ROTATORY INSTABILITY OF THE KNEE

T H E S I S

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I N

ORTHOPAEDIC SURGERY

B Y

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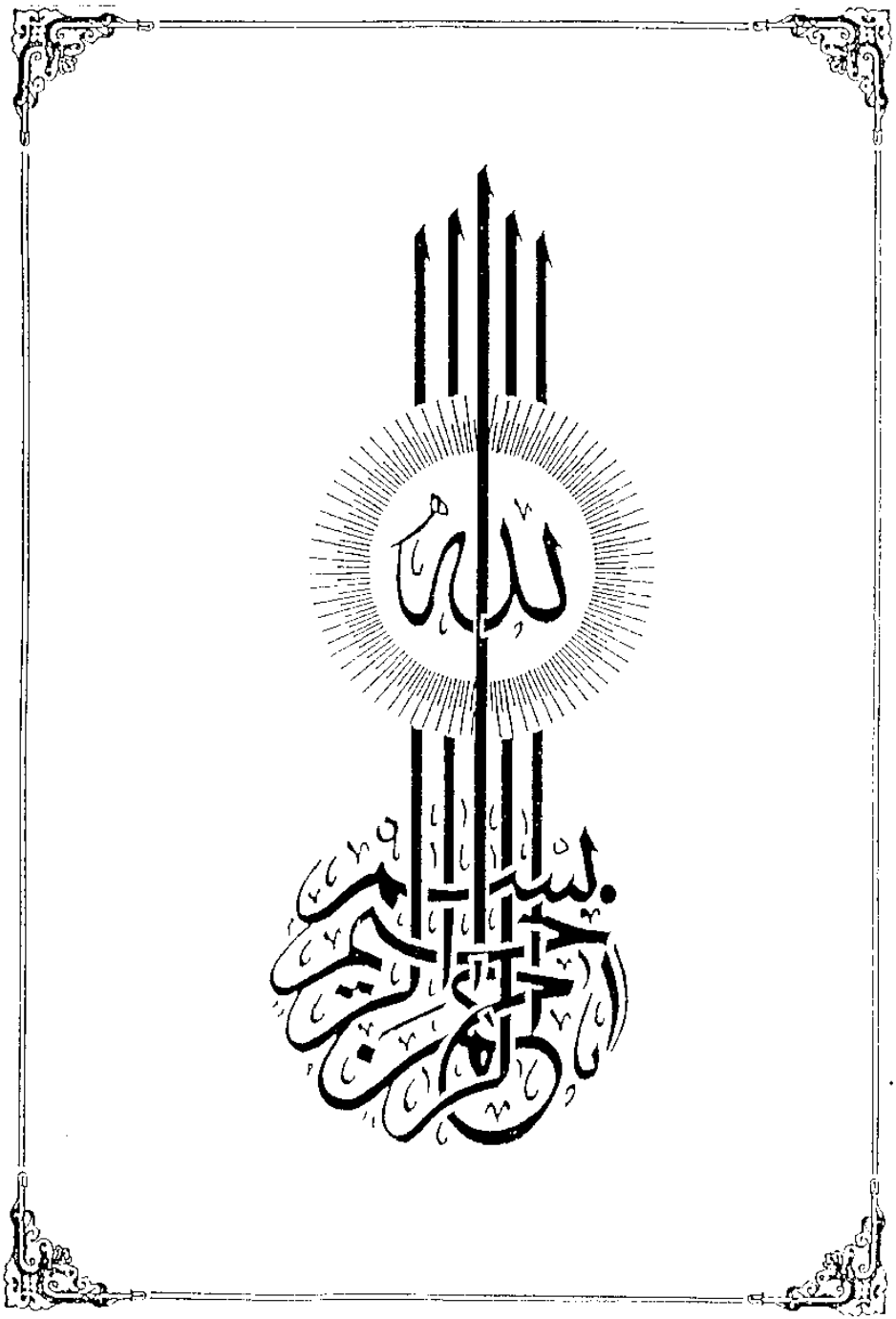

TO

MY LATE FATHER

ACKNOWLEDGMENT

"FIRST AND FOREMOST, THANKS ARE DUE TO GOD
THE BENEFICIENT AND MERCIFUL"

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C O N T E N T S

Introduction

I N T R O D U C T I O N

Second only in importance to active muscular control is the passive control of ligaments which not only determine the direction in which muscle action is transmitted to the moving surfaces but achieve through their sensory nerve fibers, the co-operation essential to protection.

The medial ligament represents the insertion of adductor magnus when it extends to tibia, and the origin of peroneus longus when it extend to the femur.

But the functions of the medial,anterior cruciate,poste rior cruciate, and lateral ligaments together with the capsule are so closely inter-related in maintaining the integrity and stability of the knee joint.

That it is difficult to describe a specific function or functions to any specific ligament.

It is clear also that mechanical perfection of the knee joint is related directly to the integrity of all ligaments.

The medial and the anterior cruciate ligaments take pride of place from the clinical point of view.

The medial ligament because of the grave implication of total rupture; and the frequency of minor injuries, the anterior cruciate because of its involvement in the mechanism of total rupture of the medial ligament for example.

