

CASE REPORT

The limits of diagnosis of testicular torsion in the child: Medicolegal implications in clinical practice

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Abstract

Testicular torsion is a pediatric urological emergency. We report a case of testicular torsion that occurred in a 10-year-old child. The case shows that it is a disease with risk of medicolegal litigation. We demonstrate the role of proper triage, and we analyze the limits and critical points for diagnosing it.

KEYWORDS

acute scrotum, echo color-Doppler, pediatric emergency, spermatic cord torsion

1 | INTRODUCTION

Testicular torsion is caused by the twisting of the spermatic cord along its axis. The spermatic cord contains vessels with nerves that are important for testis vitality. The *tunica vaginalis* is a sac from peritoneum that fixes the testes on the posterior surface while the *gubernaculum* on the inferior one. Testicular torsion may be intravaginal or extravaginal. The first type is a twist occurring inside the vaginal tunic and is typical in adolescent boys or young adults. In this case, the cause would be an abnormal graft of the posterior side of testis to the scrotum, so that the testes can freely rotate, with the formation of a bell-clapper deformity.¹ In the second case, extravaginal torsion is determined by an abnormal descent of the testicle in the neonatal period and it is typically at the inguinal canal.²

The rotation causes a decrease in testicular blood flow, resulting in ischemia and necrosis, that requires urgent surgical treatment.³ It represents one of the most common pediatric urological emergencies. Testicular torsion affects 3.8 per 100,000 male patients under the age of 18 years old. Moreover, it represents about 15% of the diseases that cause "acute scrotum" in children and orchiectomy is required in more than 40% of cases.⁴ To date, no specific cause of torsion has been identified. The most accepted hypothesis is that torsion is associated with congenital anatomical anomalies. In these cases, some predisposing factors, such as an excessive length of the spermatic cord or bell-clapper deformity, could favor torsion.⁵ In some patients, a triggering event such as physical injury or intense effort may be identified. Some authors have also reported sexual activity, testicular cancer, or some diseases that can

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cause testicular volume increase. In many cases, however, a specific trigger is not identified. In both extravaginal and intravaginal rotations, the torsion produces venous congestion with arrest of blood flow and consequent ischemia of the parenchyma of testis.^{6,7} The most typical symptomatology is characterized by pain, swelling, and testicular hyperemia. However, the symptoms are often blurred or nonspecific.⁸ In the literature, a study has been reported that compared the symptoms in prepubertal and postpubertal patients.⁹ This analysis has shown that the symptomatology in prepubertal patients tends to be scarcer and more nuanced.⁹ This would cause a diagnostic and treatment delay. For this reason, a careful but rapid differential diagnosis is mandatory. Many diseases may be similar to testicular torsion, and most of them cause acute scrotum such as acute orchiepididymitis, varicocele, inguinal hernia, testicular appendage torsion, idiopathic scrotal edema, scrotal trauma, and some systemic hematological diseases, such as the Henoch-Schönlein purpura. Differential diagnosis is based on the symptomatology and on some characteristic signs such as the reduction in the cremasteric reflex, the Prehn sign, and the Gouverneur sign. Among the instrumental investigations, echo color-Doppler (ECD) represents the *gold standard* for differential diagnosis. Recently, some authors showed that ECD can help physicians to estimate the probability of saving the testicle and, therefore, to predict surgical outcomes.¹⁰ For example, parenchyma heterogeneity represents an index of testicular necrosis and, therefore, a negative predictive factor.¹¹

Regarding laboratory investigations, recent studies suggested that the mean platelet volume (MPV) may predict surgery viability and be useful for differential diagnosis with other diseases.¹² In general, testicular torsion is a time-dependent disease where fast diagnosis is essential. The reduction in testicular blood flow quickly produces ischemia with necrosis and atrophy of the parenchyma. It has been calculated that severe testicular atrophy can occur after 4 hours when the torsion is more than 360 degrees. In cases of incomplete torsion (less than 360 degrees), atrophy may not yet have occurred if symptoms have started in the last 12 h. Therefore, it is essential that urgent surgical exploration is performed in all cases of testicular torsion within 24 h of the onset of symptoms.¹³ When ischemia has started, testicular torsion can lead to severe dysfunction, including subfertility or infertility. Several authors have suggested a negative impact of testicular torsion on semen quality, including sperm morphology, motility, density, and mean sperm counts.¹⁴⁻¹⁶ A prompt diagnosis is important to avoid the risks due to vascular damage and atrophy.

In this study, we present a case of spermatic cord torsion. We show the difficulties in diagnosing testicular

torsion and the clinical risk management of this disease. For each stage of clinical management, we have identified some critical points with different operational proposals for avoiding potential errors and ensuring patient safety.

