

Cover Page



Universiteit Leiden



The handle <http://hdl.handle.net/1887/21699> holds various files of this Leiden University dissertation

Author: Kwok, Wing Yee

Title: Clinical aspects of hand osteoarthritis : are erosions of importance ?

Issue Date: 2013-09-10

1

GENERAL INTRODUCTION

HAND OSTEOARTHRITIS: AN INTRODUCTION TO THE DISEASE

Osteoarthritis (OA) is the most common joint disorder, leading to pain and functional limitations. Higher costs for health-care are expected in the future, since the prevalence of OA rises with age and society is facing ageing of the population in the coming years¹. The pathogenesis is largely unknown, but the etiology is considered as multifactorial which could explain the heterogeneous phenotypes in OA.

Hand OA is one of the most prevalent OA phenotype, but it has not been studied frequently. Recently, several studies are conducted in this phenotype since it is clear that patients with hand OA have a high clinical burden with no disease-modifying treatment options². Hand OA is complex to study due to its heterogeneity (such as several subsets, variety in symptoms, and different speed in progression) and simultaneous involvement of multiple hand joints. Although several sets of criteria sets are used, it is still not clear how we should define hand OA². The classification criteria from the American College of Rheumatology (ACR, table 1)³ and the diagnostic recommendations by the European League Against Rheumatism (EULAR, table 2)¹ are most used and both criteria sets do not require radiographs to define hand OA.

CLINICAL PRESENTATION

Typical clinical features of hand OA are bony enlargements of distal and proximal interphalangeal joints (DIPJs, PIPJs) and deformities¹. Heberden's and Bouchard's nodes are other words for the bony enlargements in the DIPJs and PIPJs, respectively. The nodes can be clinically assessed by observation and palpation, with highly observed percentages of agreement⁴ and they can be associated with underlying structural abnormalities⁵⁻⁷. Metacarpal joints are usually not affected by hand OA, in contrast to rheumatoid arthritis. These clinical features occur with or without symptoms, such as pain or aching, stiffness, loss of mobility, decreased grip strength, and disability. In erosive OA (EOA), a subset of hand OA inflammatory signs can be recognized, such as redness and soft swelling.

Table 1: Classification criteria for osteoarthritis of the hand, according to the American College of Rheumatology (ACR)³.

Hand pain, aching or stiffness AND 3 or 4 of the following features:

- Hard tissue enlargement of 2 or more of 10 selected joints*
 - Hard tissue enlargement of 2 or more DIP joints
 - Fewer than 3 swollen MCP joints
 - Deformity of at least 1 of 10 selected joints
-

* = The 10 selected joints are the second and third distal interphalangeal (DIP), the second and third proximal interphalangeal (PIP), and the first carpometacarpal joints of both hands. This classification method yields a sensitivity of 94% and a specificity of 87%. MCP = metacarpophalangeal.

Table 2: Propositions and recommendation for the diagnosis of hand OA by the Europ League Against Rheumatism (EULAR) – modified from Zhang et al.¹

1. Risk factors for hand OA include female sex, increasing age over 40, menopausal status, family history, obesity, higher bone density, greater forearm muscle strength, joint laxity, prior hand injury and occupation or recreation-related usage.
2. Typical symptoms of hand OA are pain on usage and only mild morning or inactivity stiffness affecting just one or a few joints at any one time; symptoms are often intermittent and target characteristic sites (DIPJs, PIPJs, thumb base, index and middle MCPJs). With such typical features, a confident clinical diagnosis can be made in adults aged over 40.
3. Clinical hallmarks of hand OA are Heberden and Bouchard nodes and/or bony enlargement with or without deformity (e.g., lateral deviation of IPJs, subluxation and adduction of thumb base) affecting characteristic target joints (DIPJs, PIPJs, thumb base and index and middle MCPJs).
4. Functional impairment in hand OA may be as severe as in rheumatoid arthritis. Function should be carefully assessed and monitored using validated outcome measures.
5. Patients with polyarticular hand OA are at increased risk of knee OA, hip OA and OA at other common target sites (generalized OA) and should be assessed and examined accordingly.
6. Recognized subsets with different risk factors, associations and outcomes (requiring different assessment and management) include IPJ OA (with or without nodes), thumb base OA and erosive OA. Each may be symptomatic or asymptomatic.
7. Erosive hand OA targets IPJs and shows radiographic subchondral erosion, which may progress to marked bone and cartilage attrition, instability and bony ankylosis. Typically it has an abrupt onset, marked pain and functional impairment, inflammatory symptoms and signs (stiffness, soft tissue swelling, erythaema, paraesthesiae), mildly elevated CRP levels, and a worse outcome than non-erosive IPJ OA.
8. The differential diagnosis for hand OA is wide. The commonest conditions to consider are psoriatic arthritis (which may target DIPJs or affect just one ray), rheumatoid arthritis (mainly targeting MCPJs, PIPJs, wrists), gout (which may superimpose on pre-existing hand OA), and haemochromatosis (mainly targeting MCPJs, wrists).
9. Plain radiographs provide the gold standard for morphological assessment of hand OA. A posteroanterior radiograph of both hands on a single film/field of view is adequate for diagnosis. Classical features are joint space narrowing, osteophyte, subchondral bone sclerosis and subchondral cyst, and subchondral erosion occurs in erosive hand OA. Further imaging modalities are seldom indicated for diagnosis.
10. Blood tests are not required for diagnosis of hand OA but may be required to exclude coexistent disease. In a patient with hand OA who has marked inflammatory symptoms and/or signs, especially involving atypical sites, blood tests should be undertaken to screen for additional inflammatory arthritides.

