Essentials of musculoskeletal examination

Many doctors feel uncomfortable when examining the musculoskeletal system.

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Many health professionals are uncomfortable about the examination of the musculoskeletal system. The source of their discomfort is a result of the paucity of time devoted to rheumatology in the medical curriculum at undergraduate and postgraduate levels of instruction.[1-4] Most general physicians become competent in the cardiopulmonary examination and are happy to teach these examination techniques during ward rounds and tutorials around the bedside. The same confidence is acquired in relation to the abdominal and gastrointestinal examination. However, patients with rheumatic (or neurological) complaints are referred to rheumatologists (or neurologists) without an attempt to assess the underlying source of the symptoms or signs.

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Rheumatology is a medical discipline, but the teaching of musculoskeletal examination is relegated to the orthopaedic surgeon. Unfortunately, the surgeon is mainly concerned about ascertaining whether there is any need for surgical intervention, either immediately or in the future. As a result, the focus of their assessment is directly related to determining the state of bone and cartilage, i.e. damage to the joint. The rheumatologist, on the other hand, is concerned with localising the exact source of the pain in an effort to provide appropriate relief and prevent damage to the joint. The rheumatological evaluation is directed at determining whether the pain is being referred from another site, or arising locally from the inert structures (bone and cartilage) or the contractile structures (ligaments, tendons, entheses, bursa, capsule, etc.).[5] The commonest error is the attribution of pain from extra-articular (contractile) structures as originating from the joint itself (inert structures).

The approach to the musculoskeletal examination involves a number of important objectives, as follows:

- Routinely consider musculoskeletal features in the history and examination of patients using the 'GALS' system.[6]
- What is the nature of the presenting complaint?
- Is it an isolated event or is it part of an underlying disease?
- Is it inflammatory, degenerative, non-articular or related to another system (referred pain)?
- Are there any extra-articular manifestations?

History

The history, physical examination and special investigations combine in the evaluation of the above steps. One should routinely ask about musculoskeletal symptoms using the 'GALS' system: G = gait; A = arms; L = legs; S = spine.[6] If a problem is identified with this screening process, this needs to be taken further. Mono-articular symptoms affect a single joint area, pauci-articular implies that 2 - 4 joints are involved, while poly-articular refers to 5 or more joints being involved. There are useful guidelines for the approach to these presentations in clinical practice.[7] In inflammatory joint disease (IJD) symptoms are generally worse following a period of physical inactivity (in the morning), while the symptoms of degenerative joint disease (DJD) are usually worse after physical activity (in the evening). Stiffness (with or without pain) is characteristic of IJD while pain (with or without stiffness) is the distinguishing feature in DJD. Inactivity stiffness (usually lasting <30 minutes) is not uncommon in patients with DJD and may be misleading to the inexperienced clinician. The stiffness due to IJD usually lasts for >60 minutes. Patients with non-articular disease may have symptoms which overlap with IJD and DJD. The most useful symptom associated with referred pain is the presence of paraesthesiae. However, this is not always present and may sometimes be seen in patients with fibromyalgia. Additional aspects of the history which may help the clinical evaluation include the presence (or absence) of constitutional features such as the time to onset of fatigue, lethargy, weight loss, fevers, Raynaud's phenomenon, symptoms due to anaemia, skin rash, symptoms of sexually transmitted infection (STI) or diarrhoea, etc. Some of these symptoms need to be clarified further in that, for example, systemic lupus erythematosus (SLE) is characterised by photosensitivity and distribution in the butterfly region, whereas psoriatic arthritis (PsA) and Reiter's disease have a rash affecting the palms and soles (among other sites) which is characteristically keratotic (e.g. keratoderma blenorrhagicum). Other extra-articular symptoms may be related to pleural or pericardial effusions. Symptoms of pain and weakness should alert the clinician to consider polymyositis and/or dermatomyositis. As you will gather from Dr Du Toit's article in this issue of *CME*, eye involvement may be the presenting feature in rheumatoid arthritis (RA), but it may also be affected in SLE, Reiter's disease and ankylosing spondylitis (AS). In patients with AS, symptoms revolve mainly around the spine, causing low back pain (LBP) or neck pain. Thoracic backache should alert the clinician to consider fracture, metastases or aortic aneurysm. The duration of symptoms is also important. Acute gout is characterised by a rapid onset of pain and swelling, reaching its peak over 24 hours and then gradually subsiding. RA is characterised by a slower onset involving multiple joints and needs to be ongoing for at least 6 weeks. The diagnosis of early RA (<1 year) has been improved by the 2010 revised ACR criteria for classification of RA.[8]

