

# Chondromalacia Patella and New Diagnostic Criteria

Iraj Salehi-Abari<sup>1,\*</sup>, Shabnam Khazaeli<sup>2</sup>, Ali Niksirat<sup>3</sup>

<sup>1</sup>Rheumatology Research Center, Amir Alam Hospital, Tehran University of Medical Sciences, Tehran, Iran

<sup>2</sup>Private Sector, Tehran, Iran

<sup>3</sup>Internal Medicine, Imam Khomeini Hospital Complex, Tehran University of Medical Science, Tehran, Iran

## Email address

[salehiabari@sina.tums.ac.ir](mailto:salehiabari@sina.tums.ac.ir) (I. Salehi-Abari)

## To cite this article

Iraj Salehi-Abari, Shabnam Khazaeli, Ali Niksirat. Chondromalacia Patella and New Diagnostic Criteria. *Open Science Journal of Clinical Medicine*. Vol. 3, No. 4, 2015, pp. 126-128.

## Abstract

Chondromalacia patella (CMP) is a disease in which the cartilage of patella is genetically soften and easily wears away. CMP is commonly presented as mechanical anterior knee pain during the second and third decades of life. It more commonly occurs in women than men. When the patients cover the entire front of the knee with their hand after asked to identify the location of discomfort, called the “grab sign”. Chondromalacia patella may produce noisy knee, giving way or catching sensation under the patella. In physical examination of the patients with CMP, there are three major findings including: Positive patellar facet tenderness test, Positive patellofemoral compression test or "Shrug test" and Patellar crepitation or “Rabot test”. There is not any biochemical, serologic or acute phase reactant abnormality in CMP. Plain films of the knee including weight bearing posteroanterior, lateral and sunrise (axial) views are useful to be normal for CMP and to rule out other sources of anterior knee pain including bipartite patella, osteoarthritis, loose bodies and occult fractures. This technique is not expensive or invasive, so it practically can be done but it is not capable to show the cartilage. Magnetic resonance imaging (MRI) shows softening, wear and tear of patellar cartilage along with normal meniscuses and other cartilages of knee, it confirms the diagnosis of CMP. This imaging is semi-expensive, noninvasive and radiationless. The arthroscopy of knee is capable to provide the specialist with a directed visualizing of the patellar cartilage, so it is an accurate way to detection of CMP, but it is invasive and expensive procedure and not routinely accessible for the patient with CMP. We think that the MRI is a practical gold standard way but the arthroscopy of knee is a non-practical gold standard to detecting CMP. Many years of practice in the field of Rheumatology, gave the corresponding author (ISA) an opportunity to encounter hundreds of patients with CMP. Right now by this letter corresponding author wants to deliver a diagnostic criteria for CMP showing in table A and the ACR, EULAR, APLAR, ... are requested to evaluate this new diagnostic criteria for CMP. If this criteria is really detected to be cost-benefit/cost-effective, it will be a simple instrument for diagnosis of CMP.

## Keywords

Chondromalacia Patella, Grab Sign, Shrug Test, Rabot Test, Knee MRI, Knee Arthroscopy, Diagnostic Criteria

## 1. Introduction

Chondromalacia patella (CMP) is a disease in which the cartilage of patella (kneecap) is soften and easily wears away. Many authors believe that CMP and patellofemoral pain syndrome (PFPS) are the same conditions.

We know that the PFPS is a condition in which, anterior knee pain involving the patella and retinaculum can occur when we exclude other intra-articular and peripatellar pathologies (1).

The patella is a sesamoid bone. It lies within the quadriceps tendon and rides in the trochlear groove of the distal portion of femur. The normal patellofemoral articulation needs normal patellar cartilage, normal femoral cartilage and normal patellar tracking within the trochlear groove (2). When the patellar cartilage is genetically disorganized related to collagen and/or ground substance which leads to softening of it, called chondromalacia patella (3). It results in abnormal patellofemoral articulation.

## 2. Main Body

The patellar tracking within the trochlear groove can be abnormal due to many conditions including:

- Abnormal patellar angle
- Abnormal femoral trochlear groove angle
- Knee malalignments e.g. genu varus, genu valgus,...
- Patella alta
- Bipartite patella
- Leg length discrepancy
- Patellar retinacular tightness
- Patella dislocation/subluxation
- Thigh muscle tightness or in opposite; weakness or imbalance
- Knee ligament laxity
- Abnormal foot morphology (?)
- Abnormal Q angle (?)