2 | CASE PRESENTATION

We present the case of a 10-year-old child who came to the emergency room in the morning due to pain in his left testicle that had started the previous evening, without fever. The physicians visited the child who showed pain, with increased volume and consistency of the left testicle. The child was subjected to a standard testicular ultrasound showing an initial inhomogeneity of the parenchyma. After several hours of waiting, the child was transferred to a surgical unit for surgical exploration. During the procedure, the physicians noted testicular necrosis with double twisting of the spermatic cord along the longitudinal axis. For this reason, orchifuniclectomy and orchidopexy were performed.

3 | DISCUSSION

Testicular torsion is a disease that shows a low incidence within the general population (3.8 per 100,000 patients).⁴ However, it is one of the diseases with the highest risk of medicolegal litigation for physicians. A recent study, carried out on 52 cases of litigation for delayed diagnosis of testicular torsion, has shown that half of the cases involved an indemnity payment, while the remaining half ended in favor of the physician.¹⁷ Another study analyzed 39 cases with a similar methodology, showing that only 33% of the cases ended in favor of the physicians.¹⁸ Literature data suggest that in most cases, the emergency physicians and the urologists are involved in litigation. More rarely, primary care physicians, pediatricians, radiologists, and surgeons may be involved. In more than 70% of cases, a wrong diagnosis was contested.^{17,18} In minor percentages that omitted diagnosis, lack of radiological examination, or surgical errors were disputed. Testicular torsion shows risks of litigation, in both criminal and civil proceedings. According to scientific literature data, we have evidenced two main causes of litigation: delay in diagnosis and wrong diagnosis. We believe that these risks depend on some fundamental phases in the clinical management of the case before surgery: (1) triage; (2) medical history; (3) physical examination; (4) radiological investigations; and (5) specialist consultations in ER.

Testicular torsion is a urological urgency that requires fast and effective intervention. The speed of treatment is directly proportional to the speed of diagnosis in the

emergency room. A recent study has shown that every 10 minutes of diagnosis delay in ER reduces the chance of testicular survival and successful outcome of surgery by 4.8%. This time frame, defined as “Door To Detorsion Time (DTD),” includes the time interval between the access to ER and surgery and is a survival factor exclusively dependent on the quality of the service sanitary.¹⁹ In the scientific literature, a 6- to 8-hour rescue window was calculated from the onset of symptoms. Three groups of patients were divided based on the timing of surgical exploration. The first group, treated within 12 h, showed a probability of saving about 90%; the second group, treated between 13 and 24 h, had a probability of 54%; the third group treated after 24 h had a probability of 18%.²⁰ The scientific literature data show that adequate triage in the ER is essential for reducing the DTD. For this reason, if testicular torsion or acute scrotum is suspected, the patient waiting time must be very short. This is only possible if a proper priority code is assigned. Furthermore, an accurate medical history is mandatory in the ER, including the patient age, timing of onset of symptoms, possible triggers (recent traumas), and physical examination. Finally,

physicians should request ECD, with urological or surgical consultation to evaluate the need for urgent surgical exploration.

There is no standard presentation of symptoms. In some cases, symptoms are gradual; in other cases, an acute onset of pain is described.²¹ Atypical symptoms such as vomiting and radiating pain to abdominal region, lower limbs, or even the back are also described. Vague symptoms can deceive physicians. Literature data showed that the most frequent error (2/3 of the cases) is to confuse testicular torsion with orchiepididymitis.¹⁷ Even the physical examination is not always the same. Cases of torsion with cremasteric signs or with Prehn and Gouverneur signs are described.²⁰ Given the often-nuanced presentation, we suggest to always report a careful description of the symptoms of the patient and the result of all the signs evaluated.

Also, radiological investigations may present limits of sensitivity and specificity. The *gold standard* is ECD or high-resolution ultrasonography. The most typical sign is the so-called “whirlpool sign,” which is a spiral-like pattern at the spermatic cord.²² Although this sign has great

