Rheumatoid arthritis diagnostic pitfalls: don't overlook large joint effusion - a case report

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ABSTRACT

Background: Rheumatoid arthritis (RA) is a systemic autoimmune disease that commonly presents as inflammatory symmetric polyarthritis in small joints and may also have extra-articular involvement. Early diagnosis and treatment within the first 3 months are important to reduce progression and deformities. In some cases, large joint involvement may also present or initially present in RA, which may lead to lower suspicion of RA at the initial visit and result in delayed diagnosis.

Case Presentation: Here, we present a case of female, 55 years old with knee joint pain and effusion, which was initially thought to be osteoarthritis. The patient had inflammatory arthritis features, including morning stiffness, pain worsened at rest, and arthritis also involving hands. Yet, the patient was confirmed as having rheumatoid arthritis based on clinical, serological, and radiological features. In the detailed evaluation of knee radiographic examination, bone erosions were identified at a second look.

Conclusion: In cases of bilateral large joint involvement, radiological evaluation should be carefully considered, as rheumatoid arthritis may mimic and superimpose degenerative joint disease, considered as atypical degenerative findings. A comprehensive clinical assessment supported by serological and radiological findings is essential to avoid delayed diagnosis and enable timely treatment.

Keywords: Knee joint, joint effusion, joint disease, rheumatoid arthritis, osteoarthritis, case report.

Type of Article: Case Report **Specialty:** Rheumatology

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Introduction

Knee joint involvement might be a diagnostic pitfall in the diagnosis of inflammatory arthritis, facing the trends that RA prevalence increases with age and knee joint involvement is classically considered as osteoarthritis, in which knee Osteoarthritis (OA) is the most prevalent among other sites [1,2]. Typical clinical manifestations of RA are symmetrical inflammatory polyarthritis of small joints, especially interphalangeal proximal joints. But on further progression, there can be large joint involvement, such as wrist, elbow, shoulder, knee, ankle, and hip joint [3]. In a 2004 study in Korea, the prevalence of RA in knee joints was 42%, the third large joint following the wrist and ankle [4].

The most common radiographic feature of RA is joint erosion, which is also found in psoriatic arthritis [5,6]. Recent classification criteria for RA exclude radiographic features since the presence of radiographic erosions is found in the progressive phase, while earlier diagnosis is required to achieve better outcomes. The last criterion, including radiographic features, was American College of Rheumatology (ACR) 1987.

Case Presentation

A 55-year-old female with a body mass index of 31 kg/m^2 was admitted to the emergency unit complaining of worsening pain in both knees lasting for the last 2 weeks. Knee pain has been recurrent for the past 6 months, worsening with activity, especially when raised after sitting, lasting for an hour. The pain worsened and was accompanied by stiffness. Further history-taking reveals other joint involvement, including wrists, fingers, and morning stiffness. On physical examination, we found swelling and tenderness accompanied by a limited range of motion of both knees (Figure S2-S4), also tenderness on right PIP II–III, left PIP II– IV, and left MCP II (Figure S1). Knee Radiographic examination was initially assessed as tibiofemoral osteoarthritis K-L grade IV, with soft tissue swelling and suspected joint effusion.

Table 1. *Laboratory Findings.*

	RESULT	NORMAL VALUE
Complete blood count		
Hemoglobin	9,90 g/dl	13,2-17,3
Erythrocyte	4,01 × 10^6	4,0-5,5
Leucocyte	17,73 × 10^3	4,3-10,3
Hematocrit	33,2%	40,0-47,0
Thrombocyte	536 × 10^3	142-424
Differential count Eo/Bas/Neu/ Lym/Mon (%)	0,5/0,4/82,2/ 11,3/5,6	0-4/0,0-1,0/51-67/ 25-33/2,0-5,0
Synovial fluid analysis result		
Erythrocyte	4,992,1 /µl	
Leucocyte	2,301,6 /µl	
PMN cell	91,0%	
MN cell	9,0%	
Crystal	Negative	
Serology and autoimmune analysis result		
Rheumatoid factor total	150,00 IU/ml	< 14
Anti CCP 3	237,1 U/ml	< 20

