

Anterior Knee pain: chondromalacia

1. *J Am Acad Orthop Surg* 2005;13:534-543
2. *Arch Orthop Trauma Surg* (2000) 120 :338–342
3. *AAOS 2011: Essential of Musculoskeletal care* 4th ed; Section 6, Knee

- 1. Patellofemoral symptoms fall into two general types:
 - a. Pain
 - b. Instability
- Forces on the PFJ may vary from 3-8 times body weight in activities ranging from walking to running.
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- The etiology of this syndrome is multifactorial and in many situations is related to overuse and overloading.
- Although patellar malalignment sometimes causes anterior knee pain, it is not a necessary component.
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- The term chondromalacia indicates that pathologic changes are present in the articular surface of the patella. Many patients who undergo arthroscopy are found to have degenerative changes on the undersurface of the patella consistent with chondromalacia. .

Rest pain	Inflammatory/ infection	Serology	Appropriate Rx
Continuous Pain	CRPS Referred radicular pain Neuroma pain Secondary gain		Pain and Psycho
Intermittent sharp Pain	Loose body Unstable chondral		Arthroscopy and chondroplasty
Activity related	Chondromalacia and OA PF pressure synd Tendinitis		Rehab Activity modification Surgical

Pathogenesis

- 1. VMO: Two important studies found electromyographic differences, proving that contraction of the vastus lateralis came before the VMO in symptomatic patients compared with control subjects.
- 2. Understanding of the effect of standard realignment procedures on all components of alignment and tracking is currently limited.
- 3. Essentially, an asymptomatic joint has adequate tissue homeostasis, so the amount of load applied to the involved joint is successfully handled.
- When the joint is out of homeostasis, pain results. The ability of a joint to tolerate loading depends on multiple factors, not just the radiographic alignment of the joint. The absolute amount of loading over time is an important factor in overuse injuries.

Chondromalacia [Campbell]

OA

- In osteoarthritis, the initial changes occur
- on the surface of the cartilage, with loss of
- continuity of the transverse fibers
- followed by fibrillation, which usually
- becomes grossly visible.

CHONDROMALACIA

- In chondromalacia of the patella, the
- initial lesion is a change in the ground
- substance and collagen fibers at the deep
- levels of the cartilage. [Goodfellow: *basal degeneration*]
- Chondromalacia is attributed to a decrease in
- sulfated mucopolysaccharides in the ground substance. Its complex structure begins to break up, and the next phase of degeneration, fibrillation, occurs. These changes may deepen progressively until all the layers of cartilage are affected down to the subchondral bone.

CHONDROMALACIA OF PATELLA

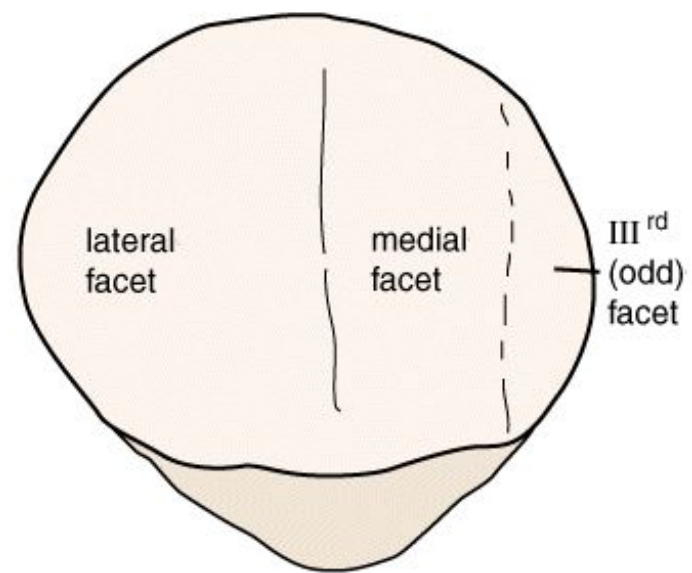
- Most commonly at one of two sites in the deep layer of cartilage.

