

2016 ACR Revised Criteria for Early Diagnosis of Knee Osteoarthritis

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Abstract

Osteoarthritis (OA) is cartilage failure resulting in joint pain and loss of joint functions. Knee OA is the OA of knee that mechanical forces have major effect on initiation and progression of it. Knee OA is the most common disease of knee especially in the middle to old ages. The most common findings in the history and physical examination of the patients with knee OA are mechanical knee pain, gelling knee pain, crepitus on knee motion, bony tenderness and bony enlargement in the joint line. During the flare up of Osteoarthritis, knee can show swelling due to joint effusion called “Hydrarthrosis” that is a mechanical type of synovial fluid.

It is usually a cold effusion and sometimes it is accompanied by warmth and mild synovitis or synovial thickening, but moderate to significant knee synovitis and hot or red knee cannot be seen during its OA flare up.

Factors that place the people at higher risk for knee OA are: middle to old ages, obesity, frequent knee bending activity, climbing the stairs frequently, squatting or deep knee bending for prolonged time and lifting or moving heavy objects frequently.

There is not any significant positive finding in biochemistry tests of the patients with knee OA. Plain radiography has low sensitivity regarding knee OA during the early phase of the disease but the MRI of knee is the most sensitive imaging during this early phase. Among the X-Ray findings, osteophyte has the most specificity for OA and the presence of cartilage defects and Bone Marrow Edema (BME) concomitantly are compatible MRI findings for OA.

The diagnosis of knee OA can be usually made by clinical/imaging judgment of an expert physician. There are three ACR classification criteria for knee OA that are useful for research purposes but they are not valuable for early diagnosis of knee OA. By this letter, the author wants to deliver a new criteria called “2016 ACR revised criteria for early diagnosis of knee OA”.

Keywords: Knee Osteoarthritis; Mechanical Knee Pain; Osteophyte; Revised Criteria for Early Diagnosis***Corresponding Author:** Iraj Salehi-Abari, Associate professor, Rheumatology Research Center, Amir Alam Hospital, Tehran University of Medical Sciences, No 29, 6th Alley, Ghaem-magham St., P.O. Box 1586858111, Tehran, Iran; E-mail: salehiabari@sina.tums.ac.ir**Introduction**

Nowadays we know that Osteoarthritis (OA) is a mild inflammatory disorder of articular cartilage and subchondral bone with genetic background and biomechanical and biochemical changes in the cartilage of the joint [1]. Indeed, osteoarthritis is cartilage failure resulting in joint pain and loss of joint functions. Knee osteoarthritis (knee OA) is the osteoarthritis of knee that mechanical forces have major effect on initiation and progression of it. Osteoarthritis is the most common disease of joints especially knee in adults. It can be primary (idiopathic) or secondary to other disorders [2]. In this letter primary knee OA will be discussed only.

Main Body

The age at onset for knee OA in the majority of the cases is more than 40 but it can occur within the young.

Both genders can be affected but women can be affected much more than men [3]. The most common symptom in the patients with knee OA is mechanical knee pain. Overall, mechanical knee pain is a pain that is initiated or increased with knee activity/exercise and finished or decreased with knee resting without morning stiffness or usually along with morning stiffness of less than 30 minutes. In early phase of knee OA, pain can occur at the beginning of the movement. In later phase it can be presented during knee movement and eventually there will be persistent pain. After prolonged resting with flexed knee, pain and/or stiffness at the beginning of the movement of knee is called “gelling pain” or “gelling phenomena”. The patients with knee OA can complain about thigh, hip, buttock or calf pain instead of knee pain. The

conditions exacerbating the knee pain are including: walking, standing, sitting with flexed knee, ascending stairs, descending stairs, using Turkish WC and etc. other complaints of the patients with knee OA can be noisy knee, giving way and locking knee that can be seen in chondromalacia patella, synovial osteochondromatosis or internal derangement of knee too. Sometimes exacerbation or initiation of knee pain within cold weather or damp may be the only complaint of the patient. In physical examination crepitus on knee motion is the most common finding.

Bony tenderness and bony enlargement in joint line are the other findings. During flare up of osteoarthritis, knee can show swelling due to joint effusion. This synovial fluid called “Hydrarthrosis” is clear with normal viscosity accompanied by White Blood Cell (WBC) count less than 2000/mm³ with less than 25% of Polymorphonuclear (PMN). It is usually a cold effusion and sometimes it is accompanied by warmth and mild synovitis or synovial thickening; But moderate to significant knee synovitis and hot or red knee cannot be seen during its OA flare up.

After many years of knee OA; laxity and/or limitation of motion and malalignment especially genu-varus and flexion contracture can be found in the physical examination of knee.

There is not any significant positive finding in the biochemistry tests and the autoantibodies especially Rheumatoid factor are usually negative in the patients with knee OA. Rheumatoid Factor (RF) or Anti Nuclear Antibodies (ANA) are positive with low titers in less than 20% of the normal population, so the positivity of them with low titers cannot rule out the diagnosis of knee OA.

Plain radiography has low sensitivity regarding knee OA during the early phase of the disease. The major X-Ray findings of OA are including:

- Narrowing of the joint space
- Eburnation or subchondral bone sclerosis
- Osteophytes and
- Subchondral bone cyst

Among the above findings; osteophyte has the most specificity for OA [4].

In the early phase of knee OA when the findings in the

history and physical examination of knee are not typical features for knee OA and we have normal (negative) X-Ray findings; the MRI of knee must be ordered to rule in/out the diagnosis of knee OA. The presence of partial or full-thickness cartilage defects and Bone Marrow Edema (BME) concomitantly are compatible MRI findings for OA.

