ARTHRODESIS WRIST

Thesis
Submitted In Partial
fulfilment for the degree of
(M.Sc)

in Orthopaedic surgery

by

Mahmoud Abdel Fattah
M. B. B.ch.

Under supervision of

PROF.Dr.

Mohammod H. El Ghwaby
Prof. of orthopaedic surgery
Ain shams university

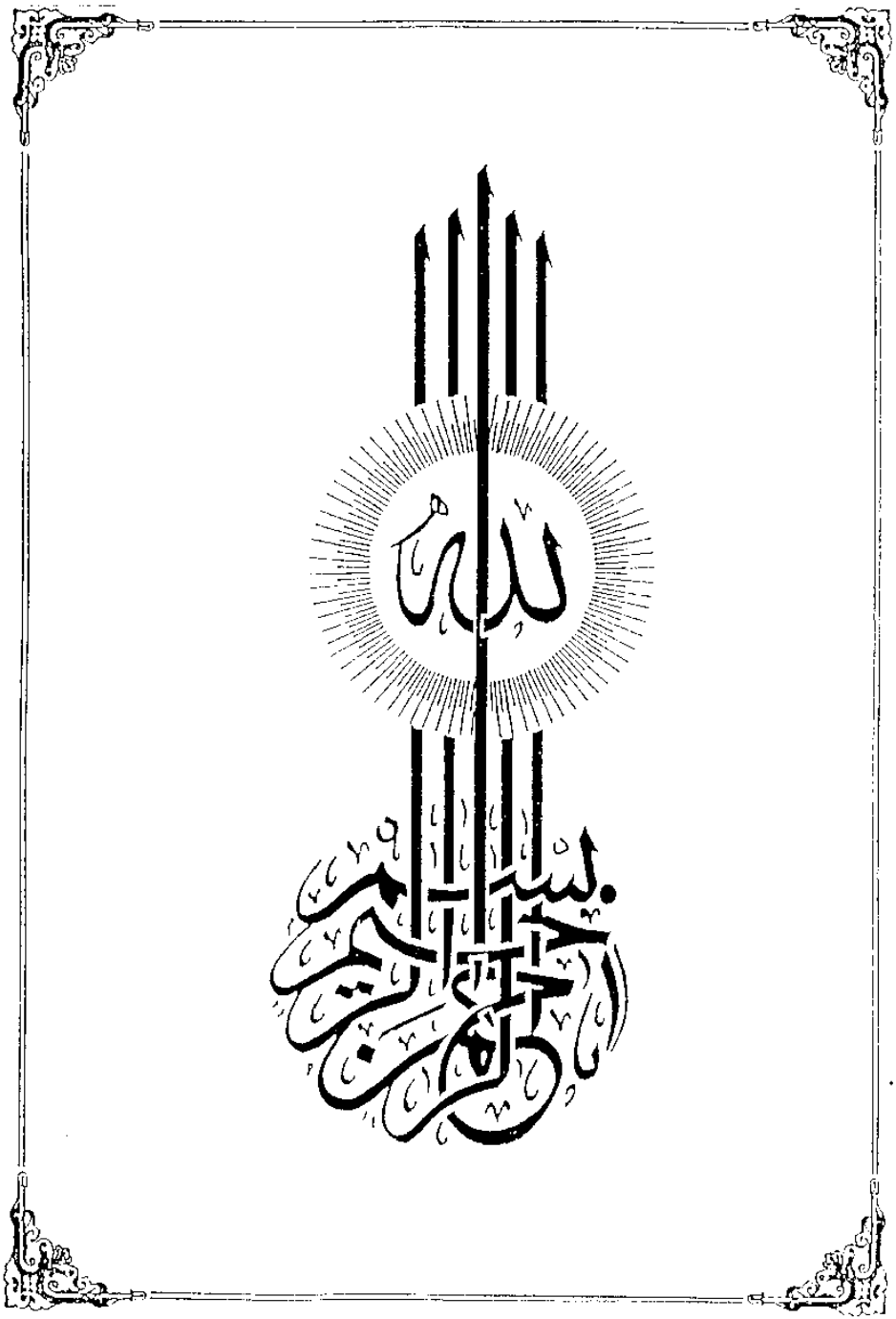
COLONAL DR.

