

Examination of the hand for MRCS

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Abstract

Examination of the hand is a key skill for both plastic surgery and orthopaedic surgery trainees alike. There is significant crossover between the two specialities and this article aims to provide a systematic approach to hand examination. It also includes specific pathologies and the special tests that are required to confirm or refute your differential diagnoses from the history. The article works through the anatomy of the hand and then a step by step examination to pick up common elective hand pathologies.

Keywords Anatomy; examination; FRCS; hand; MRCS

Introduction

The examination of the hand can be complicated and split into many different parts. The history that you have taken from the patient is the key to tailoring your examination and making it efficient and effective. There is a complex interplay between the carpal bones allowing freedom of movement while contributing to stability at the wrist. The muscles and tendons allow the fine movement of fingers which allow us to be dextrous and can make it quite debilitating when the hand or wrist is painful secondary to injury or pathology. In this article we are concentrating on elective pathology rather than trauma, but much of the initial examination is the same.

Anatomy

Bony

The bones of the hand and wrist consist of the distal radius, the distal ulna, the carpal bones (which are listed below), the metacarpals and the phalanges (Figure 1).

The metacarpals are best referred to by their names rather than numbers as this can cause confusion, i.e. thumb, index, middle, ring and little metacarpals rather than first, second, third, fourth and fifth metacarpals. The thumb has a proximal and a distal phalanx with a single interphalangeal joint. The fingers have a proximal, middle and distal phalanx with proximal interphalangeal joints (PIPJs) and distal interphalangeal joints (DIPJs).

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Vascular

The main arterial supply to the hand is from the superficial and deep arches which are formed by anastomoses between the radial and ulna arteries. Branching from these arches are the common digital arteries which subsequently divide into digital arteries (Figure 2).

Nerves

The motor and sensory functions of the hand are supplied by three peripheral nerves: radial, median and ulnar. The delineation of their supply will be explained in the examination section.

Muscles and tendons

The motor power of the hand can be split up into intrinsic (muscles within the hand itself) or extrinsic (muscles outside of the hand but with tendinous attachments in the hand). Table 1 lists the different groups.

It is the interplay between these muscles that allows for such fine motor control; imbalance within these muscle groups can lead to deformity and loss of function.

Examination

The traditional way of structuring an orthopaedic examination applies to the hand but it is often helpful to change the order from 'look-feel-move' to 'look-move-feel'. A lot of information can be gained from the inspection of a patient's hands coupled with observing their active movement. This, together with a thorough history will direct your examination further.

Look

Ask the patient to roll up their sleeves to above the elbow. This fully exposes the hands and wrists and allows you to see the elbows which can often provide clues to the origin of the pathology. Ask the patient to flex at the elbow so you can see the extensor surface of the elbow. Rheumatoid nodules or psoriatic plaques may be visible. In this position the symmetry of the hands can also be compared.

Ask the patient to hold out both hands, palms down and inspect the dorsum of the hands. Relevant signs include: deformity, scars, swellings, Garrod's pads, Heberden's nodes, Bouchard's nodes, psoriatic plaques, nail changes and interossei muscle wasting.

Ask the patient to turn their palms face up to inspect the volar surface. With the palms facing up and the patient relaxed the resting posture of the fingers can be appreciated. Relevant signs include: swellings, scars, flexed position of the fingers, Dupuytren's cords in the palm or fingers, thenar and/or hypothenar eminence wasting.

Movement and functional testing

Rather than testing each joint individually, a good screening test is to ask the patient to make a fist and then fully extend the fingers. It then becomes obvious if the fingers cannot reach the palm or have loss of extension. The movement of pathological joints can be measured using a goniometer. The normal values are listed below.

- DIPJ: 0–80 degrees
- PIPJ: 0–100 degrees
- MCPJ: 0–40 (hyperextension) – 90 degrees (flexion).

