FRACTURE OF THE HEAD OF RADIUS

THESIS

Submitted for the Partial Fulfilment of the Master Degree

in Orthopaedic Surgery.

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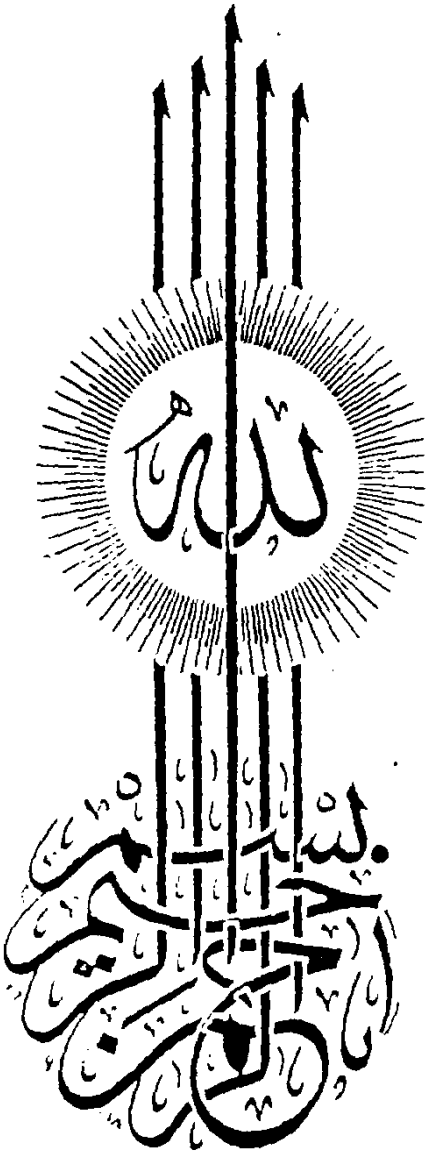

