The non-operative management of primary osteoarthritis

Joseph Furey[1*]
Vivien Graziadei[2*]
Isobel Pilkington[1]
Jacqueline Waterman[3]
Author details can be found at the end of this article
*These are joint first authors
Correspondence to: Joseph Furey; joseph.furey@ucdconnect.ie

Abstract

Osteoarthritis is a syndrome characterised by joint pain, resulting in functional limitation and a decreased quality of life. This chronic condition is one of the major public health problems facing society today and is likely to become more prevalent. The expected increase is because of the primary causative factors, advancing age and obesity, becoming increasingly prevalent in society. The diagnosis of osteoarthritis can be made clinically when activity related joint pain is present, alongside morning joint stiffness that lasts for less than 30 minutes. However, a radiological diagnosis can also be made.

This article examines the current management strategies, as outlined by the National Institute for Health and Care Excellence guidelines for osteoarthritis. Although numerous surgical options are available, this article focuses on the non-operative strategies currently used. The emphasis in this article is on general principles of treatment rather than treatment options for specific joints.

Key words: Activities of daily living; Aged; Analgesia; Arthralgia; Conservative treatment; Exercise; Non-steroidal anti-inflammatory drugs; Obesity; Opioid; Osteoarthritis; Weight loss

Submitted: 22 July 2021; accepted following double-blind peer review: 12 August 2021

Introduction

Osteoarthritis is a clinical syndrome consisting of joint pain, resulting in functional limitation and a decreased quality of life, as defined by the National Institute for Health and Care Excellence (2014) guidelines.

This debilitating disease is one of the leading chronic medical conditions among older people (Hunter and Bierma-Zeinstra, 2019). The debilitating nature of osteoarthritis arises in part from chronic joint pain and stiffness, but principally from the resulting restriction of joint movement. All of which culminate in a negative impact on activities of daily living, for example getting into a chair or walking (Bagge et al, 1992). In severe cases, patients even face the prospect of such basic tasks becoming unachievable.

Osteoarthritis can be subdivided into primary and secondary. The degenerative condition of primary osteoarthritis is characterised by inflammation of the surrounding synovial tissue, loss of articular cartilage and osteophyte formation (Clarke et al, 2015). Secondary osteoarthritis arises as a complication of either trauma or other arthropathies (Swagerty and Hellinger, 2013).

Although osteoarthritis can affect any synovial joint, the most commonly affected joints are those of the hips, knees, hands and spine (Kloppenburg and Berenbaum, 2020) (Figure 1).

Aetiology

Primary osteoarthritis is believed to be multifactorial in nature, with a range of biomechanical and constitutional factors thought to contribute to its development (Table 1).

Unfortunately, the exact aetiology of primary osteoarthritis remains unknown (Swagerty and Hellinger, 2013).

Epidemiology

Primary osteoarthritis is one of the leading causes of disease and disability worldwide (National Institute for Health and Care Excellence, 2014). The substantial disease burden

How to cite this article: Furey J, Graziadei V, Pilkington I, Waterman J. The non-operative management of primary osteoarthritis. Br J Hosp Med. 2022. https://doi.org/10.12968/hmed.2021.0407

© 2022 MA Healthcare Ltd

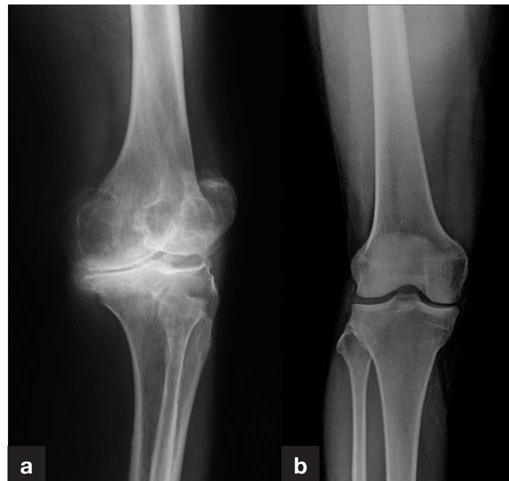

Figure 1. Plain radiographs of (a) osteoarthritic knee and (b) non-arthritic knee.

