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ORIGINAL ARTICLE
ORİJİNAL ARAŞTIRMA

Retrospective Evaluation of Acute Scrotum in Children: Eleven Years Experience of a Single-Centre

Çocuklarda Akut Skrotumun Retrospektif Değerlendirilmesi: Tek Merkezde Onbir Yıllık Deneyim

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ABSTRACT

Aim: In this study; we aimed to retrospectively evaluate the complaints, diagnostic algorithms and treatments of patients with acute scrotum who were admitted to or consulted with the Pediatric Surgery Outpatient Clinic.

Material and Method: A total of 216 patients diagnosed with acute scrotum by the Pediatric Surgery Clinic between November 2010 and October 2021 were included in this study. The age, presentation complaints, physical examination, laboratory and radiological results, additional anomalies, and medical and surgical treatment results of the patients were analyzed.

Results: The patients were aged between 3 weeks to 17 years, with a mean age of 9.9 ± 4.4 years. Pain and swelling are most common in acute scrotum present on the right side in 119 patients (55.1%) and on the left side in 97 patients (44.9%). Causes of acute scrotum were orchitis /epididymo-orchitis (O/EO) in 98 (45.4%), strangulated inguinal hernia (SIH) in 52 (24.1%), testicular torsion (TT) in 38 (17.6%), torsion of testicular appendage (TTA) in 11 (5.1%), testicular rupture in 5 (2.3%), idiopathic scrotal edema 5 (2.3%), intravaginal abscess 3 (1.4%), testicular cancer 2 (0.9%), megahydrocele 2 (0.9%). Vesicoureteral reflux was detected in 7 (7.1%) of the patients with O/EO. Fifty-two of the patients had SIH and most of them had right-sided hernias (40 right; 12 left). Thirty-eight patients passed with TT (30 left; 8 right). All of the TTA patients were followed up by medical therapy. Testicular rupture secondary to trauma developed in 5 acute scrotum patients. While 3 of these patients were followed conservatively, surgical intervention was required in 2 of them. In 2 patients detected testicular tumors developed acute scrotum, and testis sparing surgery was performed on them. Teratoma and epidermal cyst were detected in these patients, and they are still being followed up intermittently with pediatric oncology. The other patients detected idiopathic scrotal edema, intravaginal abscess, megahydrocele were managed surgically..

Conclusion: In this study; O/EO was the most common cause of acute scrotum. In addition, urinary system anomaly should be kept in mind, especially in recurrent O/EO cases. Precise and rapid diagnosis of acute scrotum patients can prevent unnecessary surgical operation and testicular loss. The findings of the current study can be considered as a preliminary reference value for pediatric surgeons in the evaluation of children presenting to the emergency department with acute scrotal pain and swelling.

Keywords: Acute scrotum; epididymo-orchitis; strangulated inguinal hernia; testis torsion; torsion of testicular appendage.

ÖZ

Amaç: Bu çalışmada; Çocuk Cerrahisi Polikliniği'ne başvuran ya da konsülte edilen akut skrotumlu hastaların şikayetleri, tanı algoritmaları ve tedavilerini geriye dönük olarak değerlendirmeyi amaçladık..

Gereç ve Yöntem: Bu çalışmaya Kasım 2010-Ekim 2021 tarihleri arasında Çocuk Cerrahisi Kliniği tarafından akut skrotum tanısı konulan toplam 216 hasta dahil edildi. Hastaların yaşı, başvuru şikayetleri, fizik muayene, laboratuvar ve radyolojik sonuçları, ek anomalileri, medikal ve cerrahi tedavi sonuçları analiz edildi.

