

Patellar instability

- Is a malady commonly seen in the orthopaedic office.
- MPFL to be the major medial soft tissue stabilizer, providing 53% of the total restraining force.
- Symptoms are occasionally preceded by a traumatic event but more commonly are insidious in onset.
- Lateral translation of the patella is the most common direction of patellar subluxation and is usually associated with malalignment of the lower extremity. In patients with lateral subluxation, the trochlea has a structural role in centralizing the patella during knee flexion.
- Osteochondral fracture in 40-50%
- Mean Q-angle values approach 10 degrees in men and 15 degrees in women.

- Tenderness over the medial epicondyle (Bassett's sign) may represent an injury to the MPFL in patients with acute or recurrent patellar dislocations
- J sign: In patients with patellar subluxation, however, the patella travels from a central position within the femoral trochlea at 30 degrees of flexion to a laterally subluxated position in full extension.
- The lateral excursion during terminal knee extension, referred to as the J sign, is pathognomonic of lateral patellar subluxation.
- The initial radiographic evaluation of the patellofemoral joint should include standard anteroposterior and lateral weight-bearing views as well as an axial radiograph.

- CT allows axial cuts of the patellofemoral articulation at angles less than 20 degrees of knee flexion.
- This enhances the detection of subluxation as the patella loses the stabilizing function of the lateral femoral condyle.
- An axial CT image demonstrating the femoral trochlear groove is superimposed on an axial image of the tibial tubercle. Values greater than 9 mm is significant
- Redislocation after non op: 15-44%

JBJS 2011;93-B:1341–7.

- Patella subluxation assessed on dynamic MRI has previously been shown to be associated with anterior knee pain.
- Patella engagement (% of patella cartilage overlapping with trochlea cartilage) had the
- strongest relationship with subluxation. Patellae with > 30% engagement tended not to
- sublux; those with < 30% tended to sublux.
- Other factors that were associated with subluxation included the tibial tubercle-trochlea notch distance, vastus medialis obliquus distance from patella, patella alta, and the bony and cartilaginous sulcus angles in the superior part of the trochlea.
- No relationship was found between subluxation and sulcus angles for cartilage and bone in the middle and lower part of the trochlea, cartilage thicknesses and Wiberg classification of the patella.
- This study indicates that patella engagement is a key factor associated with patellar
- Subluxation.

Acute Traumatic Dislocation

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- 74 patients; The average age was 20years
- 10% (N = 7) had a family history of patellar dislocation.
- Radiographs revealed a 50% incidence (N = 37) of patella alta [>1.2 insalls; >1 Blackburn peel].
- At 6 months, 58% of patients (N = 43) noted limitation in strenuous activities.
- The patients who had acute primary patellar dislocation
 1. were young and active.
 2. Most during sports,
 3. Few patients had abnormal physical features, contradicting any stereotype of an overweight, sedentary, adolescent girl whose patella dislocates with little or no trauma.

History taking is important:

- a. Trivial or significant injury
- b. Requires Hospital or self reduction
-
- c. Bilateral, Other joints
- d. Family
- e. Ligament laxity syndrome
- Initial dislocation and treatment
- Impairments: Walk, stairs, etc, Locking, giving,
- Pain or instability is the problem:

Clinical

Gait : What suggest internal torsion:

- Gait and foot progression angle

- Patellar squint

- Excessive internal rotation

Small Patella

- J Sign

- Size

- Lateral translation

- Apprehension test: knee in 30° on examiners; explain the test; note the patient; gentle lateral push

How to look for crepitus?

Feel with active movements

Is anterior or retropatellar pain is important?

