

Relationship between Trauma and Acute Scrotum: Test Torsion and Epididymal Appendix Torsion

Saimir Heta, Kastriot Haxhirexha, Virtut Velmishi, Nevila Alliu, Ilma Robo

Abstract—Background: Testicular rotation can occur at any age. The possibility to save the testicle is the fastest possible surgical intervention which is indicated by the presence of acute pain even at rest. The time element is more important to diagnose and proceed further with surgical intervention. Testicular damage is a consequence which mainly depends on the moment of onset of symptoms, at the time when the symptoms are diagnosed, the earliest action to be performed is surgical intervention. Sometimes medical tests are needed to confirm a diagnosis, or to help identify another cause for symptoms; for example, the urine test, that is used to check for infection, associated with the scrotal ultrasound test. Control of blood flow to the longitudinal supply vessels of the testicles is indicated. The sign that indicates testicular rotation is a reduction in blood flow. This is the element which is distinguished from ultrasound examination. Surgery may be needed to determine if the patient's symptoms are caused by the rotation of the testis or any other condition. Discussion: As a surgical intervention of the emergency, the torsion of the test depends very much on the duration of the torsion, as the success in the life of the testicle depends on the fastest surgical intervention. From the previous clinic, it is noted that in any case presented to the pediatric patient diagnosed with testicular rotation, there is always a link with personal history that the patient refers to the presence of a previous episode of testicular trauma. Literature supports this fact very logically. Conclusions: Salvation without testicular atrophy depends closely on establishing the diagnosis of testicular rotation as soon as possible. Following the logic above, it can be said that the diagnosis for rotation should be performed as soon as possible, to avoid consequences that will not be favorable for the patient.

Keywords—Acute scrotum, testicular torsion, newborns, infants, clinical presentation.

I. BACKGROUND

TESTICULAR torsion is a real surgical emergency with peak presentation in adolescence, between 12 and 16 years of age [1]. However, rotation can occur at any age. The classic presentation is acute severe scrotal pain at rest. To clinically save the test from torsion time is of the essence - the earlier the surgical intervention, the higher the probability of saving the testicle. The two most important factors that determine testicular damage are the time from the onset of symptoms to the reduction in rotation and the rate of incision in the spermatic cord [2]. Pain at rest is the patient's urgent

Saimir Heta and Virtut Velmishi are with the Department of Pediatric Surgery, QSUT, Tirana, Albania.

Kastriot Haxhirexha is with the Clinical Hospital, Department of Surgery, Tetovo, FYROM.

Nevila Alliu, is with the Hospital Biochemical Laboratory, Tirana, Albania.

Ilma Robo is with the Albanian University, Faculty of Medical Sciences, Department of Periodontology, Tirana, Albania (e-mail: ilarobo@yahoo.com).

complaint. However, the presentation is variable and there may or may not be any history of trauma or physical activity. Vomiting may occur. Fever is not common.

Acute scrotal pain and accompanied swelling are two clinical elements that indicate the clinical presence of test torsion. The final diagnosis is made after taking anamnesis, clinical examination, analysis (complete urine, imaging) and differential diagnosis; which in this case is done through clinical conditions: torsion of the testicular appendix, epididymitis, trauma, hernia, hydrocele, varicocele, Henoch-Schönlein purpura. These clinical conditions do not require immediate surgical intervention, unlike test torsion [3], [4]. In the case of suspected testicular torsion, the doctor will ask questions to verify if the signs and symptoms are caused by the testes roll or something else. Doctors often diagnose the rotation of the testes with a physical examination of the scrotum, testicles, abdomen and groin. The doctor may also test the patient's cremasteric reflex by rubbing or stroking the inner surface of the thigh on the affected side. Normally, this action would cause the testicle to contract. However, this reflex cannot occur if there is testicular torsion.

Sometimes medical tests are needed to confirm a diagnosis, or to help identify another cause for the symptoms a patient is experiencing. For example:

- Urine test. This test is used to check for infection.
- Scrotal ultrasound, with which the rotation of the testicles can be diagnosed, even the twisting of the spermatic cord that also contains the blood vessels, which make the blood supply to the testicles. Twisting of blood vessels reduces the blood supply to the affected testicle. This element can be diagnosed by ultrasound examination.
- Surgery. Surgery may be needed to determine if the symptoms are caused by rotation of the testis or any other condition.

If the patient has pain for several hours and the physical exam suggests testicular torsion, the patient is recommended to undergo immediate surgical intervention without any additional tests. Surgical delay can result in testicular loss.

