Fractures of The

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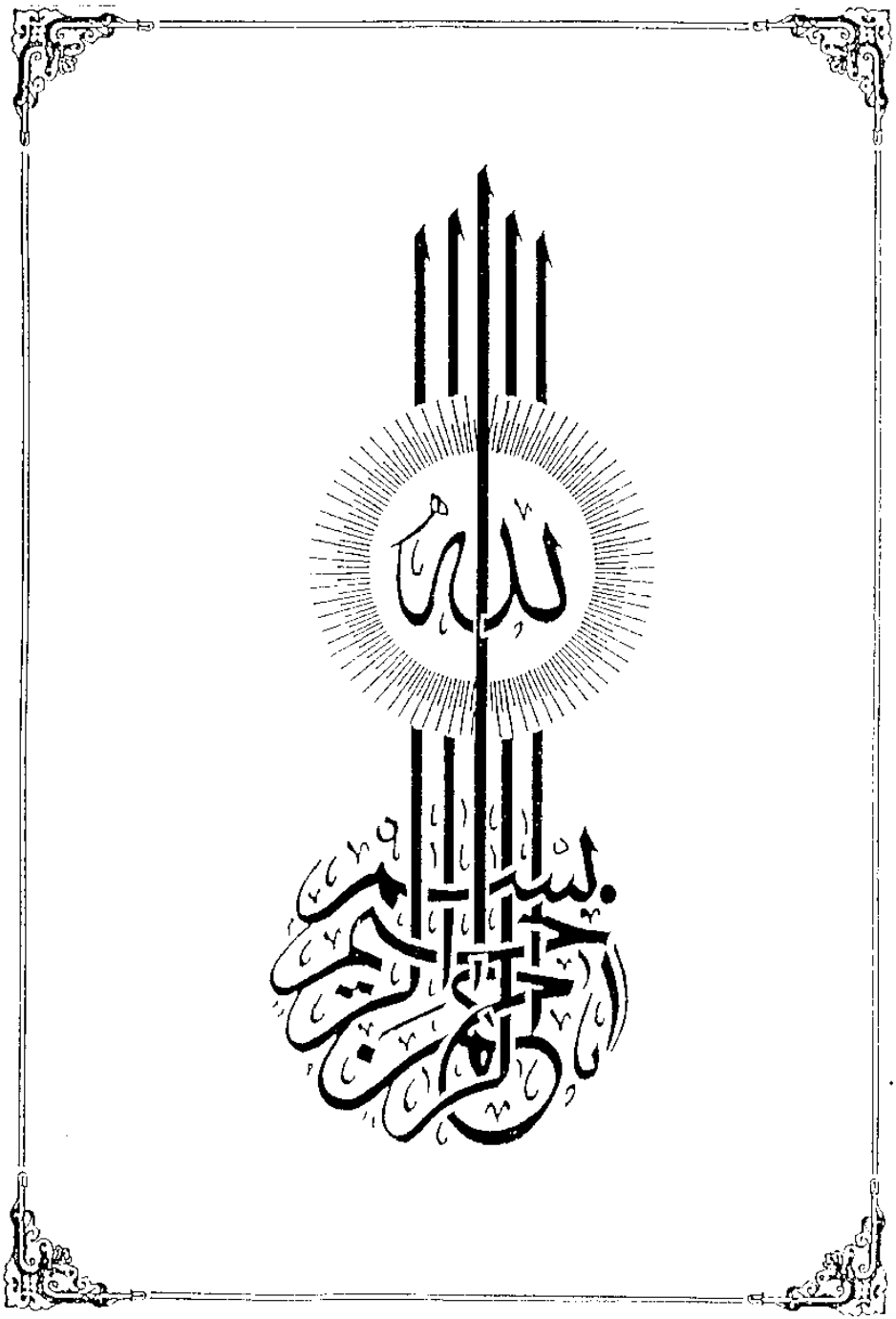

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INTRODUCTION

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INTRODUCTION

Fractures of the upper tibial plateau are rather common lesions than would be expected.

