

A 25-year review of the acute scrotum in children

D Sidler, R A Brown, A J W Millar, H Rode, S Cywes

Controversy persists with regard to the diagnosis and treatment of the acute scrotum in children. The differential diagnosis includes torsion of the testis, torsion of one of the appendices testis and epididymo-orchitis. Clinical differentiation is notoriously difficult and our policy has been to explore the scrotum of all who present with signs of an acute scrotum.

The medical records of 199 boys aged less than 13 years who presented with an acute scrotum at Red Cross War Memorial Children's Hospital in Cape Town during the period 1970 - 1996 were retrospectively reviewed. Diagnosis was made clinically in all cases. Sixty-two boys (31%) were found on exploration to have torsion of the testis (mean age 6.3 years), the left side being affecting 2.5 times more frequently than the right (1 neonate had bilateral torsion), 62 (31%) had torsion of testicular appendages and 56 (28%) had epididymo-orchitis. Nineteen were grouped separately and 13 (6.5%) of these were treated conservatively. Boys needing an orchidectomy ($N = 38$) for testicular torsion presented three times later than those who did not (48 v. 16.5 hours). Successful conservation of the testis was directly related to the time interval of symptom development and surgical derotation. Boys with torsion of a testicular appendage presented later (mean 51 hours) and were older (mean 10 years) than boys in the other two groups. Those with epididymo-orchitis were younger (mean 3.3 years) and 40% were younger than 1 year. Only in one-third was there any clinical supportive evidence of the diagnosis. Surgical complications were infrequent. We advocate expedient surgical exploration and derotation with contralateral orchidopexy, since clinical differentiation between torsion of the testis, testicular appendages and epididymo-orchitis is inexact, even with highly specialised investigation such as Doppler ultrasound and radionuclide scanning, which may not be widely available, may delay definitive treatment and suggest a lack of urgency where time is of the essence.

S Afr Med J 1997; 87: 1696-1698.

Department of Paediatric Surgery, Red Cross War Memorial Children's Hospital and University of Cape Town

D Sidler, MD, FCS

R A Brown, DCH (SA), FRCS (Edin), FCS (SA)

A J W Millar, FRCS (Eng), FRACS, DCH

H Rode, MMed (Surg), FRCS (Edin), FCS (SA)

S Cywes, MMed (Surg), FACS (Paed), FRCS (Eng), FRCS (Edin), FRCS (Glasg)

The acute scrotum of childhood is a common surgical emergency.¹ Testicular torsion is thought to be the most frequent cause and always requires urgent surgical exploration and derotation, as the viability of the twisted testis is directly proportional to the time interval between symptom development and surgical intervention.² There is, however, still controversy about the methods of diagnosis: clinical versus Doppler ultrasound and radio-isotope scanning and management; mandatory as opposed to selective surgical exploration; and orchidectomy versus conservation of the strangulated testis.²⁻⁷

Patients and methods

We retrospectively reviewed the records of 199 boys presenting to Red Cross War Memorial Children's Hospital in Cape Town with an acute scrotum, i.e. acute onset of pain and swelling of the scrotum, during the period January 1970 to May 1996. The diagnosis of an acute scrotum was made without attempting to differentiate the cause in the majority. Our policy was expediently to explore surgically all patients who presented with an acute scrotum. Exploration was performed through the median raphe of the scrotum in most cases. If torsion of the testis was found, the testis was derotated and wrapped with a warm wet gauze swab for 5 - 10 minutes to await recovery. If there was doubt about the viability of the testis, the tunica albuginea was incised and if no bleeding occurred and the testis appeared non-viable, it was excised and sent for histological examination. When an intravaginal torsion was found, the contralateral testis was fixed through the same incision by everting it from its tunica vaginalis, placing it in a subdartos pouch and suturing it to the median raphe.

If there appeared to be secondary infection of a necrotic testis, the contralateral orchidopexy was delayed. Testicular histopathological data were reviewed to confirm testicular infarction (Table 1). Twisted testicular appendages were ligated and excised. The term 'testicular appendages' was collectively used to denote remnants of embryonic structures, viz. appendix testis and epididymis, without differentiating them in our study.