II. TESTICULAR ROTATION IN NEWBORNS AND INFANTS

Rotation of the testicle can occur in newborns and infants, although it is rare. Testicular rotation is a phenomenon that can occur regardless of age; however, the age element greatly affects the frequency of occurrence of this pathology. It is known that in newborns the frequency is rare while in slightly older children, this pathology appears at even higher frequency, therefore clinical care for this pathology should be increased. The key to the whole phenomenon is the timely

capture of the pathology, so that it can be intervened in time to eliminate the most serious consequences for the pathology. In babies, the testicle can be strong to the soft touch, swollen or darker in color [3], [4]. Ultrasound cannot detect reduced blood flow to the baby's scrotum, so surgery may be needed to confirm the testicular rotation. The age of the patient will determine the type of surgical intervention that can be performed. In newborns, it is important to perform the surgical intervention as soon as possible, capturing the patient's clinical signs as soon as possible. It is understood that everything can be complicated depending on the performance of the surgical procedure, starting with the anesthesia process and related complications, or evaluating surgical contraindications. Treatment for testicular torsion in infants is controversial [3], [4]. Urgent surgery of the newborn with signs of test rotation is the next stage which has a high risk in relation to general anesthesia and the age of the patient, which affect the intervention protocol. But emergency surgery can sometimes save one part of the testicle and can prevent rotation to the other. Treating testicular rotation in infants can prevent future problems with male hormone production and fertility. Fertility is one of the consequences of non-correction of surgery at time of testicular rotation in newborns. This consequence with a significant effect on male productivity is closely related to minimal surgical intervention despite the consequences and surgical complications, performed at the age of newborn. Knowing this correlation, it is understood once again the importance of timely assessment of the clinical situation and of timely surgical intervention in order to have the best possible results in the future [3], [4].

Scrotal pain is the most common symptom of patients presenting at the emergency room. True urological emergencies, such as testicular torsion, should be considered. The literature supports the fact that testicular rotation is extremely rare in the geriatric population, in which infectious or even malignant etiologies are more common. This fact is supported by reports of patients in sixth and seventh decades of life. The rate of testicular recovery in adults who presents with testicular rotation is poor due to the lack of recognition of this pathology by physicians [4], [5]. The literature presents the case of a 66-year-old man who presented to the emergency department with scrotal pain and was found to have testicular rotation after scrotal imaging and surgical intervention. This case highlights the need to consider rotation in the differential diagnosis of any person presenting with scrotal pain, regardless of age [5].

The clinical case demonstrates that testicular rotation can occur in the elderly males. It should be included in the differential diagnosis of acute scrotum at any age. History and physical examination remain the keys to diagnosis. Doppler color ultrasound may be useful to verify the absence of blood flow to the affected side, but should not delay surgical examination [5].

III. TESTICULAR ROTATION AT PUBERTY

With or without the presence of local swelling and erythema, it is the appearance of acute pain, the clinical case

where the diagnosis of an acute scrotum can be made. Ischemic damage to the testicles can be permanent as result of testicular rotation. Age is the key element in establishing the differential diagnosis since testicular rotation is more common in neonates and appendicitis testicular rotation is more common in the age before puberty. It takes a period of 4-8 hours from ischemic injury to severe irreversible testicle damage. If we compare the two ages when the types of testicular torsions appear, it is noticed that intravaginal rotation is more common in children and adolescents than in newborns. The age difference is again significant as it is directly related to the rapid growth of the testes during puberty [3], [4].

The axis of the testicle against which the rotation occurs is the element most affected by the rapid increase in testicular mass brought about by changes in puberty. Un-stabilized fixation of vaginal tunic allows the testicle to rotate along the tunic, resulting in excessive testicle rotation, a type of clinical sign that is more common in neonates. Family history can show the characteristics of this pathology of the appearance and spread in different generations of the same family. Continuing the logic of linking this pathology to the patient's age, the literature data emphasize that testicular rotation occurs locally before the age of 3 years and after puberty [3], [4]. The association with the sensation of vomiting and nausea, with the appearance of immediate unilateral pain of the affected test, are the clinical signs of the appearance of pathology. Even the clinical examination of the pathology speaks of hypertrophy of the affected test and retraction towards the inguinal region. Hemi-scrotum presents with varying degrees of swelling or redness, depending on the duration of testicular rotation [4], [5].

Clinical ultrasound examination is another examination technique that helps establish the diagnosis. On the contrary, an accurate assessment of the presence or absence of some clinical signs such as test swelling, stiffness, lack of cremaster-reflex, the presence of nausea and vomiting may be applied. If this rating reaches level 6-7, ultrasound examination can be eliminated. The other analysis is urine culture which should result in pyuria and bacteria [4], [5]. High-resolution Doppler is used to assess blood supply and normal or abnormal blood flow in the affected test. Doppler sensitivity and specification for false positive results reaches up to 1%. Normal test prevention can be tried by moving it, from the medial direction to the lateral one. If this lateral rotation action is successful, the fall of the test is felt in an inferior position to the scrotum, accompanied by pain relief, which is an immediate sensation in the patient. Repetition of the rotation even after the destruction of the testicle is possible, so the fixation of the rotated testis is more induced and forced as action during surgical intervention. [4], [5].

