

# Treatment of testicular torsion in children: One surgeon experience

Canan Kocaoglu

Konya Education and Research Hospital, University of Health Sciences, Department of Pediatric Surgery, Konya, Turkey

Copyright © 2018 by authors and Annals of Medical Research Publishing Inc.

## Abstract

**Aim** Testicular torsion (TT) is an urgency that requires operation in children. Here, it was aimed to investigate the characteristics of cases operated on due to TT and to discuss its results in light of the literature.

**Material and Methods:** Operated due to TT, 22 cases and their ages, time spent between initial of complaints and hospital admission, color-Doppler-ultrasonography (CDUS) findings, degree of torsion and the results were investigated retrospectively.

**Results:** While median (IQR) age was 7.5 (12.25) years (4hours-16years), median (IQR) application time was 18.5 (33) hours. Three cases were with prenatal torsion. The most common complaints were pain, swelling, discoloration of scrotum, and vomiting. Three cases were admitted with inguinal masses, two of whom were undescended TT. Left testicles were torsioned in 17 cases. Median (IQR) TT degree was 540 (225). While CDUS was descriptive in 20 patients, it was reported as epididymo-orchitis and hydrocele in two cases. Orchiectomy was performed in eight cases, while testicular detorsio-fixation was performed in 14 cases. The cases undergoing orchiectomy had an average of 792 degree. Two of these were prenatal, and two were undescended TT. Mean application time for the other four cases was 83.5 hours.

**Conclusion:** For early and true diagnosis of TT, CDUS is a quite effective method. If reported not to be perfusion, the case is certainly assessed as torsion. If reported as epididymo-orchitis or hydrocele in CDUS, but suspected to be torsion, the patient should be explored immediately.

**Keywords:** Children, detorsion, orchiectomy, color-Doppler-ultrasonography, testicular torsion.

## INTRODUCTION

Testicular torsion (TT) is the rotation of testes at the axis of the vascular pedicle. This abnormal rotation may cause a decrease or cease the blood supply in the testis on the affected side (1). TT is a real one emergency because the salvation chance of the testicle gradually decreases as the duration of the testis torsion sitting out (2). TT is encountered at the rate of 1/4000 males under the age of 25 each year (3). The diagnosis of TT is performed with a detailed history, physical examination and color-Doppler ultrasonography (CDUS). TT is a quite effective method that shows whether there is blood flow on the affected testis in TT-suspected cases (4). In the present study, we aimed at investigating the characteristics of the cases operated due to TT, commenting the clinical findings and CDUS readings together and discussing the findings in light of literature.

## MATERIAL and METHODS

The hospital records of 22 cases operated due to

TT between 2005 and 2017 in our department were retrospectively investigated. For all cases, age, time from the initial of the complaint to the admission, complaints on admission, findings of physical examination, affected scrotum side, results of CDUS, torsion degrees, type of surgical intervention and postoperative findings were evaluated.

All cases were clinically evaluated prior to the operation. In taking history, initial time, side, duration, characters and severity of the symptoms were noted. The history of traumas, nausea, vomiting and existence of fever were questioned. On physical examination, hyperemia and swelling of hemiscrotum, testicular placement, scrotal tenderness, and signs of trans-illumination and blue point were assessed. In routine examinations, hemogram, urine analysis and CDUS were performed. As a result, the case considered to be TT was rapidly operated without trying manual detorsion.

Scrotal exploration was performed through scrotal mid-line incision. Although the color of the testis was seen

**Received:** 11.04.2018 **Accepted:** 27.04.2018 **Available online:** 27.04.2018

**Corresponding Author:** Konya Education and Research Hospital, University of Health Sciences, Department of Pediatric Surgery, Konya, Turkey, E-mail: drckocaoglu@hotmail.com

to be ameliorated after detorsion, testicle was fixed to the dartos fascia in the ipsilateral side. If the testis was gangrenous, gauze soaked with warm saline was applied nearly for 10 minutes. If no amelioration was seen in the color of testis, the capsule of the testis was incised; if the hemorrhage was in bright-red color, the bleeding was considered to continue, and the testis was left in its place. However, if the bleeding was in dark color, the bleeding was considered not to continue, orchiectomy was performed, and the contralateral side was fixed to the testicular dartos fascia.

The statistical analyses were performed using SPSS 22.0 for Windows, (SPSS Inc., Chicago, IL, USA). Descriptive analyses were shown using median and interquartile range (IQR) for abnormal variables, and frequency tables for ordinal variables.  $p < 0.05$  was accepted as the significance level.

