Conditions peculiar to the hands

The hand is mankind’s greatest physical asset and, anatomically, one of his most distinctive features. It has enabled humans to use the tools that their brains have invented, and is indispensable to their well-being. Everything that the doctor does to the hand should be aimed at restoring or maintaining its function.

When you examine the hand there are four systems to assess: the muscles, bones and joints; the circulation; the nerves; and the skin and connective tissues. The general examination of these systems is described in other chapters, but the important points relating to the hand are repeated here and assembled into a system of examination designed to ensure that you do not miss any important abnormalities.

A PLAN FOR THE EXAMINATION OF THE HAND

Examine each system in turn.

The musculoskeletal system (bones, joints, muscles and tendons)

Inspection
Look for any abnormality of the shape, size and contour of the hand. Look for local discolouration, scars and sinuses. Look for muscle wasting by assessing the size of the thenar and hypothenar eminences and the bulk of the muscles between the metacarpal bones (the interossei). Look at the wrist joint.

Palpation
Feel the bony contours, the tender areas, and any localized swellings. Feel the finger joints to assess the cause of any swelling of these joints.

FIG 5.1 The large spade-like fingers and hands of acromegaly.

Movement
Check the range and ease of movement of all the joints:
- the carpometacarpal joint of the thumb (flexion, extension, abduction, adduction and opposition),
- the metacarpophalangeal joints of the fingers (flexion, extension, abduction and adduction),
- the interphalangeal joints (flexion and extension).

Inability to move these joints may be caused by joint disease, soft-tissue thickening, divided tendons or paralysed muscles.

The circulation

Inspection
Pallor of the fingers indicates arterial insufficiency or anaemia. During an episode of vasospasm the fingers may be white or blue. Observe the degree of filling of the veins on the back of the hands. Ischaemic atrophy of the pulps of the fingers makes the fingers thin and pointed. Ischaemic ulcers, small abscesses and even frank gangrene may be visible.
**Conditions peculiar to the hands**

**Palpation**

Feel the temperature of the skin of each finger.

Feel both pulses (radial and ulnar) at the wrist. Sometimes the digital arteries can be felt on either side of the base of the fingers.

**Capillary return** A crude indication of the arterial inflow to the fingers can be obtained from watching the rate of filling of the vessels beneath the nail after emptying them by pressing down on the tip of the nail.

**Allen’s test** Ask the patient to clench one fist tightly and then compress the ulnar and radial arteries at the wrist with your thumbs. After 10 seconds, ask the patient to open the hand. The palm will be white. Release the compression on the radial artery and watch the blood flow into the hand.

Slow flow into one finger caused by a digital artery occlusion will be apparent from the rate at which that finger turns pink.

Repeat the procedure, but release the pressure on the ulnar artery first.

**Auscultation**

Listen with the bell of your stethoscope over any abnormal areas. Vascular tumours and arteriovenous fistulae may produce a bruit, sometimes a palpable thrill.

Measure the blood pressure in both arms.

**The nerves**

**Sensory nerves**

When there is loss of sensation you must find out which type of sensation is lost (e.g. light touch, pain, position sense, vibration sense), as described in Chapter 1, and the distribution of the sensory loss. Does it correspond to the innervation of one nerve or to a dermatome? The following gives details of the areas of skin innervated by the three nerves of the hand.

**Median nerve** The median nerve innervates the palmar aspect of the thumb, index and middle fingers, the dorsal aspect of the distal phalanx and half of the middle phalanx of the same fingers, and a variable amount of the radial side of the palm of the hand.
**Median nerve**
- Flexor digitorum sublimis
- Lateral half of flexor digitorum profundus (Flex the index finger)
- Opponens and abductor pollicis (Lift the thumb away from the palm)

**Ulnar nerve**
- Flexor carpi ulnaris
- Medial half of flexor profundus (Adduct the wrist)
- Muscles of hypothenar eminence
- Interossei
- Adductor pollicis (Abduct the little finger)

**Radial nerve**
- Extensor digitorum (Extend the wrist)
- Triceps (Extend the elbow)
- Brachioradialis

**FIG 5.5**
**DISTRIBUTION OF THE NERVES OF THE UPPER LIMB**
Conditions peculiar to the hands

Ulnar nerve
The ulnar nerve innervates the skin on the anterior and posterior surfaces of the little finger and the ulnar side of the ring finger, the skin over the hypothenar eminence, and a similar strip of skin posteriorly. The ulnar nerve sometimes innervates all of the skin of the ring finger and the ulnar side of the middle finger.

Radial nerve
This innervates a small area of skin over the lateral aspect of the first metacarpal and the back of the first web space.

The dermatomes of the hand are:
- C6 – thumb
- C7 – middle finger
- C8 – little finger.

Motor nerves
The muscles that control the movements of the hand lie within the hand and in the forearm (i.e., they are intrinsic and extrinsic). All the long flexors and extensors of the fingers lie in the forearm, and the nerves that innervate them leave their parent nerves at or above the elbow.