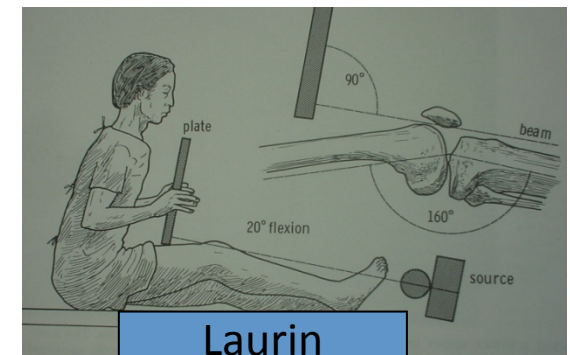
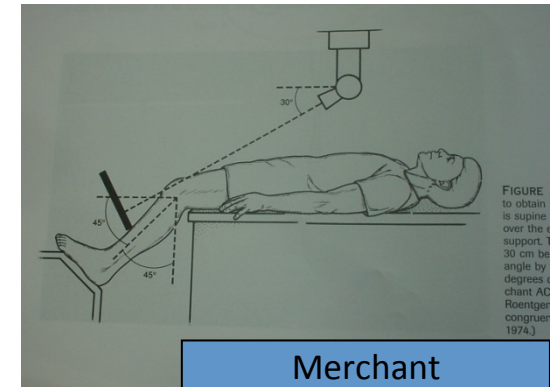
Yes. When present careful above medial and distal transposition.

[anteriorisation is indicated]

Clatterworthy: Arthroscope and then decide on the type of anteriorisation depending on cartilage loss in the patella.

X ray

- AP
- Lateral in 30° flexion
- Axial or skyline view of PFJ
- Merchant view: 45° flexion of the X ray tube at 30° to the horizontal: Sulcus angle and congruent angle
- Laurin view: Knee flexed 20° and cassette held by the patient



Assessment of patellar position

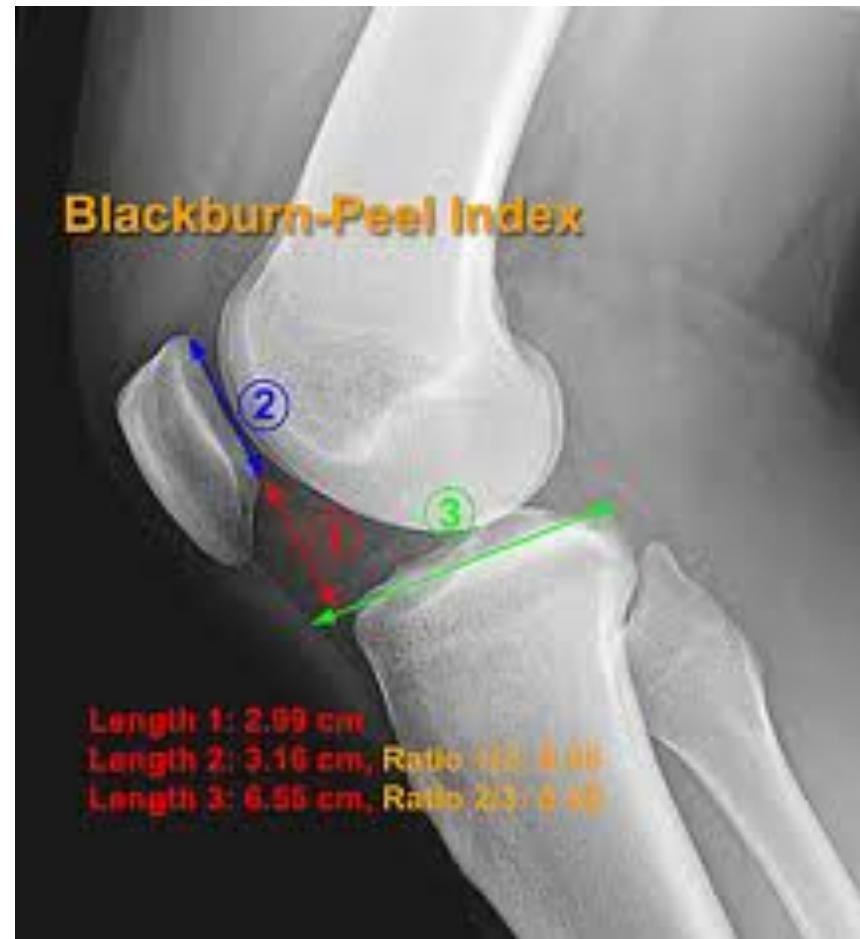
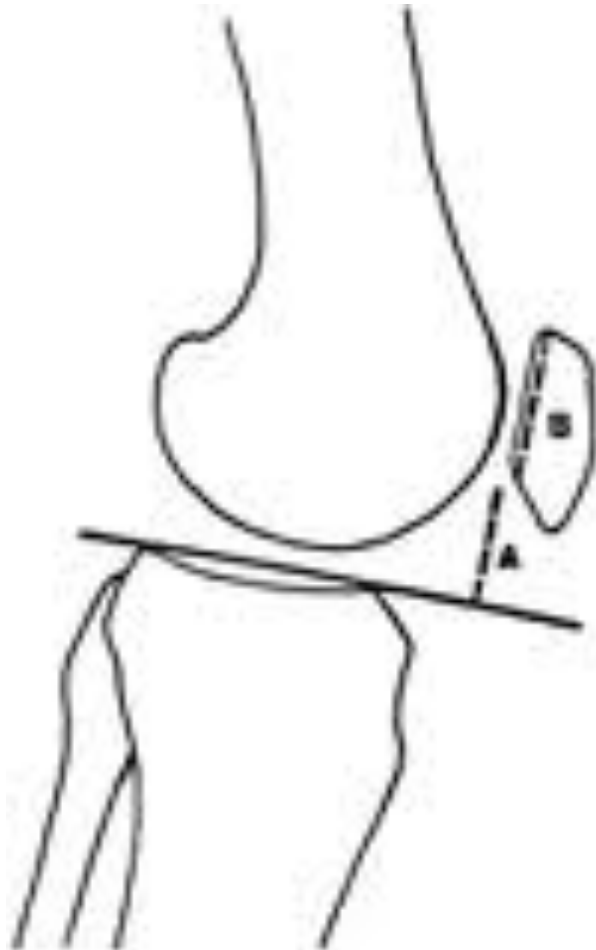
Blumensaat' s line