WAGEH EL SEISSY
Head of Orthopaedic department
Helmia Military hospital

1986

الحمد لله رب العالمين ۝ الرحمن الرحيم ۝
مالك يوم الدين ۝ إياك نعبد وإياك
نستعين ۝ أهدنا الصراط المستقيم ۝
صراط الذين أنعمت عليهم ۝ غير
المغضوب عليهم ولا الضالين ۝ ...

اللهم رضني بما قضيت
وبارك لي فيما أعطيت



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Acknowledgement

It is my pleasure to express my deepest thanks and gratitude to prof. Dr. Mohammed H El Ghwaby Professor of orthopedic surgery Ain shams university & Colonal Dr wageh El Sessy.

For there continuous guidance, advice encouragment meticulous observation, helpful instructions, and willingness to denote a lot of their precious time and vast experience during the supervision of various ports of this work.

I wish to express my gratitude, debt and heartly thanks to my collages for their endless cooperations.

I wish to express my best feeling to m y wife for her unlimited suport and cooperation.

I want to thank my parent for their pray.

Early in this century several authors had described several different pocedures for wrist arhrodesis, done in a lot of cases with different diseases in different ages and sexes.

Most of cases were done with bone grafts, with or without internal fixation and the fusion take place between the lower end of the radius and the carpal bones, proximal and distal or even may extend down to the bones of the second and third metacarpal bones.

Duber in 1878 described the use of hetero plastic grafts from dog for wrist fusion.

Steindler in 1918 using the open wedge resection technique for wrist arthro desis.

In 1920 Ely operated upon tuberculosis of wrist, using a tibial graft between the lower end of the radius and the 3 rd metacarpal bone.

While Scherb in 1927 had used a femoral graft which because of its concarity could be fitted to the surfaces of wrist joint.

Liebolt in 1938 operated upon different cases including tuberculosis, poliomyelitis, radial injury, syringomyelia

and brachial plexus injury. He preferred small chip grafts than big ones because they are easy and rapidly revascularised and fusion was done in a position of 25-30 degrees dorsiflexion.

Smith peterson in 1940 used lower end of ulna as a graft in fusion of wrist in cases of inferior radio-ulnar derangement. He preferred a position of 10-15 degrees dorsiflexion.

In 1942 abbot& Bost noticed that arthrodesis of the wrist provide improvement of the function and disability in paralytic cases as poliomyelitis, spastic paralysis, Erb's palsy and brachial plexus injuries and painful arthritis, traumatic or infective. They used iliac graft between radius and proximal raw, left inferior radioulnar and carpometa carpal joint intact.

Colona in 1944 used a split graft.

In 1949 Pulter noticed that the most satisfactory arthrodesis appear to be those which had the the most extensive fusion, namely radiocarpal, midcarpal and carpometacarpal joint preserving those of the 1st and 5 th fingers. He prefered a big fan shaped iliac graft applied in prepared similar bed extending from the radius down

to 2 nd, 3 rd and 4 th metacarpal bones, in position ranging from 20-25 degrees dorsiflexion.

Thomas in 1950 used tibial graft again after Ely.

1951. Brochman & Nissen reported a gauge technique for arthrodesis of severly flexed wrist.

Robinson & Daniel in 1952, recorded a new method for arthrodesis of the wrist joint which consists of proximal carpectomy and fixation of capitate to the lower end of the radius by a screw and applied cancellous bone chips just to reinforce the fusion and he stated that healing is not dependent on the graft.

In 1954 Wickstrom modified colona procedure.

Evans in 1955 described a new method of wedge technique for arthrodesis of the wrist which eliminated the need of the graft and being combined with exision of the lower and of the ulna and shaped the lower end of the radius into wedge with tapering end which settled into already slitted opened carpal bones.

In 1958 Stein & Irwin, deseribed the turn out 180 degrees radial corticocancellous graft incorporated between the radius and the slitted carpal bone. The graft supplies cortical bone for stability and cancellous for osteogensis.

Mackenize in 1960 operated upon cases of nerve injuries, poliomyelitis and Volkmann's contracture, where a diamond radiocarpal bed is prepared to receive the already fashioned triangular ulnar graft from the excised lower end ulna and immobilized in a position of 25 degress dorsiflexion.