Table 1. Risk factors for developing osteoarthritis

Primary osteoarthritis	Constitutional	Advanced age
		Obesity
		Female
	Biomechanical	Joint injury
		Reduced muscle strength
	Genetic	Family history
Secondary osteoarthritis	Dysplasia	
	Post trauma	
	Paget's disease	
	Perthes' disease	

From Hasan and Shuckett (2010)

can be attributed, at least in part, to osteoarthritis not being associated with a high risk of mortality. Thus, sufferers tend to have a high proportion of years living with the disease (Kloppenburg and Berenbaum, 2020).

The prevalence of osteoarthritis is likely to increase, coinciding with the ever ageing population and the rising body mass index within society (Zhang and Jordan, 2010).

Diagnosis

Osteoarthritis can be diagnosed clinically and confirmed radiologically. A clinical diagnosis is made when the following National Institute for Health and Care Excellence (2014) criteria are fulfilled; if an individual, older than 45 years old, experiences activity related joint pain along with morning joint stiffness that occurs for no longer than 30 minutes. Notably, joint stiffness may not always be present (National Institute for Health and Care Excellence, 2014).

Radiological confirmation of an osteoarthritis diagnosis is classically determined by the presence of joint space narrowing (loss of joint space), osteophytes, subchondral sclerosis and subchondral cysts (Figure 2). These features are commonly remembered by the 'LOSS' mnemonic (Swagerty and Hellinger, 2013) (Table 2).

When all of these radiological features are present, the disease process has progressed significantly, and joint deformity may be visible. However, with modern medicine and diagnostics, the prevalence of severe deformity is now rare.

© 2022 MA Healthcare Ltd

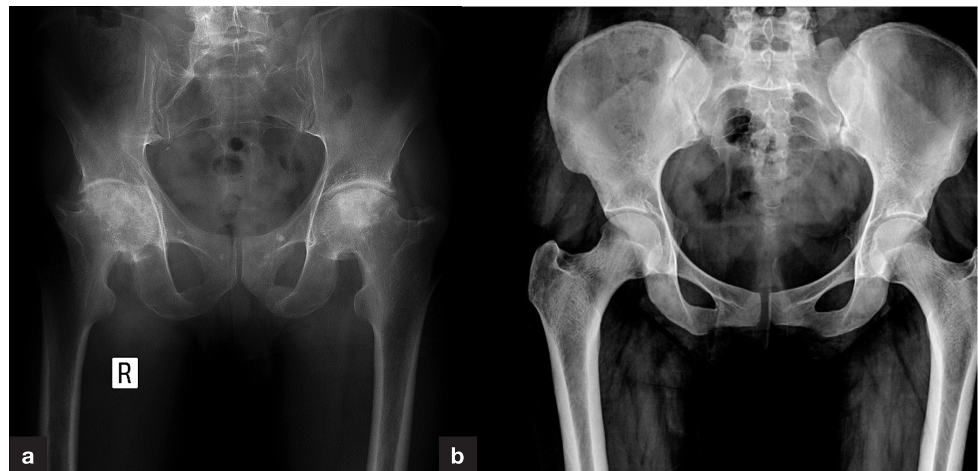

Figure 2. Radiographs showing (a) osteoarthritis of hips and (b) normal hips.

Table 2. LOSS mnemonic	
L	Loss of joint space
O	Osteophytes
S	Subchondral sclerosis
S	Subchondral cysts

Importantly, considerable discrepancy may exist between symptoms and the radiographic stage of disease (Swagerty and Hellinger, 2013).

Management strategies

Optimum management of osteoarthritis incorporates a multifactorial approach. If the disease has advanced significantly, this approach will include conservative, medical and surgical management. To achieve optimum management, the National Institute for Health and Care Excellence (2014) guidelines advocate active patient participation and self-management at as early a stage as possible.

Non-pharmacological management

Non-pharmacological management is often referred to as the 'core treatment' of osteoarthritis, as it is the foundation upon which all other methods of treating the condition are based.

Patient education is placed at the heart of non-pharmacological treatment, as it is essential for the successful outcome of any treatment strategy. To be truly effective, education should not occur at a single point in time but rather as a continual process, over which time a patient's understanding of their disease is continually developed. Clinicians must take every opportunity to engage with patients and emphasise the importance of self-management.

Education should encompass measures that can alleviate symptoms and impede disease progression, while also informing patients as to the nature of their disease. One of the most important misconceptions encountered is that osteoarthritis progression is inevitable and untreatable (National Institute for Health and Care Excellence, 2014).

