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Treatment of acute scrotum in children: 5 years' experience

Çocukluk çağı akut skrotum olgularında tedavi yaklaşımı: 5 yıllık deneyim

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BACKGROUND
A retrospective review was carried out to determine the incidence of various causes and outcome of management in patients with acute scrotum.

METHODS
Fifty children had a diagnosis of acute scrotum between 1st January 2007 and 15th May 2012. Age, mode of presentation, associated anomalies, and results of treatment were studied. Diagnosis of acute scrotum was confirmed by physical examination, Doppler ultrasound and biochemical investigations.

RESULTS
Clinical presentation consisted of sudden swelling and pain in the inguinoscrotal region. The average age was 7.5 years (2 months-14 years). Causes of acute scrotum were orchitis/epididymo-orchitis (O/EO) in 22, strangulated inguinal hernia (SIH) in 16, testicular torsion (TT) in 11, and torsion of testicular appendage (TTA) in 1. Associated urological anomalies were found in 5 patients with O/EO. Medical treatment was applied to patients with O/EO, and surgical treatment was performed in patients with SIH, TT and TTA.

CONCLUSION
In this series, O/EO was found to rank first as the cause of acute scrotum. Immediate surgical treatment in acute scrotum patients, except those with O/EO, is necessary. Associated urological anomalies should be investigated in patients with O/EO.

Key Words: Epididymo-orchitis; scrotum; strangulated inguinal hernia; testis torsion; torsion of testicular appendage.

AMAÇ
Akut skrotum tanısı ile tedavi edilen olgular altta yatan değişik nedenlerin insidansı ve bu olgulardaki tedavi sonuçlarının belirlenmesi amacı ile geriye dönük olarak incelendi.

GEREÇ VE YÖNTEM
1 Ocak 2007 ile 15 Mayıs 2012 tarihleri arasında 50 akut skrotum olgusu tedavi edildi. Yaş, klinik yansıma, ek anomaliler, tıbbi ve cerrahi tedavi sonuçları araştırıldı. Tüm olgularda tanı, fiziksel inceleme, ultrasonografi ve/veya Doppler ultrasonografi ve biyokimyasal incelemelere dayanılarak konuldu.

BULGULAR
Klinik görünüm inguinoskrotal bölgesinde ani şişlik ve ağrı oluşumuydu. Ortalama hasta yaşı 7,5 yıldı (2 ay-14 yaş). Olguların 22'sinde orşit/epididimo-orşit (O/EO), 16'sında strangüle herni (SH), 11'inde testis torsiyonu (TT), bir olguda da appendiks testis torsiyonu (ATT) saptandı. O/EO olgularının 5'inde eşlik eden ürolojik anomaliler saptandı. O/EO olguları konservatif olarak, SH, TT ve ATT olguları ise cerrahi olarak tedavi edildi.

SONUÇ
Bu çalışmada E/EO akut skrotum nedeni olarak ilk sırada bulunmuştur. O/EO olanlar hariç akut skrotum hastalarda acil cerrahi tedavi gereklidir. Ayrıca E/EO tanılı olgular ek ürolojik anomaliler açısından ele alınmalıdır.

Anahtar Sözcükler: Epididimo-orşit; skrotum; strangüle inguinal herni; testis torsiyonu; appendiks testis torsiyonu.

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Acute scrotal conditions are common in children, and present with scrotal pain, swelling, and redness in the affected hemiscrotum. The true cause is difficult to determine. There are myriad etiologies for this syndrome, including torsion of the testis (TT), torsion of the testicular appendix (TTA), epididymo-orchitis (EO), and strangulated inguinoscrotal hernia (SIH).[1-3] General belief is that EO is rare in children and associated with structural anomalies of the urinary tract.[4-6]

The aim of this study was to determine the incidence of various causes in patients with acute scrotal conditions who admitted to our clinic. It was also aimed to assess the outcome of the management.

MATERIALS AND METHODS

This is a retrospective study of 50 children diagnosed with acute scrotum between January 2007 and May 2012. Age, mode of presentation, associated anomalies, and results of medical and surgical treatment were studied. Diagnosis of acute scrotum was confirmed by physical examination, ultrasound (US) and/or Doppler US, and biochemical investigations. All the patients with EO were evaluated with routine urinalysis, urine culture and US for urinary anomalies. If suspicious findings were determined, such as positive urinalysis and urine culture or upper urinary tract dilatation on US, further investigations including renal scintigraphy and voiding cystourethrography (VCUG) were performed. Medical treatment was applied to patients with urinary tract infection before the VCUG procedure.

