

Testicular Torsion: Experience in a Tertiary Urology Referral Centre

✉ Sinharib Çitgez, ✉ Birgi Ercili, ✉ Uğur Aferin, ✉ Ahmet Gürbüz, ✉ Çetin Demirdağ, ✉ Bülent Önal

Istanbul University-Cerrahpaşa, Cerrahpaşa Faculty of Medicine, Department of Urology, İstanbul, Türkiye

What's known on the subject? and What does the study add?

In this study, the risk factors for orchietomy in patients with testicular torsion were investigated.

Abstract

Objective: To evaluate the patients who presented to our department due to testicular torsion (TT) and investigate the risk factors affecting orchietomy in patients with TT.

Materials and Methods: Between November 2005 and January 2018, the data of 46 male patients were analysed. The patients were divided into two groups: group 1, patients who underwent orchietomy and group 2, patients who underwent detorsion and testicular fixation. The paternity rates between groups 1 and 2 were compared. Statistical analyses were performed to determine the risk factors for orchietomy.

Results: The participants' mean age was 26.9 years. Of the cases, 35 (76.1%) were determined between November and March, when diurnal temperature changes were observed. Orchietomy was performed in 31 patients (group 1) and testicular detorsion and fixation in 15 (group 2). The overall orchietomy rate was 67.4%. The duration between the onset of complaints and the intervention was found to be the only risk factor for orchietomy in TT. The paternity rate in groups 1 and 2 was 86.6% and 85.7%, respectively ($p=1.0$).

Conclusion: The prolongation between the onset of complaints and the application in TT is a risk factor for orchietomy. Prompt diagnosis and intervention are required in treatment. Regarding paternity rates, groups 1 and 2 appear similar.

Keywords: Testicular torsion, orchietomy, risk factor

Introduction

Testicular torsion (TT), which is typical in all age groups, is a common cause of urological emergencies (1). TT may cause necrosis due to the deterioration of the blood supply to the testicle as a result of spermatic cord twisting. It is a condition requiring urgent treatment as it can cause organ damage. In differential diagnosis, there may be similar acute conditions such as appendix testis and epididymis torsion, infectious diseases such as epididymitis and epididymoorchitis and scrotal masses such as hydrocele, spermatocele, tumour and acute scrotal oedema (2). TT could affect male fertility in adulthood and may be a critical cause of secondary male infertility (3). Laboratory analysis of semen samples has not shown adequate sperm count and sperm vitality in >50% of patients with TT (4).

This study aimed to retrospectively evaluate the patients who presented to our clinic due to TT and analyse the risk factors that affect orchietomy in patients treated for TT.

Materials and Methods

We retrospectively reviewed the records of TT patients who underwent surgery between November 2005 and January 2018 in our clinic. A total of 46 male patients were included in the study. Clinical and demographic data such as age, the duration between the onset of complaints and intervention to the TT and body mass index and perioperative data were recorded. The patients were divided into two groups: group 1, patients who underwent orchietomy and group 2, patients who had testicular detorsion and fixation.

The medical history and physical examination, laboratory and radiological findings of all patients admitted with suspected TT were evaluated. The presence of blood flow or ischaemia was evaluated by scrotal colour doppler ultrasonography. Surgical exploration was planned for patients suspected to have TT. After detorsion, circulation within the testis was observed by applying hot compress. If the testicle has returned to normal following

Correspondence: Sinharib Çitgez MD, İstanbul University-Cerrahpaşa, Cerrahpaşa Faculty of Medicine, Department of Urology, İstanbul, Türkiye

Phone: +90 532 312 23 77 **E-mail:** drsinharib@yahoo.com **ORCID-ID:** orcid.org/0000-0002-3897-2951

Received: 02.06.2020

Accepted: 30.08.2020

Cite this article as: Çitgez S, Ercili B, Aferin U, Gürbüz A, Demirdağ Ç, Önal B. Testicular Torsion: An Experience in a Tertiary Urology Referral Centre. *J Urol Surg* 2021;8(1):29-32.