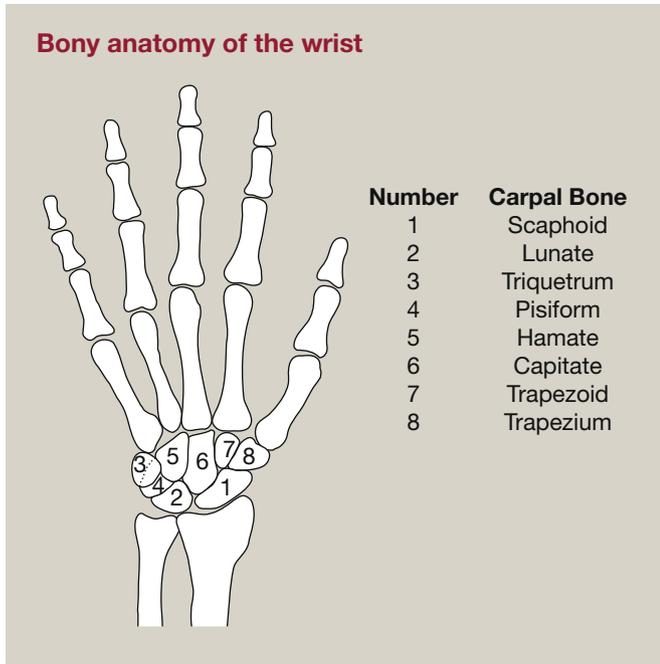


Figure 1

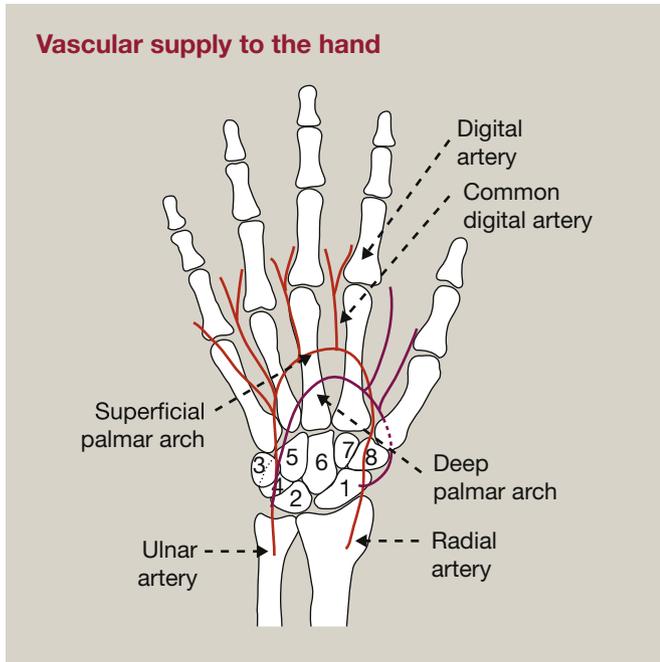


Figure 2

To assess movement of the wrist ask the patient to flex their elbows to 90 degrees and hold the hands with the palms facing each other. This allows you to compare one side to the other in flexion and extension. By making a fist with the thumbs extended the thumb can be used as an indicator to the amount of supination and pronation they can perform with each hand (Figure 3a and b).

Hands need to be functional and a huge amount of information can be gained by asking patients to perform tasks. This will

demonstrate different types of grips and shows the examiner that you are considering what effect the pathology has on the patient's day to day life. Ask the patient to hold a key (side pinch, Figure 4), a pen (end pinch, Figure 5) and pick up a coin off the table (chuck pinch, Figure 6).

Feel

There are certain bony prominences that can be palpated around the wrist and hand. These include the radial styloid, Lister's tubercle, the anatomical snuffbox, the carpometacarpal joint at the base of the thumb, the radiocarpal joint, ulnar styloid, scaphoid tubercle, pisiform and hook of hamate. These are demonstrated in Figures 7–9.

Neurological examination

The hand is supplied by three peripheral nerves: radial, median and ulnar nerves.

The radial nerve supplies the dorsal aspect of the hand over the first web space and the thumb. The median nerve supplies the palmar aspect of the hand over the thenar eminence and the thumb, index, middle and radial half of the ring finger. The ulnar nerve supplies the palm over the hypothenar eminence, the little finger and the ulnar side of the ring finger.

There is a degree of overlap and variation of these zones between individuals but there certain consistent areas which can be tested to document if the sensation of the three main nerves are intact when considering pathology proximal to the wrist.

