International Journal of Research and Review
Vol. 10; Issue: 10; October 2023
Website: www.ijrrjournal.com
Case Report *E-ISSN: 2349-9788; P-ISSN: 2454-2237*

Conventional Radiography of Grade III Knee Osteoarthritis: A Case Report

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DOI: https://doi.org/10.52403/ijrr.20231068

ABSTRACT

Introduction: Osteoarthritis (OA) is the most common form of inflammatory joint disease. It occurs most frequently in the knees, hips, the spine (vertebrae), and ankles. Radiological prevalence of knee OA in Indonesia reaches 15.5% in men and 12.7% in women aged between 40-60 years. X-ray imaging is routinely used in clinical practice to confirm knee OA diagnosis and in clinical research to monitor the progression of knee OA.

Case report: A 62-year-old female patient presented with knee pain in both knees that had been ongoing for the past 6 months. The pain was described as throbbing and stabbing, the right knee worse affected than the left. Palpation elicited tenderness, crepitus in both joints and did not reveal any deformities. Radiological AP/Lateral X-ray of the right knee revealed evidence of osteophytes, sclerosis and narrowing joint space, leading to the impression of Grade III osteoarthritis in the right knee.

Discussion: Joint pain is the chief complaint that leads patients with knee osteoarthritis to seek medical attention. Pain typically worsens with movement and decreases with rest. In diagnosing OA, an AP/Lateral radiographic examination of the right knee is conducted, revealing the presence of osteophytes, subchondral bone sclerosis and accompanied by slight joint narrowing. This impression aligns with the Grade III OA criteria according to the Kellgren-Lawrence grading system.

Conclusion: Diagnosis of osteoarthritis involves a comprehensive approach combining medical history, physical examination, and diagnostic tests. Radiographic examinations including conventional radiography play a significant role in diagnosing OA. In the early stages of the disease, joint radiographs may still appear normal. The severity of knee OA can be evaluated using the Kellgren-Lawrence (KL) grading scheme which ranges from grade 0 to grade 4.

Keywords: Knee Osteoarthritis, Conventional Radiography, The Kellgren-Lawrence Grading

INTRODUCTION

Osteoarthritis (OA) is the most common form of inflammatory joint disease, that affects 302 million people worldwide, causing disruptions in the elderly population.[1] Osteoarthritis is a degenerative and multifactorial disease. It occurs most frequently in the knees, hips, the spine (vertebrae), and ankles.[2,3]

Osteoarthritis is a slow-progression disease, its etiology remains unclear. There are several risk factors for OA including age, gender, ethnicity, genetics, diet, obesity, muscle weakness, excessive physical activity, previous trauma, decreased proprioceptive function, family history of OA, and mechanical factors. [4,5]

Around 250 million people worldwide were affected by knee OA in 2012, with risk factors being aging and increasing obesity rates. The population aged 45 years or older diagnosed with knee OA is estimated to have increased from 13.8% to 15.7%.[6] The radiological prevalence of knee OA in Indonesia reached 15.5% in men and 12.7% in women aged between 40-60 years. Sixty-

nine percent of these cases were women, and the majority were knee OA (87%).[7]

The diagnosis of OA is established through medical history, physical examination, and diagnostic tests. The diagnostic criteria for knee OA according to the American College of Rheumatology are knee pain, X-ray evidence of osteophytes, and at least one of the following: age > 50 years, joint stiffness < 30 minutes, and crepitus.[7] Joint pain is typically the primary complaint that leads patients to seek medical attention. The pain usually worsens with movement and decreases with rest.[8]

Diagnostic tools for OA include laboratory tests and radiological examinations.[9] Conventional radiography is a simple and cost-effective method. X-rays are routinely used in clinical practice to confirm knee OA diagnosis and in clinical research to monitor knee OA progression.[6]

Therapy for OA is generally symptomatic, involving risk factor management, physiotherapy intervention, and pharmacological therapy. Surgery is often required in advanced stages.[10-12] Since this condition is frequently encountered in patients at Wangaya District General Hospital, both in outpatient and inpatient settings, and many cases are unreported in the community, we are interested in reporting a case of osteoarthritis in a 62-year-old female patient who was treated as an outpatient in January 2023.

CASE REPORT

A 62-year-old female patient came to the Medical Rehabilitation Clinic with pain in both knees for the past 6 months. The pain is described as throbbing and stabbing, the right knee was worse than the left. The pain persists even after compressing the knees. The pain worsens when the patient bends her knees, stands, and walks, and slightly decreases with rest.