Simple and cost-effective measures, such as regular exercise, are advised in osteoarthritis management. Regular exercise has been shown to provide meaningful relief from osteoarthritis joint pain and stiffness (Ton et al, 2020), as well as improving the individual's mood and aiding weight loss.

Weight reduction is another key component in managing osteoarthritis that is strongly recommended to all patients but is of particular benefit for overweight or obese patients. Weight loss is especially effective when the weight bearing joints of the hip and knee are affected by osteoarthritis (Kolasinski et al, 2020). Sustainable measures recommended for weight reduction include regular exercise and dietary modifications.

© 2022 MA Healthcare Ltd

Biomechanical interventions such as alternative footwear, braces and splints, can be used as adjuncts. These are known to provide pain relief, especially in lower limb osteoarthritis. If the disease advances, further aids, such as walking sticks, can be used to assist with mobilisation and activities of daily living.

Pharmacological management

The primary focus of pharmacological treatment is managing pain associated with osteoarthritis. This can be successfully achieved via individually tailored treatment, which usually requires multimodal analgesia. As always, pain should be managed using the World Health Organization pain ladder (Hadley et al, 2019).

Topical treatments are particularly useful for the knees and joints of the hands (National Institute for Health and Care Excellence, 2014). However, these are generally only useful in early and mid-stage osteoarthritis.

Regular paracetamol is a mainstay of treatment. If this is insufficient by itself, analgesia should be escalated by adding non-steroidal anti-inflammatory drugs. Care must be taken in older people and patients with renal disease, as the side effects of non-steroidal anti-inflammatory drugs are particularly prominent in these groups. If paracetamol and ibuprofen are inadequate, opioid analgesia can be considered but again, caution is advised if the patient is elderly and frail (National Institute for Health and Care Excellence, 2014).

Previously, codeine was a popular analgesic of choice. However, because of the 127% higher rate of side effects and resulting injury, particularly in older people, its use has decreased (Buckeridge et al, 2010). In addition, Simpson and Radford (2015) showed that 10% of Caucasian adults are non-responders to codeine, with 25% receiving less than optimal analgesic effects.

Intra-articular injections (Figure 3) can prove to be a viable alternative to long-term opioid therapy. Even in moderate to severe cases of osteoarthritis, intra-articular steroid injections have been found to be beneficial (Kolasinski et al, 2020). This is especially true of large, easily accessible joints, such as the hip, knee and shoulder. However, given the relief is short lived, with pain often returning to baseline within 3–6 months, steroid injections are not a permanent solution (National Institute for Health and Care Excellence, 2014). There is no established link between intra-articular steroid injection and an increased risk of prosthetic joint infection. However, further cohort studies have been advised (Charalambous et al, 2014).

The use of platelet-rich plasma injections has become increasingly common, especially in younger patients with less severe disease, such as early or mid-stage osteoarthritis (Bennell et al, 2017). The exact mechanism of action of platelet-rich plasma is unknown, although it is thought that platelets contain growth factors that stimulate chondrocyte proliferation and the repair cascade, leading to the selective repair of damaged cartilage cells (National Institute for Health and Care Excellence, 2019). Currently, there is no standardised method of preparing platelet-rich plasma and thus, there is wide variability in preparation methods which potentially accounts for the varying efficacy of platelet-rich plasma in the literature. Analyses of platelet-rich plasma injections show it has no superiority to other available techniques (Bennell et al, 2017), but further research is essential to determine the clinical effectiveness of platelet-rich plasma and the optimum preparation protocol.

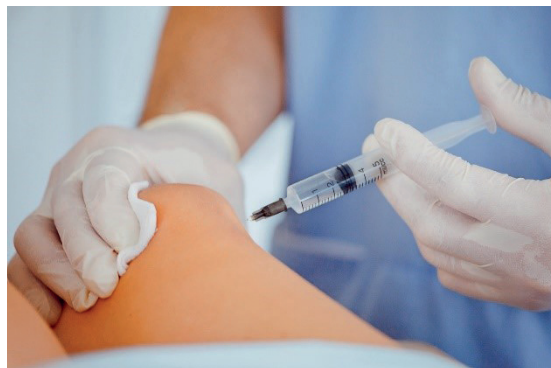

Figure 3. Intra-articular injection.

© 2022 MA Healthcare Ltd

Given the prevalence of osteoarthritis, novel pharmacological treatments are constantly being researched. An example of a potentially safe and effective treatment include hydrolysed collagen (Volpi et al, 2021). Promising results show stimulation of chondrocytes in vitro and triggering growth of hyaline cartilage over fibrocartilage tissue. Randomised control trials show a resulting reduction in symptoms (De Luca et al, 2019). Further research is required before such treatments are used as a mainstay of management.

