Rheumatology

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Osteoarthritis update

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Background

Osteoarthritis (OA) is by far the most common cause of joint disorder and more prevalent than all other forms of arthritis combined. It is frequently encountered by physicians of all specialties and is a common cause of comorbidity. The sites most often targeted by OA are the hand, knee, hip and spinal apophyseal joints. It is strongly age-associated and is unusual in people under the age of 50, whereas in older people knee OA is the single most common cause of disability. With the increasing proportion of elderly in the community it represents a major healthcare challenge.

Causes and natural history

Osteoarthritis is restricted to synovial joints and has no systemic component. The two key pathological features are localised loss of hyaline articular cartilage and adjacent bone remodelling. These show on radiographs as focal joint space narrowing, bony sclerosis and new bone formation especially at the joint margin (osteophyte). OA is a metabolically active, dynamic process that involves all the joint tissues.

OA reflects the inherent repair processes of synovial joints that may be triggered by a variety of extrinsic and intrinsic insults (Fig 1) affecting any component of the integrated joint (cartilage, bone, synovium/capsule, ligament, muscle). In general, OA is a slow repair process, resulting in structurally altered but asymptomatic joints (hence the common presence of asymptomatic structural and radiographic OA). In some cases, however, the repair process cannot compensate, resulting in continuing remodelling and anatomical change and a stronger association with symptoms and functional impairment (ie symptomatic OA).

Risk factors

Multiple risk factors for the development and/or progression of primary OA are recognised[1] and broadly divisible into: (1) generalised, constitutional and (2) local, largely biomechanical (Table 1). The importance of individual risk factors varies between joint sites. Furthermore, risk factors for the development of OA may differ from those for disease progression and poor outcome.

Traditionally, OA was divided into primary and secondary forms depending on the recognition of an apparent major risk factor such as joint trauma. However, such division results in a large 'primary' group and is overly simplistic since it is now recognised that there is interaction between constitutional and local risk factors. For example, post-meniscectomy OA is more prevalent and severe in those with generalised nodal OA. Importantly, many environmental/lifestyle risk factors are potentially reversible (such as obesity and muscle weakness) or avoidable (eg occupational joint trauma), with important implications for secondary and primary prevention. Occupations that at least double the risk of OA, and therefore are approved for industrial compensation in the UK, include coal mining (knee OA) and farming (hip OA).

Heritability

Strong heritability (ca 40–60%) has been demonstrated for OA of the hand, knee, hip and spine. This genetic susceptibility results from multiple genes, currently unidentified, rather than a single gene defect.[2]

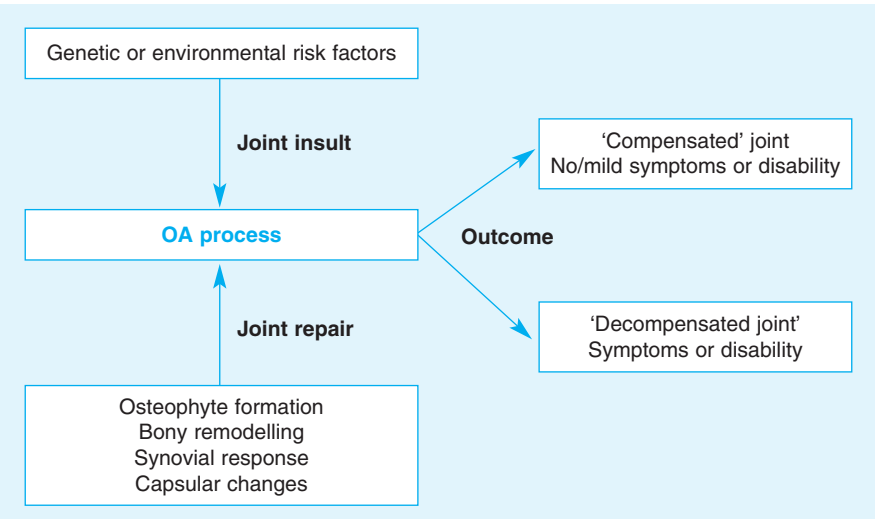

Fig 1. Osteoarthritis (OA) as a process of insult and repair.

Table 1. Risk factors for osteoarthritis.