CRP: C-reactive protein, DIPJ: distal IPJ, IPJ: interphalangeal joint, OA: osteoarthritis, MCPJ: metacarpophalangeal joints, PIPJ: proximal IPJ.

PREVALENCE OF HAND OA

The prevalence estimates of hand OA depend upon the population sampled and on the hand OA criteria used. Heberden's nodes have been reported in 58% and Bouchard's nodes in 30% of American adults aged over 60 years⁸. Radiographic signs of hand OA can be found in up to 81% of the elderly population^{9,10}. The prevalence of symptomatic hand OA is lower; age- and sex-adjusted prevalence estimates for symptomatic hand OA following the ACR criteria in adults vary between 2.0 and 6.2%⁸⁻¹¹.

CLINICAL IMPACT OF HAND OA

Hand OA is often regarded as a mild disease³, however the clinical burden of hand OA in symptomatic patients can be high. Patients may experience considerable pain, decreased grip force and joint mobility and impaired functional ability, especially when grip strength with twisting of the hands is required^{12,13}. In patients with hand OA consulting secondary care health-related quality of life is lowered compared with normal controls¹⁴ and is similar to patients with rheumatoid arthritis, as is pain and disability^{14,15}.

The cause of pain in hand OA is unclear. Structural abnormalities, e.g. osteophytes and cartilage loss as assessed on radiographs, play a role, but only demonstrate limited associations¹⁶. Recent ultrasound studies in hand OA show that inflammatory signs, such as greyscale synovitis and power Doppler signal, are frequently present in hand OA and could be a cause of pain¹⁷. Besides patient effects, such as from genetic and psychosocial factors, the experience and expectations of patients can contribute in reporting pain^{18,19}. Regarding the course of pain and disability, several studies reported that over mid- to longterm follow-up (3-8 years) around 50% of subjects with hand OA deteriorate, whereas a quarter report less symptoms²⁰⁻²².

Progression in hand OA is considered as a relatively slow process²³. However, radiographic progression can already be seen after 18-24 months^{24,25}. After 10 years 90% of patients and 74% of patients had progression of osteophytes and joint space narrowing (JSN), respectively²⁶. Remarkably, no association was seen between symptomatic and radiographical progression²¹. Research is warranted whether there is no true association or whether the current outcome measures are not sensitive enough to detect progression.

OUTLINE OF THE THESIS

This thesis described studies in hand OA, with special focus on the epidemiology of hand OA in secondary care, erosive OA as a subset of hand OA and the role of imaging in hand OA.

In **chapters 2 and 3** current knowledge on hand OA is summarized. **Chapter 2** gives a narrative review of the current knowledge on hand OA concerning its occurrence, risk factors, clinical impact and its subsets. **Chapter 3** assesses the risk factors for the progression of hand OA, based on a systematic review.

As pointed out in chapter 2, hand OA is a heterogeneous disorder. Especially subjects with symptoms and signs of hand OA who consult clinicians are clinically relevant. Among these patients, those referred to secondary care are most in need of treatment. To increase insight in this patient group, we performed an observational study, to describe the phenotype of OA in rheumatology practice and to investigate the determinants that are involved in the health-related quality of life in these patients. The results of this study are shown in **chapter 4**.