IV. CLINICAL PRESENTATION AND PHYSICAL EXAMINATION OF THE PATIENT

The most common and alarming complaint is testicular pain generally at rest. However, the presentation is variable and may or may not have a history of trauma or physical activity.

The patient may be confused. Fever is not common. The delicate tenderness of the testicle is universal. Because the time for diagnosis of testicular torsion is directly related to the success of testicular survival without atrophy, efforts have been made to quickly diagnose rotation as the number of negative examinations decreases. Based on literature [1], Barbosa and colleagues developed an initial evaluation system for testicular swelling (2 points), hard testicles [2], lack of cremaster reflex, nausea/vomiting, and high testicles. Outages for low and high risk were 2 points and 5 points, respectively. Negative and positive evaluation values were 100% respectively for outages of 2 and 5 (specificity 81%, sensitivity 76%).

Based on literature [1], [4] Barbosa and colleagues concluded that only 20% of patients present with acute scrotum. The degree of swelling, erythema, and persistence varies depending on the duration of the testicular rotation. Indeed, a decrease in pain and an increase in swelling and stiffness of the hemi-scrotum are often seen after 24 hours of rotation [4].

V. DISCUSSION

The age difference of the pediatric patient, the pain and explanation of the occurrence of episodes, as well as the severity of the pain, referred by the patient, and reconfirmed by the parents, greatly aid in the differential diagnosis. Pain as a subjective element can also be minimized by the child. The above clinical conditions can be classified as age-dependent: before birth, before puberty or after puberty; this can help in diagnosing the clinic as soon as possible. Diagnostic studies and treatments and available and safe Color Doppler Ultrasound (CDU) provide a rapid assessment of testicular vascularity. The CDU is very specific and sensitive in diagnosing rotation, as well as other pathologies that can cause acute scrotum. CDU results consistent with testicular torsion include reduction or absence of Doppler color or waveforms and parenchymal heterogeneity compared to the contralateral testicle. With inconsistent CDU findings, medical history and physical examination should be well evaluated to determine if intervention is necessary. Doppler does not help diagnose testicular rotation, but identifies other causes of scrotal pain, such as epididymitis or kidney stones [5], [6].

Testicular rotation is a real surgical emergency because the stability of the testicles is inversely related to the duration of the rotation. When findings support or raise suspicions of spermatic cord twisting, urgent examination of the scrotum occurs and should not be delayed. Acute scrotum is a basic diagnosis and can be treated by any certified urologist, with or without sub-specialty training. Transferring patients to pediatric care centers adds unnecessary delays and may reduce the rate of testicular survival. It is worth noting the clinical importance of the timely approach that clinicians should have to diagnose and treat acute scrotum. Neonatal testicular rotation occurs at about 12% of testicular rotation clinical cases. Testicular infarction without visible rotation has been documented by Brereton and Manley since 1980 (given from various sources in the literature[5], [6]). According to which

this torsion is thought to be a secondary consequence of spontaneously deviated rotation. The clinical signs are present at birth and the event of rotation of the testicles occurs at perinatal age; that is why the most appropriate term for the disease is the perinatal torsion. With age and as the child grows, perinatal pathology takes on a different form, shifting the rotation to that of the extra-vaginal form. This form is the most suitable form for these pathologies, no longer of perinatal age [6], [7].

The phenomenon of allowing rotation restricts the external mobility of the vaginal tunic at neonatal age, within the scrotum, perceived under the effect of an external force, or trauma caused by cremaster contractions. Since the elasticity and the mobility of tissues mentioned above exist bilaterally, then as pathology, the rotation of the testicle occurs and can appear bilaterally; it can affect both the left and right sides [6], [7]. Birth weight below the neonatal average accompanied by pathological signs of the area where mainly visible hypertrophy and discoloration of the scrotum are involved, affecting either one of the testicles, or having bilateral involvement. These clinical signs date back to the author Burge, 1987, data taken from later sources in the literature [5], [6]. If the pathology is left without timely intervention, it is understood that the consequence is testicular atrophy which can be avoided removing the affected testicle surgically. Since the characteristic of pathology is bilateral performance, it is suggested that surgical intervention also involve fixation of the other testis as a preventive measure against recurrence. These data were documented by Burge in 1987 and subsequently modified and supported by Mishrika et al. in 1992, data obtained from later sources of literature [5], [6].

