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The correlation between ultrasonographic findings and the Lysholm scores in knee osteoarthritis

Lijuan He [a], Yinze Qi [b], Qingfu Wang [b], Xiangdong Tian [b], Dong Zhang [c], Lili Yang [c], Weili Wang [c], Haobin Ding [c], Qing Chang [b], Yufeng Ma [b,*]

[a] *Dongfang Hospital, Beijing University of Chinese Medicine, Beijing 100078, China*
[b] *Beijing University of Chinese Medicine Third Affiliated Hospital, Beijing 100029, China*
[c] *Beijing University of Chinese Medicine, Beijing 100029, China*

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KEYWORDS
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Abstract *Objective:* To analyze the correlation between ultrasonographic findings and Lysholm scores in knee osteoarthritis.
Methods: This cross-sectional observational study included 77 cases of knee osteoarthritis examined from February to December in 2015. There were 66 females and 11 males, with an average age (mean (SD)) of 57.39 (6.41) years, single or bilateral knee pain and limitation of mobility, and an average course of disease of 13.60 (3.00) months. Multiple regression equations were applied in a linear regression analysis to assess the correlation between ultrasound findings and Lysholm scores.
Results: The ultrasonographic findings of joint effusion, synovial hypertrophy, protrusion of the medial meniscus (MMP), and inflammation of subpatellar fat pad were significantly correlated with the Lysholm scores (all $P < 0.05$). In contrast, there was no association between the ultrasonographic findings of Baker's cyst or patellar ligament lesion and the Lysholm scores (both $P > 0.05$).
Conclusion: Musculoskeletal ultrasound can better detect the pathological changes of soft tissue in the knee, mainly including synovial hypertrophy, joint effusion, and MMP in comparison

* Corresponding author.
E-mail address: mayufeng6708@163.com (Y. Ma).
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with those by plain radiology. After statistical analysis, it is indicated that ultrasonographic findings of synovial hypertrophy was possibly associated with joint locking, joint effusion with supporting, MMP with squatting, and inflammation of subpatellar fat pad with squatting and locking.

Introduction

Knee osteoarthritis (KOA) is a condition involving dynamic pathological changes; it reflects the dysequilibrium between damage and repair of articular cartilage, and also the disturbed balance between damage and repair of the bone, synovial membrane, joint capsule, ligaments, tendons, and muscular tissue.[1,2] The clinical symptoms of KOA are significantly displayed, but plain radiography of the knee does not necessarily reveal changes such as osteophyte formation and change in the joint space. The conditions without radiological signs are referred to as negative radiological KOA.[3] Hence, clinicians cannot rely solely on plain radiography for clinical diagnosis of KOA, and it is necessary to examine the soft tissue around the knee.

Musculoskeletal ultrasonography (MUS) has been widely used in the clinical diagnosis of KOA, as it is non-invasive, safe, relatively inexpensive, and is able to produce the real-time dynamic images. However, it is unclear whether musculoskeletal ultrasound can directly reflect the clinical symptoms of KOA. In the present study, we analyzed 77 patients with KOA who underwent MUS, and assessed the correlation between the ultrasonographic findings and Lysholm scores in order to further guide clinical practice.

Methods

Diagnosis, inclusion and exclusion criteria

This study included patients who were diagnosed with KOA from February to December in 2015 at the Beijing University of Chinese Medicine Third Affiliated Hospital and treated as KOA orthopedic outpatients. KOA patients were assessed according to the clinical criteria by American College of Rheumatology for KOA (1995): (1) knee pain present most of the time for a 1-month period; (2) osteophyte formation detected on plain radiography; (3) joint fluid examination indicative of osteoarthritis; (4) age $\geq$ 40 years; (5) morning stiffness for $\leq$30 min; (6) bone fricative. Those patients who met criteria 1 and 2, or 1, 3, 5, and 6, or 1, 4, 5, and 6 were diagnosed with KOA.[4] Study inclusion criteria were: (1) fulfillment of the diagnostic criteria of KOA, and (2) voluntary signing of informed consent. Exclusion criteria were: (1) arthritic manifestations, such as rheumatoid arthritis, ankylosing spondylitis, and gout (stage of attack); (2) complications affecting the joints, such as psoriasis, syphilitic neuropathy, ochronosis, metabolic bone disease, and acute trauma; (3) pregnant or lactating women or the mentally ill; (4) participation in other drug clinical trials; (5) unsuitability for the clinical trial as assessed by the researchers.

Clinical data

A final total of 77 patients were included in the present study, including 66 females and 11 males aged 44—77 years (at an average age (mean (SD)) of 57.39 (6.41) years). The main symptoms were knee pain in single or bilateral knees and limited mobility, and the average duration of symptoms was 13.60 (3.00) months.

Research methods

This was a cross-sectional study. The participants were enrolled and examined before undergoing standing weight-bearing posterior-anterior and lateral knee radiography and MUS. Radiographs were evaluated by a group of senior orthopedic surgeons, and ultrasonographic findings were evaluated by specialized ultrasound physicians. The participants were also instructed to complete Lysholm score sheets. The results were recorded and statistically analyzed.

Observational indices

Radiographic features

Radiographs were evaluated using the Kellgren—Lawrence (K—L) grading system.[5] Grade 0, completely normal; Grade I, suspicious narrowing of the joint space or possible osteophytes; Grade II, obvious osteophytes, normal or suspicious narrowing of the joint space; Grade III, moderate osteophytes, obvious joint space narrowing, partly hardened subchondral bone, abnormalities may be present; Grade IV, large osteophytes, marked joint space narrowing, marked subchondral bone sclerosis, and obvious deformity.

Musculoskeletal ultrasonography

A Terason 3000CV ultrasound probe (Burlington, Massachusetts) with a frequency of 5—13 MHz was used to examine the knee for joint effusion, synovial hypertrophy, meniscal lesions, patellar fat pad inflammation, patellar ligament lesions, and Baker's cysts. Patients were instructed to slightly bend the knee when the clinician was checking for meniscal lesions and scanning from the medial joint line inspection gap >3 mm

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