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53 Pain in the arm and hand

A pain in the hand is worth a look at the neck. By heck don't forget the neck!

ORTHOPAEDIC SURGEON TO STUDENTS, 1965

Pain in the arm and hand is a common problem in general practice, tending to affect the middle aged and elderly in particular.

Overview of causes of a painful arm and hand

Pain originating from the cervical spine and shoulder disorders can extend down the arm. While pain from disorders of the shoulder joint (because of its C5 innervation) does not usually extend below the elbow, radiculopathies originating in the cervical spine can transmit to distal parts of the arm (see FIG. 53.4 , later in this chapter).

Important causes are illustrated in FIGURE 53.1 . Myocardial ischaemia must be considered, especially for pain experienced down the inner left arm.

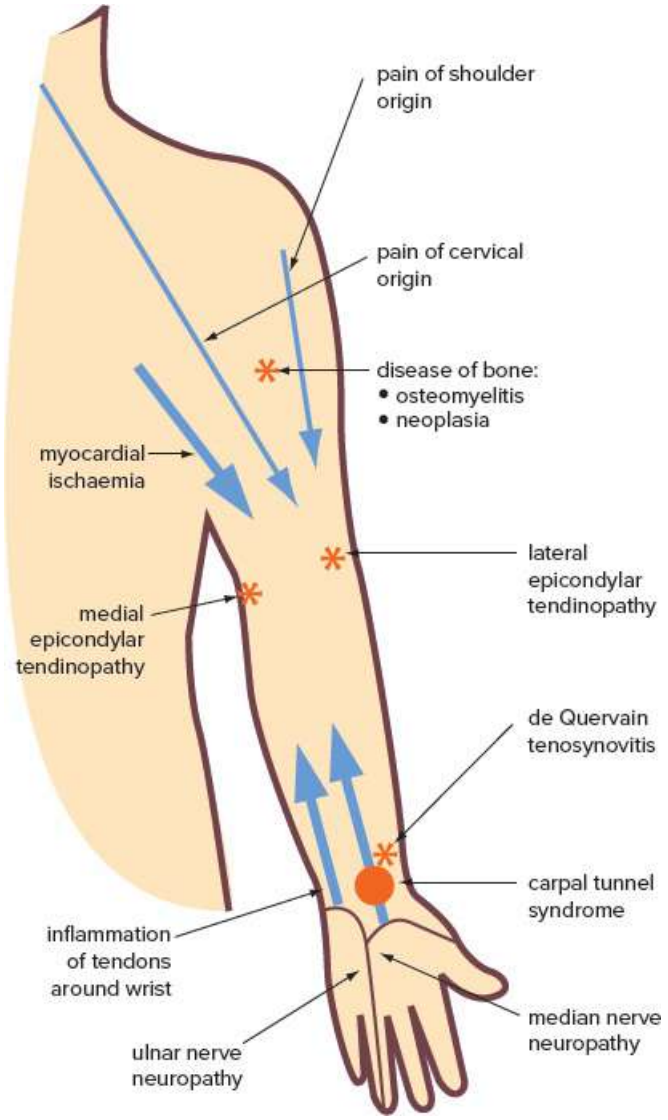

FIGURE 53.1 Important causes of arm pain (excluding trauma and arthritis)

Soft tissue disorders of the elbow are extremely common, especially tennis elbow. Two types of tennis elbow are identifiable: 'backhand' tennis elbow, or lateral epicondylar tendinopathy, and 'forehand' tennis elbow, or medial epicondylar tendinopathy, which is known also as golfer's or pitcher's elbow.

Other significant elbow disorders include inflammatory disorders of the elbow joint, such as rheumatoid arthritis, osteoarthritis and olecranon bursitis, which may follow recurrent trauma, gout, rheumatoid arthritis or infection.

Another important group of disorders are the various regional pain syndromes around the wrists, including the common de Quervain tenosynovitis (affecting the tendons of extensor pollicis brevis and abductor pollicis longus) and to a lesser extent the extensor tendons to the fingers. Pain from these overuse syndromes can be referred in a retrograde manner into the forearm.

A fascinating and poorly understood syndrome is that related to dysfunction of the upper four vertebral segments of the thoracic spine, which can cause referred pain in the arm that does not correspond to the dermatomes. This syndrome is often confused with the more common regional pain disorders such as tenosynovitis and tennis elbow.

The various causes of the painful arm can be considered with the diagnostic strategy model (see TABLE 53.1).

Table 53.1 Pain in the arm and hand: diagnostic strategy model

Probability diagnosis
Dysfunction of the cervical spine (lower)
Disorders of the shoulder
Medial or lateral epicondylar tendinopathy
Overuse tendinitis of the wrist
Carpal tunnel syndrome
Osteoarthritis of the thumb and DIP joints
Serious disorders not to be missed
Cardiovascular: • angina (referred) • myocardial infarction • axillary vein thrombosis Neoplasia: • Pancoast tumour • bone tumours (rare) Severe infections: • septic arthritis (shoulder/elbow) • osteomyelitis • infections of tendon sheath and fascial spaces of hand • sporotrichosis (gardener's arm)
Pitfalls (often missed)
Entrapment neuropathies (e.g. median nerve, ulnar nerve)
Pulled elbow (children)
Foreign body (e.g. elbow)
Rarities: • polymyalgia rheumatica (for arm pain)

- reflex sympathetic dystrophy
- thoracic outlet syndrome
- arm claudication (left arm)
- Kienböck disorder

Seven masquerades checklist

Depression
Diabetes
Spinal dysfunction

Is the patient trying to tell me something?

Possibly, especially with the so-called RSI work-related syndromes.

A diagnostic approach

Probability diagnosis

The commonest causes of arm pain are referred pain and radiculopathies caused by disorders of the cervical spine, the tennis elbows (lateral and, to a lesser extent, medial epicondylar tendinopathy), carpal tunnel syndrome (CTS) and regional pain syndromes caused by inflammation of the tendons around the wrist and thumb.

Disorders of the shoulder, particularly supraspinatus tendinitis, should be considered if the pain is present in the C5 dermatome distribution. Pain in the hand is commonly caused by osteoarthritis of the carpometacarpal joint of the thumb and the distal interphalangeal (DIP) joints, and also by CTS.

Serious disorders not to be missed

Like any other presenting problem, it is vital not to overlook malignant disease or severe infection. In the case of the arm, possible malignant disease includes tumours in bones, lymphoma involving axillary glands and Pancoast tumour, which may cause severe arm pain before any signs are evident.

Neoplastic tumours of the hand are uncommon and usually benign. Benign tumours include giant cell tumour of the tendon sheath, pigmented villonodular synovitis, neurilemmoma and neurofibroma. Malignant tumours are exceptionally rare but can include synovioma and rhabdomyosarcoma.

In addition, myocardial ischaemia, especially infarction in the case of pain of sudden onset, should be considered for left arm pain.

Sepsis can involve joints, the olecranon bursa and the deeper compartments of the hand, the

latter leading to serious sequelae if not rapidly diagnosed and treated.

Subclavian or axillary vein thrombosis, known as ‘effort thrombosis’, causes swelling in the arm with pain high in the axilla. It is seen in people working constantly above their head, such as painters and basketballers. It is an emergency requiring antithrombotic therapy.

Be aware of osteochondritis dissecans of the radius and capitellum in adolescents.

Pitfalls

These include entrapment syndromes for peripheral nerves—if in doubt refer for electromyography. Variations of peripheral nerve entrapments include the pronator syndrome (compression of the median nerve by the pronator teres or a fibrous band near the origin of the deep flexor muscles) and ulnar nerve entrapment at the elbow in the cubital fossa and, rarely, in the Guyon canal in the wrist.

Lesions of the nerve roots comprising the brachial plexus can also cause arm pain, especially in the C5 and C6 distribution. These can be detected by the brachial plexus tension tests.

Rarer causes of arm pain

These include polymyalgia rheumatica, although the pain typically involves the shoulder girdle, regional pain syndrome (Sudeck atrophy) and the thoracic outlet syndromes.

The thoracic outlet syndromes include problems arising from compression or intermittent obstruction of the neurovascular bundle supplying the upper extremity, for example, cervical rib syndrome, costoclavicular syndrome, scalenus anterior and medius syndrome, ‘effort thrombosis’ of axillary and subclavian veins and the subclavian steal syndrome.

The commonest cause of the thoracic outlet syndrome is sagging musculature related to ageing, obesity, and heavy breasts and arms, aptly described by Swift and Nichols as ‘the droopy shoulder syndrome’.[1]

Cervical ribs are relatively common and may or may not contribute to the thoracic outlet syndrome. Often the cause is a functional change in the thoracic outlet due to the ‘droopy shoulder syndrome’ with no significant anatomical fault.[2]

Arm claudication is also rare. It can occur with arterial obstruction due to occlusion of the proximal left subclavian artery or the innominate artery. Exercise of the arm may be associated with central nervous system symptoms as well as claudication.

Seven masquerades checklist

Of the seven primary masquerades, spinal dysfunction and depression are those most likely to be associated with arm pain. Nerve root pain arising from entrapment in the intervertebral foramina of the cervical spine or from a disc prolapse frequently leads to pain and/or paraesthesia in the

arm.

Although diabetic neuropathy primarily manifests in the lower limbs it may be associated with neuropathies in the hands, including erythromelalgia (redness and burning related to heat). Hypothyroidism may cause a CTS.

Psychogenic considerations

The hand can be regarded as a highly emotive ‘organ’ that is frequently used to give outward expression to inner feelings. These can range from grossly disturbed psychiatric behaviour, manifested as a hysterical conversion disorder by a non-functioning hand, to occupational neuroses such as repetition strain injury (RSI) and malingering.[3] Experienced occupational physicians and surgeons[3] find the hand and arm a source of functional disability most often as a result of industrial injury.

The clinical approach

History

The painful arm represents a real diagnostic challenge, so the history is very relevant.

It is common for arm pain to cause sleep disturbances and three causes are cervical disorders, CTS and the thoracic outlet syndrome. The working rule is:

- thoracic outlet syndrome—patients cannot fall asleep
- CTS—patients wake in the middle of the night
- cervical spondylosis—wakes the patient with pain and stiffness that persists well into the day[4]

The history should include an analysis of the pain and a history of trauma, particularly unaccustomed activity. In children evidence should be obtained about the nature of any injury, especially pulling the child up by the arms or a fall on an outstretched hand, which can cause potentially serious fractures around the elbow.

Examination

As part of the physical examination of the painful arm it may be necessary to examine a variety of joints, including the cervical spine (CHAPTER 51), shoulder (CHAPTER 52), elbow, wrist and the various joints of the hand. The arms should be inspected as a whole and it is very important to have both arms free of clothing and compare both sides.

Elbow joint

Inspection (from anterior, lateral and posterior aspects). Hold elbow in an anatomical position to

measure the carrying angle of forearm—elbow fully extended, forearm supinated (palm facing forwards) normal 5–15° (greater in females). Note any swellings:

- olecranon bursitis (bursa over olecranon)
- nodules:

  RA (subcutaneous border ulna)

  gout

  SLE (rare) and rheumatic fever (very rare)

  granulomas (e.g. sarcoidosis)

Examine it from the back to assess the triangle made by the olecranon and epicondyle.

Palpation. Perform with patient supine and elbow held in approximately 70° flexion. Palpate bony landmarks and soft tissue. Note especially any tenderness over lateral epicondyle (tennis elbow) and medial epicondyle (golfer's elbow).

Movement (test active and passive). Hinge joint:

- extension—flexion (0° to 150°):

  the arc for daily living is 30–130°

  limitation of extension is an early sign of synovitis

- pronation—supination (rotation):

  occurs at radiohumeral joint

  test in two positions: 90° flexion (held to side of body) + at full extension

  supination 85° plus

  pronation 75° plus

Resisted movements

- Painful resisted flexion at wrist = medial epicondylar tendinopathy
- Painful resisted extension at wrist = lateral epicondylar tendinopathy

Wrist joint

Follow the usual rules: *look, feel, move, test function, measure, look elsewhere* and *X-ray*. Note swellings or deformities, including the 'anatomical snuff box' and distal end of radius. Feel for

heat, tenderness and swelling, especially over the radial aspect of the wrist.

Movements. With elbow fixed at 90° and held into the waist:

1. compare dorsiflexion and palmar flexion on both sides (normal range extension 70–80° flexion 80–90°)
2. compare ulnar deviation (normal to 45°) and radial deviation (20°)
3. compare pronation and supination (normal to 90° for both)

Neurological examination

Test sensation, motor power and reflexes where indicated.

Summary of tests for motor power:

- C5—test resisted movement deltoid
- C6—test resisted movement biceps
- C7—test resisted movement triceps
- C8—test resisted EPL and FDL
- T1—test resisted interossei

Sensory patterns are presented in FIGURE 51.4 (CHAPTER 51).

Investigations

Pain in the arm and hand can be difficult to diagnose but the rule to follow is: ‘If in doubt, X-ray and compare both sides’. This applies particularly to elbow injuries in children. The presence of a foreign body in the hand or arm also requires consideration.

Investigations to consider include:

- blood film and WCC
- ESR
- ECG
- imaging

    plain X-rays, e.g. cervical spinal

    ultrasound

arthrograms (shoulder, elbow, wrist)

CT or MRI scanning

technetium bone scan

- nerve conduction studies
- electromyography

Note: Modern sophisticated ultrasound examination is becoming a useful diagnostic modality for soft tissue disorders such as tendinopathy.

Arm pain in children

The main concerns with children are the effects of trauma, especially around the elbow. Considerable awareness of potential problems and skilful management are required with children's elbow fractures. Foreign bodies in the arm also have to be considered.

Pulled elbow

This typically occurs in children under 8 years of age, usually at 2–5 years, when an adult applies sudden traction to the child's extended and pronated arm (see FIG. 53.2A): the head of the radius can be pulled distally through the annular radioulnar ligament (see FIG. 53.2B).[5]

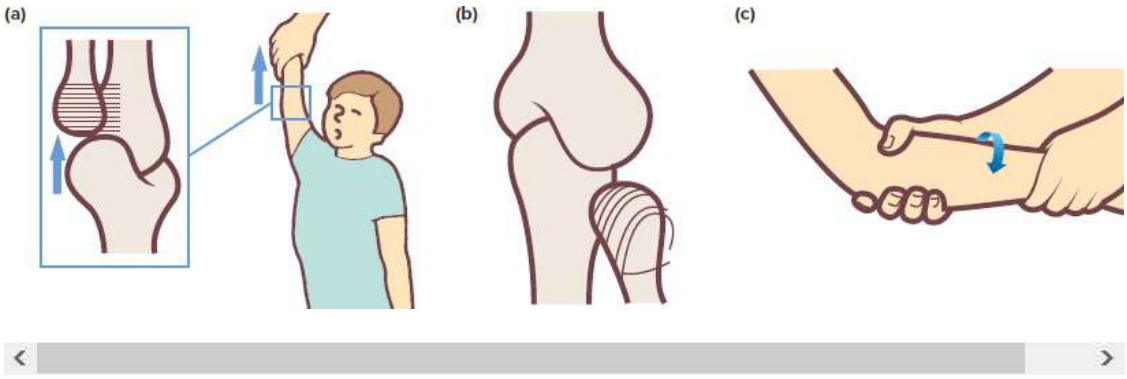

FIGURE 53.2 Pulled elbow: **(a)** mechanism of injury, **(b)** annular ligament displaced over head of radius, **(c)** reduction by supination flexion method

Symptoms and signs

- The crying child refuses to use the arm.
- The arm is limp by the side or supported in the child's lap.
- The elbow is flexed slightly (further flexion will be strenuously resisted).

- The forearm is pronated or held in mid-position.
- The arm is tender around the elbow (without bruising or deformity).

  Note: An X-ray is not usually necessary.

Treatment

Supination flexion method

1. Sit the child on the parent's lap. Gain the child's confidence.
2. The child faces the doctor with the parent holding the non-affected arm.
3. Place one hand around the child's elbow to give support, pressing the thumb over the head of the radius.
4. Using gentle traction, firmly and smoothly twist the forearm into full supination (see FIG. 53.2C) as you fully flex the elbow. A faint click or 'pop' (which will be painful) will be heard. After a few minutes the child will settle and resume full pain-free movement. Warn parents that recurrences are possible up to 6 years.

Hyperpronation flexion method

An alternative method after following steps 1–3 above is to fully pronate the forearm and then flex the elbow.

Alternative combination method

An easier method for the child is to very gently alternate pronation and supination through a small arc as you flex the elbow.

Note: Spontaneous resolution can occur eventually. Place the arm in a sling if necessary. If you cannot get the child's cooperation, send them home in a 'high' sling.

Fractures and avulsion injuries around the elbow joint, which are a major problem in children, are discussed in more detail in CHAPTER 124 .[6]

Arm pain in adults

Older people are more likely to be affected by problems such as referred pain, radiculopathy or myelopathy from cervical spondylosis, tumours, polymyalgia rheumatica, entrapment neuropathies such as CTS and ulnar nerve entrapment. The latter can be related to trauma, such as Colles fractures. In addition the elderly are more prone to suffer from the thoracic outlet syndrome as previously described under 'Pitfalls'. Osteoarthritis of the hand and tenosynovitis,

such as trigger thumb or finger, are more common with advancing age.

Tennis elbow

Tennis elbow is caused by overuse or overload of the muscles of the forearm, especially in the middle aged. It is an overload injury caused by excessive strain on the extensor muscles of the forearm resulting from wrist extension. Both lateral and medial tennis elbow tendinopathy are generally self-limiting, but symptoms can persist for up to 2 years, or even much longer.

Lateral tennis elbow (lateral epicondylar tendinopathy)

The patient who presents with this common and refractory problem is usually middle aged and only about one in 20 plays tennis. A typical clinical profile is presented in TABLE 53.2 .

Table 53.2 Lateral tennis elbow: typical clinical profile

Age	40–60 years
Occupation	Carpenter, bricklayer, cleaner, gardener, dentist, violinist
Sport	Tennis (only 5% of causes), squash
Symptoms	Pain at outer elbow, referred down back of forearm Rest pain and night pain (severe cases) Pain in the elbow during gripping hand movements (e.g. turning on taps, turning door handles, picking up objects with grasping action, carrying buckets, pouring tea, shaking hands)
Signs	No visible swelling Localised tenderness over lateral epicondyle, anteriorly Pain on passive stretching wrist Pain on resisted extension wrist and third finger Normal elbow movement
Course	6 to 24 months (most self-limiting)
Management	Basic: • rest from offending activity • RICE* and oral NSAIDs if acute • exercises—stretching and strengthening Additional (if refractory): • corticosteroid/LA injection (max. two) • manipulation • surgery

* RICE: rest, ice, compression, elevation

Signs

On examination the elbow looks normal, and flexion and extension are painless.

There are three important positive physical signs:

1. localised tenderness to palpation over the anterior aspect of the lateral epicondyle
2. pain on passive stretching (see FIG. 53.3) and Page 632
3. pain on resisted extension (see FIG. 53.4) at the wrist with the elbow held in extension and the forearm prone

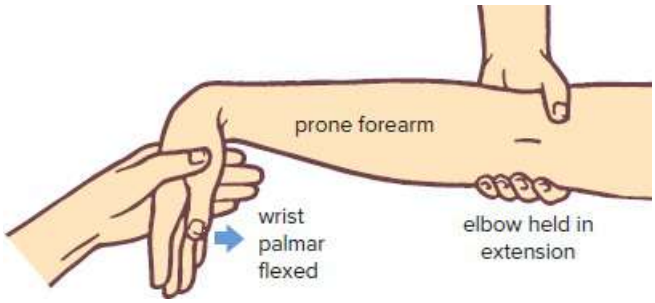

FIGURE 53.3 Lateral tennis elbow test: reproducing pain on passive stretching at the wrist

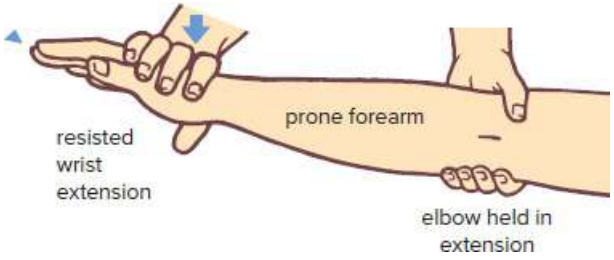

FIGURE 53.4 Lateral tennis elbow test: reproducing pain on resisted extension of the wrist

Management

Although there are myriad treatments, the cornerstones of therapy are rest from the offending activity and exercises to strengthen the extensors of the wrist. The application of ice may help relieve discomfort of acute pain. Three systematic reviews have found little evidence for efficacy

of any one specific intervention but short-term use of NSAIDs and progressive strengthening and stretching exercises were better than placebo.[7] A trial of oral NSAIDs or topical NSAID applied four times a day may be worthwhile.[8]

Exercises

Stretching and strengthening exercises for the forearm muscles represent the best management for tennis elbow. Three options are presented.