The nerves that innervate the intrinsic muscles have a long course in the forearm before they reach the hand. Thus, it is necessary to examine all the motor functions of the three principal nerves in the upper limb (median, ulnar, and radial) if you wish to find the level at which a nerve is damaged. A rapid assessment of the motor function of these three nerves in the hand can be obtained by looking for the following physical signs.

A median nerve palsy, which may follow penetrating injuries, lacerations at the wrist, dislocation of the carpal tunnel and carpal tunnel compression, may present as follows.

If the injury is at wrist level:
- wasting of the thenar eminence
- absent abduction of the thumb
- absent opposition of the thumb.

If the injury is at or above the cubital fossa:
- wasting of the forearm and thenar eminence
- loss of flexion of the thumb and index finger
- hand held in the benediction position, with ulnar fingers flexed and index finger straight.

An ulnar nerve palsy, which may follow damage or compression at the elbow, penetrating injuries, fractures of the medial epicondyle, lacerations at the wrist and long-standing marked cubitus valgus, may present as follows.

If the injury is at wrist level:
- wasting of the hypothenar eminence and hollows between the metacarpals
- absence of flexion of the little and ring fingers
- claw hand, with ring and little finger hyperextended at the metacarpophalangeal joint and flexed at the interphalangeal joints
- absence of adduction and abduction of the fingers with a positive Froment’s test.

If the injury is at the level of the elbow:
- wasting of intrinsic muscles
- claw hand, but with terminal interphalangeal joints not flexed as half of flexor digitorum profundus now paralysed
- positive Froment’s test.

If the injury is high above the elbow:
- all the above
- the flexor carpi ulnaris also paralysed.

A radial nerve palsy, which may follow fractures of the shaft of the humerus, penetrating injuries and pressure in the axilla from prolonged resting with the arm suspended over a chair or over a crutch, may present in the following ways.
If there is an injury in the axilla:
- absence of extension of the wrist (wrist drop)
- loss of triceps action.

If the injury is at the level of the middle third of humerus:
- wrist drop
- sparing of the brachioradialis (when paralysed, this weakens elbow flexion).

If the injury is to the posterior interosseous:
- hand held in radial deviation when attempting extension
- no wrist drop
- an inability to maintain finger extension against forcible flexion.

If the injury is to a superficial branch of the nerve:
- no motor loss.
The examination of the motor function of these three nerves can be simplified by using three screening tests:

1. **median nerve**: abduction of the thumb;
2. **ulnar nerve**: abduction of the little finger;
3. **radial nerve**: extension of the wrist.

As you perform each of these tests, feel the muscle you are testing to check whether or not it is contracting.

**The skin and connective tissues**

Much will have been learnt about the skin after studying its circulation and innervation. Be careful to note any colour changes and any inflammatory processes. It is also important to palpate the palmar fascia, as thickening and contraction of this structure are a common cause of contraction deformities (Dupuytren’s contracture). Also note any change in the shape or configuration of the hand and digits and any abnormal skin creases. Hyperextensibility of the joints may indicate a connective tissue disorder such as Ehlers–Danlos syndrome.

**The wrist, elbow, shoulder, thoracic outlet, neck**

Examine the wrist, elbow, shoulder, thoracic outlet and neck because abnormalities at these sites can cause symptoms in the hand.

**RECORDING DATA ABOUT THE HAND**

Almost every issue of the Medical Insurance Societies’ publications contains references to errors that have arisen because of inadequate or misleading records of lesions in the hand.

Never forget to state which hand you are describing. Write the words in full: RIGHT or LEFT. A bad R can easily be confused with an L.

**Name the digits**

Some people prefer to number rather than name the digits, the first digit being the thumb, the second digit the index finger and so on. But unless you remember to write the word ‘digit’ every time, you will eventually make a mistake because the first finger, which is the index finger, is the second digit. **Do not use this system; always use names: thumb, index, middle, ring and little finger.**
Abnormalities and lesions of the hand

It is acceptable to number the toes, as the first toe is the great toe.

ABNORMALITIES AND LESIONS OF THE HAND

Congenital abnormalities

There are three common skeletal abnormalities in the hand:

1. part of the hand (usually a digit) may be absent
2. there may be an extra digit
3. the digits may be fused (syndactyly).

All these abnormalities are rare, but immediately recognizable.

Dupuytren’s contracture

This is a thickening and shortening of the palmar fascia and the adjacent connective tissues that lie deep to the subcutaneous tissue of the hand and superficial to the flexor tendons. The cause of this change in the fascia is not known. As the thickening increases, it becomes attached to the skin of the palm.

FIG 5.12 Syndactyly. Fusion of the middle and ring fingers of each hand.

FIG 5.13 Syndactyly. Fusion of the middle and index fingers, in this case associated with a marked failure of finger growth and other bony abnormalities.

It is known to occur in response to repeated local trauma and in association with cirrhosis of the liver, but in most cases there is no obvious predisposing cause.

History

Age Dupuytren’s contracture usually begins in middle age but progresses so slowly that many patients do not present until old age.

Sex Men are affected ten times more often than women.
Conditions peculiar to the hands

**Symptoms** A nodule in the palm. The patient may notice a thickening in the tissues in the palm of the hand, near the base of the ring finger, many years before the contractures develop.