Factors that place the adult people at higher risk for knee OA are including [5]:

- Advanced age
- Overweight/obesity
- Frequent knee bending activity
- Climbing more than 10 flights of stairs most days
- Squatting or deep knee bending 30 minutes or more at least one day in the past 30 days
- Lifting or moving objects weighing more than 25 pounds at least one day in the past 30 days

Among the above risk factors; advanced age is one of the most important risk factors associated with knee OA. The diagnosis of knee OA can be usually made by clinical/imaging judgment of a Rheumatologist/Orthopedist, an internist or even an expert general practitioner.

There are three American College of Rheumatology (ACR) classification criteria for knee OA that are useful for research purposes but they are not valuable for early diagnosis of knee OA. They are including:

- The ACR Clinical classification criteria of knee OA
- The ACR Clinical/Radiographic classification criteria of knee OA
- The ACR Clinical/Laboratory classification criteria of knee OA

The ACR Clinical classification criteria for knee OA is a popular method of classifying knee OA. In this criteria the presence of knee pain along with at least three of the following six items can classify the knee OA in the patients [6]:

- Age > 50 years old
- Morning stiffness < 30 minutes
- Crepitus on knee motion
- Bony tenderness
- Bony enlargement
- No palpable warmth

In the ACR Clinical/Radiographic classification criteria, the presence of knee pain with at least one of the following three items along with osteophyte in knee X-Ray can classify the knee OA in the patients:

- Age > 50 years old
- Morning stiffness < 30 minutes
- Crepitus on knee motion

In the ACR Clinical/Laboratory classification criteria, the presence of knee pain along with at least 5 of the following 9 items can classify the knee OA in the patients:

- Age > 50 years old
- Morning stiffness < 30 minutes
- Crepitus on knee motion
- Bony tenderness
- Bony enlargement
- No palpable warmth
- ESR < 40 mm/hr
- RF < $\frac{1}{40}$
- Synovial fluid compatible with OA

Upon ACR Clinical classification criteria and ACR Clinical/Laboratory classification criteria, many cases of chondromalacia patella can be categorized as patients with knee OA. We know that a classic case of chondromalacia patella is a woman (or may be a man) with the age of less than 40, anterior mechanical knee pain, no morning stiffness or morning stiffness of less than 30 minutes, patellar crepitus, positive shrug test, no palpable warmth on knee and normal ESR along with negative RF.

Upon ACR Clinical/Radiographic classification criteria a significant percentage of the cases of knee OA can be missed. Nowadays we see many cases of knee OA with ages below 50 and a history of prolonged morning stiffness with normal knee examination in whom knee X-Ray shows osteophytes.

I would like to remind the ACR members who contributed to delivering these criteria regarding the classification of knee OA that the items of “no palpable warmth”, “ESR less than 40 mm/hr” and “RF less than $\frac{1}{40}$ ” can be seen in all normal population which in turns decreases the specificity of the criteria.

I don't want to evaluate the above three classification criteria for knee OA; I don't want to discuss their sensitivity and specificity. I want to deliver a new criteria for early diagnosis of knee OA presented in table A. I want to recommend a guideline approaching towards diagnosis of knee OA too, presented in table B. Finally, the corresponding author of this letter [as the creator of 2016 Novel criteria for early classification of SpondyloArthritides [7], 2015 ACR/SLICC Revised Criteria for Diagnosis of Systemic Lupus Erythematosus [8] ; Iran criteria for early diagnosis of Rheumatoid arthritis [9] , Ankylosing spondylitis [10], Granulomatosis with polyangiitis [11] , Sjogren's syndrome [12], Pre-Scleroderma State [13]; 2015 Persian Gulf criteria for diagnosis of Polymyositis/Dermatomyositis [14], Relapsing polychondritis [15], Behcet's disease [16] and new criteria for diagnosis of Chondromalacia patella [17] and Pre-Rheumatoid Arthritis State [18]] would like to ask ACR, EULAR, APLAR and all of the Rheumatologists in the world to evaluate this new criteria for early diagnosis of knee OA.

I would like to inform you that we cannot evaluate it due to financial restriction, the absence of proper research equipments and media.

Table A: 2016 ACR revised Criteria for early diagnosis of knee OA ^a

Entry Criteria:	
• Knee pain and/or knee bony tenderness	
• Absence of exclusion criteria ^b	
Domain I:	
• Mechanical knee pain ^c	1.p
• Knee bony tenderness	1.p
• Crepitus on knee motion	1.p
• Compatible synovial fluid ^d	1.p
Domain II:	
• 40< Age at onset ≤50 years old	1.p
• Age at onset > 50 years old	2.p
• Knee bony enlargement ^e	1.p
• Osteophyte in knee X-Ray or compatible knee MRI	2.p

- In the presence of 3 points out of 10 with at least 1 point from Domain II along with all entry criteria, the diagnosis of knee OA can be established
- Exclusion criteria are including: 1) moderate to significant knee synovitis 2) Hot or red knee 3) history and/or physical examination findings compatible with the internal derangement of knee
- Knee pain that is initiated or increased with knee activity/exercise and finished or decreased with knee resting
- Clear fluid with normal viscosity accompanied by WBC count less than 2000/mm³ with less than 25% PMN
- It must be ignored in the presence of osteophyte in knee X-Ray

Table B: Practical guideline approaching towards the diagnosis of knee OA

Step I : History and physical examination by expert physician
Step II : Knee X-Ray
II A : AP and lateral X-Ray
II B: Axial view and interchondilar view
Step III: Synovial fluid analysis if it is presented
Step IV: Knee MRI

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