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Examination

On examination the 'GALS' system is once again applied to identify a musculoskeletal problem. One should perform a quick screen of movement in the different areas (arms, legs, spine) and see the patient walk. One is looking for deformities (very rare in early RA), such as ulnar drift, soft-tissue or bony swelling, subluxations or dislocations at several articulations, tenderness, redness and other features of inflammation. The main focus is on determining a pattern of joint involvement. In osteoarthritis (OA) of the hands there is bony swelling of the distal interphalangeal (DIP) joints (Heberden's nodes) and/or the proximal interphalangeal (PIP) joints (Bouchard's nodes) as well as the first carpometacarpal (CMC) joint, usually symmetrical. In RA of the hands there is soft-tissue swelling of the PIP joints and metacarpophalangeal (MCP) joints. The DIP joints are virtually never involved in RA, but inflammatory changes at this site may be

seen in psoriatic arthritis (PsA) or gout. At the wrist, RA leads to soft-tissue swelling around the radiocarpal joint and may result in prominence of the ulna styloid and the dinner-fork deformity (due to volar subluxation of the carpus in relation to the radius). The Tinel and Phalen sign must be assessed for carpal tunnel syndrome. Primary OA never involves the wrist, elbow or shoulder. Swelling of these joints should alert one to the likelihood of RA, gout or chondrocalcinosis. Spinal disease is extremely uncommon in RA, except in the late stages. In AS, however, spinal disease generally occurs early and will result in decreased movement in all planes together with tenderness at sites of ligament insertion into bone (enthesitis). Peripheral joints may be involved in patients with AS, reactive arthritis or PsA. General examination includes an assessment of all the systems as this may help in deciding whether the musculoskeletal complaint is secondary to a more general medical problem or part of a rheumatic disease. Polymyalgia rheumatica (PMR) is characterised by clinical findings mainly in the shoulder and hip girdles, while in fibromyalgia syndrome (FMS) the main findings are the identification of tender points in the absence of inflammation. Each individual articulation needs to be separately assessed to ascertain the exact source of pain and this will be elaborated later. Rash must be looked for and psoriasis may be confined to the hairline, scalp, umbilicus or anal cleft. This may be missed if not actively considered. Discoid lesions may occur in the palms or fingers, in the ears and on the scalp. SLE causes a very typical butterfly rash which may be erythematous in the inflammatory phase or hyperpigmented in the post-inflammatory stage. Dermatomyositis causes a heliotrope rash around the eyelids, the shawl sign, typified by a rash around the neck and Gottron's papules over the PIP and MCP joints. These should all be looked for in the patient with musculoskeletal symptoms.

Special investigations

These are useful for establishing the diagnosis (auto-antibodies/uric acid), quantifying inflammation (CRP/ESR), screening for drug toxicity (LFT, FBC), extra-articular manifestations, as seen in RA and SLE, CPK if you suspect idiopathic inflammatory myopathy (IIM). Radiological changes in RA usually occur after 6 - 8 months of IJD and X-rays may be normal in the early stages. The same applies in patients with gout. Magnetic resonance imaging (MRI) and ultrasound of the small joints may show changes in RA before the X-rays become abnormal. Early sacro-iliitis can only be diagnosed with MRI and patients with early AS may have normal S-I joints on X-ray. Compression ultrasound may confirm the diagnosis of deep-vein thrombosis (DVT) in the patient with antiphospholipid syndrome (APS). In these patients anti-cardiolipin antibody (ACL) and beta-2 glycoprotein I may be positive.