**Contraction deformities.** The patient notices an inability fully to extend the metacarpophalangeal joint of the ring finger, and later the little finger. If the contraction of the palmar fascia becomes severe, the finger can be pulled so far down into the palm of the hand that it becomes useless.

There is no pain associated with this condition. Very rarely, the nodule in the palm may be slightly tender.

**Development** The nodule gradually enlarges and the strands of contracting fascia become prominent. Deep creases form where the skin becomes tethered to the fascial thickening, and the skin in these creases may get soggy and excoriated. The deformity of the fingers slowly worsens.

**Multiplicity** Dupuytren’s contracture is commonly bilateral and can also occur in the feet.

**Cause** Dupuytren’s contracture may follow repeated trauma to the palm of the hand, which is probably why it used to be found in shoe repairers and other manual workers, but nowadays it is uncommon to find a convincing cause.

**Systemic disease** There may be symptoms of epilepsy or cirrhosis of the liver. There is a higher incidence of the condition in patients suffering from these diseases. The reasons for these associations are unexplained.

**Family history** Dupuytren’s contracture can be familial. If so, it is inherited in an autosomal dominant manner.

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**Revision panel 5.1**

Factors associated with Dupuytren’s contracture

- Alcoholism
- Epilepsy
- Diabetes
- Repeated trauma
- Family history

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**Examination**

**The palm of the hand** Palpation of the palm of the hand reveals a firm, irregular-shaped nodule with indistinct edges, 1–2 cm proximal to the base of the ring finger. Taut strands can be felt running from the nodule to the sides of the base of the ring and little fingers, and proximally towards the centre of the flexor retinaculum. These bands get tighter if you try to extend the fingers.

The skin is puckered and creased, and tethered to the underlying nodule.

**The deformity** The metacarpophalangeal joint and the proximal interphalangeal joint are flexed because the palmar fascia is attached to both sides of the proximal and middle phalanges. The distal interphalangeal joint tends to extend. The ring finger is most affected and may be pulled down so far that its nail digs into the palm of the hand.
The flexion deformity is not lessened by flexing the wrist joint.

Local tissues The rest of the hand is normal. There may be some thickening of the subcutaneous tissue on the back of the proximal phalanges of the affected fingers, sometimes called Garrod’s pads.

General examination Dupuytren’s contracture is sometimes associated with epilepsy and cirrhosis of the liver. There may be systemic evidence of these diseases. These are rare associations.

The condition may be present in the feet.

Congenital contracture of the little finger

This is a congenital deformity of the little finger. The patient is rarely aware of the fact that they have a deformity, accepting it as the normal shape of their little finger.

It is mentioned here because, although it is the opposite deformity to a Dupuytren’s contracture, the student who is unaware of its existence may misdiagnose it.

Pick up a tea cup with your thumb and index finger and hook your little finger in the manner of the affected snob at a tea party. You will find that you have extended your metacarpophalangeal joint and flexed both of the interphalangeal joints. Someone with a congenital contracture of the little finger has this deformity all the time and cannot straighten the finger.

Volkmann’s ischaemic contracture

Volkmann’s ischaemic contracture is a shortening of the long flexor muscles of the forearm, caused by fibrosis of the muscles, secondary to ischaemia. The common causes of the ischaemia are direct arterial damage at the time of a fracture near the elbow (most often a supracondylar fracture), a tight plaster which restricts blood flow, and arterial embolism.
Conditions peculiar to the hands

History

Age Supracondylar fractures are common in children and young adults, so Volkmann's contracture most often begins between the ages of 5 and 25.

Cause The patient usually knows the cause of the deformity because they can clearly relate the loss of finger extension to their injury. Indeed, the loss of finger movements frequently begins while the arm is immobilized for the treatment of the fracture.

Symptoms When muscles become ischaemic, they are usually painful. If a patient complains of pain under their plaster at a point distant from the site of the fracture, remove the plaster and examine the muscles carefully.

Movements of the fingers, especially extension, become painful and then limited. This is more noticeable if there is no restriction of movement caused by a coexisting fracture. If the forearm is not in a plaster cast, the patient soon discovers that they can extend their fingers if they flex their wrist.

If the blood supply of the hand is also diminished, the skin of the hand will be cold and pale.

Ischaemia of the nerves in the anterior compartment (the median and anterior interosseous nerves) often causes ‘pins and needles’ (paraesthesia) in the distribution of the median nerve, and sometimes the severe burning pain of ischaemic neuritis.

Development As the acute phase passes, the pain slowly fades away, but the restriction of finger extension increases and the hand becomes claw-like. The patient may present with a fully developed deformity.

Examination

Inspection The skin of the hand is usually pale and the hand looks wasted. All the finger joints are flexed and the anterior aspect of the forearm is thin and wasted. The deformity is called a ‘claw hand’.

Palpation In the acute phase the forearm is swollen and tense, but once this has passed the forearm feels thin, the hand is cool and the pulses at the wrist may be absent. In the later stages the fibrosis and shortening make the forearm muscles hard and taut.

