The Weekly Probe

12th May April 2017 **Volume 14 Issue 16**

Thanks - Thanks to Will S for coordinating the huge amount of work which went behind making last Friday, Hand Hygiene Day to make it such a success. Thanks also to all those who joined in with the effort making posters, posing for posters etc. Let's all follow the lead to continue to raise the important profile of hand hygiene within the ED and at "Sutho".

THIS WEEK

Acute Scrotal pain

A 15 month old boy represents with vomiting. On examination his abdomen is soft nontender with no distension yet the scrotum is empty and there is an inguinal lump. What is going on?

A 15 year old boy presents with 3 days of constant scrotal pain with no infective symptoms. The ultrasound showed increased testicular flows and an enlarged epididymis (associated increased blood flows) Torsion?

We see at times males who have been referred with acute scrotal pain.

Our aim as in most EM issues is to look for life threats, and then other processes which may cause both short and long term injury to that organ / limb. In scrotal pain the most important process, particularly in reproductive males is torsion and any acute scrotal pain is torsion until proven otherwise.

To define the cause of an acute scrotum you need a careful history, a thorough physical examination and appropriate diagnostic tests. The onset, character and severity of symptoms must be determined. The physical examination should include inspection and palpation of the abdomen, testis, epididymis, scrotum and inguinal region (not done in the first case).

Urinalysis should always be performed, but scrotal imaging is necessary only when the diagnosis remains unclear. None of the conditions responsible for acute scrotal pain or swelling has a single pathognomonic finding, but the combined background information and physical findings *frequently* suggest the correct diagnosis

The general abdominal examination should be performed, with particular attention given to flank tenderness and bladder distention. However the testes should always be examined as part of the abdominal examination in any male, to avoid missing those torsions presenting with more 'abdominal' symptoms. Vomiting is a common associated symptoms with torsion and when the abdomen is found to be soft and nontender, avoid the mistake of labeling the presentation as secondary to gastro or food poisoning. Examine the groin! (Similarly examine the chest as pleural / lung base pathology may present as an abdominal problem).

Next the inguinal regions should be examined for obvious hernias and any swelling or erythema. The genital examination begins with inspection of the scrotum. The two sides

should be assessed for discrepancies in size, degree of swelling, presence and location of erythema, thickening of the skin and position of the testis. Unilateral swelling without skin changes suggests the presence of a hernia or hydrocele. The duration of symptoms is also relevant. A high-riding testis with an abnormal (transverse) lie may suggest torsion, but this diagnosis is less likely if pain has been present for over 12 hours and the scrotum has a normal appearance. In both epididymitis and testicular torsion, the affected hemiscrotum typically displays significant erythema and swelling after 24 hours.

The spermatic cord in the groin may be tender in a patient with epididymitis but typically is not tender in a patient with testicular torsion.
The cremasteric reflex should also be assessed. This reflex is elicited by stroking or gently pinching the skin of the upper inner thigh while observing the scrotum. A normal response is contraction of the cremasteric muscles on the ipsilateral side with unilateral elevation of the testis. The cremasteric reflex is rarely intact in patients with testicular torsion but is usually present in patients with torsion of a testicular appendix. One study found that CR carried 88.2% sensitivity, 86.2% specificity, 35.7% PPV, 98.9% NPV, and 86.3% accuracy for torsion. In children under 11 years, the sensitivity was 75%, specificity 83.9%, accuracy 83.3%, while boys ≥11 years had a sensitivity of 100%, specificity 89%, and accuracy of 90.1%. ie good yet not perfect.

The testis is best examined by grasping it between the thumb and the first two digits. The epididymis should be palpable as a soft, smooth ridge posterolateral to the testis. The testes are normally the same size.
As our main concern is of torsion, the discussion will largely focus on testicular torsion (TT).

TORSION

Torsion, or rotation of the testis with twisting of the spermatic cord, is a surgical emergency. Torsion- seen from birth to 77 years of age, yet two peaks in incidence, the largest around puberty (accounting for 65% of all torsions) with another much smaller peak in the first year of life.

