

# Testicular Torsion in Children: A 10-Year Clinical and Histological Evaluation

## Çocuklarda Testis Torsiyonu: 10 Yıllık Klinik ve Histolojik Değerlendirme

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### ABSTRACT

**Objective:** The purpose of the present study is to determine the clinical, radiological and pathological characteristics of testicular torsion patients, the intervention techniques applied according to time to hospital admission of the patient and testis-saving rates in the childhood age group.

**Material and Methods:** This retrospective study included the patients aged between 0-18 years who applied to pediatric surgery clinic due to the complaint of abdominal pain or scrotal pain between January 2011 to January 2021 and were diagnosed with testicular torsion after evaluation. The patient age, hospital admission complaint, duration of the symptoms, month of hospital admission, lateralization of the affected testicle, preoperative diagnostic studies, type of the implemented intervention (orchiectomy/detorsion) and postoperative diagnosis were determined. Hematoxylin-Eosin-stained archive slides of the materials sent to pathology department for examination were reviewed by two pathologists.

**Results:** In this period of 10 years; 28 patients aged between 0-18 years admitted to our hospital because of testicular torsion. Scrotal pain and tenderness were present in all the patients (100%). Of the patients; 4 (14.3%) were neonatal and 21 (75%) were between the ages 12-18 years. Testicular parenchyma could not be macroscopically selected in the examination of orchiectomy materials and the materials were hemorrhagic. Hemorrhagic infarction was detected by microscopic examination.

**Conclusion:** Acute scrotum is a frequently seen surgical emergency in the childhood period. There are many entities that may cause acute scrotum; performing differential diagnosis accurately and timely can protect the patient from unnecessary surgery and testicular loss.

**Key Words:** Acute Scrotum, Child, Testicular Torsion

### ÖZ

**Amaç:** Bu çalışmanın amacı çocuk yaş grubunda testis torsiyonlu hastaların klinik, radyolojik ve patolojik özelliklerini, hastaların hastaneye başvuru zamanına göre müdahale yöntemlerini ve testis kurtarma oranlarını belirlemektir.

**Gereç ve Yöntemler:** Bu retrospektif çalışma Ocak 2011-Haziran 2021 yılları arasında karın ağrısı veya skrotal ağrı ile çocuk cerrahisi kliniğine başvuran ve değerlendirme sonrası testis torsiyonu tanısı alan 0-18 yaş arası hastaları kapsamaktadır. Hastaların yaşı, hastaneye başvuru şikayeti, semptomların süresi, hastaneye başvurduğu ay, etkilenen testisin lateralizasyonu, preoperatif tanı çalışmaları, yapılan müdahalenin tipi (orşiektomi/detorsiyon) ve postoperatif tanı



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**Ethics Committee Approval / Etik Kurul Onayı:** This study was conducted in accordance with the Helsinki Declaration Principles. The study was approved by Hatay Mustafa Kemal University, Tayfur Ata Sökmen Medical Faculty, Non-Interventional Clinical Research Ethics Committee with the decision number 26.08.2021-01.

**Contribution of the Authors / Yazarların katkısı:** GURSOY D: Constructing the hypothesis or idea of research and/or article, Planning methodology to reach the Conclusions, Taking responsibility in patient follow-up, collection of relevant biological materials, data management and reporting, execution of the experiments, Taking responsibility in logical interpretation and conclusion of the results, Taking responsibility in necessary literature review for the study, Taking responsibility in the writing of the whole or important parts of the study. CELIKKAYA ME: Organizing, supervising the course of progress and taking the responsibility of the research/study, Taking responsibility in logical interpretation and conclusion of the results, Taking responsibility in necessary literature review for the study, Taking responsibility in the writing of the whole or important parts of the study. SECINTI IE: Constructing the hypothesis or idea of research and/or article, Organizing, supervising the course of progress and taking the responsibility of the research/study, Taking responsibility in necessary literature review for the study. ATICI A: Organizing, supervising the course of progress and taking the responsibility of the research/study, Reviewing the article before submission scientifically besides spelling and grammar.