Table 1. Histological data on 38 excised twisted testes, 1 tumour and 2 cases of epididymo-orchitis

| | |
|--|----|
| Total haemorrhage necrosis | 30 |
| Fibrosis + granulation tissue | 2 |
| Dystrophic mineralisation | 2 |
| Haemosiderin deposit | 2 |
| Subtotal necrosis | 5 |
| Necrotic testis, viable epididymis | 2 |
| Necrotic testis (no histology available) | 1 |
| Yolk sac tumour | 1 |
| Epididymo-orchitis | 2 |
| Down syndrome | 1 |

Since our study emphasises the management of the twisted testis, all infective pathology was grouped under epididymo-orchitis without differentiation of the pathology. In patients with epididymo-orchitis a swab was taken for microbiological culture. Occasionally, the tunica albuginea

was incised when there was marked swelling and evidence of increased tension within the testis; this was done to relieve pressure, improve perfusion and alleviate postoperative pain.

Results

At surgical exploration the following pathologies were identified: 63 cases of torsion of the testis in 62 boys, 62 of torsion of testicular appendages and 56 of epididymo-orchitis (Fig. 1). The age incidence for the various pathologies is shown in Fig. 2. Another diagnosis was given to 19 boys, of whom 11 were treated conservatively (Table II).

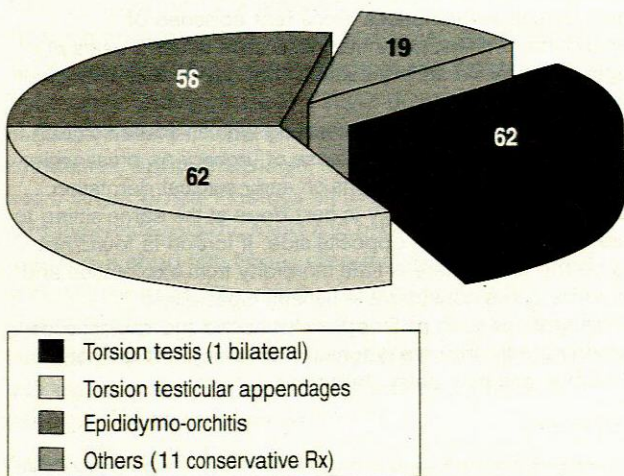


Fig. 1. Incidence of acute scrotum in 199 boys.

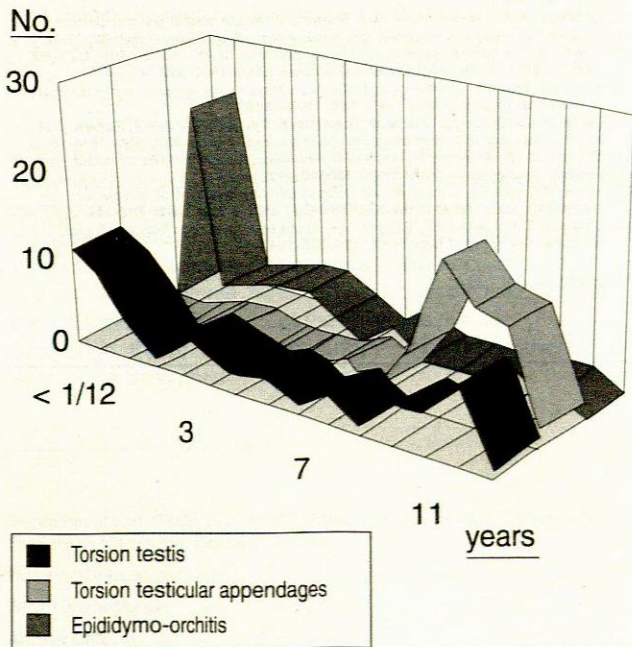


Fig. 2. Age incidence graph of acute scrotum.

The mean age of boys with a torsion of the testis, excluding the 11 neonates, was 6.3 years. Torsion of the left testis was more common (45 v. 18 of the right). The mean time interval between symptom development and surgical exploration of those testes considered necrotic and needing orchidectomy was three times longer than in the case of viable testes (48 v. 16.5 hours). Sixty per cent of all twisted testes (28 left and 10 right) had to be removed. Five undescended testes (UDTs) were encountered, with bilateral UDTs being present in one patient. No twisted testis with duration of symptoms more than 24 hours was viable. Nine out of 11 neonates with testicular torsion had an orchidectomy, bilateral in one case. All were considered clinically non-viable. The histopathological findings in respect of 41 excised testes, 38 testicular torsions, 2 cases of epididymo-orchitis and 1 yolk sac tumour are shown in Table II. One testis was not sent for histological examination. Thirty specimens of twisted testes showed complete haemorrhagic necrosis; some even showed reactive fibrosis with granulation tissue and dystrophic calcification. In 5 cases (13%) there were some viable seminiferous tubules and 2 patients had a necrotic testis with viable epididymis.