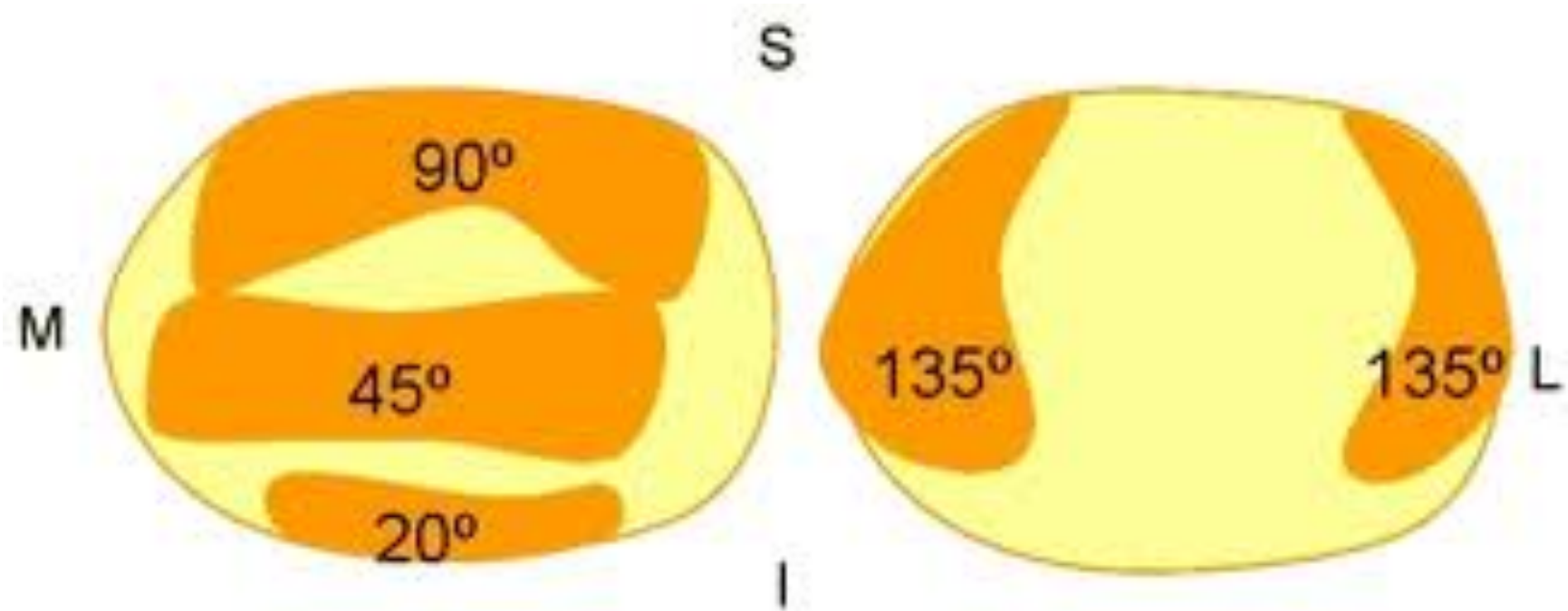
The first is an area about 1 cm in diameter astride the ridge that separates the lateral facet from the medial facet;

The second area straddles the inferior part of the central ridge that separates the medial and lateral facets.

- If these noncontact areas were never subjected to the mechanical stresses of articulation, chondromalacia at these sites might be of little significance.
- The tendency in other joints for articular cartilage that habitually is out of contact with other articular cartilage to undergo surface fibrillation. These changes are age-dependent, nonprogressive, surface changes; they do not progress to an advanced, full-thickness cartilage loss.

- Grade I Minimal articular cartilage changes.
Localized softening with minimal or no break in the surface.
A blunt instrument pressed on the surface may sink
May appear slightly discolored and soft.
- Grade II An area of fibrillation or fissuring and an irregular surface.
- Grade III Definite fibrillation with fissuring extending down to the subchondral bone, “crab meat appearance.”
- Grade IV Exposure of the subchondral bone and erosion





Patella Contact Area (Posterior View)

