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Assessment of radiographic findings in patients with osteoarthritis of knee

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Abstract
Background: Osteoarthritis (OA) is one of the most prevalent conditions resulting to disability particularly in elderly population. Plain radiography remains a mainstay in the diagnosis of OA. Hence; under the light of above mentioned data, the present study was undertaken for assessing radiographic findings in patients with osteoarthritis of knee.
Materials and Methods: Present study was conducted on 20 patients with presenting with knee pain and clinical suspicion of osteoarthritis. Detailed radiographic and MR imaging was be done in all subjects. Radiographic examination was done. All radiographs were assigned scores by using the Kellgren-Lawrence scoring system. This summary Kellgren-Lawrence score was based on osteophyte formation, joint space narrowing, sclerosis, and joint deformity characteristics according to the five-level scale defined as follows: grade 0, normal; grade 1, doubtful osteoarthritis; grade 2, minimal osteoarthritis; grade 3, moderate osteoarthritis; or grade 4, severe osteoarthritis. Radiographic findings were compiled as per performa and subjected to analysis using appropriate statistical tests.
Results: 20 percent of the patients each showed doubtful and minimal osteoarthritis while the remaining 10 percent of the patients showed moderate osteoarthritis. On MRI examination, no meniscal abnormalities were seen in 25 percent of the patients while Globular intrasubstance abnormalities were seen in 35 percent of the patients. Linear intrasubstance meniscal abnormality was seen in 25 percent of the patients while Tear (displaced/ undisplaced/ complex/ macerated) was seen in 15 percent of the patients.
Conclusion: The pathologic changes of pre-radiographic OA can be detected at an earlier stage of the disease through radiographic examination.

Keywords: Osteoarthritis, radiographic

Introduction
Osteoarthritis (OA) is one of the most prevalent conditions resulting to disability particularly in elderly population. OA is the most common articular disease of the developed world and a leading cause of chronic disability, mostly as a consequence of the knee OA and/or hip OA. Knee osteoarthritis (OA), also known as degenerative joint disease, is typically the result of wear and tear and progressive loss of articular cartilage. It is most common in elderly women and men. Knee osteoarthritis can be divided into two types, primary and secondary. Several attempts to develop diagnostic criteria for OA were previously undertaken and incorporate patient-reported joint pain in conjunction with consistent radiographic findings [1-3].
Plain radiography remains a mainstay in the diagnosis of OA. Before the practitioner makes a clinical diagnosis of idiopathic knee OA, secondary underlying disorders should be considered and excluded. Secondary conditions of the knee that may enhance the risk of knee OA should be examined carefully. Osteoarthritis frequently affects the knee and can cause profound changes in the surrounding bone and soft tissues. These changes include cartilage loss, subchondral sclerosis, osteophytosis, subchondral cysts, and meniscal degeneration. Radiographs can show osteoarthritic changes of the bone; however, soft-tissue involvement may not be appreciated. CT is superior to conventional radiography osseous changes because it provides a tomographic assessment of soft-tissue and osseous change. MR imaging has direct multiplanar imaging capability and provides a higher soft tissue contrast than CT does. MR imaging is established as a noninvasive tool for evaluating pathologic changes in the articular cartilage, menisci, and ligaments of the knee [4-6].

Hence; under the light of above mentioned data, the present study was undertaken for assessing radiographic findings in patients with osteoarthritis of knee.

Materials and Methods

Present study was conducted on 20 patients with presenting with knee pain and clinical suspicion of osteoarthritis. Detailed radiographic and MR imaging was be done in all subjects.

Inclusion criteria included:

- Patients with knee pain and clinical suspicion of osteoarthritis
- Cases of all age groups irrespective of sex

Exclusion Criteria

- Patients with past history of trauma or knee surgery were excluded from the study
- Patients who couldn't undergo MR imaging such as patients with- cardiac pacemaker

Radiographic examination was done. All radiographs were assigned scores by using the Kellgren-Lawrence scoring system. This summary Kellgren-Lawrence score was based on osteophyte formation, joint space narrowing, sclerosis, and joint deformity characteristics according to the five-level scale defined as follows: grade 0, normal; grade 1, doubtful osteoarthritis; grade 2, minimal osteoarthritis; grade 3, moderate osteoarthritis; or grade 4, severe osteoarthritis. Radiographic findings were compiled as per performa and subjected to analysis using appropriate statistical tests.

Results

Mean age of the patients was 56.8 years. 60 percent of the patients were females while 40 percent of the patients were males.

50 percent of the patients didn't show any significant findings on radiograph. 20 percent of the patients each showed doubtful and minimal osteoarthritis while the remaining 10 percent of the patients showed moderate osteoarthritis. On MRI examination, no meniscal abnormalities were seen in 25 percent of the patients while Globular intrasubstance abnormalities were seen in 35 percent of the patients. Linear intrasubstance meniscal abnormality was seen in 25 percent of the patients while Tear (displaced/ undisplaced/ complex/ macerated) was seen in 15 percent of the patients.