These consistent testing points are: radial nerve, first web space dorsally; median nerve, radial border of index finger; and ulnar nerve, ulnar border of little finger.

Motor testing is performed by the following actions:

- **Radial:** Ask the patient to point a pretend gun. This utilizes extensor pollicis longus and extensor indicis propius.
- **Median:** Ask the patient to make an OK sign. This utilizes flexor pollicis longus and flexor digitorum profundus to the index finger.
- **Ulna:** Ask the patient to abduct their fingers. This utilizes the interossei.

Special tests

Tinel's test: This test was originally designed to map out the progression of healing after a nerve injury but is often used to delineate pathology. The test is performed to ascertain if there irritation or healing at a specific point of a nerve. The nerve is percussed over the area of interest and if the patient experiences neuropathic sensations travelling peripherally this suggests pathology.

Phalen's test: This is a test for carpal tunnel syndrome. It increases the pressure in the carpal tunnel and exacerbates median nerve symptoms if positive. The test is performed by asking the patient to maximally flex their wrists for 30–60 seconds.

Froment's test (Figure 10): This is a test for ulnar nerve pathology. Ask the patient to hold a piece of paper in between their thumb and index finger while keeping the digits straight. The

Muscles and tendons of the hand

Intrinsic

Lumbricals
 Interossei
 Abductor pollicis brevis
 Flexor pollicis brevis
 Opponens pollicis
 Adductor pollicis
 Opponens digiti minimi
 Flexor digiti minimi
 Abductor digiti minimi

Extrinsic extensors

Extensor carpi radialis longus
 Extensor carpi radialis brevis
 Extensor digiti communis
 Extensor indicis proprius
 Extensor digiti minimi
 Extensor carpi ulnaris
 Abductor pollicis longus
 Extensor pollicis longus
 extensor pollicis brevis

Extrinsic flexors

Flexor carpi radialis
 Flexor carpi ulnaris
 Flexor digitorum superficialis
 Flexor digitorum profundus
 Flexor pollicis longus

Table 1

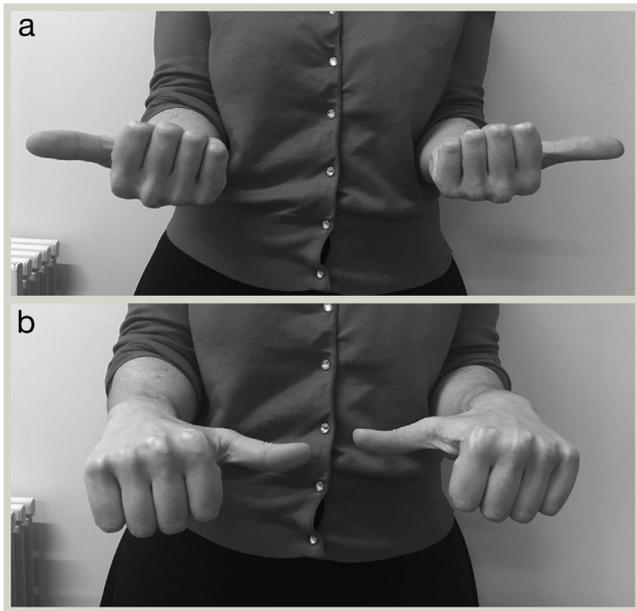


Figure 3 (a) Supination and (b) pronation examination.



Figure 5 End pinch.

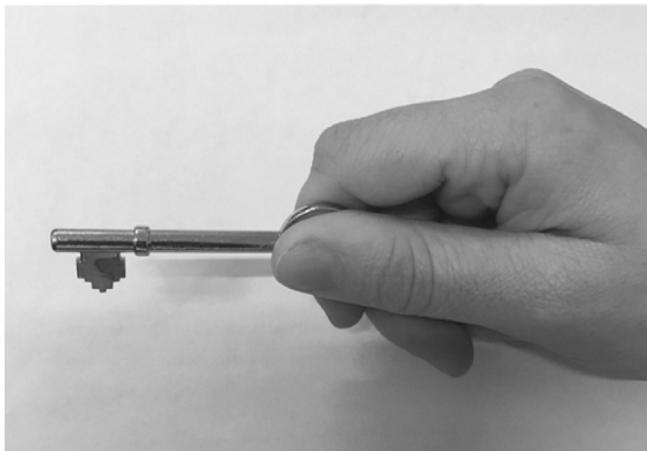


Figure 4 Side pinch.