All of above conditions result in abnormal patellofemoral articulation and produce anterior knee pain. We think that all of these conditions are PFPS or patellofemoral joint syndrome, but only one of them in which patellar cartilage is primarily softened and capable to progress to erosion and fragmentation is really chondromalacia patella (CMP). Then CMP is a member of the family of PFPS. CMP is commonly presented as mechanical anterior knee pain during the second and third decades of life (4). It more commonly occurs in women than men, with the female to male ratio of 2-3 to 1 (4,5).

The onset of knee pain may be acute or insidious, after trauma or without it (6). At first it may be unilateral and then progresses to being bilateral. Knee pain usually worsen with prolonged sitting, standing, running, squatting or during ascending and/or descending steps (7). When the patients cover the entire front of the knee with their hand after asked to identify the location of discomfort, called the "grab sign".

Chondromalacia patella may produce noisy knee, giving way or catching sensation under the patella. In physical examination of the patients with CMP, there are three major findings including:

- Positive patellar facet tenderness test
- Positive patellofemoral compression tests
- Patellar crepitation

With the patient's knees in full extension and the quadriceps relaxed, displacing the patella laterally and palpating its lateral facet and repeating it on medial side; tenderness of facet palpation means a positive patellar facet tenderness test (8).

The sensation of pain with manual compression of the patella against the femur during quadriceps contraction means a positive patellofemoral compression test (9).

There are various maneuvers resulting in positive patellofemoral compression test including "Shrug test", "Clarke sign", "Zohlen sign" and so on that we don't want to get into details regarding them.

Patellar crepitation or "Rabot test" or "signe de Rabot" is the grater sound with manual transversal displacement of the patella.

There are other maneuvers or tests e.g. Mc Connell test that we don't want to explain them. None of the clinical findings are specific or characteristic for CMP and they may be seen in other condition of PFPS or patellofemoral osteoarthritis.

There is not any biochemical, serologic or acute phase reactant abnormality in CMP.

Plain films of the knee including weight bearing posteroanterior, lateral and sunrise (axial) views are useful to be normal for CMP and to rule out other sources of anterior knee pain including bipartite patella, osteoarthritis, loose bodies and occult fractures. This technique is not expensive or invasive, so it practically can be done but it is not capable to show the cartilage.

Computed tomography (CT) scan can visualize both bone and cartilage and soft tissues but the procedure delivers a much higher dose of radiation more than plain X-Rays.

Magnetic resonance imaging (MRI) using magnetic waves rather than X-Rays is capable to show cartilage. T<sub>2</sub>-weighted or proton density-weighted images (T<sub>2</sub>/PD) is the best sequences for assessing cartilage when the MRI shows softening, wear and tear of patellar cartilage along with normal meniscuses and other cartilages of knee, it confirms the diagnosis of CMP. Upon MR imaging (T<sub>2</sub>/PD), there are four grades for CMP including:

- Grade I : swelling and softening of patellar cartilage
- Grade II : softening of patellar cartilage along with the beginning of cartilage fissuring
- Grade III : extended fissuring along with thinning of patellar cartilage
- Grade IV : the patellar cartilage is destroyed down to the subchondral bone

This imaging is semi-expensive, noninvasive and radiationless.

The arthroscopy of knee is capable to provide the specialist with a directed visualizing of the patellar cartilage, so it is an accurate way to detection of CMP, but it is invasive and expensive procedure and not routinely accessible for the patient with CMP.

A knee arthroscopic study showed that only about 50% of patients with clinical diagnosis of CMP had actual CMP according to arthroscopy of knee (10). Another arthroscopic study showed 86% sensitivity, 74% specificity and 81% accuracy for MRI diagnosis of CMP using T<sub>2</sub>/PD imaging (11). We think the authors of above two studies believe that CMP and PFPS are the same and a significant part of their cases are PFPS, not CMP clinically.

Many years of practice in the field of Rheumatology, gave the corresponding author (ISA) an opportunity to encounter hundreds of patients with CMP. About 10 years ago I (ISA) presented clinical manifestations of chondromalacia patella in 260 Iranian patients that I believe some of them had been PFPS not CMP (12).

