Testicular torsion unravelled

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Testicular torsion is a true vascular emergency – prompt diagnosis and surgical management is critical. If treatment is not instigated within 4–6 hours of the onset of pain, irreversible testicular infarction may result, necessitating orchidectomy. This review presents the key features, management principles and medicolegal considerations of this serious condition.

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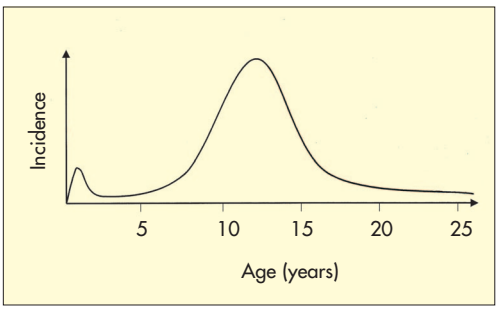
Testicular torsion is one of the commonest surgical emergencies presenting to general surgeons, urologists, accident and emergency clinicians, paediatricians and GPs. The incidence has a bimodal distribution (Melekos et al, 1988), with the main peak around puberty and another smaller peak in the first year of life (*Figure 1*). In men under the age of 25, the annual incidence of torsion is around 1 in 4000 (Anderson and Williamson, 1988). In the UK, around 400 men a year would lose a testis as a result of a delay in the diagnosis of testicular torsion (Bennett et al, 1987). Early recognition and urgent intervention is essential to preserve testicular viability. In addition, failure of or delay in diagnosis may have important medicolegal implications.

Figure 1. The incidence of testicular torsion.



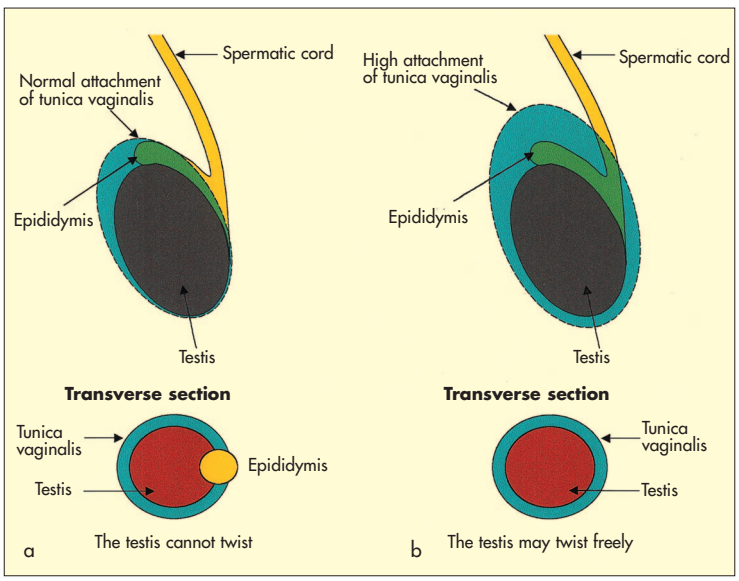


Figure 2a. Normal testis. b. Bell clapper testis.

AETIOLOGY

Testicular torsion usually occurs spontaneously although it has been associated with trauma, bicycle riding, sexual activity and cold weather (Anderson and Williamson, 1988). An anatomical abnormality may predispose to torsion in some cases, and two mechanisms have been described.

Intravaginal torsion

This is the most common form and is found in those presenting around puberty. A congenital high attachment of the tunica vaginalis on the cord produces the so-called 'bell clapper' deformity. This congenital anomaly allows the testis and cord to rotate more readily than in a normal testis (*Figures 2a* and *b*). The bell clapper deformity occurs in up to 12% of males and is bilateral in a majority of cases, with a significant risk of contralateral torsion (Caesar and Kaplan, 1994).

Extravaginal torsion

This form is most commonly seen in the first year of life. The entire testis and tunica vaginalis twist in a vertical axis on the spermatic cord as a result of incomplete fixation of the gubernaculum to the scrotal wall. This allows free rotation of the testis within the scrotum itself.