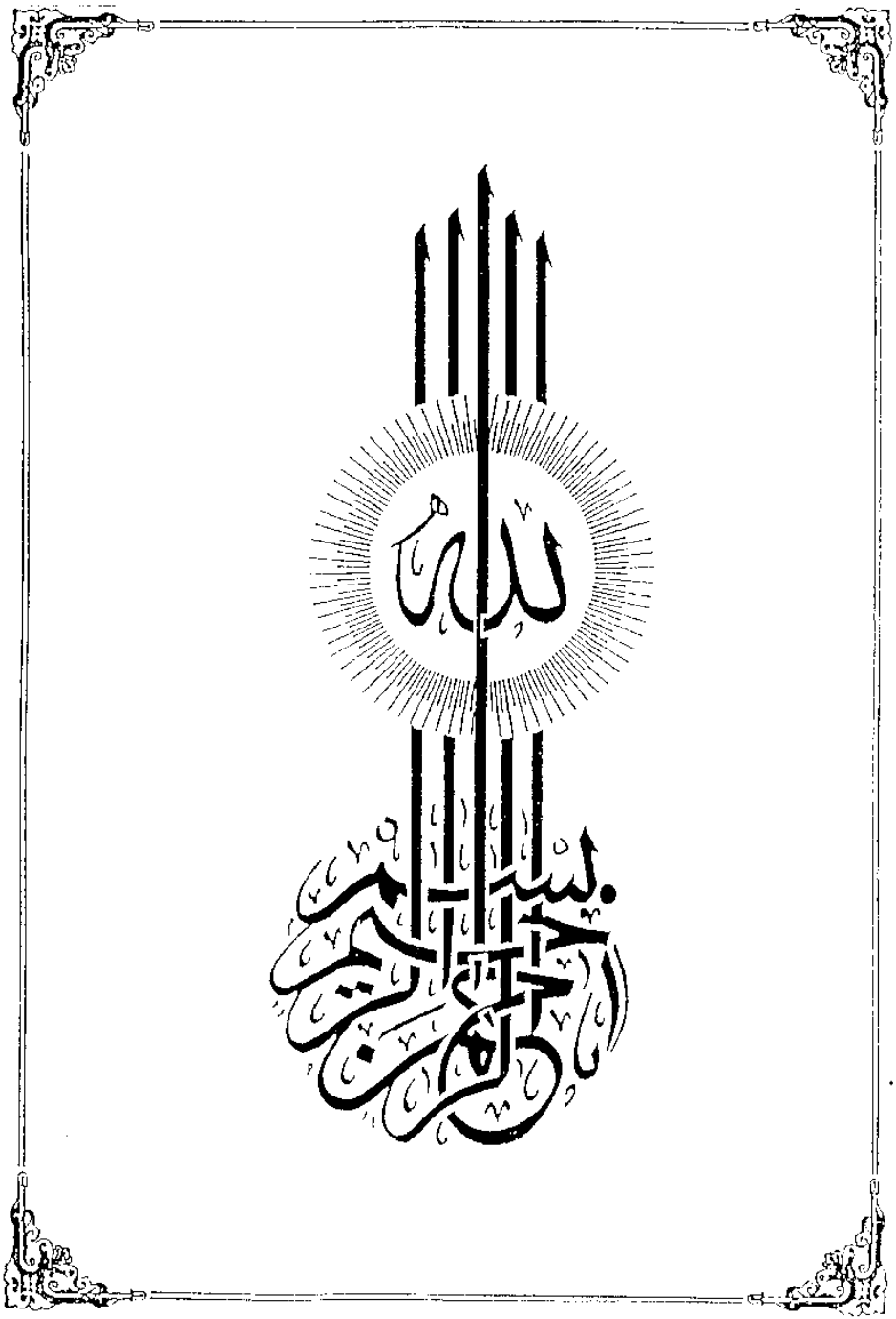

DEDICATED TO MOHSEN MY BROTHER

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INTRODUCTION

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Fracture the head of the radius is a serious injury. This injury might be over looked clinically and roentgenographically as the clinical condition might simulate a simple contusion around the elbow and a radiograph might not show the fracture or its exact type accurately.

The treatment of isolated fracture of the head and neck of the radius has long been a subject of keen study. There is a great controversy whether conservative or operative treatment is better. The very fact that this controversy exists is an indication that either treatment leaves much to be desired.

Getting functionally adequate painless stable range of motion in the elbow must be the aim of any orthopaedic surgeon. The present thesis will deal with a study of fracture of the head of radius in both children and adults.

ANATOMY

Anatomic Considerations:

I. Anatomy of the head of the radius:

The head of the radius shares in the formation of two joints, the elbow joint proper and the superior radio-ulnar joint (Key, 1931).

- In children the head of the radius is cartilagenous and soft so it can resist injuries, the ossific center appears at the age of four years and by the age of fourteen years, the head becomes completely ossified and disc shaped (Culter, 1926). In the meantime the epiphysed plate becomes closed (Gray, 1967). By this age the consistency of the head becomes inelastic cancellous bone with a thin cortical shell and consequently it can be easily cracked or shattered into pieces (Last, 1981).

The head of the radius is disc shaped, its thickness is about 3-5 mm (Carstam, 1950). It is not quite cylinderical in shape, but it is slightly oval, lying obliquely having a diameter ranging from 24 mm to 28 mm (Kapandji, 1975).

The head is covered completely by hyaline cartilage in cut section the head consists of columnar dense cancellous bone running in more or less longtudinal pattern (Jacob, 1946). This is considered by Mason (1954) to explain why the plane of fractures of the head comes always in a longtudinal direction.

- The medial side of the articular circumference articulates with the radial notch of the ulna and the rest of it articulates

with the smooth inner surface of the annular ligament (Last, 1981).

- The superior surface articulates with half sphere shaped capitulum, the superior surface is concave, cup shaped surrounded by the superior border which is bevelled on the medial side. The superior surface glides on the capitulum while the bevelled medial border moves against the capitulo - trochlear groove (Kapandji. 1975).