The tunica vaginalis normally covers the anterior surface of the testis and extends varying distances over the epididymis and the spermatic cord. Where the coverings extend up the cord the testis is suspended freely within the tunical cavity, within which it may rotate around its narrow ‘mesentery’. This so-called ‘bell clapper’ variant has been seen in 12% of testes at postmortem; it is the aetiology of torsion in most cases in childhood and adolescence, and is frequently bilateral. The testis may adopt a horizontal position in the scrotum, which is a clue to the presence of this predisposing anatomy. Torsion occurs ‘intravaginally’ and is at its peak around puberty, when rapidly increasing testicular mass increases the chance of the testis rotating.

In the neonatal period the descending or recently descended testis and its coverings are extremely mobile within the scrotum. In this age group the cord and coverings may twist en masse. This is referred to as an extravaginal torsion and accounts for most torsions at this early age, although intravaginal torsion is also seen.

Childhood and peripubertal torsion -Torsion in this age group usually causes acute-onset ipsilateral testicular pain but the history does not always fit this classical pattern. Of those without this localizing pain, look for an undescended testes. This was the clinical scenario seen in case 1. In 34% have associated groin, abdominal or thigh pain- could be the earliest and predominant symptom.

Urinary symptoms of dysuria or frequency- 5% and vomiting - 39%; 36% of patients had a history of previous unilateral or bilateral testicular pain or swelling. Injury was implicated in only 4% of cases, recent exercise in 7% and bicycle riding in 3%, while 11% were woken from sleep with the pain. Thus a history of trauma does not exclude the diagnosis of testicular torsion.

Testicular torsion usually begins abruptly. Moderate pain developing gradually over a few days is more suggestive of epididymitis or appendiceal torsion. Also note that those with intermittent torsion may have few or no clinical findings despite a history that is highly suggestive as they may resolve by spontaneous untwisting of the cord, but this is a warning that should not be ignored.

In general, begin with the normal side where a horizontal lie to the testis suggests a bell-clapper deformity in 25%, indicating a risk of contralateral torsion. On the affected side the body of the testis is tender and swollen, and rides high in the scrotum, with a thickened tender cord. The cremasteric reflex is usually absent and a detectable secondary hydrocele is found in 52% of patients. Mild fever and erythema of the overlying scrotal skin are late signs, associated with low testicular salvage rates.
Ischaemic testicular damage resulting from torsion is related both to the number of turns on the spermatic cord and the duration of torsion. Certainly all cases with a torsion of > 360° and > 24 h duration will have ipsilateral testicular loss or severe atrophy if the testis is left *in situ*. Arterial

occlusion probably occurs primarily in cords with multiple twists, whereas arteriolar stasis develops secondary to the venous occlusion and engorgement seen with lesser twists.

The threshold seems to be 8 h, before which testicular atrophy is rare and after which it is the rule. Boys with torsion often seek medical attention significantly earlier (median: 9.5 h) than those with appendiceal torsion (median: 48 h) and in one study those requiring an orchidectomy presented later than those who did not (median 30 *vs* 9 h): In that study testicular salvage rate was 88% and 36% with a pain duration of <12 h and >12 h, respectively. The Bristol series showed that of those testes that had been twisted for < 12 h, only 4% appeared necrotic and were removed, but beyond this time 75% of patients underwent orchidectomy.

Table 4. Testicular viability as a function of pain duration ($n = 40$)

Symptom duration (h)	Viable testis	Orchidectomy	Salvage rate (%)
0–5	14	2	87.5
6–11	9	1	90
>12	5	9	36
>24	2	7	22

Neonatal torsion - About 10% of all torsions occur in the neonatal period and these can be subdivided into two groups, depending on whether the condition is seen at birth (prenatal torsion, 70%) or occurs later in previously normal testes (postnatal, 30%). It presents at an early nappy change or at the postnatal check as a firm asymptomatic testicular mass. The testicle may be in a high or inguinal position, with bruising of the scrotal skin. Most authors agree that immediate exploration of the prenatally twisted testis rarely if ever results in ipsilateral testicular salvage. Consult early – consider prompt exploration with contralateral orchidopexy.

Previous testicular surgery - There is little security in excluding torsion by virtue of previous surgery, particularly as information about the previous operation may not be available at the time of acute presentation. Management decisions should therefore be based on the clinical assessment of the patient, as if no surgery had taken place.