1. *The wringing exercise.* Chronic tennis elbow can be cured by a simple wringing exercise using a small hand towel.[9]
   Method

   - Roll up the hand towel.
   - With the arm extended, grasp the towel with the affected side placed in neutral.
   - Then exert maximum wring pressure: first flexing the wrist for 10 seconds, then extending the wrist for 10 seconds.

     This is an isometric 'hold' contraction.

     This exercise should be performed only twice a day, initially for 10 seconds in each direction. After each week increase the time by 5 seconds in each twisting direction until 60 seconds is reached (week 11). This level is maintained indefinitely.

     Note: Despite severe initial pain, the patient must persist, using as much force as possible. Review at 6 weeks to check progress and method.

2. *Weights exercise.* The muscles are strengthened by the use of hand-held weights or dumbbells. A suitable starting weight is 0.5 kg, building up gradually (increasing by 0.5 kg) to 5 kg, depending on the patient.
   Method

   - To perform this exercise the patient sits in a chair beside a table.
   - The arm is rested on the table so that the wrist extends over the edge.
   - The weight is grasped with the palm facing downwards (see FIG. 53.5).
   - The weight is slowly raised and lowered by flexing and extending the wrist.
   - The flexion/extension wrist movement is repeated 10 times, with a rest for 1 minute, and the program is repeated twice.

3. *The pronating exercise.*[10] A suitable stretching exercise is to rhythmically rotate the hand and wrist inwards with the elbow extended and the forearm pronated (see FIG. 53.6). Another proven exercise program is that outlined by Nirschl[11] and this can be provided by referral to a

physiotherapist familiar with the program.

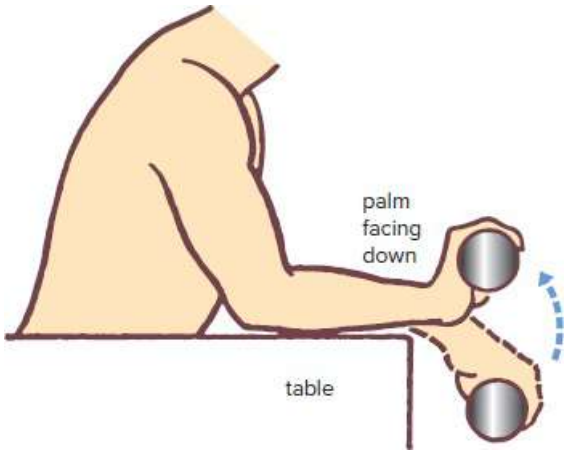

FIGURE 53.5 Lateral tennis elbow: the dumbbell exercise with the palm facing down

FIGURE 53.6 Tennis elbow stretching exercise: the hand and wrist are rhythmically rotated inwards until the painful point is reduced

Injection therapy

The injection of 1 mL of a long-acting corticosteroid and 1 mL of local anaesthetic should be reserved for those severe cases when pain restricts simple daily activities, and not used initially for those patients with only intermittent pain.

A Netherlands study showed that corticosteroid injections are the best short-term treatment for tennis elbow. Over the longer term, physiotherapy offers better results than injection but is on a

par with a wait and see approach.[12]

Surgery

Severe and refractory cases can be referred for surgery but this is rarely indicated and there is no evidence to date on its efficacy. The usual procedure is the stripping of the common extensor origin combined with debridement of any granulation tissue.[3] Other treatments include glyceryl trinitrate patches and autologous blood injections.

Medial tennis elbow (medial epicondylar tendinopathy)

In ‘forehand’ tennis elbow, or golfer’s elbow, the lesion is the common flexor tendon at the medial epicondyle. The pain is felt on the inner side of the elbow and does not radiate far. The main signs are localised tenderness to palpation and pain on resisted flexion of the wrist.

In tennis players it is caused by stroking the ball with a bent forearm action or using a lot of top spin, rather than stroking the ball with the arm extended.

The treatment is similar to that for lateral epicondylar tendinopathy except that in a dumbbell exercise program the palm must face upwards.

After-care and prevention (lateral and medial epicondylar tendinopathies)

If related to tennis, sport should be resumed gradually. Using a good quality, lighter racket and suitable grip size, start quietly with a warm-up period. Obtain advice on style, including smooth stroke play and avoiding ‘wristy’ shots.[11] It may be worthwhile to advise the use of a non-stretch band or brace situated about 7.5 cm below the elbow.

Olecranon bursitis

Olecranon bursitis presents as a swelling localised to the bursa (which has a synovial membrane) over the olecranon process. The condition may be caused by trauma, arthritic conditions (rheumatoid arthritis and gout) or infection.

Traumatic bursitis may be caused by a direct injury to the elbow or by chronic friction and pressure as occurs in miners (beat elbow), truck drivers or carpet layers. Acute olecranon bursitis with redness and warmth can occur in rheumatoid arthritis, gout, pseudogout, haemorrhage and infection (sepsis). Septic bursitis must be considered where the problem is acute or subacute in onset, and hence aspiration of the bursa contents with appropriate laboratory examination is necessary (smear, Gram stain, culture and crystal examination). Treatment depends on the cause.

Simple aspiration/injection technique

Chronic recurrent traumatic olecranon bursitis with a synovial effusion may require surgery but most cases can resolve with partial aspiration of the fluid and then injection of corticosteroid

through the same needle. Sepsis must be ruled out.

Overuse syndromes of forearm muscles[8]

Pain is often experienced in the belly of a muscle, such as the flexors and extensors, following unaccustomed use of the wrists and elbows. There is pain on contraction and stretching of the muscles and tenderness on palpation. This problem can be limiting for a significant period. Early treatment includes relative rest, ice packs, analgesics (paracetamol) and gradual return to activity. Referral for physiotherapy to supervise rehabilitation is important.

Carpal tunnel syndrome (CTS)

CTS is caused by entrapment of the median nerve in the carpal tunnel. Patients complain of ‘pins and needles’ affecting the pulps of the thumb, and index, middle and half of the ring finger (see FIG. 53.7). They usually notice these symptoms after, rather than during, rapid use of the hands. They may also complain of pain, which may even radiate proximally as far as the shoulder, from the volar aspect of the wrist. Causes or associations of CTS are presented in TABLE 53.3 . It resolves spontaneously in about one-third of patients.

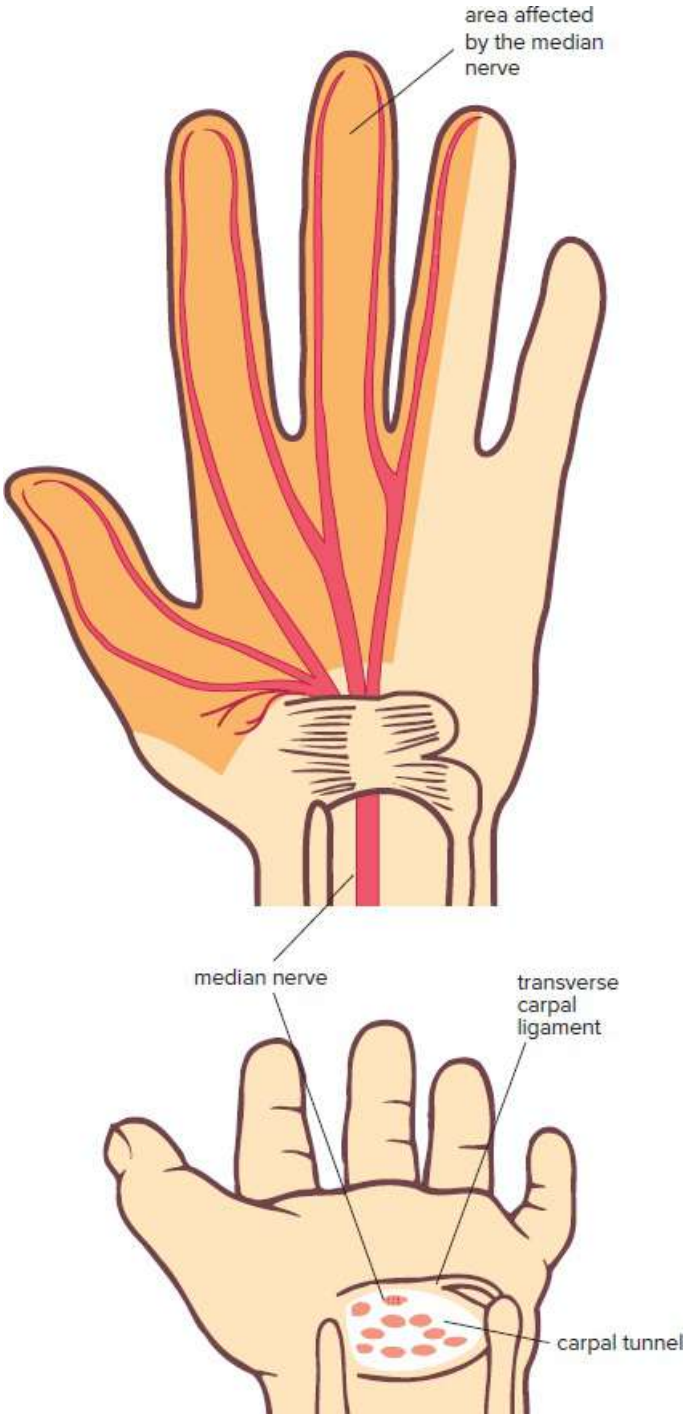

FIGURE 53.7 Carpal tunnel syndrome (median nerve compression syndrome)

Table 53.3 Carpal tunnel syndrome: causes or associations

Idiopathic
Acromegaly
Amyloidosis
Consider cervical nerve root pressure
Diabetes
Fibrosis
Granulomatous disorders (TB, etc.)
Hypothyroidism
Multiple myeloma
Occupational: repetitive work with flexed wrists
Paget disease
Pregnancy
Premenstrual oedema
Rheumatoid arthritis
Tophaceous gout
Trauma

The pathognomonic symptom

Patients complain of awakening from their sleep at night with ‘pins and needles’ affecting the fingers. They get out of bed, shake their hands, the ‘pins and needles’ subside and they return to sleep. In severe cases, the patient may awaken two or three times a night and go through the same routine.

Work-related CTS

CTS is seen in many work situations requiring rapid finger and wrist motion under load, such as meat workers and process workers. A type of flexor tenosynovitis develops and thus nerve compression in the tight tunnel. It is advisable to arrange confirmatory investigations by nerve conduction studies and electromyography for this work-induced overuse disorder. This testing is also indicated where the diagnosis is uncertain or if the condition persists and numbness or weakness develops.

Diagnosis (simple clinical tests)

In the physical examination a couple of simple tests can assist with confirming the diagnosis. These are the Tinel test and Phalen test. However, they are ‘soft’ signs with a relatively low sensitivity and specificity.[13]

Tinel test

- Hold the wrist in a neutral or flexed position and tap over the median nerve at the flexor surface of the wrist. This should be over the retinaculum just lateral to the palmaris longus tendon (if present) and the tendons of flexor digitorum superficialis (see FIG. 53.8).
- A positive Tinel sign produces a tingling sensation (usually without pain) in the distribution of the median nerve.

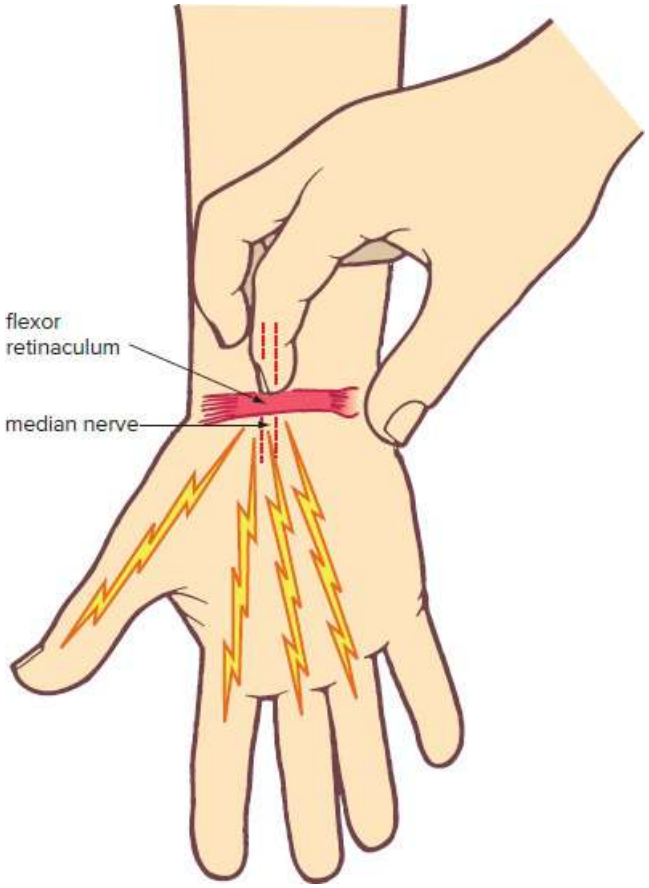

FIGURE 53.8 Carpal tunnel syndrome: Tinel sign

Phalen test

- The patient approximates the dorsum of both hands, one to the other, with wrists maximally flexed and fingers pointing downwards.
- This position is held for 60 seconds.
- A positive test reproduces tingling and numbness along the distribution of the median nerve.

Two point discrimination

The test that has the highest specificity of all basic clinical tests is two point discrimination, but it has low sensitivity for CTS.[13]

Treatment

The treatment is determined by the severity. For mild cases simple rest and splinting (particularly at night) is sufficient. Carpal tunnel injection with 1 mL of corticosteroid is frequently of diagnostic as well as therapeutic value (see FIG. 53.9). Ultrasound therapy has been used with some success. Surgical release (flexor retinaculotomy) is necessary for patients with sensory or motor deficits and those with recalcitrant CTS.

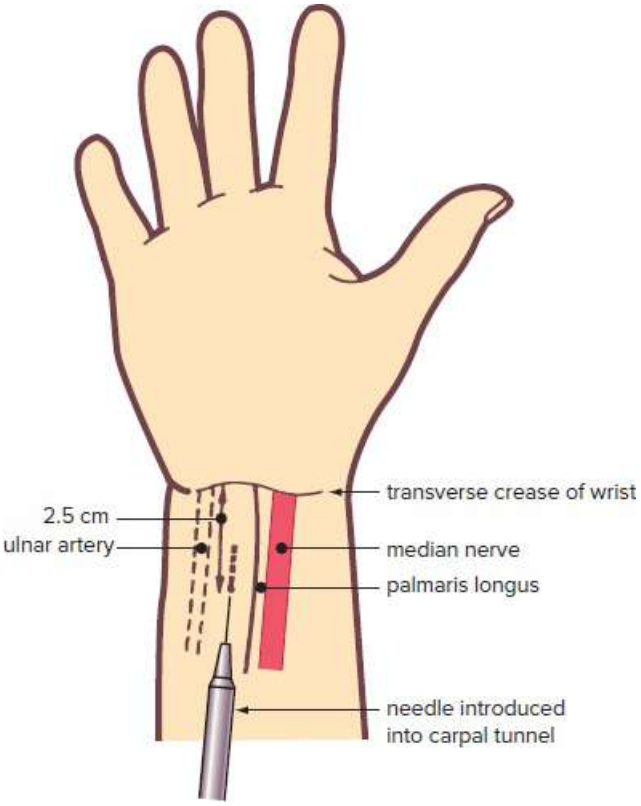

FIGURE 53.9 Injection technique for carpal tunnel syndrome: between the palmaris longus and ulnar artery

Systematic evidence-based reviews indicate the benefit of short-term oral corticosteroids[7] and local corticosteroid injection (short-term). NSAIDs and wrist splinting, especially at night, may provide pain relief.[14] Avoid use of diuretics.

In reference to surgery, one review found similar clinical outcomes between open carpal tunnel release and endoscopic release but the latter had more complications.[7]

Trigger finger/thumb (flexor tenosynovitis)

In the fingers the common work-induced condition is stenosing flexor tenosynovitis, also known as trigger thumb and finger. Trigger finger or thumb has a reported lifetime risk of 2.6% in the population and is more common in the fifth and sixth decades of life.[14] It is associated with type 1 diabetes, rheumatoid arthritis, gout, hypothyroidism and amyloidosis. It is caused by the same mechanism as de Quervain stenosing tenosynovitis. In middle age these tendons, which are rapidly and constantly being flexed and extended, can undergo attrition wear and tear, and fibrillate and fragment; this causes swelling, oedema and painful inflammation and the formation of a nodule on the tendon that triggers back and forth across the thick, sharp edge of the ‘pulley’ (of the fibrosseous tunnel in the finger) (see FIG. 53.10).

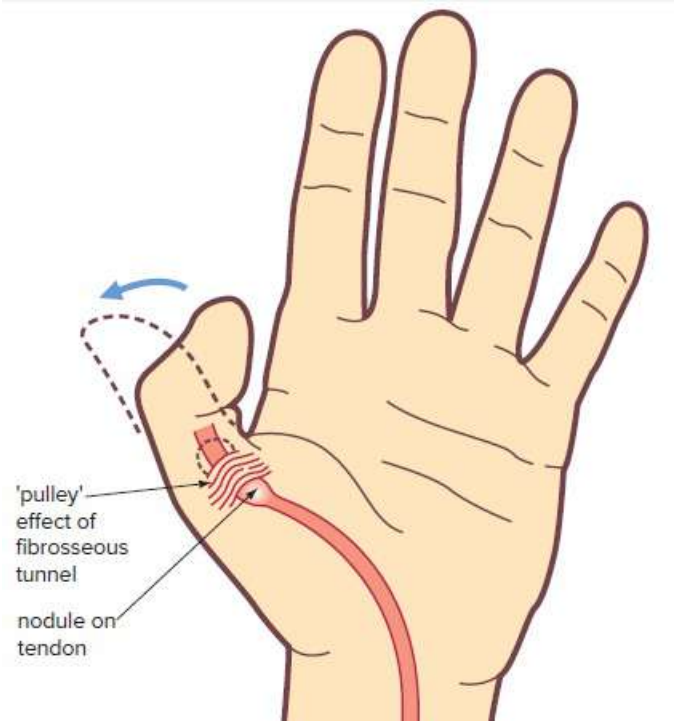

FIGURE 53.10 Trigger thumb

These patients may present with a finger locked in the palm of the hand; the finger can only be extended passively (manually) with the other hand. It is easily diagnosed by triggering. If the pulp of the finger is placed over the ‘pulley’, crepitus can be felt and tenderness elicited. The thumb and fourth (ring) finger are commonly affected, at the level of the metacarpal head.

Treatment

Oral NSAIDs (with care) may provide pain relief.[14] Although surgery is simple and effective, treatment by injection is often very successful. The injection is made under the tendon sheath

adjacent to but not into the tendon or its nodular swelling (A1 pulley). The approach can be proximal, distal or lateral to the nodule. Controlled trials report a success rate of up to 70%.[14]

Method

- The patient sits facing the doctor with the palm of the affected hand facing upwards.
- Draw 1 mL of long-acting corticosteroid solution into a syringe and attach a 25 gauge needle for the injection.
- Insert the needle at an angle distal to the nodule and direct it proximally within the tendon sheath (see FIG. 53.11). This requires tension on the skin with free fingers.
- By palpating the tendon sheath, you can (usually) feel when the fluid has entered the tendon sheath.
- Inject 0.5–1 mL of the solution, withdraw the needle and ask the patient to exercise the fingers for 1 minute.

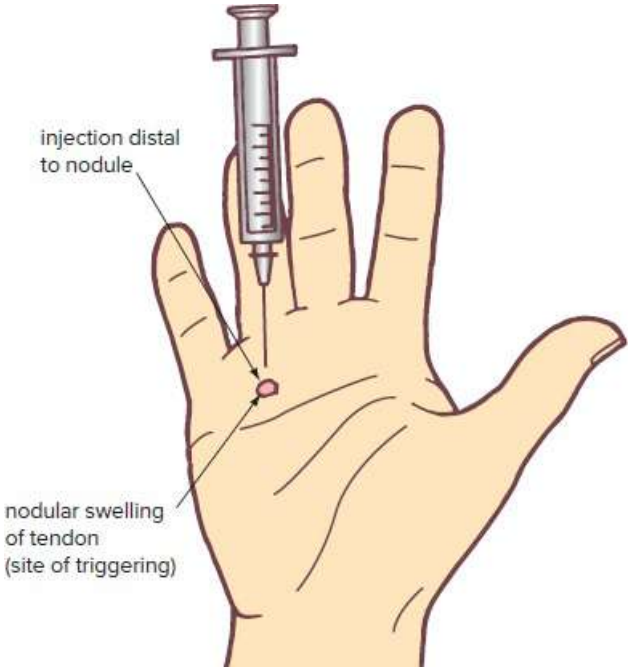

FIGURE 53.11 Injection site for trigger finger

Postinjection

Improvement usually occurs after 48 hours and may be permanent. The injection can be repeated after 3 weeks if the triggering is not completely relieved. If triggering recurs, surgery is indicated. This involves division of the thickened tendon sheath only.