- Lateral X ray in 30° flexion
- Line projected anteriorly from the intercondylar notch
- Lower pole of the patella at this line

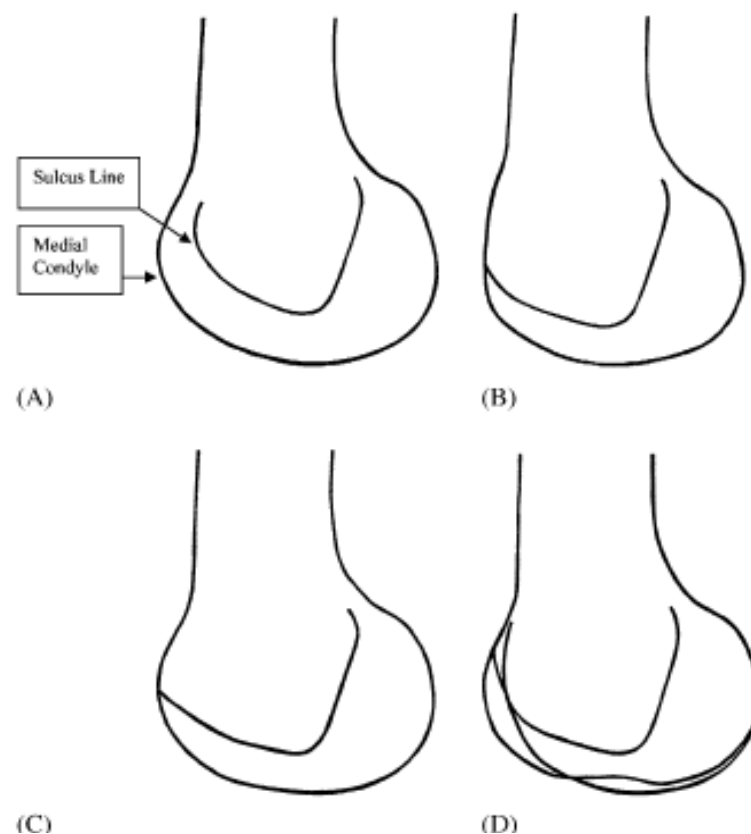
Insall Salvati Method [Lat X ray 30°]