Erosive OA is one of the subsets with the highest clinical impact on patients. This subset is especially prevalent in secondary care. To increase insight in this subset, information is needed on its prevalence in the general population and how this subset

relates to patient symptoms. We had the privilege to collaborate with the researchers of the Rotterdam Study in the Netherlands and the North Staffordshire Osteoarthritis Project (NorStOP) in the United Kingdom to perform this research. **Chapter 5** estimates prevalences of erosive OA of interphalangeal joints (IPJs) in the general population of the Rotterdam Study and its relation to symptomatic hand OA, hand pain and disability. **Chapter 6** replicates the prevalence of erosive OA in IPJs in a population of symptomatic community-dwelling adults. Furthermore, we investigated the clinical impact of erosive OA compared to inflammatory diseases, in order to place the clinical burden of erosive OA into the spectrum of the clinical burden of other inflammatory rheumatic diseases. **Chapter 7** describes the frequency of erosive disease in 1stCMCJs with its co-occurrence with interphalangeal erosions in a population of symptomatic community-dwelling adults and to explore the clinical impact of erosive disease in the thumb base.

Inflammation is considered of importance in erosive OA, but details on inflammation in hand OA in general or in erosive OA specifically is not available. This could be due to the limitation of conventional radiographs, which are most often used as imaging modality in hand OA, to detect inflammation, such as synovitis. Therefore, the question if inflammation could also play a role in hand OA in general was studied in **chapter 8**, where the association of OA features on ultrasound and pain per joint in hand OA patients is investigated. **Chapter 9** compares inflammation as assessed by ultrasound between patients with erosive OA and non-erosive hand OA.

Hand OA progresses over time, but the rate of progression varies between patients. To evaluate progression in patients with hand OA over a short time reproducible, valid and sensitive outcome measures are important, especially for patients with rapid progressive phenotypes in need of treatment. Methodological studies help us to develop these outcome measures. In **chapter 10** the validity of joint space width (JSW) measurements in millimetres in hand OA patients is investigated by comparison this method to grading of joint space narrowing (JSN) following a semi-quantitative score. Furthermore, we made a comparison of JSW between patients with hand OA and normal controls and correlation with clinical features.

The value of Magnetic Resonance Imaging (MRI) in hand OA is investigated in **chapter 11**, where the reproducibility of the Oslo Hand OA (OHOA)-MRI scoring method is presented and a correlation is made between MRI-features with pain, radiographs, and ultrasound in patients with hand OA.

All patients at the Rheumatology department of the LUMC who are diagnosed with OA are referred to the clinical nurse specialist for education and advice about lifestyle, helping devices and pain medication. The latter is especially important, since no disease-modifying therapy is available for OA patients. In **chapter 12** in an open study the effectiveness of a protocol-led consultation given by clinical nurse specialists in rheumatology practice between 2005-2009 is described.

Finally, **chapter 13** gives a summary of the thesis and conclusion, together with a future perspective for treatments in OA.