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belirlendi. Patoloji birimine inceleme için gönderilen materyallere ait Hematoksilen-Eozin boyalı arşiv preparatları iki patolog tarafından yeniden gözden geçirildi.

**Bulgular:** Bu 10 yıllık dönemde 0-18 yaş arası 28 hasta testis torsiyonu nedeni ile hastanemize başvurmuştu. Hastaların hepsinde (%100) skrotal ağrı ve hassasiyet mevcuttu. Hastaların 4 tanesi (%14.3) yenidoğandı ve 21 hasta (%75) 12-18 yaşları arasındaydı. Orşiektomi materyallerinin incelenmesinde makroskopik olarak testis parankimi seçilemiyordu ve materyaller hemorajikti. Mikroskopik incelemede hemorajik enfarktüs saptandı.

**Sonuç:** Akut skrotum çocukluk çağında sık görülen cerrahi acillerdir. Akut skrotuma neden olabilecek çok sayıda antite mevcuttur; ayrıca tanının doğru ve zamanında yapılması hastayı gereksiz cerrahiden kurtaracak ve testis kaybını önleyecektir.

**Anahtar Sözcükler:** Akut skrotum, Çocuk, Testis Torsiyonu

## INTRODUCTION

The presence of pain, swelling and redness in the scrotum is defined as acute scrotum. There are many important or non-important causes of acute scrotum and acute scrotum is the most commonly seen emergency in the childhood period. Testicular torsion is the most important and most emergency cause of acute scrotum (1). Since time loss may result testicular loss, the diagnosis of testicular diagnosis should be absolutely eliminated in each male child with the complaint of acute scrotum (2).

Testicular torsion (TT), testicular appendage torsion (TAT), epididymo-orchitis (EO), scrotal trauma, idiopathic scrotal edema, varicocele, inguinal hernia, hydrocele, pyocele and tumors are the pathologies that should be considered in the differential diagnosis of acute scrotum. Acute scrotum is a real phenomenon and the studies have shown that hemorrhagic testicular infarction, irreversible testicular injury and complete testicular infarction are observed 2 hours, 6 hours and 24 hours after the onset of the symptoms, respectively. The testicles could not be saved if the treatment of TT is not initiated in the first 6 hours. Early diagnosis and management are necessary to prevent the complications such as testicular infarction and infertility. Scrotal Doppler ultrasonography (USG) is the primarily applied imaging technique in case of sudden-onset scrotal pain in both children and adults since it is non-invasive and easy accessible (3,4).

The purpose of the present study is to determine the clinical, radiological and pathological characteristics of TT patients, the intervention techniques applied according to time to hospital admission of the patient and testis-saving rates in the childhood age group.

## MATERIALS-METHOD

This retrospective study included the patients aged between 0-18 years who applied to pediatric surgery clinic due to the complaint of abdominal pain or scrotal pain between January 2011 to January 2021 and were diagnosed with TT after evaluation. The patients were diagnosed based on anamnesis, physical examination and scrotal Doppler USG. The low amount or absence of blood supply was evaluated in favor of