©Copyright 2020 by the Association of Urological Surgery / Journal of Urological Surgery published by Galenos Publishing House.



detorsion, scrotal fixation was then performed (Figure 1). If necrosis was noted, an orchiectomy was conducted.

Patients in groups 1 and 2 were called by phone, and the paternity rates of their partners were determined. The inclusion criteria were being in a relationship with the intent to become pregnant for at least 1 year, age >18 years, and a normal contralateral testis. Conversely, patients with primary infertility, those who were unwilling to participate or unreachable, and those with a history of undescended testis and/or varicocele were excluded from the analysis.

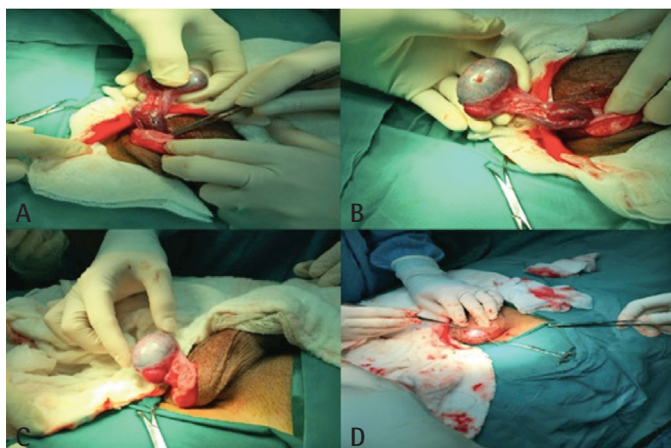


Figure 1. (A) Scrotal exploration of left TT. (B) Surgical detorsion performed in the operating room. (C) Blood circulation observed in the testis after warm gauze application. (D) Scrotal fixation performed

TT: Testicular torsion

Statistical Analysis

Statistical analyses were performed using the Statistical Package for the Social Sciences (SPSS) version 21.0 software (IBM SPSS Statistics for Windows, version 21.0. monk, NY: IBM Corp., Armonk, NY). Pearson's chi-square and Fisher's Exact tests were used to assess differences between the categorical variables, whereas the Kruskal-Wallis and Mann-Whitney U tests were used to identify differences between the median values. A p-value <0.05 was considered statistically significant. An ethics committee approval was not sought owing to the retrospective design of the study. The consent form was filled in by all the participants and their families.

Results

The mean age of the patients was 26.90±7.61. Of the patients, 31 were in group 1 and 15 in group 2. The demographic data is presented in Table 1. The mean follow-up time was 6.8 years (2-15). Among the patients, 27 had TT on the left testicle and 19 had it on the right. The average time between the onset of complaints and admission to the hospital was 28.3 (6-38) hours.

The patients presented with scrotal pain and swelling. Pre-diagnosis of all the patients was made by physical examination and verified with scrotal colour doppler US. Two patients could not be diagnosed using scrotal colour doppler ultrasonography. In 76% of cases (35 patients), the time of application was found to be at the time of diurnal temperature change (between November and March), and the orchiectomy rate was 67.4% (31 patients).

In group 1 patients, diffuse haemorrhage and infarction were observed during surgery. In these patients, orchiectomy was performed because no testicular blood supply was noted following hot compress application and circulation control after at least 15 minutes after surgical detorsion. The time from the onset of complaints to hospital admission period was 30.7 (10-36) hours for group 1 and 16.7 (6-20) hours for group 2 (p=0.001, Table 2).

A total of 22 patients were available for study inclusion criteria to compare paternity rate, including 15 and 7 in groups 1 and 2, respectively. The paternity rate in groups 1 and 2 was 86.6% and 85.7%, respectively (p=1.0).