Dupuytren contracture

Also referred to as ‘Viking disease’, this contracture, which causes discomfort and dysfunction rather than pain, is fibrous hyperplasia of the palmar fascia leading to nodular formation and contracture over the fourth and fifth fingers in particular (see FIG. 53.12). It occurs in about 10% of males over 65 years. The cause is unknown, but there is an AD genetic predisposition. It is associated with smoking, alcoholism, liver cirrhosis, COPD, diabetes, epilepsy and heavy manual labour. If the palmar nodule is growing rapidly, injection of corticosteroids or collagenase (e.g. Xiaflex) into the cord or nodule may be beneficial, but collagenase carries a risk of tendon rupture. Surgical intervention is indicated for a significant flexion deformity.

FIGURE 53.12 Dupuytren contracture showing flexion contractures of the fourth and fifth digits and a palmar cord

De Quervain tenosynovitis (washerwoman’s sprain)

At the wrist, a not uncommon, work-induced condition is de Quervain stenosing tenosynovitis of the first dorsal extensor compartment tendons (extensor pollicis brevis and abductor pollicis longus), which pass along the radial border of the wrist to the base of the thumb. It is usually seen when the patient is required to engage in rapid, repetitious movements of the thumb and the wrist, especially for the first time, and thus is common in assembly line workers, such as staple gun operators. It often occurs in pregnancy, particularly postpartum.

Clinical features

- Typical age 40–50 years
- Pain at and proximal to wrist on radial border

- Pain during pinch grasping
- Pain on thumb and wrist movement
- Dull ache or severe pain (acute flare-up)
- Can be disabling with inability to use hand (e.g. writing)

Triad of diagnostic signs

- Tenderness with possible crepitations on palpation over and just proximal to radial styloid
- Firm tender localised swelling in area of radial styloid (may be mistaken for exostosis)
- Positive Finkelstein sign (the pathognomonic test)

Finkelstein test

- The patient folds the thumb into the palm with the fingers of the involved hand folded over the thumb, thus making a fist.
- Move (adduct) the wrist in an ulnar direction (towards the little finger) to stretch the involved tendons as you stabilise the forearm with the other hand (see FIG. 53.13).
- A positive test is indicated by reproduction of or increased pain.

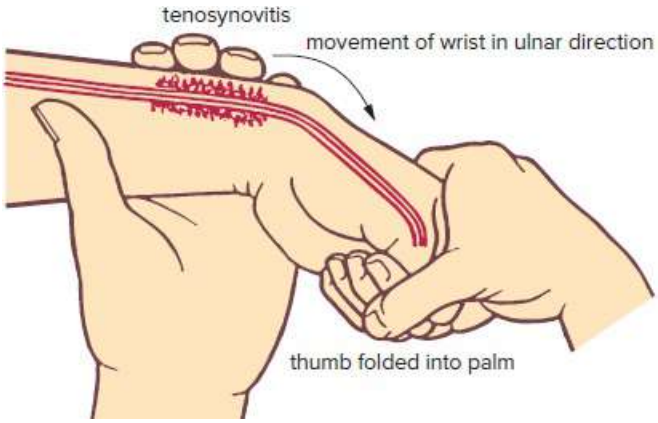

FIGURE 53.13 Finkelstein test

Treatment

- Conservative management is preferred. Rest and avoid the causative stresses and strains on the thumb abductors.
- Refer to occupational and hand therapists for a custom-made splint that involves the thumb

and immobilises the wrist.

- Consider trial of oral or topical NSAIDs four times a day for 14–21 days.
- Local long-acting corticosteroid injection can relieve and may even cure the problem but care should be taken to inject the suspension within the tendon sheath rather than into the tendon.
- Surgical release is required for recalcitrant cases.

Method of tendon sheath injection

- Identify and mark the most tender site of the tendon and the line of the tendon. Identify and avoid the radial artery.
- Thoroughly cleanse the skin with an antiseptic such as povidone-iodine 10% solution.
- Insert the tip of the needle (23 gauge) about 1 cm distal to the point of maximal tenderness (see FIG. 53.14).
- Advance the needle almost parallel to the skin along the line of the tendon.

- Inject about 0.5 mL of the corticosteroid suspension within the tendon sheath. If the needle is in the sheath very little resistance to the plunger should be felt, and the injection causes the tendon sheath to billow out.

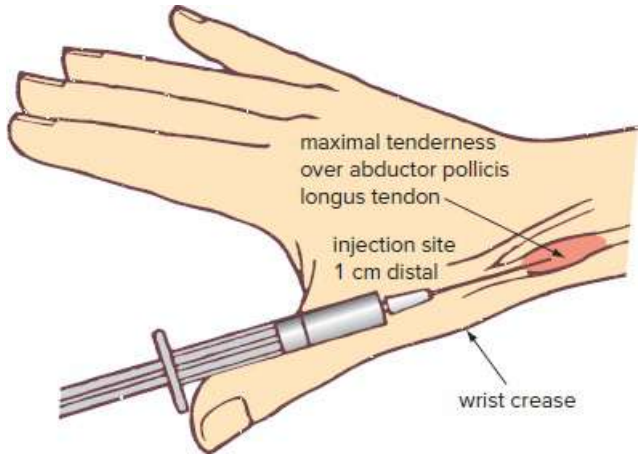

FIGURE 53.14 Tendon sheath injection

Tendinopathy

After excluding CTS, trigger thumb/finger, de Quervain tenosynovitis, rheumatoid and related disease, tendinitis is uncommon in the hand.[15] Tendinitis may occur in other extensor compartments of the wrist and hand with unusual repetitive stressful actions, such as power drills jamming, and in conveyor quality control where an object is picked up with the forearm prone,

supinating to examine it and pronating to replace it.

Treatment is rest from the provoking activity, splintage and tendon sheath injection with long-acting corticosteroid in a manner similar to that described for de Quervain tenosynovitis.

Intersection syndrome[16]

Intersection syndrome is caused by a bursitis that develops at the site where the extensor pollicis brevis and abductor pollicis longus tendons cross over the extensor carpi radialis tendons (see FIG. 53.15). The bursitis is due to friction at the crossing point or due to tenosynovitis of the extensor tendons. On palpation tenderness is found dorsally on the radial side with swelling and crepitus. Treatment is based on relative rest, a trial of NSAIDs and an injection of local anaesthetic and corticosteroid into the bursa.

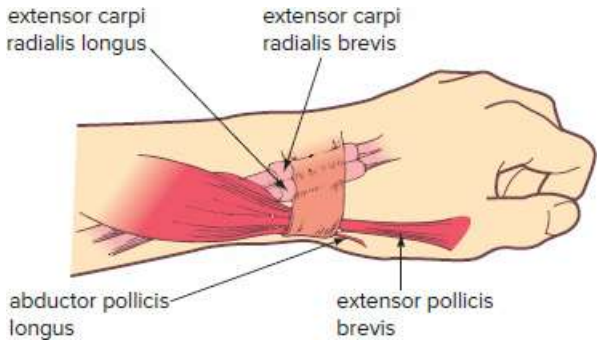

FIGURE 53.15 Intersection syndrome: pain is present over the intersection of tendons

Post-traumatic chronic wrist pain[10]

Patients often present with persistent wrist pain following trauma, such as a fracture, sprain to the wrist or even a seemingly mild strain, such as falling down with the wrist flexed into the hand. An undiagnosed fracture, ischaemic necrosis or unstable ligamentous injury including a triangular fibrocartilage tear should be investigated by radiology or referral where appropriate. Look for a scapholunate ligament tear (which causes wrist instability) with tenderness 2 cm distal to the tubercle on the radial side of the lunate. For persistent tenderness an injection of corticosteroid and local anaesthetic into the tender site is advisable.[8] Imaging including MRI can be helpful but if in doubt about the diagnosis refer to a hand and wrist surgeon.

Ulnar collateral ligaments injury (‘gamekeeper’s thumb’)[16]

A special injury is gamekeeper’s thumb (also known as skier’s thumb) in which there is ligamentous disruption of the metacarpophalangeal joint with or without an avulsion fracture at the base of the proximal phalanx at the point of ligamentous attachment (Bennett fracture). This injury is caused by the thumb being forced into abduction and hyperextension by the ski pole as the skier pitches into the snow. Pinch grip is often affected.

Diagnosis is made by X-ray with stress views of the thumb. Incomplete tears are immobilised in

a scaphoid type of plaster for 3 weeks, while complete tears (Stener lesions) and avulsion fractures should be referred for surgical repair.

Mallet finger

A mallet finger is a common sports injury caused by the ball (football, cricket ball or baseball) unexpectedly hitting the fingertip and forcing the finger to flex. Such a forced hyperflexion injury to the distal phalanx can rupture or avulse the extensor insertion into its dorsal base. The characteristic swan-neck deformity (see FIG. 53.16) is due to retraction of the lateral bands and hyperextension of the proximal interphalangeal joint.

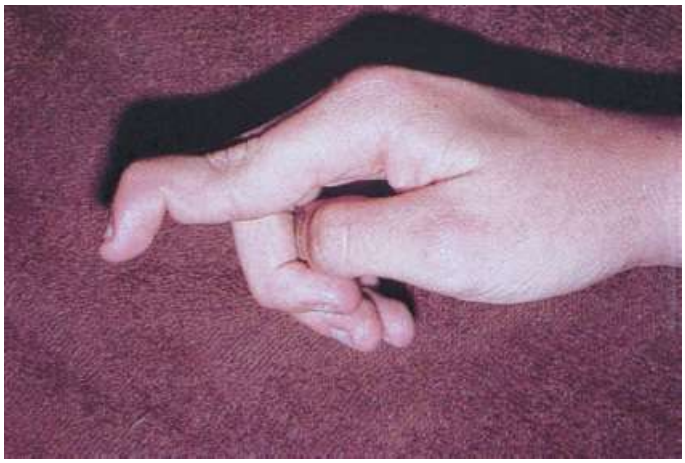

FIGURE 53.16 Mallet finger with swan-neck deformity following rupture of the extensor tendon to the distal phalanx

The 45° guideline

Without treatment, the eventual disability will be minimal if the extensor lag at the distal joint is less than 45°; a greater lag will result in functional difficulty and cosmetic deformity.

Treatment

Maintain hyperextension of the distal interphalangeal joint for 6 weeks, leaving the proximal interphalangeal joint free to flex. This can be managed with a mallet finger splint, or non-stretched adhesive tape (see FIG. 53.17).

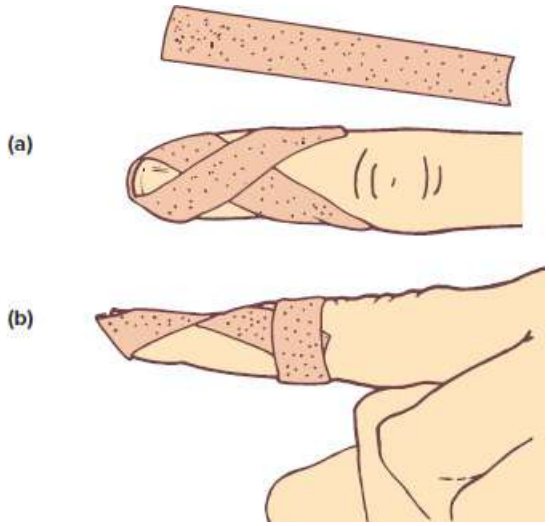

FIGURE 53.17 Mallet finger: position of finger after application of tapes

Ischaemic necrosis

Ischaemic necrosis, particularly of the scaphoid, can occur following failure to recognise a fracture. Tenderness in the ‘anatomical snuff box’ following trauma should be treated as a scaphoid until repeated X-rays prove negative. In children, chronic pain in the region of the lunate suggests avascular necrosis—Kienböck disease, presenting with dorsal wrist pain (see later in this chapter).

Ganglia[14]

About 60–70% of these common fluid-filled cysts occur on the dorsal aspect of the wrist overlying a joint or tendon sheath. The vast majority arise from the dorsal scapholunate ligament. Pain can result from compression on an adjacent nerve or joint space. If diagnosis is uncertain, an ultrasound scan (or even an MRI) may pinpoint the tumour, although neither is commonly required. See CHAPTER 116 for treatment.

Neurovascular disorders of the hand

Painful vascular disorders, which are more likely to occur in women in cold weather, include Raynaud phenomenon, erythromelalgia, chilblains and acute blue finger syndrome. Acrocyanosis is not a painful condition.

Raynaud phenomenon

The basic feature of Raynaud phenomenon, which is a vasospastic disorder, is sequential discolouration of the digits from pallor to cyanosis to rubor upon exposure to cold and other

factors (a useful mnemonic is WBR, namely white → blue → red) (see FIG. 53.18). The rubor is a reactive hyperaemia when fingers become red and tender. Associated symptoms are pain, tingling and numbness. It is possible to get loss of tissue pulp at the ends of the fingers and subsequent necrotic ulcers. The benign form is the commonest, but may indicate an evolving connective tissue disorder. It is highly significant if it extends to the MCP joints (see CHAPTER 21).

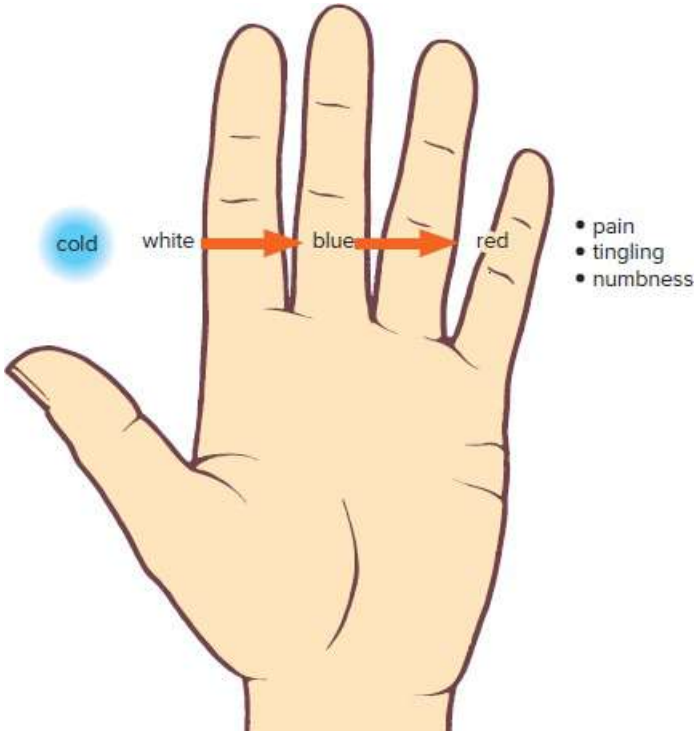

FIGURE 53.18 Raynaud phenomenon: symptoms and colour changes of fingers with cold

Causes

Primary

- Raynaud syndrome (idiopathic)

Secondary

- Occupational trauma (vibrating machinery)
- Connective tissue disorders (e.g. rheumatoid arthritis, SLE, systemic sclerosis, CREST, polyarteritis nodosa)
- Arterial disease (e.g. Buerger disease)

- Haematological disorders (e.g. polycythaemia, cold agglutinin disease, leukaemia)
- Drugs (e.g. beta blockers, sympathomimetic drugs with receptor activity, ergotamine, nasal decongestants)

Aggravating factors

- Smoking
- Cold, wet weather
- Stress or emotional upset

Differential diagnoses

- Chilblains—itchy, patchy discolouration without pallor
- Diffusely cold mottled hands—recover quickly on warming

Investigations

Exclude underlying causes with appropriate tests.

Treatment[14]

- In an attack, it is best to warm the extremities gradually.
- Total body protection from cold—wear layered clothing to prevent heat loss.
- Use an electric blanket at night, as required.
- Use mittens, fleece-lined gloves and thick woollen socks. Use warm long sleeves.
- Gloves or mittens should be worn when handling cold surfaces and objects, such as frozen food.
- Avoid smoking.
- Consider sympathectomy.

Vasodilators (during cold weather)[14]

topical glyceryl trinitrate 2% ointment—applied to the base of the affected fingers 2–4 times daily or applied over the radial artery or dorsum of the hand

or

amlodipine 5–20 mg (o) once daily

or

nifedipine SR 30–60 mg (o) once daily

or

diltiazem SR 180–240 mg (o) once daily

Erythromelalgia (erythermalgia)

This condition is characterised by erythema (redness), a burning sensation and swelling of the hands (and feet) after exposure to heat and exercise. It may be primary or secondary to a disease such as diabetes, haematological disorders[17] (e.g. polycythaemia rubra vera) and connective tissue disease. Treatment of primary erythromelalgia includes trials of aspirin, phenoxybenzamine (Dibenyline), methysergide or sympathectomy.

Acute blue finger syndrome in women

This unusual syndrome involves the sudden onset of pain and cyanosis of the ventral aspect of the digit initially, and then the entire digit. It lasts 2–3 days and the attacks recur one or more times per year. No abnormalities are found on physical or on laboratory examination.

The cause is probably spontaneous rupture of a vein at the base of the finger.

Chilblains (perniosis)

Precautions

- Think Raynaud phenomenon
- Protect from trauma and secondary infection
- Do not rub or massage injured tissues
- Do not apply heat or ice

Treatment

Physical treatment

- Elevate affected part
- Warm gradually to room temperature

Drug treatment

- Apply glyceryl trinitrate vasodilator spray or ointment or patch (use plastic gloves and wash hands for ointment)

Other treatment

- Drink rum at night (traditional old wives' tale!)
- Nifedipine SR 30 mg daily

Regional pain syndrome

The hand can be affected by complex regional pain syndrome, previously called reflex sympathetic dystrophy (RSD; also in this case Sudeck atrophy). The patient presents with severe pain, swelling and disability of the hand. It may occur spontaneously or, more usually, it follows trauma that may even be trivial. It can occur after a Colles fracture, especially with prolonged immobilisation.

Clinical features

- Throbbing, burning pain, worse at night
- Paraesthesia
- Initial: red, swollen hand; warm, dry skin
- Later: cold, cyanosed and mottled, moist skin; shiny and stiff fingers
- Wasting of small muscles
- X-rays—patchy decalcification of bone (diagnostic)

The problem eventually settles but may take years. Patients need considerable support, encouragement, basic pain relief, mobility in preference to rest and perhaps referral to a pain clinic.

Kienböck disorder

Kienböck disease is avascular necrosis of the carpal lunate bone (see FIG. 53.19), which may fragment and collapse, eventually leading to osteoarthritis of the wrist.

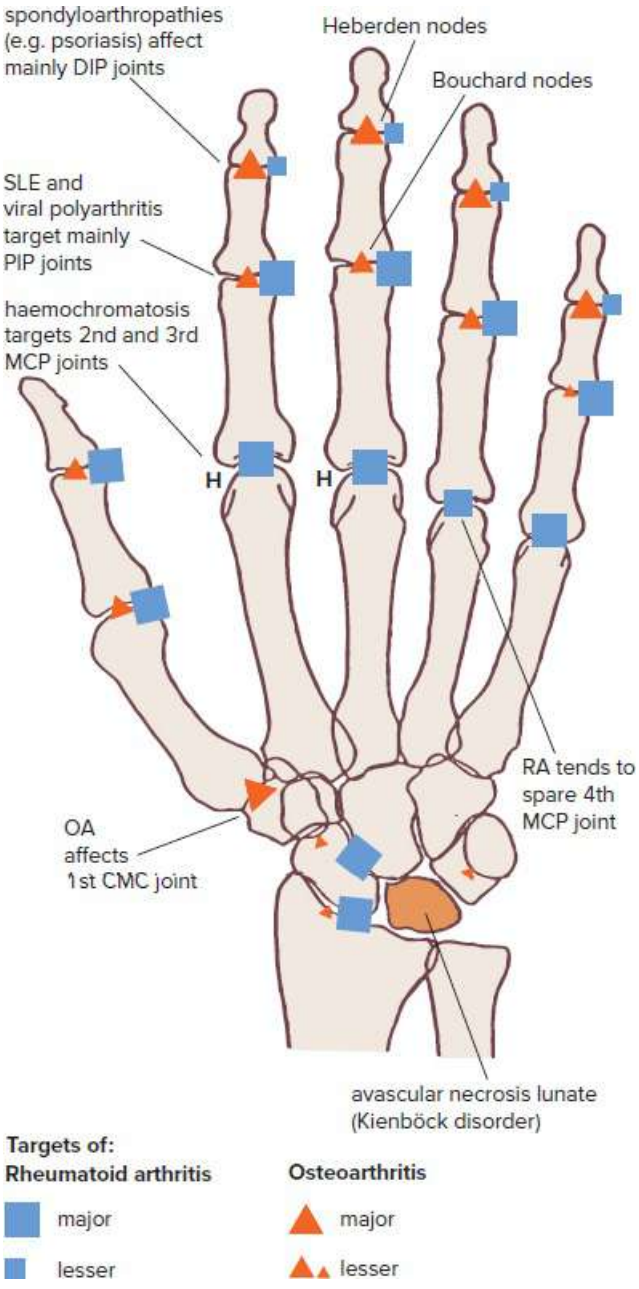

FIGURE 53.19 Typical sites of arthritic conditions and osteochondritis in the hand

It presents usually in young adults over the age of 15 as insidious, progressive wrist pain and stiffness that limits grip strength and hand function. Males are affected more often than females and the right hand more than the left, indicating the relationship to trauma.

