# Patellar Dislocation



Essay

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of the Master Degree in *Orthopaedics*



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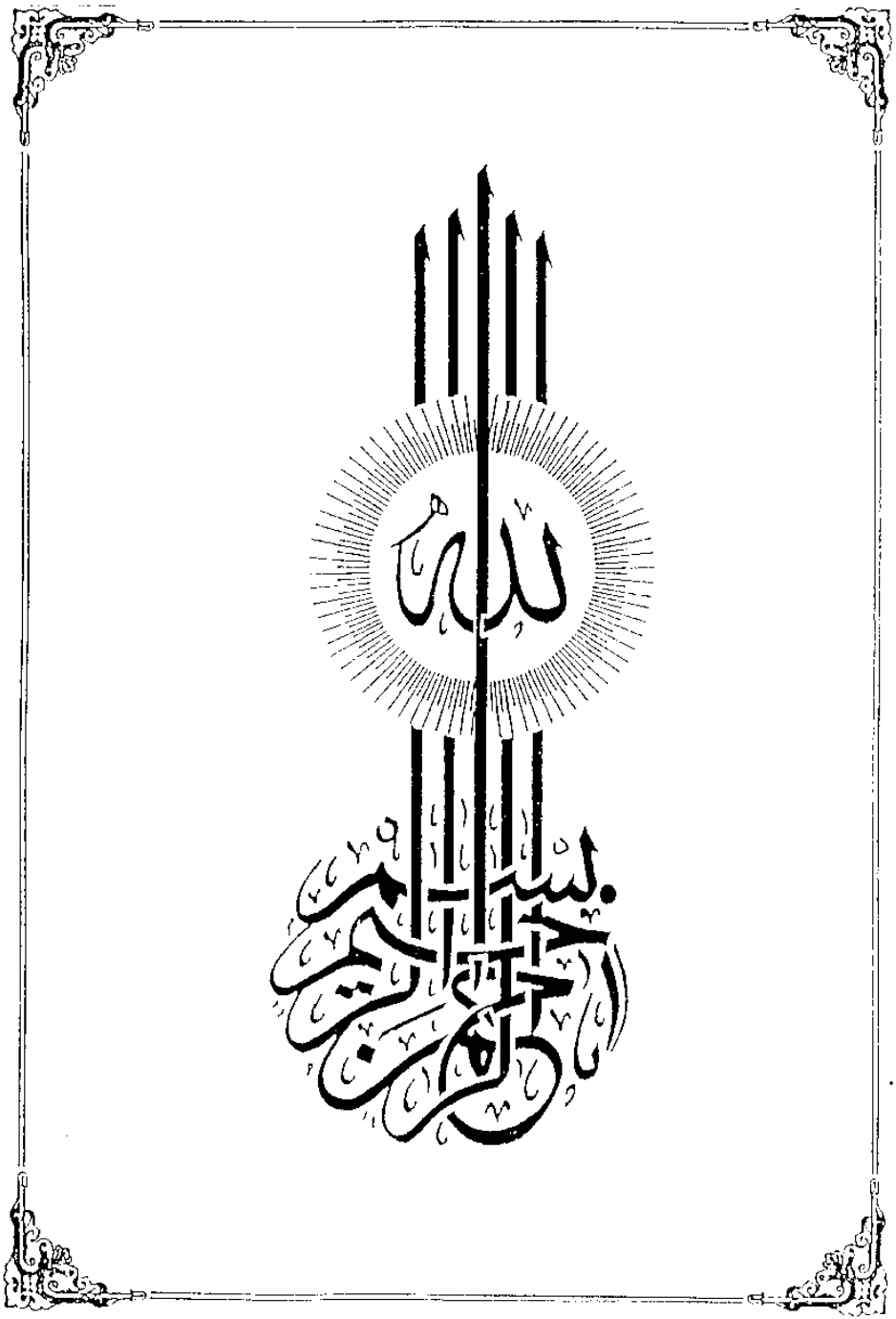

# Introduction

A normal patello-femoral joint is necessary for optional knee function. The patello-femoral joint is so shaped that the patella moves in a shallow path (or track) between the femoral condyles; if this track is too shallow the patella readily dislocates, and if its line is faulty the patellar articular cartilage is subject to excessive wear. one important function of the patella is to increase the power of extension; it lifts the quadriceps forwards there by increasing its moment arm.