Individual joint/articulation

The information provided above is useful in making a diagnosis of an underlying rheumatic disease. However, it does not help one in the evaluation of the local problem with respect to the source of the pain. For example, pain in the left shoulder in a patient with RA could be due to synovitis of the shoulder (affecting the inert structure leading to damage), a supraspinatus tendinitis (affecting a contractile structure outside the articular surfaces) or it could be referred from the heart if the patient has ischaemic heart disease due to premature atherosclerosis, which occurs in patients with RA. A careful physical examination of the involved joint is crucial in making these distinctions. Many patients are referred to an arthritis clinic with a diagnosis of 'shoulder OA' or 'frozen shoulder', when the diagnosis is, in fact, supraspinatus tendinitis. The exact localisation is important, as it has therapeutic and prognostic implications for the patient. The use of an algorithm helps one to differentiate the various sources of pain, as outlined in Fig. 1. The examination should start with active abduction.

One should routinely ask about musculoskeletal symptoms using the 'GALS' system: G = gait; A = arms; L = legs; S = spine.

Scenario 1: If there is no pain and no limitation, the likelihood of referred pain is high but not absolute. The pain may still be coming from a contractile structure not

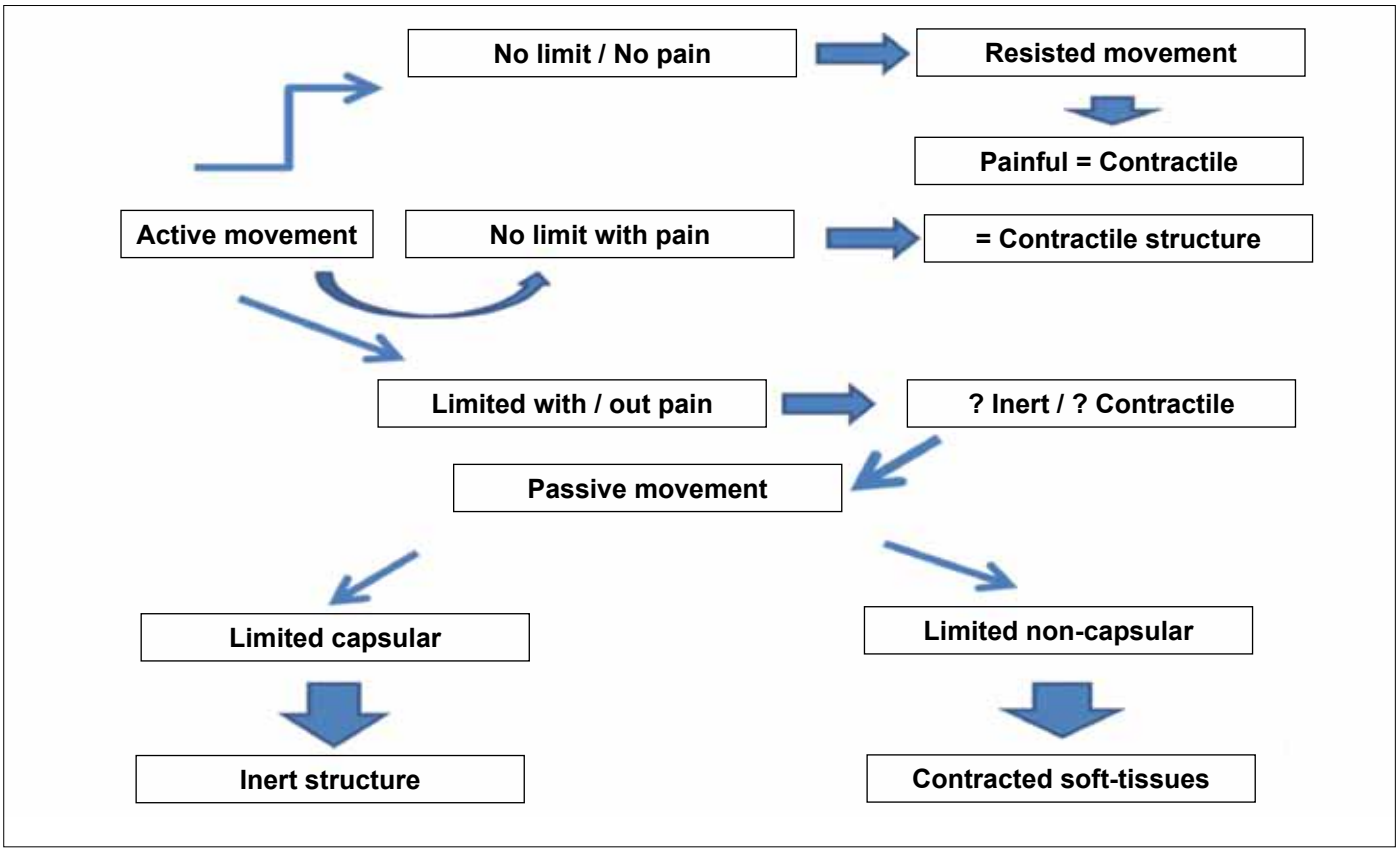

Fig. 1. Essentials of musculoskeletal examination.

Table I. Different capsular patterns of limitation of passive movement in articulations at the different joint areas (the shoulder and hip joints are complex joints containing several articulations)

Joint examined	Capsular pattern of limitation
Shoulder	External rotation > abduction > internal rotation
Hip	Internal rotation > abduction > external rotation
Knee	Flexion > extension
Elbow	Flexion > extension
Wrist	Flexion = extension
Lumbar spine	Limitation in all planes
Cervical spine	Limitation in all planes except flexion

Table II. Diagnosis of hypermobility syndrome is based on finding a score of 4 or more when the different areas are examined for their range of motion

Joint area	Score
Extension of little finger beyond 90 degrees	1 for each
Extension of elbow beyond 10 degrees	1 for each
Extension of knees beyond 10 degrees	1 for each
Thumb touches volar portion of wrist in flexion	1 for each
Palms touch flat on floor without bending the knees	1 point only
Total	9 points

IN A NUTSHELL

- Teaching about musculoskeletal diseases and examination techniques is generally neglected in the medical curriculum.
- Careful clinical evaluation may obviate the need for expensive and unnecessary radiological investigations.
