Anterior Knee Pain

Essay

Submitted for Partial Fulfilment in

Orthopaedic Surgery

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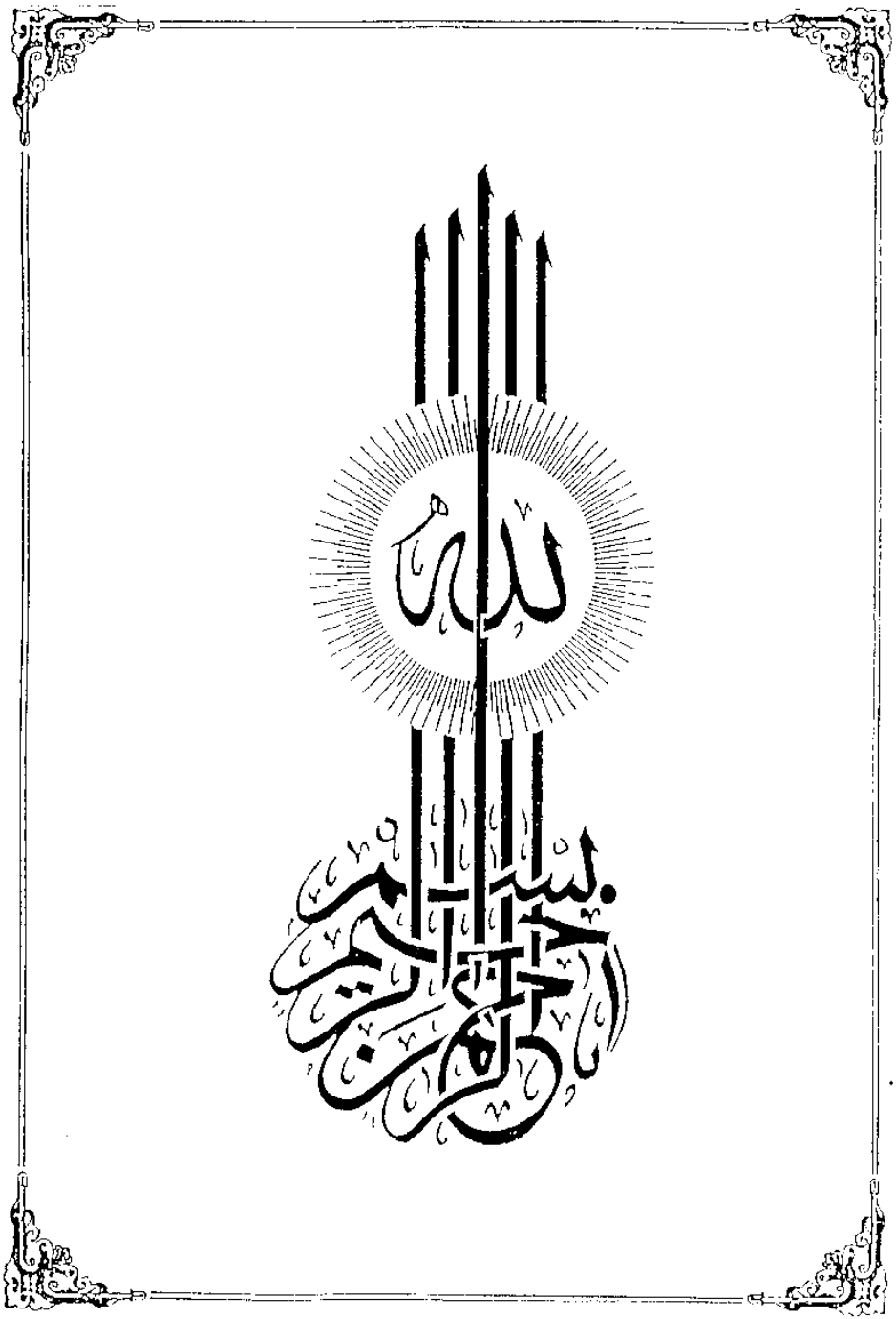

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Introduction

This review concerns the well known symptom complex which is typified by chronic pain in the front of one or both knees in a young person.

In this review the term "Anterior Knee Pain" is used to describe the symptom complex whatever its cause; there may be more than one.

Anterior knee pain is a common problem, particularly among athletically motivated young adults. Despite the eight decades that have passed since the term Chondromalacia Patellae, was introduced, many aspects of the diagnosis and treatment of this disorder remain controversial.

In the past few years, however, two fundamental changes in thinking have gradually evolved:

- First, there is now a consensus that use of the term "Chondromalacia" should be limited to gross morphologic, age-related articular cartilage softening.

- Second, attention has been directed to the primary role of the supporting soft tissues in producing patel-

lofemoral malalignment and as source of anterior knee pain.

Anterior knee pain is a syndrome in search of a pathology. The hunt for a cause has produced many explanations, a multiplicity of subtle physical and radiological signs and measurements and altogether too many surgical operations.

So, the purpose of this essay is to examine the evolution of the current understanding of what anterior knee pain is or is not. This discussion will focus on chondromalacia of patella, abnormal synovial plica and patellar malalignment because they are almost the primary causes of anterior knee pain in young people untill recently.