Congenital scrotum abnormalities are relatively rare, but most often occur together, accompanying other medical abnormalities. Blood supply and lymphatic drainage are the main factors of testicular swelling which resists over time gradually leading to testicular atrophy. Testicular artery ligation or mechanical blockage of the artery lumen is one of the reasons for the appearance of pathology [5], [6]. The appearance of testicular atrophy requires the presence of prolonged swelling of the testicles for a period of several weeks. If blood supply of the affected testicle is secured by collateral supply, it happens that testicular atrophy occurs in about 1/3-d of clinical cases of accidentally affected cord. At the first view happens to appear acute testicular necrosis which passes into gangrene. Gangrene may further complicate, by infection or formation of local abscess. Surgical intervention and proper application in appropriate doses and adjusted to the body weight of the baby/child, antibiotics, is what is required in such cases. Fertility is the most serious consequence of the delay of the surgical intervention necessary for the treatment of the pathology in question. Following this logic of clinical evaluation, in the anamnesis of clinical cases of fertility, it is said that the former presence of testicular rotation in the perinatal age, is one of the reasons for the occurrence of infertility in adulthood [6], [7].

As mentioned above, the precondition of surgical intervention is necessarily timely diagnosis and with proper

diagnostic methods, the necessary diagnostic tests of pathology, indicated by the clinical signs mentioned earlier. The moment of making the diagnosis further facilitates the treatment protocol and the treatment plan, as it is the initiative for undertaking the surgical intervention. Informing parents about the consequences of atrophy and then about the child's adult fertility is done by signing consent before surgery. Boys aged 12 to 16 years are the most affected by this pathology, as in this age range, the pathology expresses the highest frequency of clinical cases presented with the need for surgical intervention. The typical clinical sign is testicular pain at rest, which appears as result of a previous trauma which is not recorded in the patient's memory [6], [7]. Testicular torsion is a real surgical emergency that requires early surgical intervention for successful rescue. The decision for orchiectomy is made during the surgical intervention, usually based on the lack of blood flow and the color of the testicle. Informed consent should include the possibility of testicular atrophy, the long-term prognosis of which is unknown. However, in the clinical history of male infertility, a history of testicular torsion is rare. Fortunately, because orchiopexy is a relatively simple surgical procedure that can be performed by any surgeon after ultrasound examinations, the chance of successfully treating testicular torsion in adolescent boys remains high [6], [7].

VI. CONCLUSIONS

Establishing the diagnosis of testicular torsion as soon as possible is directly related to the success of clinical testicular "rescue" without atrophy. Efforts should be made to quickly diagnose torsion. The appearance of rotation of one of the testes should be a sign for the fastest possible surgical intervention and a preventive sign for the possible rotation of the other testicle.

AUTHOR CONTRIBUTIONS

Literature research was conducted by Dr. Saimir Heta. It was his insistent work that made it possible to reach the conclusions in this article.

CONFLICTS OF INTEREST

We declare that there is no conflict of interest between the authors and the material presented in this article.

REFERENCES

- [1] Mäkelä E, Lahdes-Vasama T, Rajakorpi H, Wikström S. A 19-year review of paediatric patients with acute scrotum. *Scand J Surg.* 2007;96:62–66. (PubMed)
- [2] Visser AJ, Heyns CF. Testicular function after torsion of the spermatic cord. *BJU Int.* 2003;92:200–203. (PubMed)
- [3] Barbosa JA, Tiseo BC, Barayan GA, et al. Development and initial validation of a scoring system to diagnose testicular torsion in children. *J Urol.* 2013;189:1859–1864. (PubMed)
- [4] *J Pediatr Surg.* 2018 Aug 8. pii: S0022-3468(18)30436-6. doi: 10.1016/j.jpedsurg.2018.07.006. (Epub ahead of print); Controversies in the management of neonatal testicular torsion: A meta-analysis.; Monteilh C, Calixte R, Burjonrappa S.
- [5] *Urol Case Rep.* 2018 Nov; 21: 1–2.; Published online 2018 Aug 4. doi: (10.1016/j.eucr.2018.08.003); PMID: PMC6086218; PMID: 30116718

- "Testicular torsion in older men: It must always be considered" Ibrahim Mejdoub, Mohamed Fourati, Sami Rekik, Nouri Rebai, Mourad Hadjslimen, and Mohamed Nabil Mhiri
- [6] Grace S. Hyun; Testicular Torsion; *Rev Urol.* 2018; 20(2): 104-106. doi: (10.3909/riu0800); PMID: PMC6168322; PMID: 30288149
 - [7] Ahmadnia H, Dolati M, Ghanadi A, Younesi Rostami M, Akhavan Rezayat A; "Effect of Unilateral Iatrogenic Torsion on Contralateral Testis in Rat, Prepubertal and Postpubertal" *Urol J.* 2018 Sep 11. doi: 10.22037/uj.v0i0.4289. (Epub ahead of print).