The patient's previous medical history had intra-articular injections and anti-inflammatory injections in August 2022. She also took medications to reduce swelling and pain in her knees. The patient mentioned that she used to be physically active when she was younger, but she has been less active in recent years.

At the physical examination, the patient's general condition is good and alertness. She weighs 65 kg, blood pressure was 120/80 mmHg, heart rate was 80 beats per minute, respiratory rate was 20 breaths per minute, axillary temperature was 36°C, and visual analog scale (VAS) was 30/100. The knee examination revealed no deformities. Tenderness and crepitus on palpation at both joints. The patellar grind test showed positive result.

Radiological finding was conducted to support the diagnosis, revealed X-rays of the right knee in the anteroposterior and lateral views showing the osteophytes and sclerosis in the right knee, showed Kellgen and Lawrence (KL) grading III of the right knee.

The diagnosed bilateral Grade III knee osteoarthritis was made. The treatment included physiotherapy and intra-articular injections. The patient also received education regarding her condition, including comprehensive information about osteoarthritis (its definition, causes, risk factors, disease progression, complications, management, permissible and restricted activities and exercises). She was advised to rest and protect the affected joints, avoid knee flexion (squatting, sitting cross-legged, and using a sit-down toilet), minimize heavy lifting, walk carefully to prevent falls and further trauma, and engage in regular light exercise.

DISCUSSION

Osteoarthritis is also known as degenerative joint disease with multifactorial disease. The joints most frequently affected are weight-bearing joints such as knees, hips, the spine (vertebrae), and ankles.[2,3]

Knee osteoarthritis is characterized by chronic pain and functional impairment in the elderly. The risk of developing OA increases with age. The prevalence of OA is relatively high in the population, particularly in individuals aged over 50

years. While in individuals under 45 years, there is a higher prevalence in men than women, but there is generally no difference across all ages.[13]

The diagnostic criteria for knee OA according to the American College of Rheumatology include knee pain and X-ray evidence of osteophytes, with at least one of the following: age > 50 years, joint stiffness < 30 minutes, and crepitus.[7] Joint pain is usually the main complaint that leads patients to seek medical attention. Pain typically worsens with movement and decreases with rest. In general, OA patients report that their symptoms have been present for a long time but have developed gradually.[8]

In this case, the patient is 62 years old and came to the Medical Rehabilitation Clinic with clinical complaints of pain in both knees, which is more severe in the right knee, and has been present for the past 6 months. Both the patient's age and her reported symptoms are risk factors for osteoarthritis.

The areas most commonly affected by OA are the knees. Additionally, it can also occur in the carpometacarpal joint of the thumb, metatarsophalangeal joint of the big toe, facet joints of the spine, and hips.[2,3] This aligns with the patient's complaints in both knees.

The patient also complains of difficulty moving and walking due to the pain, and she occasionally experiences sensations as if something is breaking or crumbling when her knees are moved. Physical examination of OA patients usually reveals joint movement, both active and passive. Additionally, crepitus is often heard, which becomes more pronounced as the disease progresses. This symptom occurs due to the friction between the bone surfaces of the joint during movement or passive manipulation.[14] In this case, crepitus is heard in both the right and left knees when moved passively.

The diagnosis of OA is based not only on clinical symptoms but also on radiological findings. However, in the early stages of the disease, joint radiographs often appear normal. Radiographic examination, known as X-rays or radiography, is a diagnostic tool used to diagnose OA. Patients can be scanned in various positions, including lying down, sitting, standing, full extension, semi-flexion, without weight bearing, and weight bearing conditions. The weight bearing condition is relevant to clinical assessment as the knees are typically under their natural load during function.[12]

The establishment of grading systems has allowed for the assessment of disease severity, contributing to the basis of knee OA diagnosis. Grading systems not only enable qualitative assessment but also provide semi-quantitative assessment of OA severity. The Kellgren-Lawrence (KL) grading system, derived from X-ray imaging features, is commonly used as a standard for assessing knee OA severity. [15]

The radiological features that support the diagnosis of OA are as follows: [16, 17]

- joint space narrowing
- subchondral sclerosis
- osteophytosis
- joint erosions
- subchondral cysts
- bone marrow lesions
- synovitis, which is a less common finding.