The cup shaped proximal surface of the radial head has a concavity which corresponds to the convexity of the capitulum humeri. The best contact between them occurs in semiflexion and pronation (Kapandji, 1975).

- The neck of the radius is the constricted part below the head extending down to the radial tuberosity. It is cylinderical in shape and is about 1.3 - 2.5 cm in length (Carstam, 1950). In children the head and neck have the same diameter while in adults the neck has a narrower one (Kapandji, 1975).

- In pronation and supination, the head of raduis rotates in the radial notch of the ulna and the annular ligament, while in flexion and extension of the elbow it moves against the capitulum. In extension the anterior half of the head comes in relation with the capitulum, while in full flexion the head of the radius enters the radial fossa on the lower end of the humerus (Kapandji. 1975).

II. The head of the radius and the elbow joint:

- The capitulum articulates with the head of the raduis at the humero-radial articulation. The capitulum is a section of a sphere, it projects forwards and inferiorly from the lateral part of the lower end of the humerus by 45 degrees(Rockwood and Green 1984) and is bounded by a prominent ridge from the non-articular bone. The capitulo-trochlear sulcus articulates with the peripheral ridge of the radial head. Above the capitulum, on the humerus, a shallow radial fossa accomodates the head of radius in full flexion (Last, 1981).

III. The radio-ulnar connections:

1 - The superior radio-ulnar joint:

It is a pivot joint formed of two bony components, namely the circumference of the radial head and the radial notch of the ulna, and one fibrous component which is the annular ligament. The superior radio-ulnar joint and the elbow joint make one continous joint cavity (Gray, 1973).

The surrounding ligaments:

A) The annular ligament: is a strong fibrous band forming $\frac{4}{5}$ of the fibro-osseous circle around the radial head (Cunningham 1976). It is suffeciently elastic to allow for the variations in the shape of the head, being oval, so that pronation and supination of the normal or even the deformed head can be easily and normally accomplished (Speed, 1924). The ligament is attached to the anterior and posterior margins of the radial

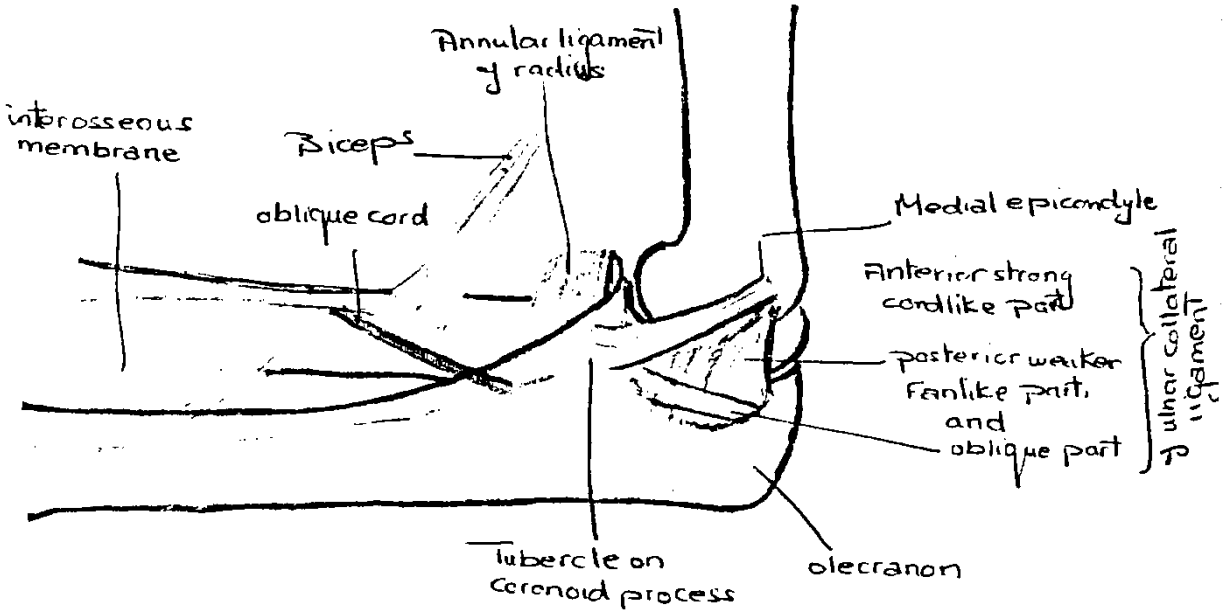

FIG (1)

The elbow joint visualized from the medial side.