Figure 6 Chuck pinch.

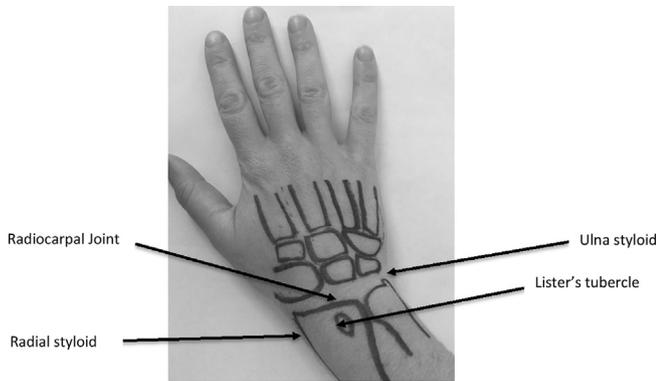


Figure 7 Dorsal surface markings. The radiocarpal joint can be palpated by moving distal from Lister's tubercle.

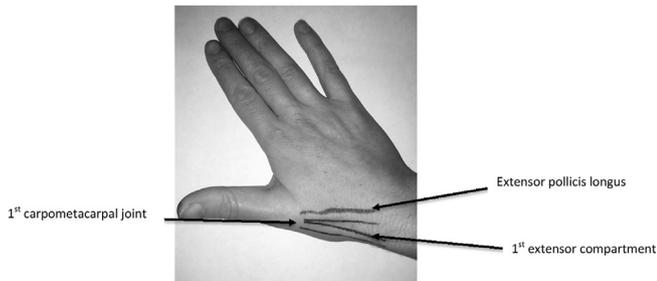


Figure 8 The anatomical snuffbox. The boundaries of the anatomical snuffbox are the extensor pollicis longus tendon and the tendons of the 1st extensor compartment (abductor pollicis longus and extensor pollicis brevis).

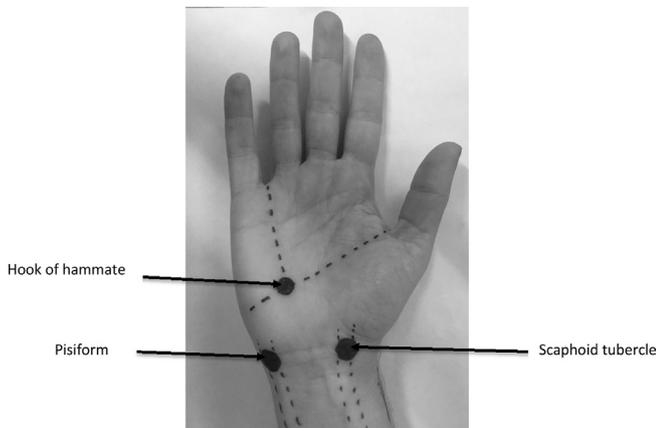


Figure 9 Volar surface markings. The hook of hamate can be found at the intersection of Kaplan's line and a line drawn from the 4th web space. The pisiform can be felt on the ulna aspect of the wrist crease with the tendon of flexor carpi ulnaris leading up to it. The scaphoid tubercle can be felt on the radial aspect of the wrist crease with the tendon flexor carpi radialis leading up to it.

examiner copies the grip of the patient and tries to pull the piece of paper away. The ulnar nerve supplies the interossei that allow the patient to hold onto the piece of paper. If their ulna nerve is damaged they will recruit FPL (supplied by the median nerve) and will pinch the paper instead of clasping it in the web space.