Table II. Other diagnoses (N = 19)

| Pathology | No. | Treatment |
|---|-----|-----------------------|
| Resolving torsion of the testicular appendage | 2 | Conservative |
| Torsion testis | 1 | No consent |
| Epididymo-orchitis | 4 | Conservative |
| Bell clapper abnormality of testis | 2 | Bilateral orchidopexy |
| No pathology | 3 | Surgical exploration |
| Idiopathic scrotal oedema | 3 | Conservative |
| Trauma | 3 | Surgical exploration |
| Yolk sac tumour | 1 | Orchidectomy |

Fifty-five had an immediate contralateral orchidopexy and 3 a delayed procedure. One boy in whom the contralateral orchidopexy was delayed because of the risk of infection was lost to follow-up. Two neonates with an extravaginal testicular torsion did not undergo a contralateral orchidopexy.

Boys with torsion of testicular appendages were older (mean age 10 years) and they presented later (mean time 51 hours) than the group with a torsion of the testis. Three were initially treated conservatively, but eventually needed surgical excision because of persistent pain.

Children with epididymo-orchitis were younger with a mean age of 3.3 years. Forty per cent were under 1 year of age. Twenty-two presented with pyrexia, 14 with leucocytosis and 14 (25%) had a positive urinary or surgical culture.

Fourteen children were investigated and 2 boys (mean age 2 months), both with urinary tract infection, were shown to have vesico-ureteric reflux grade I and II, respectively. Eleven boys were treated conservatively: 2 with a clinically resolving torsion of an appendix testis, 3 with idiopathic scrotal oedema, 2 with trauma and 4 with epididymo-orchitis. In 1 boy with a torsion of the testis, consent for surgical exploration could not be obtained and he was subsequently lost to follow-up.

Three had a negative surgical exploration (1.6%). Pre-operative diagnoses were torsion of the testis, torsion of the appendix testis and epididymo-orchitis, respectively. In 2 others a bilateral orchidopexy was undertaken for a testis with a bell clapper deformity and 1 boy had a yolk sac tumour.

Postoperative complications were rare: 4 infections, 1 inguinal abscess needing drainage, 1 reactive hydrocele and 1 atrophic testis each in the group with torsion of the testes and torsion of the testicular appendages.

Discussion

In our paediatric experience torsion of the testis, testicular appendages and epididymo-orchitis were equally common causes of the acute scrotum in boys aged under 13 years (Fig. 1). Unfortunately, no discriminating features in either history or examination conclusively differentiated the correct diagnosis. The ultimate goal in the management of an acute scrotum is to salvage the twisted testis,¹ given that 24 hours after symptom development, testicular viability is minimal.^{1,2} Urgent surgical exploration is therefore warranted if testes are to be preserved.

Our results of a 60% excision rate as well as the histological results of granulation tissue and or dystrophic calcification in some cases point to a considerable time interval between onset of torsion and surgical exploration. This can be attributed to late recognition by the parents, especially in neonates and infants, poor transport facilities to the local referral hospital, misdiagnosis, the complacency of the initial attending doctor and in-hospital delay.

The age distribution for these three common causes of an acute scrotum is shown in Fig. 2. Testicular torsion had a biphasic presentation with a peak in the neonatal period and a second peak just prior to puberty. Epididymo-orchitis was most common in the first year of life. Torsion of the testicular appendages was most common in early puberty, possibly due to a surge of gonadotrophic hormones³ at this time. Unfortunately, because of considerable overlap in age, age at presentation is of little diagnostic value.⁶ Similar findings have been reported in the literature.^{5,8}

Special investigations such as Doppler ultrasound and radio-isotope scanning have been used for diagnosis in other centres, thereby advocating a more selective surgical approach for the acute scrotum.³ Several critical reports have been published recently, warning of the inaccuracy of these investigations,⁹⁻¹¹ which are time-consuming as well as often unavailable after hours.

