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Hand osteoarthritis: Clinical and imaging study

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KEYWORDS

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Abstract *Aim:* To examine the validity of US in assessing hand osteoarthritis (OA) and to study the relationship between ultrasonographic findings and OA symptoms.
Methods: This study was carried out on thirty patients with primary hand OA, and fifteen healthy subjects serving as a control group. Patients were classified according to ultrasonographic findings of joint involvement into two subgroups: 15 patients with interphalangeal (IP) OA and 15 patients with IP and first carpometacarpal (CMC) joint OA. All hand joints were examined for tenderness, soft tissue swelling, hard tissue enlargement (nodes), and deformity. Functional assessment by AUSCAN questionnaire, grip and pinch strength measurement and pain assessment by Visual Analogue Scale (VAS) were carried out. Plain X-rays of both hands were taken and classified according to the Kellgren–Lawrence (K–L) grading scale. High resolution US of the hand joints was performed which focused on examining cartilage thinning, joint space narrowing (JSN), and osteophytes (OST).
Results: There was a positive correlation between the K–L grading and US findings regarding JSN and OST. There was a positive correlation of AUSCAN score with cartilage thinning, OST and JSN. There was a negative correlation of grip strength with cartilage thinning and OST. There was a negative correlation between pinch strength and US findings (cartilage thinning, OST and JSN). There was a positive correlation between pain and US findings. Heberden's nodes were

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associated with underlying distal IP cartilage thinning, OST and JSN. On comparing the two subgroups of patients; patients with both IP and first CMC joint involvement experienced significantly higher levels of pain and disability and had weaker pinch strength.

Conclusions: Ultrasonographic findings correlated with clinical findings as nodes, functional parameters as grip and pinch strength, and pain. The increased detection of OA structural pathology by US may make this a useful tool for hand OA assessment.

1. Introduction

Osteoarthritis (OA) is the most common form of arthritis among the elderly. Joints most affected by this disease are knees, hips and hands.[1,2] Hand OA is a highly prevalent condition. It occurs commonly, though not exclusively, in the context of generalized OA, and can result in considerable disability. Although a number of criteria have been used to define hand OA clinically, radiographically or epidemiologically, its diagnosis and classification present certain difficulties due to a number of issues.[3] Challenges in diagnosing and classifying hand OA include different diagnostic possibilities (as rheumatoid arthritis, diabetic hand syndrome, gout and psoriatic arthritis), the large number of joints that may be affected, the nature of Heberden's nodes (HN) and Bouchard's nodes and their relationship to underlying OA of the interphalangeal (IP) joints.[3]

Other challenges include poor correlation between symptoms and structural changes of OA in the same joint, differences between OA of the IP joint and base of the thumb regarding risk factors and prognosis, and lack of consensus regarding the nature and specificity of erosive OA as a discrete subset of hand OA.[3] EULAR Standing Committee for International Clinical Studies Including Therapeutics (ESCISIT) task force set out to develop recommendations for the diagnosis of hand OA, using an evidence based format involving both a systematic review of available research evidence and expert consensus opinion.[4]

Previous epidemiological studies have largely targeted radiographic OA, and most of them have concentrated on knee and hip joints. While symptomatic hand OA should be a focus of studies because it causes disability and has formidable societal and public health impact, few studies have been conducted especially among the elderly.[3]

Osteoarthritis has traditionally been imaged with conventional radiographs (CR). However, in recent years, novel imaging techniques such as musculoskeletal ultrasonography (US) has been utilized to obtain a better understanding of this disease. Although the application of US to inflammatory diseases has been common and widespread, it has been applied to OA less frequently.[5–7]

2. Methods

This study was carried out on thirty patients with hand OA, and fifteen healthy age and sex-matched subjects serving as a control group. Patients were classified according to ultrasonographic findings of joint involvement into two subgroups: 15 patients with IP joint OA and 15 patients with IP and first carpometacarpal (CMC) joint OA. Personal data was obtained from patients and controls, which included age, sex, occupation and menstrual history in females, as well as detailed history about their hand condition including morning stiffness, joints involved, relieving and aggravating factors and medications received.

All studied subjects underwent general examination as well as local examination of the hand joints; distal interphalangeal (DIP), proximal interphalangeal (PIP), metacarpophalangeal (MCP), first^{t} CMC and the wrist joints of both hands. All areas were examined for tenderness, soft tissue swelling, nodes and deformities. Each finding was graded on a scale of 0–3, where 0 = normal, 1 = mild, 2 = moderate and 3 = severe. Pain severity was assessed by the Visual analogue scale (VAS).[8] They underwent functional assessment using the Australian Canadian Osteoarthritis hand index (AUSCAN) questionnaire,[9] which rated their pain, stiffness and limitation of functional activities on a scale of 0 (no problems at all) to 4 (extremely difficult). Grip strength was measured for each hand with a standard dynamometer (using the mean of three attempts). Pinch strength was measured with a pinchmeter for each hand; the mean value of the three trials was recorded. Laboratory investigations, which included erythrocyte sedimentation rate (ESR), C-reactive protein (CRP), rheumatoid factor titer, and uric acid were measured as recommended by EULAR to exclude secondary causes of hand OA.[4] Postero-anterior hand radiographs were taken and OA severity was classified according to the Kellgren–Lawrence (K–L) grading scale.[10] High resolution US, using Siemens Prima apparatus, utilizing high resolution multi-frequency probe (7.5–10 MHz) was used to assess each joint for: cartilage thinning, osteophytes (OST) and joint space narrowing (JSN), and was subjectively graded from 0 to 3 (none, mild, moderate and severe) by the same ultrasonographer.

2.1. Statistics

Data was analyzed using the Statistical Package for Social Sciences (SPSS ver.17 Chicago, IL, USA). The data was score

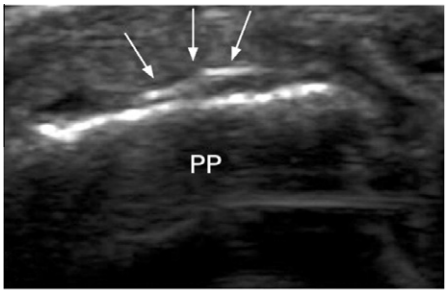

Figure 1 Dorsal longitudinal view of the proximal interphalangeal joint on ultrasonography, showing osteophytes (arrows).