Both extravaginal and intravaginal testicular torsion result in occlusion of the testicular artery in the spermatic cord and venous stasis in the pampiniform plexus, with subsequent ischaemia and infarction.

CLINICAL FEATURES

Testicular torsion presents as an acutely and exquisitely painful testis, particularly in adolescents. Previous attacks of similar pain with subsequent complete resolution are occasionally described, and may represent intermittent episodes of torsion. Half of testicular torsions occur while the patient is sleeping, leading him to wake suddenly. The important features in the history and examination are listed in *Table 1*. Patients presenting with such symptoms should be considered as having testicular torsion, until proven otherwise at surgery (Schul and Keating, 1994). The differential diagnosis includes epididymo-orchitis, torsion of the hydatid of Morgagni (a remnant of the Mullerian duct), trauma, idiopathic scrotal oedema and mumps orchitis in the very young. *Table 2* presents the distinguishing features of each condition.

DOPPLER ULTRASONOGRAPHY

The high rates of 'negative' scrotal explorations have prompted the use of preoperative radiological investigations to assist in obtaining a definitive diagnosis in some patients. Colour Doppler ultrasound may be used to demonstrate arterial blood flow to the testicle in cases where urgent scrotal exploration is not indicated on clinical grounds. Poor signal suggests poor blood flow in the testicular artery, and a diagnosis of torsion is therefore highly likely. This technique is operator dependent, with studies demonstrating 85–90% sensitivity and 75–95% specificity (Lerner et al, 1990; Lewis et al, 1995). Crucially, the use of Doppler ultrasound must not result in an unnecessary delay in reaching the diagnosis and the delivery of definitive surgical treatment.

TABLE 1.
The important clinical features of testicular torsion

History	Pain is of acute onset
	Mainly ipsilateral testicular pain
	Occasionally radiating to groin, abdomen or thigh
	History of previous testicular pain is common – intermittent torsion
Examination	Acutely tender and swollen testicle
	Horizontal lie (bell clapper deformity)
	High riding testis in scrotum
	Absent cremasteric reflex
	Mild fever and erythema of the scrotal skin (late signs)
Investigations	Urinalysis – usually normal
	Colour Doppler ultrasound – may show poor or absent blood flow

TREATMENT

The gold standard treatment is urgent surgical exploration of the scrotum.

TABLE 2.
Key features in the differential diagnosis and management of testicular torsion

Epididymo-orchitis	History	Pain is of gradual onset
		Usually occurs over a few days
		History of previous scrotal pain is uncommon
		Uncommon in adolescent boys
		Urinary symptoms Dysuria
		Frequency
		Urethral discharge
	Examination	Pyrexia
		Tender epididymis and/or testis
		Prehn's sign present (elevation of testis in supine position relieves pain – not present in torsion)
	Investigations	Urinalysis – pyuria (leucocytes positive)
		MSU – microscopy culture and sensitivity
		Urethral swab – chlamydia or gonorrhoea
		Colour Doppler ultrasound – increased blood flow in epididymis
	Treatment	Empirical antibiotics initially
		Subsequently directed by result of MSU
		Bed rest
		Analgesia
		Scrotal support and elevation
Torsion of the hydatid of Morgagni	History	Occurs between 7 and 14 years of age
		Pain either acute or gradual in onset
		Less severe than that of torsion
	Examination	Palpable 3–5 mm tender nodule at upper pole
		The 'blue-dot' sign at the upper pole
	Investigations	Urinalysis – normal (pyuria is uncommon)
		Colour Doppler ultrasound – not useful
	Treatment	Does not usually require operative intervention
Trauma	History	Usually a specific history
		Absence of other symptoms
	Examination	Findings dependent on history
	Investigations	Urinalysis – not helpful
		USS – may differentiate testicular rupture and haematoma
	Treatment	Usually conservative
		Surgery – if testicular rupture or complication of haematoma

MSU = mid-stream urine; USS = ultrasound scan. Continued on next page

Interestingly, at the time of diagnosis, manual detorsion may be attempted following administration of appropriate local anaesthesia (spermatic cord block). If successful, elective orchidopexy may be undertaken within the next few days. However, the results of manual detorsion are variable, and this procedure should not be seen as a replacement for surgery.