Table 1: Distribution of patients according to Kellgren-Lawrence score (on Radiography)

Kellgren-Lawrence score (on Radiography)	Parameter	Number of patients	Percentage of patients
Grade 0	Normal	10	50
Grade 1	Doubtful Osteoarthritis	4	20
Grade 2	Minimal Osteoarthritis	4	20
Grade 3	Moderate Osteoarthritis	2	10
Total		20	100

Table 2: Distribution of patients according to Meniscal abnormalities (On MRI)

Grade (On MRI)	Number of patients	Number of patients	Percentage of patients
Grade 0	Normal	5	25
Grade 1	Globular intrasubstance abnormalities	7	35
Grade 2	Linear intrasubstance meniscal abnormality	5	25
Grade 3	Tear (displaced/ undisplaced/ complex/ macerated)	3	15
Total		20	100

Discussion

Characterized by degenerative changes in the bones, cartilage, menisci, ligaments, and synovial tissue, osteoarthritis (OA) has evolved to be considered a disease of the whole joint. Using imaging, OA has traditionally been diagnosed with radiographs that demonstrate joint space width (JSW) and osteophytes. Recently, additional modalities such as magnetic resonance imaging (MRI), ultrasound (US), and optical coherence tomography (OCT), have enhanced OA diagnosis and management through improvements in soft tissue depiction. Early identification of OA is crucial to improving clinical decision-making and advancing the understanding of disease progression and treatment options [6-10].

In the present study, mean age of the patients was 56.8 years. 60 percent of the patients were females while 40 percent of the patients were males. 50 percent of the patients didn't show any significant findings on radiograph. 20 percent of the patients each showed doubtful and minimal osteoarthritis while the remaining 10 percent of the patients showed moderate osteoarthritis. Singh AK *et al*. assessed epidemiology of osteoarthritis of knee and various MRI findings. In all the 128 patients radiographs (anteroposterior) were taken in extended and weight bearing position. Staging of osteoarthritis of knee was done using Kellgren-Lawrence scoring system and then we performed magnetic resonance imaging of the knee. All these patients were then interviewed about their clinical symptoms and osteoarthritis of knee was graded by WOMAC scale. Osteoarthritis has a positive correlation with age, female sex and BMI. However occupation of the patient was not associated with any statistical significance. No association was seen between cartilage defects, bone marrow edema, sub chondral cysts, subchondral sclerosis, Baker's cysts subluxations of tibia and synovitis with clinical features. The patellofemoral compartment of knee joint mostly contributed to the clinical symptoms of the patients in our study population though not being statistically significant (*P* >0. 05). In tibiofemoral compartment a statistically significant correlation was seen between most of the MRI findings and KL score, however in patellofemoral compartment this correlation is poor. Clinical findings and plain radiographs are still important in evaluating osteoarthritis of knee, MRI plays an important role in imaging the bony and soft tissues of knee as a whole organ, thereby helping in better management and outcome of the disease [11].

In the present study, on MRI examination, no meniscal abnormalities were seen in 25 percent of the patients while Globular intrasubstance abnormalities were seen in 35 percent of the patients. Linear intrasubstance meniscal abnormality was seen in 25 percent of the patients while Tear (displaced/ undisplaced/ complex/ macerated) was seen in 15 percent of the patients. Kumm J *et al*. evaluated the prevalence of findings

suggestive of knee OA by magnetic resonance imaging (MRI) in middle-aged subjects without radiographic OA with or without OA risk factors. 340 subjects from the Osteoarthritis Initiative, aged 45–55 years (51% women) with Kellgren–Lawrence grade 0 in both knees, who had 3T knee MR images were eligible. 294 subjects had risk factors and 46 were without risk factors. MR images were assessed using the MOAKS scoring system. At least 1 MR-detected feature was found in 96% (283/294) of subjects with risk factors and in 87% (40/46) of those without. Cartilage damage (82%), bone marrow lesions (60%), osteophytes (45%), meniscal body extrusion (32%), and synovitis–effusion (29%) were the most common findings in subjects with risk factors, while cartilage damage (67%), osteophytes (46%), meniscal body extrusion (37%), and bone marrow lesions (35%) were most common in subjects without. The prevalence of any abnormality was higher in subjects with OA risk factors than in subjects without (prevalence ratio adjusted for age and sex 1.3 [95% CI 1.1–1.6]), so was prevalence of subchondral cysts and bone marrow lesions. MR-detected structural changes were more frequent in patellofemoral joints. Their findings highlight the great challenge in distinguishing pathological features of early knee OA from what could be considered part of "normal ageing." Bone marrow lesions were more frequently found in subjects with multiple OA risk factors [12].

Conclusion

The pathologic changes of pre-radiographic OA can be detected at an earlier stage of the disease through radiographic examination.

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