Arthritic conditions of the wrist and hand

Arthritis of the hand is an inappropriate diagnosis and specificity is required to highlight the various joints that are the targets of the specific arthritides, which include osteoarthritis, rheumatoid arthritis, spondyloarthropathies, gout, haemochromatosis and connective tissue disorders. Typical target areas in the hand are shown in FIGURE 53.19 .

Osteoarthritis

Osteoarthritis commonly involves the interphalangeal joints of the fingers (especially the DIP joints)[18] and the carpometacarpal (CMC) joint of the thumb. Degenerative changes produce bony swellings around the margins of the joints—Heberden nodes of the DIP joints and less commonly Bouchard nodes of the PIP joints. A patchy distribution occurs in metacarpophalangeal, intercarpal and wrist joints, usually related to trauma.

Osteoarthritis of the thumb

This is very common, especially in women. Pain is felt at the base of the thumb, and tenderness on palpation of the CMC joint is typical. Functional limitation is progressive, with weakness of the pinch grip and limited thumb excursion. Surgical correction may be required.

Rheumatoid arthritis

In rheumatoid arthritis, the DIP joints are often spared (only about 30% involved), but the metacarpophalangeal and proximal interphalangeal joints and wrist joints are generally affected symmetrically and bilaterally. Rheumatoid arthritis tends to affect the metacarpophalangeal joints of the fourth finger less commonly.

Gout

Gout may affect normal joints of the hand but is encountered more frequently in osteoarthritic hand joints (especially DIP joints) in elderly people taking diuretics. This clinical feature is known as nodular gout.

Seronegative arthropathies

A similar appearance to rheumatoid arthritis occurs, except that with psoriatic arthritis the terminal joints are often affected by swelling, giving the appearance of ‘sausage digits’. (Refer CHAPTERS 25 and 28 .)

Infections of the hand

Although not encountered as frequently as in the past, serious suppurative infections of the deep fascial spaces of the hand and tendon sheath can still occur, especially with penetrating injuries and web space infection.

Infections of the hand include:

- infected wounds with superficial cellulitis or lymphangitis (*Streptococcus pyogenes*)
- subcutaneous tissues—nail bed (paronychia), pulp (whitlow, e.g. herpes simplex)
- erysipeloid—this is a specific infection in one finger of fishers or meat handlers, caused by *Erysipelothrix insidiosa.* There is a purplish erythema that gradually extends over days. It is rapidly cured by penicillin
- tendon sheath infection (suppurative tenosynovitis)—this is a dangerous and painful infection that can cause synovial adhesions with severe residual finger stiffness. The affected finger is hot and swollen and looks like a sausage
- 'aquarium' or 'swimming pool' granuloma—non-painful infection of the tendon sheath due to *Mycobacterium marinum* following a minor cut of the finger; doxycyclin or clarithromycin is usually effective but refer to infectious disease physician
- deep palmar fascial space infection—infection from an infected tendon sheath or web space may spread to one of the two deep palmar spaces: the medial (midpalmar) space or lateral (thenar) space
- sporotrichosis (gardener's arm)—a chronic fungal infection from contaminated spikes of wood or rose thorns presenting as hard non-tender nodules in the skin of the hand and extending along the lymphatics of the arm. The diagnosis is confirmed by biopsy. Treat with itraconazole

Management of serious infection

- Early appropriate antibiotic treatment for infection and early surgical referral where necessary
- Antibiotics (adult doses)

  Streptococcus pyogenes (mild to moderate cellulitis, lymphangitis)

  procaine penicillin 1.5 g IM daily, 3–7 days

  or

  phenoxymethylpenicillin 500 mg (o) 6 hourly for 10 days

  If severe, to cover both *S. pyogenes* and *Staphylococcus aureus* infection (suspected or proved)

  flucloxacillin/dicloxacillin 2 g IV 6 hourly until improved, then oral for 10 days

'Cracked' hands and fingers

- Wear protective work gloves: cotton-lined PVC gloves.

- Use soap substitutes (e.g. Cetaphil lotion, Dove).

  Apply 2–5% salicylic acid and 10% liq picis carb in white soft paraffin ointment

  or

  corticosteroid ointment: class II–III

When to refer

- Disabling osteoarthritis of carpometacarpal joint for possible surgical repair
- Myelopathy (motor weakness) and persistent radiculopathy (nerve root pain and sensory changes) in the arm
- Unresolving nerve entrapment problems such as median and ulnar nerves
- Elbow injuries in children with proven or possible supracondylar fracture or avulsion epicondylar fractures
- Evidence or suspicion of suppurative infection of the tendon sheaths or deep palmar fascial spaces
- Septic arthritis and osteomyelitis
- Regional pain syndrome
- Other conditions not responding to conservative measures

Practice tips

- With elbow injuries in children, X-ray both elbows and compare one side with the other; this helps to determine whether there is displacement of fragments or a disturbance in the normal anatomy of the elbow.
- Tendinopathy and other entheseal problems of the arm are common and tend to take 1–2 years to resolve spontaneously, yet they resolve rapidly with rest, an exercise program or corticosteroid injections. Surgical relief is effective for refractory cases.
- The so-called thoracic outlet syndrome is probably most often caused by the ‘droopy shoulder syndrome’ rather than by a cervical rib.
- Consider corticosteroid injections for CTS and stenosing tenosynovitis (de Quervain and trigger finger or thumb). They are very effective and often curative.

- The site of arthritis in the hand provides a reasonable guide as to the cause.
- Always keep regional pain syndrome in mind for persistent burning pain in the hand following injury—trivial or severe.

Patient education resources

Hand-out sheets from *Murtagh's Patient Education* 8th edition:

- Carpal tunnel syndrome
- Mallet finger
- Olecranon bursitis
- Tennis elbow
- Trigger finger

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54 Hip, buttock and groin pain

Which of your hips has the most profound sciatica?

WILLIAM SHAKESPEARE (1564–1616), *MEASURE FOR MEASURE*

Pain in the hip, buttock, groin and upper thigh tends to be interrelated. The lay meaning of hip (e.g. ‘wide hips’) is more expansive than the medical term (femoroacetabular joint), so ‘hip pain’ can describe pain in the buttock or lower back. Most pain in the buttock has a lumbosacral origin. Pain originating from disorders of the lumbosacral spine (commonly) and the knee (uncommonly) can be referred to the hip region, while pain from the hip joint (L3 innervation) may be referred commonly to the thigh and the knee. Disorders of the abdomen, retroperitoneal region and pelvis may cause hip and groin pain, sometimes mediated by irritation of the psoas muscle.

Key facts and checkpoints

- Hip troubles have a significant age relationship (see FIG. 54.1).
- Children can suffer from a variety of serious disorders of the hip—such as developmental dysplasia of the hip (DDH), Perthes disease, tuberculosis, septic arthritis, slipped capital femoral epiphysis (SCFE) and inflammatory arthritis—all of which demand early recognition and management.
- SCFE typically presents in the obese adolescent (10–15 years) with knee pain and a slight limp.
- Every newborn infant should be tested for DDH, which can usually be treated successfully when diagnosed early.
- Limp has an inseparable relationship with painful hip and buttock conditions, especially those of the hip.
- The spine is the most likely cause of pain in the buttock in adults.
- If a woman, especially one with many children, presents with bilateral buttock or hip pain, consider dysfunction of the sacroiliac joints (SIJs) as the cause.

- If a middle-aged or elderly woman presents with hip pain, consider the underdiagnosed conditions of trochanteric bursitis or gluteus medius tendinitis (greater trochanteric pain syndrome).

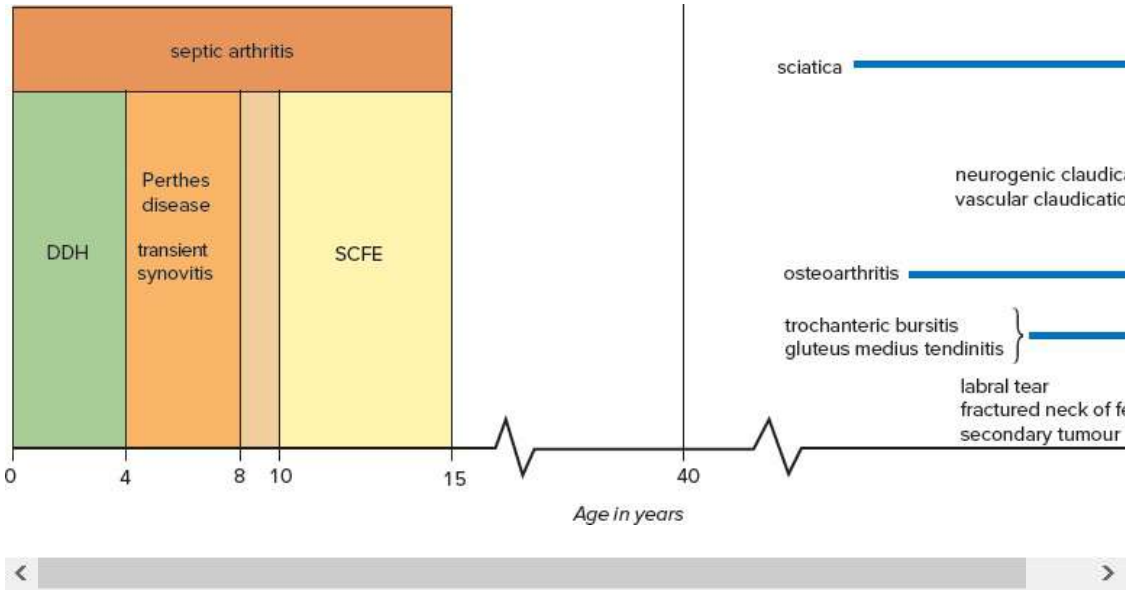

FIGURE 54.1 Typical ages of presentation of hip disorders

A diagnostic approach

A summary of the diagnostic strategy model is presented in TABLE 54.1 .

Table 54.1 Hip and buttock pain: diagnostic strategy model

Probability diagnosis
Traumatic muscular strains
Referred pain from spine
Osteoarthritis of hip
Greater trochanteric pain syndrome
Serious disorders not to be missed
Cardiovascular: • buttock claudication Neoplasia: • metastatic cancer

- osteoid osteoma

Septic infections:

- septic arthritis
- osteomyelitis
- tuberculosis
- pelvic and abdominal infections: pelvic abscess, pelvic inflammatory disease, prostatitis
- synovial chondromatosis

Childhood disorders:

- DDH
- Perthes disease
- slipped femoral epiphysis
- transient synovitis (irritable hip)
- juvenile chronic arthritis

Pitfalls (often missed)

Polymyalgia rheumatica

Fractures:

- stress fractures femoral neck
- subcapital fractures
- sacrum
- pubic rami

Tear of hamstring

Avascular necrosis femoral head

Femoroacetabular impingement

Torn acetabular labrum

Sacroiliac joint disorders

Inguinal or femoral hernia

Bursitis or tendinitis:

- greater trochanteric pain syndrome
- ischial bursitis
- iliopsoas bursitis

Osteitis pubis

Neurogenic claudication

Chilblains

Rarities:

- haemarthrosis (e.g. haemophilia)
- Paget disease
- nerve entrapments: sciatica ‘hip pocket nerve’, obturator, lateral cutaneous nerve of thigh

Seven masquerades checklist

Depression

Spinal dysfunction

Is the patient trying to tell me something?

Non-organic pain may be present. Patient with arthritis may be fearful of being crippled.

Probability diagnosis

The commonest cause of hip and buttock pain presenting in general practice is referred pain from the lumbosacral spine and the sacroiliac joints.[1] The pain is invariably referred to the outer buttock and posterior hip area (see FIG. 54.2). The origin of the pain can be the facet joints of the lumbar spine, intervertebral disc disruption or, less commonly, the SIJs. Much of this pain is inappropriately referred to as ‘lumbago’, ‘fibrositis’ and ‘rheumatism’.

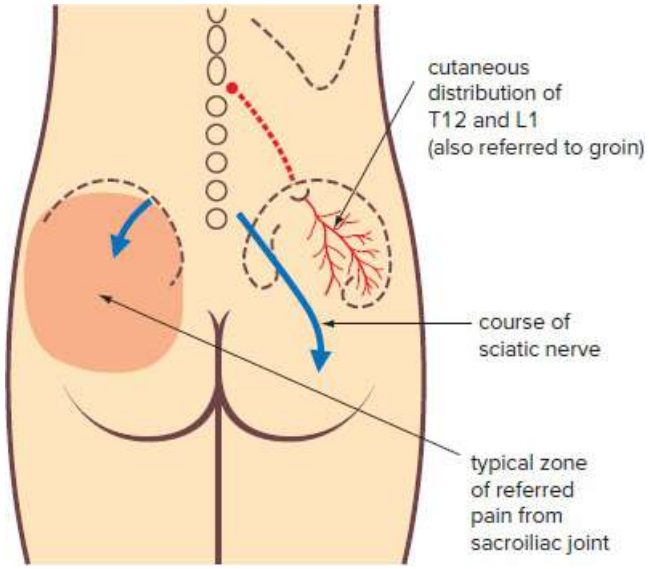

FIGURE 54.2 Referral patterns of pain from the lumbosacral spine and the sacroiliac joints

Trauma and overuse injuries from sporting activities are also common causes of muscular and ligamentous strains[2] around the buttock, hip and groin.

The hip joint is a common target of osteoarthritis. This usually presents after 50 years of age but can present earlier if the hip has been affected by another condition.

Serious disorders not to be missed

The major triad of serious disorders—cardiovascular, neoplasia and severe infections—are applicable to this area albeit limited in extent.

Aortoiliac occlusion

Ischaemic muscle pain, including buttock claudication secondary to aortoiliac arterial occlusion, is sometimes confused with musculoskeletal pain. An audible bruit over the vessels following exercise is one clue to diagnosis.

Neoplasia

Primary tumours, including myeloma, lymphoma and sarcoma, can arise rarely in the upper femur and pelvis (especially the ileum). More commonly, these areas are targets for metastases, especially from the prostate, breast and lung.

Infection

Some very important, at times ‘occult’, infections can develop in and around the hip joint.

Osteomyelitis is prone to develop in the metaphysis of the upper end of the femur and must be considered in the child with intense pain, a severe limp and fever. Tuberculosis may also present in children (usually under 10 years) with a presentation similar to Perthes disease.

Transient synovitis or ‘irritable hip’ is the most common cause of hip pain and limp in childhood.

Inflammation of the side wall of the pelvis as in a deep pelvic abscess (e.g. from appendicitis), pelvic inflammatory disease (PID) including pyosalpinx, or an ischiorectal abscess, can cause deep hip and groin pain and a limp. This pain may be related to irritation of the obturator nerve.

Retroperitoneal haematoma can cause referred pain and femoral nerve palsy.

Childhood disorders that must not be missed include:

- DDH and acetabular dysplasia
- Perthes disease
- SCFE
- stress fractures of the femoral neck

Inflammatory disorders of the hip joint that should be kept in mind include:

- rheumatoid arthritis
- juvenile chronic arthritis (JCA)
- rheumatic fever (a flitting polyarthritis)
- spondyloarthropathy

Pitfalls

There are many pitfalls associated with hip and buttock pain and these include the various childhood problems. Fractures can be a pitfall, especially subcapital fractures.

Red flag pointers to potentially serious hip conditions

- Swelling, redness, very limited joint motion
- Pain, fever, systemic features (in absence of trauma)
- Neurological changes (e.g. loss of power)
- Rapid joint swelling after trauma
- Constant localised pain unaffected by movement

SIJ disorders are often missed, whether it be the inflammation of sacroiliitis or mechanical dysfunction of the joint.

Inflammatory conditions around the hip girdle are common and so are often misdiagnosed. These include the common gluteus medius tendinitis and trochanteric bursitis (greater trochanteric pain syndrome).

Polymyalgia rheumatica commonly causes shoulder girdle pain in the elderly but pain around the hip girdle can accompany this important problem.

Chilblains around the upper thighs occur in cold climates and are often known as ‘jodhpur’ chilblains because they tend to occur during horse riding in very cold weather.

Nerve entrapment syndromes require consideration. Meralgia paraesthetica is a nerve entrapment causing pain and paraesthesia over the lateral aspect of the hip (see FIG. 55.3 , CHAPTER 55).

An interesting modern phenomenon is the so-called ‘hip pocket nerve’ syndrome. If a man presents with ‘sciatica’, especially confined to the buttock and upper posterior thigh (without local back pain), consider the possibility of pressure on the sciatic nerve from a wallet in the hip pocket. This problem is occasionally encountered in people sitting for long periods in cars (e.g.

taxi drivers). It appears to be related to the increased presence of plastic credit cards in wallets (see FIG. 54.3).

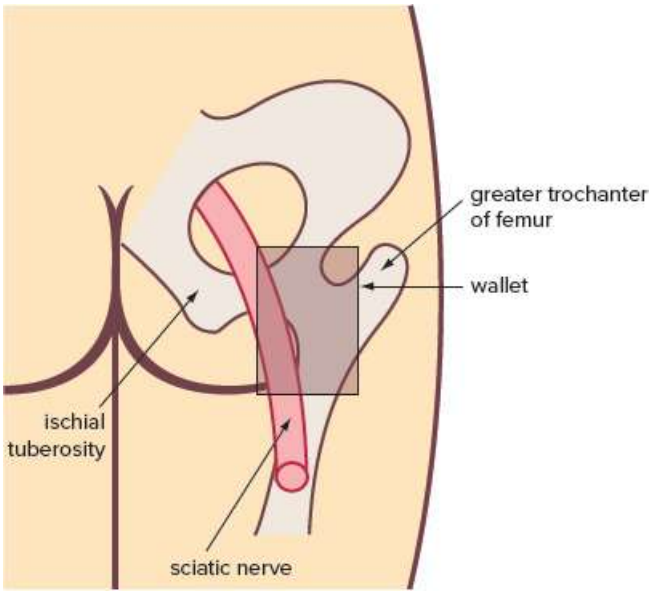

FIGURE 54.3 ‘Hip pocket nerve’ syndrome: location and relations of sciatic nerve in the buttock

Paget disease can involve the upper end of the femur and the pelvis. Increased pain may indicate a fracture or malignant change causing osteosarcoma.

General pitfalls

- Failure to test the hips of neonates carefully and follow up developmental dysplasia of the hip.
- Misdiagnosis of arthritis and other disorders of the hip joint because of referred pain.
- Overlooking an SCFE or a stress fracture of the femoral neck in teenage boys, especially athletes. If an X-ray shows that the epiphysis is fusing or has fused, arrange a technetium bone scan.

Seven masquerades checklist

The one outstanding masquerade is spinal dysfunction, which is the most likely cause of pain in the buttock. Many dermatomes meet at the buttock and theoretically pain in the buttock can result from any lesion situated in a tissue derived from L1, L2, L3, S2, S3 and S4.[1] Symptoms from L3 can spread from the outer buttock to the front of the thigh and down the leg, over the medial aspect of the knee to the calf. Such a distribution is common to an L3 nerve root lesion and arthritis of the hip.

Furthermore, dysfunction of the facet joints and sacroiliac joints can refer pain to the buttock. The relatively common L1 lesion due to dysfunction at the T12–L1 spinal level can lead to referred pain over the outer upper quadrant of the buttock and also to the groin (see FIG. 54.2).

