Correlation between radiographic and arthroscopic findings in Asian osteoarthritic knees

Hamid Rahmatullah Bin Abd Razak, Hwee Yee Christian Heng, Ke Yi Cheng, Amit Kanta Mitra
Department of Orthopaedic Surgery, Singapore General Hospital, Singapore

ABSTRACT

Purpose. To evaluate the correlation between radiographic and arthroscopic findings for severity of knee osteoarthritis (OA) in 119 Asians.

Methods. Medical records of 52 men and 67 women aged 33 to 70 (mean, 51) years who had complaints of chronic mechanical knee pain for >3 months and were arthroscopically diagnosed with articular cartilage degeneration of the knee were reviewed. The severity of knee OA was classified using the Kellgren-Lawrence (K&L) scale and the modified Outerbridge classification. The highest grade in any compartment of the knee was used to represent the severity of OA. The correlation between the radiographic and arthroscopic findings for severity of knee OA was evaluated.

Results. 17 of the 119 patients with no radiographic evidence of OA (K&L grade 0) had articular cartilage degeneration arthroscopically (mean grade, 1.14). In general, higher K&L grades correlated with more severe articular cartilage degeneration. The Pearson correlation coefficient was 0.32, indicating that the association between the radiographic and arthroscopic findings for severity of knee OA was weak.

Conclusion. The K&L scale correlated poorly with arthroscopic findings of articular cartilage degeneration in an Asian population with knee OA.

Key words: arthroscopy; osteoarthritis, knee; radiography

INTRODUCTION

Osteoarthritis (OA) of the hips and knees is the fourth leading cause of functional disability worldwide. OA is strongly associated with ageing. The morbidity burden of OA in Asia is significant due to the large proportion of ageing population.1 Radiographs of the tibiofemoral joint are used to devise scales for the severity of OA, such as the Kellgren-Lawrence (K&L) scale.2 Western studies have evaluated the correlation between the radiographic (K&L scale) and arthroscopic findings.3-6 During deep flexion of the
knee, the peak stresses reach the damage limits of the cartilage. Various cultures in Asia require frequent deep flexion of the knee. This study evaluated the correlation between radiographic (K&L scale) and arthroscopic findings for severity of knee OA in 119 Asians.

MATERIALS AND METHODS

Medical records of 52 men and 67 women aged 33 to 70 (mean, 51) years who had complaints of chronic mechanical knee pain for >3 months and were arthroscopically diagnosed with articular cartilage degeneration of the knee between January 2006 and December 2010 by the senior author were reviewed. They had no history of knee trauma, surgery, or inflammatory, septic, or gouty arthritis.

Standing anteroposterior radiographs of the knees in full extension were reviewed by 2 blinded musculoskeletal radiologists to determine the severity of OA. According to the K&L scale, grade 0 was defined as no radiological findings of OA, grade I as doubtful narrowing of joint space and possible osteophytic lipping, grade II as definite osteophytes and possible narrowing of joint space, grade III as moderate multiple osteophytes, definite narrowing of joint space, some sclerosis and possible deformity of bone contour, and grade IV as large osteophytes, marked narrowing of joint space, severe sclerosis, and definite deformity of bone contour.

Arthroscopy was performed within one month through standard portals. According to the modified Outerbridge classification, arthroscopic articular cartilage conditions of the medial and lateral femoral condyles as well as medial and lateral tibial plateaus were classified as grade 0 for normal cartilage, grade I for cartilage with softening and swelling, grade II for partial thickness defect with fissures on the surface that do not reach subchondral bone or exceed 1.5 cm in diameter, grade III for fissuring to the level of subchondral bone in an area with a diameter >1.5 cm, and grade IV for exposed subchondral bone. The highest grade in any compartment of the knee was used to represent the severity of OA.

The correlation between the radiographic and arthroscopic findings for severity of articular cartilage degeneration was evaluated.

RESULTS

17 of the 119 patients with no radiographic evidence of OA (K&L grade 0) had articular cartilage degeneration arthroscopically (mean grade, 1.14; Table). In general, higher K&L grades correlated with more severe articular cartilage degeneration. The Pearson correlation coefficient was 0.32, indicating that the association between the radiographic and arthroscopic findings for severity of knee OA was weak. Inter- and intra-observer variability of the 2 radiologists was not assessed.

DISCUSSION

In 36 patients with OA of the knee, the K&L scale significantly underestimated the degree of articular cartilage degeneration.6 In 173 patients with OA in the medial compartment of the knees, the sensitivity of the K&L scale in detecting articular cartilage degeneration was 98%, but most of the patients had advanced OA.9 Plain radiographs are insensitive in detecting early/mild articular cartilage damage.10 In our study, the association between the radiographic and arthroscopic findings for severity of knee OA was weak (r=0.32), which is consistent with findings in other studies.11,12 The K&L scale overemphasises the presence of osteophytes and insufficiently accounts for joint space narrowing,

<table>
<thead>
<tr>
<th>Kellgren-Lawrence scale</th>
<th>Mean±SD highest modified Outerbridge classification grade</th>
<th>Correlation coefficient (95% confidence interval)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade 0 (n=17)</td>
<td>1.14±0.46</td>
<td>0.32 (0.15–0.47)</td>
</tr>
<tr>
<td>Grade I (n=14)</td>
<td>1.27±0.58</td>
<td></td>
</tr>
<tr>
<td>Grade II (n=45)</td>
<td>2.05±0.77</td>
<td></td>
</tr>
<tr>
<td>Grade III (n=35)</td>
<td>3.46±0.42</td>
<td></td>
</tr>
<tr>
<td>Grade IV (n=8)</td>
<td>3.67±0.21</td>
<td></td>
</tr>
</tbody>
</table>
which is indicative of articular cartilage thinning. According to the K&L scale, if osteophytes are not present, the joint must be graded as negative for OA. Repeat squatting results in reversal of shear reactions that may have implications for the long-term mechanical function and integrity of the joint cartilage. In these patients, joint space narrowing may be more prominent than osteophytosis. This may be a reason for the poor correlation between the radiographic (K&L scale) and arthroscopic (modified Outerbridge classification) findings in articular cartilage degeneration. In contrast, one study reported good correlation between the K&L scale and joint space narrowing, but the joint space narrowing was calculated from the radiographs, and arthroscopy was not performed to validate the actual articular cartilage degeneration.

One limitation of our study was selection bias as all patients were symptomatic and represented only a small cross-section of our community. Furthermore, sub-analysis of the individual features of the K&L scale and their correlation with arthroscopic findings was not performed. The Rosenberg radiographs of the knee, which are more sensitive and specific for joint space narrowing than the conventional standing anteroposterior radiographs, were not obtained.

**CONCLUSION**

The K&L scale correlated poorly with arthroscopic findings of articular cartilage degeneration in an Asian population with knee OA.

**DISCLOSURE**

No conflicts of interest were declared by the authors.

**REFERENCES**