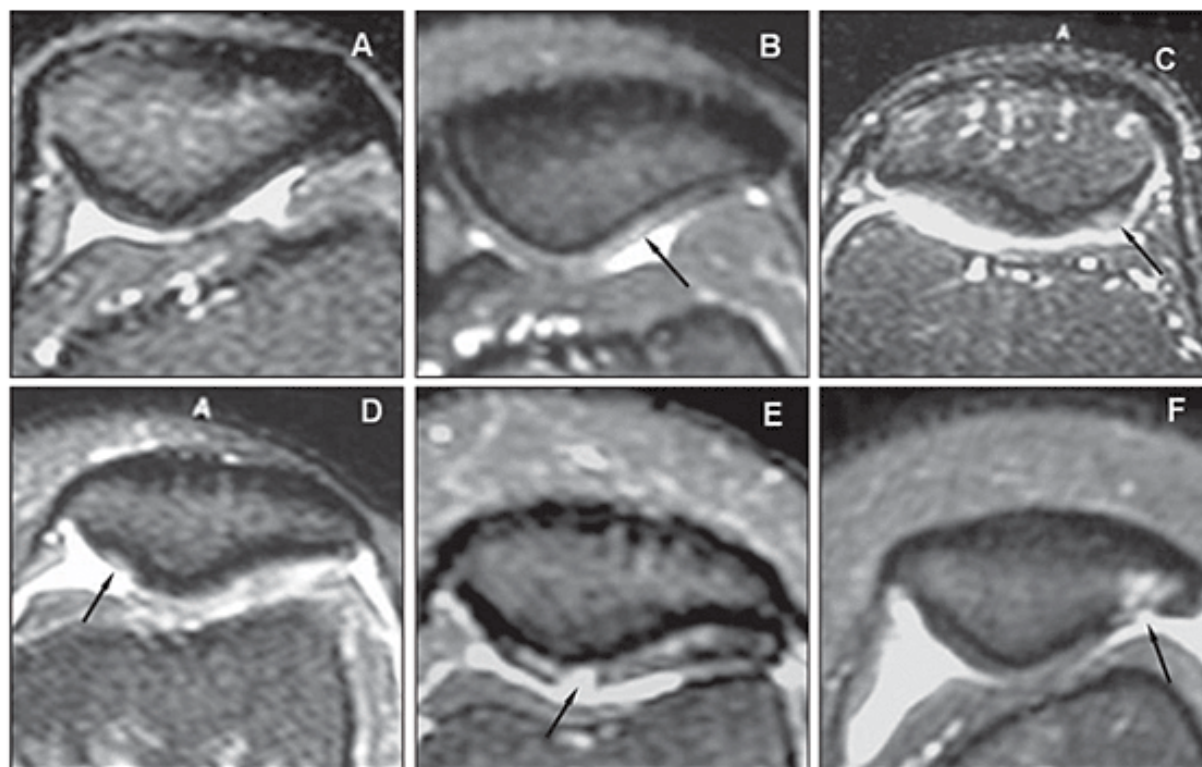
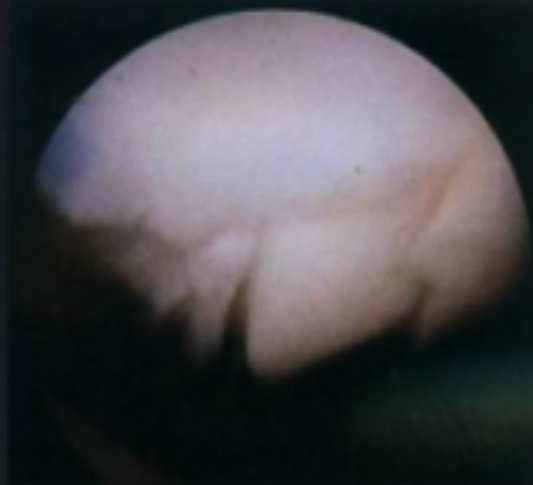


Figure 1. TSE T2 SPIR (high-field) slices image showing the rating applied (arrows). Grade 0: cartilage presenting normal signal and contours (A). Grade 1: cartilage presenting abnormal signal (B) or cartilage presenting abnormal signal and concave contour, without fissures or erosion (C). Grade 2: chondral fissure or erosion without subchondral bone exposure (D). Grade 3: chondral fissure or erosion with subchondral bone exposure (E) or chondral fissure or erosion with subchondral bone exposure or signal alteration (F).

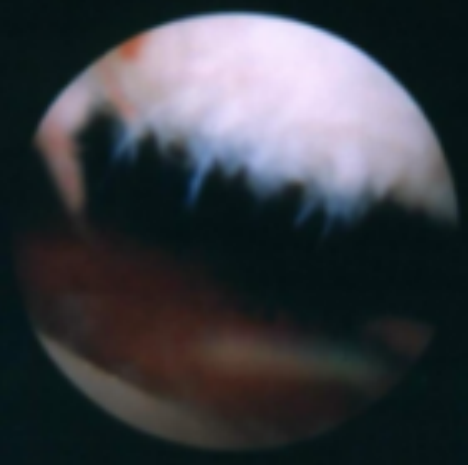
Normal



Fibrillation



Erosion



Wear of Articular Cartilage Viewed by Arthroscopy

Modified Outerbridge

- Blistering
- Superficial ulceration [$<50\%$]
- $>50\%$
- Full thickness loss
- [Original: 0.5 inches]