The discussion will include, the clinical presentation, diagnosis, pathology and etiology of anterior knee pain. Various non-operative and operative methods of treating anterior knee pain have been mentioned.

Surgical Anatomy

Surgical Anatomy of the Knee

I. Limb alignment

Because of the arrangement of ligaments and muscles, the joint is essentially very stable, but the length of the bones involved leads to considerable magnification of any deforming forces and as a result it is more liable to injury than any other joint in the body.

a. Coronal Tibio Femoral Angle (C.T.F.)

The anatomical axes of the femur and tibia are represented by lines drawn down the centre of the diaphyses. These will normally be set at an angle to each other which varies between 4-9^{o} and is known as the coronal tibiofemoral angle (CTF). The higher values occur in the female as a result of the wider pelvis. Variations occur due to abnormalities caused by trauma, disease or dysplasia. (Fig. 1.a)

b. Mechanical Axis

The mechanical axis is represented by a line joining the centre of the head of the femur to the centre of the ankle joint. Normally this will pass through the centre of the knee joint. (Fig. 1.b)

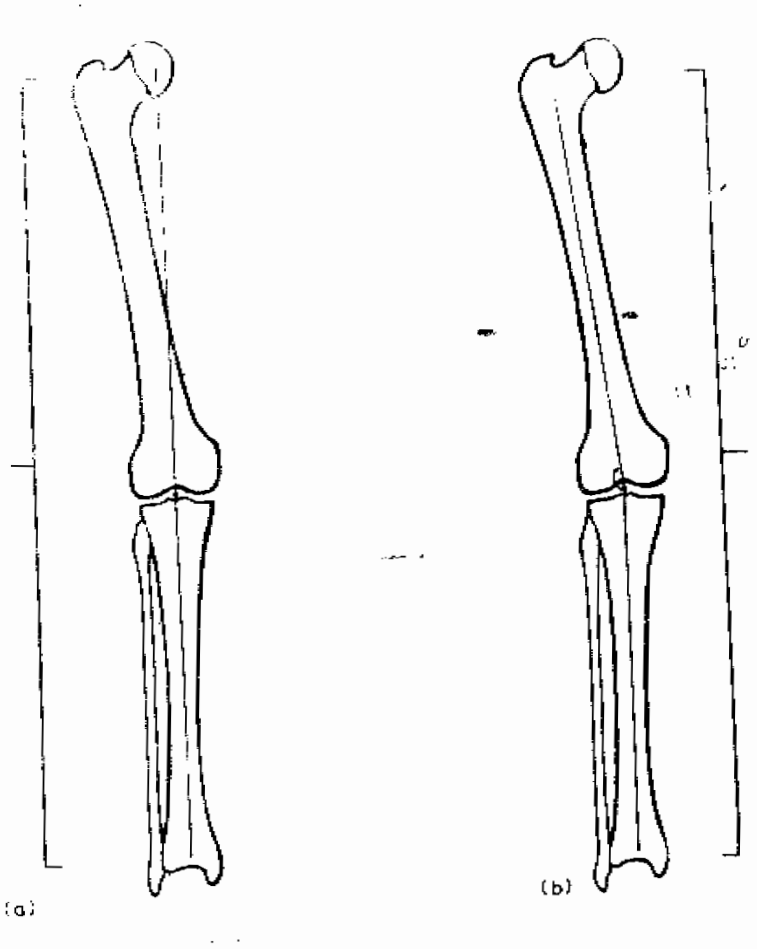

Fig.1 a. The mechanical axis.

b. The coronal tibiofemoral angle (CTF).

(Jackson, R.W. & Waugh (1984):

Surgery of the knee joint)

II. The Articular Surfaces

a. Femur

The articulating part of the femur consists of two condyles. Posteriorly they are circular and parallel to each other. Anteriorly the two condyles flatten out and the medial inclines towards the lateral side. The patellar surface of the lateral condyle is normally rather more porminent than the medial. It may be underdeveloped in patients who suffer from subluxation or habitual dislocation of the patella. On the peripheral surface of the medial condyle there is a V-shaped indentation. On the lateral condyle the groove is strip-shaped. These indentations are situated at the anterior end of the part of the condyle that articulates with the tibia. Into these indentations the anterior horns of the appropriate meniscus fit when the knee is full extension.

b. Tibia

The upper surface of the tibia presents two rounded condyles, though the medial is rather more oval in shape. It is also slightly concave from side to side and anteroposteriorly. The lateral condyle, which is more

nearly circular, is concave from side to side but has a slight convex contour when viewed anteroposteriorly. It is this convexity which accounts for the fact that rare cases of osteochondritis dissecans occur at this site.

c. Patella

It is a sesamoid bone developed in the quadriceps tendon and has the function of making the quadriceps muscle mechanically more efficient. It may also have a secondary role in protecting the front of the joint. There are two facets divided by a median ridge into lateral and medial. The size of these varies in relation to each other. Depending on the ratio between them, **Wiberg (1941)** classified them into three groups. (Fig. 2)

Reider et al., (1981) found that:

In the First Group (Type I):

The lateral and medial facets were approximately equal, there were 24% of cases.