Movement Extension of the fingers is limited but improves as the wrist is flexed. This is an important sign, as it differentiates Volkmann's ischaemic contracture from Dupuytren's contracture. Further flexion of the fingers (beyond the deformity) is present but the grip is weak. All other hand movements are present but may be difficult to perform with the fingers fixed in an acutely flexed position.

Passive forced extension of the fingers is painful in the acute stage and uncomfortable in the established condition. An important diagnostic feature of ischaemic contracture is that all the muscles, even the damaged ones, have some function, whereas when a claw hand is caused by a nerve lesion, some of the muscles will be completely paralysed.

State of local tissues The abnormalities in the arteries and nerves of the forearm and hand have already been described. If the contracture follows a fracture, the vessels and nerves above the level of the fracture should be normal.

The heart, great vessels, subclavian and axillary arteries must be examined carefully in case they are the source of an arterial embolus.

Palpate the supraclavicular fossa for a cervical rib or subclavian artery aneurysm.

Carpal tunnel syndrome

This is a condition in which the median nerve is compressed as it passes through the carpal tunnel – the space between the carpal bones and the flexor retinaculum. The compression can be caused by skeletal abnormalities, swelling of other tissues within the tunnel, or thickening of the retinaculum. It is often associated with pregnancy, rheumatoid arthritis, diabetes, myxoedema, previous trauma and osteoarthritis.

History

Age and sex Carpal tunnel syndrome is common in middle-aged women – especially at the menopause.

Local symptoms Pins and needles in the fingers, principally the index and middle fingers, is the common presenting symptom. Sometimes the thumb is involved.

Theoretically the little finger should never be affected, as it is innervated by the ulnar nerve, but occasionally patients complain that the whole of their hand tingles.

Pain in the forearm. For some (so far unexplained) reason, patients often complain of a pain which radiates from the wrist, up along the medial
Abnormalities and lesions of the hand

side of the forearm. This is usually an aching pain, not pins and needles.

**Loss of function.** As the compression increases, the axons in the nerve are killed and objective signs of **nerve damage** appear. Because the sensitivity of the skin supplied by the median nerve is reduced, the patient notices that she drops small articles and cannot do delicate movements. Note that this is not caused by a loss of muscle power, but by the loss of fine discriminatory sensation. Ultimately, if the nerve damage is severe, there may be a **loss of motor function,** which presents as weakness and paralysis of the muscles of the thenar eminence and the first two lumbricals (see median nerve palsy on page 146).

**Exacerbations at night.** Patients are often woken in the middle of the night by their symptoms. This feature is difficult to explain but is so characteristic that it is considered to be pathognomonic of the condition.

**General symptoms.** An increase of weight commonly exacerbates carpal tunnel syndrome symptoms. A change in weight may be secondary to another disease such as myxoedema, diabetes or steroid therapy, or to physiological water retention, as in pregnancy.

If the condition is secondary to rheumatoid arthritis or osteoarthritis, the patient may have symptoms of arthritis in the wrist and other joints.

**Examination**

**Inspection.** The hand usually looks quite normal, except in the advanced case where there may be visible wasting of the muscles forming the thenar eminence.

**Palpation.** Pressure on the flexor retinaculum does not produce the symptoms in the hand, but holding the wrist fully flexed for 1 or 2 minutes may induce symptoms. Light-touch sensitivity and two-point discrimination may be reduced in the skin innervated by the median nerve (palm, thumb, index and middle finger). The loss of muscle bulk in the thenar eminence may be easier to feel when these muscles are contracting.

The wrist pulses and the colour and temperature of the skin should be normal.

**Movement.** All movements of the joints of the hand, active and passive, should be present.

Abduction, adduction and opposition of the thumb may be weak, but the muscles that cause these movements are rarely completely paralysed.

**General examination.** There are two important aspects of the general examination.

First, you must **exclude other causes of paraesthesia in the hand,** such as cervical spondylosis, cervical rib, peripheral neuritis, and rare neurological disease. This requires a detailed examination of the head, neck and arm.

Second, you must **look for evidence of the cause of the carpal tunnel syndrome,** such as pregnancy, rheumatoid arthritis, osteoarthritis and myxoedema.

**Claw hand**

Claw hand is a deformity in which all the fingers are permanently flexed. Although an ulnar nerve paralysis makes the hand claw-like, because it causes flexion of the ring and little fingers, it does not cause a true claw hand, because only part of the hand is involved.

The causes of claw hand are neurological and musculoskeletal.

**Neurological causes**

Remember these causes by thinking of the course of the nerve fibres from the spinal cord through the brachial plexus into the peripheral nerves. Although the deformity is caused by a loss of motor function, there is often an associated sensory loss.

**Spinal cord.** Poliomyelitis, syringomyelia, amyotrophic lateral sclerosis.

**Brachial plexus.** Trauma to medial roots and cord – especially birth injuries to the lower cord as in Klumpke’s paralysis; infiltration of the brachial plexus by malignant disease.

**Peripheral nerves.** Traumatic division of the median and ulnar nerves; peripheral neuritis.

**Musculoskeletal causes**

**Volkmann’s ischaemic contracture.** This only causes a claw hand at rest, as the deformity can be reduced or abolished by flexion of the wrist.