Any dislocation should be reduced as soon as possible. While a joint is dislocated, the metabolism of its hyaline cartilage is disturbed and synovial fluid functions are impaired. Hyaline cartilage may degenerate over a brief period of time and irreversible changes occur rapidly there after.

Afflictions of the patello-femoral integrity may be classified as acute dislocation, recurrent dislocation, subluxation, habitual and congenital dislocation. Acute dislocation of the patella is a painful condition. Most dislocations are lateral; most result from indirect trauma, but they may result from direct trauma. The acute pathology may involve both soft tissues and bone.

Habitual dislocation implies that dislocation occurs every time the knee is flexed. The displacement is painless, in marked contrast to recurrent dislocation which occurs as isolated episodes, often in response to trauma and is accompanied by pain and followed by swelling.

Congenital dislocation refers to an irreducible dislocation present since birth and associated with a lateral position of the entire quadriceps mechanism. The distinction between these groups is important as the surgical treatment for each is quite different.

Operations for recurrent dislocation usually involve procedures distal to the patella. Habitual dislocation of the patella always requires releases proximal to the patella.

# Contents

# Anatomy of Patello-Femoral Joint

The patella moves in a shallow track between the femoral condyles. The peripheral borders of the patella form a triangle with the apex pointing distally. It has two surfaces (anterior and posterior), three borders (superior or base, medial and lateral borders) and an apex which is pointing distally. The anterior surface is divided into three parts. The rough superior third, the base of the triangle, receives the insertion of the quadriceps tendon. The middle third reveals numerous vascular orifices and is crossed by numerous vertical striations giving a fuzzy or bristled appearance on the axial view of X-ray. The inferior third terminates in a V-shaped point, which is enveloped by the patellar tendon. The posterior surface is divided into two parts. The inferior non-articulating portion which is dotted with vascular orifices whose vessels pass through the densely adherent infrapatellar fat pad. The superior articulating portion is completely covered by hyaline cartilage and is divided into lateral and medial facets by a vertical median ridge which represents the apex of the transverse section of the patella. The medial facet is subdivided into the medial facet proper and a much smaller **odd** facet along the medial border of the patella by a small secondary vertical

ridge which conforms to the curve of the lateral border of the medial condyle with the knee in full flexion, while the median ridge conforms to the straight medial border of the lateral condyle. The base of patella receives the insertion of the quadriceps tendon anteriorly. Posteriorly there is a small free section between the tendon insertion and the insertion of the synovium at the posterior margin. The apex of the patella forms a rounded projection which receives the attachment of the patellar tendon. The medial and lateral borders of the patella receive the attachment of the synovium, the joint capsule, the patello-femoral ligaments and the quadriceps expansion (the vastus medialis descending more distally than the lateralis). The lateral border receives a fibrous expansion of the fascia lata (figure 1). The articular portion of the anterior surface of the distal femur, which articulates with the patella, has been referred to variously as the patellar facets of the femur, the patellar groove and the trochlea. The trochlear surface of the femur is divided into two facets, medial and lateral. Proximally, they are in continuity with a shallow groove conforming exactly to the contour of the distal portion of the articular surface of the patella. The trochlear facets are convex in all directions and closely match the medial and lateral facets of the patella. The