Due to joint effusion findings, arthrocentesis was further performed for both knees. Joint effusion of cloudy yellow joint fluid and clouds were obtained, and the microscopic shows typical inflammatory synovial fluid (Table 1). This findings, alongside with the clinical features and anaemia on laboratory findings rise the suspicion of autoimmune arthritis, therefore the patient was consult to the rheumatology department. Reviewing the radiographic findings, marginal erosions were also identified on the medial aspects of the right tibia and lateral aspects of left femur and tibia. Giving the patient characteristics, female, over 50 years old, obese, and initial radiographic finding, it is common in clinical settings that the patient was considered as osteoarthritic. Yet, small joint involvement (even large joints experienced more prominent inflammation) should always be consideration of inflammatory arthritis including rheumatoid arthritis.

Further serologic testing showing high positive anti-CCP3 and rheumatoid factor. Then, based on ACR European League Against Rheumatism (EULAR) Classification Criteria for Rheumatoid Arthritis score obtained is 10 (including: >10 joints, high positive rheumatoid factor /Anti–Cyclic Citrullinated Peptide Antibody, abnormal C-Reactive Protein / Erythrocyte sedimentation rate, complaint duration ≥6 weeks), the patient was classified as rheumatoid arthritis. Patient then commenced treatment with methotrexate 7.5 mg weekly.

Discussion

Rheumatoid arthritis predominantly involves small joints of the hands and feet because they contain abundant synovial tissue, the primary target of autoimmune inflammation [7]. Their complex structure and rich vascular supply make them especially susceptible to the early, chronic, and symmetric inflammatory process characteristic of RA. In the 2010 ACR/EULAR classification criteria, the number and distribution of involved joints are critical for achieving a score of ≥6, which is required to classify a patient as having definite RA. In particular, involvement of small joints - such as the metacarpophalangeal (MCP), proximal interphalangeal (PIP), and wrist joints - contributes more significantly to the overall score than involvement of large joints alone, reflecting the typical pattern of early disease presentation [8]. As the disease progresses, larger joints may become involved, most commonly the wrist, followed by the ankle and knee [3]. The prevalence of knee involvement in RA patients varies, ranging from 30% to 50% at the initial phase and 70%-80% as the disease progresses, where these findings are more frequent in men [9,10]

A study by Abdel-Tawab, et al. [11] taken place in Egypt show that the knee is the sixth most involved joint after MCP, PIP, wrist, Metatarsophalangeal, and Temporomandibular Joint (TMJ). This shows that aside from the hand and wrist, the distribution of joint involvement between regions may vary. In Indonesia, TMJ is not prevalent, as is the case in Turkey, resulting into lesser clinical suspicion of RA when TMJ is involved in these regions [12].

RA and OA differ fundamentally in their mechanisms of joint damage, and these differences are clearly reflected in radiographic findings. In rheumatoid arthritis, chronic autoimmune activation leads to synovial hyperplasia and pannus formation - an invasive inflammatory tissue

that erodes cartilage and penetrates subchondral bone. Pro-inflammatory cytokines such as Tumor Necrosis Factor-alpha, Interleukin 1, and Interleukin 6 promote angiogenesis and upregulate Receptor Activator of Nuclear Factor kappa-B Ligand, stimulating osteoclast-mediated bone resorption. As a result, plain radiographs typically show marginal erosions, particularly at the "bare areas" of the joint, along with periarticular osteopenia due to hyperemia and inflammatory bone loss. Joint space narrowing is usually symmetric, reflecting uniform cartilage destruction from persistent synovitis. In advanced disease, deformities and subluxations may develop due to ligamentous and capsular damage [13].

In contrast, osteoarthritis is driven by mechanical stress (overload) and progressive cartilage degeneration. Cartilage loss exposes subchondral bone, triggering a reparative response mediated by growth factors such as Transforming Growth Factor-beta. This leads to chondrocyte proliferation and endochondral ossification at joint margins [14]. Radiographically, OA is characterized by osteophyte formation, subchondral sclerosis, and sometimes subchondral cysts. Joint space narrowing is typically asymmetric, corresponding to uneven mechanical loading. Unlike RA, erosions are not a dominant feature; instead, imaging reflects bone proliferation and remodeling rather than inflammatory destruction [15].

