Expert Review  Rheumatological Examination of the Hand

Laura Ingle¹ and Anthony Bradlow²

Abstract  The rheumatological examination of the hand is a common assessment in medical practice, yet it appears to be poorly performed in terms of frequency and accuracy. This paper presents a methodical examination designed to detect underlying pathology as well as evaluate the functional state of the hand. In addition to outlining a structured method of assessment, it describes the common signs that can be detected at each stage of examination and which a doctor can expect to encounter on a general ward or in primary care. It is based on research papers, textbook accounts, the conventions of clinical examinations and clinical experiences.

Key words: clinical examination, hand, rheumatological examination.

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Introduction  The hands have been described as the patient's 'calling card', providing indications of underlying systemic disease [1]. Studies have shown over 40% of inpatients exhibit signs of systemic medical conditions in their hands [2], although there appears to be a discrepancy between the number of patients with clinical signs and the frequency with which the signs are detected [3].

Indeed the examination of the hands is a necessary part of any systematic clinical examination and ought to be performed routinely. This article however will be specific to hand involvement in rheumatological conditions. The orthopaedic examination of the hand is considered in a separate article [4] and is recommended to the reader as an illustration of both the similarities and the subtle differences between the two examinations.

A rheumatological assessment must elucidate information about the underlying arthritic or vasculitic process in a methodical manner [5] as well as providing an evaluation of any functional disability. Structured screening tools such as the GALS locomotor screen [6] have combined these qualities, but doctors and students must also be familiar with the systematic clinical examination specific to the hand.

This article will present a routine for examination focussed on the key adult pathologies likely to be encountered by a foundation doctor on general wards or a medical student in their training (see Table 1). When describing or documenting findings from an examination care must be taken to use the correct anatomical terminology. A concise and comprehensive description is found in the Orthopaedic Examination of the Hand and Wrist [4].

| Rheumatoid Arthritis (RA)  
| Osteoarthritis (OA)  
| Psoriatic Arthritis (PsA)  
| Systemic Sclerosis  
| Systemic Lupus Erythematosus (SLE)  
| Septic Arthritis  
| Crystal Arthropathies (Gout & Pseudogout)  
| Dermatomyositis  
| Dupuytren's contracture |

Table 1  Rheumatological conditions that commonly involve the hands.

Outline  The examination can be considered in three parts: inspection ("look"), palpation ("feel") and manipulation ("move"). The first two stages address the three basic components of the hand: the skin,
soft tissues and bones. For the final stage, ‘move’, there are again three steps: active movement, passive movement and stability. Thus, the rheumatological examination of the hand can be broken down into nine stages.

1) Preparation
As for all examinations, the preparatory steps of washing hands, introducing oneself to the patient and gaining consent to perform the examination must be achieved. It must also be ascertained if the patient is currently experiencing any pain, as this will influence how the examination is performed.

Next, the patient should be positioned sitting comfortably opposite the examiner, and for ease of assessment rest the patient’s arms on a pillow placed across their lap. It is important to have the arms exposed to above the elbow, and any watches or bracelets removed, so as not to impede the next step of the examination – inspection.

2) Look
“Let not your conceptions of disease come from words heard in the lecture room... See, and then reason and compare and control. But see first” [7].

Osler’s guidance is particularly pertinent for rheumatology where much of the formal evaluation can come from visual assessment. This is not to say that a glance will suffice however; inspection must be methodical [8].

Begin by examining the hands as they rest on the pillow on the patient’s lap (see Figure 1). Conventionally the examination commences on the dorsal aspect, before asking the patient to pronate their hands to reveal the volar surface. Comparison is key and can highlight subtle differences that may otherwise go undetected. Having finished inspecting the hands ask the patient to raise their forearms so the elbows can be observed (see Figure 2).

For all three positions, systematically consider the components of the hand: skin, soft tissue and bone.

Skin
Scars – over joints can indicate previous surgery on arthritic joints. Also inspect the anterior aspect of the hand for surgical scars from decompression of the carpal tunnel, as a recognised cause of carpal tunnel syndrome is rheumatoid arthritis (RA).