	Hand	Hip	Knee
Generalised predisposition:			
Increasing age	+++	++	+++
Gender	F > M	F = M	F > M
Obesity	+	+	+++
Heredity (as yet unidentified genes)	++	++	++
High bone density	+	++	++
Localised/mechanical factors:			
Joint laxity/malalignment	+ (thumb)	–	++
Muscle weakness	–	+	+++
Joint injury, surgery	+	+	+++
Dysplasia	–	+++	+

Natural history

The natural history of OA is extremely variable, both between individuals and at different joint sites. For example, nodal interphalangeal OA usually has a good clinical outcome, with resolution of symptoms and retention of good function once Heberden and Bouchard nodes are fully developed, whereas knee OA may rapidly progress to severe pain and disability.

Table 2. Clinical features of osteoarthritis.

- Joint pain worse on usage and relieved by rest
- Transient (few minutes only) morning stiffness or stiffness after rest ('gelling')
- Coarse crepitus, restricted range of movement
- Localised joint (± peri-articular) tenderness
- Bony swelling
- No systemic upset
- No manifestations in other systems

Clinical features and investigations (Table 2)

Pain and functional restriction are the usual presenting symptoms. Pain is usually worse on joint usage, but relieved by rest, and also towards the end of the day. In contrast to inflammatory arthritis, there is little early morning or inactivity stiffness.

Affected joints, especially finger joints, may become inflamed but the distribution pattern (eg knees and distal interphalangeal joints) is usually characteristic. Distinction of OA from other musculoskeletal conditions is often, but not always, straightforward (Tables 3 and 4). The causes of pain and stiffness in OA are not fully understood. Cartilage has no nociceptive fibres, but OA pain may arise from subchondral bone, the synovium or peri-articular sites.[3] Comorbidity is very common in OA patients and psychosocial factors may interact to modify pain perception and disability.

Although frequently performed, a radiograph is not necessary to confirm a clinical diagnosis of OA. In fact, there is considerable mismatch between X-ray changes of OA and symptoms, especially at joints other than the hip.

Table 3. Pointers to other diagnoses.

Features	Associations
Age <45 years	Inflammatory arthritis, prior major trauma, hereditary dysplasia, metabolic disease
Marked early morning stiffness (>1 hour)	Inflammatory arthritis
Joint locking/giving way	Meniscal or ligamentous injury
Unusual joint distribution (eg metacarpophalangeal joints)	Metabolic disease (eg haemochromatosis)
Multiple regional pain	Fibromyalgia
Marked joint effusion, soft tissue thickening	Inflammatory arthritis, crystal synovitis, septic arthritis, trauma
Discrete swelling around joint	Bursitis or other peri-articular lesion

Key treatments

There is no cure for OA, but much can be done to reduce symptoms and maintain or improve function (Table 5). For each individual, unique factors (coexistent morbidity, health beliefs and social support) will influence treatment decisions. All published guidelines acknowledge this.[4,5] Four key treatments should be offered to all patients with OA:

- education
- exercise
- reduction of adverse mechanical factors, and
- simple analgesia.

Patient education and non-pharmacological therapies

Non-pharmacological measures are the keystone of OA treatment, although often overlooked. Patient education, particularly in self-management techniques, and access to information is fundamental to OA management. Advice on exercise and activity should be given to all patients with OA. Cardiovascular fitness training and quadriceps strengthening exercise independently reduce pain and disability in large joint OA[6] and both should be prescribed. Involvement of physiotherapists and occupational therapists is therefore a key component of management. There are virtually no contraindications to exercise. Patients should be advised to exercise 'little and often' with graded increases tailored to the individual. The effects of exercise are lost when therapy is discontinued and strategies to promote adherence are important.

Correct use of a walking stick can reduce hip loading by 20%, and heel wedges have been found effective in uni-

Table 4. 'Red flag' symptoms and signs in monoarthropathy.

Feature	Associations
Fever	Sepsis
Systemic upset	Sepsis
Warmth and erythema	Sepsis, crystal synovitis
Night predominant pain unrelated to posture	Malignancy, osteonecrosis
Rapidly progressive pain	

compartmental knee OA. For knee or hip OA, a shoe with a thick soft sole and no raised heel should be advised. Increased body mass index is associated with both development and progression of OA, especially at the knee, so weight loss should be addressed.

Oral and topical drugs

Drug therapies can be added, if required, to the core non-pharmacological interventions. Paracetamol (acetaminophen) is the safest analgesic and the recommended oral agent of first choice. Opioids, alone or together with paracetamol, may be useful but constipation and central nervous system disturbance can be a problem. Oral non-steroidal anti-inflammatory drugs (NSAIDs) may be marginally more effective than paracetamol in some patients,[7] but are associated with potentially serious renal and gastrointestinal toxicity. Periodic rather than long-term use of NSAIDs is preferable and either cyclo-oxygenase (COX)-II selective NSAIDs or concomitant gastroprotection with a proton-pump inhibitor or misoprostol should be used in at-risk patients (the majority of OA patients). Stronger analgesics, such as nefopam, tramadol or meptazinol may be required but, although shown to be efficacious, they have a relatively high incidence of side effects.