These fractures are either articular or non-articular, but knee joint function must be considered in the management of both.

To have any chance of success, all treatment must be based on the best possible diagnosis of injury. Traumatic lesions of the knee are no exception to this general principle.

Arthroscopy, concomitant with arthrography, as well as computed tomography, are considered recent advances delineating the accurate diagnosis of these lesions.

The ultimate aim of this review is to clarify the simplest classification that would also be as complete as possible, as well as the different methods of recent investigations and the variable lines of treatment aiming at avoidance of late complications.

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ANATOMICAL CONSIDERATIONS

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I. ANATOMICAL CONSIDERATIONS

1. Anatomy of the upper end of the tibia

Although in the FRONTAL VIEW, the articular surface of the tibial table is perpendicular to the longitudinal axis of the bone, the same is not true in the SAGITTAL VIEW. Seen in PROFILE, the tibial table slopes backwards at an angle of 10° - 15° to the horizontal (FIG. 1), (COURVOISIER, 1973).

This tilt is MAXIMAL in the newborn and should normally undergo a "STRAIGHTENING OUT" process as the age advances (KATE and ROBERT, 1965).

The backward inclination of the upper end of the tibia relative to the long axis of the shaft varies considerably in different individuals. When excessive, it seems to imply an attitude of squatting position as among the natives of INDIA.

A groove deep to the ligamentum patellae characterizes the squatters tibiae. This groove results from tendinous pressure during movement of the knee, the lateral lip of which is one of the factors that prevent the lateral displacement of the patella.

Furthermore, the tendinous pressure of the ligamentum patellae increases the backward tilt of the upper end of the

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tibia, as shown by the significant increase of the angle of squatters tibiae if compared with non squatters (KATE AND ROBERT, 1965).

The upper end of the tibia is widely expanded especially in its transverse axis, to provide a good bearing surface for the body weight transmitted through the lower end of the femur.

It flares from the shaft proximally in the subcondylar area for ligament and tendon attachments, a small articulation for the proximal tibio-fibular joint and relatively flat articular area to support the femoral condyles. (FIG. 2, 3)

It is surfaced by a very thin compact bone which is fragile particularly around the margins of the plateau. It comprises two prominent masses, named MEDIAL and LATERAL CONDYLES and a prominent tuberosity projecting anteriorly from its lower part. Superiorly each of the condyles is covered with an articular surface.

The two being separated by an irregularly roughened non-articular INTERCONDYLAR AREA. (FIG. 4).

A knowledge of the trabecular bony structure of the upper extremity of the tibia can contribute to an understanding of

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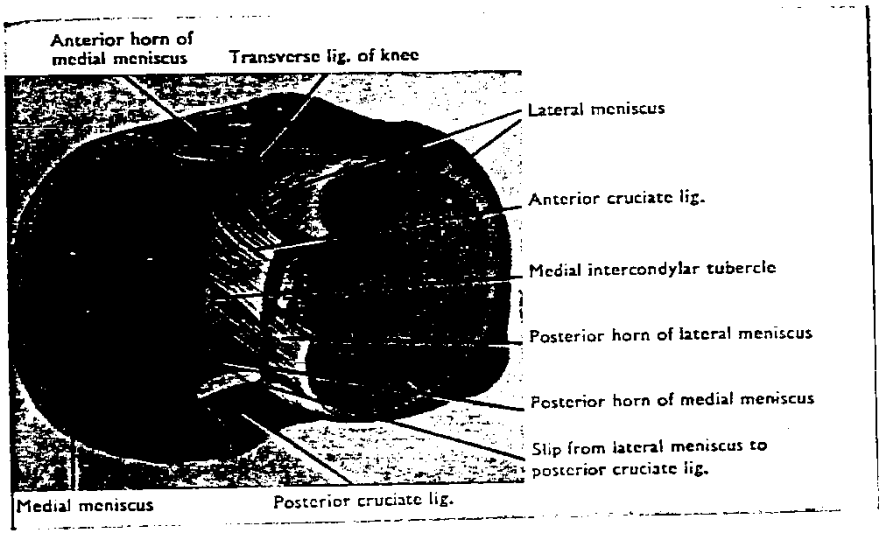