Discussion

TT is an emergency medical condition that requires prompt and mandatory intervention. If therapeutic intervention is not provided immediately, testicular ischaemia and necrosis

Table 1. Characteristics of patients	
Patient characteristics	n
No. of patients	46
Age (year)	
Mean (range)	26.9 (18-48)
Side	
Left	27 (58.7%)
Right	19 (41.3%)
The duration between the onset of complaints and application	
Mean (range)	28.3 (6-38)
Scrotal doppler US (ischaemia)	
Yes	44 (95.6%)
No	2 (4.4%)
Operation time (min)	
Mean (range)	32.4 (20-54)
Diurnal temperature change	
Yes	35 (76.1%)
No	11 (23.9%)
Hospitalisation time (days)	
Mean (range)	1.2 (1-2)
US: Ultrasonography	

Table 2. The predictive factors for orchiectomy in patients with TT

	Group 1 (n=31)	Group 2 (n=15)	p-value
Age (year)			
Mean (+ SD)	27.1±8.9	26.2±6.6	0.412
Operation time (min)			
Mean (+ SD)	32.5±17.4	32.1±16.9	0.256
Body mass index			
Mean (+ SD)	22.27±4.8	22.82±4.6	0.785
The duration between the onset of complaints and the application			
Mean (± SD)	30.7±6.1	14.8±1.1	0.001
Hospitalisation time (days)			
Mean (± SD)	1.2±0.8	1.1±0.5	0.878
Side			
Left	18	9	
Right	14	5	>0.99
Diurnal temperature change			
Yes	25	10	
No	6	5	>0.99
Scrotal Doppler US finding (ischaemia)			
Yes	30	14	
No	1	1	>0.99

SD: Standard deviation, US: Ultrasonography, TT: Testicular torsion

can occur (3). The duration and severity of the rotation of the spermatic cord are determining factors of tissue loss in the testicle. Based on the results obtained in experimental studies, a 720-degree torsion is required for complete cessation of blood flow from the testicular artery and the formation of ischaemia (4). If this happens, testicular infarction occurs as a result of venous occlusion, congestion and arterial ischaemia. Studies have shown that testicles are affected within 4-6 hours in case of blood flow cessation and necrosis begins after 12-16 hours (5,6). In cases that were intervened within the first 6 hours, the testicle could be preserved close to 100%, whereas in cases intervened after 12 hours, preservation of the testicle was reported to decrease to 20% (7). In our study, the average time between the onset of complaints and admission to the hospital was found to be 28.3 (6-38) hours. This was found to be 30.7 (10-36) hours in group 1 and 16.7 (6-20) hours in group 2 (p=0.001). Thus, it was seen that the duration of hospital admission was a risk factor for orchiectomy. The incidence of TT was reported as 1/4000 before the age of 25; this rate decreases as the age increases (8). Depending on different etiological factors, TT commonly occurs in the neonatal period and adolescence, between the ages of 12 and 18 (8,9). The average age of patients in the study was found to be 26.90±7.61. The reason for the relatively high average age was that the patients who presented to our clinic were adults. Paediatric patients are brought to the paediatric surgery

department in our hospital. Left TT was detected in 27 cases and right TT in 19 cases. Although the right/left ratio differs in the studies in literature, TT is believed to be more common on the left. In a study of paediatric patients in our country (Turkiye), it was reported that TT was seen more frequently in the left testicle than in the right (10).

The most crucial radiological method used in the diagnosis of TT is scrotal colour doppler ultrasonography. However, higher sensitivity of scintigraphy has been overlooked due to the fact that it could not be applied easily in emergency conditions. It has been observed that arterial blood flow is lost in scrotal colour Doppler ultrasonography. Hypervascularization indicates inflammation. False-negative results can be detected in the early periods of TT, intermittent or incomplete torsions (11). Therefore, radiological evaluation should be considered together with clinical findings. In our study, false negativity was detected in scrotal colour doppler ultrasonography in two cases, one patient each in groups 1 and 2. These cases were found to be TT after surgical exploration.