Psychogenic considerations

Cyriax[1] claims that the hip shares with the back and the shoulder ‘an enhanced liability to fixation’ for psychological reasons. This problem is often related to work compensation factors or overpowering stresses at home. A common finding in psychoneurotic patients complaining of buttock and thigh pain is 90° limitation of flexion at the hip joint. The importance of testing passive movements of the hip joint is obvious, for often such limitation of flexion is combined with a full range of rotation. In arthritis of the hip joint internal rotation is invariably affected first.

Such patients often walk into the office with a marked limp and leaning on a thick stick. It requires great skill to evaluate and manage them tactfully and successfully.

On the other hand, patients with genuine osteoarthritis fear being crippled and ending in a wheelchair. They require considerable education and reassurance.

The clinical approach

History

Pain associated with hip joint pathology is usually described as a deep aching pain, aggravated by movement and felt in the groin and anteromedial aspect of the upper thigh, sometimes exclusively around the knee (see FIG. 55.1 in CHAPTER 55). A limp is a frequent association.

An obstetric history in a woman may be relevant for sacroiliac pain.

Key questions

- Can you tell me how the pain started?
- Could you describe the pain?
- Point to where the pain is exactly.
- Does the pain come on after walking for a while and stop as soon as you rest?
- Is there any stiffness, especially first thing in the morning?
- Do you have any difficulty climbing stairs?
- Do you get any backache?

- Do your movements feel free?
- Do you have a limp?
- Do you have a similar ache around the shoulders?
- Have you had an injury such as a fall?
- Have you lost any weight recently?
- Do you have night pain?
- Do you have trouble with shoes and socks?
- How far can you walk?
- Is it painful to lie on the affected side at night?
- Did you have a hip problem as a child?
- Does the pain respond to any treatments?

Examination

Follow the traditional methods of examination of any joint: *look, feel, move, measure, test function, look elsewhere* and *X-ray*. The patient should strip down to the underpants to allow maximum exposure.

Inspection

Ask the patient to point exactly to the area of greatest discomfort. Careful observation of the patient, especially walking, provides useful diagnostic information. Note any antalgic (painful) gait. If walking with a limp, the leg adducted and foot somewhat externally rotated, osteoarthritis of the hip joint is the likely diagnosis.

If called to a patient who has suffered an injury such as a fall or vehicle accident, note the position of the leg. If shortened and externally rotated (see FIG. 54.4A), a fractured neck of femur is the provisional diagnosis; if internally rotated, suspect a posterior dislocation of the hip (see FIG. 54.4B). With anterior dislocation of the hip, the hip is externally rotated.

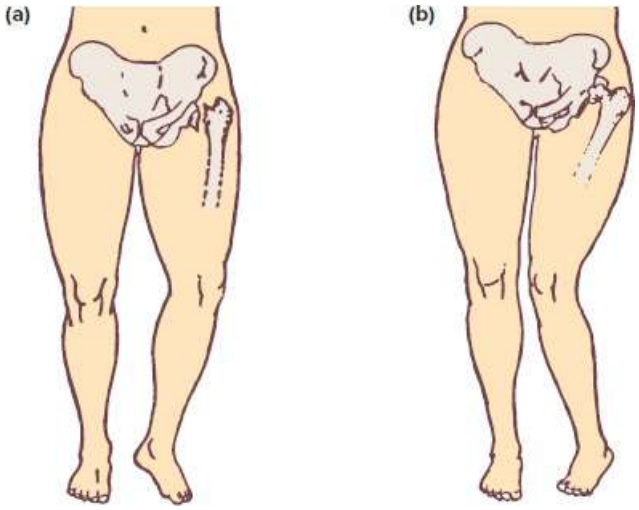

FIGURE 54.4 **(a)** General configuration of the legs for a fractured neck of femur, **(b)** general configuration for a posterior dislocated hip

Get the patient to lie supine on the couch with the anterior superior iliac spines (ASISs) of the pelvis placed squarely and note the shape and position of the limbs. Look for muscle wasting.

Palpation

Feel one to two finger breadths below the midpoint of the inguinal ligament for joint tenderness. Check for trochanteric bursitis, gluteus medius tendinitis and other soft tissue problems over the most lateral bony aspect of the upper thigh.

Movements

- Passive movements with *patient supine* (normal range is indicated):

  flexion with patient's knees flexed (compare both sides): 0–125°

  external rotation (knee and hip extended in adults): 0–45°

  internal rotation (knee and hip extended in adults): 0–45°

  abduction (stand on same side—steady pelvis): 0–45°

  adduction (should see the patella of the opposite leg): 0–30°

In children it is most important to measure rotation and abduction/adduction with the knee and hip flexed to detect early Perthes disease or SCFE.

- *Patient prone:*

  extension (one hand held over SIJ): 0–20°

Note: Osteoarthritis of the hip typically affects internal rotation (IR), extension and abduction first.

Measurements

- True leg length (ASIS to medial malleolus)
- Apparent leg length (umbilicus to medial malleolus)

Note:

- Unequal true leg length = hip disease on shorter side
- Unequal apparent leg length = tilting of pelvis

Feel the height of the greater trochanter relative to the ASIS to determine if shortening is in the hip or below.

Test function including gait and special tests

Gait:

- Antalgic gait—shortened stance phase of affected leg, as patient doesn't want to stand on it, indicates pain with weight-bearing
- Coxalgic gait—upper torso shifts towards painful side due to pain in the hip
- Trendelenburg gait (the gluteus medius lurch)—similar to coxalgic but pelvis tilts
- Trendelenburg test—tests hip abductors (gluteus medius): the non-weight-bearing hemipelvis drops if abnormal
- Thomas test—tests for fixed flexion deformity
- Squeeze test for osteitis pubis

Femoroacetabular impingement (FAI):[2,3]

- This is abnormal contact between the anterior femoral head and the acetabular rim. More common in sports men or women.
- Two deformities: CAM (lump from extra bone) and pincer
- Test—get the patient to hold the hip in 90° of flexion and maximal internal rotation. Then bring the leg into adduction (FADIR test). Reproduction of pain is a positive test and indicates intra-articular hip pathology such as labral tears and a cam or Ganz (bone outgrowth) lesion. The FABER test (see later in this chapter) also tests for this pathology. FAI causes anterior groin and trochanteric regional pain.

Look elsewhere

Examine the lumbosacral spine, SIJs, groin and knee. Consider hernias and possibility of PID. Feel pulses and test for femoral bruits.

Investigations

These can be selected from:

- serological tests: RA factor, FBE, ESR, C-reactive protein
- radiological:

  plain AP X-ray of pelvis showing both hip joints

  lateral X-ray (‘frog’ lateral best in children)

  X-ray of lumbosacral spine and SIJs

  CT scan: hip joint, pelvis, lumbosacral spine

  MRI scan: stress fracture, early avascular necrosis, early osteomyelitis, labral tears of hip joint, metastases, soft tissue tumours

  isotope bone scan; useful for whole body bony metastases
- needle aspiration of joint: if septic arthritis suspected

Role of ultrasound

Ultrasound diagnosis is now sensitive in children in detecting fluid in the hip joint, and can diagnose septic arthritis and also localise the site of an osteomyelitic abscess around a swollen joint. It can accurately assess the neonatal hip joint and confirm the position of the femoral head in children <6 months. Ultrasound is used less since increased availability of MRI.

Hip pain in children

Hip disorders have an important place in childhood and may present with a limp when the child is walking. These important disorders include:

- DDH
- congenital subluxation of hip and acetabular dysplasia
- transient synovitis

- Perthes disease
- septic arthritis/osteomyelitis
- SCFE
- pathological fractures through bone cyst

The important features of hip pain in children are summarised in TABLE 54.2 .

Table 54.2 Comparison of important causes of hip pain in children

	DDH	Transient synovitis	Perthes	SCFE	Septic arthritis
Age (years)	0–4	4–8	4–8	10–15	Any
Limp	+	+	+	+	Won't walk
Pain	-	+	+	+	+ + +
Limited movement	Abduction	All, especially abduction and IR	Abduction and IR	All, especially IR	All
Plain X-ray	No diagnostic value in neonatal period (use ultrasound) US up to 6 months then plain X-ray	Normal	Subchondral fracture Dense head Pebble stone epiphysis	AP may be normal Frog lateral view shows slip	Normal Use ultrasound

Developmental dysplasia of the hip

In DDH, previously known as congenital dislocation of the hip, the underdeveloped femoral head dislocates posteriorly and superiorly. DDH is described as transiently unstable or as a mild subluxation (1 in 80 hips at birth, which stabilises in a few days) and frankly dislocated (1 in 800 hips).[4] Risk factors include the '5 Fs': female, first born, family history, foot abnormalities, 'funny' delivery (breech or transverse), as well as oligohydramnios and caesarean section.

Clinical features

- Females:males = 6:1
- Asymmetry in 40%
- Bilateral in one-third
- Tight adductors and short leg evident
- Diagnosed early by Ortolani and Barlow tests (abnormal thud or clunk on abduction); test usually negative after 2 months

- Ultrasound excellent (especially up to 6 months) and more sensitive than clinical examination
- X-ray difficult to interpret up to 3 months, then helpful

Note:

1. When diagnosed and treated from birth it is possible to produce a normal joint after a few months in an abduction splint.
2. Every baby should be examined for DDH during the first day of life then regularly and before discharge from hospital and at the 6-week check.[4] The Ortolani and Barlow tests remain important means of detecting an unstable or dislocated hip, but ultrasound is becoming more important and is recommended for high-risk babies (e.g. breech, family history of DDH).

Screening examination

Carry out the examination on a large firm bench with the baby stripped. Relaxation is essential; give the baby a bottle if necessary. Be gentle and have warm hands.

With the legs extended, any asymmetry of the legs, especially any shortening, or skin creases is noted.

Ortolani test (IN test: gentle clunk into acetabulum)

- Hold the leg in the hand with knee flexed—thumb over groin (lesser trochanter) and middle finger over greater trochanter (see FIG. 54.5). Steady the pelvis with the other hand.
- Flex hips to about 90°, gently abduct to 45° (note any clunk [felt more than heard] or jerk as hip reduces).

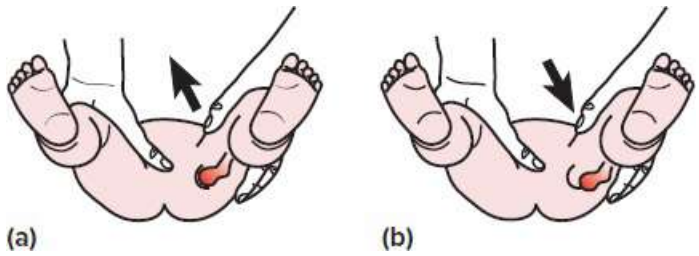

FIGURE 54.5 Screening for developmental dysplasia of the hip (left side): **(a)** Ortolani sign, **(b)** Barlow sign

Barlow test (OUT test: gentle clunk out of acetabulum)

- As one hand stabilises the pelvis, grasp the knee of the relevant leg, then flex the hip to 90°, abduct 10–20°.
- With gentle but firm backward pressure, rock the femur backwards and forwards on the pelvis by pressing forward with the middle finger and backwards with the thumb. Note any jerk or clunk as hip 'goes out' of the acetabulum. If the femoral head displaces, there is dislocation.

Plain X-ray has little or no place in the diagnosis of DDH in the neonatal period.[5] Ultrasound imaging is recommended. Early referral for treatment is essential. If not detected early the femoral head stays out of the acetabulum and after the age of 1 year the child may present with delay in walking or a limp. The diagnosis is then detected by X-ray.

Treatment (guidelines)

- DDH must be referred to a specialist[4]
- 0–6 months—Pavlik harness or abduction splint
- 3–18 months—reduction (closed or open) and cast (pelvic spica)
- >18 months—open reduction and possible osteotomy

  Slings are not recommended.

Note: Despite early treatment some cases progress to acetabular dysplasia (underdevelopment of the 'roof' of the hip joint) and to premature osteoarthritis. Thus a follow-up X-ray of the pelvis during teenage years should be considered for anyone with a history of DDH.

Perthes disease

Perthes disease results in the femoral head becoming partly or totally avascular (i.e. avascular necrosis).

Clinical features

- Males:females = 4:1
- Usual age 4–8 years; range 2–12 years (rarely 13–18 years)
- Sometimes bilateral
- Presents as a limp (antalgic or Trendelenburg gait) and aching (hip or groin pain)
- May be knee pain
- ‘Irritable’ hip early
- Limited movement in abduction and IR

X-ray. Joint space appears increased and femoral head too lateral: typical changes of sclerosis, deformity and collapse of the femoral capital epiphysis may be delayed.

Management

- Refer urgently (provide crutches)
- Aim is to keep femoral head from becoming flat
- Choice of treatment depends on severity of the condition and age of the patient—physiotherapy important

If untreated, the femoral head usually becomes flat over some months, leading to eventual osteoarthritis. Some untreated cases of Perthes disease heal and have a normal X-ray. Surgery, if needed, is osteotomy.

Transient synovitis

This common condition is also known as ‘irritable hip’ or observation hip and is the consequence of a self-limiting synovial inflammation.

Clinical features

- Child aged 3–8 years (usually 6 years)
- Sudden onset of hip pain and a limp
- Child can usually walk but with pain (some may not)
- May be history of trauma or recent URTI or viral illness
- Painful limitation of movements, especially abduction and rotation

- Blood tests and X-rays normal (may be soft tissue swelling); ESR may be mildly elevated
- Ultrasound shows fluid in the joint

Differential diagnosis. This includes septic arthritis, JCA, Perthes disease.

Outcome. It settles to normal within 7 days, without sequelae.

Treatment. Refer early. Treatment is bed rest or the use of crutches and analgesics. Follow-up X-ray is needed in 4 to 6 months to exclude Perthes disease. Aspiration under general anaesthetic may be needed to exclude septic arthritis.

Slipped capital femoral epiphysis

One problem of the displaced capital epiphysis of the femoral head (SCFE) is when some patients develop avascular necrosis despite expert treatment. Diagnosis of the condition before major slipping is important. This necessitates early consultation with the teenager experiencing hip or knee discomfort and then accurate interpretation of X-rays.

Clinical features

- Adolescent 10–15 years, often obese
- Most common in the ‘oversized and undersexed’ (e.g. the heavy prepubertal boy)
- Bilateral in 20%
- Limp and irritability of hip on movement
- Anterior hip (groin) pain
- Knee pain
- Hip rotating into external rotation on flexion and often lies in external rotation (ER)
- Most movements restricted, especially IR

Any adolescent with a limp or knee pain should have X-rays (AP and frog view) of both hips (see FIG. 54.6). Otherwise, this important condition will be overlooked. SCFE is graded I to IV. The femoral head is located posterior-inferior.

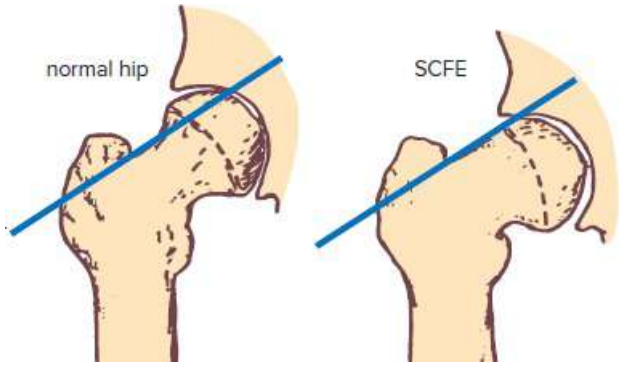

FIGURE 54.6 Appearance of a slipped capital femoral epiphysis; note that, in the normal state, a line drawn along the superior surface of the femoral neck passes through the femoral head, but passes above it with SCFE

Management

- Cease weight-bearing and refer urgently to an orthopaedic surgeon. Also refer if the clinical signs indicate SCFE but the X-rays look normal.
- If acute slip, gentle reduction via traction is better than manipulation in preventing later avascular necrosis.
- Once reduced, pinning is performed.

Septic arthritis

Septic arthritis of the hip should be suspected in all children with acutely painful or irritable hip problems. These patients may not be obviously sick on presentation, particularly in infants <2 years. A negative needle aspiration does not exclude septic arthritis. If sepsis is suspected it is better to proceed to an arthrotomy if clinically indicated.

The irritable hip syndrome should be diagnosed only after negative investigations, including plain films and ultrasound, full blood examination, ESR and bone scan. Needle aspiration has to be considered but irritable hip is often diagnosed without it, by observing in hospital in traction. If a deterioration or elevated temperature develops, needle aspiration with or without arthrotomy is indicated.

After micro and culture, treat with IV antibiotics.

Osteomyelitis

The proximal femur is the most common site in children. It can be difficult to distinguish from septic arthritis. A bone scan is useful but MRI is the most sensitive imaging. Refer to CHAPTER 58 for treatment.

Avulsion bony injuries

Forceful contraction of muscles originating around the pelvis can lead to avulsion at their origin in those with skeletal immaturity. This causes acute pain and muscular dysfunction:

- anterior superior iliac spine (sartorius)
- anterior inferior iliac spine (long head rectus femoris)
- ischial tuberosity (hamstrings)
- lesser trochanter (psoas)

Management includes X-ray and referral. As a rule, surgical reattachment is not required.

The little athlete[6]

The most common problem in the younger athlete is pain or discomfort in the region of the iliac crest or anterior or superior iliac spines, usually associated with traction apophysitis or with acute avulsion fractures.[7] There is localised tenderness with pain on stretching and athletes should rest until they can compete without discomfort.

If there are persistent signs, pain in the knee, hip irritability or restricted range of motion, X-rays should be ordered to exclude serious problems such as SCFE or Perthes disease.

Hip and buttock pain in adults

The following conditions are highly significant in the elderly:

- osteoarthritis of the hip
- aortoiliac arterial occlusion → vascular claudication
- spinal dysfunction with nerve root or referred pain
- degenerative spondylosis of lumbosacral spine → neurogenic claudication
- polymyalgia rheumatica
- trochanteric bursitis
- fractured neck of femur
- secondary tumours

Subcapital fractures

The impacted subcapital fractured femoral neck can often permit weight-bearing by an elderly patient. No obvious deformity of the leg is present. Radiographs are therefore essential for the investigation of all painful hips in the elderly. Patients often give a story of two falls—the first[5] very painful, the second with the hip just 'giving way' as the femoral head fell off.

The displaced subcapital fracture has at least a 40% incidence of avascular necrosis and usually requires prosthetic replacement in patients over 70 years. MRI scan is the investigation of choice if the X-rays are normal. Intertrochanteric fractures are also common (see CHAPTER 124).

Avascular necrosis

The age of onset is usually 20–50 (average 38 years). Consider this with hip pain and deep groin pain especially with IR in those at risk: corticosteroid use, SLE, sickle-cell disease, past hip fracture or dislocation, pregnancy, alcoholic liver disease. Investigate with imaging (as above) and refer.

Osteoarthritis of the hip

Osteoarthritis of the hip is the most common form of hip disorder. It can be caused by primary osteoarthritis, which is related to an intrinsic disorder of articular cartilage, or to secondary osteoarthritis. Predisposing factors to the latter include previous trauma, DDH, septic arthritis, acetabular dysplasia, SCFE and past inflammatory arthritis.

Clinical features

- Equal sex incidence
- Usually after 50 years, increases with age
- May be bilateral: starts in one, other follows
- Insidious onset
- At first, pain worse with activity, relieved by rest, and then nocturnal pain and pain after resting
- Stiffness, especially after rising
- Characteristic deformity
- Stiffness, deformity and limp may dominate (pain mild)
- Pain usually in groin—may be referred to medial aspect of thigh, buttock or knee

Examination

- Antalgic gait
- Usually gluteal and quadriceps wasting
- First hip movements lost are IR and extension
- Fixed flexion deformity
- Hip held in flexion and ER (at first)
- Eventually all movements affected
- Order of movement loss is IR, extension, abduction, adduction, flexion, ER

Treatment

- Careful explanation: patients fear osteoarthritis of hip
- Weight loss if overweight
- Relative rest
- Use crutches for acute pain

- Analgesics and NSAIDs (judicious use)
- Aids and supports (e.g. walking stick)
- Physiotherapy
- Physical therapy, including isometric exercises
- Hydrotherapy—very useful

Surgery

This is an excellent option for those with severe pain or disability unresponsive to conservative measures. Total hip replacement is the treatment of choice in older people but a femoral osteotomy may be considered in younger people in selected cases. In selected patients in their 30s and 40s with severe disease, total hip replacement is being performed successfully. A type of total hip replacement called hip resurfacing is becoming more popular in certain situations in patients under 60 years of age; >90% achieve a good result. Most replacements last 15–20 years.

Groin pain

All conditions involving the hip joint, especially osteoarthritis, can present with groin pain.

Consider an unrecognised fracture in neck of femur, psoas abscess, Paget disease, osteitis pubis and hernias. Also consider hip labral or chondral lesions. Hip labral injuries present with inguinal pain or upper anterior thigh pain, and require investigation and referral.