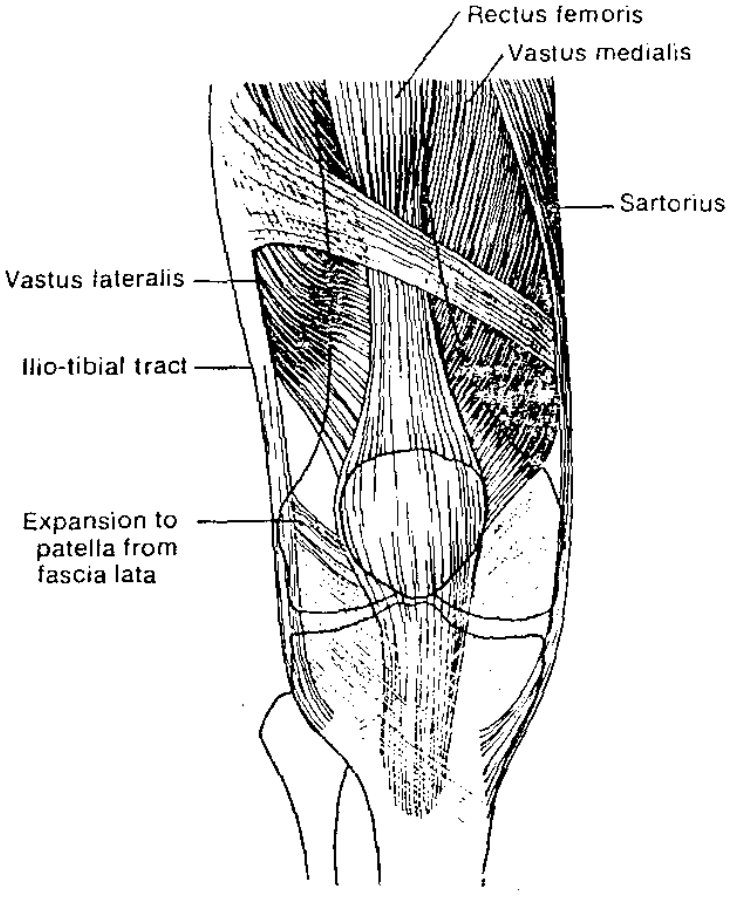


**Fig. (1):** Constitution and orientation of the superficial portion of the extensor apparatus.

lateral (external) trochlear facet extends more proximally, is larger overall, and projects further anteriorly than the medial facet. In full extension with the quadriceps tightened, the patella articulates with the supratrochlear fat pad of the femur and in full flexion with that portion of the medial and lateral femoral condyles which articulate with the tibial plateau in full extension.

## *Stabilizers of Patella*

The patella is solidly anchored to the knee by a cruciform soft tissue system, in which it is possible to distinguish both active and passive elements.

### Passive Stabilizers

Inferiorly, the patellar tendon limits the proximal ascent of the patella from the tibia. Its orientation is roughly in the long axis of the lower extremity, but often slightly oblique laterally from proximal to distal, which adds to the tendency toward lateral displacement of the patella. Medially, capsular condensations form a tough fibrous layer which inserts into the superior two thirds of the posterior part of the medial border of the patella. This medial patello-femoral ligament links the patella to the medial femoral epicondyle and passively limits lateral patellar excursion. Inferiorly, the medial menisco-

patellar ligament inserts into the inferior third of the medial border of the patella, connecting the patella to the anterior part of the medial meniscus. This ligament is buried in the margin of the fat pad. Laterally, the capsular condensation, the lateral patello-femoral ligament, connects the patella to the lateral epicondyle. It is reinforced inferiorly by the lateral menisco-patellar ligament which is more developed than its medial counter part. It connects the inferior third of the lateral patellar border to the anterior part of the lateral meniscus. Additionally, on the lateral side, there is an insertion from the fascia lata. The lateral patello-femoral ligament tends to be anatomically less well individualized than its medial counter part. However, the combination of this lateral ligament, the lateral menisco-patellar ligament and the patellar expansion of the fascia lata combine to form a much stronger soft tissue checkrein laterally than medially (figure 2). This point can be confirmed on physical examination in that greater lateral displacement can be accomplished passively than medial displacement. The patellar tendon, medial and lateral patello-femoral ligament, medial and lateral menisco-patellar ligaments and contribution from the fascia lata contribute to passive elements of the soft tissue

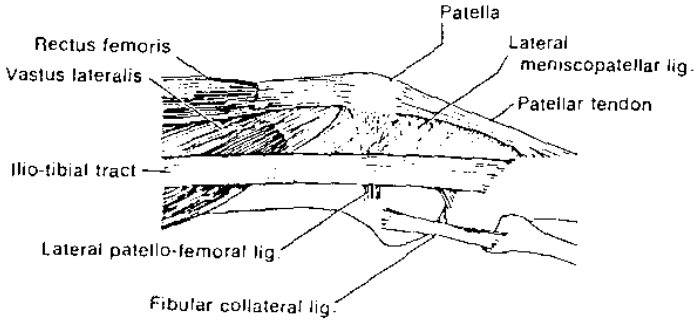


**Fig. (2):** Lateral view of the extensor mechanism showing the orientation of the elements making up the lateral retinaculum.

stabilizers. They, along with the bony confines of the trochlea, define the limits of patellar excursion.