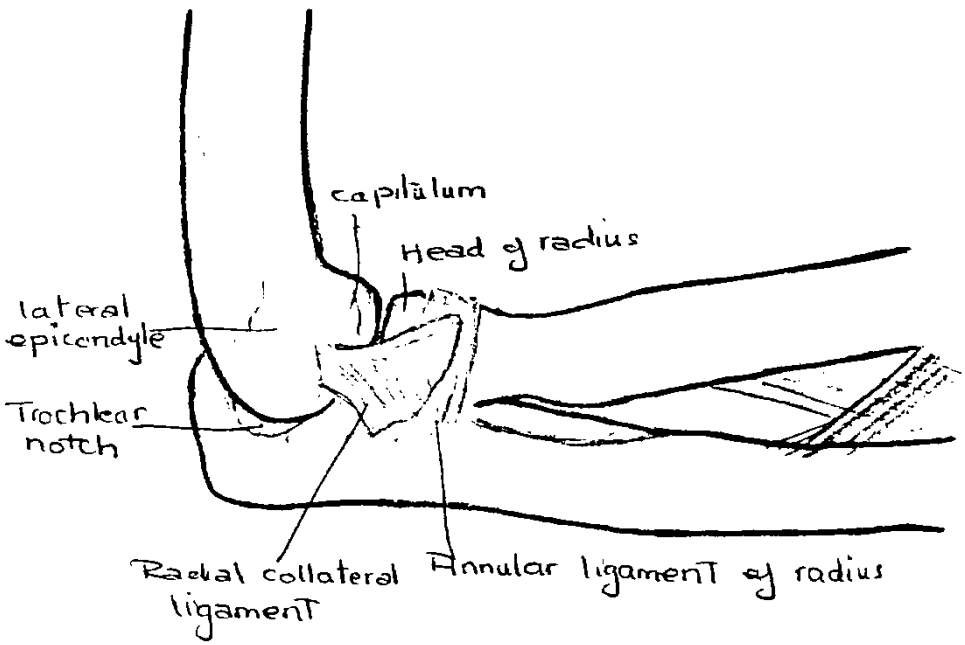

FIG (2)

The elbow joint visualized from the lateral side.