Acute groin pain

Acute groin problems include muscular and musculotendinous strains, as well as common overuse sporting injuries such as tendinopathy and tendoperiostitis. These need to be differentiated from referred pain from the lumbosacral spine, hip and pelvis problems such as hip labral injuries. More common acute groin injuries include injuries to the following muscles and their tendons: adductor longus (e.g. musculotendinous strains causing inner thigh pain), rectus femoris, sartorius and iliopsoas. The relatively common adductor muscle or tendon injury results in upper thigh pain, local tenderness and resisted hip adduction. Ultrasound or MRI confirms the diagnosis. Treatment is based on physiotherapy, exercises and possibly a corticosteroid injection.

Chronic groin pain

There are many causes of chronic groin pain, the commonest being bone and joint abnormalities. Important causes involve muscle and musculotendinous lesions, including adductor longus tendoperiostitis, osteitis pubis (pubic symphysis), iliopsoas bursitis, stress fractures (e.g. femoral neck and pubic rami), ‘occult’ inguinal or femoral hernias and referred pain from musculoskeletal disorders of the lumbosacral spine and hip. Local pinpoint tenderness over the symphysis is a feature of osteitis pubis.

Investigations include X-ray of the pelvis, tomography of the pubic symphysis (to detect osteitis pubis and pubic instability), bone scan to detect stress fractures or osteitis pubis, herniography and imaging such as CT scan, MRI (the most sensitive) or ultrasound.

Hip labral tears and FAI[8,9,10]

Acetabular labral tears are becoming better recognised in motor accident victims, dancers and athletes, especially with the use of MRI and hip arthroscopy. Patients may complain initially of mild to moderate anterior groin and trochanteric regional pain. Then of sharp impingement pain in the hip and/or groin and of painful clicking, catching or locking. The impingement test should be performed (see earlier in chapter). X-rays will exclude bony hip pathology while MRI is the radiological investigation of choice. Initial treatment is with analgesics and exercise modified physiotherapy. According to Paoloni, examination after hip joint anaesthetic injection is the gold standard for diagnosing hip pathology.[10] Refer for possible surgical treatment through hip arthroscopy. However, there are no proven effective treatments for FAI and hip labral tears, so any interventions should be approached cautiously.[3]

Sacroiliac pain

Pain arising from SIJ disorders is normally experienced as a dull ache in the buttock but can be referred to the groin or posterior aspect of the thigh. It may mimic pain from the lumbosacral spine or the hip joint. The pain may be unilateral or bilateral. It is worse in loading situations,

e.g. walking, running, getting in and out of cars.

There are no accompanying neurological symptoms such as paraesthesia or numbness but it is common for more severe cases to cause a heavy aching feeling in the upper thigh.

Causes of SIJ disorders

- Inflammatory (the spondyloarthropathies)
- Infections (e.g. TB, *Staphylococcus aureus*—rare)
- Osteitis condensans ilii
- Degenerative changes
- Mechanical disorders
- Post-traumatic, after sacroiliac disruption or fracture
- Childbirth—in postnatal period

Examination

The SIJs are difficult to palpate and examine but there are several tests that provoke them.

Direct pressure. With the patient lying prone a rhythmic springing force is applied directly to the upper and lower sacrum respectively.

Winged compression test. With the patient lying supine and with arms crossed, ‘separate’ the iliac crests with a downwards and outwards pressure. This compresses the SIJs.

Lateral compression test. With hands placed on the iliac crests, thumbs on the ASISs and heels of hand on the rim of the pelvis, compress the pelvis medially. This distracts the SIJs.

Patrick or FABER test. The flexion, abduction, external rotation (FABER) method can provoke the hip as well as the SIJ. The patient lies supine on the table and the foot of the involved side and extremity is placed on the opposite knee (the hip joint is now flexed, abducted and externally rotated). The knee and opposite ASIS are pressed downwards simultaneously (see FIG. 54.7). If low back or buttock pain is reproduced the cause is likely to be a disorder of the SIJ.

FIGURE 54.7 The Patrick (FABER) test for right-sided hip or sacroiliac joint lesion, illustrating directions of pressure from the examiner

Unequal sacral 'rise' test. Squat behind the standing patient and place hands on top of the iliac crests and thumbs on the posterior superior iliac spines (PSIS). Ask the patient to bend slowly forwards and touch the floor. If one side moves higher relative to the other a problem may exist in the SIJs (e.g. a hypomobile lesion in the painful side if that side's PSIS moves higher).

Mechanical disorders of the SIJ

These problems are more common than appreciated and can be caused by hypomobile or hypermobile problems.

Hypomobile SIJ disorders are usually encountered in young people after some traumatic event, especially women following childbirth (notably multiple or difficult childbirth), or after a heavy fall onto the buttocks, as well as in those with structural problems (e.g. shortened leg). Pain tends to follow rotational stresses of the SIJ (e.g. tennis, dancing). Excellent results are obtained by passive mobilisation or manipulation, such as the non-specific rotation technique with the patient lying supine.[12]

Hypermobile SIJ disorders are sometimes seen in athletes with instability of the symphysis pubis, in women after childbirth and in those with a history of severe trauma to the pelvis (e.g. MVAs, horse riders with foot caught in the stirrups after a fall). The patient presents typically with severe aching pain in the lower back, buttocks or upper thigh. Such problems are difficult to treat and manual therapy usually exacerbates the symptoms. Treatment consists of relative rest, analgesics and a sacroiliac supportive belt.

Greater trochanteric pain syndrome[11]

Pain around the lateral aspect of the hip is a common disorder, and is usually seen as lateral hip pain radiating down the lateral aspect of the thigh in older people engaged in walking exercises, tennis and similar activities. It is analogous in a way to the shoulder girdle, where supraspinatus tendinitis and subacromial bursitis are common wear-and-tear injuries.

The cause is tendinopathy of the gluteus medius and/or minimus tendon (considered to be the main pathology), where it inserts into the lateral surface of the greater trochanter of the femur and/or gluteus minimus tendon with or without inflammation of the trochanteric bursa. Weakness of these abductor muscles has been demonstrated. The degenerative tendon may tear, rupture or become detached. The pain of this condition tends to occur at night, especially after activity such as long walks and gardening. X-rays are usually normal but ultrasound may demonstrate the pathology, while MRI can show the greatest detail.

Clinical features

- Older person especially female >45–50 years
- Pain on outside hip referred to as far as foot
- Pain on lying on hip at night
- Pain climbing stairs, getting in and out of car
- Limp
- Localised tenderness on outer border of thigh

Treatment[12]

A trial of NSAIDs (weigh the risks) is worthwhile and physiotherapy involving hip-strengthening exercises is first-line treatment. Injection therapy, including under ultrasound guidance, is also very effective and facilitates exercises. However, it is usually a self-limiting condition in the majority of patients.

Method of injection without ultrasound

- Determine the points of maximal tenderness over the trochanteric region and mark them. (For tendinopathy, this point is immediately over or above the superior aspect of the greater trochanter—see FIG. 54.8).
- Inject aliquots of a mixture of 1 mL of long-acting corticosteroid with 4–5 mL of local anaesthetic into the tender area, which usually occupies an area similar to that of a standard marble. The needle may be ‘fanned’ by repeatedly almost withdrawing then re-angling.

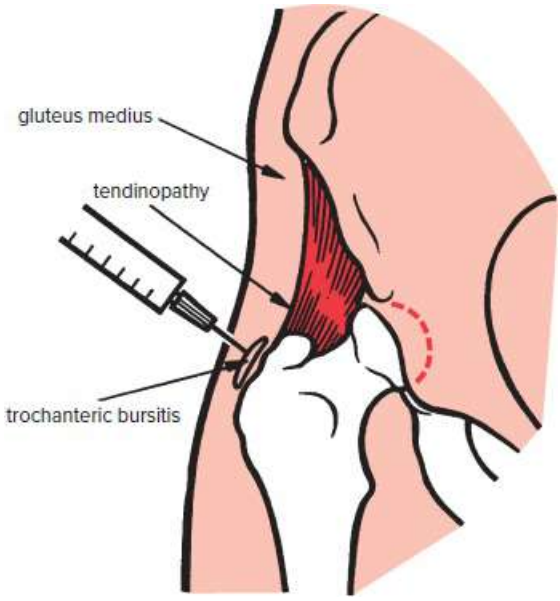

FIGURE 54.8 Injection technique for gluteus medius tendinopathy (into area of maximal tenderness)

The injection may be very effective for a variable time. Follow-up management includes sleeping with a small pillow under the involved buttock, sleeping on a sheepskin rug, and stretching the gluteal muscles with knee–chest exercises, which are the key to relief.[12] Advise the patient to walk with the feet turned out—'the Charlie Chaplin gait'. One or two repeat injections over 6 or 12 months may be required. Surgical intervention such as iliotibial band release ± bursectomy may be necessary. Local application of ice and massage therapy may provide relief. Massaging the site with fingers, a soft drink bottle or a tennis ball (while lying on the side) may also be effective.

Fascia lata syndrome

Pain in the lateral thigh can be caused by inflammation of the fascia lata. It is often due to overuse or weak musculature around the hip. Treatment is relative rest and physiotherapy.

Ischial bursitis

Tailor's bottom or 'weaver's bottom', which is occasionally seen, is a bursa overlying the ischial tuberosity. Irritation of the sciatic nerve may coexist and the patient may appear to have sciatica.

Clinical features

- Severe pain when sitting, especially on a hard chair
- Tenderness at or just above the ischial tuberosity

Treatment

- Infiltration into the tender spot of a mixture of 4 mL of 1% lignocaine and 1 mL of LA corticosteroid (avoid the sciatic nerve)
- Foam rubber cushion with two holes cut out for the ischial prominences

Snapping or clicking hip (coxa saltans)[13]

Some patients complain of a clunking, clicking or snapping hip, either palpable and/or audible. This represents an annoying problem that may cause pain in the groin or thigh. It is more common in females with a wide pelvis.

Causes

- A taut iliotibial band (tendon or tensor fascia femoris) slipping backwards and forwards over the prominence of the greater trochanter (most common) *or*
- The iliopsoas tendon snapping across the iliopectineal eminence at the anterior brim of the pelvis
- The gluteus maximus sliding across the greater trochanter
- Joint laxity
- FAI and/or hip labral tears

Treatment

The basics of treatment are:

- explanation and reassurance
- exercises to stretch the iliotibial band[13]

Occasionally surgery is necessary to lengthen the iliotibial band.

Exercises

- The patient lies on the ‘normal’ side and flexes the affected hip, with the leg straight and a weight around the ankle (see FIG. 54.9), to a degree that produces a stretching sensation along the lateral aspect of the thigh. Suitable for taut iliotibial band.

- This iliotibial stretch should be performed for 1–2 minutes, twice daily.

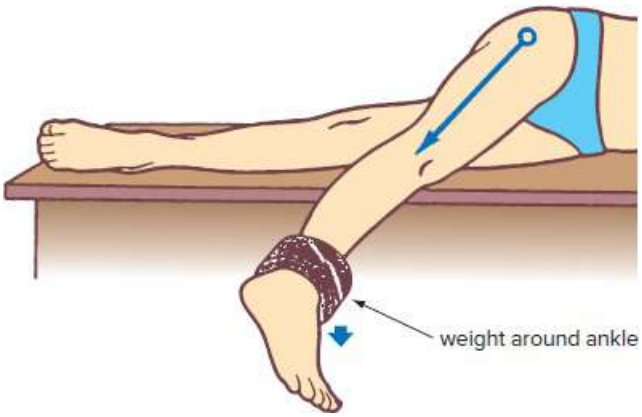

FIGURE 54.9 One treatment for the clicking hip

Piriformis tendinopathy

This syndrome is caused by pressure on the sciatic nerve due to its aberrant course through the piriformis muscle. Symptoms include the gradual onset of deep-seated buttock pain, pain on and just after sitting, difficulty climbing stairs and sciatica-like symptoms centred on the buttocks. There is buttock point tenderness and pain on resisted rotation of the hip. Treatment is based on isometric stretching exercises under physiotherapist supervision.

When to refer

- Clinical evidence or suspicion of severe childhood disorders: DDH, Perthes disease, septic arthritis, SCFE or osteomyelitis
- Undiagnosed pain, especially night pain
- Any fractures or suspicion of fractures such as impacted subcapital fracture or stress fracture of the femoral neck
- True claudication in the buttock, whether it is vascular from aortoiliac occlusion or neurogenic from spinal canal stenosis
- Disabling osteoarthritis of the hip not responding to conservative measures; excellent results are obtained from surgery to the hip
- Any mass or lump

Practice tips

- Training on a plastic DDH model may help practitioners master the manoeuvres for examining the neonatal hip.

- True hip pain is usually felt in the groin, medial thigh and medial aspect of the knee.
- The name of the FABER test is an acronym for **F**lexion, **Ab**duction, **E**xternal **R**otation of the hip.
- Night pain adds up to inflammation, bursitis or tumour.
- The hip joint can be the target of infections such as *Staphylococcus aureus*, tuberculosis or inflammatory disorders such as rheumatoid and the spondyloarthropathies, but these are rare numerically compared with osteoarthritis.
- Psoas-related pain is an important differential diagnosis of anterior hip pain.

Patient education resources

Hand-out sheets from *Murtagh's Patient Education* 8th edition:

- Bursitis and tendinitis of outer hip
- Hip: osteoarthritis

Resources

Healthy Hips Australia: www.healthyhipsaustralia.org.au/.

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55 Pain in the leg

Thou cold sciatica
Cripple our senators, that their limbs may halt
As lamely as their manners.

WILLIAM SHAKESPEARE (1564–1616), *TIMON OF ATHENS*

Pain in the leg has many causes, varying from a simple cramp to an arterial occlusion. Overuse of the legs in the athlete can lead to a multiplicity of painful leg syndromes, ranging from simple sprains of soft tissue to compartment syndromes. A major cause of leg pain lies in the source of the nervous network to the lower limb, namely the lumbar and sacral nerve roots of the spine. It is important to recognise radicular pain, especially from L5 and S1 nerve roots, and also the patterns of referred pain, such as from apophyseal (facet) joints and sacroiliac joints (SIJs).

Key facts and checkpoints

- Always consider the lumbosacral spine, the SIJs and hip joints as important causes of leg pain.
- Hip joint disorders may refer pain around the knee only (without hip pain).
- Nerve root lesions may cause pain in the lower leg and foot only (without back pain).
- Nerve entrapment is suggested by a radiating burning pain, prominent at night and worse at rest.
- Older people may present with claudication in the leg from spinal canal stenosis or arterial obstruction or both.
- Acute arterial occlusion to the lower limb requires relief within 4 hours (absolute limit of 6 hours).
- The commonest site of acute occlusion is the common femoral artery.
- Varicose veins can cause aching pain in the leg.

A diagnostic approach

A summary of the diagnostic strategy model is presented in TABLE 55.1 .

Table 55.1 Pain in the leg: diagnostic strategy model

Probability diagnosis

Muscle cramps

Nerve root ‘sciatica’

Osteoarthritis (hip, knee)

Exercise-related pain (e.g. Achilles tendinitis), muscular injury (e.g. hamstring, gastrocnemius, soleus)

Serious disorders not to be missed

Vascular:

- peripheral vascular disease
- arterial occlusion (embolism)
- thrombosis popliteal aneurysm
- deep venous thrombosis
- iliofemoral thrombophlebitis

Neoplasia:

- primary (e.g. myeloma)
- metastases (e.g. breast to femur)

Infection:

- osteomyelitis
- septic arthritis
- erysipelas
- lymphangitis
- gas gangrene

Pitfalls (often missed)

Osteoarthritis hip

Osgood–Schlatter disorder

Spinal canal stenosis → neurogenic claudication

Herpes zoster (early)

Greater trochanteric pain syndrome

Nerve entrapment, e.g. meralgia paraesthetica

‘Hip pocket nerve’: from wallet pressure
Iatrogenic: injection into nerve
Sacroiliac disorders
Sympathetic dystrophy (causalgia)
Peripheral neuropathy
Rarities:

- osteoid osteoma
- polymyalgia rheumatica (isolated)
- Paget disease
- popliteal artery entrapment
- tabes dorsalis
- ruptured Baker cyst

Seven masquerades checklist
Depression
Diabetes
Drugs (indirect)
Anaemia (indirect)
Spinal dysfunction

Is the patient trying to tell me something?
Quite possible. Common with work-related injuries.

Probability diagnosis

Many of the causes, such as foot problems, ankle injuries and muscle tears (e.g. hamstrings and quadriceps), are obvious and common. There is a wide range of disorders related to overuse syndromes in athletes.

A very common cause of acute severe leg pain is cramp in the calf musculature, the benign nature of which escapes some patients as judged by middle-of-the-night calls.

One of the commonest causes is nerve root pain, invariably single, especially affecting the L5 and S1 nerve roots. Tests of their function and of the lumbosacral spine for evidence of disc disruption or other spinal dysfunction will be necessary. Should multiple nerve roots be involved, other causes, such as compression from a tumour, should be considered. Remember that a spontaneous retroperitoneal haemorrhage in a patient on anticoagulant therapy can cause nerve root pain and present as intense acute leg pain. The nerve root sensory distribution is presented in FIGURE 55.1 .

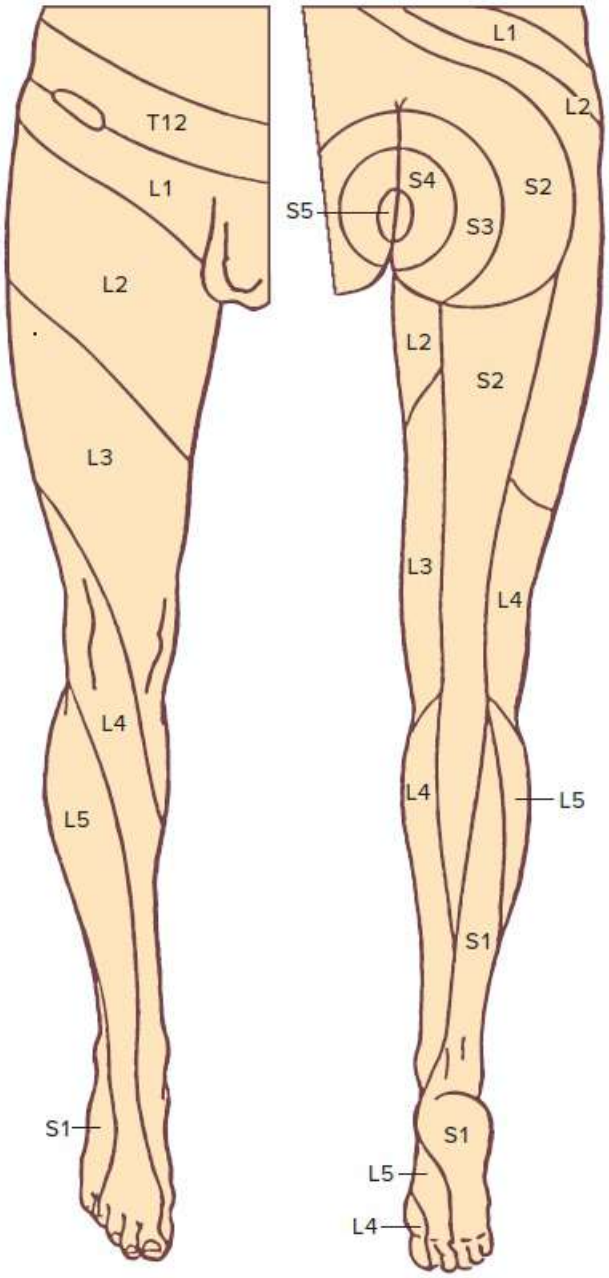


FIGURE 55.1 Dermatomes of the lower limb, representing approximate cutaneous distribution of the nerve roots

Other important causes of referred thigh pain include ischiogluteal bursitis (weaver's bottom) and gluteus medius tendinitis or trochanteric bursitis.

Serious disorders not to be missed

Neoplasia

Malignant disease, although uncommon, should be considered, especially if the patient has a history of one of the primary tumours, such as breast, lung or kidney. Such tumours can metastasise to the femur. Consider also osteogenic sarcoma and multiple myeloma, which are usually seen in the upper half of the femur. The possibility of an osteoid osteoma should be considered with pain in a bone relieved by aspirin.

Infections

Severe infections are not so common, but septic arthritis and osteomyelitis warrant consideration. Superficial infections such as erysipelas and lymphangitis occur occasionally.

Vascular problems

Acute severe ischaemia can be due to thrombosis or embolism of the arteries of the lower limb. Such occlusions cause severe pain in the limb and associated signs of severe ischaemia, especially of the lower leg and foot.