REFERENCE LIST

- Zhang W, Doherty M, Leeb BF, Alekseeva L, Arden NK, Bijlsma JW et al. EULAR evidence-based recommendations for the diagnosis of hand osteoarthritis: report of a task force of ESCISIT. *Ann Rheum Dis* 2009; 68:8-17.
- Kloppenborg M, Stamm T, Watt I, Kainberger F, Cawston TE, Birrell FN et al. Research in hand osteoarthritis: time for reappraisal and demand for new strategies. An opinion paper. *Ann Rheum Dis* 2007; 66:1157-61.
- Altman R, Alarcon G, Appelrouth D, Bloch D, Borenstein D, Brandt K et al. The American College of Rheumatology criteria for the classification and reporting of osteoarthritis of the hand. *Arthritis Rheum* 1990; 33:1601-10.
- Myers HL, Thomas E, Hay EM, Dziedzic KS. Hand assessment in older adults with musculoskeletal hand problems: a reliability study. *BMC Musculoskelet Disord* 2011; 12:3.
- Caspi D, Flusser G, Farber I, Ribak J, Leibovitz A, Habet B et al. Clinical, radiologic, demographic, and occupational aspects of hand osteoarthritis in the elderly. *Semin Arthritis Rheum* 2001; 30:321-31.
- Cicutini FM, Baker J, Hart DJ, Spector TD. Relation between Heberden's nodes and distal interphalangeal joint osteophytes and their role as markers of generalised disease. *Ann Rheum Dis* 1998; 57:246-8.
- Thaper A, Zhang W, Wright G, Doherty M. Relationship between Heberden's nodes and underlying radiographic changes of osteoarthritis. *Ann Rheum Dis* 2005; 64:1214-6.
- Dillon CF, Hirsch R, Rasch EK, Gu Q. Symptomatic hand osteoarthritis in the United States: prevalence and functional impairment estimates from the third U.S. National Health and Nutrition Examination Survey, 1991-1994. *Am J Phys Med Rehabil* 2007; 86:12-21.
- Andrianakos AA, Kontelis LK, Karamitsos DG, Aslanidis SI, Georgountzos AI, Kazilas GO et al. Prevalence of symptomatic knee, hand, and hip osteoarthritis in Greece. The ESORDIG study. *J Rheumatol* 2006; 33:2507-13.
- Carmona L, Ballina J, Gabriel R, Laffon A. The burden of musculoskeletal diseases in the general population of Spain: results from a national survey. *Ann Rheum Dis* 2001; 60:1040-5.
- Grotle M, Hagen KB, Natvig B, Dahl FA, Kvien TK. Prevalence and burden of osteoarthritis: results from a population survey in Norway. *J Rheumatol* 2008; 35:677-84.
- Jones G, Cooley HM, Bellamy N. A cross-sectional study of the association between Heberden's nodes, radiographic osteoarthritis of the hands, grip strength, disability and pain. *Osteoarthritis Cartilage* 2001; 9:606-11.
- Kjeken I, Dagfinrud H, Slatkowsky-Christensen B, Mowinckel P, Uhlig T, Kvien TK et al. Activity limitations and participation restrictions in women with hand osteoarthritis: patients' descriptions and associations between dimensions of functioning. *Ann Rheum Dis* 2005; 64:1633-8.
- Slatkowsky-Christensen B, Mowinckel P, Loge JH, Kvien TK. Health-related quality of life in women with symptomatic hand osteoarthritis: a comparison with rheumatoid arthritis patients, healthy controls, and normative data. *Arthritis Rheum* 2007; 57:1404-9.
- Leeb BF, Sautner J, Andel I, Rintelen B. SACRAH: a score for assessment and quantification of chronic rheumatic affections of the hands. *Rheumatology (Oxford)* 2003; 42:1173-8.
- Dahaghin S, Bierma-Zeinstra SM, Hazes JM, Koes BW. Clinical burden of radiographic hand osteoarthritis: a systematic appraisal. *Arthritis Rheum* 2006; 55:636-47.
- Keen HI, Lavie F, Wakefield RJ, D'Agostino MA, Hammer HB, Hensor E et al. The development of a preliminary ultrasonographic scoring system for features of hand osteoarthritis. *Ann Rheum Dis* 2008; 67:651-5.
- Colloca L, Benedetti F. How prior experience shapes placebo analgesia. *Pain* 2006; 124:126-33.
- Wager TD. Expectations and anxiety as mediators of placebo effects in pain. *Pain* 2005; 115:225-6.
- Allen KD, Jordan JM, Renner JB, Kraus VB. Relationship of global assessment of change to AUSCAN and pinch and grip strength among individuals with hand osteoarthritis. *Osteoarthritis Cartilage* 2006; 14:1281-7.
- Bijsterbosch J, Watt I, Meulenbelt I, Rosendaal FR, Huizinga TW, Kloppenburg M. Clinical and radiographic disease course of hand osteoarthritis and determinants of outcome after 6 years. *Ann Rheum Dis* 2011; 70:68-73.

22. Dieppe P, Cushnaghan J, Tucker M, Browning S, Shepstone L. The Bristol 'OA500 study': progression and impact of the disease after 8 years. *Osteoarthritis Cartilage* 2000; 8:63-8.
23. Plato CC, Norris AH. Osteoarthritis of the hand: longitudinal studies. *Am J Epidemiol* 1979; 110:740-6.
24. Botha-Scheepers S, Riyazi N, Watt I, Rosendaal FR, Slagboom E, Bellamy N et al. Progression of hand osteoarthritis over 2 years: a clinical and radiological follow-up study. *Ann Rheum Dis* 2009; 68:1260-4.
25. Macfarlane DG, Buckland-Wright JC, Emery P, Fogelman I, Clark B, Lynch J. Comparison of clinical, radionuclide, and radiographic features of osteoarthritis of the hands. *Ann Rheum Dis* 1991; 50:623-6.
26. Harris PA, Hart DJ, Dacre JE, Huskisson EC, Spector TD. The progression of radiological hand osteoarthritis over ten years: a clinical follow-up study. *Osteoarthritis Cartilage* 1994; 2:247-52.