**Joint disease.** Asymmetrical muscle tension, bone and joint deformities and subluxation of the finger.
Conditions peculiar to the hands

joints caused by rheumatoid arthritis may produce a claw-like hand.

**Trigger finger**

This is a condition in which a finger gets locked in full flexion and will only extend after excessive voluntary effort, or with help from the other hand. When extension begins, it does so suddenly and with a click – hence the name trigger finger. The condition is caused by a thickening of the flexor tendon, paratenon, or a narrowing of the flexor sheath, preventing movement of the tendon within the flexor sheath.

**History**

*Age and sex* There are two groups of patients affected by this condition – middle-aged women and very young children. The thumb can be affected in neonates and infants, but this is a rare condition.

*Symptoms* The patient complains that the finger clicks and jumps as it moves, or gets stuck in a flexed position.

A trigger finger is not usually a painful condition, even when force is required to extend it.

The disability gradually gets more severe, but a fixed, immovable flexed finger is uncommon.

*Cause* Occasionally the patient can recall an injury to the palm of the hand which may have caused the tendon or tendon sheath to thicken, but in most cases there is no indication of the cause.

**Examination**

*Inspection* The patient will show you how the finger gets stuck and how it snaps out into extension. The finger looks quite normal.

*Palpation and movement* The thickening of the tendon or tendon sheath can be felt at the level of the head of the metacarpal bone. During movement, the thickening can be felt snapping in and out of the tendon sheath.

*General examination* Trigger finger is not associated with any systemic musculoskeletal disease.

**Mallet finger**

This is a fixed flexion deformity of the distal interphalangeal joint of a finger, caused by an interruption of the extensor mechanism: either a rupture of the extensor tendon or an avulsion fracture of its insertion. It is also known as ‘baseball’ finger because the commonest cause of the injury is a blow on the tip of the finger by a ball or hard object which forcibly flexes it against the pull of the extensor tendon, which then ruptures or pulls off the bone.

**History**

The patient usually remembers the original injury but, if it is not painful, may not complain about it until the deformity is established and a nuisance.

*Symptoms* The inability to extend the tip of a finger is not a great disability, but to a person with an occupation that requires fine finger movements, including full extension of the distal interphalangeal joints, the deformity can be a serious handicap. Some patients complain that the deformity is disfiguring.
Examination

When the patient holds out their hand, with the fingers extended, the distal phalanx of the affected finger remains 15–20° flexed. If you flex the distal interphalangeal joint to 90°, the patient can extend it back to the 20° position but cannot get it straight.

An X-ray is required to decide whether the tendon is ruptured or avulsed.

Chilblains
(Erythema pernio)

A chilblain is an area of oedema in the skin and subcutaneous tissues that follows a local change in capillary permeability induced by cold. Chilblains are by far the most common of the group of conditions known as cold sensitivity states. In addition to the oedema, there is vasospasm and interstitial infiltration with lymphocytes.

History

Age Chilblains first appear in childhood or early adult life.

Sex Woman are affected more often than men.

Occupation An outdoor occupation increases the chances of a susceptible subject getting chilblains.

Symptoms The patient complains of a swelling on the side or back of a finger (or toe) that has developed within a few minutes or hours of exposure to cold. The swelling is painful, especially in a warm environment, and often itches. The overlying skin may ulcerate and weep serous fluid. As chilblains usually follow exposure to the cold, they are more common in winter.

Chilblains are often multiple and occur on the toes, heels and lower leg, as well as the hands.

Development Chilblains first appear in childhood and adolescence and then appear regularly every winter until the patient reaches middle age. After the susceptibility to chilblains subsides, most patients continue to have some cold sensitivity problems in the hands, such as Raynaud’s phenomenon (see next page).

Family history The tendency to get chilblains is often familial.

Examination

Position Chilblains usually occur on the backs and sides of the fingers.

Colour At first the skin over the swelling is pale, but it quickly turns a reddish-blue colour.

Temperature The temperature of the skin over the swelling is normal or slightly cooler than normal.

Shape and size The lumps on the fingers are flattened, elongated mounds, with indistinct edges that fade away into the normal finger. They vary in size. On the fingers they are usually 0.5–2 cm wide, but on the legs they can be 4–5 cm across.

Surface The oedema involves the skin and subcutaneous tissues and often collects in an intradermal blister, which can burst and leave a superficial ulcer. If the acute superficial ulcer fails to heal, it may become deeper, destroying the full thickness of the skin and leaving a permanent scar.

Composition Although the lump is mainly oedema fluid, there is often sufficient cellular infiltration to make it feel firm and sometimes hard.

Lymph glands The axillary or inguinal lymph glands will not be enlarged unless the chilblain is infected – a rare event.
Conditions peculiar to the hands

Local tissues There may be evidence of long-standing arterial insufficiency – absent wrist pulses, loss of the finger pulps, recurrent paronychia and scars from previous chilblains. The changes should be distinguished from the painful hypoaesthetic patchy areas of discoloration and coldness that can result from arterial emboli. The nerves of the hands should be normal.

General examination The other extremities may be cold and show Raynaud’s phenomenon or acrocyanosis.

