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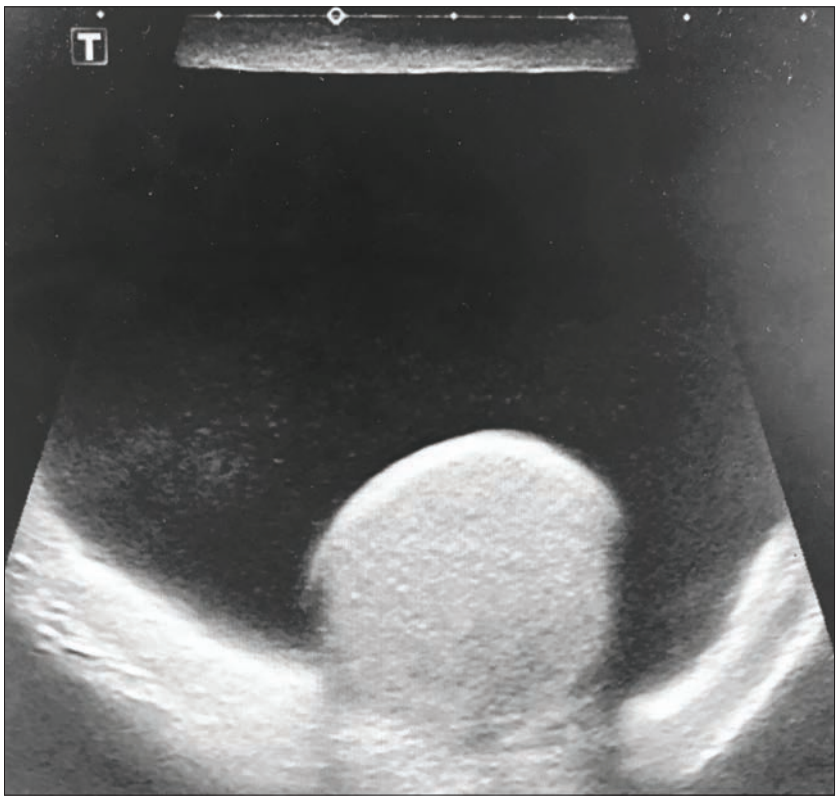


FIGURE 1
A hydrocele as seen on ultrasound

What are the common causes of testicular lumps?

How should men be examined and investigated?

Which patients should be referred?

TESTICULAR LUMPS PROVIDE A DIAGNOSTIC CHALLENGE. ALTHOUGH EACH POTENTIAL DIAGNOSIS has distinctive features the underlying differential of a testicular malignancy can cause concern for patient and GP alike. Although the incidence of testicular cancer has increased over the past few decades,[1,2] testicular tumours are still rare, diagnosed in only 4% of men undergoing scrotal ultrasound in one study.[3] Many GPs will only see one or two new diagnoses in their career.

Furthermore, there has been an improvement in the time to diagnosis and subsequently treatment thanks to raised public awareness.[4] The potential differential diagnoses are wide ranging, with epididymal cysts and hydroceles the most common findings.[3,5]

CAUSES

It is important that a testicular torsion is immediately excluded. The classical history is of acute pain coupled with an exquisitely tender testicle, abnormal lie, nausea/vomiting and an absent cremaster reflex, that will progress to a swollen testis as venous drainage is prevented.

'It is important that a testicular torsion is excluded immediately'

In a UK study of 845 men undergoing ultrasound for scrotal swelling, epididymal cysts, or spermatoceles when containing sperm, were the most common finding, occurring in 27% of patients.[3] Epididymal cysts arise from dilatation of the efferent ductules at the head of the epididymis. Spermatoceles are common after vasectomy as the vas deferens is obstructed but only cause symptoms in 3-5% of patients. Most episodes resolve with conservative treatment, but < 1% require surgical treatment.[6] Benign cysts of the tunica albuginea can also occur and are rarely symptomatic or require treatment.