**Active Stabilizers *(Figure 3)***

The four main muscular elements of the quadriceps fuse distally into the quadriceps tendon, which can still be identified as three separate layers, at its insertion into the patella. Superficially, the rectus femoris inserts into the anterior portion of the base of patella, as well as the superior third of the anterior surface of the patella. The most superficial fibres continue over the anterior surface of the patella to create a continuous bridge of tough fibrous tissue on into the patellar tendon. These represent a direct tibial insertion of the quadriceps. In the midportion, the vastus medialis and lateralis unite in the midline to form a solid aponeurosis which inserts into the base of the patella just posterior to the insertion of rectus femoris. The vasti insertion also continue medially and laterally into their respective border of the patella. Medially, the muscle fibres and fibrous insertion descend more distally than laterally. The intermedius inserts via a broad thin tendon into the base of the patella posterior to the vasti but anterior to the capsule. Medially and laterally, these insertions reinforce the respective patello-femoral ligaments. Thus, the four components of

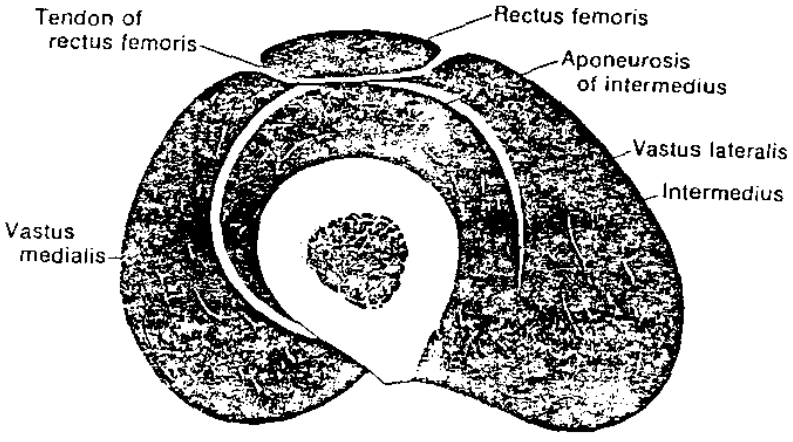


**Fig. (3):** This cross-sectional view of the distal femur shows the orientation of the four individual components of the quadriceps. The fascial orientation remains constant as they insert into the proximal, medial, and lateral borders of the patella.

the quadriceps constitute the active element of the soft tissue stabilizers *(Ficat and Hungerford, 1977).*

The lateral retinaculum cannot be considered to be static, since it receives the tendinous insertions of the vastus lateralis and originates on the ilio-tibial band. The vastus lateralis and the vastus lateralis obliquus muscles may exert dynamic forces on the lateral retinaculum. An increased tension on the quadriceps complex may produce lateralization of the patella or a so-called valgus vector (figure 4). This lateral movement of the patella, however, is opposed by the oblique fibres of the vastus medialis obliquus, the medial retinaculum, and the lateral facets of the troclea and patella. The vastus lateralis obliquus is a small oblique muscle that originates partially from the lateral intermuscular septum and inserts into the vastus lateralis tendon and the patella. Close inspection of the tendinous insertion of the vastus lateralis obliquus showed what appeared to be three distinct anatomical patterns. In the first pattern, the vastus lateralis obliquus muscle originates beneath the main muscle belly of the vastus lateralis and then circles inferiorly and anteriorly to insert obliquely on the vastus lateralis portion of the quadriceps tendon. In the second pattern, the fibres of the vastus lateralis obliquus muscle