- Pattern recognition is important in identifying rheumatic syndromes and diseases.
- Emphasis is on early diagnosis and institution of therapy for diseases like RA.
- The 'GALS' system is a useful screening tool for musculoskeletal problems from the history and examination.
- For the individual joint a careful clinical assessment is needed to localise the source of pain – referred v. articular v. non-articular.

being stressed by the simple movement. The next step is to do the movement against resistance. If this is painful, then referred pain can be excluded.

The main focus [on examination] is on determining a pattern of joint involvement. Primary OA never involves the wrist, elbow or shoulder.

Scenario 2: If there is no limitation but pain, especially at the end of range, the source of the pain is a contractile structure.

Scenario 3: If there is limitation, with or without pain, the challenge is now to ascertain whether the source of pain is the inert structures or the contractile structures. One would now proceed to passive movement, which will result in the following scenarios:

Scenario 3a: Passive movement not limited. This implies that the contractile structures are the source of pain and discomfort, but neurology must be excluded. This may include rupture of a tendon.

Scenario 3b: Passive movement limited. In this situation the physician needs to ascertain the pattern of limitation, which is either 'capsular' or 'non-capsular'. Each articulation has its specific capsular pattern of limitation and the important patterns are outlined in Table I. At the shoulder, the capsular pattern of limitation of passive movement is present when external rotation (ER) is more limited than abduction (ABD), which is more limited than internal rotation (IR).

Scenario 4: Capsular pattern of limitation at shoulder. This implies that the pathology is at the gleno-humeral articulation. It could be inflammatory or degenerative.

Scenario 5: Non-capsular pattern of limitation, e.g. ER=ABD=IR. This implies that a contractile structure has become contracted and would be consistent with a diagnosis of frozen shoulder (adhesive capsulitis). The same applies to other deformities such as a flexion deformity at the knee or elbow.

Peripheral joints may be involved in patients with AS, reactive arthritis or psoriatic arthritis (PsA).

While the algorithm concentrates on limited range of movement, some patients may have excessive range of movement at the joint due to hypermobility syndrome. Patients with this syndrome, defined by the presence of 4 or more points (Table II), are predisposed to tendon rupture, premature OA and diffuse aching (FMS). The patient should be counselled about these.

References available at www.cmej.org.za