## RESULTS

Median (IQR) age was 7.5 (12.25) years (min 4 hours, max 16 years). Three cases were with prenatal torsion. Median (IQR) application time was 18.5 (33) hours (min 2, max 120 hours). Scrotal pain, swelling, redness and vomiting were the most frequent complaints during the application. Of all cases, 68% were admitted with the complaints of pain, redness and swelling. However, only three cases were admitted with the inguinal masses. Two of these three cases were undescended TT, and the last one was TT accompanied by inguinal hernia. Among 22 cases, left TT developed in 17 (77.3%) cases, while right TT occurred in five (22.7%). Median (IQR) TT degree was 540 (225) degree (range 90-1080).

While CDUS was descriptive in 20 (90.9%) patients, orchiepididymitis and hydrocele were reported in each of the following two cases one and one (for each, 4.5% and 4.5%). The first case for which CDUS was not descriptive was 2.5 years old and admitted with the complaint of swelling and pain beginning suddenly in left scrotum six hours earlier. On physical examination, left scrotum was determined to be with edema, hyperemic and tender. On CDUS, left orchiepididymitis was reported. In the patient started the treatment of orchiepididymitis, edema, hyperemia and tenderness was seen to increase the following day. CDUS was repeated, and the case was reported as left epididymitis and left TT. The case was urgently operated 36 hours after the initiation of the complaints. The testis was detorsioned, and the ipsilateral testicular fixation was performed.

However, the second case for which CDUS was not descriptive was at the age of 7 years, and was admitted with the complaint of abdominal pain starting 4 hours after a friend's kick to the abdomen. Swelling was detected in left scrotum on physical examination, and CDUS was reported as left scrotal hydrocele. The physical examination on the following day revealed hyperemia and tenderness in scrotum, and CDUS was repeated and

reported as left TT. The patient was urgently operated 48 hours after the initiation of the complaints. The left testis was detorsioned, and ipsilateral testicular fixation was carried out. On control CDUS of both cases followed-up for two years, it was observed that left testes were shrunk, and the bleeding was decreased.

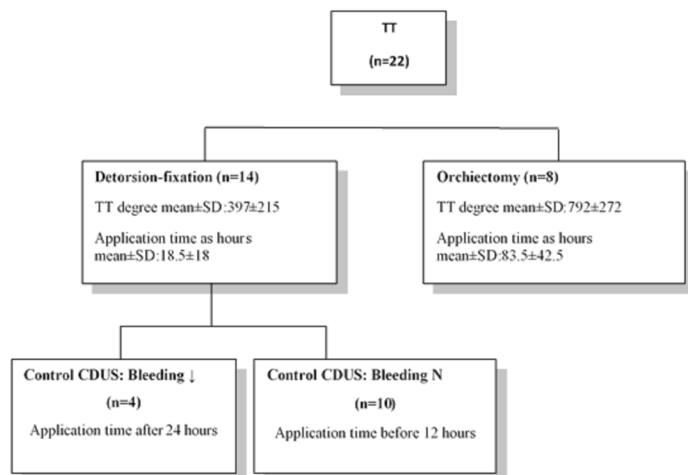
While extravaginal only in three cases, the torsions were intravaginal in 19 cases (Table 1). All those with extravaginal were prenatal torsions. The testes were detorsioned and fixed to ipsilateral dartos fascia in 14 cases. Unfortunately orchiectomy was performed in eight cases. Those for whom orchiectomy was performed were the cases applying late and with torsions of  $792 \pm 272$  degrees (min 90, max 1080). Average application time was  $83.5 \pm 42.5$  hours (min 22, max 120 hours). Of these eight cases, two were prenatal TT, and the other two were undescended TT.

On control CDUS of 14 cases for whom detorsion and fixation were performed, it was reported that the testes were shrunk, and the bleeding was decreased in four cases. Of these four cases, one was the case with prenatal torsion. While the torsion degrees of the other three cases were between 540 and 720, the time from initiation of the complaints to operations ranged between 24-48 hours. When these four cases were incised, orchiectomy was not performed despite lack of promising bleeding, because they were smaller than 10 years of age. In another 10 cases, control CDUS was reported as normal testes, and the application time of these cases was shorter than 10 hours (Figure 1).