Based on this experience we advocate expedient surgical exploration. As 5 out of 38 histological specimens (13%) showed areas of viability in the excised testis, we caution against overzealous excision of a twisted testis. Neonatal torsion of the testis has a bleak outcome. Emergency or elective management is still controversial;¹² however, two testes were salvaged in our series and we therefore advocate early surgical exploration if the neonate is well enough to undergo safe anaesthesia.

Torsion of a testicular appendage was common in prepubertal boys.^{5,8} There may be a place for conservative treatment, if the diagnosis can be confidently made by observation of the presence of a bluish bleb visible through

the oedematous scrotal skin in the early stages, or when presentation is late with subsiding symptoms. However, 3 boys who were initially treated conservatively required surgical excision of the twisted hydatid for persistent intractable pain. Removal of a gangrenous testicular appendage produced immediate symptomatic relief, suggesting that expeditious exploration and removal are justified.

Epididymo-orchitis was most common in the first year of life (40%). Fourteen patients with positive urinary or surgical swab cultures were further investigated and only 2 boys (14%) had an associated urinary abnormality, namely vesico-ureteric reflux grades I and II. Associated urinary abnormalities were therefore infrequent.¹³ Lewis *et al.*¹ believe a high voiding pressure to be the cause of epididymitis in their cases. Recurrent episodes of epididymo-orchitis, particularly in a child under 2 years of age, and positive urinary cultures mandate further urological investigation.

In conclusion, children presenting with an acute scrotum should be managed with a sense of urgency as preservation of testicular viability depends on early surgical derotation. Contralateral orchidopexy is best done at the same sitting to prevent torsion of the opposite side. If torsion is found not to be the cause there is little morbidity from exploration and in some cases considerable benefit. Specialised investigations such as Doppler ultrasound and radionuclide scanning may improve diagnostic accuracy, but are not infallible, and may delay definitive treatment.

REFERENCES

1. Lewis AG, Bukowski P, Jarvis D, Wacksman J, Sheldon A. Evaluation of the acute scrotum in the emergency department. *J Pediatr Surg* 1995; **30**: 277-282.
2. Clift VL, Hutson JM. The acute scrotum in childhood. *Pediatr Surg Int* 1989; **4**: 185-188.
3. Klin B, Zlotovich L, Horne T, Livshitz G, Efrati Y, Vinograd I. A selective approach to the treatment of acute scrotum in children. *Pediatr Surg Int* 1996; **11**: 483-486.
4. Caldaroni AA, Valvo JR, Altabarnakian VK, Rabinowitz R. Acute scrotal swelling in children. *J Pediatr Surg* 1984; **19**: 581-584.
5. Nour S, MacKinnon AE. Acute scrotal swelling in children. *J R Coll Surg Edinb* 1991; **36**: 392-394.
6. Anderson AM, Giacomantonio JM, Schwarz D. Acute scrotal pain in children: prospective study of diagnosis and management. *Can J Surg* 1989; **32**: 29-32.
7. Cywes S. The painful testis in infants and children. *S Afr J Surg* 1966; **4**: 73-83.
8. Davenport M. Acute problems of the scrotum. *BMJ* 1996; **312**: 435-438.
9. Allen TD, Elder JS. Shortcomings of colour Doppler sonography in the diagnosis of testicular torsion. *J Urol* 1995; **154**: 1508-1510.
10. Corrales JG, Corbel L, Cipolla B, Staerman F, Darnault P, Guille F. Accuracy of ultrasound diagnosis after blunt testicular trauma. *J Urol* 1993; **150**: 1834-1836.
11. Steinhart GF, Boyarsky S, Mackey R. Testicular torsion: Pitfalls of colour Doppler sonography. *J Urol* 1993; **150**: 461-462.
12. Stone KT, Kass EJ, Cacciarelli AA, Gibson DP. Management of suspected antenatal torsion: What is the best strategy? *J Urol* 1995; **153**: 782-784.
13. Gislason T, Noronha RFX, Gregory JG. Acute epididymitis in boys: a 5-year retrospective study. *J Urol* 1980; **124**: 533-534.

Accepted 25 Apr 1997.