Skin quality – can be affected by both disease processes and treatments. Tight and thickened skin tapered over the fingertips suggests systemic sclerosis (SS). This can evolve to cause contractures and marked deformities of the hand. Scaly silver plaques on extensor surfaces, particularly the elbows, may reflect psoriatic arthritis (PsA). Protracted treatment with corticosteroids causes thinning of the skin and bruising. Vasculitis, occurring in RA or systemic lupus erythematosus (SLE), can cause finger-pulp infarcts (see Figures 3a and 3b).

Figure 1 Position of arms and hands for initial inspection

Colour changes – redness may reflect underlying inflammation; one of Celsus’ four cardinal inflammatory signs [9]. Also assess for the triphasic hues of Raynaud’s phenomenon, ranging from ischaemic white, through the blue of cyanosis, to throbbing red reactive hyperaemia (see Figure 4) [10]. It is important to establish the presence of Raynaud’s phenomenon if considering a diagnosis of SS, as its absence makes such a diagnosis highly unlikely; over 95% of patients with SS have Raynaud’s Phenomenon [11]. Impressive and long-lasting blanching of the knuckles on clenching the fists is a pointer to Raynaud’s Phenomenon even in a warm room.
Figure 2  Position of arms and hands for inspection of elbows

Roughened red papules on the extensor surfaces of phalanges (Gottron’s papules) occur in dermatomyositis. Telangiectasia situated on palms and in nail folds are characteristic of SS [10]. Thick, cracked skin over the tips and sides of the fingers, otherwise unexplained, may raise suspicions of “mechanic’s hand”; a distinctive sign of the rare yet memorable tRNA synthetase syndrome [12].

Soft tissue
Nail changes — reflect underlying disease processes. Of particular note are the psoriatic signs, as 90% of patients with PsA will have typical nail changes [13]. These include onycholysis (lifting from the nail bed), pitting and longitudinal ridging. In addition, nails may reveal the nail fold infarcts of vasculitides, or dilated nail fold capillaries typical of SS and dermatomyositis. These can be seen with the naked eye, though are more easily visible through an ophthalmoscope set at 40 dioptres abetted by the use of lubricant gel as a magnifying agent [14].

Subcutaneous deposits — calcification in the pulp of the fingers is a feature of limited cutaneous systemic sclerosis, previously called CREST syndrome (Calcinosis, Raynaud’s phenomenon, Esophageal dysmotility, Sclerodactyly, Telangiectasia). White subcutaneous deposits located asymmetrically around joints are more likely to be tophi associated with gout. However, tophi may occur at atypical sites (for example the fingertips) particularly in elderly patients receiving diuretics [15].

Muscle wasting — may be evident, caused by lower motor neuron lesions (see Table 2) or reduced movement of damaged joints. The pattern of wasting should be noted.

Soft tissue swelling — Generalised puffiness is a common, non-specific sign in the early stages of connective tissue diseases. Synovial hypertrophy occurs in RA and noting the site of the inflammation is important for diagnosing complications. For example hypertrophy on the dorsum of the wrist can lead to rupture of extensor tendons, whereas on the palmar aspect it may cause carpal tunnel syndrome [15]. Diffuse cylindrical swelling of one or two digits (dactylitis), can be due to swelling specifically of the flexor tendon, as occurs in PsA (see Figure 5) [13].

Figures 3a and3b  Rheumatoid vasculitis with flea-bite changes and nodules (© Dr R Luqmani 2007).
Mononeuropathies – Involvement of one nerve

Causes: distal nerve entrapment is seen in RA. This frequently affects median nerve (carpal tunnel syndrome) and ulnar nerve.

Mononeuritis Multiplex – Peripheral nerve involvement in an asymmetric manner

Causes: RA, vasculitides such polyarteritis nodosa & Wegener's granulomatosis.

Polyneuropathy – Symmetric involvement of multiple nerves

Causes: Amyloidosis.

Table 2 Common rheumatological causes of lower motor neuron lesions. These include nerve root and plexi lesions (e.g. compression neuropathies) and, more frequently encountered, peripheral nerve lesions.
Figure 6  Joint distribution of Rheumatoid Arthritis. Rheumatoid Arthritis involves the wrists (at an early stage) and the small joints of the hand symmetrically. In particular it affects the proximal interphalangeal (PIP) joints and the metacarpophalangeal (MCP) joints, notably the thumb MCP joints. There is sparing of the distal interphalangeal (DIP) joints.