At operation, a midline scrotal incision is commonly used, and the diagnosis determined by inspecting the affected testicle. Most testes twist inward and toward the midline, if torsion has occurred, and therefore the cord is untwisted in the opposite direction. The testis is then wrapped in a warm saline-soaked swab and the anaesthetist supplies 100% oxygen via the endotracheal tube. If the result of reperfusion is favourable, orchidopexy (fixation) is performed. The testis is fixed at three positions (upper pole, mid pole and lower pole), commonly with non-absorbable sutures. If the testicle is not salvageable (*Figure 3*) an orchidectomy is performed. The contralateral testis should then be explored, through the same incision, and a prophylactic orchidopexy should be performed to prevent future torsion on that side.

TABLE 2.
Key features in the differential diagnosis and management of testicular torsion (continued)

Mumps orchitis	History	Mainly in prepubertal males	
		Usually bilateral testicular pain and swelling	
		Gradual in onset	
		Associated with systemic symptoms	Malaise, fatigue and myalgia
			Fever and chills
			Nausea and headache
		May follow the development of parotitis by 4–7 days	
	Examination	Testicular enlargement	
		Mild tenderness	
		Erythematous scrotal skin	
	Investigations	Urinalysis and urethral cultures to exclude epididymitis	
		Serum immunofluorescence antibody testing	
		Colour Doppler ultrasound – may show increased flow	
	Treatment	Most cases resolve spontaneously in 3–10 days	
		Therefore treatment is conservative	
		Bed rest and analgesia	
Idiopathic scrotal oedema	History	Uncommon cause of acute scrotal pain	
		Usually in very young children	
		Thought to be the result of an allergic phenomenon	
		Discomfort confined to the scrotal skin	
	Examination	Erythema and swelling of scrotum	
		Bilateral and may extend to penile shaft and perineum	
		Testis and cord usually non-tender and of normal size	
	Investigations	USS – significant scrotal wall oedema, testis and epididymis normal	
	Treatment	No operative intervention necessary	
		Conservative and supportive management only	

MSU = mid-stream urine; USS = ultrasound scan

SALVAGE RATES

The time from symptom onset to surgery is crucial, as it will dictate subsequent clinical outcome. If this time period is 6 hours or less, there is a good chance of salvaging a torted testis. Significantly lower salvage rates result if this time period is longer (*Figure 4*).

COMPLICATIONS

Undiagnosed testicular torsion, or an infarcted testis left in the scrotum, may result in complications. Short-term complications include infection, which may lead to abscess or sinus formation. The most serious long-term complication is the formation of antisperm antibodies, secondary to ischaemic testicular injury, which then attack the contralateral testis and may result in infertility (Bartsch et al, 1980). Other long-term complications occur as a result of poor surgical technique.

Future torsion may occur in a testis which has undergone previous inadequate prophylactic fixation (Thurston and Whitaker, 1983). Evidence suggests that the risk of future torsion may be avoided by everting the tunica vaginalis at the time of original surgery (Lent and Stephani, 1993), or by placing the testis into a dartos muscle pouch, without suturing (Bellinger et al, 1989). Cosmetic outcome is an important factor in psychological recovery following orchidectomy. The immediate use of a testicular prosthesis should be considered in this situation. However, if there is any suspicion of a potential risk of infection, the prosthesis can be inserted at a later date.

MEDICOLEGAL CONSIDERATIONS

The difficulty in making a clinical diagnosis, and the sequelae of complications, may make testicular torsion an active and costly form of litigation. The average payment was around $60 000 (£42 000) in a study from the United

States (Matteson et al, 2001). The majority of claims are the result of incorrect diagnosis – the commonest being epididymo-orchitis. As this is treated with antibiotics, in stark contrast to torsion, which needs urgent surgical intervention, it is understandable why there may be such a high rate of litigation with misdiagnosis.