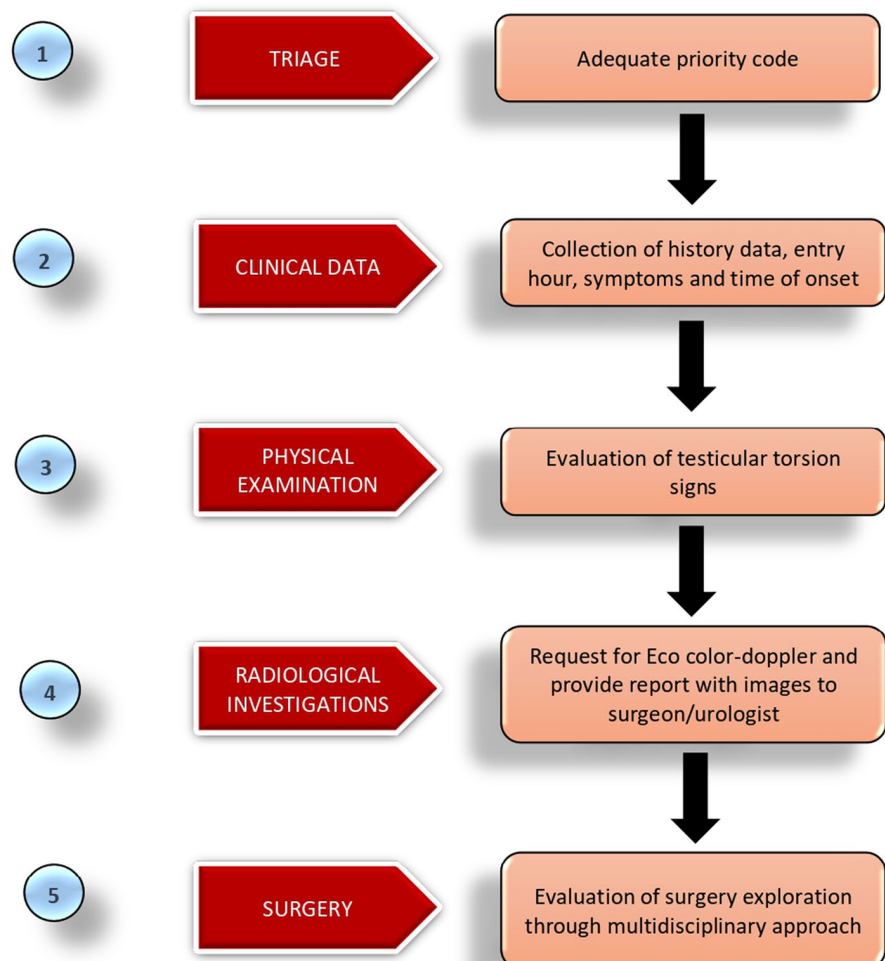


FIGURE 1 Diagnostic protocol in cases of suspected testicular torsion

clinical significance, it is common for radiologists to view a simple winding course of the funiculus with a redundant pattern. In general, a 96% ECD sensitivity was calculated but cases of false negativity are also described even after performing this investigation. In the forensic field, we suggest to always carry out this investigation by consulting a radiology specialist before proposing any surgical exploration. Furthermore, we evidence to specify in the record of the patient for any diagnostic doubts, always attaching a print of the images to be submitted also to the attention of the urologist or surgeon.

In the reported case, testicular torsion occurred about 10 h before access to ER. Surgical exploration showed the spermatic cord was twisted with double knotting and necrosis, so the only possible solution was the orchiectomy even if the physicians had diagnosed the disease promptly, because the child access to ER was too late. However, the case shows that there was an avoidable error in each of the critical phases listed. In the triage phase, it would have been appropriate to assign a higher priority code to reduce the waiting time of the patient in the ER; the time and hour of onset of symptoms were not requested; in the phase of the physical examination, the results of the tests were not reported; in radiology, an ECD was not performed but only a standard ultrasound scan. These data show that proper clinical management in the critical phases may reduce the risk of medicolegal dispute.

In conclusion, the case confirms that testicular torsion shows high litigation risks. Therefore, if torsion is suspected in the child or adolescent we propose to:

1. Ensure a triage with adequate priority;
2. Perform a thorough collection of history data, indicating the time of onset of symptoms and the time of entry at ER. A description of the anatomical localization of symptoms is mandatory in order to identify cases with atypical symptoms that require a careful differential diagnosis;
3. Always perform the physical examination with the relative tests, reporting the result in the patient record;
4. Request an ECD with a radiologist consultation;
5. Provide the radiological report with the images to an urologist or surgeon;
6. Evaluate surgical exploration with clinical and radiological data through multidisciplinary approach (Figure 1).

The case demonstrates how the study of clinical risk management can improve public health standards by reducing the risk of medicolegal disputes.²³ We emphasize a proper protocol for testicular torsion in order to offer a higher quality of care and avoid diagnostic errors.

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CONFLICT OF INTEREST

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

AUTHOR CONTRIBUTIONS

IA conceived the idea of the research. IA and PR managed the organization and drafting of the paper. LA and MAS analyzed the data and wrote the paper.

ETHICAL APPROVAL

Written informed consent was obtained from the parent to use the data and publish this report.

CONSENT

The consent was given by the child's parents.

DATA AVAILABILITY STATEMENT

Data sharing is not applicable to this article as no datasets were generated or analyzed during the current study.

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