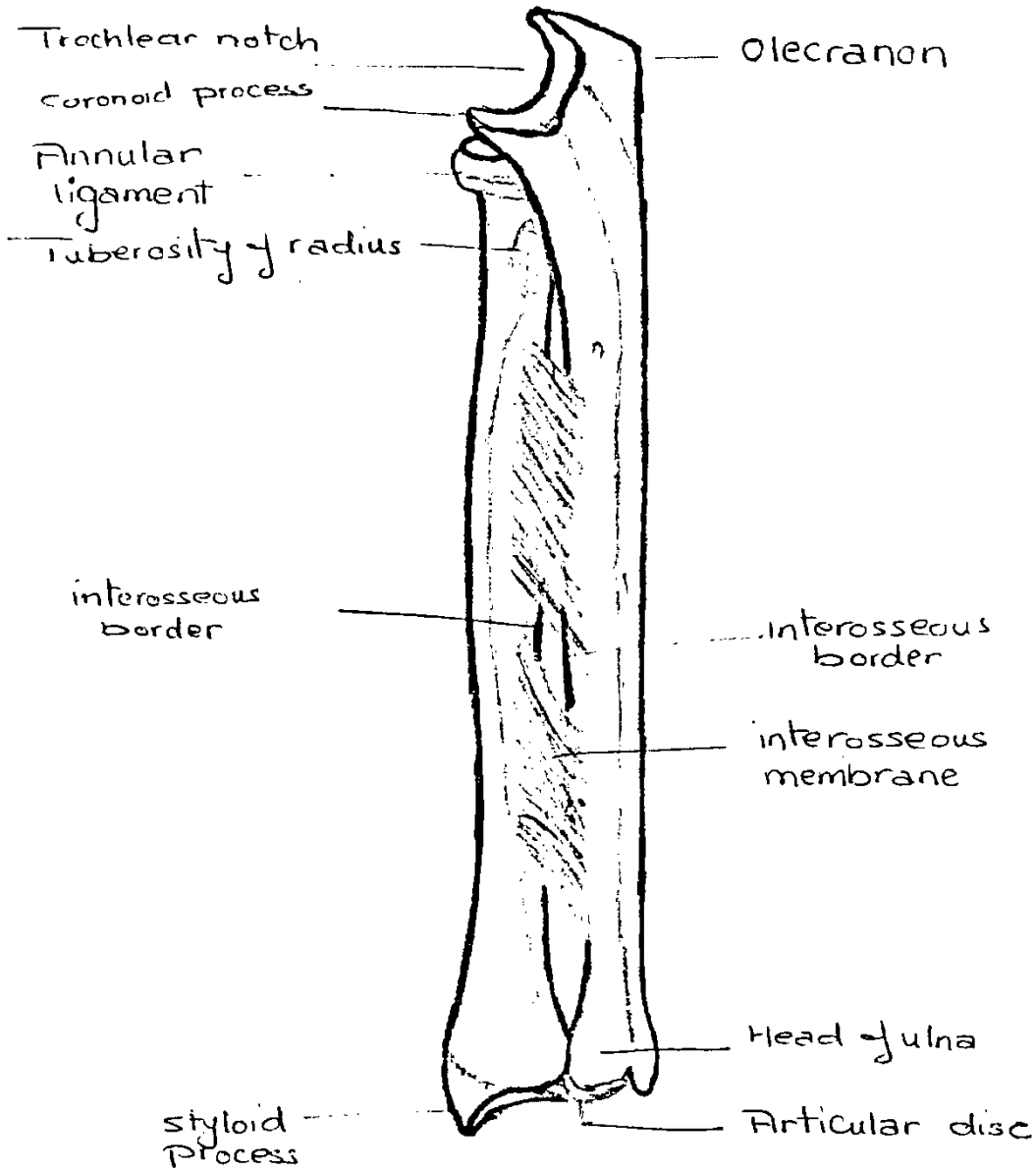

FIG (3)

Anatomy of the superior, middle and inferior radio-ulnar articulations

notch of the ulna. It is narrow anteriorly and broad posteriorly and blends with the capsule of the elbow joint superiorly, while the lateral ligament of the elbow is inserted into it laterally (Gray, 1973). Distally, it encloses the head and the neck, making a funnel shaped structure which tapers distally to close around the neck. The ligament has no attachment to the head or neck of the radius (McDougall and White, 1957). Its inner surface is coated by a thin layer of cartilage in the articulating area and is lined by the synovial membrane in the non articulating area (Gray, 1973). The functions of the annular ligament are that it acts as an articular surface articulating with the head of the radius in the superior radio-ulnar joint (Kapandji,.1975) and keeps the stability of the head of the radius in the tightly fitting pivot joint (Mason, 1954).

B) The Quadrate ligament: Gray (1973) described it as an interosseous extension closing the superior radio-ulnar joint distally, it consists of a fibrous band attached to the interosseous border of the radial notch of the ulna and to the neck of the radius, having two borders, each of them strengthened by fibrous extensions from the inferior border of the annular ligament (Kapandji, 1975). The radial attachment extends proximally to just distal to the articular margins, it lies in line with the radial tuberosity (Kaplan, 1970).

The fibres of this ligament run in a criss-cross pattern so that some of them become tense while the others are relaxed during