KIENBOCK'S DISEASE

ESSAY IN PARTIAL FULFILMENT OF MASTER DEGREE of ORTHOPAEDIC SURGERY

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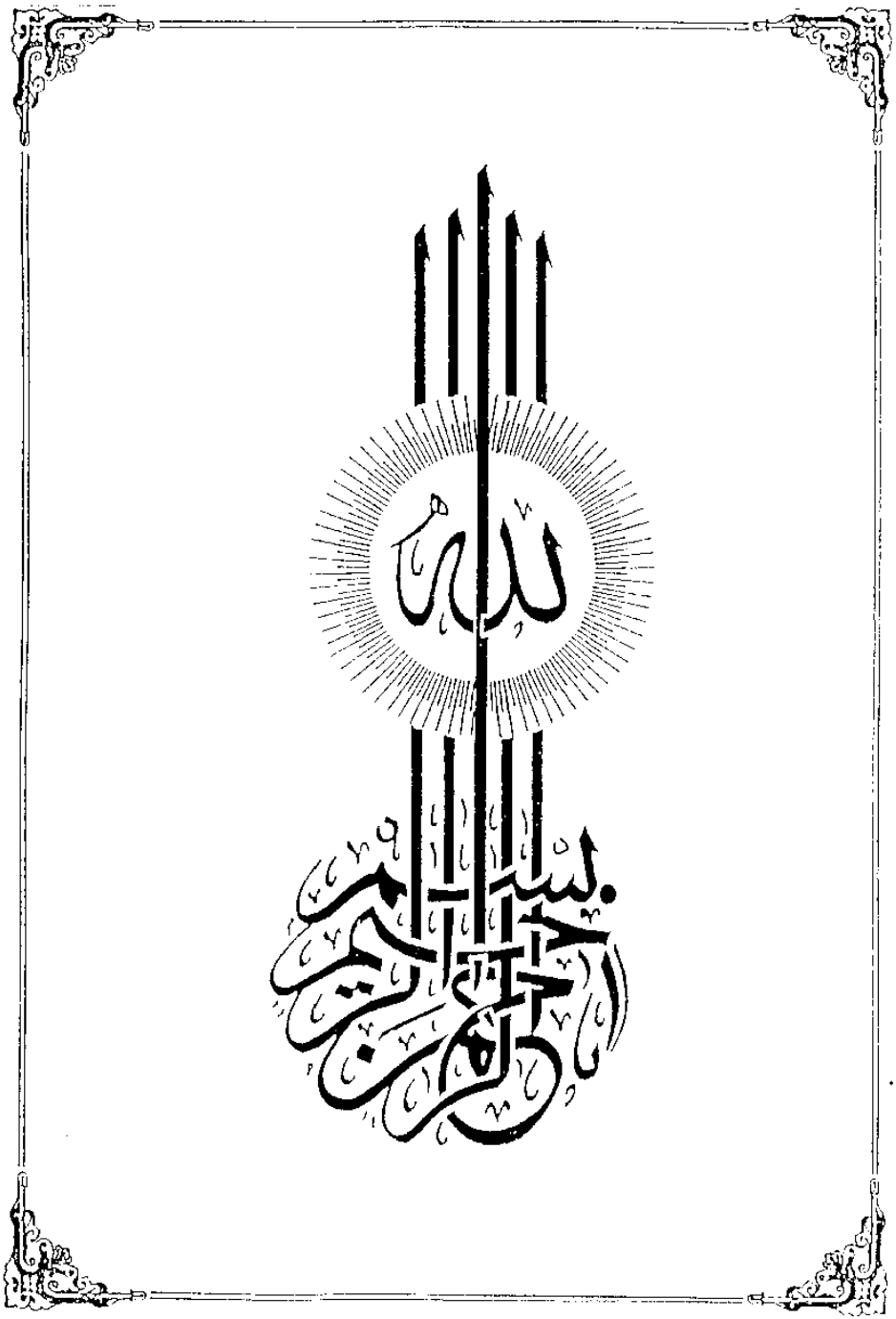
PART I

INTRODUCTION



Robert Kienbock, 1871 - 1953. (Photo-graph from Acta Radiologica Scandinavica (suppl. 5`) . 1928.p.36.)

ROBERT KIENBOCK (1871-1953) was born in VIENNA and was enducated at the university of VIENNA, qualified in medicine in 1895. x-ray discovered by ROENTGEN that year had immediate and dramatic application in medicine. After a brief postgraduate period in Paris and London, KIENBOCK returned to VIENNA and specialised in this new field - He founded a private. X-ray institute in 1899 and began contributing papers on both the diagnostic and therapeutic appliction of X-ray. He began lecturing on X-ray at the medical school in 1903 and became Prefessor of Radiology in 1917. He had a special interest in the radiologic features of bone diseuses.