**Table 1. The findings of cases with testicular torsions**

n	22	
Age years (median IQR)	7.5 (12.25)	
Lateral	Right, n(%)	5 (22.7)
	Left, n (%)	17 (77.3)
Application time as hours		
median (IQR)	18.5 (33)	
Prenatal torsion, n	3	
Undescended TT, n	2	
Torsion with inguinal hernia, n	1	
TT degree median (IQR)	540 (225)	
Torsion as to tunica vaginalis	Intravaginal, n (%)	19 (86.36)
	Extravaginal, n(%)	3 (13.64)
Findings of CDUS	TT	20
	Orchi-epididymitis	1
	Hydrocele	1

TT; Testicular torsion, CDUS; Color-Doppler Ultrasonography, IQR; interquartile range



**Figure 1.** The distribution of the cases with detorsion-fixation vs orchietomy for TT

## DISCUSSION

Although TT constitutes 25 to 35% of acute scrotum, this rate changes by depending on age of the cases, type of medical centers applied and type of the method used in diagnostic process(5). In the differential diagnosis of TT, torsion of appendages of testis, epididymitis, orchitis, traumas, idiopathic scrotal edema, inguinal hernia, hydrocele, varicocele and tumors should be kept in mind for the patients with acute scrotum(6). TT starts with a sudden and severe inguinal pain in general. In addition, inguinal pain is mostly accompanied by nausea and vomiting. On physical examination, upward growth and horizontal position of the testis are significant outstanding remarks. As well as these remarks, an increase in temperature and color change in scrotal skin may be witnessed. As a matter of fact, redness in scrotum, pain and swelling were also observed in 68% of our cases. While three of all our cases applied to the clinic with inguinal masses, bruise was present in scrotum in three prenatal torsions. TT is mostly seen in neonatal and adolescent periods (7). In our series, while three cases were prenatal, 10 cases were between 14-16 years of age. The fact that TT is mostly seen in left testes has been shown in different studies (8). As consistent with literature, left TT was observed in 77.3% of all cases.

For the cases with acute scrotum, as well as detailed history and physical examination, demonstrating the existence of perfusion in the testis through CDUS and testicular scintigraphy is quite beneficial in order to rule out TT (9,10). While the standard approach was previously scrotal exploration for the patients with suspected TT, CDUS is recommended today in urgent conditions for all children with acute scrotum to avoid unnecessary surgical interventions (11). Because CDUS is a non-invasive and easily accessible procedure giving results rapidly as a beneficial technique in the differentiation of other pathologies in scrotum, its popularity is getting more increased. However, because CDUS requires professional experience and is a user-dependent procedure, it may cause faulty readings. Diagnostic errors stemming from insufficient experience of radiologists in

scrotal ultrasonography (US), sometimes intermittent formation of the torsion and difficulty in investigating US findings in younger children are the factors decreasing the diagnostic strength of CDUS (12,13). In a prospective study performed by Altinkilic et al., where the accuracy of CDUS was investigated, the sensitivity and specificity of CDUS were found as 100% and 75.2% in the cases with suspected TT, recently (14). In another study by Baker et al., the sensitivity and specificity were reported to be 88% and 98%, respectively (9). Among our series, the first CDUS findings of two cases in which TT was observed during the operation were reported as hydrocele and orchiepididymitis. Of these two cases, the first diagnosed with hydrocele was 2.5 years of age. In this case, the younger age could have caused difficulties in reading US findings. The second case diagnosed with orchiepididymitis was 7 years old. The diagnosis could not have been performed due to early application time (4 hours) and relatively lower degree of the torsion (360), as with some cases in literature (12,13). Because testicular volume is reasonably large enough to allow higher accuracy in adolescents over pubertal age, CDUS may be more effective in this age segment. Even so, during pre-adolescent period, and especially when testicular volume is smaller than 1 or 2 mL, the margin of error increases, and CDUS is of a limited clinical benefit (15).

Early diagnosis is of a vital importance for TT, and the treatment is performed through detorsion and fixation to scrotum properly. The most important criteria are the degree and time of the torsion to determinate testicular loss during the exploration. If TT is detected before the first six hours, the rate of amelioration is 90%, while the rate decreases up to 10%, if it is detected after 24 hours (16,17). In our study, although complete amelioration was also achieved in the cases operated on before 12 hours, testicular necrosis was determined in those operated on after 24 hours.

It is controversial that orchietomy is performed in testis suspected for viability, or testis is left in its place for hormonal activity. In an ischemic injury, there is a risk for the testis to develop autoimmunization against its own spermagonia. However, if the ischemic injury develops before 10 years of age, there is no risk of autoimmunization, and the testis is left in its place, because blood-testis barrier does not develop. However, if the patient's age is over 10 years, orchietomy is appropriate (15). In our study, testes were left in their places in four cases younger than 10 years old, one of whom was prenatal TT.