## 3. Conclusion

We think that the MRI is a practical (non-invasive) gold

standard way but the arthroscopy of knee is a non-practical (invasive) gold standard to detecting CMP.

Right now by this letter corresponding author wants to deliver a cost-benefit/cost-effective diagnostic criteria for CMP showing in table A.

Meanwhile a three step guideline is delivered here regarding the diagnosis of CMP by using this new criteria showing in table B. In each step that the diagnosis of CMP is confirmed or rejected, the approach to CMP will be stopped.

Finally, the APLAR, EULAR, ACR and all research centers in the world that are researching and studying about CMP are requested to evaluate this new diagnostic criteria for CMP. If this criteria is really detected to be cost-benefit/cost-effective, it will be a simple and/or good instrument for diagnosis of CMP. It should be mentioned that we do not have enough research funding to evaluate this diagnostic criteria.

**Table A.** Diagnostic criteria for Chondromalacia patella.

|   |  |   |
|---|--|---|
| ❖ | Entry criteria   |   |
|   | <ul style="list-style-type: none"> <li>• A patient with mechanical anterior knee pain aged less than 50 years</li> <li>• No knee arthritis, peri-arthritis, internal derangement and other PFPS upon history and physical examination</li> </ul> |   |
| ❖ | Main clinical criteria   |   |
|   | <ul style="list-style-type: none"> <li>• Patellar facet tenderness test positivity</li> <li>• Patellofemoral compression test positivity</li> <li>• Patellar crepitation or Rabot test positivity</li> </ul>                                     |   |
| ❖ | Complementary criteria   |   |
|   | <ul style="list-style-type: none"> <li>• Age ≤ 30 years-old</li> <li>• 30 &lt; age ≤ 40</li> <li>• Normal knee X-Ray</li> <li>• Compatible knee MRI</li> </ul>   | <p>2.p.</p> <p>1.p.</p> <p>1.p.</p> <p>2.p.</p> |

The presence of all of the entry criteria and at least one of the main clinical criteria along with at least two points of the complementary criteria can establish the diagnosis of Chondromalacia patella.

**Table B.** Amir-Alam hospital guideline toward the diagnosis of CMP.

|  |
|--|
| Step I: History and physical examination by an expert Rheumatologist or orthopedist.     |
| Step II: Plain films of the knee including posteroanterior (PA), lateral and axial views |
| Step III: MRI of the knee.   |

**References**

- [1] Cutbill JW, Ladly KO, Bray RC, et al. Anterior knee pain: a review. *Clin J Sport Med* 1997; 7:40.
- [2] Earl JE, Vetter CS. Patellofemoral pain. *Phys Med RehabilClin N Am* 2007; 18:439.
- [3] Väättäin U, Kiviranta I, Jaroma H et al. *Int J Sports Med* 1998; 19(2): 144-148.
- [4] DeHaven KE, Lintner DM. Athletic injuries: comparison by age, sport, and gender. *Am J Sports Med* 1986; 14:218.
- [5] Boling M, Padua D, Marshall S, et al. Gender differences in the incidence and prevalence of patellofemoral pain syndrome. *Scand J Med Sci Sports* 2010; 20:725.
- [6] Fulkerson JP. Diagnosis and treatment of patients with patellofemoral pain. *Am J Sports Med* 2002; 30:447.
- [7] Post WR. Clinical evaluation of patients with patellofemoral disorders. *Arthroscopy* 1999; 15:841
- [8] Sweitzer BA, Cook C, Steadman JR, et al. The inter-rater reliability and diagnostic accuracy of patellar mobility tests in patients with anterior knee pain. *PhysSportsmed* 2010; 38:90.
- [9] Niskanen RO, Paavilainen PJ, Jaakkola M, Korkala OL. Poor correlation of clinical signs with patellar cartilaginous changes. *Arthroscopy* 2001; 17:307.
- [10] Leslie I J, Bentley G. Arthroscopy in the diagnosis of chondromalacia patellae.
- [11] McCauley TR, Kier R, Lynch KJ, Jokl P. Chondromalacia patellae: diagnosis with MR imaging. *AJR Am J Roentgenol.* 1992;158(1):101-5
- [12] Salehi I, Jamali R, Khazaeli SH, et al. clinical manifestations of chondromalacia patella in 260 Iranian patients. *International Journal of Rheumatic diseases.* 2005;8:124-127