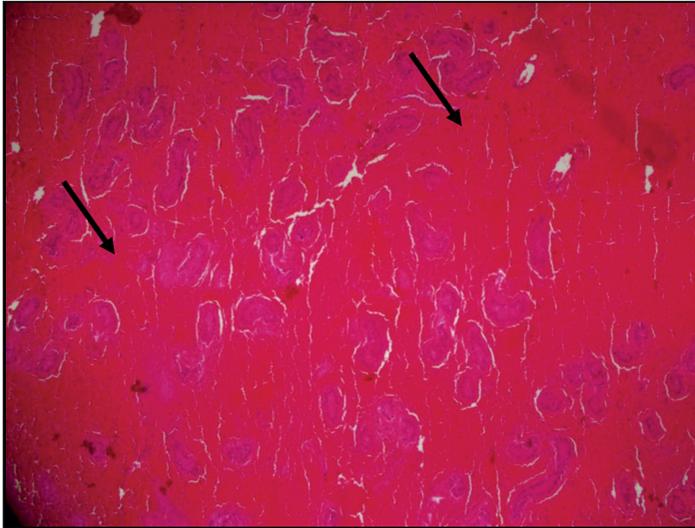
TT. The patient age, hospital admission complaint, duration of the symptoms, month of hospital admission, lateralization of the affected testicle, preoperative diagnostic studies, type of the implemented intervention (orchiectomy/detorsion) and postoperative diagnosis were determined. The duration of symptoms was considered as the time interval between onset time of complaints and time to hospital admission. Hematoxylin-Eosin-stained archive slides of the materials sent to pathology department for examination were reviewed by two pathologists (DG, IES). The study was approved by Hatay Mustafa Kemal University, Tayfur Ata Sökmen Medical Faculty, Non-Interventional Clinical Research Ethics Committee with the decision number 26.08.2021-01.

## Statistical Analysis:

The present study was conducted with 28 patients. The categorical variables were presented as numericals and percentages. The Shapiro Wilk test was used to test distribution normality and continuous variables such as age and duration were expressed as median and interquartile range (IQR).

## RESULTS

In this period of 10 years; 28 patients aged between 0-18 years admitted to our hospital because of TT. Scrotal pain and tenderness were present in all the patients (100%). Of the patients; 4 (14.3%) were neonatal and 21 (75%) were between the ages 12-18 years. The median age of all the patients was 15.50 (11.00-17.00) years. The time to hospital admission ranged between 3-240 hours among the patients and the median time to hospital admission was 23.50 (5.50-60.00) hours. May (14.3%) and July (17.7%) were the most frequent months of hospital admission. Only one patient (3.6%) had admitted to the hospital in June. All the patients (100%) were undergone color Doppler USG at the time of their admission to the hospital. The left and right testes were affected in 21 (75%) and 7 (25%) patients, respectively. Orchiectomy was performed in 14 (50%) patients at the time of admission while 14 (50%) patients were undergone detorsion procedure. Contralateral testis fixation was performed in 4 patients in whom time to hospital exceeded 24 hours after onset of admission complaints and who were undergone orchiectomy. Orchiectomy was applied postoperatively one month later since necrotic leakage was detected in the surgery site and no blood supply was



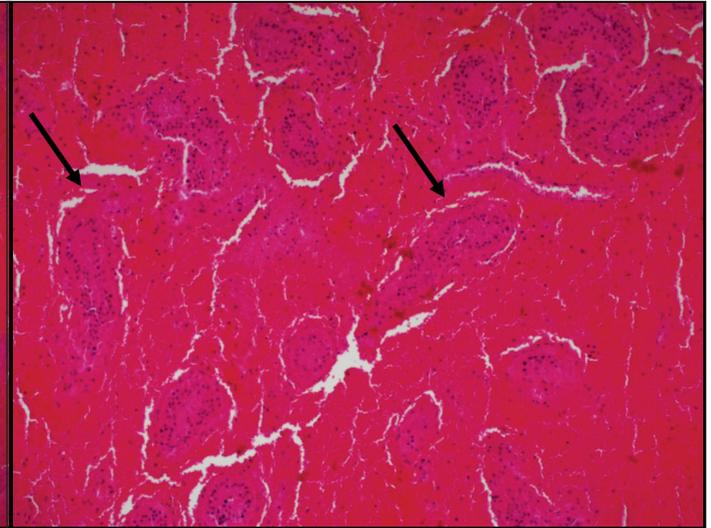
**Figure 1:** Hemorrhage in testicular parenchyma (arrow) (H+E, x40)

encountered by Doppler USG in one patient (3.6%) who had undergone detorsion procedure at the time of admission. Testicular parenchyma could not be macroscopically selected in the examination of orchiectomy materials and the materials were hemorrhagic. Hemorrhagic infarction was detected by microscopic examination (Figure 1-2). The results were evaluated to be consistent with TT. Perioperative morbidity or mortality was observed in none of the patients.