Presenting effusion could also be evaluated through lateral knee radiography, showing an increase in soft tissue density on the suprapatellar recess. In large effusion volume, anterior displacement from the posterior margin of the quadriceps tendon could be evaluated Llopis et al. [16]. Even so, knee joint involvement in osteoarthritis is a common finding due to its weight-bearing nature. But, RA may also present with knee joint involvement even at the earlier phase.

In our patient, the anteroposterior X-ray of the right knee reveals genu erosion without osteophyte formation. Joint space narrowing is observed in all three compartments, with the most severe narrowing present in the lateral (non-weight-bearing) compartment (Figure 1A). Meanwhile, lateral X-ray imaging of the right knee shows an increasing density of the suprapatellar recess, marking the presence of effusion (Figure 1C). The patient subsequently underwent joint fluid aspiration, with the result of leukocytes of 2.301 cells/ml, with 91% polymorphonuclear cell (PMN), showing an inflammatory effusion.

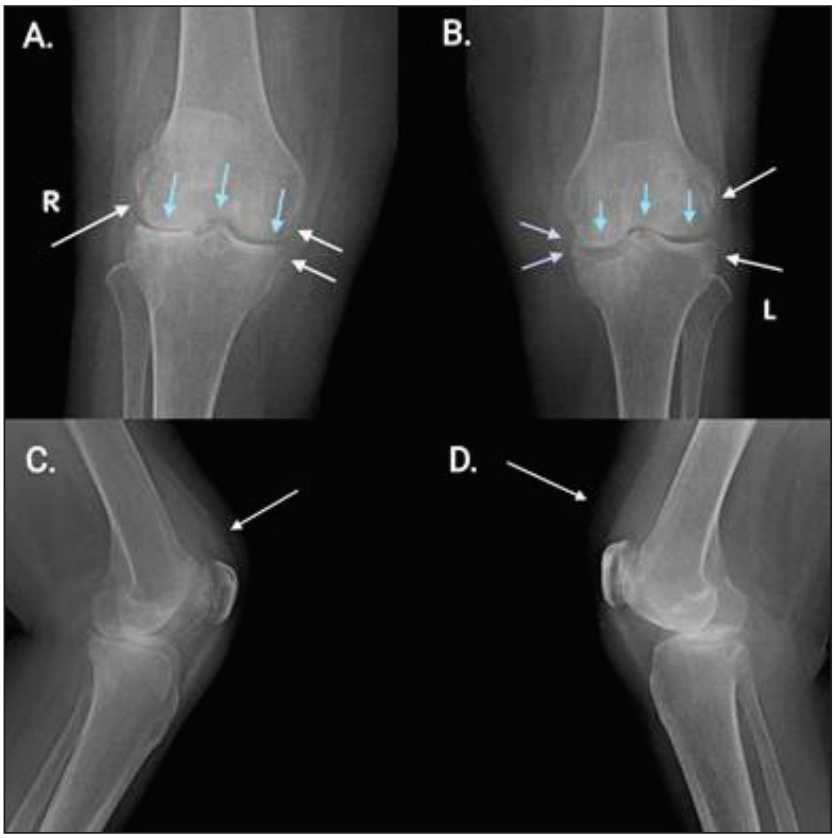

Figure 1. *Knee radiographics A. Right knee AP position, B. Left knee AP position, C. Right knee lateral position, D. Left knee lateral position. In Figures A and B, the white arrow shows marginal erosion, blue arrow shows joint space narrowing, and the purple arrow shows minimal osteophyte formation. In figures C and D, the white arrow shows increasing density of soft tissue on the suprapatellar recess.*

In the patient's left knee, joint effusion was observed, along with radiographic findings of erosion and joint space narrowing on the anteroposterior view (Figure 1B and 1D). However, compared to the right knee, the left knee also showed osteophyte formation and predominant joint space narrowing in the medial (weight-bearing) compartment. These findings suggest the possibility of secondary osteoarthritis superimposed on rheumatoid arthritis in the left knee [17].