Numerous variations of the Kellgren and Lawrence classification system have been used in research.[3] Below is the original description.[7]

- **grade 0 (none)**: definite absence of x-ray changes of osteoarthritis
- **grade 1 (doubtful)**: doubtful joint space narrowing and possible osteophyte lipping
- **grade 2 (minimal)**: definite osteophytes and possible joint space narrowing
- **grade 3 (moderate)**: moderate multiple osteophytes, definite narrowing of joint space and some sclerosis and possible deformity of bone ends
- **grade 4 (severe)**: large osteophytes, marked narrowing of joint space, severe

sclerosis and definite deformity of bone ends

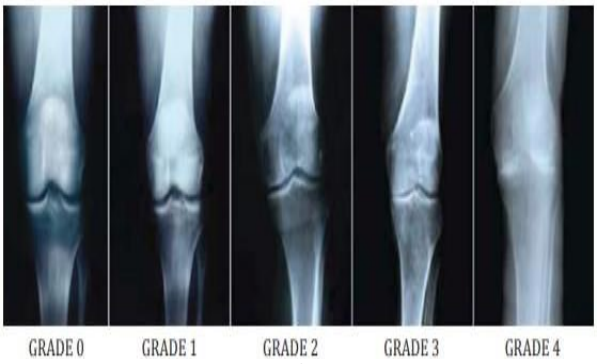

Figure 1. Plain radiograph of knee osteoarthritis grade

In the results of the conventional radiography, an examination was conducted on the right knee, revealing the presence of osteophytes on the medial and lateral condyles of the femur and tibia, as well as on the posterior superior and inferior margins of the patella. Additionally, there is subchondral bone sclerosis in the proximal region of the right knee, with mild narrowing of the medial compartment of the femorotibial joint, leading to the impression of Grade III osteoarthritis of the right knee (according to the Kellgren Lawrence grading scale). This impression aligns with Kellgren and Lawrence Grade III, where osteophytes, joint space narrowing, and sclerosis are present without the presence of deformities.

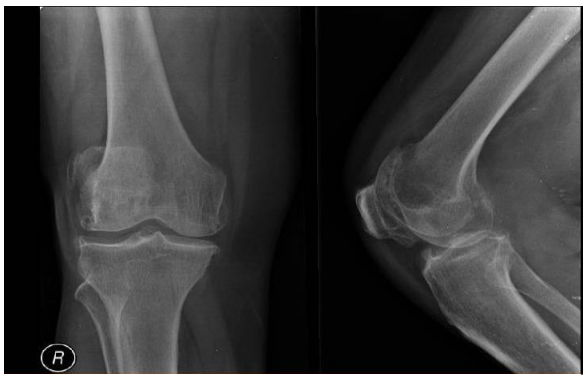

Figure 2. AP/ Lateral views right knee with osteophytes, sclerosis and narrowing joint space.

The management of OA aims to reduce pain, maintain or improve joint function, decrease limitations in daily physical activities, enhance independence, and improve the overall quality of life for individuals with OA.[14] Initially, both non-pharmacological and pharmacological therapies are employed. Non-pharmacological interventions include patient education about the disease, while pharmacological interventions involve administering intra-articular injections and non-pharmacological interventions, such as physiotherapy sessions.

CONCLUSION

Osteoarthritis is a multifactorial degenerative disease that affects various joints, including the knees, hips, spine (vertebrae), and ankles. The diagnosis of OA is established through a combination of medical history, physical examination, and diagnostic tests. Radiographic examinations, such as conventional X-rays, is a significant role in supporting the diagnosis. However, in the early stages of the disease, joint radiographs may appear normal. Radiological features that support the diagnosis of knee OA include asymmetric joint space narrowing, increased density (sclerosis) of the subchondral bone, osteophytes at the joint margins, joint erosions, subchondral cysts, bone marrow lesions, and the less common finding of synovitis. The severity of knee OA can be assessed using the Kellgren-Lawrence (KL) grading scheme, which ranges from grade 0 to grade 4.

Declaration by Authors

Acknowledgement: None
Source of Funding: None
Conflict of Interest: The authors declare no conflict of interest.

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How to cite this article: Ni Made Linda Pertiwi, Ni Luh Jaya Kirana. *Conventional radiography of grade III knee osteoarthritis: a case report International Journal of Research and Review*. 2023; 10(10):536-540.
DOI: *https://doi.org/10.52403/ijrr.20231068*

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