Figure 7  Joint distribution of Osteoarthritis. Primary OA involves many joints of the hand. Classically affects the PIP, DIP, 2nd and 3rd MCP and 1st CMC joints, with sparing of the other MCP joints. There can also be wrist involvement.

3) Feel
The nature of any swelling can now be ascertained through palpation of the three components of the hand. Inflamed joints are painful and must be examined gently. Many doctors advocate watching the patient’s face throughout palpation in order to observe signs of discomfort and prevent further pain.

Skin
Temperature – Localised warmth can indicate inflammation, whereas cold extremities may be caused by Raynaud’s phenomenon. Increased temperature is best felt by palpating across the area with the back of the hand. A hot, painful erythematous joint must be considered septic until proven otherwise and accordingly managed as an emergency. The site alone can not be used to diagnose a septic joint, as polyarticular septic arthritis is not uncommon.

Sensation – A simple assessment of sensation can be achieved by comparing the hands to each other and to a reference point e.g. the skin on the patient’s forehead. A gross measurement is all that is needed initially as any abnormalities can be more formally evaluated by two-point discrimination and modality assessment.

Begin by testing for loss of sensation in the fingertips (peripheral neuropathy; a feature of RA). Next, the sensory distribution of the median, ulnar and radial nerves should be evaluated as RA may also produce mononeuropathies through compression or, more rarely, vasculitic involvement of the vasa nervorum [16].

The median nerve can be tested over the palmar surface of the index finger, the ulnar nerve over the little finger, and the radial nerve at the dorsum of the base of the thumb (see Figures 9 -10).

Abnormalities of the median nerve should raise the question of carpal tunnel syndrome being present and prompt the performing of Tinel and Phalen’s tests (see Table 5) [19].
Soft tissue
It is important to attempt to distinguish between the various structures that comprise soft tissue, for example subcutaneous tissue, bursae, muscle and tendons.

Pitting oedema – and bogginess of subcutaneous tissues overlying a joint is a sign of acute inflammation and may occur in early RA [15].

Bursae – or fluid effusions may produce a tense swelling around the joint. These can be distinguished from other enlargements by the ability to squeeze fluid from one side of the joint to the other.

Tendons – can become palpably thickened and nodular in early-stage RA, sometimes preceding the deforming joint changes.

Joint capsule thickening – is confined to the anatomical boundaries of the joint. It feels doughy and can be best felt by pinching the soft tissues gently and rolling the synovium over the joint.

Bone
Gently squeeze across the joints in a methodical order, assessing for the nature of any swelling present. Each metacarpophalangeal (MCP) and interphalangeal (IP) joint must be palpated in turn (see Figure 11) and compared to the opposite side. This is best done by holding the joint between your thumb and forefinger and palpating gently. It is difficult to distinguish between the individual joints comprising the wrist however and so is acceptable to consider it as a single joint and examine it in the same manner (see Figure 12).

If the swollen joint feels soft, warm and diffusely tender it is usually due to acute synovitis. If it is hard it is usually due to bony overgrowth e.g. from osteophytes. A fluctuant joint is most likely due to an effusion. Localized tenderness can be caused by an inflamed node.

There is a time-honoured belief that pain out of proportion to the degree of synovitis present (i.e. severe pain accompanied by arthralgia rather than florid arthritis) favours a diagnosis of SLE. However, fulfilling the ARA criteria for SLE is a far more accurate diagnostic tool than disproportionate pain. Indeed, no signs can be safely interpreted in isolation from the patient’s history and full examination; hand-signs in the examination setting only offer a range of possibilities.
4) Move

By this stage of the examination it is likely that the examiner will have detected the presence of a rheumatological condition and furthermore have a possible diagnosis in mind. That is not to say that the third step of the assessment is unimportant. It provides significant information about the functioning of the hand and reveals an insight into the effects the pathology may have on the patient’s day-to-day functioning.

Active

Active movement may be limited by damage to articular surfaces, muscle weakness and tendon involvement. Before beginning the tasks, the patient should be asked to report any pain they experience, describing when it comes on and when it ends. The pattern of pain is of diagnostic significance. Pain in most or all directions is the most sensitive sign of synovitis. Pain in one plane of movement is more characteristic of a localized intra- or peri-articular lesion [15].

In addition to pain the patient may describe stiffness, which is related to fluid retention in the peri-articular tissues and an indication of the inflammatory processes.