In TT treatment, success is achieved by early diagnosis and detorsion in the fastest way, fixing both testicles to the scrotum. The most critical factor in determining testicular loss after TT is the degree of torsion and how many hours it lasts. In our study, 67.4% of patients in group 1 required orchiectomy. Mansbach et al. (1) reported that they performed orchiectomy in 34% of TT cases (762 of 2248), whereas Kandemir et al. (12) reported orchiectomy in 42.5% of TT cases. The rate in our study appears to be higher (67.4%) compared to the series in literature. We believe that the main reason for this is the delay of the application period. Additionally, it should be considered that our patient group did not include the neonatal and early childhood age group, contrary to the studies in literature. Therefore, new and further studies on this subject are warranted.

One of the secondary findings of our study; in 76% of TT cases, the application time was in the period when diurnal temperature change was detected (between November and March). Hence, as hypothesised, TT cases were found to commonly occur in winter and spring. When we look at the studies on this subject in the literature, Lu et al. (13) reported that the incidence of TT was higher (77.5%) when diurnal temperature changed, that is, in the winter and spring. Oxidative stress that develops in the presence of torsion causes necrosis in germinal cells and may cause infertility in the future (14). In studies, it has been reported that fertility is preserved in men who undergo detorsion in the early period (<13 hours), whereas fertility is negatively affected in men who undergo orchiectomy in the late period (15). Additionally, spermatogenic damage to the ipsilateral testis may affect the contralateral testis (16-18). In particular, the theory that the opposite testicle is affected by the immunological mechanism is at the forefront (16). Furthermore, there are

studies showing that fertility has not changed in patient groups with and without orchiectomy (19,20). A study investigated paternity rates among 63 couples where the men had been treated for TT. The study found no decrease in paternity rates among TT men when compared to the general population (21). To clearly determine the endocrine and exocrine function after TT, there is a need for larger prospective long-term follow-up studies using unselected control groups and reporting on future paternity rates. In our study, paternity rates between groups 1 and 2 were similar (86.6% vs 85.7%, respectively; $p=1.0$).

Study Limitations

The present study had limitations including its long period of data collection, non-randomisation, and the relatively small number of cases in the subgroups and the study being a retrospective study. Moreover, the patients in our study showed only the patient profile in the urology clinic, and the small number was seen as a limitation in this study.

Furthermore, maternal factors were not included in this study. Despite these limitations, our results suggest that the duration between the onset of complaints and application in TT is a risk factor for orchiectomy. Prompt diagnosis and intervention are required in treatment. However, we did not note significant differences regarding paternity rates between groups 1 and 2. Future studies should be prospectively designed to overcome existing limitations.

Conclusion

In this retrospective study, the duration between the onset of complaints and application in TT patients was found to be a risk factor for orchiectomy. Prompt recognition and treatment are necessary for testicular salvage.

Ethics

Ethics Committee Approval: An ethics committee approval was not sought owing to the retrospective design of the study.

Informed Consent: The consent form was filled in by all the participants and their families.

Peer-review: Internally peer-reviewed.

Authorship Contributions

Surgical and Medical Practices: S.Ç., Ç.D., B.Ö., Concept: S.Ç., Ç.D., B.Ö., Design: S.Ç., B.E., Ç.D., Data Collection or Processing: S.Ç., B.E., A.G., Analysis or Interpretation: U.A., A.G., Literature Search: S.Ç. Writing: S.Ç., B.E., Ç.D.

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declare that they have no relevant financial.

