ORIGINAL RESEARCH PAPER

Radiodiagnosis

A STUDY ON THE ASSESSMENT OF RADIOGRAPHIC CHANGES IN OSTEOARTHRITIS AMONG STUDY SUBJECTS

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ABSTRACT

INTRODUCTION: Our objective was to assess radiographic features of osteoarthritis (OA) and to determine which is more closely associated with knee pain and hence might be used as a radiographic definition of OA in the community. To evaluate joint space width in normal subjects.

METHODS: Sample size was 395 rounded to 400 subjects from a case-control community study of knee pain underwent AP standing and midflexion skyline radiographs. Joint space width, measured by metered calliper to 0.1 mm, and graded individual features of OA (osteophyte 0–3, narrowing 0–3, sclerosis 0–1, cysts 0–1) were assessed in all three compartments Subjects were categorised as having knee pain by a positive response to question about pain . Cases were taken from all the sections , Departments , Health Centres of the Medical College

RESULTS: Joint space width measurements was to within ±0.4 mm (95% CI for limits of agreement); ê values for grading were >0.7. A number of Subjects were without knee pain too . In these radiographically normal knees, mean joint space width varied according to sex but did not decrease with age. A definition based on the presence of osteophyte >grade 1 in any compartment was more efficient at predicting pain than definitions based on either measurement or grading of joint space; there was no clear threshold of joint space loss at which the likelihood of pain substantially increased.

CONCLUSION: Among men and women in the community, osteophyte is the radiographic feature that associates best with knee pain. Radiographic assessment of both TFJ and PFJ should be included in all community studies. Joint space loss is not a feature of asymptomatic aging, and there is not a biological cut off for joint space width below which the likelihood of knee pain markedly increases

INTRODUCTION

Osteoarthritis (OA) of the knee is a major cause of disability in the community and imposes significant economic costs upon society. Estimated population prevalence varies from 4–30%, depending on the age, sex distribution, and disease definition.[1] While all clinicians may know what constitutes OA, epidemiological and outcome studies have been hampered by lack of agreement on a precise definition. This has partly reflected a desire for an all embracing definition that includes the three domains that we associate with OA: pain, disability, and structural change. However, there is discordance between these domains. For example, only 40–80% of subjects with radiographic knee OA have symptoms.[2] Most researchers have concentrated on definitions based on aspects of structural change visualised on plain radiographs. Ideally, any such definition should be reproducible, accurate, and associated with knee pain, but there remains controversy as to which radiological features should be used to define knee OA, particularly in the community. The radiographic grading system of Kellgren and Lawrence,[3] variations of which have been used in most epidemiological studies, emphasises the presence of osteophyte. More recent studies have also re-emphasised the importance of osteophyte in definition.[4,5] However, radiographic assessment of the patellofemoral compartment, a site commonly affected by OA,[6] has often been excluded. When this assessment has been included, it has mainly been from lateral view radiographs,[4,7] which are less sensitive at measuring joint space loss than skyline views.[8,9] The importance of joint space narrowing may be underestimated because of a lower sensitivity of visual grading compared with direct measurement. Additionally, some community studies have been undertaken among the female population and it is not known how generalisable these results are to men, given the higher prevalence of symptoms in women for a given radiographic change.[10] The importance of osteophyte in defining OA at the knee is in contrast with the hip, where definitions based on minimum joint space have been proposed.[11,12] These proposals have been facilitated by knowledge of joint space width in asymptomatic subjects without disease.[13,14,15] In contrast, there

is a paucity of data on the range of tibiofemoral and patellofemoral joint space in asymptomatic people. One previous study of subjects attending an Accident and Emergency Department with knee pain or trauma reported a reduction in tibiofemoral joint space with age.[16] The aims of this study were to examine different radiological features of osteoarthritis and their association with pain and to establish a range for knee joint space widths among asymptomatic subjects in a community study of men and women.

METHEDOLOGY

After local ethical committee approval . Patients coming to outpatient department or admitted in the hospital satisfying the criteria were included in the study. Subjects comprised 400 Subjects (mean age 60 years, range 40–80) derived from a community study. This involved a questionnaire survey For subjects to be designated as "knee pain" positive, a positive response was required to both parts of the question (a) "Have you ever had pain in or around the knee on most days for at least a month? (b) If so, have you experienced any pain during the last year?[17] A negative response to both parts of the above question was designated as "knee pain" negative. The subject's designation (knee pain positive or negative) was hence assigned to both knees. Subjects who were knee pain positive were age and sex matched to a subject from the same general practice who was knee pain negative and invited to attend for a clinical examination including height and weight estimation and plain radiography.