Differential diagnosis

Whilst adolescents with acute scrotal pain have a 50–60% chance of having a torsion, it is the underlying cause in only 25–35% of paediatric patients. Mushtaq reviewed the acute scrotal presentations over 4 years to Westmead kids – see below. Note the age distribution.

Table 1. Diagnosis in boys presenting with acute scrotum ($n = 204$)

Diagnosis	No. boys	
Torsion of testicular appendage		110
Right	53	
Left	55	
Bilateral	2	
Torsion of testis		40
Right	12	
Left	27	
Bilateral	1	
Epididymo-orchitis		29
Right	17	
Left	11	
Bilateral	1	
Idiopathic scrotal oedema		9
Haematoma		2
Idiopathic testicular pain		5
Trauma		4
Hydrocele		2
Inguinal hernia		1
Scrotal cellulitis		1
Pyelonephritis		1

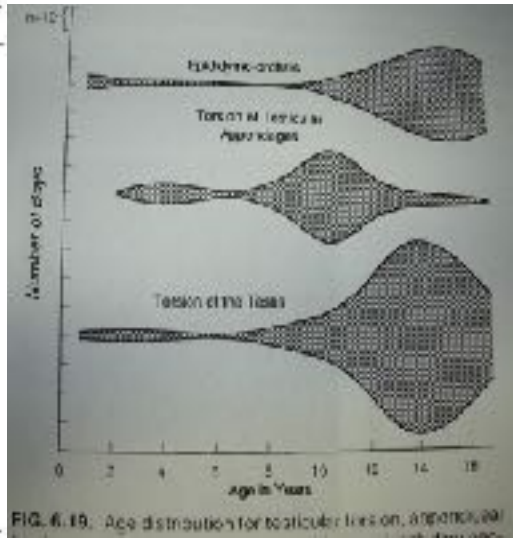
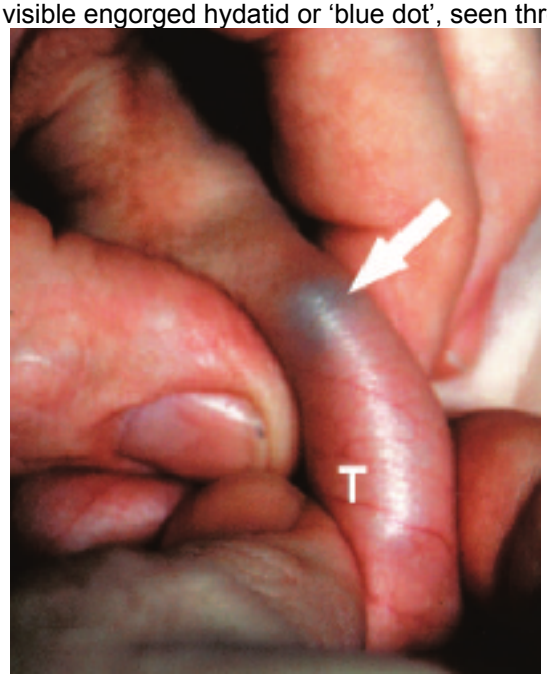


FIG. 6.19 Age distribution for testicular torsion, appendiceal

Diagnosis of Selected Conditions Responsible for the Acute Scrotum

Condition	Onset of symptoms	Age	Tenderness	Urinalysis	Cremasteric reflex
Testicular torsion	Acute	Early puberty	Diffuse	Negative	Negative
Appendiceal torsion	Subacute	Prepubertal	Localized to upper pole	Negative	Positive
Epididymitis	Insidious	Adolescence	Epididymal	Positive or negative	Positive

Torsion of appendices- Number of types. The most prevalent is the appendix testis which lies on the upper pole of the testis (95%). The other appendages are on the epididymis (in ½ of the male population) or more rarely on the cord itself or in the epididymo-testicular groove. There is one peak in presentation at ~ 10 years old, which is earlier than the peak for torsion.
The pain may be of a more gradual onset and associated symptoms of nausea, vomiting and abdominal pain are rarer.
Examination may reveal a focal tenderness, usually at the upper pole of the testis, with a non-tender testis and epididymis. A palpable tender nodule at the upper pole alludes to the diagnosis and a visible engorged hydatid or 'blue dot', seen through the scrotal skin, is pathognomonic.