References

1. Mansbach JM, Forbes P, Peters C. Testicular torsion and risk factors for orchiectomy. *Arch Pediatr Adolesc Med* 2005;159:1167-1171.
2. McAndrew HF, Pemberton R, Kikiros CS, Gollow I. The incidence and investigation of acute scrotal problems in children. *Pediatr Surg Int* 2002;18:435-437.
3. Girgin R, Çınar Ö, Mungan NA. Are Haematological Parameters Reliable for Differential Diagnosis of Testicular Torsion and Epididymitis? *Journal of Urological Surgery* 2020;7:109-113.
4. Molokwu CN, Somani BK, Goodman CM. Outcomes of scrotal exploration for acute scrotal pain suspicious of testicular torsion: A consecutive case series of 173 patients. *BJU Int* 2011;107:990-993.
5. Djahangirian O, Ouimet A, Saint-Vil D. Timing and surgical management of neonatal testicular torsions. *J Pediatr Surg* 2010;45:1012-1015.
6. Karakeçi A, Ozan T, Pirinççi N, Fırdolaş, F, Orhan İ. 10-Year Single Center Experience in Testicular Torsion Cases. *F.Ü Sađ. Bil. Tıp Derg* 2019;33:39-42.
7. Coley BD. The acute pediatric scrotum. *Ultrasound Clin* 2006;1:485-496.
8. Kurt G, Cerrah Celayir A, Şahin C, Pelin K. Testis torsiyonlu olgularda 4.5 yıllık deneyimlerimiz. *Zeynep Kamil Tıp Bülteni* 2017;48:94-98.
9. Waldert M, Klatt T, Schmidbauer J, Remzi M, Lackner J, Marberger M. Color Doppler sonography reliably identifies testicular torsion in boys. *Urology* 2010;75:1170-1174.
10. Yapanođlu T, Aydın HR, Adanur Ş, Polat Ö, Demirel A, Okyar G. Onüç yıllık çocukluk dönemi testis torsiyonu deneyimlerimiz. *Eurasian J Emerg Med* 2007;39:164-168.
11. Chen M, Esler R. Accuracy and Delay of Using Ultrasound in Testicular Torsion. *J Urol Surg* 2019;6:273-277.
12. Kandemir A, Balasar M, Ünlü MZ, Pişkin MM. Akut skrotumun önemli bir sebebi; testis torsiyonu: 7 yıllık deneyimlerimiz. *The Cystoscope* 2015;2:288-293.
13. Lu Q, Ji C, Zhang G, Lian H, Zhang S, Li X, Gan W, Guo H. Clinical Analysis of 49 Cases With Testicular Torsion. *Zhonghua Wai Ke Za Zhi* 2015;53:599-602.
14. Melekos MD, Asbach HW, Markou SA. Etiology of Acute Scrotum in 100 Boys With Regard to Age Distribution. *J Urol* 1988;139:1023-1025.
15. Anderson MJ, Dunn JK, Lipschultz LI, Coburn M. Semen Quality and Endocrine Parameters After Acute Testicular Torsion. *J Urol* 1992;147:1545-1550.
16. Ozkan KU, Boran C, Kilinc M, Garipardiç M, Kurutaş EB. The Effect of Zinc Aspartate Pretreatment on Ischemia-Reperfusion Injury and Early Changes of Blood and Tissue Antioxidant Enzyme Activities After Unilateral Testicular Torsion-Detorsion. *J Pediatr Surg* 2004;39:91-95.
17. Gorur S, Helli A, Orhan İ. Testis torsiyonu patofizyolojisi ve tedavisinde yenilikler. *Androloji Bülteni* 2007;30:219-224.
18. Shiraishi K, Naito K, Yoshida K. Nitric Oxide Promotes Germ Cell Necrosis in the Delayed Phase After Experimental Testicular Torsion of Rat. *Biol Reprod* 2001;65:514-521.
19. Johnsen SG. Testicular biopsy score count--a method for registration of spermatogenesis in human testes: normal values and results in 335 hypogonadal males. *Hormones* 1970;1:2-25.
20. Ergur BU, Kiray M, Pekcetin C, Bagriyanik HA, Erbil G. Protective Effect of Erythropoietin Pretreatment in Testicular Ischemia-Reperfusion Injury in Rats. *J Pediatr Surg* 2008;43:722-728.
21. Wei SM, Yan ZZ, Zhou J. Beneficial Effect of Taurine on Testicular Ischemia-Reperfusion Injury in Rats. *Urology* 2007;70:1237-1242.