Chronic ischaemia due to arterial occlusion can manifest as intermittent claudication or rest pain in the foot due to small vessel disease.[1]

Various pain syndromes are presented in FIGURE 55.2 . It is important to differentiate vascular claudication from neurogenic claudication (see TABLE 55.2).

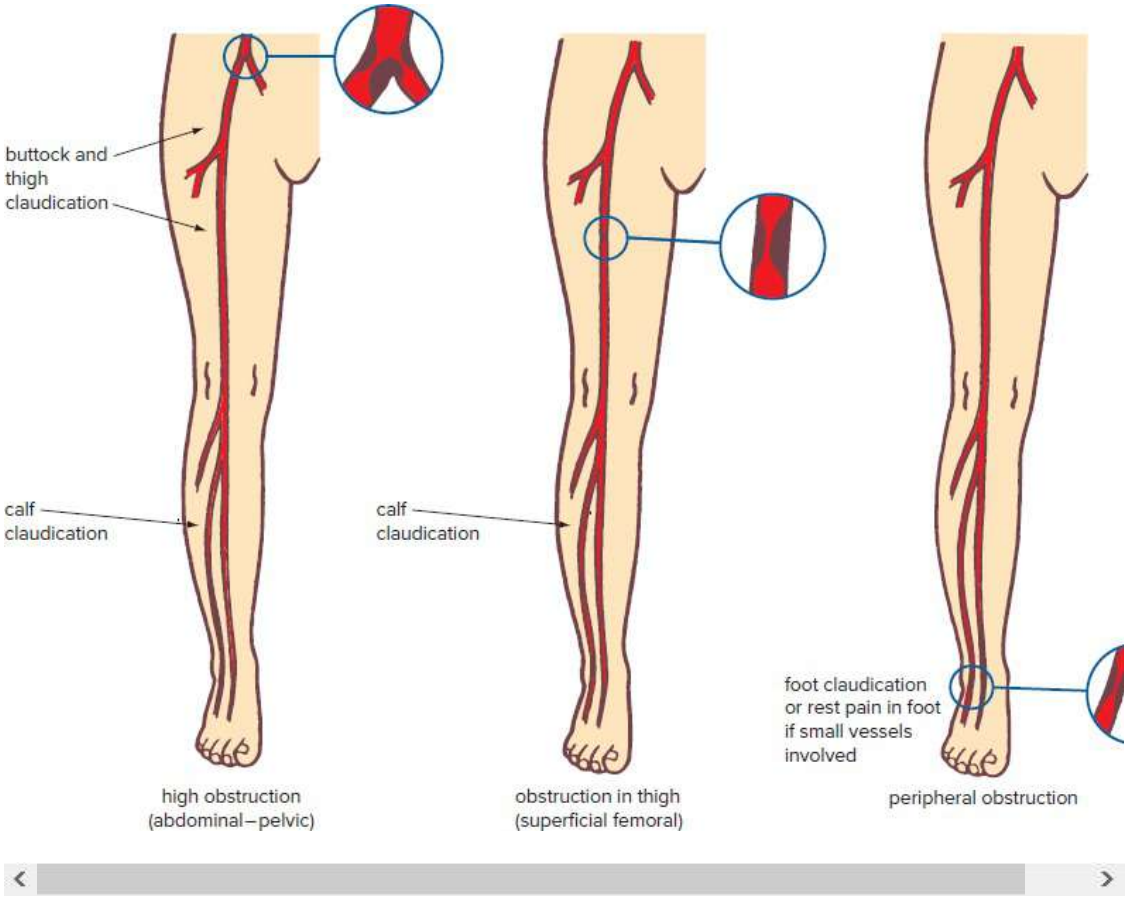


FIGURE 55.2 Arterial occlusion and related symptoms according to the level of obstruction

Table 55.2 Comparison of the clinical features of neurogenic and vascular claudication

	Neurogenic claudication	Vascular claudication
Cause	Spinal canal stenosis	Aortoiliac arterial occlusive disease
Age	Over 50 Long history of backache	Over 50
Pain site and radiation	Proximal location, initially lumbar, buttocks and legs Radiates distally	Distal location Buttocks, thighs and calves (especially) Radiates proximally
Type of pain	Weakness, burning, numbing or tingling (not cramping)	Cramping, aching, squeezing
Onset	Walking (uphill and downhill) Distance walked varies Prolonged standing	Walking a set distance each time, especially uphill
Relief	Lying down Flexing spine (e.g. squat position) May take 20–30 minutes	Standing still—fast relief Slow walking decreases severity
Associations	Bowel and bladder symptoms	Impotence Rarely, paraesthesia or weakness
Physical examination		
Peripheral pulses	Present	Present (usually)
Lumbar extension	Aggravates	Reduced or absent in some, especially after exercise No change
Neurological	Saddle distribution Ankle jerk may be reduced after exercise	*Note:* abdominal bruits after exercise

Diagnosis confirmation	Radiological studies EMG	Duplex ultrasound Ankle brachial index Arteriography

Venous disorders

The role of uncomplicated varicose veins as a cause of leg pain is controversial. Nevertheless, varicose veins can certainly cause a dull aching ‘heaviness’ and cramping, and can lead to painful ulceration.

Superficial thrombophlebitis is usually obvious, but it is vital not to overlook deep venous thrombosis. These more serious conditions of the veins can cause pain in the thigh or calf.

Pitfalls

There are many traps and pitfalls in the painful leg. Herpes zoster at the pre-eruption phase is an old trap and more so when the patient develops only a few vesicles in obscure parts of the limbs.

As the population ages we can expect to encounter more cases of spinal canal stenosis, secondary to the degenerative changes. The early diagnosis can be difficult, and buttock pain on walking has to be distinguished from vascular claudication due to a high arterial obstruction.

The many disorders of the SIJ and hip region can be traps, especially the poorly diagnosed yet common gluteus medius tendinitis. Another more recent phenomenon is the ‘hip pocket nerve syndrome’, where a heavy wallet crammed with credit cards can cause pressure on the sciatic nerve.

One of the biggest traps, however, is when hip disorders, particularly osteoarthritis, present as leg pain, especially on the medial aspect of the knee.

Nerve entrapments (see FIG. 55.3) are an interesting cause of leg pain, although not as common as in the upper limb. Some entrapments to consider include:

- lateral cutaneous nerve of thigh, known as meralgia paraesthetica
- common peroneal nerve
- posterior tibial nerve at ankle (the ‘tarsal tunnel’ syndrome)
- obturator nerve, in obturator canal
- femoral nerve (in inguinal region or pelvis)

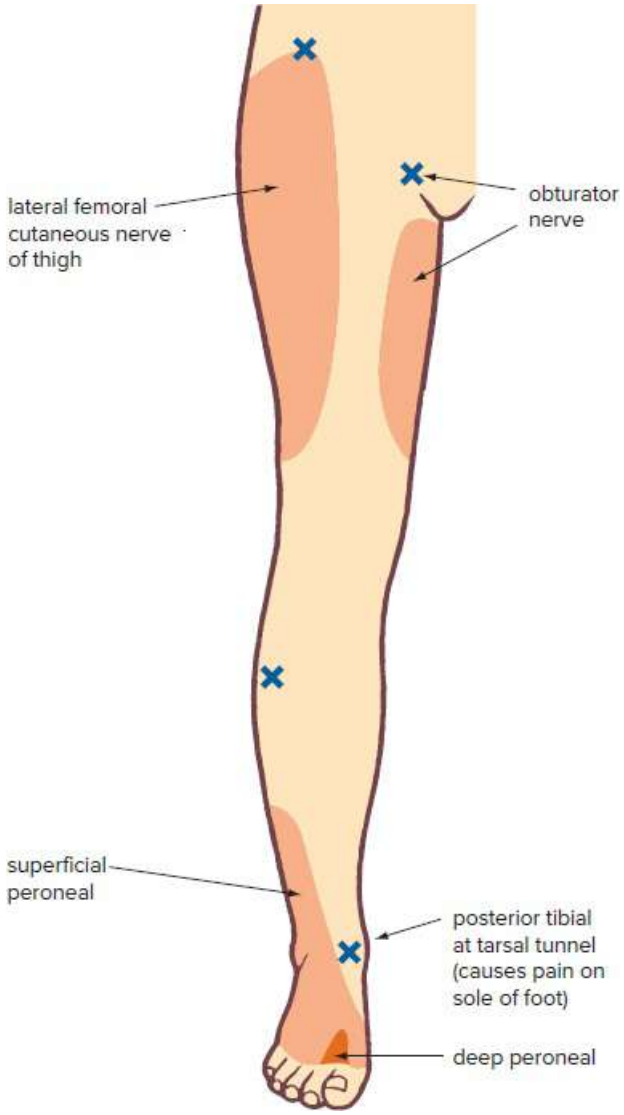


FIGURE 55.3 Distribution of pain in the leg from entrapment of specific nerves; the sites of entrapments are indicated by an X

Then there are the rare causes. One overlooked problem is complex regional pain syndrome I (sympathetic dystrophy), which may follow even minor trauma to the limb. This 'causalgia' syndrome manifests as burning or aching pain with vasomotor instability in the limbs. The essential feature is the disparity between the intensity of the pain and the severity of the inciting injury.

General pitfalls

- Overlooking beta blockers and anaemia as a precipitating factor for vascular claudication
- Overlooking hip disorders as a cause of knee pain

- Mistaking occlusive arterial disease for sciatica
- Confusing nerve root syndromes with entrapment syndromes

Seven masquerades checklist

The outstanding cause of leg pain in this group is spinal dysfunction. Apart from nerve root pressure due to a disc disruption or meralgia paraesthetica, pain can be referred from the apophyseal (facet) joints. Such pain can be referred as far as the mid-calf (see FIG. 55.4).

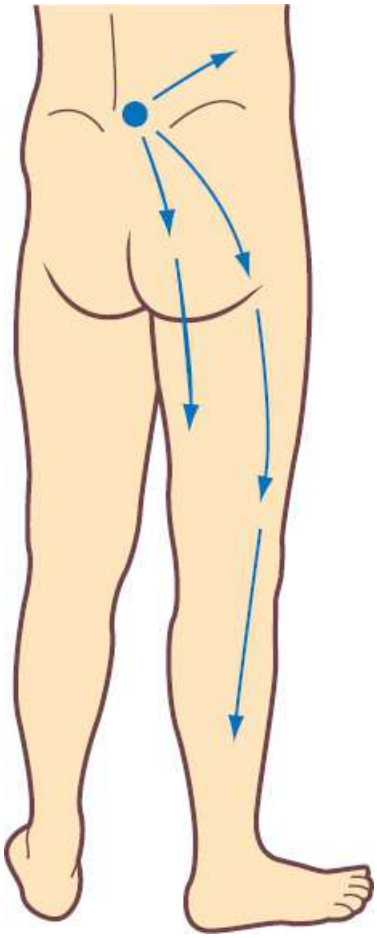


FIGURE 55.4 Possible referred pain patterns from dysfunction of an apophyseal joint, illustrating pain radiation patterns from stimulation by injection of the right L4–5 apophyseal joint

Source: Reproduced with permission from C Kenna and J Murtagh. *Back Pain and Spinal Manipulation.* Sydney: Butterworths, 1989

The other checklist conditions—depression, diabetes, drugs and anaemia—can be associated with pain in the leg. Depression can reinforce any painful complex.

Diabetes can cause discomfort through a peripheral neuropathy that can initially cause localised

pain before anaesthesia predominates. Drugs such as beta blockers, and anaemia, can precipitate or aggravate intermittent claudication in a patient with a compromised circulation.

Psychogenic considerations

Pain in the lower leg can be a frequent complaint (maybe a magnified one) of the patient with non-organic pain, whether depressed, malingering or having a conversion reaction. Sometimes regional pain syndrome (reflex or post-traumatic) is incorrectly diagnosed as functional.

The clinical approach

Careful attention to basic detail in the history and examination can point the way of the clinical diagnosis.

History

In the history it is important to consider several distinctive aspects, outlined by the following questions.

- Is the pain of acute or chronic onset?
- If acute, did it follow trauma or activity?

  If not, consider a vascular cause: vein or artery; occlusion or rupture.

- Is the pain ‘mechanical’ (related to movement)?

  If it is unaltered by movement of the leg or a change in posture, it must arise from a soft tissue lesion, not from bone or joints.

- Is the pain postural?

  Analyse the postural elements that make it better or worse.

  If worse on sitting, consider a spinal cause (discogenic) or ischial bursitis.

  If worse on standing, consider a spinal cause (instability) or a local problem related to weight-bearing (varicose veins).

  If worse lying down, consider vascular origin, such as small vessel peripheral vascular disease. If worse lying on one side, consider greater trochanteric pain syndrome.

  Pain unaffected by posture is activity-related.

- Is the pain related to walking?

  No: Determine the offending activity (e.g. joint movement with arthritis).

Yes: If immediate onset, consider local cause at site of pain (e.g. stress fracture). If delayed onset, consider vascular claudication or neurogenic claudication.

- Is the site of pain the same as the site of trauma?

  If not, the pain in the leg is referred. Important considerations include lesions in the spine, abdomen or hip and entrapment neuropathy.

- Is the pain arising from the bone?

  If so, the patient will point to the specific site and indicate a ‘deep’ bone pain (consider tumour, fracture or, rarely, infection) compared with the more superficial muscular or fascial pain.

- Is the pain arising from the joint?

  If so, the clinical examination will determine whether it arises from the joint or juxtaposed tissue.

Examination

The first step is to watch the patient walk and assess the nature of any limp (see CHAPTER 28).

Note the posture of the back and examine the lumbar spine. Have both legs well exposed for the inspection.

Inspect the patient’s stance and note any asymmetry and other abnormalities, such as swellings, bruising, discolouration or ulcers and rashes. Note the size and symmetry of the legs and the venous pattern. Look for evidence of ischaemic changes, especially of the foot.

Palpate for local causes of pain and if no cause is evident examine the spine, blood vessels (arteries and veins) and bone. Areas to palpate specifically are the ischial tuberosity, trochanteric area, hamstrings and tendon insertions. Palpate the superficial lymph nodes. Note the temperature of the feet and legs. Perform a vascular examination, including the peripheral pulses and the state of the veins if appropriate.

If evidence of peripheral vascular disease (PVD), remember to auscultate the abdomen and adductor hiatus, and the iliac, femoral and popliteal vessels.

A neurological examination may be appropriate, particularly to test nerve root lesions or entrapment neuropathies. It is worthwhile developing a routine for rapidly assessing the motor function of L5 (e.g. hallux dorsiflexion) and S1 (e.g. walking on tiptoes), as sciatica presents so commonly.

Examination of the joints, especially the hip and SIJs, is very important.

Investigations

A checklist of investigations that may be necessary to make the diagnosis is as follows:

- FBE and ESR
- radiology:

    leg X-rays, especially knee, hip

    plain X-ray of lumbosacral spine

    CT scan of lumbosacral spine

    ultrasound or MRI of greater trochanteric area

    MRI scan of lumbosacral spine

    bone scan
- electromyography
- vascular:

    arteriography

    duplex ultrasound scan

    ankle brachial index

    venous pool radionuclide scan

    contrast venography

    air plethysmograph (varicose veins)

    D-dimer test

Leg pain in children

Aches and pains in the legs are a common complaint in children. The most common cause is soreness and muscular strains due to trauma or unaccustomed exercise. A rare cause of bilateral leg pain in children is leukaemia. Consider osteomyelitis (see CHAPTER 58).

It is important to consider child abuse, especially if bruising is noted on the back of the legs.

‘Growing pains’

So-called ‘growing pains’, or idiopathic leg pain, is thought to be responsible for up to 20% of leg pain in children.[2] Such a diagnosis is vague and often made when a specific cause is excluded. It is usually not due to ‘growth’ but related to excessive exercise or trauma from sport and recreation, and probably emotional factors.

The pains are typically intermittent and symmetrical and deep in the legs, usually in the anterior thighs or calves. Although they may occur at any time of the day or night, typically they occur at night, usually when the child has settled in bed. The pains usually last for 30–60 minutes and tend to respond to attention such as massage with an analgesic balm or simple analgesics (refer to CHAPTER 84).

Serious problems

It is important to exclude fractures (hence the value of X-rays if in doubt), malignancy (such as osteogenic sarcoma, Ewing tumour or infiltration from leukaemia or lymphoma), osteoid osteoma, osteomyelitis, scurvy and beriberi (rare disorders in developed countries) and congenital disorders such as sickle-cell anaemia, Gaucher disease and Ehlers–Danlos syndrome.

Leg pain in adults

The older the person, the more likely it is that arterial disease with intermittent claudication and neurogenic claudication due to spinal canal stenosis will develop. Other important problems of the elderly include degenerative joint disease, such as osteoarthritis of the hips and knees, muscle cramps, herpes zoster, Paget disease, polymyalgia rheumatica (affecting the upper thighs) and sciatica.

Spinal causes of leg pain

Problems originating from the spine are an important, yet at times complex, cause of pain in the leg.

Important causes are:

- nerve root (radicular) pain from direct pressure
- referred pain from:

  disc pressure on tissues in front of the spinal cord

  apophyseal joints

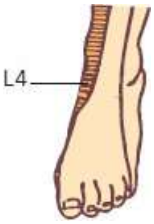
  SIJs
- spinal canal stenosis causing claudication

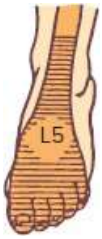
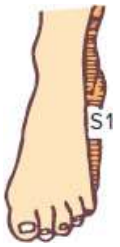
Various pain patterns are presented in FIGURES 55.3 and 55.4 .

Nerve root pain

Nerve root pain from a prolapsed disc is a common cause of leg pain. A knowledge of the dermatomes of the lower limb (see FIG. 55.1) provides a pointer to the involved nerve root, which is usually L5 or S1 or both. The L5 root is invariably caused by an L4–5 disc prolapse and the S1 root by an L5–S1 disc prolapse. The nerve root syndromes are summarised in TABLE 55.3 .

Table 55.3 Comparison of neurological findings of the neurological levels L3, L4, L5 and S1[7]

Nerve root	Pain distribution (see FIG. 55.1)	Sensory loss	Motor function	Reflex
L3	Front of thigh, inner aspect of thigh, knee and leg	Anterior aspect of thigh 	Extension of knee 	Knee jerk 
L4	Anterior thigh to front of knee	Lower outer aspect of thigh and knee, inner great toe 	Flexion, adduction of knee, inversion of foot 	Knee jerk 
L5	Lateral aspect of leg, dorsum	Dorsum of foot, great toe, 2nd, 3rd and 4th	Dorsiflexion of great toe and ankle	Tibialis posterior (clinically impractical)

	of foot and great toe	toes, anterolateral aspect of lower leg 		
S1	Buttock to back of thigh and leg, central calf, lateral aspect of ankle and sole of foot	Lateral aspect of ankle, foot (4th and 5th toes) 	Plantar flexion of ankle and toes, eversion of foot 	Ankle jerk 

A summary of the physical examination findings for the most commonly involved nerve roots is presented in TABLE 55.3 .

Sciatica

See CHAPTER 28 . Sciatica is defined as pain in the distribution of the sciatic nerve or its branches (L4, L5, S1, S2, S3) caused by nerve pressure or irritation. Most problems are due to entrapment neuropathy of a nerve root, in either the spinal canal (as outlined above) or the intervertebral foramen.

It should be noted that back pain may be absent and peripheral symptoms only will be present.

Treatment

A protracted course can be anticipated, in the order of 12 weeks (see CHAPTER 28). The patient should be reassured that spontaneous recovery can be expected. As for low back pain, systematic reviews of various interventions for sciatica (advice, or physical or medical therapy) have failed to find any particular method that impresses. Bearing that in mind, a trial of conservative treatment might involve the following:

- back care education
- relative bed rest if very painful only (2 days is optimal)—a firm base is ideal
- return to activities of daily living ASAP
- analgesics (avoid narcotic analgesics if possible)
- NSAIDs[3] (mild global improvement; 2 weeks is reasonable)
- basic exercise program, including swimming
- some find traction helpful (even intermittent manual), although a Cochrane review suggests otherwise.[4]

Referral to a therapist of your choice (e.g. physiotherapist) may be advisable. Conventional spinal manipulation is usually contraindicated for radicular sciatica. If the sciatica is not responding or the circumstances demand more active treatment, an epidural corticosteroid injection has been shown to slightly reduce pain and disability in the short term.[5] Surgical consultation is indicated for a severe or progressive neurological deficit.

Lumbar spinal canal stenosis (LSS)[6]

LSS is narrowing of the spinal canal resulting in pressure on the sciatic nerve roots and possibly the spinal canal and cord. It typically occurs in people aged over 50 years with a history of spinal degenerative changes, including osteoarthritis (see FIG. 28.9), but LSS may be congenital.