- $T[\text{Tendon}]/P[\text{patella}] = 1.02 \pm 0.13$. Should not be more than 20%
- 1.2 = Patella alta
- 0.8 = Patella Baja
- Not accurate: difficult to define the tibial tuberosity. Non-articular patella may be beaked.

$$\frac{1}{2} = 0.95$$



- A true lateral with the posterior borders of the femoral condyle overlapping is needed to assess the trochlear groove depth; normally 7–8mm measured 1cm from its upper limit.
- < 5mm is considered dysplastic.
- Dejours' s trochlear morphology:
- (A) normal knee, the sulcus line is the trochlear floor
- (B) Type I dysplasia. The medial femoral condyle is deficient. The sulcus line joins the the medial condyle
- (C) Type II dysplasia. The crossing of the two condylar outlines of the trochlear floor is symmetrical but situated distally.
- (D) Type III dysplasia: the crossing of the two condylar outlines with asymmetry of the outline of the trochlear



Sky line view

Merchant view:

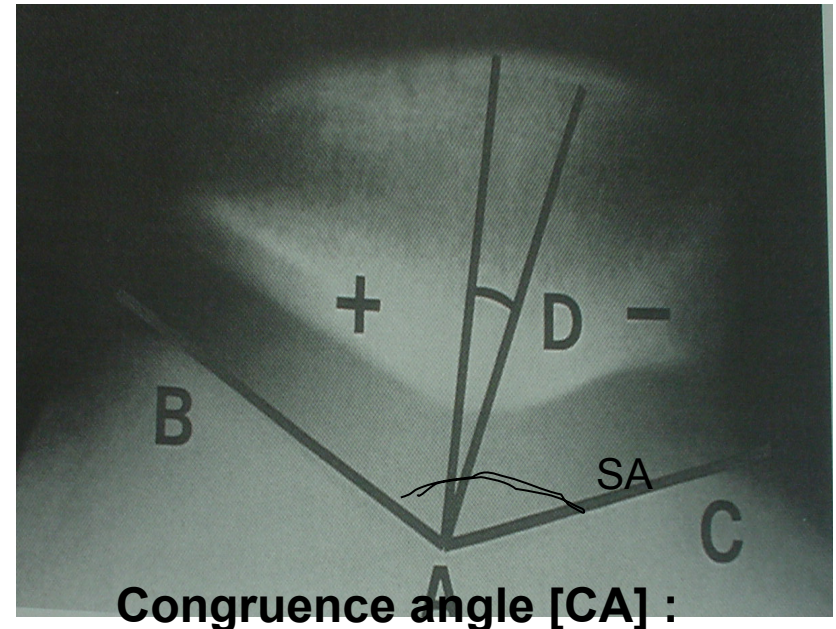
Sulcus angle : Angle BAC ; N = 138°

Congruence angle [CA] :

Line bisecting BAC and II line to the patellar ridge.