ICRS

- Superficial cracks
- $<1/2$ the depth
- $>1/2$ the depth
- Up to subchondral

Clinical Symptoms

- Diffuse, aching AKP that is worse after prolonged sitting (movie theater sign), climbing stairs, jumping, or squatting.
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- A sense of instability or a retropatellar catching sensation.
- Usually no history of swelling is reported.
- Often the pain develops after an increase in activity level or in weight training.
- In most instances, patients will report no preexisting trauma, but on occasion there may be a history of a direct blow to the patella.

- ***Diagnostic Tests***
- AP, lateral, and bilateral axial patellofemoral views are necessary. The axial patellofemoral view helps to rule out malalignment and arthritis

- **Differential Diagnosis**
- • Meniscal tear
- • Patellar malalignment
- • Patellar osteoarthritis
- • Patellar tendinitis (jumper's knee)

Exercise

- the traditional concept of trying to achieve isolated VMO exercise is not supported
- One randomized study evaluated the effects of open kinetic chain exercise (non-weight-bearing) versus closed chain exercise (weight-bearing) in a group of patients with anterior knee pain.
- Although both types of exercise produced improvements in strength, pain relief, and return to function, the closed chain exercises produced less pain
- Goble³⁵ reported that 84% of patients improved after 8 weeks of quadriceps rehabilitation and stretching. [*Am J Sports Med* 1992;20:434-440.]
- Long-term (7-year) follow-up of 49 patients treated with quadriceps exercises, rest, and NSAID showed that nearly 75% of patients maintained improvement from 6 months to 7 years. [*J Bone Joint Surg Am* 1999;81:355-363.36]

Activity modification

- 1. Athletes must modify their training
- 2. Adjustments should be made in work and daily activities for nonathletes. Such modifications are important to get the patient back within his function.
- 3. Strengthening must be done without causing severe pain.
- 4. Strengthening may often be facilitated by patellar taping.
- 5. Open or closed chain exercise programs a

- Before concluding that AKP is caused by chondromalacia of the patella, other causes must be ruled out.
- Isolated lesions of the articular cartilage of the patellofemoral joint are one of the less common causes of anterior knee pain.
- In such patients, arthroscopic débridement of Outerbridge grade 2 and 3 chondral lesions can be useful.
- Lateral release is seldom needed
- Complications of lateral release can include persistent or worsening pain or instability. When present, these complications can make the preoperative symptoms seem minor.

- The possibilities of curative treatment for cartilage lesions, especially for degenerative changes, are limited. This is due to the hyaline cartilage's lack of an intrinsic regeneration capacity
- Two arthroscopic procedures are applied routinely: mechanical treatment on the one hand and laser surgical treatment of chondral lesions on the other hand.
- With laser: The main point of criticism is the formation of osteochondronecrosis and chondrolysis. Debridement of the joint including moderate abrasion of the cartilage surface, if possible, is recommended for stage 2 or higher according to Outerbridge
- Only relatively small numbers of cartilage-restoring procedures in the patellofemoral joint have been reported, and overall results are mixed.
- Patellofemoral arthroplasty can be considered in the presence of true end-stage arthrosis.⁶⁴⁻⁶⁶ Resurfacing of the patellofemoral joint should be done only in low-demand patients after very careful clinical evaluation clearly shows that this articulation is the sole cause of symptoms.

- 1. Arthroscopic debridement of the joint cannot lead to cure, but only to an improvement of the chondromalacia
- 2. During the follow-up period, results are the same with or without degenerative meniscal damage. The grade of cartilage lesion is an essential determinant of the length of the period of satisfaction.
- 3. Two-thirds of the patients in stage 1–2 of chondromalacia were satisfied with their surgical result for longer than 24 months
- 4. Almost every second patient suffering from stage 4 chondromalacia complained of recurrent pain 1 year. One of every 6 patients received a knee joint prosthesis within the 1st year. One of every 6 patients received a knee joint prosthesis within the 1st year.

