, 45.37% of the cases of testicular torsion led to orchiectomy, while most adolescent patients underwent orchiopexy (78.2%). Since adolescents have the ability to articulate their symptoms, they visit a hospital in a timely manner. However, infants are unable to express scrotal pain. Thus, diagnosis and treatment are inevitably delayed. In addition, neonatal testicular torsion is generally asymptomatic, making it difficult to diagnose (5).

10. Complications

Torsion testis complications develop as a result of testicular ischemia and are closely related to the degree of torsion of the testis and ischemic duration. Torsion testis may lead to sub/infertility, testicular infarction, necrosis, and loss of the testis (26,27).

11. Conclusion

Acute testicular torsion is one of the most dramatic urological emergencies for both the patient and his family. The result of testicular torsion is determined by when the patient arrives at the emergency department, as well as how quickly the diagnosis is diagnosed and treatment begins. Delays in identification and treatment always result in testicular atrophy. Approximately 20-40% of cases of testicular torsion require an orchiectomy. African Americans and younger males have a significantly higher risk of losing a testis. The salvage rate is approximately 100% for those who present within the first 6 hours of symptoms, but it soon reduces to less than 50% if the delay in seeking help is more than 12-24 hours. More importantly, when the testis is repaired with orchiopexy, there is a risk of future torsion.

12. Take home messages

Acute scrotum is a typical emergency presentation in surgical and emergency departments. Diagnosis of TT is challenging and time critical. Many presentations are diagnostically ambiguous, which may lead to unnecessary investigation, potentially delaying surgical therapy.

The first person to encounter the patient is the triage nurse who must be familiar with the symptoms of the disorder. Time is of the essence, and the nurse should be aware of torsion and promptly admit the patient and quickly notify the

ED physician. TWIST score can be use aims to streamline this decision-making process and allow for rapid triaging based on physical findings. The emergency department physician should consult with a radiologist for the necessary test while also consulting with a urologist. If the testing confirms torsion, the urologist is typically required to do the surgery. The nurse ought to educate the family and patient about the potential problems, which include testicular loss and infertility. The nurse should ensure that the patient is not given any food or drink by mouth and that the patient is prepared to undergo immediate surgery.

More importantly, the nurse should not administer any pain medications until the patient has been evaluated by a urologist, as this will mask the symptoms and postpone the diagnosis. Only a holistic approach to diagnosis and treatment makes it possible to save the testis. Open communication between team members is essential if results are to be improved.

Compliance with ethical standards

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Disclosure of Conflict of interest

The authors declare no conflict of interest.

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