If ridge is lateral = positive angle

Normal: -6°

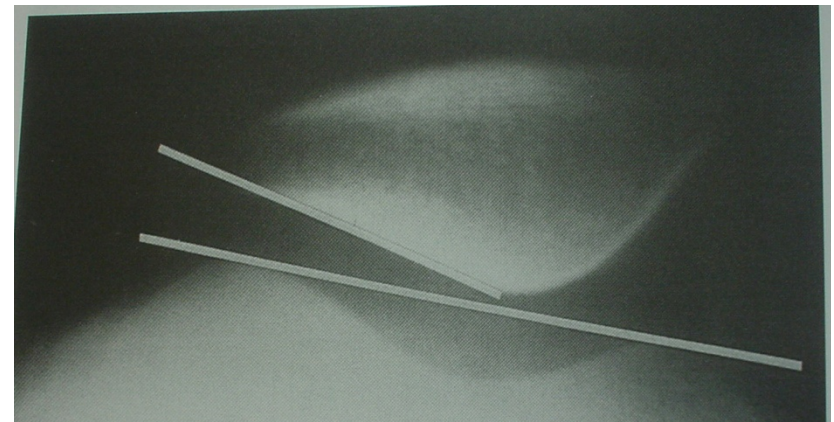


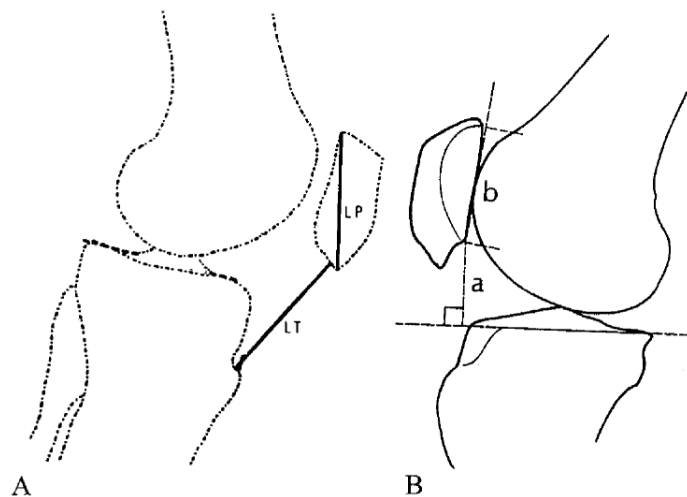
Laurin View

Lateral Patello-femoral angle:

angle between lateral facet and line joining two condyles

Normal: 97% opens laterally and 3% parallel





A. Insall ratio 0.8 -1.2 [Lig/patella]
with knee in 30° of flexion

B. Blackburne-Peel :0.8-1.1

A. SULCUS ANGLE

The angle is formed by the condyles and the sulcus. (Brattstrom)

Mean = 138° Std. Dev. = 6°

Correlates well with instability.

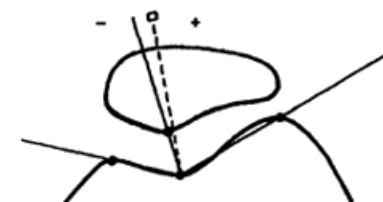


B. CONGRUENCE ANGLE

A zero reference line bisects the sulcus angle; the angular distance of the articular ridge from that line is the congruence angle. (Merchant, et al.)

Mean = 6° Std. Dev. = 6° (Aglietti, et al.)

Measures subluxation.



C. LATERAL PATELLOFEMORAL ANGLE

The angle between the intercondylar line and the lateral facet. (Laurin, et al.)

It should open laterally.

Measures tilt with subluxation.



D. PATELLOFEMORAL INDEX

M = the closet distance between the articular ridge and the medial condyle; L = the closet distance between the lateral facet and condyle.

Ratio M/L = 1.6 or less. (Laurin, et al.)

Measures tilt and subluxation.



Normal values

	Normal	Patella Pain	Patella instability
Insall T/P	1.06	1.09	<u>1.30</u>
Sulcus angle	138*	138*	<u>153*</u>
Congruence angle	-6.7	-9.2	<u>+16.6</u>
Lateral P-F angle	20*	<u>39*</u>	3*
P-F index	1.4	1.4	3.2
CT			
Congruence angle	13*	-5.7*	+4.2
Patella tilt angle	15*	14*	4.85



Classification of trochlear dysplasia

Type A is characterized by the crossing sign on the lateral view and by a shallow trochlea (sulcus angle $>145^\circ$) on the axial view

Type B is characterized by the crossing sign and supratrochlear prominence, or spur, on the lateral view (left) and by a flattened trochlea on the axial view (right).

Type C lateral view shows the crossing sign with double contour . On the axial view (right), the trochlea demonstrate medial hypoplasia.