Surgical management

Typically, surgical management is reserved for cases of osteoarthritis that have a substantial impact on the individual's quality of life and are refractory to non-surgical management (National Institute for Health and Care Excellence, 2014).

Orthopaedic referrals should be made before the individual develops established functional limitations and severe pain (National Institute for Health and Care Excellence, 2014), as surgical outcomes are poor beyond this point.

Joint replacement is the most common surgical treatment for osteoarthritis, especially in relation to hip and knee osteoarthritis. In the National Joint Registry (2019) report, osteoarthritis is listed as the sole indication in 88.5% of primary hip replacements and 96.2% of primary knee procedures.

Other surgical management techniques include osteotomy and joint fusion. Fusions are usually reserved for end stage osteoarthritis that is refractory to other forms of surgical interventions. However, fusion can also be considered where there are no alternative options, such as hallux rigidus, where arthroplasty options are limited.

Conclusions

Osteoarthritis is a clinical syndrome consisting of joint pain that results in functional limitations and a decreased quality of life. One of the leading causes of disease and disability worldwide, osteoarthritis is believed to be caused by a variety of factors, such as advanced age and an increased body mass index.

Diagnosis can be either clinical or radiological. Clinical diagnosis is reached when a person experiences activity related joint pain, along with morning joint stiffness that lasts for less than 30 minutes. Radiologically, osteoarthritis is classically diagnosed by the presence of joint space narrowing (loss of joint space), osteophytes, subchondral sclerosis and subchondral cysts.

Initial management involves conservative management and medical treatment. The fundamental principle of conservative management is patient education, with the aim of improving the patient's understanding of osteoarthritis and strategies to minimise the symptoms.

Key points

- Osteoarthritis is a clinical syndrome consisting of joint pain, leading to functional limitations and a decreased quality of life. This chronic condition is one of the leading causes of disease and disability worldwide.
- Initial management strategies are initially based on conservative management and medical treatment. Surgical treatment, most commonly joint replacement, is reserved for osteoarthritis cases that are refractory to non-surgical management or that have a substantial impact on quality of life.
- Conservative management focuses on patient education to improve the patient's understanding of osteoarthritis alongside simple and cost-effective measures, (including weight loss and regular exercise).
- Pharmacological treatment aims to manage the pain related to osteoarthritis, usually achieved through multimodal analgesia. Paracetamol and non-steroidal anti-inflammatory drugs are mainstays of management. Adjuvant therapies include joint injections, which provide short term (3–6 month) relief.

© 2022 MA Healthcare Ltd

Curriculum checklist

This article addresses the following requirements from the general internal medicine curriculum:

- Providing continuity of care to medical inpatients, including management of comorbidities and cognitive impairment
- Managing patients in an outpatient clinic, ambulatory of community setting, including management of long-term conditions
- Managing medical problems in patient, in other specialities and special cases.

Simple and cost-effective measures, such as regular exercise, are a mainstay of treatment. Exercise provides meaningful relief from osteoarthritis joint pain and stiffness, as well as having the additional benefit of promoting weight reduction. This is especially effective when osteoarthritis affects weight bearing joints.

Pharmacological treatment focuses on pain management and is usually achieved through multimodal analgesia. Paracetamol and non-steroidal anti-inflammatory drugs are mainstays of management. Adjuvant therapies include joint injections, which provide short-term (3–6 month) relief, or stronger analgesia, such as opioids. Further research is required to determine the exact benefit of recently developed treatments, though there is some hope that these will provide longer relief for patients.

Surgical management, most commonly joint replacement, is reserved for osteoarthritis cases that has a substantial impact on the individual's quality of life and is refractory to non-surgical management.

Author details

[1]Department of General Surgery, Princess Royal University Hospital, London, UK

[2]Department of Orthopaedics, Kings College Hospital NHS Foundation Trust, London, UK

[3]Department of Orthopaedics, Hillingdon Hospital NHS Trust, London, UK

Conflicts of interest

The authors declare that they have no conflicts of interest.