Raynaud’s phenomenon

The symptoms and signs which are commonly called *Raynaud’s phenomenon* are a series of colour changes in the hands following exposure to cold. To remember the order of the colour changes, remember the initials WBC (the same as ‘white blood count’): white, blue and crimson (red).

White. The skin of one, or a number, of the fingers turns white.

Blue. After a variable time, the skin turns a purple-bluish colour but is still cold and numb.

Red. When the vasospasm relaxes, the skin turns red and hot and feels flushed, tingling and often painful.

One or two of these phases may be absent. The fingers may go white and then turn red, or return to normal after the blue phase, or just turn blue.

The orthodox explanation of these changes is as follows.

The white phase is caused by severe arteriolar spasm, making the tissues bloodless.

The blue phase is produced by a very slow trickle of deoxygenated blood through dilated capillaries. Venous congestion may also be caused by persistent venous spasm.

The red phase is the period of high blood flow (reactive hyperaemia) that follows relaxation of the arteriolar spasm. The increased blood flow through the dilated vessels makes the skin red, hot and painful.

There are many causes of Raynaud’s phenomenon. These are described in Chapter 7 because Raynaud’s phenomenon is not a condition peculiar to the hands alone, although they are invariably affected. It can also occur in the feet, ears, nose and lips.

In between attacks the tissues look quite normal. Ultimately the arteries suffer permanent structural damage, which causes permanent tissue damage.

Scleroderma

Scleroderma is an uncommon disease in which the skin and subcutaneous tissues become thickened and stiff. Although it is a systemic disease affecting the bowel, especially the oesophagus and colon, as well as the skin, it often appears in the hands many years before it develops in other sites. Structural changes in the hands may be preceded for many years by Raynaud’s phenomenon. The aetiology of the disease is unknown. The principal abnormality is found in the collagen fibrils, which are thick and stiff.

History

Age Scleroderma commonly begins in the late 30s, but may not become severe for many years.

Sex Females are more often affected than males.

Symptoms There is thickening of the fingers. The patient notices that the skin of her fingers is slowly becoming pale and thick, and the movements of the interphalangeal joints are reduced.

Many patients present with the colour changes of Raynaud’s phenomenon years before the skin changes begin.

Painful splits and ulcers appear in the skin of the fingertips. Some patients get multiple, recurrent small abscesses around the nails; these abscesses throb and ache and finally discharge a small bead of pus.

Development Although the symptoms may begin in one hand or even one finger, they gradually spread to involve all the digits of both hands.

Systemic effects If the disease affects the oesophagus, the patient will complain of dysphagia. Involvement of the colon causes constipation and colicky abdominal pain.

Local examination

Colour The skin of the hands has a white, waxy appearance caused by the combination of ischaemia and skin thickening.
Abnormalities and lesions of the hand

Temperature  The hands are cool, especially at the fingertips.

Shape and size  The hands and fingers look swollen and the skin thickened but the pulps of the fingertips may be wasted. There are often small scars on either side of the finger nails, and on the pulps, where previous abscesses have pointed and discharged.

Nodules  There may be small, hard subcutaneous nodules in the finger pulps and on the dorsal aspect of the hands and fingers. These are patches of calcified fat. This abnormality is called calcinosis.

Pulses  The pulses at the wrist are usually palpable, but Allen’s test often reveals occlusions of the digital arteries.

Nerves  The nerve supply of the hand is normal.

Joints  The thick skin reduces the range of all movements of the finger joints. The interphalangeal joints are particularly affected, and the most noticeable abnormality is an inability to straighten the fingers.

General examination

Other signs of scleroderma may be visible.

Face.  The skin of the face looks tight and shiny and the mouth is small – microstomia. There are often multiple telangiectases all over the face (and sometimes on the hands).

Wasting.  There may be generalized wasting if the dysphagia is causing malnutrition.

Abdominal distension.  Scleroderma in the large bowel inhibits peristalsis and causes chronic constipation and abdominal distension.

The combination of Calcinosis, Raynaud’s phenomenon, Esophageal problems (dysphagia), Scleroderma and Telangiectases is known as the CREST syndrome.

Flexor sheath ganglion

A ganglion is an encapsulated myxomatous degeneration of fibrous tissue. When a ganglion occurs on the anterior aspect of a flexor sheath it can interfere with the grip and cause pain and disability out of proportion to its size.

History

Age and sex  Flexor sheath ganglia are most common in middle-aged men.
Conditions peculiar to the hands

**Symptoms**  The patient complains of a sharp pain at the base of one finger whenever they grip something tightly.

They may also complain of a lump at the site of the pain.

**Examination**

*Colour and temperature*  These are normal.

*Site*  A small tender nodule can be felt on the palmar surface of the base of a finger, superficial to the flexor sheath.

*Tenderness*  Direct pressure on the lump is usually very painful.

*Shape*  The nodule is spherical or hemispherical.

*Size*  Flexor sheath ganglia are usually quite small; some cause symptoms when they are only 2–3 mm in diameter.

*Surface and edge*  The surface of the nodule is smooth and the edge sharply defined.

*Composition*  The nodule feels solid and hard. It is usually too small to permit the assessment of any other features such as fluctuation or translucence.