Conclusion

This case underscores a key diagnostic pitfall in rheumatoid arthritis: delayed recognition due to underappreciation of radiographic erosions in large joints. Although the initial presentation with knee effusions mimicked osteoarthritis, the presence of marginal erosions, minimal osteophyte formation, and symmetric compartmental involvement were atypical for degenerative disease and suggestive of inflammatory arthritis. Failure to recognize these radiographic red flags can postpone appropriate investigation and management. An integrated assessment - combining clinical findings, inflammatory synovial fluid analysis, serologic markers, and characteristic imaging features - is essential to prevent delayed diagnosis, particularly in resource-limited settings.

What is new?

Rheumatoid arthritis is a chronic autoimmune disease that primarily affects small joints, typically presenting with marginal erosions, soft tissue swelling, osteoporosis, and joint space narrowing. It is well known for causing progressive joint destruction, especially in the hands and wrists. What is new in this manuscript is that, although less commonly observed, the radiologic features of rheumatoid arthritis in large joints can overlap with those of osteoarthritis, which may lead to potential misdiagnosis. In cases of knee joint (RA genu) involvement, radiographic findings may include joint effusion, joint space narrowing in the non–weight-bearing area, marginal erosions, and juxta-articular osteopenia.

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List of Abbreviations

ACR	American College of Rheumatology
Anti-CCP	Anti–Cyclic Citrullinated Peptide Antibody
AP	Anteroposterior
CBC	Complete blood count
CRP	C-Reactive Protein
Eo	Eosinophil
ESR	Erythrocyte Sedimentation Rate
EULAR	European League Against Rheumatism
IL-1	Interleukin 1
IL-6	Interleukin 6
K–L	Kellgren–Lawrence (grading system)
Lym	Lymphocyte
MCP	Metacarpophalangeal (joint)
MN	Mononuclear cell
Mon	Monocyte
MTP	Metatarsophalangeal (joint)
Neu	Neutrophil
OA	Osteoarthritis
PIP	Proximal Interphalangeal (joint)
PMN	Polymorphonuclear Cell
RA	Rheumatoid Arthritis
RANKL	Receptor Activator of Nuclear Factor kappa-B Ligand
RF	Rheumatoid factor
ROM	Range of motion
TGF-β	Transforming growth factor-beta
TMJ	Temporomandibular Joint
TNF-α	Tumor necrosis factor-alpha

Conflict of interest

The authors declare that there is no conflict of interest regarding the publication of this article.

Consent to participate

Written informed consent was obtained from the patient.

Funding

None.

Ethical approval

Ethical approval is not required at our institution for anonymous case reports.

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Summary of the case

1	Patient (gender, age)	Female, 55
2	Final diagnosis	Rheumatoid arthritis (with knee joint involvement)
3	Symptoms	Bilateral knee pain with swelling and morning stiffness
4	Medications	Methotrexate 7.5 mg weekly
5	Clinical procedure	Arthrocentesis
6	Specialty	Rheumatology

SUPPLEMENTARY MATERIAL

Figure S1. *Left Hand. Swelling (+), Boutonniere deformity (+), and ulnar deviation (+).*

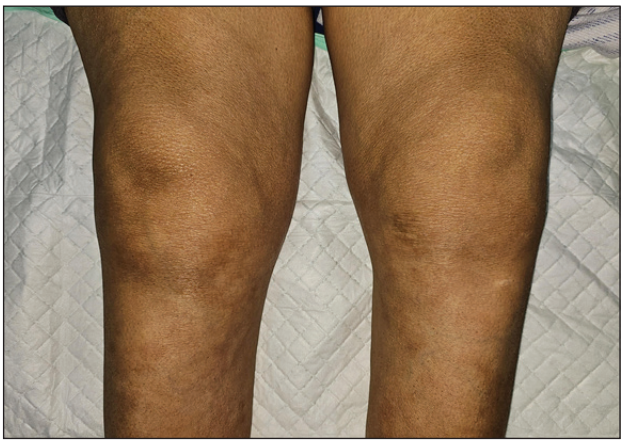

Figure S2. *Knee D/S with bilateral swelling.*

Figure S3. *Knee dextra, medial view.*

Figure S4. *Knee sinistra, medial view.*