- ***Standing Quadriceps Stretch***
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- Stand supported.
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- Bend your knee up toward your buttock and grasp your ankle.
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- Pull up gently and hold this position for 30 to 60 seconds.
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- Repeat with the opposite leg.
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- Perform 2 to 3 sets, 4 to 5 days a week, continuing for 3 to 4 weeks.
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- ***Supine Hamstring Stretch***
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- • Lie on the floor with one leg straight and one leg bent. Clasp your hands behind the thigh of the bent leg, near the knee.
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- • Straighten the leg and then pull it gently toward your head, until you feel a stretch. (If you have difficulty clasping your hands behind your leg, loop a towel around your thigh. Grasp the ends of the towel and pull the leg toward you.)
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- • Hold this position for 30 to 60 seconds.
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- • Repeat with the opposite leg.
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- • Perform 2 to 3 sets, 4 to 5 days a week, continuing for 3 to 4 weeks.



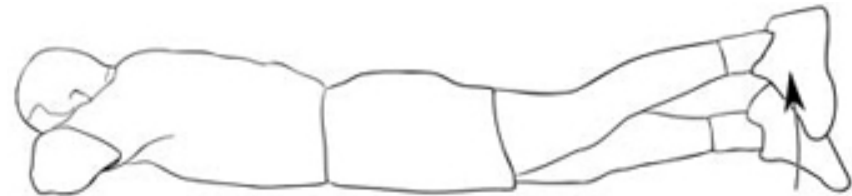
- ***Hamstring Curls***
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- • Stand on a flat surface with your weight evenly distributed on both feet.
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- • Hold onto the back of a chair or the wall for balance.
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- • Bend the affected knee, raising the heel of the affected leg toward the ceiling as far as possible without pain.
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- • Hold this position for 5 seconds and then relax.
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- • Perform 3 sets of 15 repetitions, progressing to 3 sets of repetitions.
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- • Perform the exercise 3 to 4 days a week, continuing for 3 to 4 weeks.



- ***Straight-Leg Raises***
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- • Lie on the floor, supporting your torso with your elbows as shown.
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- • Keep the affected leg straight and bend the other leg at the knee so that the foot is flat on the floor.
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- • Tighten the thigh muscle of the affected leg and slowly raise it 6 to 10 inches off the floor.
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- • Hold this position for 5 seconds and then relax.
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- • Perform 3 sets of 10 repetitions 4 to 5 days a week, continuing for 3 to 4 weeks.



- ***Straight-Leg Raises (Prone)***
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- • Lie on the floor on your stomach with your legs straight.
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- • Tighten the hamstrings of the affected leg and raise the leg toward the ceiling as far as you can.
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- • Hold this position for 5 seconds.
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- • Lower the leg and rest it for 2 seconds.
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- • Perform 3 sets of 10 repetitions 4 to 5 days a week, continuing for 3 to 4 weeks.
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Chondrocalcinosis

- 1. CMA JOURNAL/
MARCH 1, 1981/VOL.
124 545

- Pseudogout, defined as recurrent acute arthritis due to intrasynovial deposition of calcium pyrophosphate dihydrate crystals
- It is a relatively common arthritic disorder of the elderly.
- Oligoarticular and polyarticular episodes were observed in half of these patients.
- Antecedent problems included infection, trauma, surgery and vascular events.
- A third had asymptomatic capsular or periarticular calcific deposits or both.
- 1/3 had pyrophosphate arthropathy, a progressive, destructive, accelerated form of osteoarthritis.
- An attack of pseudogout may offer a clue to the presence of an unsuspected metabolic disease, such as primary hyperparathyroidism or idiopathic hemochromatosis [Among our 50 patients we found three cases of primary hyperparathyroidism (a frequency of 6%)]

Joints:

- I Knee
- II Wrist
- III Shoulder

70% patients the attacks occurred during the course of another illness
+ crystals and synovial fluid up to 50,000 cells in majority

X ray:

Chondrocalcinosis:

- bilateral, fairly symmetric, fine-to dense calcification of articular fibrocartilage, most frequently in the menisci of the knees (Figs. 2 and 3).
- Calcification of hyaline articular cartilage was observed less frequently.

Capsular and periarticular calcification:

- In one third. In half: primary hyperparathyroidism. The knee was the most commonly affected

Pseudogout was strongly associated with degenerative joint disease, especially of the knee

As well, a third of our patients had an accelerated, destructive form of osteoarthritis, designated pyrophosphate arthropathy. [15-75%]

In our patients pyrophosphate arthropathy of the knee was characterized by predominant involvement of the patellofemoral compartment