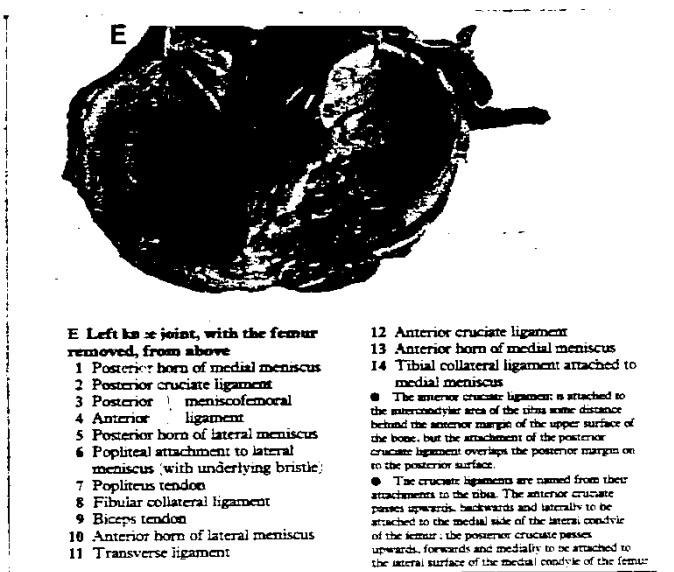

E Left knee joint, with the femur removed, from above

1 Posterior horn of medial meniscus
2 Posterior cruciate ligament
3 Posterior meniscofemoral ligament
4 Anterior ligament
5 Posterior horn of lateral meniscus
6 Popliteal attachment to lateral meniscus (with underlying bristle)
7 Popliteus tendon
8 Fibular collateral ligament
9 Biceps tendon
10 Anterior horn of lateral meniscus
11 Transverse ligament
12 Anterior cruciate ligament
13 Anterior horn of medial meniscus
14 Tibial collateral ligament attached to medial meniscus

● The anterior cruciate ligament is attached to the intercondylar area of the tibia some distance behind the anterior margin of the upper surface of the bone, but the attachment of the posterior cruciate ligament overlaps the posterior margin on to the posterior surface.

● The cruciate ligaments are named from their attachments to the tibia. The anterior cruciate passes upwards, backwards and laterally to be attached to the medial side of the lateral condyle of the femur; the posterior cruciate passes upwards, forwards and medially to be attached to the lateral surface of the medial condyle of the femur.

FIG. 2 & 3- Articular surfaces of the upper end of the tibia.