He was one of the few pioneers in radiology whose life was not shortened by the effects of exposure to rudiation. (QUATED after L.F. PELTIER 1980).

In our essay in KIENBOCK'S DISEASE we shall discuss the anatomy of the lunate bone and its vascularisation the main theories of aetiology of the disease and the pathological changes of the lunate bone in the disease. In other chapter we shall speak about the clinical picture and the investegation for diagnosis of the disease, lastly we discuss in detail the conservative and the operative manegment of kienbock's disease starting from the immibolisation by plaster cast to the most recent operations include, hand-carved silicone replacenent and the operation of excision and transfer the pisiform bone with its blood supply in the place of the affected lunate, ending by arthrodesis of the wrist jiont and its indication.

We must not forget "PASTE JL 1843" who was the first one who described the manifestation of lunatomalascia of the lunate bone.

PART II

ANATOMY, RADIOLOGY AND KINEMATICS OF THE LUNATE BONE

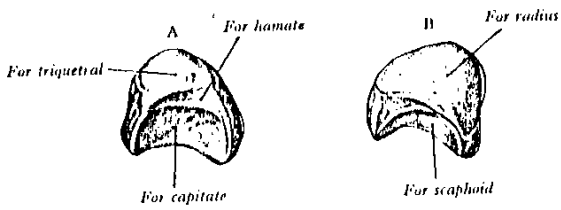
ANATOMY OF THE LUNATE BONE

The lunate bone is one of the eight bones forming the carpal bones which arranged in two rows, the proximal row formed the scaphiod, lunate, triquitrum the pisiform is fourth bone in the proximal row but it is placed on the palmer surface of the triquentrum and is considered as a sesamied bone, the distal row contains the on trape zium, trapeziod, capitate and the homate, the distal border of the proximal carpal row is concave and prox-imal border isconvex.

(Rene Cailliet 1982)

MORPHOLOGY OF THE LUNATE BONE (GRAY 1980) Fig.1.

It is a crescent in outline formed of six surface rough palmar and dorsal surfaces, smooth proximal, distal lateral and medial surfaces, the rough palmer surfaces almost triangular in outline is larger and wider than the rough dorsal surface, the smooth, concave proximal surface articulates with the distal radius and the articular disc of the distal radio-ulnan jiont. the lateral surface is narrow and presents a flat, semilunar for articulation with the scaphiod bone. The medial surface articulates with the trique tral and its almost square, its separated from the distal surface by a curved ridge, which is usually some what hollowed out for artic-ulation with the edge of the hauate bone, when the hand is adducted, the distal surface is deeply concave to accomodate the medial part of the haed of the capitate bone.



The left lunate bone

(A)distomedial (B)proximedial

FIG. (I)

DEVELOPMENT OF THE LU NATE BONE: 9(GRAY 1980)

The hand developed as a flattened expanstion at the termination bud, the mesenchymal tissue in the periphery of the plate condenses to outline the pattern the digits and the thinner intervening regions break down from the circumferance inwards. the carpal bones are usually cartilaginous at birth but centers of ossification may be present in the capitate and hamate, usually ossified from one centre, the lunate ossific centre appeare in 6 years of life inboth males and females.

* ANOMALIES OF THE LUMATE BONE

CCongenital fusion of the lunate and triquetral bones hever cause symptoms, it may run in families, twelve cases of congenital fusion of the lunate and trquetral bones have been found in south african bantu ptients, they occurin four types, an incomplete (speudo-arthrosis), bony fusion with a dividing notch at one or both surfaces, or a complete compound bone with or without other carpal anomalies.

(De-Villiers 1952)

* ARTERIAL SUPPLY OF THE LU NATE BONE:

(RICHARD et al 1983), diseribed the intraosseous vascular anatomy of the carpal bones of 25 fresh cadaver limbs was studied by injection of WARDS BLUE LATEX and spalteholz clecaring techniques the carpal bones were

classified into three general groups based on the size and location of nutrient vessels, the presence or absense of intraosseous anastomosis and the dependance of large areas on a single intraosseous vessel. GROUP I include thescaphiod and, capitatae and 20%of llunate each a large areas of bone dependant on a single intra - osseous vessel and was considered at greater risk to develop avascular necrosis following fracture. Group II included the trapezied bone and hamate, both of which have two areas of vessel entry but lack ofintra-osseous anestomosis. Group III included the trapezium, triquitrum, pisiform and 80% of the lunates which recieve nutrient arteries through two non articular have consisbent intra-osseous anestomosis and have no large aress of bone dependant upon a single vessel, so the clinical incidance of avascular necrosis in group II and III is low. RICHARD et al menstion that the lunate has a consistant dersal and palmar blod vessels entering the bone in 80% of the specimens take the pattern x,y and I., in 20% of the specimen nutrient vessels were seen entering only the palmar surface.