The other most common finding, hydrocele, is a fluid collection between parietal and visceral layers of the tunica vaginalis.[5,7] Hydroceles may be congenital in which case the process vaginalis remains patent forming a communication with the peritoneal cavity, this usually closes spontaneously when the testis descends into the scrotum and most are closed by the age of two.[8] In around 12-14% of patients, the process vaginalis persists into adulthood and may predispose them to both hydroceles and hernias.[9,10] Acquired hydroceles may occur any time during adulthood and can be idiopathic/primary or secondary to infection, systemic disease, trauma, and rarely tumour or inguinal surgery.[11]

A third common diagnosis is a varicocele, an abnormal dilatation of the pampiniform venous plexus and internal spermatic vein, reportedly found in 8-22% of healthy males.[12,13] They are most commonly found on the left side, probably because of the anatomy of the »

left gonadal vein and its angular drainage into the left renal vein.[14] Akbay and colleagues found 89.7% of cases to be unilateral on the left side, 10.8% bilateral, and 0.38% on the right side.[12]

Testicular cancer is rare, accounting for only 1% of all male malignancies and 5% of urological tumours.[15] However, it is still the most commonly diagnosed cancer in males ages 15-40.[16] The typical histology of a testicular tumour is germ cell in 95-98% of cases.[17,18] These tumours can be subdivided into seminomas, most common in the fourth decade, and non-seminomatous tumours more common in the third decade. Patients can be reassured that cure rates from this cancer are approximately 95% in Western Europe.[18] Five-year survival is close to 100% for stage 1 seminomas, and falls to 48% in the poorest prognostic group – non-seminoma with metastases at diagnosis.[18] The cure rates have improved dramatically in the past 30 years since the introduction of cisplatin-based combination chemotherapy.[19]

Inguinal hernias occur when part of the intra-abdominal tissue (bowel or omentum) protrudes through the abdominal wall in the region of the inguinal canal. The most common type is an indirect inguinal hernia in which the contents of the hernia follow the path of the spermatic cord, through the internal and external spermatic ring, and in some cases this may descend into the scrotum causing a lump. Classically the clinician cannot get above the lump on examination.

Other than torsion, a tender, testicular swelling might suggest epididymo-orchitis. In younger patients this is most commonly caused by an STI, while in older patients it is more likely to be caused by a urinary tract pathogen often secondary to instrumentation or an underlying abnormality (such as an enlarged prostate).[20] The varying underlying aetiology explains the bimodal distribution seen in one retrospective study in Israel in which it was most frequently diagnosed in men aged 16-30 and 51-70.[21]

HISTORY AND EXAMINATION

A routine history should be taken. It is important to ascertain how long the testicular lump has been present. Associated symptoms such as a pulling or dragging sensation or pain should be noted, to understand how much

Table1

The underlying pathology, classic presentation and management plan for most common diagnoses of testicular lumps

Condition	Underlying pathology	Classic presentation	Management
Varicocele	Dilatation of pampiniform venous plexus and internal spermatic cord	15-25 year old presents asymptomatically or with a dragging sensation or infertility. Classic 'bag of worms' on palpation, may resolve on lying flat, non-tender	Reassurance – no treatment required, unlikely to cause symptoms/complications
Testicular tumour	> 95% germ cell tumours	20-40 year old presents with painless, unilateral scrotal mass	Two-week wait referral to urologist
Hydrocele	Fluid collection between parietal and visceral layers of tunica vaginalis	Any age Fluid-filled lump, firm or soft depending on volume, unable to palpate testis separately, transilluminates brilliantly	Ultrasound (urgent if 20-40 year old, unable to palpate testis fully) Assuming testicular cancer excluded: Reassurance If symptomatic/large/troubling to patient – consider routine referral to urologist
Spermatocele/ epididymal cyst	Dilatation of tubules in epididymis	Middle age Non-tender, well circumscribed soft mass near epididymis, testis palpable separately, transilluminable	Ultrasound Reassurance If symptomatic/large/troubling to patient – consider routine referral to urologist
Inguinal hernia	Protrusion of bowel or omentum through external spermatic ring	Increasing incidence with age Long-standing pain and swelling in groin. Reducible mass in groin, unable to get above it, non-transilluminable, cough impulse	Assuming no signs of incarceration/strangulation: Referral to general surgeon; urgent if symptomatic or partially reducible, routine if asymptomatic
Epididymo-orchitis	Inflammation of the epididymis ± testis	Age 16-30 or 51-70 Swollen, tender testis and epididymis May see erythema or reactive hydrocele	Assuming no signs of torsion/not systematically unwell: If STI likely cause – ceftriaxone IM 500 mg + doxycycline for 2 weeks + refer to GUM clinic If more likely UTI related – ciprofloxacin for 2 weeks + routine urology referral Follow up patient to ensure resolution of symptoms

functional bother the patient is suffering. Any signs of infection, tenderness, fever and discharge may point towards a diagnosis of epididymo-orchitis.