Type D, the crossing sign, double contour, and supratrochlear spur are seen on the lateral view (left), and asymmetry of the trochlear facets is seen on the axial view (right).

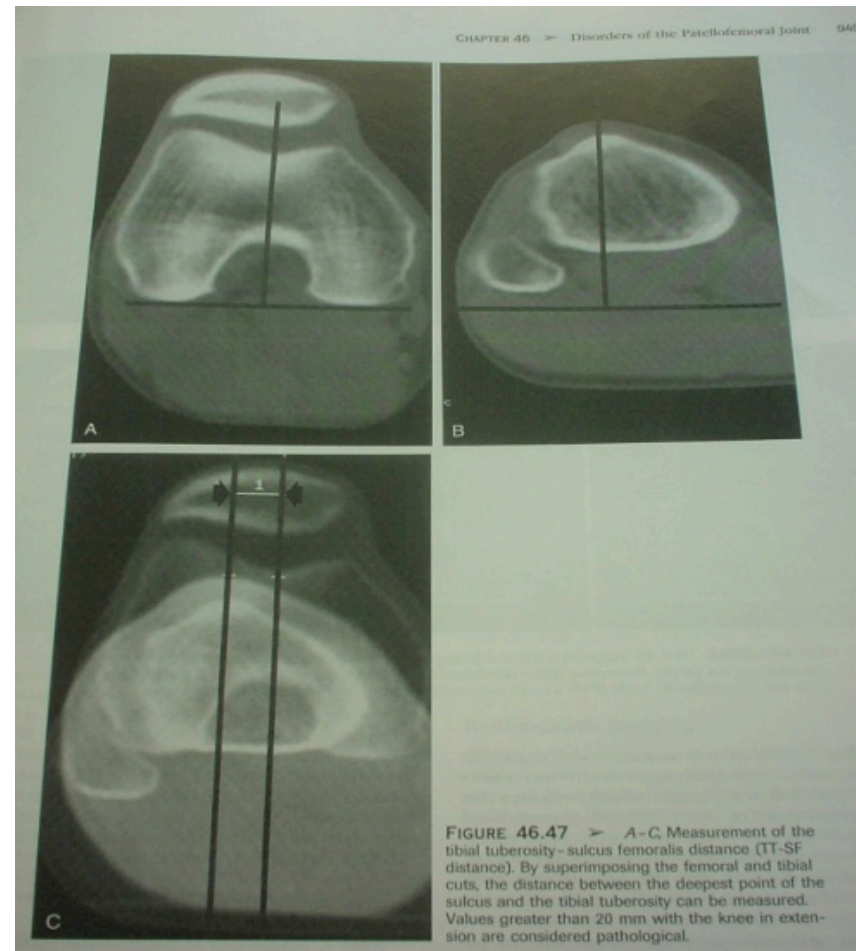
- Dejour *Sports Med Arthrosc* 2007;15:39-46.)

TT-TG distance

TT-SF: Tibial tuberosity – Trochlear groove distance

This distance is more accurate measurement than Q angle

> 20 mm is pathological



What are the changes on MRI. These changes required for ACC

- Why medial: Relocation injury
- Axial fat suppressed T2-weighted MR image
- Shows offset bone bruises in the medial aspect of the patella and in the lateral aspect of the lateral femoral condyle , a pathognomonic sign of patellar **dislocation**.