Later presentation with reactive hydrocele and secondary inflammatory changes, and the similarity of symptoms with torsion, prevents a confident diagnosis in many cases.
A clear case of a twisted appendage can be managed conservatively with a combination of bed rest, scrotal support and NSAIDs. If the scrotum is explored to confirm the diagnosis, the appendage is excised.

Idiopathic scrotal oedema generally occurs in boys below 7 years of age. Characterised by the rapid onset of significant oedema without tenderness. The skin is reddened and thickened but the underlying testis and epididymis are not tender. ? aetiology. The oedema extends upwards into the groin, downwards into the perineum to the anal verge, is frequently bilateral and resolves over 2–3 days with no active management. Few of these patients proceed to surgery, because the diagnosis is usually apparent. Tx with bed rest and elevation.

Editor: Peter Wyllie

Inguinal hernia should be suspected in a child who has a history of intermittent groin swelling. If the diagnosis is unclear, ultrasound examination can be helpful. An incarcerated or strangulated hernia requires urgent surgical intervention, whereas a reducible hernia should be repaired electively.

A **hydrocele** occurs because of a patent processus vaginalis. The hydrocele can seal off, trapping peritoneal fluid around the testis, or it can persist and dilate, possibly causing bowel herniation. Most hydroceles resolve spontaneously. Therefore, an infant with a hydrocele and no evidence of a hernia is usually just observed for the first one or two years of life. If the hydrocele persists beyond this time, surgical repair tshould be considered

Varicocoele- Occasionally, a varicocele causes mild to moderate scrotal discomfort. No changes in the scrotal skin occur, but the affected hemiscrotum may have a full appearance. On physical examination, a varix is palpable as a "bag of worms" above a palpably normal testis and epididymis. Referral to a urologist is prudent because varicoceles can affect both testicular growth and fertility.

Severe **testicular injury** is uncommon and usually results from either a direct blow to the scrotum or a straddle injury. A spectrum of injuries may occur. Traumatic epididymitis is a noninfectious inflammatory condition that usually occurs within a few days after a blow to the testis. Treatment is similar to that for nontraumatic epididymitis. Scrotal trauma can also result in intratesticular hematoma, hematocele or laceration of the tunica albuginea (testicular rupture). Color Doppler ultrasonography is the imaging technique of choice. Surgical referral is required because testicular rupture requires immediate drainage and repair. Hematomas and hematoceles are managed on an individual basis.

Infective inflammation of the epididymis, testis or both causes scrotal pain and swelling (~16% in one series). Biphasic age distribution, with a peak in newborns and infancy, followed by infrequent occurrence until mid-adolescence when a second peak incidence occurs. They are usually associated with a gradual onset of pain, fever and urinary tract symptoms and findings. In early epididymitis, the epididymis exhibits tenderness and induration, but the testis itself is not tender. Swelling to the degree that the epididymis is no longer palpable can indicate torsion if the symptoms have been present for only a few hours. With both appendiceal torsion and epididymitis, loss of testicular landmarks occurs later in the clinical course. The testis may be elevated to elicit Prehn's sign. Lack of pain relief (negative sign) may contribute to the diagnosis of testicular torsion. As noted, even unequivocal urinary symptoms do not enable torsion to be excluded.. It is not unusual to explore these patients to confirm the diagnosis. When urinary infection and/or epididymo-orchitis is confirmed it is important to exclude underlying urinary tract anomalies (US / MCU).

Can we rule out torsion and the need to explore?
It must be pointed out that a misdiagnosis of testicular torsion leading to an unnecessary 'scrotal exploration' does not lead to medical litigation, whereas a missed diagnosis may. Note things may not be as you suspected!!

Table 5. Diagnostic accuracy of history and physical examination ($n = 169$)

	No. boys		
	Operative diagnosis	Preoperative clinical diagnosis	False negative (%)
TA	104	86	17
TT	40	35	12.5
EO	25	14	44

TT, testicular torsion; TA, torsion of the testicular appendage; EO, epididymo-orchitis.