Although a painless testicular mass (within the body of the testis itself) is pathognomonic of testicular cancer, this was the presenting complaint in only half the patients in a Spanish registry study, and scrotal pain was the initial symptom in 20% of cases.[22,23] Rarer signs and symptoms such as gynaecomastia and back pain have been reported as the presenting sign in 7% and 11% of testicular malignancies respectively and so should be asked about.[23] A history of cryptorchidism/undescended testis increases the risk by up to eight times, giving a lifetime risk of 4%.[24,25] Occasionally minor trauma to a testis containing a tumour results in an acute presentation with a haematoma around the mass.

Other than a family history of testicular cancer in a first-degree relative or previous cancer in the contralateral testis, risk factors are rare and unlikely to guide the diagnostic process.[17,26,27] Patients with 'testicular dysgenesis syndrome' (cryptorchidism, hypospadias, decreased spermatogenesis diagnosed by infertility) are also at risk of testicular cancer, but this is rare.[28]

Examination of the scrotum should be performed with the patient standing, which will exacerbate hernias, hydroceles and varicoceles, and lying. Diagnosis in testicular swellings can be made in a stepwise manner, as shown in box 1, below. The key question is whether the lump is intra- or extra-testicular, as palpable intra-testicular lesions are highly likely (around 90%) to be malignant, while those lying outside the testis are much more likely to be benign.[29,30]

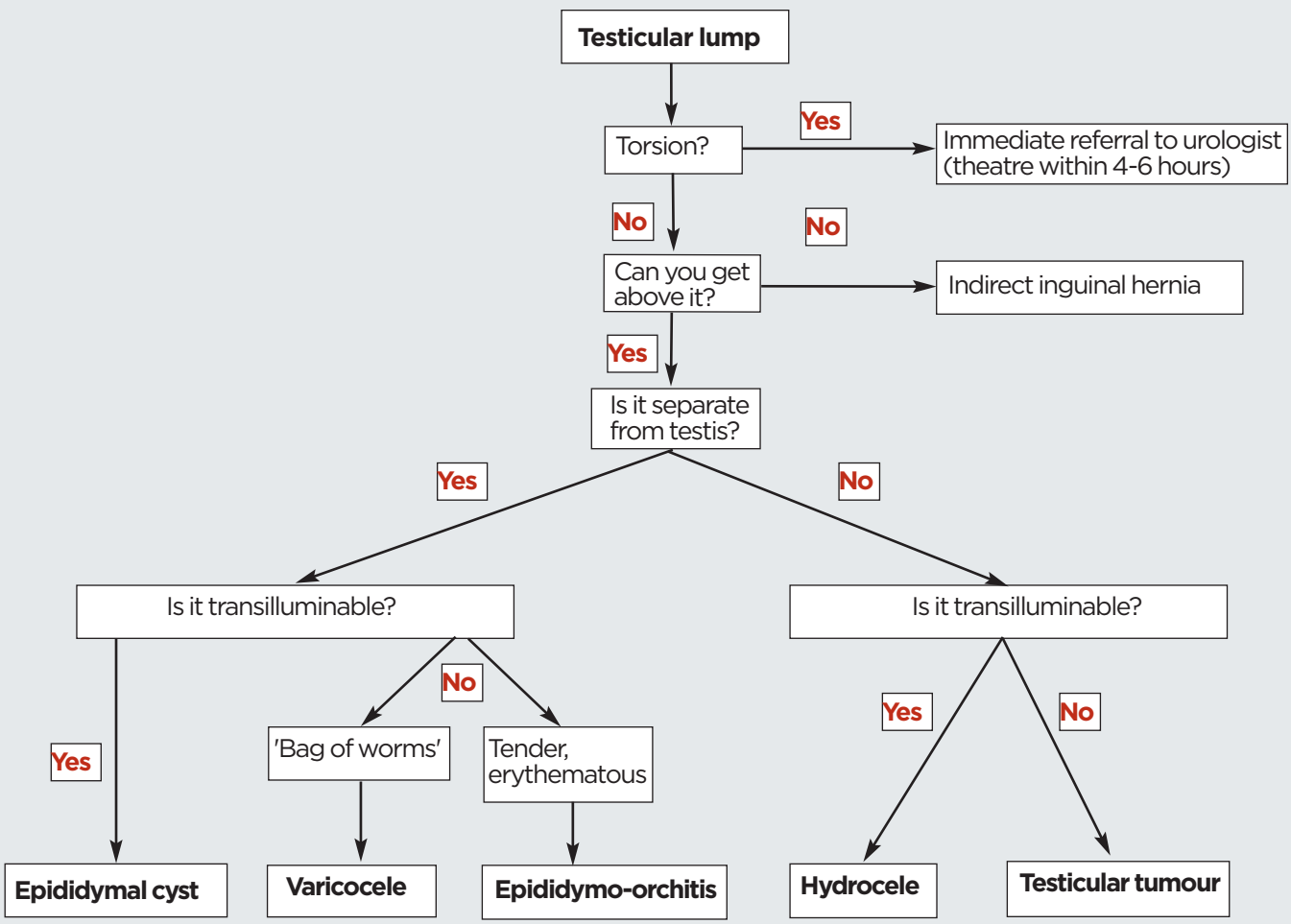
The use of a pen torch will give good information on whether a lump is solid or fluid filled, such as a hydrocele which will transilluminate brilliantly.