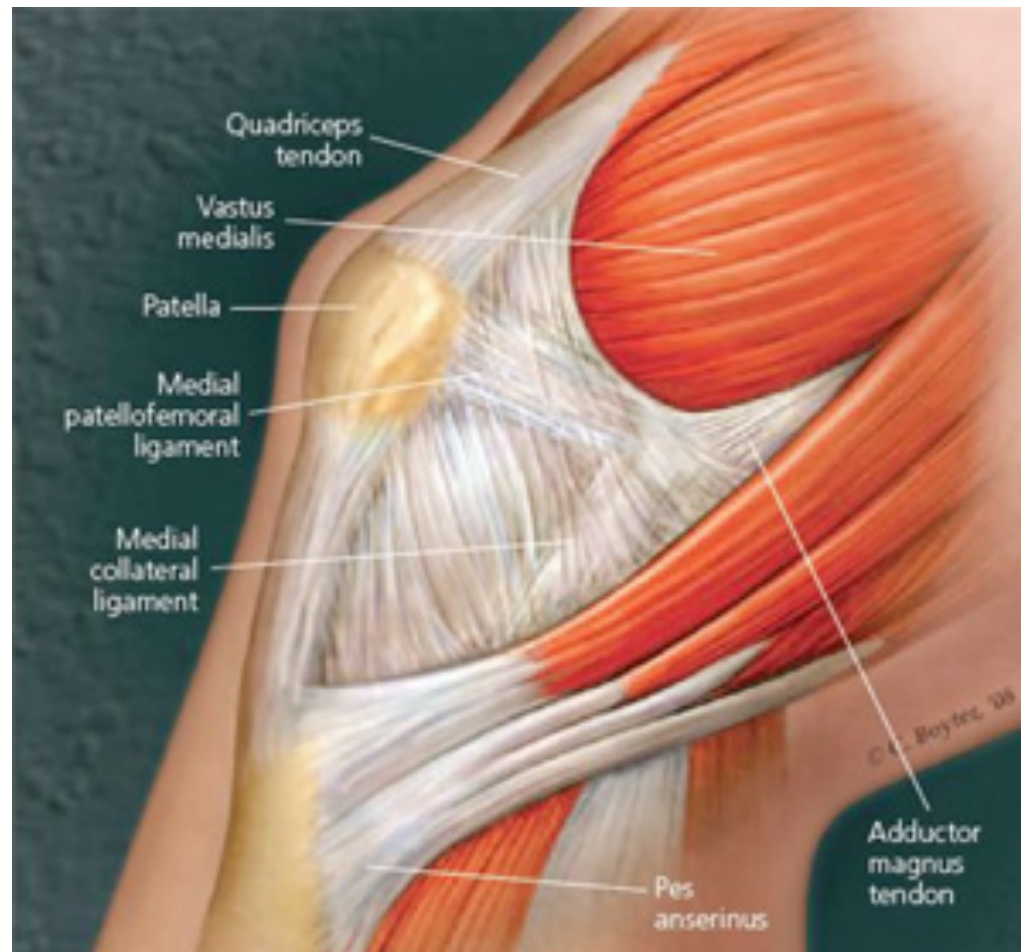
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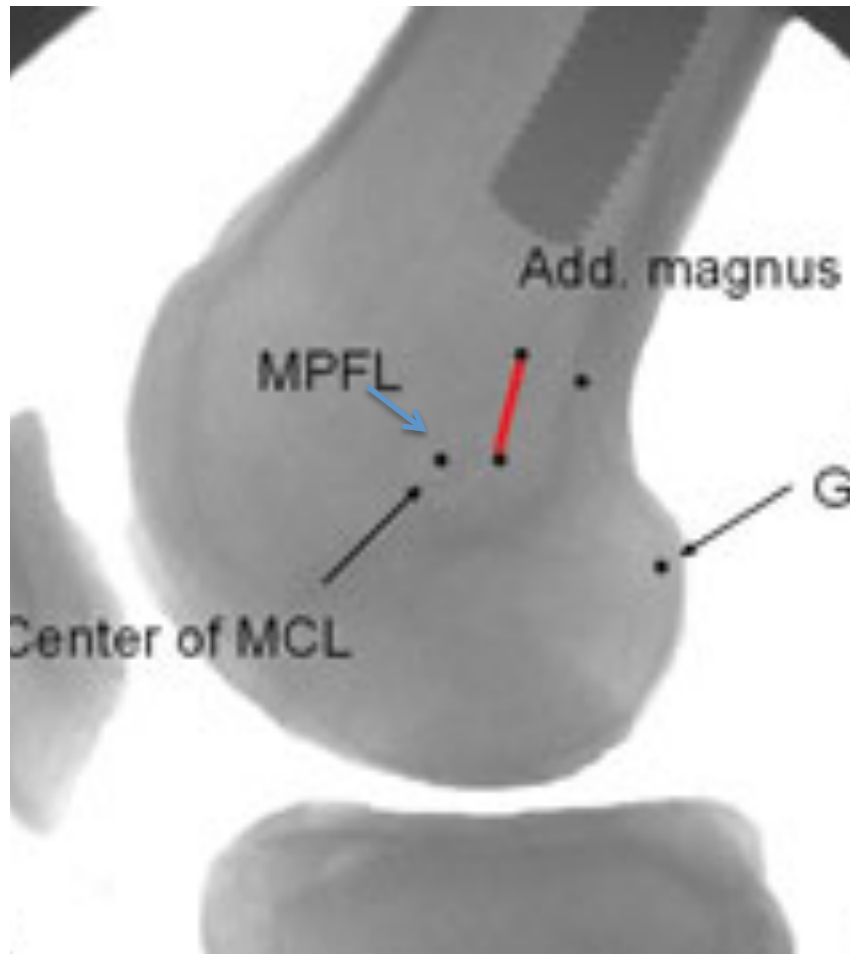
- The medial retinaculum (black arrow) is mildly sprained, manifest as mild contour irregularity and mild surrounding high signal intensity edema.