In the Second Group (Type II): Most common.

Lateral facet is significantly longer than the medial, was found to be presnt is 57% of cases.

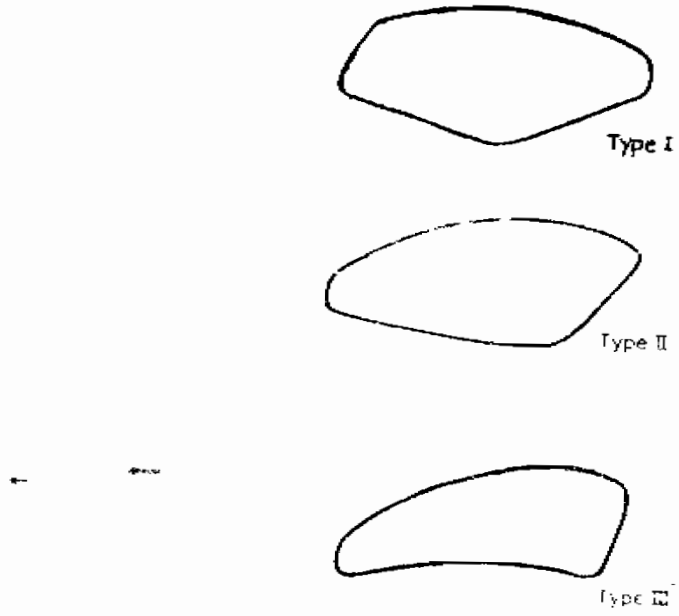

Fig. 2: Wiberg Classification of patellar shapes.

(Jackson et al., 1984: Surgery of the knee joint)

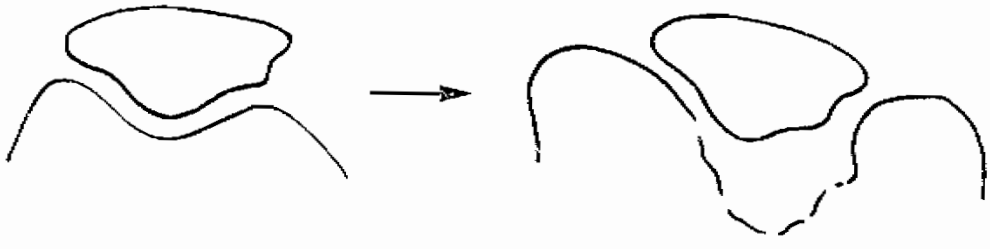

Fig. 3: a. From full extension to 90° the patellar facets of the Femur articulates with the medial and lateral facets of the patella.

b. Beyond 90° the patella rotates and the medial femoral condyle articulates with the odd facet. **(GoodFellow et al., 1976: J. of Bone and Joint Surgery)**

In the Third Group (Type III):

In which the lateral condyle was considerably greater than the medial facet, which was almost vertical there were 19%. **Wiberg** was of the opinion that chondromalacia was much more common in type III, though this has not subsequently been confirmed.

On the medial side of the patella there is a small facet which comes into contact with the femoral condyle only in the last part of the flexion range (the occasional medial facet).

In the performance of a range of movement from extension to 90 degrees of flexions all the articular surface of the patella, save only the odd facet, articulates with the femur. Only when flexion proceeds to about 135 degrees does the odd facet articulate. Surface fibrillation of the cartilage of the odd facet is frequently found limited to this area **(GoodFellow et al., 1976).** (Fig. 3)

The height of the patella in relation to the tibia and femur is remarkably constant. In the normal position the length of the patella from the upper surface down to the tip of the lower pole is equal to the length of the patellar tendon **(Insall and Salvati, 1971).**

This is most easily measured on lateral radiograph. The patella occupies a higher position in patients suffering from subluxation and recurrent dislocation of the patella. **Insall et al., (1976)** have suggested that variations in the ratio are also associated with chondromalacia.

d. The Q-angle

This is the angle between the axis of pull of the quadriceps and the patellar tendon. In practice it is measured by drawing a line from the anterior superior iliac spine to the centre of the patella and then a further line from the centre of the patella to the tibial tuberosity. (Fig. 4) **Insall et al., (1976)** found that these two lines met an angle averaging 14^{o}. He considered that anything above 20^{o} was abnormal.

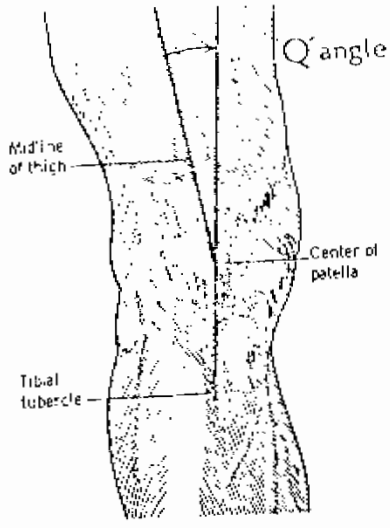

Fig. 4: The Q-angle.

(Jackson, R.W. & Waugh (1984): Surgery of the knee joint)