ANN CHIR MAIN 1982 described the gross

Examination of 41 dried lunate, on the volar aspect of the hand 2 or 3 vessels coming from the ramus carp us volaris and from the radial ertery run downward and penetrate the bone through a big foramen and several smaller arround. On the dersal aspect, 2 or 3 minute

branches arise from the dersal carpal arch and penetrate the triangula r posterior surface of the lunate beneeth the carpal jients, the interosseous artery sends some conspicous branches to the posterior margin of the radins and the dorsum of the lunate, the volar group appeared to be the most important contributor to the blood supply and the big volar foramen named (hilus) of the lunate.

JIONTS IN RELATION TO THE LUNATE BONE: Fig. 2

GRAY 1980 classified then into:

a. Jients between the bones of the proximal row of the carpus.

b. jionts between the bones of the distal row.

c. complicated and extensive jionts between the two rows termed the mid-carpal jiont.

e. jionts of the proxinal row of carpal bones:

(1) the scaphiod, lunate and triquetral bones are connected by dersal and palmar ligaments which are placed transversly between the bones of the first row.

MAYFIELD et al (1976) described a distinct capito-triquetral ligament in 28 dissections, extending from the palmar aspect of the capitate, across the hamate to the palmar surface of the triquitrum.

The interosseous ligamets : are two norrow bundles one connecting the lunate and scaphiod bones, the other to the lunate and the triquietral bones.

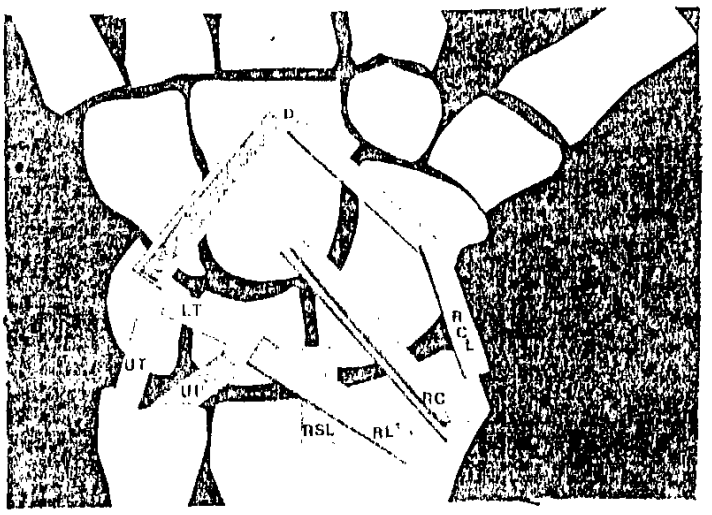


Fig . (2) schematic representation of carpal ligaments

(2) The pisiform articulates with the palmer surface of the triquetral bone and the following ligaments associated :

fibrous capsule, pisohamate pisometacarparpal.

The firous capsule is thin and surrounds the jiont, the pischamte and pisometacarpal ligaments connects the pisiform to the hook of the hamate and to the base of the fifth metacarpal bone respectively, both are continuation of the tendon of the flexor carpi-ulnaris.

(b) Distal row carpal jionts :

The bones are connected by dorsal, palmer and inter-osseous ligama nts, they run transversally between the trapezium and trapeziod the trapeziod and capitate and hamate bones, the interosseous ligamens are mutch thicker tham those of the proximal row.

(c) MIDCARPAL JIONT:

Between the proximal raw and the distal raw of carpal bones, divided into two, parts medial and lateral parts.

the medial part (sellar jiont), the head of capitate and the hamate articulate with the cocavity formed by the scaphiod, lunate and triquetral bones, the lateral part (plane jiont) the trapezium and trapeziod articulate with the scaphiod bone.

LIGAMENTS RELATED TO MID-CARPAL JIONTS:

Dorsal and palmer ligaments are short, irregular pundles passing between the bones of the first and second row, on palmer surface the fascicles radiating from the head of the capitate to the surrounding bones tarmed (the radiate carpal ligament).

The colateral ligaments : radial and ulnar are very short, the radial one is stronger and more distinct, connect the scaphiod and trapezium. the ulnar one connect the trique tral and the hamate.

THE SYNOVIAL MEMBRANE OF THE CARPAS:

Covers the proximal part of the cavity intervens between the distal surfaces of the scaphiod, the lunate and the proximal surfaces of the second row bones, it sends two prolongations upwards between the lunate and triquetral bones and three prolongations downwards between the four bones of second row.