Finklestein's test: This test is performed to help diagnose de Quervain's tenosynovitis. With the patient seated ask them to

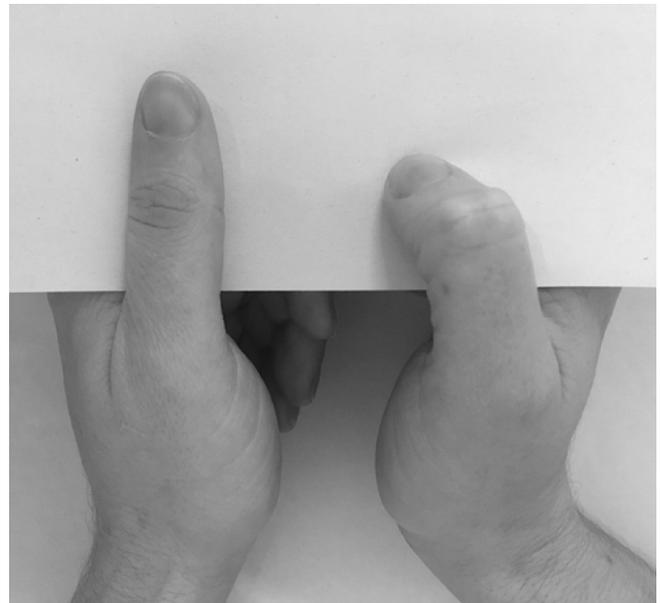


Figure 10 Positive Froment's test.

make a fist with their thumb held inside the fingers. Take the patients fist and forcibly ulnarly deviate the wrist. The patient will find this extremely uncomfortable and will rise from the chair to prevent you from properly performing the test if it is truly positive!

Transillumination: This technique allows you to determine if a swelling is fluid filled. Shine a small torch onto one portion of the swelling and if it is fluid filled the whole cyst will illuminate.

Specific pathologies

Rheumatoid arthritis

There are classic deformities that can be seen in rheumatoid arthritis (RA). These are seen less frequently now that disease-modifying drugs are used. In severe RA, clinical manifestations in the hand include: rheumatoid nodules, caput ulnae, Boutonniere deformities of the thumb and/or fingers, ulnar drift of the fingers at the MCPJs, subluxation of the MCPJs and swan neck deformities of the fingers. Painful joints may demonstrate boggy swellings suggestive of synovitis. Extensor tendon rupture can occur in RA so it is important to test for the function of these. The key to examining rheumatoid hands is to complete the functional assessment as described earlier.

Osteoarthritis

In the fingers Herberden's node can be seen along with mucous cysts at the DIPJ. Bouchard's nodes may be seen at the level of the proximal interphalangeal joint. The patient's range of movement will be decreased and they may not be able to bring their fingertips to the palm when trying to make a fist.

The base of the thumb is a very common site for osteoarthritis, especially at the level of the carpometacarpal joint. If it progresses, the thumb may adopt an adducted posture, closer to the palm with compensatory hyperextension at the level of the MCPJ.

Osteophyte formation at the base of the thumb is closely associated with the carpal tunnel so it is important to test the function of the median nerve in these patients.

Dupuytren's disease

Dupuytren's disease may result in fixed flexion deformities of the fingers. It occurs most commonly in the little and ring fingers but may involve any digit, including the thumb. Visible cords and skin pits may be visible on the palmar side and Garrod's pads may be present dorsally. Heuston's table top test demonstrates if the patient can put their hand flat on a surface. It is important to measure the various flexion deformities with a goniometer and document these. To ascertain whether a patient has an aggressive form of Dupuytren's disease it is worth inspecting the soles of their feet for plantar nodules and asking if there are any signs of Peyronie's disease in male patients as both these conditions may occur in association with Dupuytren's disease.

Carpal tunnel syndrome

This is a common presentation in the hand and often comes up in exams. Inspect the hands side by side, comparing the bulk of the thenar eminences; severe carpal tunnel syndrome may result in atrophy of the thenar muscles supplied by the motor branch of the median nerve. Test the sensation on the radial and ulnar sides of each digit. Test the sensation over the thenar eminence – this is

supplied by the cutaneous branch of the median nerve which comes off proximal to the carpal tunnel. If the sensation here is altered you should consider pathology more proximal than the carpal tunnel. Ask the patient to abduct their thumb and hold it against resistance. Perform Tinel's test over the carpal tunnel followed by Phalen's test.

Conclusion

Although the hand examination can seem daunting it can be broken down into smaller more manageable sections. The key still lies in a thorough history which guides your clinical examination. ◆

FURTHER READING

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