## DISCUSSION

Acute scrotal pain and swelling are the commonly seen phenomena among children and frequently require surgical consultation in the emergency service. TT, TAT and EO are the most prevalently seen causes of acute scrotum in the childhood period (5). Although, TT and TAT have been reported to be the most frequently detected pathologies in the prepubertal men, however, prevalence of each pathological diagnosis present variety among regions (6). Perinatal torsion is not frequently seen and make up 10% of pediatric cases (7). In our study, 4 (14.3%) of the cases were neonatal and our result was similar with the literature. It has been found in a study that the rate of TT was 35.5% in the children with acute scrotum (8). On the other side, that rate was found to be 23% in another study (9). Beside these outcomes, the rates of TT, TAT and EO were determined to be 74.2%, 8.2% and 3.4%, respectively (10).

Acute scrotum is observed most commonly between the ages of 12-18 years and first year of the life representing a bimodal distribution (4,11). In also our study, 75% of the cases were between 12-18 years of age. Acute scrotum is usually observed in the winter months. On the other side, torsion was frequently observed in January and August in a study and this result was attributed to the decreased atmospheric pressure (12). Of the patients included in our study, 14.3% and 17.7% had admitted to the hospital in May and July, respectively.



**Figure 2:** Infarct in seminiferous tubules (arrow) (H+E, x100)

This result suggested us that seasons had no effect on the development of acute scrotum. It has been identified in a study that left testicle was more frequently torsioned (58%) (13). In also our study, TT was more frequently encountered in the left testicle in (75%) consistently with the literature.

According to the literature, testis-saving rates range between 30-70% in the patients with TT. The differential diagnosis of acute scrotum may be difficult because of similar clinical and examination findings. Although, acute phase reactants are adequate for diagnosis of acute epididymitis, they may not provide adequate data in its differentiation from TT (16). It has been reported in many papers that color Doppler USG can be used preoperatively as a sensitive and reliable diagnostic method with respect to prevention of unnecessary surgical treatment (14, 15). It has been reported that sensitivity and specificity of color Doppler USG were 96-100% and 84-100% in diagnosis of torsion, respectively (16, 17). Nuclear testicular flow studies performed as another technique for evaluation of blood flow of the testicles are not currently preferred since it is a long-lasting procedure and also not always available (18). The popularity of color Doppler USG has progressively increased because it is a non-invasive procedure and contributes to accurate diagnosis at least as much as nuclear scan. Beside this, it can easily differentiate the other pathologies in the scrotum. However, it may occasionally cause erroneous results since it is a operator-dependent technique. Diagnostic failings resulting from the experience of the radiologist in scrotal USG, the fact that torsion may be occasionally intermittent and difficulty in performing USG in little kids are the factors that decline diagnostic strength of color Doppler USG (19). Color Doppler USG was performed in all the patients with TT included in our study. The successful treatment of TT can be obtained by early diagnosis and scrotal fixation of bilateral testes via the fastest surgical removal of testicular torsion. The most important factors for determination of testicular loss are the degree of testicular torsion and its duration in hours. Testis can

be saved if the appropriate intervention could be performed in the first 6 hours. Extreme testicular atrophy has been found due to torsions that exceeded 360 degrees and lasted longer than 24 hours (20). According to the results, orchiectomy was not performed in 46.4% patients and the testes could be saved by detorsion. Our testis-saving rate was consistent with the literature.

## CONCLUSION

Acute scrotum is a frequently seen surgical emergency in the childhood period. There are many entities that may cause acute scrotum; performing differential diagnosis accurately and timely can protect the patient from unnecessary surgery and testicular loss. Every child who admitted to the emergency service due to the complaint of acute scrotum should be absolutely performed color Doppler ultrasonography since it is a non-invasive and reliable diagnostic method. Multicenter studies involving a large number of patients are needed to determine the causes and incidence of acute scrotum and also to assess the importance of Doppler Ultrasonography.

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