References

Bagge E, Bjelle A, Eden S et al. A longitudinal study of the occurrence of joint complaints in elderly people. Age Ageing. 1992;21(3):160–167. https://doi.org/10.1093/ageing/21.3.160

Bennell KL, Hunter DJ, Paterson KL. Platelet-rich plasma for the management of hip and knee osteoarthritis. Curr Rheumatol Rep. 2017;19(5):24. https://doi.org/10.1007/s11926-017-0652-x

Buckeridge D, Huang A, Hanley J et al. Risk of injury associated with opioid use in older adults. J Am Geriatr Soc. 2010;58(9):1664–1670. https://doi.org/10.1111/j.1532-5415.2010.03015.x

Charalambous CP, Prodromidis AD, Kwaees TA. Do intra-articular steroid injections increase infection rates in subsequent arthroplasty? A systematic review and meta-analysis of comparative studies. J Arthroplasty. 2014;29(11):2175–2180. https://doi.org/10.1016/J.ARTH.2014.07.013

Clarke A, Pulikottil-Jacob R, Grove A et al. Total hip replacement and surface replacement for the treatment of pain and disability resulting from end-stage arthritis of the hip (review of technology appraisal guidance 2 and 44): systematic review and economic evaluation. Health Technol Assess. 2015;19(10):1–668. https://doi.org/10.3310/hta19100

De Luca P, Colombini A, Carimati G et al. Intra-articular injection of hydrolyzed collagen to treat symptoms of knee osteoarthritis. A functional in vitro investigation and a pilot retrospective clinical study. J Clin Med. 2019;8(7):975. https://doi.org/10.3390/jcm8070975

Hadley GR, Jones MR, Kaye AD. Analgesic Ladder Approach. In: Abd-Elsayed A (ed) Pain. 2019; Springer, Cham. https://doi.org/10.1007/978-3-319-99124-5_202

Hasan M, Shuckett R. Clinical features and pathogenetic mechanisms of osteo-arthritis of the hip and knee. British Colombia Medical Journal. 2010;52(8):393–398

© 2022 MA Healthcare Ltd

Hunter DJ, Bierma-Zeinstra S. Osteoarthritis. Lancet. 2019;393(10182):1745–1759. https://doi.org/10.1016/s0140-6736(19)30417-9

Kloppenburg M, Berenbaum F. Osteoarthritis year in review 2019: epidemiology and therapy. Osteoarthritis Cartilage. 2020;28(3):242–248. https://doi.org/10.1016/j.joca.2020.01.002

Kolasinski SL, Neogi T, Hochberg MC et al. 2019 American College of Rheumatology/Arthritis Foundation guideline for the management of osteoarthritis of the hand, hip, and knee. Arthritis Care Res. 2020;72(2):149–162. https://doi.org/10.1002/acr.24131

National Institute for Health and Care Excellence. Osteoarthritis: care and management. 2014. https://www.nice.org.uk/guidance/cg177/resources/osteoarthritis-care-and-management-pdf-35109757272517 (accessed 24 March 2022)

National Institute for Health and Care Excellence. Platelet-rich plasma injections for knee osteoarthritis. 2019. https://www.nice.org.uk/guidance/ipg637/resources/plateletrich-plasma-injections-for-knee-osteoarthritis-pdf-1899874048147909 (accessed 24 March 2022)

National Joint Registry. The National Joint Registry 16th Annual Report 2019. 2019. https://www.ncbi.nlm.nih.gov/books/NBK559972/ (accessed 27 March 2022)

Simpson K, Radford H. A population study into the prevalence and genetic profile of patients with chronic pain who do not respond to oral codeine. 2015. https://www.clinicaltrialsregister.eu/ctr-search/trial/2007-006184-70/results (accessed 24 March 2022)

Swagerty LD, Hellinger D. Radiographic assessment of osteoarthritis. Am Fam Physician. 2013;64(2):279–286

Ton J, Perry D, Thomas B et al. PEER umbrella systematic review of systematic reviews: management of osteoarthritis in primary care. Can Fam Physician. 2020;66(3):e89–e98

Volpi P, Zini R, Erschbaumer F et al. Effectiveness of a novel hydrolyzed collagen formulation in treating patients with symptomatic knee osteoarthritis: a multicentric retrospective clinical study. Int Orthop. 2021;45(2):375–380. https://doi.org/10.1007/s00264-020-04616-8

Zhang Y, Jordan JM. Epidemiology of osteoarthritis. Clin Geriatric Med. 2010;26(3):355–369. https://doi.org/10.1016/j.cger.2010.03.001

© 2022 MA Healthcare Ltd