To gauge what active movements are possible, begin by asking the patient to roll up their hand, from fully extended fingers to full flexion. Signs of musculoskeletal disease include an increase in reaction time, decreased speed of movement and poor coordination [20]. The intrinsic muscles of the hand must also be assessed, through flexion of the MCP joints whilst the IP joints are extended (the action of the lumbricals) and abduction of the fingers (dorsal interossei).

As well as demonstrating decreased movement of joints already noted to have musculoskeletal disease, new pathologies may be detected during active movement. For example, synovial infiltration of the flexor tendon sheaths in RA often causes a trigger finger.

Perhaps with the hand more than any other part of the body, functional movements need to be formally evaluated. In keeping with ‘rule of three’ governing the rheumatological examination so far, there are a triplet of basic functional grips to examine (see Table 6 and Figures 13 – 15). Further description of a variety of functional grips can be found elsewhere and the reader is referred to The Orthopaedic Examination of the Hand for this information [4].
Figure 13 The Power Grip. The patient grips the examiner’s index and middle fingers, held out straight.

Figure 14 The Pinch Grip. The patient holds a key or a piece of paper between their thumb and index finger.

Figure 15 The Precision Grip. The patient touches the tip of the thumb to each fingertip in turn.

Passive
During this stage is it imperative to watch the patient’s face throughout so as not to take the range of movement beyond the active range and inflict pain. The range of movement is determined by the anatomical construction of the joint, which may well be altered by the disease process (see Table 7) [21].

During the movement crepitus may be palpated (the sensation of creaking) and can be a sign of damage to the bearing surfaces. Characteristically crepitations are coarse in OA and fine in RA [14].

Stability
Joint stability is provided through a combination of dynamic stability (muscle power) and static stability (ligaments and intact joint surfaces).

Dynamic stability is tested by asking the patient to perform a movement against examiner-resistance. In particular the stability of the MCP joints should be assessed if RA is suspected, as these frequently sublux in advanced RA. To test for this the examiner should provide resistance at the proximal phalanx of each finger in turn, whilst the patient attempts to extend the MCP joint (see Figure 16). A subluxed joint will demonstrate considerable movement during this manoeuvre.
Figure 16  Examination for palmar subluxation at metacarpophalangeal joints. The patient is attempting to flex and extend the middle finger at the MCP joint. Whilst supporting the patient with their left hand, the examiner is providing resistance to the middle finger with their right hand.

Muscle power can also be evaluated whilst providing resistance to movement. In advanced rheumatological diseases weakness and atrophy may be apparent, usually in muscles adjacent to the affected joints. Muscle tenderness is uncommon, except in inflammatory muscle disease (such as acute polymyositis) [19].

Static stability is measured through gently stressing the joint in directions controlled by a ligament, again whilst watching the patient’s face so as not to hurt them. Minimal force is required here, to prevent the patient’s muscles from going into spasm.

5) Completion

Despite the conclusion of the examination of the hand, the rheumatological examination itself is not yet finished. If positive findings have been made it is necessary to follow these up by offering to examine any other appropriate joints or systems. Indeed, no signs can be safely interpreted without obtaining a comprehensive history and performing a thorough examination.

Finally, as always, the patient should be thanked and their comfort ensured, for example through helping back to their chair or a waiting room. The examiner should end by washing their hands and presenting their findings.

Conclusion

This article describes the commonly-used routine for the rheumatological examination of the hand. By approaching the examination in this methodical manner the clinician will not only detect features of any underlying pathology but also (and just as importantly) be able to evaluate the impact of disease on the functioning of the hand.

Acknowledgements

Images courtesy of Dr Raashid Luqmani, Consultant Rheumatologist, Nuffield Orthopaedic Centre, Oxford.

Conflicts of Interest

None declared.

References


Psoriatic arthritis – Different types of PsA are recognised:
1. Asymmetric oligoarthritus – involves one or two joints of the fingers and toes in addition to large joints
2. Symmetrical polyarthritis – similar distribution to RA.
3. Psoriatic spondylitis – sacroilitis
4. DIP involvement – resembles OA but with psoriatic nail changes
5. Arthritis mutilans – a destructive form of arthritis, which can cause telescoping of joints.
6. Dactylitis of toes and sometime fingers.

SLE – Small joints commonly involved in a symmetrical manner. However, there is usually little objective synovitis.