Lymph node examination should be performed in all patients with suspected testicular tumour. Importantly these neoplasms spread most commonly to the para-aortic lymph nodes, which may be hard to palpate in the abdomen unless large.[31,32] Inguinal lymphadenopathy meanwhile may provide evidence of an infective process of the scrotum.

The classic presentation for each diagnosis is shown in table 1, opposite. »

Box 1

Flow diagram for examination and diagnosis of a testicular lump



key points

SELECTED BY

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Although the incidence of testicular cancer has increased over the past few decades, testicular tumours are still rare and many GPs will only see one or two new diagnoses in their career. In one UK study, out of 845 patients who had been referred with testicular lumps or pain, only 33 (4%) were diagnosed with testicular cancer. Epididymal cysts, or spermatoceles when containing sperm, were the most common finding, and were found in 228 patients (27%). The second most common finding was hydrocele, a fluid collection between the parietal and visceral layers of the tunica vaginalis, which was found in 96 patients (11%).

The vast majority (95-98%) of testicular cancers are germ cell tumours. These can be further subdivided into seminomas and non-seminomatous tumours, which are most common in the fourth and third decades of life respectively. In Western Europe, five-year survival for testicular cancer is approximately 95%. It is almost 100% for stage 1 seminomas, but falls to 48% in the poorest prognostic group – non-seminomatous tumours with metastases at diagnosis. Cure rates have improved dramatically in the past 30 years since the introduction of cisplatin-based combination chemotherapy.

Although a painless testicular mass (within the body of the testis itself) is pathognomonic of testicular cancer, this was the presenting complaint in only half the patients in a Spanish registry study. Scrotal pain was the initial symptom in 20% of cases and so should not necessarily provide reassurance. Furthermore, 7% of patients have gynaecomastia and 11% of patients have back pain due to metastasis.

When examining scrotal swellings, the key question is whether the lump is intra- or extra-testicular, as palpable intra-testicular lesions are highly likely (around 90%) to be malignant, whereas those lying outside the testis are usually benign. The use of a pen torch will give good information on whether a lump is solid or fluid filled, such as a hydrocele which will transilluminate brilliantly.

NICE recommends that men with non-painful enlargement or change in shape or texture of the testis should be referred via the two-week wait cancer pathway. Any painful or tender mass within the body of the testis which is not suggestive of infection should also be referred. GPs should refer patients for an urgent ultrasound if they are aged 20-40 with a hydrocele; if there is uncertainty as to whether the mass is intra-testicular or extra-testicular; or if the testis cannot be fully palpated.

Treatment for testicular cancer involves inguinal (radical) orchidectomy, sometimes followed by chemotherapy, and in more advanced cases subsequent lymph node dissection.

However variations of textbook definitions should be considered, and importantly it should be remembered that an underlying tumour may be obscured by another pathology. For example an overlying hydrocele may obscure complete palpation of the testis and so should not provide reassurance.[33]

INVESTIGATION

The key message is that if a testicular tumour is suspected then no investigation should delay a two-week wait cancer referral.[34]

'If a testicular tumour is suspected then no investigation should delay a two-week wait cancer referral'

Urinalysis should be performed in patients with suspected epididymo-orchitis, in order to diagnose an underlying urinary tract infection. If positive, urine microscopy, culture and sensitivity testing should be carried out.[20]

Measuring testicular tumour markers, alpha-fetoprotein and human chorionic gonadotrophin, at the time of referral can be considered, but should not delay referral according to the Royal College of Surgeons commissioning guide.[34] It should also be noted that these are only raised in 50% of patients with testicular cancer and so negative values should not be used as reassurance.[22,35]

An ultrasound of the testes is the gold standard investigation for any scrotal swelling, with sensitivity for a testicular tumour close to 100%.[36] Patients who meet the criteria for a two-week wait referral should not be delayed by waiting for an ultrasound scan but should be referred directly.[34] Urgent ultrasound, as arranged by the GP, is warranted in patients:

- Aged 20-40 years with a hydrocele
- Where there is uncertainty if the mass is intra-testicular or extra-testicular
- Where the testis cannot be fully palpated[34]

All extratesticular scrotal swellings of uncertain origin should have a routine ultrasound.[34] Again an ultrasound is highly sensitive for the other differential diagnoses, such as hydrocele as shown in figure 1, p13.