*Lymph glands*  The local lymph glands should not be enlarged.

*Local tissues*  The rest of the hand is normal.

**Comment**

Benign giant cell tumours of the flexor sheath present in an identical manner and are indistinguishable from flexor sheath ganglia.

**Heberden’s nodes**

*Heberden’s nodes*  are bony swellings close to the distal finger joints. They are non-specific and do not indicate any particular disease.

**History**

The patient complains of swelling and deformity of their knuckles. There may be a history of an old injury to the finger or aching pains in both the lumps and the joints.

**Examination**

Heberden’s nodes are commonly found on the dorsal surface of the fingers just distal to the distal interphalangeal joint. They are not mobile and can be easily recognized as part of the underlying bone.

The joint movements may be slightly restricted by osteoarthritis, and there may be radial deviation of the distal phalanx. The index finger is the finger most often affected. Small adventitious bursae may develop between the skin and the nodes. Similar nodes may appear near the proximal interphalangeal joint.

**Comment**

Heberden’s nodes do not indicate any specific underlying bone or joint disease and have no clinical significance. They should not be confused with rheumatoid nodules, which are areas of necrosis surrounded by fibroblasts and chronic inflammatory cells and are found in all types of connective tissue. Patients with rheumatoid nodules invariably have other evidence of rheumatoid arthritis.

**Rheumatoid arthritis in the hand**

The symptoms and signs of rheumatoid arthritis are described in Chapter 4, but, as this disease affects the hand so often, its manifestations in the hand are described here. All the deformities of rheumatoid arthritis result from the combination of uneven pull by the tendons and destruction of the joint surfaces.
Abnormalities and lesions of the hand

**Thickening of the joints**
The joints most affected are the metacarpophalangeal and the proximal interphalangeal joints. Swelling of these joints gives the finger a fusiform, spindle shape.

**Ulnar deviation of the fingers**
The fingers are pulled towards the ulnar side of the hand, causing a varus deformity at the metacarpophalangeal joints. In advanced disease the varus deformity can be as much as 45–60°.

**Flexion of the wrist**
The wrist joint develops a fixed flexion deformity and usually some ulnar deviation.

**‘Swan neck’ deformity of the fingers**
This deformity is hyperextension of the proximal interphalangeal joint and flexion of the distal interphalangeal joint. It is caused by fibrotic contraction of the intersosseous and lumbral muscles.

**Boutonnière deformity**
The joint deformities of this abnormality are the opposite of those of the ‘swan neck’ deformity: flexion of the proximal interphalangeal joint and hyperextension of the distal interphalangeal joint.

It is caused by the projection and trapping of the flexed proximal interphalangeal joint through a rupture of the central portion of the extensor tendon expansion.

**Tendon ruptures**
In severe rheumatoid arthritis, any tendon may undergo attrition (damage from friction) and rupture. This causes a variety of deformities. The commonest tendons to rupture are the long extensor tendons of the fingers and thumb.

**Compound palmar ‘ganglion’**
This is a term that is applied to an effusion in the synovial sheath that surrounds the flexor tendons. It is not a ganglion. In the UK it is now invariably secondary to rheumatoid arthritis, but in many other parts of the world it is almost always caused by a tuberculous synovitis.

**History**
The commonest presenting symptom is swelling on the anterior aspect of the wrist and sometimes in the palm of the hand. Pain is uncommon.

The patient may notice crepitus during movements of the fingers.

Paraesthesia may occur in the distribution of the median nerve.

**Examination**
Distension of the flexor tendon synovial sheath produces a soft, fluctuant swelling which can be felt on the anterior aspect of the wrist and lower forearm, and in the palm of the hand. Because the swelling passes beneath the flexor retinaculum, compression
of the lump on one side of the retinaculum makes it distend on the other side.

Crepitus may be felt during palpation and when the patient moves their fingers. This is caused by the presence of fibrin bodies within the synovial sheath – commonly called ‘melon seed bodies’.

There are no local signs of inflammation.

**General examination** All the joints should be examined to exclude rheumatoid arthritis, and the chest should be examined (and X-rayed) to exclude tuberculosis.

### THE NAILS

Inspection of the nails often yields useful information about the patient’s general health.

The nails are usually pale pink. The commonest cause of loss of this colour is anaemia.

Another sign of anaemia in the hands of white-skinned races is loss of skin crease colour. When the hand is relaxed, the palmar skin creases are slightly darker than the rest of the skin, but if the skin of the palm is stretched, the creases turn a deep red. This deep red colour is not visible if the patient is anaemic.

The presence of splinter haemorrhages is an important physical sign because they are usually caused by emboli from a bacterial endocarditis or a fulminating septicaemia. They may also occur in rheumatoid arthritis, mitral stenosis and severe hypertension.

### Clubbing

Clubbing of the nails is a term used to describe the loss of the normal angle between the surface of the nail and the skin covering the nail bed.

If you look at your finger from the side, you will see that the plane of the nail and the plane of the skin covering the base of the nail bed form an angle of 130–170°.

In clubbed nails there is hypertrophy of the tissue beneath the nail bed, which makes the base of the nail bulge upwards and distorts nail growth so that the nail becomes curved. The planes of the nail and the skin covering the nail bed then meet at an angle greater than 180°.