MPFL in Patellar dislocation

Am J Sports Med August 2009 vol. 37 no. 8 1513-1521

- 42 cases, 7 year follow up
- MPFL rupture: Femoral in 35 patients, midsubstance in 11, and patellar in 7.
- At follow-up, 15 patients [40%]
- [13 femoral, 1 patellar, 1 midsubstance]
- Control MRI showed full-thickness patellofemoral cartilage lesions in 50% of the patients, unrelated to MPFL injury location
- **An MPFL avulsion at the femoral attachment in primary traumatic patellar dislocations predicts subsequent patellar instability.** The authors suggest that MPFL injury location be taken into account when planning treatment of primary traumatic patellar dislocation





- MPFL is in between ME and adductor tubercle.
- Gracilis tendon and select isometric point
- Brace for 6 weeks
- No patella alta or PTT distance less than 20

Surgeries

- Patella alta
- Or
- PTT >20
- Distal surgeries:
 - Goldthwaite before the growth
 - Transfer tibial tubercle after the growth

Fulkerson: JOASS January 2011, Vol 19, No 1

- Medial patellofemoral ligament reconstruction is recommended for patellofemoral instability in the presence of trochlear dysplasia in patients without patella alta or increased tibial tubercle–trochlear groove distance.
- Trochleoplasty should be reserved for severe dysplasia in which patellofemoral stability cannot otherwise be obtained.

- The gracilis or semitendinosus tendon is looped through the longitudinal patellar tunnel, passed under the fascia and fixed in a drill hole in the medial femoral condyle with an interference screw

Natural course

- Fithian et al² reported recurrence in 49% of patients with at least two prior instability events.
- Trochlear dysplasia is estimated to occur in <2% of the population; however, it is present in up to 85% of patients with recurrent patellar instability.

- Predisposing factors (eg, hyperlaxity, rotational malalignment, lateral extensor mechanism vector) are known to cause recurrent patellar subluxation or dislocation, a lateralized patellar resting position, and distortion of trochlear morphology.
- Lateral patellar positioning may limit the development of normal trochlear depth and morphology.
- Persistent lateral patellar tracking can result in a flattened lateral trochlea and can indirectly create a shallow groove. This scenario is suggestive of a developmental process.
- Patellar dislocation typically occurs in persons with several anatomic risk factors. Patellar dislocation likely is caused by a combination of congenital and developmental factors.

Fulkerson anterior tibial osteotomy 88A Aug

- The obliquity of the osteotomy gives more anteriorisation or more medial transfer of the tubercle.
- Less oblique osteotomy giving more medialisation and less anteriorisation