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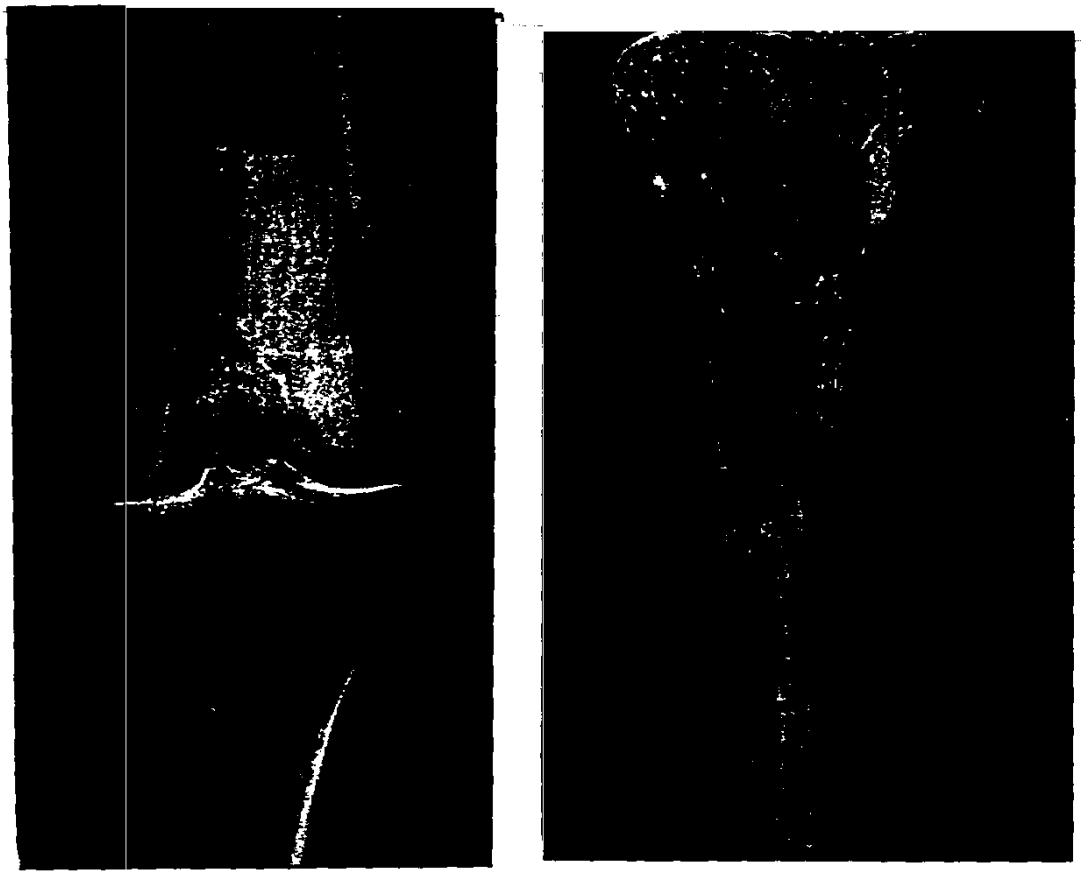

FIG. 4- Intercondylar area of the tibia.

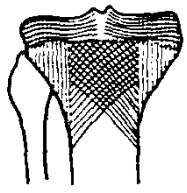

FIG. 5- Bony trabeculae of the upper end of the tibia.

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the different types of fracture, liable to occur there, as well as of their prevalence (DUPARC and FICAT, 1960).

The trabecular architecture of the bone has been described by DUPARC and FICAT, 1960. Discussing the frontal view, they described (FIG. 5) :

a. Central or interglenoidal zone, corresponding to the tibial spines.

b. Weight-bearing zone, corresponding to the internal and external femoro-tibial points of contact.

c. Marginal or meniscus zone.

From the diagram it can be shown that femoral weight-bearing zones over the tibia are NOT projected directly on the diaphysis but constitute an internal and external overhang. (Fig. 6).

This circumstance explains the vulnerability of the tibial condyles. Trabeculation is in the form of a system of POINTED INTERSECTING ARCHES, with an internal and external bracket.

BELGRANO and his associates (1967) did not describe exactly the same structure and their diagrams were taken from their radiological and tomographic studies. The arrangement of the bony trabeculae was different, but it explains equally the vulnerability of the upper end of the tibia.

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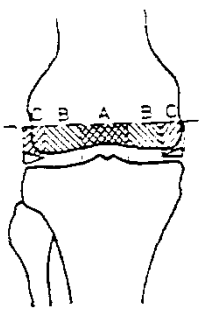

Weight-bearing zones : A/central zone. B/direct zone. C/meniscus zone.(taken from DUPARC and PICAT)