It is possible to have a very curved nail but still have a normal nail/nail-fold angle, so do not look only at the shape of the nail when assessing clubbing: look at the whole finger.

The terminal phalanx may enlarge to make the end of the finger bulbous.

**Splinter haemorrhages**

Splinter haemorrhages are small extravasations of blood from the vessels of the nail bed caused by minute arterial emboli. They are long, thin, red-brown streaks, their long axis running towards the end of the finger. Their colour and shape make them look like splinters of wood beneath the nail.
Spoon-shaped nails
(koilonychia)

A normal nail is convex transversely and longitudinally, the degree of curvature varying considerably from person to person. Loss of both these curves produces a hollowed-out spoon-shaped nail (koilonychia).

When a patient complains that their nails have changed from a normal to a spoon shape, it is very likely that they have developed anaemia following chronic loss of blood, usually from menorrhagia or haemorrhoids.

Subungual haematoma and melanoma

A blow on a nail can cause bleeding beneath it. A collection of blood beneath the nail is called a subungual haematoma. If it appears at the time of the injury, the patient usually makes their own diagnosis and only comes for treatment if it is painful.

Sometimes the patient does not notice the injury and comes complaining of a brown spot beneath the nail. The clinical problem in this case is to decide whether the brown spot is haemosiderin or melanin – a haematoma or a mole.

The features of the spot sometimes help. A haematoma is usually reddish-brown, with sharp edges. A melanoma is brown with a greyish tinge, and has indistinct edges.

Inspection with a small hand-lens may solve the problem by revealing small blood vessels in the lesion, which means it is cellular.

Revision panel 5.3
The signs of clubbing

Increased nail/nail-fold angle
Increased longitudinal and transverse nail curvature
Bulbous terminal phalanges
Spongy nail bed

Revision panel 5.4
Some causes of clubbing

Congenital
Carcinoma of the bronchus
Chronic lung disease
Alveolitis
Bronchiectasis
Cystic fibrosis
Congenital cyanotic heart disease
Ulcerative colitis/Crohn’s disease
Conditions peculiar to the hands

If the patient has watched the lesion for a few weeks, they will be able to tell you if it has moved down the nail with nail growth, or stayed still. Haematomata move down the nail; melanomata do not move.

If it is not possible to make a definite clinical diagnosis, the patient should be managed as if they had a melanoma until you prove otherwise.

Glomus tumour

This is a very rare tumour but is mentioned because it can cause a great deal of pain, and often occurs beneath the nail. It is an angioneuromyoma.

The patient complains of severe pain every time they touch the nail. Examination usually reveals a small, purple-red spot beneath the nail. The colour is due to the angiomatous nature of the tumour; the pain comes from its abnormally rich nerve supply. Glomus tumours can occur in any part of the skin but are most often found in the hands.

Changes in the nails associated with generalized diseases

- Psoriasis: pitting, ridges, poor growth.
- Myxoedema: brittle nails.
- Cirrhosis of the liver: white nails.
- General debilitating illnesses: transverse furrows (Bean’s lines).
- Anaemia: koilonychia.
- Gout (and pseudogout).

Infections in the hand

Infections in the hand cause severe pain and swelling. They are more likely to present in an emergency department than in a routine surgical outpatient clinic, but two varieties are so common that they deserve a description in this chapter.

Paronychia

This is an infection beneath the skin at the side or base of the nail, and which develops into a small abscess.
The patient complains of a painful, tender spot close to the nail that may have throbbed all night and kept them awake. They may remember picking or cutting a piece of cuticle or split skin (hang nail) a few days before the pain began.

The skin at the base and side of the nail is red, shiny and bulging and the whole area is exquisitely tender.

In the early stages the pus collects between the nail and the overlying skin, but later it spreads deep to the nail so that movement of the nail is painful and pus is visible through it.

Paronychia are more common in fingers with a poor circulation.
Chronic paronychia

Normally a paronychia subsides after the pus has drained out, but if there is a foreign body present or the infecting organism is an unusual bacterium or a fungus, the wound may fail to heal and continue to discharge. The patient may then present with a discharging sinus in a discoloured area close to the nail, with unhealthy bluish granulation tissue protruding from it. Biopsy is an essential part of the management of such a case to exclude other conditions such as malignant melanoma and squamous cell carcinoma.

Pulp space infections

These are infections, usually followed by abscess formation, in the subcutaneous tissue which forms the pulp of the fingertip.

They present with throbbing pain, swelling and redness. Sometimes there is a history of a penetrating injury such as a prick with a needle. On examination, there is swelling and tenderness and sometimes a pus-filled blister. If the blister is opened, you will see a hole in the skin leading to the subcutaneous abscess.

If neglected or poorly treated, the skin of the pulp, and the distal phalanx, may necrose.

The only lesion likely to be mistaken for a pulp space infection is a rapidly growing, vascular, secondary tumour deposit in the distal phalanx. Although this will be red, hot and tender, it will progress much more slowly than an infection and not suppurate. There may also be clinical evidence of the primary lesion.