Standardised AP (weight bearing, full extension) and skyline radiographs (mid-flexion, according to method of Laurin) of both knees were available for all subjects. A single observer graded narrowing and osteophyte 0–3, according to a standard atlas.19 On a separate occasion, a second observer independently measured joint space in the medial and lateral compartments of the tibiofemoral (TFJ) and patellofemoral (PFJ) joints of both knees by hand to the nearest 0.1 mm using a metered dial calliper . On the skyline view, minimum joint space in each facet was measured from the bright radiodense band of subchondral cortex on the patella to the articular

margin of the femoral cortex.[20] On the AP view, measurements of minimum joint space were made in each compartment using recommended landmarks.[20,21] Both observers were blind to each other's assessment and the knee pain status of the patient.

Level of agreement for grading was quantified by kappa , reproducibility of continuous variables was assessed using the method of Bland and Altman.[22] Confidence intervals and correlation coeffcients were calculated according to standard methods.[23] Odds ratios for pain were calculated for different cut off levels of abnormality All analyses included both knees from each subject, except for the association of graded individual features and measured joint space width with pain, where the maximum grade or minimum joint space in either knee for each specified compartment was selected for analysis—that is, the "worst" knee

RESULTS
The study comprised 53% & 47% without pain. 19% had >grade 2 osteophyte in any compartment in either knee and 20% had >grade 2 narrowing in any compartment .The number of subjects with each maximum osteophyte or narrowing grade in either TFJ or PFJ according to the presence of knee pain. Joint Space In "Normal" Subjects which were without knee pain or osteophyte in any compartment, and were designated as having radiographically "normal" knees. This group comprise of mean age 58 years, range 40–75. Mean values were generally higher in men than women. In both sexes there was no significant decline in joint space in any compartment with increasing age. There was no significant correlation between joint space and height, weight or body mass index.

Association Of Graded Radiographic Features With Pain - The association of individual radiographic features with pain at single and combined sites the Odds ratios for pain (95% CI) are was according to the level at which features are dichotomised (for example, grade 1 and above v grade 0, grade 2 and above v grade 0–1, etc). The cut off levels represented the maximum grade in either knee (that is, the worst knee) for each specified compartment. Efficiency was computed from (sensitivity + specificity)/2. There were positive associations between pain and the presence of osteophyte at any joint site, with a stronger association at increasing grades. However, for narrowing, all associations were generally less marked. Also, the association varies considerably according to the site of narrowing. For example, while narrowing of all grades in the lateral PFJ facet is strongly associated with pain, there was no association between pain and narrowing in the medial facet. Likewise, at the TFJ, the association with pain is much stronger for narrowing in the medial compartment compared with lateral.

Associations between pain and joint space width - odds ratios were calculated for different measurement cut off levels (for example, 2 mm), which represent the minimum joint space width in either knee (that is, the worst knee) for each specified compartment. In general, these results are similar to those for graded narrowing, with the strongest associations between pain and joint space width being found in the lateral PFJ and medial TFJ compartments. All medial PFJ widths were only weakly associated with pain, with, paradoxically, the strongest associations with pain found at >8 mm.

DISCUSSION
Demonstrated that among asymptomatic subjects without knee osteophyte there is no reduction in mean joint space width with age. This result is in contrast with the findings of a previous study,[16] which suggested that joint space width decreases with age until a symptomatic pain threshold is reached. These conflicting results are likely to be caused by differences in subject selection. The associations between radiographic change and pain suggest that a definition based on the presence of > grade 1 osteophyte in any compartment is the most efficient method with which to define radiographic knee OA in the community. Although this finding is in agreement with most previous studies, many of these have either not been performed in the community, have not included men, or have not optimally visualised the patellofemoral compartment.[4,5,7]

The presence of narrowing assessed by either method is less efficient at predicting knee pain than the presence of osteophyte. In particular, it is worth emphasising that osteophyte seems to be strongly associated with pain when it is present at any site, whereas the association of pain with narrowing is strong only at the lateral PFJ or medial TFJ. For narrowing at the PFJ, this might be explained by the fact that when the lateral facet is narrowed, the medial facet may become paradoxically widened. The exact performance of osteophyte in defining knee OA varies according to joint site. The importance of osteophyte in radiographic definition at the knee does not extend to other joint sites. For example, joint space narrowing at the hip is clearly a better predictor of pain than osteophyte[12]

CONCLUSION
The results of this study suggest that the presence of osteophyte is the best predictor of knee pain among men and women in the community and that direct measurement of joint space does not confer any advantage over grading. Joint space width does not decrease with age among asymptomatic subjects and there does not seem to be a biological threshold for joint space width, below which the likelihood of symptoms markedly increases. The discordant associations between individual radiographic features and symptoms at the hip and knee is further evidence that each joint site justifies separate consideration in the assessment of OA.

CONFLICT OF INTEREST: None declared

ETHICAL APPROVAL:
The study was approved by the Ethics Committee

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