It is a traditionally held view that the finding of a varicocele should lead to a renal ultrasound in order to exclude a renal tumour.[13] However, a systematic review found only 2.3% of cases of renal tumour presented with a varicocele, and concluded that this typically occurs at a late stage at which point a retroperitoneal tumour would likely have manifest itself in other ways.[13] NICE still recommends further investigation with ultrasound of an acute varicocele in men over 40.[37]

At the two-week wait clinic patients will have serum tumour markers, testicular ultrasound followed by CT chest, abdomen and pelvis. Sperm banking should be offered if a positive diagnosis is found.[18] Inguinal/radical orchidectomy should occur on the next available operating list.

REFERRAL

Any suspicion of testicular torsion warrants immediate review by a senior urologist as surgery is required within four to six hours of symptom onset.[38]

NICE recommends that all patients with a non-painful enlargement or change in shape or texture of the testis be referred via the two-week wait cancer pathway to a urologist.[39] Reassuringly for patients the conversion rates for these referrals are still low. Any painful or tender mass within the body of the testis which is not suggestive of infection should also be referred. Kumaraswamy and colleagues found that only 8% of 241 men referred for suspected testicular cancer under the two-week rule had sonographic findings suggestive of testicular cancer.[40]

'An ultrasound of the testes is the gold standard investigation for any scrotal swelling, with sensitivity for a testicular tumour close to 100%'

Proven asymptomatic hydroceles, epididymal cysts, spermatoceles and varicoceles with no underlying tumour (on ultrasound) do not necessitate referral to a urologist.[34] Patients in whom these are causing functional symptoms or discomfort should be referred routinely.

Clearly any evidence of a strangulated or obstructed inguinal hernia warrants an emergency referral to a general surgeon.[41,42] Irreducible or partially reducible inguinal hernias warrant

urgent referral to a general surgery outpatient clinic, otherwise reducible asymptomatic hernias can be referred routinely.[41,42] The Royal College of Surgeons commissioning guide suggests diagnostic imaging should not be arranged at a primary care level.[43]

TREATMENT

Treatment for testicular cancer involves inguinal (radical) orchidectomy, sometimes followed by chemotherapy,[44] and in more advanced cases subsequent lymph node dissection.[18] Patients commonly ask about impact on fertility and should be counselled that these treatments can affect fertility to varying extents but semen analysis and cryopreservation should be offered prior to treatment.[18]

Once an underlying testicular tumour is excluded hydrocele, epididymal cysts and spermatoceles can often be managed conservatively. Symptomatic and unsightly cysts (usually when larger than the testis itself) are excised through a scrotal incision. Aspiration and sclerotherapy, despite fewer initial complications, are less successful with lower patient satisfaction and generally only considered in patients unfit for surgery.[45] Hydroceles are managed by opening the layers of the tunica vaginalis to drain the fluid, followed by either excision of the tunica sac, plication of the sac (Lord's procedure) or eversion of the sac (Jaboulay's procedure).[46]

Varicoceles should again be managed with reassurance where possible. In those with functional/pain problems embolisation or ligation can be considered for symptomatic treatment. Around 20% of patients will have fertility problems,[47] and although a meta-analysis by Baazeem and colleagues found intervention improved sperm parameters such as count and motility, there was no improvement in pregnancy rates and so it is not currently recommended by NICE in order to improve fertility.[48-50]

CONCLUSION

Testicular swellings provide a diagnostic challenge and one that can often be resolved within primary care.

A testicular lump may be a source of great anxiety for the patient, and more often than not these fears can be allayed by a thorough examination and if necessary a timely ultrasound.

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Useful information

British Association of Urological Surgeons
www.baus.org.uk/patients/conditions/12/testicular_lump

The Urology Foundation
www.theurologyfoundation.org/images/160523_Bitesize_Guide_to_Testicular_Cancer.pdf

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