Bulgular: Hastaların yaşları 3 hafta ile 17 yıl arasında olup, ortalama yaş 9.9 ± 4.4 yıldır. Ağrı ve şişlik en sık akut skrotumda 119 hastada (%55.1) sağ tarafta, 97 hastada (%44.9) sol taraftadır. Akut skrotum nedenleri 98'inde (%45.4) orşit/epididimo-orşit (O/EO), 52'sinde (%24.1) strangüle inguinal herni (SIH), 38'inde (%17.6) testis torsiyonu (TT), 11'inde (%5.1) appendiks testis torsiyonu, 5' inde (%2.3), testis rüptürü 5'inde (%2.3), idiyopatik skrotal ödem 5 (%2.3), intravajinal apse 3 (%1.4), testis kanseri 2 (%0.9), megahidrosel 2 (%0.9) %) idi. O/EO olan hastaların 7' sinde (%7.1) vezikoüreteral reflü tespit edildi. Hastaların 52'sinde SIH vardı ve çoğunda sağ taraftaydı (40 sağ; 12 sol). Otuz sekiz hastada TT vardı (30 sol; 8 sağ). ATT (appendiks testis torsiyonu) olan hastalarının tamamı medikal tedavi ile takibe alındı. 5 akut skrotum hastasında travmaya bağlı testis rüptürü gelişti. Bu hastalardan 3'ü konservatif olarak takip edilirken, 2'sinde cerrahi müdahale gerekti. Akut skrotum gelişen 2 hastada testis tümörü tespit edildi ve bunlara testis koruyucu cerrahi uygulandı. Bu hastalarda teratom ve epidermal kist saptanmış olup halen aralıklı olarak pediatrik onkoloji ile takip edilmektedir. İdiyopatik skrotal ödem, intravajinal apse, megahidrosel saptanan diğer hastalar cerrahi olarak tedavi edildi.

Sonuç: Bu çalışmada; akut skrotumun en sık nedeni O/EO tespit edilmiştir. Özellikle tekrarlayan O/EO vakalarında ek olarak üriner sistem anomalisi akıldan çıkarılmamalıdır. Akut skrotum hastalarının doğru ve hızlı teşhis edilmesi, gereksiz cerrahi operasyonu ve testis kaybını önleyebilir. Mevcut çalışmanın bulguları, acil servise akut skrotal ağrı ve şişlik ile müracaat eden çocukların değerlendirilmesinde cerrahlar için ön referans değer olarak kabul edilebilir.

Anahtar Kelimeler: Akut skrotum, epididimorşit, strangüle inguinal herni, testis torsiyonu, appendiks testis torsiyonu.

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INTRODUCTION

The acute scrotum has been defined as the occurrence of testicular swelling with acute pain, and it may be due to many surgical and medical reasons. Among the causes of acute scrotum epididymoorchitis (EO), spermatic torsion of the cord and torsion of testicular appendages, idiopathic scrotal edema, hydrocele, trauma, testicular tumors epididymal cysts, strangulated inguinal hernia (SIH) can be counted. Early diagnosis and treatment of acute scrotum with imaging methods is important. Because torsion cannot be diagnosed in a short time like 6 hours may result in testicular damage that cannot be compensated for later. Color Doppler ultrasonography (US) is used as the first imaging modality for sudden onset scrotal pain in children and adults (1).

In this study; we aimed to retrospectively evaluate patients with acute scrotum admitted to or consulted with the Pediatric Surgery Outpatient Clinic.

MATERIAL AND METHOD

This study is a retrospective study, and 216 patients treated with the diagnosis of acute scrotum in the pediatric surgery clinic between November 2010 and October 2021 were included in the study. This study was conducted by ethics committee approval obtained from Karamanoğlu Mehmetbey University Faculty of Medicine (02-10/08.03.2022). Each patient and/or their parents were informed in advance of the interventions and investigations. Diagnosis of the acute scrotum was confirmed by physical examination, the US and/or Doppler US, and biochemical investigations. All the patients with EO were assessed with routine urinalysis, urine culture, and/or the US for urinary anomalies. Children with a known scrotal mass or a history of trauma were excluded from the study. The age of the patients, the onset of pain, anamnesis, and the interventions made to the patient as a result of color Doppler US were recorded, and these records were used for study purposes. In this study, the costs of laboratory, US and consultation, surgery, or medical intervention to the patient were not assessed.