RESULTS

Clinical presentations of patients consisted of sudden swelling and pain in the inguinal, scrotal or inguinoscrotal region and sometimes symptoms associated with the gastrointestinal system. The age of the patients ranged from the newborn period to 14 years. With the exception of 9 newborn patients, the average age was 7.5 years (2 months-14 years). The average time intervals between the onset of the symptoms and admission to hospital (SH) and admission to hospital and surgical treatment (AS) in the operated patients were 50.2 hours (8-168 hours) and 3.6 hours (2-4 hours), respectively.

Etiology of acute scrotum is depicted in Table 1. O/EO was detected in 22 patients; their average age was 7.8 years (1-14 years) and average duration of symptoms was 63.2 hours (24-168 hours). Assessment for possible underlying urogenital anomalies included urinary US in all the patients with EO. Further investigations, including renal scintigraphy and VCUG, were performed in 8 cases who revealed positive urinalysis and urine cultures or US finding of upper urinary tract dilatation. Associated urological anomalies were found in 5 patients: isolated penoscrotal hypospadias in 2, utriculus prostaticus associated with penoscrotal hypospadias in 1, bilateral vesicoureteral reflux in 1, and isolated vesical exstrophy in 1. There were 31 episodes of EO in 22 patients. Two patients presented with more than one attack clinically, while only one episode of EO was observed in the other patients. Three of the patients (13.6%) had positive urinalysis (>10 white blood cells per high-power field). Urine cultures showed infection in 3 children with EO (Pseudomonas), and 19 were uninfected. Diagnosis of EO was confirmed with Doppler US in all patients with EO. They were treated conservatively.

Table 1. Causes of acute scrotum in our patients

Etiology	n	Percent (%)
Orchitis/epididymo-orchitis	22	44
Strangulated inguinal hernia	16	32
Testicular torsion	11	22
Torsion of testicular appendage	1	2

Sixteen of the patients had SIH and most of them had right-sided hernias (13 right; 3 left). The average age of these patients was 1.9 years (22 days-10 years), and 8 of the patients were in the newborn period. The average duration of symptoms was 31.1 hours (8-96 hours). Contents of the hernia sac included mostly jejunoileal intestinal segments (n=13), but other sac contents were Meckel diverticula in 1, appendix vermiformis in 1 and sigmoid colon in 1, and these patients were treated surgically.

Eleven patients presented with TT (9 left; 2 right) and 1 patient with TTA. The average age of patients with TT was 10.9 years (newborn-14 years). Color Doppler US was performed in 10 patients with TT. The average SH and AS durations were 53.1 hours (24-120 hours) and 2.8 hours (2-4 hours), respectively. The average degree of torsion was 540° (360°-1080°). There were 7 clockwise and 2 counter-clockwise torsions. The rotational direction could not be addressed in 2 patients, and spontaneous detorsion was presumed to have occurred during surgery. The type of torsion was intravaginal in all of the patients. Orchiectomy (O) was performed in 6 patients with parenchymal infarct, and detorsion and orchiopexy (DO) was performed in 5 without parenchymal infarct. For the O and DO groups, the average duration of symptoms was 68.0 and 38.4 hours and average degree of torsion was 510° and 360°, respectively. Routine contralateral testicular fixation with Dartos pouch orchiopexy technique was performed in all the TT patients. The follow-up US was performed 4 weeks after surgery. If any abnormalities regarding sonomorphological findings were detected, US examinations were repeated semiannually. Testicular atrophy was detected in 2 of the DO

patients in the 6th and 18th postoperative months. Excision of a testicular appendage was performed in 1 patient with TTA.

DISCUSSION

Every boy with acute onset scrotal pain and swelling requires immediate evaluation. The commonest causes of acute scrotum in children are TT, EO and TTA.[1-3,7] Various incidences have been reported regarding the etiology of pediatric acute scrotum.[1-3] The true incidence of these causes in acute scrotum is unclear, but EO is thought to be uncommon.[8]

There were a total of 19993 admissions in the study period, giving an overall acute scrotum incidence of 0.25% in our department. The relatively low percentage of acute scrotum patients in this series[8] with respect to general admissions during the same period may be explained by the local condition of our hospital. Because Doppler US is only available in the daytime, patients presenting symptoms of acute scrotum at night were referred to other medical centers for Doppler US. It is probable that these patients received further treatment where the US investigation was carried out.