However adjunctive tests to improve the accuracy of diagnosis are used at times - ^{99m}Tc-radioisotope scan, or colour Doppler ultrasonography. They should not be used routinely unless the delay involved in obtaining them is minimal. Some feel they can provide useful information in patients in whom the diagnosis of torsion seems unlikely or the duration of symptoms indicate a dead testis if torsion is the cause.
Reports of patients with positive blood flow on Doppler ultrasonography who in fact had torsion reinforce the view that the diagnosis should be clinical and that the priority is expeditious surgical management. Torsions often produce venous obstruction and infarction and that the arterial flow is not compromised until the oedema becomes significant. Negative explorations are an unavoidable consequence of this approach. When pain has been present for more than 12 hours or the diagnosis is unclear, colour Doppler ultrasound examination may be helpful. Most institutions report colour Doppler ultrasound to be a useful imaging modality in boys with acute scrotum, although others continue to report false-positive and false-negative results.
Editor: Peter Wyllie

One study reviewed a series of 243 boys who presented with an acute scrotum (19% torsion). Immediate OT in 14 patients, and US in 229 patients. Increased or normal blood flow in 182 patients- none of these patients later developed testicular atrophy, which would have indicated misdiagnosed torsion. Another study in European Journal of Pediatric Surgery reviewed 65 boys- 54 boys had a symmetrical or increased flow signal on the affected side- none with torsion on followup - 5 boys explored (sensitivity 100% /negative predictive value of 100%. Journal of Urology 1993 with 77 boys revealed that none of the 55 with normal or increased blood flow had a torsion.

BUT!!! Another study of 172 boys (41 with testicular torsion) found that ultrasound finding of decreased or absent testicular flow had a sensitivity of 63% and a specificity of 99%. They had 10 boys with torsion who had normal flows on US – 8 had a coiled spermatic cord on ultrasound. Two cases were also reported by Steinhardt with positive blood flow who subsequently were found at surgery to have TT. On the other hand Albrecht *et al.* assessed 38 normal prepubertal boys with colour Doppler and power Doppler ultrasound and they showed that up to 30% of clinically normal testes have no demonstrable intratesticular blood flow. **It is these studies that we should remember as families and courts are unforgiving when a boy loses a testicle – we should be aiming for 100% sensitivity.**

One group reported a strategy to reduce the number of unnecessary emergency operations in their patients. If there was any doubt about the diagnosis and the history was of < 24 h, the patient was urgently explored. They did not operate on patients with a clear diagnosis of appendicular torsion presenting with the blue-dot sign. In practice, none of the twisted testes treated after 14 h was viable. A swollen erythematous scrotum with a history of > 24 h was either a dead twisted testis or appendage. These were treated expectantly; if they resolved over the next few days then a twisted appendage was confirmed. If not, the diagnosis of torsion was confirmed radiologically and the patient treated by semi-elective ipsilateral orchidectomy and contralateral fixation. This should however be a decision left to the urology team.

Conclusions

- If a patient presents acutely with testicular pain and a possible diagnosis of testicular torsion, an exploration should be undertaken as an emergency.
    - **Urology should be involved within an hour of a boy presenting with acute testicular pain**
- If a patient presents with a history of intermittent testicular pain refer for urgent bilateral orchidopexy.
- The testis should be explored soon if testicular torsion has been diagnosed and the symptoms have been present for > 24 h.
- If symptoms have been present for > 12 h and clinically diagnosed of testicular torsion, ~ 75% of these testes will be necrotic.

NEXT WEEK'S CASE

A 58yo man presented with severe left elbow pain after an altercation at a Bulldogs match – say no more!

Editor: Peter Wyllie

What is going on?

JOKE / QUOTE OF THE WEEK

Please forward any funny and litigious quotes you may hear on the floor (happy to publish names if you want)

THE WEEK AHEAD

Tuesday *Medical Grand Rounds 8:15am Level 2 Auditorium*

Thursday *JMO Education – Antibiotics and their usage – Professor Sydney Bell*
Staff Education, Level 2
12:00-13:30

Editor: Peter Wyllie