RESULTS

The patients were aged between 3 weeks to 17 years, with a mean age of 9.9 ± 4.4 years. The patients 0-6 years old were 21 (9.8%), 87 (40.1%) 7-12 years old, 108 (50.1%) over 13 years old. Color Doppler USG imaging was performed on all patients, and the most important parameter was marked to be decreased blood supply to the testis and epididymis. Pain and swelling are most common in acute scrotum present on the right side in 119 patients (55.1%) and on the left side in 97 patients (44.9%). On physical examination of the patients included sudden swelling and pain, hyperemia, tenderness, stiffness, and especially gastrointestinal symptoms in the testicular torsion. Cremasteric reflex could not be detected in 5 (13%) of the patients in testicular torsion.

The causes of acute scrotum were disclosed in **Table 1**. O/OE was disclosed in 98 (45.4%) patients. Their mean age was 8.4 years (1-17 years), meantime of symptoms was 53.8 hours (18-120 hours) while the meantime of the beginning symptoms of patients with TT was 5.6 hours.

Table 1. Reasons of acute scrotum in our patients

Etiology	n	Percent (%)
Orchitis/epididymo-orchitis	98	45.4
Strangulated inguinal hernia	52	24.1
Testicular torsion	38	17.6
Torsion of testicular appendage	11	5.1
Testicular rupture	5	2.3
Idiopathic scrotal edema	5	2.3
Intravaginal abscess	3	1.4
Testicular cancer	2	0.9
Megahydrocele	2	0.9

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Further analysis, involving renal scintigraphy and voiding cystourethrography (VCUG), were carried out in 18 cases that disclosed positive urinalysis and urine cultures or the US disclosing of upper urinary tract dilatation. As a result of these investigations, vesicoureteral reflux was detected in 7 (7.1%) of the patients with EO. The cause of vesicoureteral reflux was primary in 3 of these patients, multicystic dysplastic kidney in 1, posterior urethral valve in 1, ectopic ureter in 1, and penoscrotal hypospadias in 1 patient. Vesicoureteral reflux was grade 2 in 4 patients, grade 3 in 2, and grade 4 in 1 patient. Cystoscopy was performed on these 6 patients, and the rectourethral fistula was detected in 1 of the patients.

There were 148 episodes of O/EO in 98 patients. Nine patients presented with more than one attack clinically, while only one episode of O/EO was observed in the other patients. Eleven of the patients (11.2%) had positive urinalysis (>10 white blood cells per high-power field). Urine cultures showed infection in 12 (12.2%) children with O/EO (E.Coli, Klebsiella, Pseudomonas), and 86 were uninfected. Diagnosis of O/EO was endorsed with Doppler US in all patients with O/EO. They were followed up conservatively.

Fifty-two of the patients had SIH and most of them had right-sided hernias (40 right; 12 left). The mean age of these patients was 1.3 years (43 days-8 years), and 28 of the patients were in the newborn period. The mean duration of symptoms was 26.2 hours (6-84 hours). The hernia sac involved predominantly jejunoileal intestinal segments (n=42), but others were Meckel diverticula in 4, appendix vermiformis in 5, sigmoid colon in 1, and these patients were followed up surgically.

Thirty-eight patients passed with TT (30 left; 8 right). The mean age of patients with TT was 11.2 years (newborn-17 years). Color Doppler US was carried out in 34 patients with TT. The mean time SH and AS ranges were 38.1 hours (12-96 hours) and 2.1 hours (1-4 hours), respectively. The mean degree of torsion was 420° (180°-1080°). TT was detected clockwise in 23 patients and counter-clockwise in 12 patients. The subsequent US was conducted 4 weeks after surgery. We encountered testicular atrophy in 4 of the DO patients in the 6th,12th,18th,24th postoperative months. All of the TTA patients were followed up by medical therapy.

Testicular rupture secondary to trauma developed in 5 acute scrotum patients. While 3 of these patients were followed conservatively, surgical intervention was required in 2 of them. The right testis was injured in 4 (80%) of the patients and the left testis was injured in 1(20%) of the patients. The reason was a physical attack in 3 of the patients with scrotal injury, and sports injuries in 2 of them. Testicular atrophy developed in 1 of 2 of these 5 patients who had a testicular injury and underwent surgical intervention, and orchiectomy was performed with the consent of the patient's relatives 2 years after the trauma.