Failure or delay in referral is the second commonest cause of litigation. While many cases may be attributed to clinician's error, it was found that a delay by patients in seeking medical advice may also be a significant cause of high orchidectomy rates (Bennett et al, 1987). Claims as a direct result of surgical negligence are less common. Failure to perform contralateral orchidopexy at the time of surgical exploration is regarded as indefensible, but recognized complications of surgery are generally associated with lower rates of settled claims. As well as employing good medical practice, informed consent may help reduce overall rates of litigation from surgical misadventure. The potential risk of orchidectomy and the need for contralateral orchidopexy should be clearly explained to the patient as well as documented in the medical casenotes.

CONCLUSIONS

Testicular torsion is a common surgical emergency, which necessitates immediate recognition and urgent surgical exploration, for a satisfactory outcome. Poor salvage rates can be prevented by early presentation and expeditious management. HM

Conflict of interest: none.

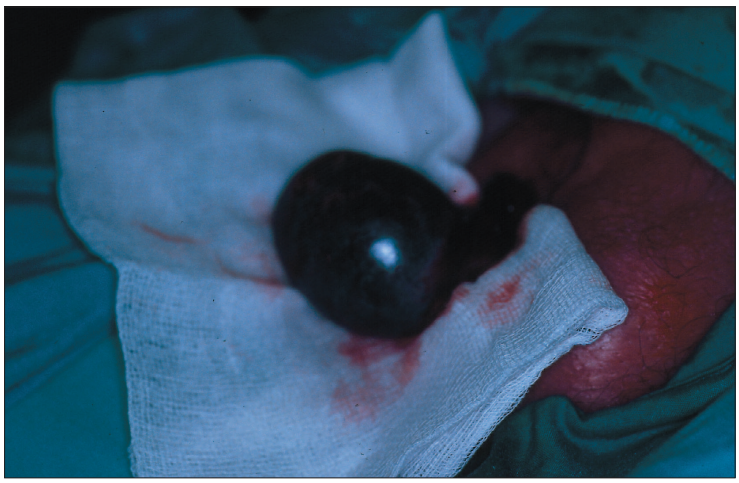


Figure 3. Testicular torsion may result in irreversible infarction of a testis.

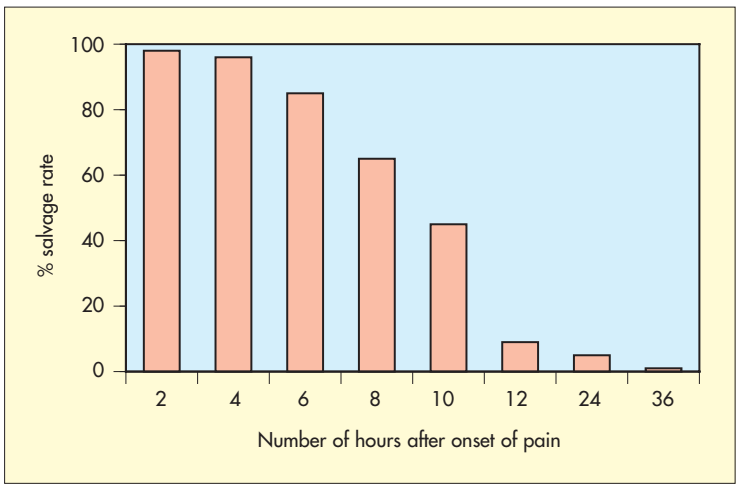


Figure 4. Salvage rates depend on time to presentation.

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KEY POINTS

- Acute onset unilateral testicular pain is presumed to be torsion unless proved otherwise at surgery.
- There is a bimodal distribution of incidence, with the main peak around puberty and another smaller peak in neonatal period.
- Early diagnosis and prompt surgical intervention is mandatory to achieve good testicular salvage rates.
- Prophylactic contralateral orchidopexy should always be performed when torsion is found.
- Incorrect diagnosis or delay in referral may have important medicolegal implications.