Gout – when occurring in the hand tends to affect the MCP joint. In elderly patients the DIP joints may be involved, and in some instances the wrists can be affected too.

Septic arthritis – usually single joint involvement, though polyarticular septic arthritis is not uncommon.

Table 3 Joint distribution of common rheumatological conditions.

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Table 4 Joint deformities of common rheumatological diseases.

<table>
<thead>
<tr>
<th>Rheumatoid Arthritis</th>
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<tbody>
<tr>
<td>Swan-neck deformity: flexion of the DIPJ and hyperextension of the PIPJ</td>
</tr>
<tr>
<td>Boutonniere deformity: extension at the DIPJ and flexion of the PIPJ</td>
</tr>
<tr>
<td>Z-thumb: flexion of the first MCPJ and hyperextension of the IPJ</td>
</tr>
<tr>
<td>Ulnar deviation of the fingers at the MCP joint</td>
</tr>
<tr>
<td>Volar subluxation of metacarpals: partial dislocation of the MCPJ giving the appearance of ‘dropped’ fingers.</td>
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<tr>
<th>Osteoarthritis</th>
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<tr>
<td>Heberden’s nodes: small bony nodules on the dorsum of the DIP</td>
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<tr>
<td>Bouchard’s nodes: small bony nodules on the dorsum of the PIP</td>
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<th>Psoriatic Arthritis</th>
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<tr>
<td>6 types of joint involvement and deformities.</td>
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<th>SLE</th>
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<tr>
<td>Jacou’s arthropathy: a deforming arthropathy caused by ligament and capsule laxity.</td>
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</table>

Table 4 Joint deformities of common rheumatological diseases.
Tinel’s test (“Tinel’s = tapping”) (Jules Tinel (1879 – 1952), French Neurologist)

Elicitation: Position the patient’s hand palm upwards and tap over the median nerve as it passes through the carpal tunnel in the wrist (surface landmark: proximal skin crease). Tap along the course of the carpal tunnel into the palm to see if any symptoms result. This is ideally performed with a Queen’s Square patellar hammer but can also be done with fingertips if a hammer is unavailable.

Positive response: A sensation of tingling in the distribution of the median nerve over the hand

Phalen’s test (Phalen’s = feeling) (George Phalen (1911 – 1998), American Orthopaedic surgeon)

Elicitation: Allow the patient’s wrists to fall freely into maximum flexion and maintain the position for 60 seconds or more, for example by asking the patient to press the dorsal aspects their hands together (the inverted praying position).

An alternative method is to press the median nerve at the carpal tunnel for 60 seconds with a finger or thumb tip; a better way if the patient has wrist arthritis rendering it too painful to flex the wrist.

Positive response: A sensation of tingling in the distribution of the median nerve over the hand.

Table 5  Tinel’s Test and Phalen’s Test

<table>
<thead>
<tr>
<th>The Power Grip</th>
<th>Holds items steady with the wrist in partial extension to optimise the action of the finger flexors.</th>
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<tbody>
<tr>
<td>The Pinch Grip</td>
<td>Holds objects between the pulp of the thumb and the radial side of the middle phalanx of the index finger (as used when holding a key).</td>
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<tr>
<td>The Precision Grip</td>
<td>Picks up objects between the pulps of the thumb and the finger. It requires both a stable thumb to oppose the digits and intact sensation in the fingertips.</td>
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</tbody>
</table>

Table 6  Basic functional grips of the hand

<table>
<thead>
<tr>
<th>Digit</th>
<th>Joint</th>
<th>Active movement</th>
<th>Maximum range of movement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fingers</td>
<td>MCP</td>
<td>flexion</td>
<td>90° (most at index, least at little finger)</td>
</tr>
<tr>
<td></td>
<td>MCP</td>
<td>extension</td>
<td>30°</td>
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<tr>
<td></td>
<td>PIP</td>
<td>flexion</td>
<td>110°</td>
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<td></td>
<td>DIP</td>
<td>flexion</td>
<td>70°</td>
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<tr>
<td>Thumb</td>
<td>MCP</td>
<td>flexion</td>
<td>90°</td>
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<tr>
<td></td>
<td>MCP</td>
<td>extension</td>
<td>15°</td>
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</table>

Table 7  Range of movements of normal joints