In 2 patients detected testicular tumors developed acute scrotum, and testis sparing surgery was performed on them. Teratoma and epidermal cyst were detected in these patients, and they are still being followed up intermittently with pediatric oncology. The other patients detected idiopathic scrotal edema, intravaginal abscess, megahydrocele were managed surgically.

DISCUSSION

Acute scrotal pain is defined as "a constellation of new-onset pain, swelling, and/or tenderness of the intrascrotal contents (2). The acute scrotum is an extensive term that includes a wide variety of unique disease processes. Due to the time dependence of some morbid but reversible conditions, such as acute testicular torsion, prompt evaluation and diagnosis are required. The frequency of the intact reflex has been reported in 61.7% to 100% of boys between 24 months and 12 years of age (3). While the cremasteric reflex does not disappear in epididymitis and orchitis, the reflex cannot be obtained on the affected side in testicular torsion (4). On the other hand, the cremasteric reflex is unstable and may be absent in 30% of normal men without any pathology. Conversely, several case series report that patients with surgically confirmed testicular torsion may still have cremasteric reflexes anywhere from 8% to 30% of the time (5). In this study, the testicular torsion was found in 38 (17.6%) pediatric patients of acute scrotum. Also, the cremasteric reflex was not intact in 5 (13%) patients of testicular torsion. This finding is also consistent with the literature.

Morever, in our patients, pain and swelling in the acute scrotum were detected on the right side in 119 patients (55.1%) and on the left side in 97 patients (44.9%).

The most common cause of acute scrotum is epididymitis (6). The incidence of EO, which is one of the causes of acute scrotum, was shown as 57.4% in one study and 22.7% in another study (7). O/EO was detected in 45.4% (98 patients) of our patients admitted with acute scrotum clinic. This result was also found to be compatible with the literature.

In our patients, pain and swelling in the acute scrotum were detected on the right side in 119 patients (55.1%) and on the left side in 97 patients (44.9%).

Torsion of testicular processes is common in prepubertal children, and this clinical condition can be confused with testicular torsion and EO (8). Perinatal torsion is not observed frequently and constitutes 10% of pediatric cases. Although scrotal fat necrosis is not common, it is a benign cause of scrotal pain. Acute idiopathic scrotal edema is rare, self-limiting and often painless. In testicular torsion, the pain has a sudden onset, but in epididymitis, the pain increases over time (9).

The causal etiologies of acute scrotal pain are extensive. These include ischemic, traumatic, infectious, inflammatory, referred pain, acute or chronic, or idiopathic. Given their nature, an acute scrotum should be considered similar to patients presenting with an acute abdomen. It is difficult to identify the causes of acute scrotal pain in subgroups because many conditions are chronic but have an acute presentation (10). There is little data specifically reporting the incidence of the acute scrotum as a presenting complaint, but male genitourinary complaints are estimated to be between 0.5% and 2.5% of all emergency department visits. However, the annual incidence of testicular torsion is estimated to be 1 in 4000. This means that an estimated 1 in 160 men will experience spermatic cord torsion in the first 25 years of their life. However, the most common cause of acute scrotal pain, even in children, is torsion of the appendix testis rather than the spermatic cord (11). The incidence of testicular torsion, which is another causes of acute scrotum, was shown as 42.6% in a study (7) and 23% in another study (12). In our study, testicular torsion was detected in 38 (17.6%) pediatric patients and appendix testicular torsion in 11(5.1%) patients. These findings were also found to be compatible with the literature.

In a study conducted (13); on patients with O/EO, the underlying urinary system anomaly was found to be 22.7% (5 of 22 patients). Unlike this, in our study, urinary system anomaly was found to be vesicoureteral reflux in 7.7% (7 of 98 patients). Therefore, urinary system anomalies should be kept in mind, especially in pediatric patients with recurrent O/EO.