Prenatal TT is an intrauterinely developing event, and its etiology has yet to be completely elucidated. However, difficult labor, breech delivery, birthing large infant, hyperactive cremasteric reflex and multiple gestations have been emphasized as the factors leading to prenatal TT (18). Only 5% of prenatal torsioned testes were reported to be saved (19). In our study, three cases were also determined to be prenatal TT, and so these cases were operated at once. While two of these cases were orchietomized, the last TT was left in its place due to the

promising bleeding, but control CDUS showed it was shrunk and with decreased bleeding. In prenatal TT, the fixation of contralateral testis is a controversial entity. Because TT determined within the postpartum first two weeks may be associated with the pathology from descending prenatal testis, contralateral testis should be fixed to scrotum due to the likelihood of torsion in adolescent period (15). In our clinical practice, we also fix contralateral testis to scrotum in the cases with prenatal TT.

## CONCLUSION

Early diagnosis is of a vital importance in TT in terms of morbidity. The diagnosis performed within the first 24 hours increases chance of detorsion. CDUS is a quite effective method in the determination of TT. For early and true diagnosis of TT, CDUS is a quite effective method. If reported as no blood flow, the case is certainly assessed as torsion. If reported as epididymo-orchitis or hydrocele in CDUS, but suspected to be torsion, the patient should be explored immediately and CDUS should be repeated at frequent intervals.

*Competing interests: The authors declare that they have no competing interest.*

*Funding: There are no financial supports*

## REFERENCES

1. Pentyla S, Lee J, Yalamanchili P, Vitkun S, Khan SA. Testicular torsion: a review. *J Low Genit Tract Dis* 2001;5(1):38-47.
2. Agrawal AM, Tripathi PS, Shankwar A, Naveen C. Role of ultrasound with color Doppler in acute scrotum management. *J Family Med Prim Care* 2014;3(4):409-12.
3. TT Ringdahl E, Teague L. Testicular Torsion. *American Family Physician* 2006;74(10):1739-43
4. Liang T, Metcalfe P, Sevcik W, Noga M. Retrospective review of diagnosis and treatment in children presenting to the pediatric department with acute scrotum. *AJR Am J Roentgenol.* 2013;200:444-9.
5. Makela E, Lahdes-Vasama T, Rajakorpi H, Wikstrom S. A 19-year review of paediatric patients with acute scrotum. *Scand J Surg* 2007;96(1):62-6.
6. Corbett HJ, Simpson ET. Management of the acute scrotum in children. *ANZ J Surg* 2002;72(3):226-8.
7. Özdemir K, Savaş Ç. Çocuklarda akut skrotum. *SDÜ Tıp Fakültesi Derg* 2000;7:50-60.
8. McCombe AW, Scobie WG. Torsion of scrotal contents in children. *Br J Urol* 1988;61(2):148-50.
9. Baker LA, Sigman D, Mathews RI, Benson J, Docimo SG. An analysis of clinical outcomes using color doppler testicular ultrasound for testicular torsion. *Pediatrics* 2000;105(3Pt1):604-7.
10. Gatti JM, Patrick Murphy J. Current management of the acute scrotum. *Semin Pediatr Surg* 2007;16(1):58-63.
11. Kass EJ, Stone KT, Cacciarelli AA, Mitchell B. Do all children with an acute scrotum require exploration? *J Urol* 1993;150(2Pt2):667-9.
12. Ingram S, Hollman AS, Azmy A. Testicular torsion: missed diagnosis on colour Doppler sonography. *Pediatr Radiol* 1993;23(6):483-4.
13. Allen TD, Elder JS. Shortcomings of color Doppler sonography in the diagnosis of testicular torsion. *J Urol* 1995;154(4):1508-10.
14. Altinkilic B, Pilatz A, Weidner W. Detection of normal intratesticular perfusion using color coded duplex sonography obviates need for scrotal exploration in patients with suspected testicular torsion. *J Urol* 2013;189(5):1853-8.
15. Hutson JM. Undescended Testis Torsion and Varicocele. In: Coran AG, Adzick NS, Krummel T, Laberge JM, Shamberger R, Caldamone A, editors. *Pediatric Surgery*. 7th ed. Philadelphia: Elsevier Mosby; 2012. p. 1015-6.
16. Pogorelic Z, Mrklic I, Juric I. Do not forget to include testicular torsion in differential diagnosis of lower acute abdominal pain in young males. *J Pediatr Urol* 2013;9(6PtB):1161-5.
17. 17-Saraç M, Bakal Ü, Tartar T, Gürbaz MT, Onur MR, Kazez A. Çocuklarda testiküler detorsiyonun ön sonuçları. *Çocuk Cerrahisi Dergisi* 2014;28(2):57-60.
18. Brandt MT, Sheldon CA, Wacksman J, Matthews P. Prenatal testicular torsion: principles of management. *J Urol* 1992;147(3):670.
19. Kaye JD, Levitt SB, Friedman SC, Franco I, Gitlin J, Palmer LS. Neonatal torsion: a 14-year experience and proposed algorithm for management. *J Urol* 2008;179(6):2377-83.