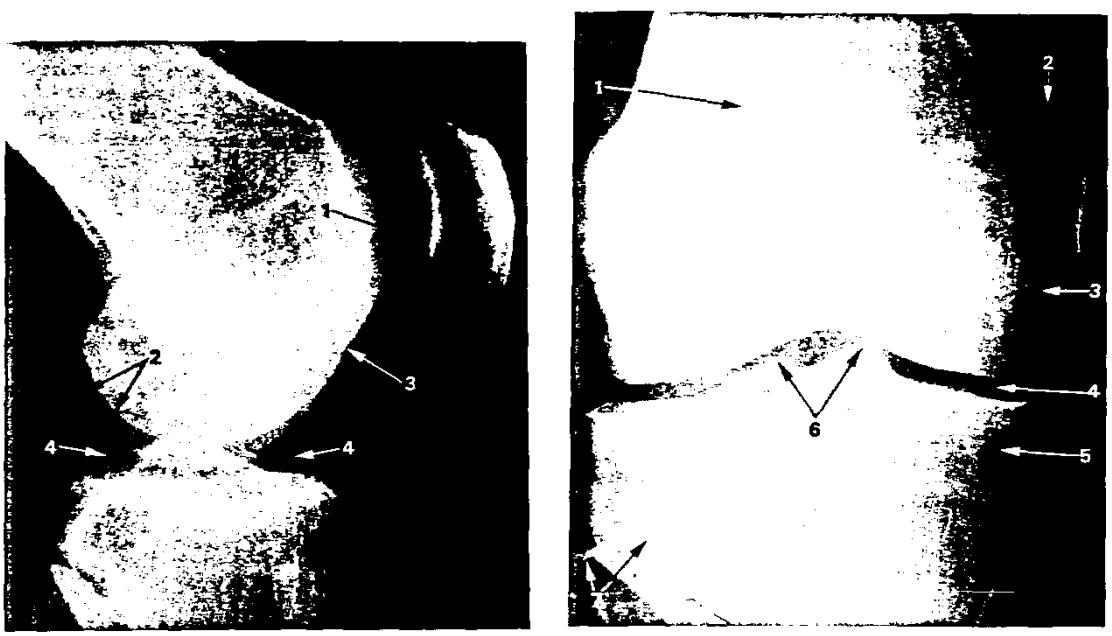

FIG. 6- Femoral weight-bearing zones over the tibia.

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2. *The upper plateau of the tibia :*

It is the knee surface of the tibia. It comprises two condylar surfaces, medial and lateral and an intercondylar area.(FIG. 7(a) and (b))

The articular surface of the medial condyle :

It is OVAL in shape with its long axis anteroposterior and is perceptibly the longer of the two condyles in conformity with the differences which exist between the tibial surfaces of the two femoral condyles.

It is related around its anterior, medial and posterior margins to the MEDIAL MENISCUS, and the area of contact is flattened. The rest of the surface is concave and the articular cartilage of its raised lateral margin covers the medial intercondylar tubercle.

The articular surface of the lateral condyle :

It is more nearly SADDLE-SHAPED and CIRCULAR in shape and is related to the corresponding meniscus. Elsewhere, the surface is very slightly concave to adapt the surface of the corresponding femoral condyle and its raised medial margin is continued on the raised aspect of the lateral intercondylar tubercle. (FRIBERG, 1971).

The edges of the two articular surfaces are SHARP except at the posterior lip of the lateral surface, where the margin

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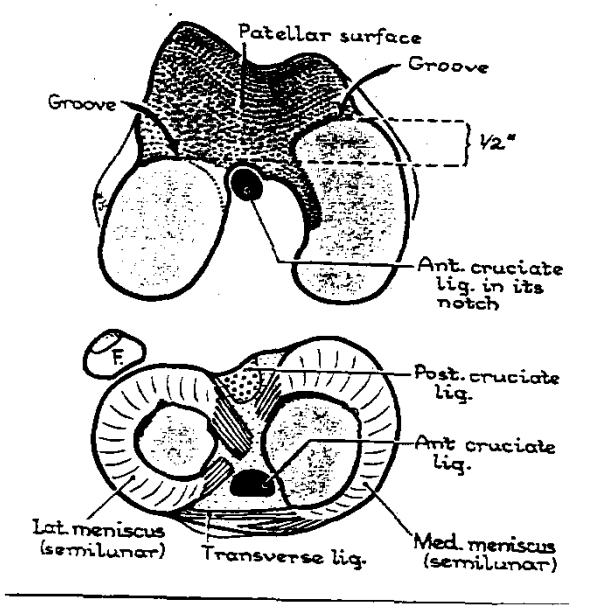

FIG. 7- The upper plateau of the tibia.

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