For knee and hand OA, topical NSAIDs have confirmed short-term efficacy compared with placebo carrier cream.[8] Capsaicin is another topical analgesic approved for this use.

Intra-articular injections

Steroids. Intra-articular corticosteroids may give marked pain relief for 2–6 weeks. There are no clinical predictors of response. Placebo-controlled trials show benefit at the knee,[9] there are no positive trials at the hip and evidence for efficacy of first carpometacarpal joint injections is weak.[10] There are theoretical risks of cartilage damage, but human data support the safety of long-acting steroid injected into the knee at a frequency of four times per year. The risk of sepsis is less than one in 17,000 if aseptic precautions are taken. Increased pain and stiffness for 1–2 days post-injection is not uncommon.

Hyaluronans

The concentration and molecular weight of hyaluronic acid, a cartilage and synovial fluid component, is reduced in patients with OA. 'Viscosupplementation' (intra-articular injection of hyaluronans) was originally designed to ameliorate this. However, hyaluronans give only modest benefit over placebo,[11] are relatively expensive and present logistical difficulties in requiring courses of weekly injections for 3–5 weeks.

Table 5. Medical management options.

Non-pharmacological	Pharmacological
Patient education:	**Oral preparations:**
Information	Paracetamol
Self-management	Weak opioids (eg codeine)
Exercise:	NSAIDs, selective COX-2 inhibitors
Aerobic	Stronger opioids (eg nefopam, tramadol)
Walking	Supplements (eg glucosamine sulphate)
Strengthening	**Topical preparations:**
Correction of mechanical disadvantage:	NSAIDs
Weight loss if overweight/obese	Capsaicin
Appropriate footwear	**Intra-articular injections:**
Pacing of activities	Long-acting corticosteroids
Aids and appliances	Hyaluronic acid derivatives
Local physical treatments:	
Heat/cold	
Pulsed electrical stimulation	

COX = cyclo-oxygenase; NSAID = non-steroidal anti-inflammatory drug.

Key Points

Many of the risk factors for 'primary' osteoarthritis (OA) (eg obesity, reduced muscle strength, repetitive joint trauma) can be avoided or modified

All patients with OA should be given (1) education, (2) a prescription of exercise (both local strengthening and aerobic), (3) advice on reducing adverse mechanical factors, and (4) simple analgesia

Combining multiple different treatment approaches, that individually may have relatively small effects but which work in different ways, can result in significant improvements in pain and function

Patients who fail on medical management or who may be considered rather too young or too old should not have to wait to 'earn' their joint replacement. Consider early rather than late referral for a surgical opinion

KEY WORDS: diagnosis, dietary supplements, non-pharmacological treatments, oral drugs, osteoarthritis, risk factors, topical and intra-articular treatments, total joint replacement

Other treatments

Dietary supplements

Glucosamine sulphate, a nutritional supplement, is a synthetic molecule of a cartilage matrix component. Company sponsored trials lasting up to three years report modest reductions in pain and slowing of joint space narrowing in knee OA.[12] The effects on other joints are poorly studied, and over-the-counter doses are often less than the 1,500 mg doses used in trials. Chondroitin sulphate also has trial data to support pain relief in OA. Neither is licensed for OA in the UK and the results of ongoing studies are awaited.

Total joint replacement

There are no accepted guidelines for indications for total joint replacement (TJR) but most patients undergoing this procedure have persistent pain and disability, despite optimisation of their medical management. TJR of the hip or knee is successful, with joint survival times of at least 10 years in 95% of cases. The operative mortality is about 1%. Age and obesity do not reduce the benefit, but those with poor functional status gain less benefit. Therefore, it is best to operate on patients unresponsive to conservative treatment earlier rather than late. In contrast to the success of TJR, other procedures such as tidal irrigation, arthroscopic lavage and debridement are no more effective than sham procedures.[13]

Disease-modifying osteoarthritis drugs

A number of disease-modifying osteoarthritis drugs have been developed to date, with the aim of inhibiting cartilage breakdown. So far, none has been shown to have clear benefit in human OA.

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