TTA is also one of the common causes of acute scrotum. Most of the cases are followed conservatively. In a clinical study (13), TTA was detected in 2% of the acute scrotum. Unlike the literature, TTA was detected in 5.1% (11 patients) of the patients admitted to our clinic. The patients were followed conservatively without surgery.

Spermatic cord torsion can be intravaginal or extravaginal. Extravaginal torsion occurs almost exclusively in newborns. It occurs due to increased mobility of the testis before descending into the scrotum when it attaches to the scrotal wall through the tunica vaginalis (14).

A focused history and physical examination are essential in the evaluation of the acute scrotum. A patient should be interviewed and asked about the onset and duration of symptoms and whether they are continuous or intermittent. The clinician should ask about a history of increased activity, physical exertion, heavy lifting, or direct trauma, as well as objective external signs such as swelling, urethral discharge, erythema, redness, or skin color changes. Associated symptoms such as fever, dysuria, frequent urination, urgency, hematospermia, abdominal pain, back pain, or weight loss should be required (15). The cremasteric reflex is unstable and may be absent in 30% of normal men without any pathology. Conversely, several case series report that patients with surgically confirmed testicular torsion may still have cremasteric reflexes anywhere from 8% to 30% of the time (16). Cremasteric reflex could not be detected in 5 (13%) of the patients in whom we detected testicular torsion. This finding is also consistent with the literature.

The definitive treatment of testicular torsion is surgical exploration and detorsion, usually followed by orchiopexy to prevent recurrent torsion. Although the success rate is highly variable and has been reported to range from 25% to 80%, manual detorsion can and should be attempted at the bedside. In patients with testicular torsion, the affected testis is rotated medially. Therefore, manual detorsion should be attempted from medial to lateral first ("opening the book") and may require an additional 180 to 720 degrees. Specifically, this requires the patient's right testicle to rotate counterclockwise or the patient's left testicle to rotate clockwise, similar to the act of opening the spine of a book. Manual detorsion is contraindicated if pain and/or torsion is suspected for more than 6 hours. Point-of-care ultrasound can be helpful in assessing the direction and effectiveness of this maneuver. Successful manual detorsion should result in almost immediate pain relief. Even if manual detorsion is successful, surgical exploration is still mandatory (17).

The prognosis of acute scrotal pain depends on the cause. In patients with epididymitis, the pain resolves within a few days after treatment, but induration may take weeks or months. Some people with diabetes can develop an abscess that leads to sepsis, a potential outcome. In patients who develop epididymitis secondary to sexual activity, the partner should be referred and treated to stop the cycle of transmission. In patients diagnosed with testicular torsion, the diagnosis depends on early diagnosis and treatment. If the treatment is delayed for 12-24 hours, the risk of testicular loss and infertility is high (18).

Most people with acute scrotal pain present to the emergency room first, and the triage nurse should therefore be fully aware of the elective causes that require immediate and immediate medical attention. If acute torsion is suspected, the triage nurse should immediately admit the patient to the emergency room and notify the emergency room physician. The nurse should continue to monitor the patient and report increasing pain to the clinician. If there is a delay in assessment or care, the nurse should take care to report this to the clinical team leader who directs the patient's assessment and care (19).

CONCLUSION

Pediatric acute scrotum is a complex clinical condition that requires rapid and accurate intervention. There are many diseases that cause acute scrotum. In this study; O/EO was the most common cause of acute scrotum. In addition, urinary system anomaly such as vesicoureteral reflux should be kept in mind, especially in recurrent O/EO cases. The findings of this study can be considered as a preliminary reference value for pediatric surgeons in the evaluation of pediatric acute scrotum patients. Because, rapid and accurate management is important for managing acute scrotal pain and rescuing affected testicles. However, we think that studies in more centers and involving more patients are needed to fully elucidate the causes and extent of acute scrotum.

ETHICAL DECLARATIONS

Ethics Committee Approval: This study was conducted by ethics committee approval obtained from Karamanoğlu Mehmetbey University Faculty of Medicine (02-10/08.03.2022).

Informed Consent: All patients signed the free and informed consent form.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

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