The symptoms are as outlined for neurogenic claudication in TABLE 55.2 . Pain, which is usually bilateral, is in the buttocks, thighs and legs—proximal radiating distally. Some 50% remain clinically stable, 25% deteriorate and about 25% improve with time. Conservative treatment includes relative rest, specific exercises, analgesics and agents for neuropathic pain. There is no evidence of the value of epidural corticosteroid injections or oral corticosteroids. Surgical consultation is indicated for severe or progressive neurological deficit or progressive pain. The risk of surgical complications increases with age. The standard surgery is spinal decompression.

Referred pain

Referred pain in the leg can arise from disorders of the SIJs or from spondylogenic disorders. It is typically dull, heavy and diffuse. The patient often uses their hand to describe its distribution compared with their use of fingers to point to radicular pain.

Spondylogenic pain

Non-radicular or spondylogenic pain originates from any of the components of the vertebrae (spondyles), including joints, the intervertebral discs, ligaments and muscle attachments. An

important example is distal referred pain from disorders of the apophyseal joints, where the pain can be referred to any part of the limb as far as the calf and ankle but most commonly to the gluteal region and proximal thigh (see FIG. 55.4).

Another source of referred pain is that caused by compression of a bulging disc against the posterior longitudinal ligament and dura. The pain is typically dull, deep and poorly localised. The dura has no specific dermatomal localisation, so the pain is usually experienced in the low back, sacroiliac area and buttocks. Less commonly, it can be referred to the coccyx, groin and both legs down to the calves. It is not referred to the ankle or the foot.

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Sacroiliac dysfunction

This typically causes a dull ache in the buttock, but it can be referred to the iliac fossa, groin or posterior aspects of the thighs (see CHAPTER 54). It rarely radiates to or below the knee. It may be caused by inflammation (sacroiliitis) or mechanical dysfunction. The latter must be considered in a postpartum woman presenting with severe aching pain present in both buttocks and thighs.

Nerve entrapment syndromes

Entrapment neuropathy can result from direct axonal compression or can be secondary to vascular problems, but the main common factor is a nerve passing through a narrow rigid compartment where movement or stretching of that nerve occurs under pressure.

Clinical features

- Pain at rest (often worse at night)
- Variable effect with activity
- Sharp, burning pain
- Radiating and retrograde pain
- Clearly demarcated distribution of pain
- Paraesthesia may be present
- Tenderness over nerve
- May be positive Tinel sign (tap posterior tibial nerve behind medial malleolus)

Meralgia paraesthetica

This is the commonest lower limb entrapment and is due to the lateral femoral cutaneous nerve of the thigh being trapped under the lateral end of the inguinal ligament, 1 cm medial to the

ASIS.[8]

The nerve is a sensory nerve from L2 and L3. It occurs mostly in middle-aged people, due mainly to thickening of the fibrous tunnel beneath the inguinal ligament, and is associated with obesity, pregnancy, ascites or local trauma such as belts, trusses and corsets. Its entrapment causes a burning pain with associated numbness and tingling (see FIG. 55.3).

The distribution of pain is confined to a localised area of the lateral thigh and does not cross the midline of the thigh.

Differential diagnosis

- L2 or L3 nerve root pain (L2 causes buttock pain also)
- Femoral neuropathy (extends medial to midline)

Treatment

- Injection of corticosteroid medial to the ASIS, under the inguinal ligament
- Surgical release (neurolysis) if refractory
- Treat the cause (e.g. weight reduction, constricting belt, corset)

Note: Meralgia paraesthetica often resolves spontaneously.

Peroneal nerve entrapment

The common peroneal (lateral popliteal) nerve can be entrapped where it winds around the neck of the fibula or as it divides and passes through the origin of the peroneus longus muscle 2.5 cm below the neck of the fibula. It is usually injured, however, by trauma or pressure at the neck of the fibula.

Symptoms and signs

- Pain in the lateral shin area and dorsum of the foot
- Sensory symptoms in the same area
- Weakness of eversion and dorsiflexion of the foot (described by patients as ‘a weak ankle’)

Differential diagnosis

- L5 nerve root (similar symptoms)

Treatment

- Shoe wedging or other orthotics to maintain eversion
- Neurolysis is the most effective treatment

Tarsal tunnel syndrome

This is an entrapment neuropathy of the posterior tibial nerve in the tarsal tunnel beneath the flexor retinaculum on the medial side of the ankle. The condition is due to dislocation or fracture around the ankle or tenosynovitis of tendons in the tunnel from injury, or rheumatoid arthritis and other inflammations.

Symptoms and signs

- A burning or tingling pain in the toes and sole of the foot, occasionally the heel
- Retrograde radiation to the calf, perhaps as high as the buttock
- Numbness is a late symptom

- Discomfort often in bed at night and worse after standing
- Removal of shoe may give relief
- Sensory nerve loss variable, may be no loss
- Tinel test (finger or reflex hammer tap over nerve below and behind medial malleolus) may be positive
- Tourniquet applied above ankle may reproduce symptoms

The diagnosis is confirmed by electrodiagnosis.

Treatment

- Relief of abnormal foot posture with orthotics
- Corticosteroid injection into tunnel
- Decompression surgery if other measures fail

Vascular causes of leg pain

Occlusive arterial disease

Risk factors for peripheral vascular disease (for development and deterioration):

- smoking

- diabetes
- hypertension
- hypercholesterolaemia
- family history
- atrial fibrillation (embolism)

Aggravating factors:

- beta-blocking drugs
- anaemia

Acute lower limb ischaemia

Sudden occlusion is a dramatic event that requires immediate diagnosis and management to save the limb.

Causes

- Embolism—peripheral arteries
- Thrombosis: major artery, popliteal aneurysm
- Traumatic contusion (e.g. postarterial puncture)

The symptoms and signs of acute embolism and thrombosis are similar, although thrombosis of an area of atherosclerosis is often preceded by symptoms of chronic disease (e.g. claudication). The commonest site of acute occlusion is the common femoral artery (see FIG. 55.5).

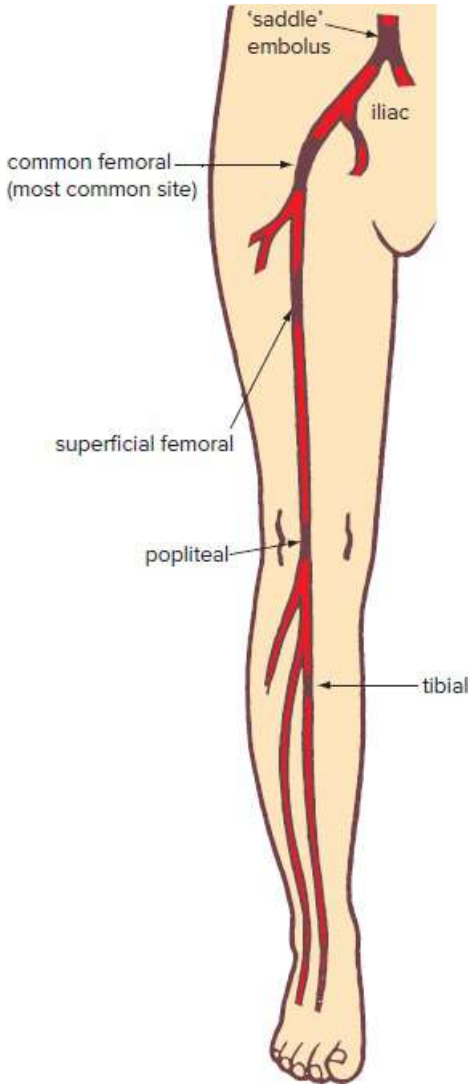

FIGURE 55.5 Common sites of acute arterial occlusion

Signs and symptoms—the 6 Ps

- Pain
- Pallor
- Paraesthesia or numbness
- Pulselessness
- Paralysis
- ‘Perishing’ cold

The pain is usually sudden and severe and any improvement may be misleading. Sensory changes initially affect light touch, not pinprick. Paralysis (paresis or weakness) and muscle compartment pain or tenderness are most important and ominous signs.

Other signs include mottling of the legs, collapsed superficial veins and no capillary return. If the foot becomes dusky purple and fails to blanch on pressure, irreversible necrosis has occurred.

Note: Look for evidence of atrial fibrillation.

Examination of arterial circulation

This applies to chronic ischaemia and also to acute ischaemia.

Skin and trophic changes

Note colour changes, hair distribution and wasting. Note the temperature of the legs and feet with the backs of your fingers.

Palpation of pulses

It is important to assess four pulses carefully (see FIG. 55.6). Note that the popliteal and posterior tibial pulses are difficult to feel, especially in obese subjects.

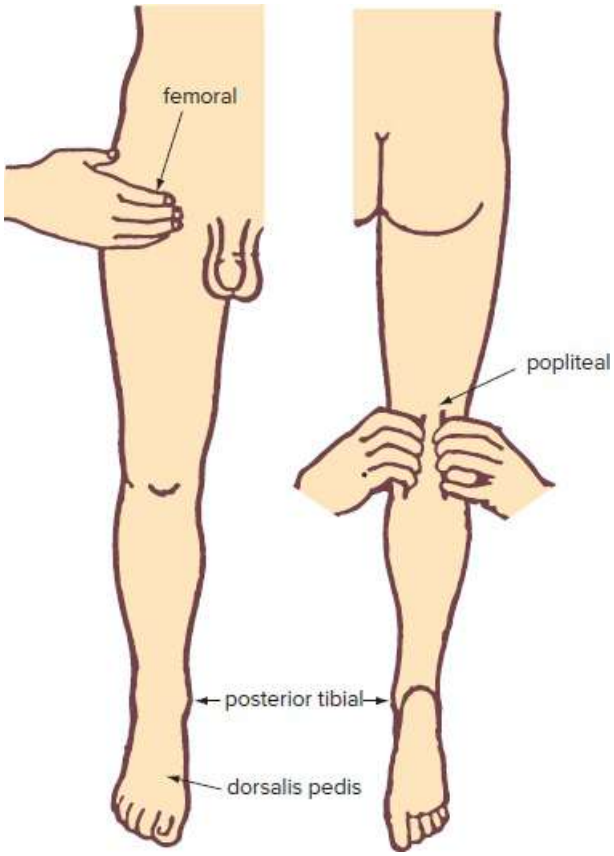

FIGURE 55.6 Sites of palpation of peripheral pulses in the leg

Femoral artery. Palpate deeply just below the inguinal ligament, midway between the ASIS and the symphysis pubis. If absent or diminished, palpate over abdomen for aortic aneurysm.

Popliteal artery. Flex the leg to relax the hamstrings. Place fingertips of both hands to meet in the midline. Press them deeply into the popliteal fossa to compress artery against the upper end of the tibia (i.e. just below the level of the knee crease). Check for a popliteal aneurysm (very prominent popliteal pulsation).

Posterior tibial artery. Palpate, with curved fingers, just behind and below the tip of the medial malleolus of the ankle.

Dorsalis pedis artery. Feel at the proximal end of the first metatarsal space just lateral to the extensor tendon of the big toe.

Oedema

Look for evidence of oedema: pitting oedema is tested by pressing firmly with your thumb for at least 5 seconds over the dorsum of each foot, behind each medial malleolus and over the shins.

Postural colour changes (Buerger test)

Raise both legs to about 60° for about 1 minute, when maximal pallor of the feet will develop. Then get the patient to sit up on the couch and hang both legs down.[8]

Note: Comparing both feet, check the time required for return of pinkness to the skin (normally less than 10 seconds) and filling of the veins of the feet and ankles (normally about 15 seconds). Look for any unusual rubor (dusky redness) that takes a minute or more in the dependent foot. A positive Buerger test is pallor on elevation and rubor on dependency and indicates severe, chronic ischaemia.

Auscultation for bruits after exercise

Listen over abdomen and femoral area for bruits.

Note: Neurological examination (motor, sensory, reflexes) is normal unless there is associated diabetic peripheral neuropathy.

Treatment

Golden rules: Occlusion is usually reversible if treated within 4 hours (i.e. limb salvage). It is often irreversible if treated after 6 hours (i.e. limb amputation).

- Unfractionated heparin (immediately) 80 U/kg IV
- Emergency embolectomy (ideally within 4 hours):

  under general or local anaesthesia

  through an arteriotomy site in the common femoral artery

  embolus extracted with Fogarty balloon or catheter

or

- Stenting of vessels (less invasive and less expensive)
- Angioplasty
- Arterial bypass if acute thrombosis in chronically diseased artery
- In selected cases, thrombolysis with streptokinase or urokinase appropriate
- Amputation (early) if irreversible ischaemic changes

- Lifetime anticoagulation will be required

Note: An acutely ischaemic limb is rarely life-threatening in the short term. Thus, even in the extremely aged, demented or infirm, a simple embolectomy is not only worthwhile but also is usually the most expedient treatment option.

Chronic lower limb ischaemia

Chronic ischaemia caused by gradual arterial occlusion can manifest as intermittent claudication, rest pain in the foot or overt tissue loss—ulceration, gangrene.

Intermittent claudication is a pain or tightness in the muscle on exercise (Latin *claudicare*, to limp), relieved by rest. Rest pain is a constant severe burning-type pain or discomfort in the forefoot at rest, typically occurring at night when the blood flow slows down.

The main features are compared in TABLE 55.4 .

Table 55.4 Comparison between intermittent claudication and ischaemic rest pain

	Intermittent claudication	Ischaemic rest pain
Quality of pain	Tightness/cramping	Constant ache
Timing of pain (typical)	Daytime; walking, other exercise	Night-time; rest
Tissue affected	Muscle	Skin
Site	Calf > thigh > buttock	Forefoot, toes, heels
Aggravation	Walking, exercise	Recumbent, walking
Relief	Rest	Hanging foot out of bed; dependency
Associations	Beta blockers Anaemia	Night cramps Swelling of feet

Intermittent claudication

The level of obstruction determines which muscle belly is affected (see FIGS 55.2 and 55.6).

Proximal obstruction (e.g. aortoiliac)

- Pain in the buttock, thigh and calf, especially when walking up hills and stairs
- Persistent fatigue over whole lower limb
- Impotence is possible (Leriche syndrome)

Obstruction in the thigh

- Superficial femoral (the commonest) causes pain in the calf (e.g. claudication at 200–500 m), depending on collateral circulation

- profunda femoris → claudication at 100 m
- multiple segment involvement → claudication at 40–50 m

Causes

- Atherosclerosis (mainly men over 50, smokers)
- Embolisation (with recovery)
- Buerger disease: affects small arteries, causes rest pain and cyanosis (claudication uncommon)
- Popliteal entrapment syndrome (<40 years of age)

Note: The presence of rest pain implies an immediate threat to limb viability.

Investigations

- FBE: exclude polycythaemia and thrombocytosis
- Colour Doppler duplex ultrasound: measure resting ankle systolic BP; determine ankle/brachial index; normal value 0.9–1.1; <0.9 suggestive of PAD, <0.5 likely severe PAD and <0.4 critical
- CTA angiography: the gold standard, reserved for proposed intervention
- Digital subtraction angiography (developing)
- MRI: good sensitivity and specificity

Management of occlusive vascular disease

Prevention (for those at risk)

- Smoking is *the* risk factor and must be stopped.
- Other risk factors, especially hyperlipidaemia, must be attended to and weight reduction to ideal weight is important.
- Exercise is excellent, especially walking.

Diagnostic plan

- Check if patient is taking beta blockers.
- General tests: blood examination, random blood sugar, urine examination, ECG.
- Measure blood flow by duplex ultrasound examination or ankle brachial index.

- Arteriography should be performed *only* if surgery is contemplated.

Conservative treatment

- General measures (if applicable): control obesity, diabetes, hypertension, hyperlipidaemia, cardiac failure.
- Achieve ideal weight.

- There must be absolutely no smoking.
- Exercise: daily graduated exercise to the level of pain. About 50% will improve with walking; so advise as much walking as possible. It is a mistake to avoid walking for fear of bringing on the first vestiges of pain.
- Try to keep legs warm and dry.
- Maintain optimal foot care (podiatry).
- Drug therapy: aspirin 150 mg daily + a statin. Consider ACE inhibitors.

Note:

- Vasodilators and sympathectomy are of little value.
- About one-third progress, while the rest regress or don't change.[9]

When to refer to a vascular surgeon

- 'Unstable' claudication of recent onset; deteriorating
- Severe claudication—unable to maintain lifestyle
- Rest pain
- 'Tissue loss' in feet (e.g. heel crack, ulcers on or between toes, dry gangrenous patches, infection)

Surgery. Reconstructive vascular surgery is indicated for progressive obstruction, intolerable claudication and obstruction above the inguinal ligament:

- endarterectomy—for localised iliac stenosis
- bypass graft (iliac or femoral artery to popliteal or anterior or posterior tibial arteries)

Percutaneous transluminal dilation. This angioplasty is performed with a special intra-arterial balloon catheter for localised limited occlusions. An alternative to the balloon is laser angioplasty.

Venous disorders

Varicose veins

Varicose veins are dilated, tortuous and elongated superficial veins in the lower extremity.

The veins are dilated because of incompetence of the valves in the superficial veins or in the communicating or perforating veins between the deep and superficial systems (see FIG. 55.7). The cause is a congenital weakness in the valve and the supporting vein wall, but there are several predisposing factors (TABLE 55.5). Previous DVT can damage valves, especially calf perforators, and cause varicose veins.

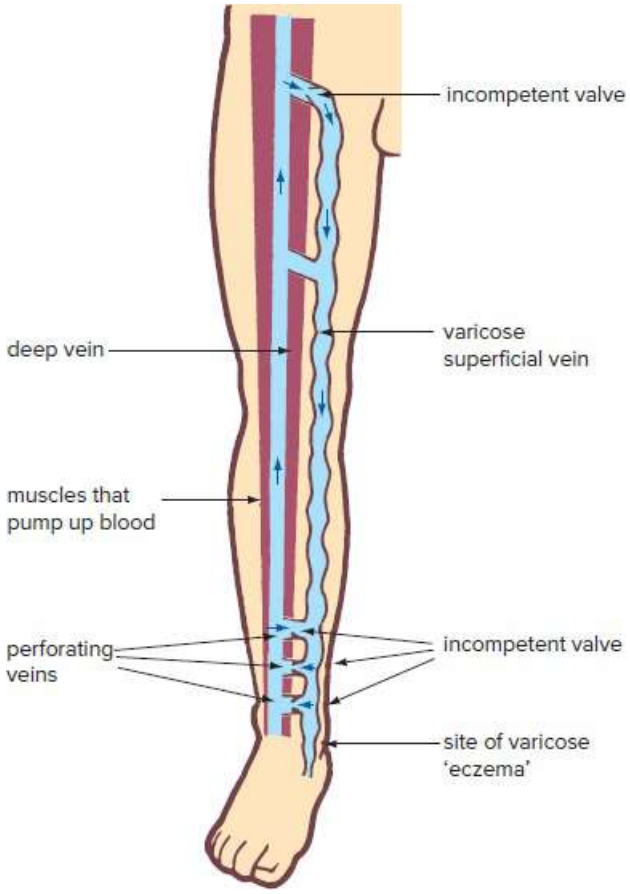

FIGURE 55.7 The common sites of varicose veins

Table 55.5 Risk factors for varicose veins

Female sex (5:1)
Family history

Pregnancy
Multiparity
Age
Occupation
Diet (low fibre)

Dilated superficial veins, which can mimic varicose veins, may be caused by extrinsic compression of the veins by a pelvic or intra-abdominal tumour (e.g. ovarian cancer, retroperitoneal fibrosis). Uncommonly, but importantly, superficial veins dilate as they become collaterals following previous DVT, especially if the iliofemoral segment is involved.

Symptoms

Varicose veins may be symptomless, the main complaint being their unsightly appearance. Symptoms include swelling, fatigue, heaviness in the limb, an aching discomfort and itching.

Varicose veins and pain

They may be painless even if large and tortuous. Pain is a feature where there are incompetent perforating veins running from the posterior tibial vein to the surface through the soleus muscle.

Severe cases lead to lower leg venous hypertension syndrome,[10] characterised by pain that is worse after standing, cramps in the leg at night, irritation and pigmentation of the skin, swelling of the ankles and loss of skin features such as hair.

A careful history will usually determine if the aching is truly due to varicose veins and not to transient or cyclical oedema, which is a common condition in women.[11]

The complications of varicose veins are summarised in TABLE 55.6 .

Table 55.6 Complications of varicose veins

Superficial thrombophlebitis
Skin ‘eczema’ (10%)
Skin ulceration (20%)
Bleeding
Calcification
Marjolin ulcer (squamous cell carcinoma)

Examination