The patients' ages in this study ranged from the newborn period to 14 years. EO occurred most commonly around 8 years (1-14 years). Traditional teaching suggests that EO is rare in children and occurs more frequently among late adolescents.[2,3,5,9,10] Contrary to published reports, only 22.7% of our patients (5 of 22) with EO were found to be around the peripubertal age group. The incidence of positive urinalysis (13.6%) in this study shows similarity with previous reports, in which incidences were between 15%-59%.[2,5,11] Urine cultures were inconclusive in the majority of the patients in the current study and showed infection with *Pseudomonas* in 3 patients, and this clinical data is similar to the literature.[12,13] However, the urine culture-proven infection rate of 51.6% has also been reported in children with epididymitis.[14] The incidence of underlying urogenital anomaly in our patients with EO was 22.7% (5 of 22) and is consistent with previous reports.[5,15,16] There is controversy regarding whether all the patients with EO should undergo urinary tract investigation. It has been recommended that all boys with EO should be evaluated for urogenital anomalies.[3] Others suggest further urological assessment only in children with high risk of urinary anomalies.[1,7,16] In the current study, routine use of urinalysis and urine culture with urinary US permitted us to perform selective use of VCUG and renal scintigraphs, which was found to be cost-effective.

Strangulated inguinoscrotal hernia (SIH) is another clinical entity that should be included in the differential diagnosis of acute scrotum in children. There are reports with varying incidences of SIH in pediatric acute scrotum. In a large series of 1228 children with acute scrotum, the incidence of SIH was reported to be lower than 7%.[15] However, an incidence of up to 49% was also reported.[17] The incidence of SIH (32.7%) in this study is similar to that of Tabari's series.[18] The average age of patients with SIH in the current study was 1.9 years (22 days-10 years), with half of them in the newborn period, and 81.2% of the patients presented with right-sided hernias. Thus, it is highly recommended that SIH be kept in mind if a newborn presents symptoms compatible with acute scrotum. With regard to the current study, despite the rather late admission of patients with SIH, no morbidity was observed after surgical treatment.

Testicular torsion (TT) is an urgent condition requiring prompt surgical treatment. In addition to its duration, the degree of rotation has been implicated in the clinical outcome.[19-21] Ischemia can occur as soon as 4 hours after torsion and is almost certain after 24 hours.[22] It was reported that if detorsion occurred in less than 6 hours or after 24 hours, testicular salvage rates of 90% and less than 10% could be achieved, respectively.[23] In Sidler's series,[1] orchiectomy was performed in 61.2% within 24 to 48 hours of clinical onset. In the current series, orchiectomy was performed in 6 children (54.5%). Two patients with detorsion revealed testicular atrophy in the late follow-up, defined as at least 15% less volume compared to the contralateral testis. If these atrophied testes are not taken into account with regard to testicular salvage, a rather low rate of 27.3% (3 of 11) in this study may be explained by the late diagnosis and treatment. Some patients with a prolonged period of symptoms may have had intermittent torsion or a partial torsion such that the testes may be salvageable. Thus, surgery should never be delayed on the assumption of nonviability based on a clinical estimate of the duration of torsion, as in three of our patients. The testes in these patients could be salvaged by surgical treatment despite the rather long duration of symptoms. The average value of torsion in this series for nonviable testes was slightly higher than in patients who did not undergo orchiectomy (510° versus 360°), in accord with the literature.[24] The duration of symptoms was also found to be longer in orchiectomized children, as may be expected. Although there was a neonate in the TT group, there were no patients with extravaginal torsion, as commonly seen in neonates in this series.

Torsion of the testicular appendix (TTA) is one of the most frequent causes of acute scrotum. Although it is a benign condition and the necrotic tissue is reabsorbed without any sequelae in almost all cases, the clinical presentation is a major challenge to clinicians. Most of these cases are managed conservatively. The

case of TTA in the presented series was diagnosed intraoperatively. The incidence of TTA in this series was 2% lower than previous reports.[8,14] This can be explained by the relative low percentage of TTA in our acute scrotum patients or underdiagnosis of this clinical entity.

In conclusion, the most common causes of acute scrotum in this series were O/EO, SIH, TT, and TTA. In light of this study and previous reports, immediate surgical treatment after investigations is necessary in acute scrotum patients, except those with O/EO. With this timely approach, it is anticipated that complication rates will decrease and salvage of affected testes will increase. In addition, associated urological anomalies should be searched in patients with O/EO, and in order to protect the upper urinary system, urinary tract infections should be treated.

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