Although rupture of the anterior cruciate is the most common lesion in the knee. (Smillie I.S.1952).

It is not the most important, rupture of the medial ligament comes first.

Anatomical Considerations

ANATOMY OF THE KNEE JOINT

The knee joint is a synovial joint. It is formed by three bones the femur. The tibia, and the largest sesamoid bone in the body the patella.

It is essentially a hinge joint, but allows a little rotation during the flexion.

The expanded lower extremity of the femur articulates with the expanded upper end of the tibia, and also with the patella.

As it is a weight- bearing joint, it requires to be very stable.

Strength of the joint depends very little upon its bony conformation, but rather upon the powerful ligaments in and about it and the muscles that reinforce the joint.

BONY CONTOURS:

The lower extremity of the femur consists of two condyles, separated posteriorly by a deep notch, but fusing anteriorly into a trochlear grove for articulation with the patella(last 1978).

The lateral condyles of the femur and the tibia are broader and flatter and receive most of the weight.

The medial condyle of the femur is longer and elliptical and on a lower level than the lateral, thus permitting the leg to swing out during flexion to prevent interference with its fellow condyle.

The posterior portions of the condyles are very sharply curved to allow increased speed in action (Colonna 1960).

The articular surfaces of the patella is divided by a vertical ridge into a large lateral and a small medial surface, this latter is further divided by vertical ridge into two smaller areas, the intermediate and perpendicular facets(Last 1978).

Two faint horizontal lines divide the intermediate and lateral surfaces, each into three areas.

Seven facets therefore are seen on the articular surface of the pattella two upper, two middle and two lower, and the perpendicular facet (Romanes 1971).

In flexion the crescentic facet of the medial condyle of the femuris in contact with the perpendicular facet of the pattella. and the lateral surface glides around in contact with the lateral condyle of femur, while the intermediate facet lies free in the intercodylar notch of the femur.

In extension the lateral surface and the intermediate facets on the trochlea, while the perpendicular facet is not in articulation with the femur (last 1978).

The tibial plateau has two spearate articular facets with the bifurcated spine inbetween.

The medial facet lies wholly on the upper surface of the condyle, but the lateral fact curves back over the posterior margin of the tibial condyle.

This bevelled margin allows withdrawal of the lateral meniscus by the popliteus muscle.

The femoral condyles are partly separated from the tibial condyles by fibrocartilage called the menisci, they lie in the marginal parts of the tibial condyles (Lewin 1952)

THE INTRA-ARTICULAR STRUCTURES:

1- The Cruciate Ligaments : They are pair of very strong ligaments connecting tibia to femur.

They lie within the fibrous capsule but outside the synovial membrane which ensheathes them anteriorly and at the sides.

They cross each other, the anterior is lateral to the posterior.

The anterior cruciate ligament connects the front of the tibial spine to the back of the medial aspect of the lateral femoral condyle.

The posterior cruciate ligament connects the back of the interocondylar fossa of the tibia to the front of the tibia to the front of the lateral aspect of the medial condyle.

It prevents the femur from sliding forwards of the tibial plateau, while the anterior cruciate prevents backward displacement of the femur on tibial plateau, and also has important role that of limiting extension of the lateral condyle of the femur and of the causing medial rotation of the femur in "screw-home" position of full extension(last 1978).

2- The Menisci : They are C shaped fibrocartilage. they are avascular except at There attachments. Each lies on the upper surface of its respective tibial condyle.

The medial meniscus is the larger, fixed at its anterior horns by fibrous tissue to the tibia.

Its circumference is connected by the capsule of the joint to the femur and tibia. The capsular attachment to the tibia is lax,. The lateral meniscus is fixed to the tibia at both its horns. in addition its posterior convexity is slung by the anterior and posterior meniscofemoral ligaments to the medial condyle of the femur infront and behind the attachment of the posterior cruciate ligament.

The circumference of the meniscus is attached by lax capsule, coronary ligaments, to the articular margins of the femur and tibia except beneath the tendon of popliteus. Here there is a gap in the coronary ligament, through it the popliteus tendon and bursa pass. The convexity of the lateral meniscus receive the insertion of a flat tendon derived from the upper half of the popliteus muscle.

The transverses ligament passes across between the anterior horns of the medial and lateral menisci.

The delicate capsule is attached to it (last 1978). The menisci are the shock-absorbers, which deepen the sockets on top of the tibia .

They are moving wedges, which prevent displacement, especially laterally.

They function normally until forced between the bones or until caught there is by some unusual movement of the knee especially rotation while is flexion.

If the tibia is pushed side-ways on the femur, the femoral condyles will be found running up on the sides of the menisci. The higher the condyle rises on the meniscus, the tighter the ligaments becomes and the more firmly the knee is held. The menisci adds further adaptation of the tibial socket to the femoral condyles, assist the lateral ligaments to check or prohibit exagaerated lateral movement of the joint and help in torsion movements of the knee joint (Lewin 1952). Flexion and extension take place above the menisci, in the upper compartment of the joint, while in rotation the menisci move with the femur, in the lower compartment of the joint. During rotation of the flexed knee, the lateral meniscus held by the menisco-femoral ligaments and by the popliteus tendon in constant position relative to the femoral condyles.