Seddon in 1963, had modified smith peterson technique to eliminate the thickening which result with shortening after resection of the radiocarpal cartilage. Seddon had prepared a diamond shaped bed with its proximal triangular half on the radius and its distal half on the carpus, to receive the prepared ulnar graft and the wrist is held in a position of 25 degrees dorsiflexion.

In 1965, Clayton advocated surgical fusion of the wrist in rheumatoid arthritis. The cases were either with ankylosis and marked deformity, marked instability due to carpal destruction or with sever. He prepared a radiocarpal metacarpal slot down to the 3 rd metacarpal bone for the ulnar graft, internaly fixed by a nail passing through it.

Schwartz in 1976, recorded a certain method for local wrist fusion, conserving a part of the joint and was confined to the radio-scaphoid component. The idea of the technique was to make a bite over the radio-scaphoid component

of the joint and the cavity was fitted with autogenous iliac bone graft. This techniqus resemble some congenital anomalies of wrist.

Lee Ramsay & Ranawat in 1969 discussed arthrodesis of the wrist in rheumatiod arthritis with dislocation, osseous destruction, total instability and deformity. They used graft with internal fixation and fixed in straight neutral position.

Yer Robert carrol & harold in 1971 advocated the use of a solid radiocarpo metacarpal using a graft between lower end of radius and base of 2 nd, 3 rd metacarpal in position of 0-15 dorsiflexion.

Lewis & Edward (1973) prefered internal fixation (Steimman pin) drilled through the carpus and radius and countersunk into the intermetacarpal space, between the 2 nd and 3 rd or 3 rd and 4 th metacarpal. They arthrodesed their cases in neutral position.

Multiple stapling arthro desis of wrist was used in 26 wrist fusion. 21 fusion had followed up from 1972 to 1982, and other five cases from 1977 till 1980 at hospital saint-jacjues and we study by Yamina in 1984 to follow up the results.

Mannerfelt and Malmsten 1971 introduce a new methods of arthrodesis transfixing the wrist from the third metacarpal to high up in the shaft of the radius with a Rush pin, only one series treated by their method has been published (Mikkelsen 1980).

ANATOMY OF WRIST:--

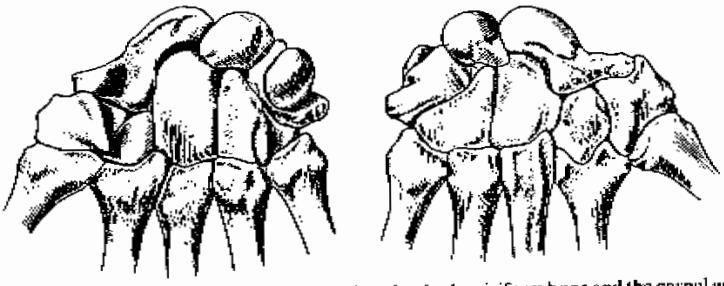
The wrist joint is a simple synovial joint whose bony surface are formed by the proximal raw of carpal bones anu the distal surface of the radius, defined by Kaplan as (extension from the carpo-metacarpal joint to the distal border of pronator quadratus proximally).

The eight carpal bones are arranged in two raws proximal and distal.

The proximal raw consists of scaphoid, lunate and Tri quetral, which form together. The convexity of the semicircle, the posiform complete the proximal raw by articulating with the front of Triquatral and so build up the flexor convexity of carpus which maintained by beem affect of flexor retinaculum.

The four bones of distal raw are trapezium, Trapzeoid, capitate and hamate. They articulate with the bones of proximal raw forming an s-shaped mid carpal joint and the inter corpal, intervenous between each two bones.

The normal arc of palmor flexion to dorsal flexion in pronation only is 20 cm with added supination the arc 22.5 cm.



The carpal bones. A, Palmar view, showing clearly the pisiform bone and the carpal groove. *B*, Dorsal

Articular surfaces

Lower end of radius:-

Distal radius provides a large articular surface for proximal carpal raw as result of metaphyseal flaring.

Inferiorly the articular surface is bi concave with an inclination of articular facets, that average 12 degree in palmar direction and 14 degree in tangential to lunate fosca in ulnar direction. It is covered by hyaline cartilage.

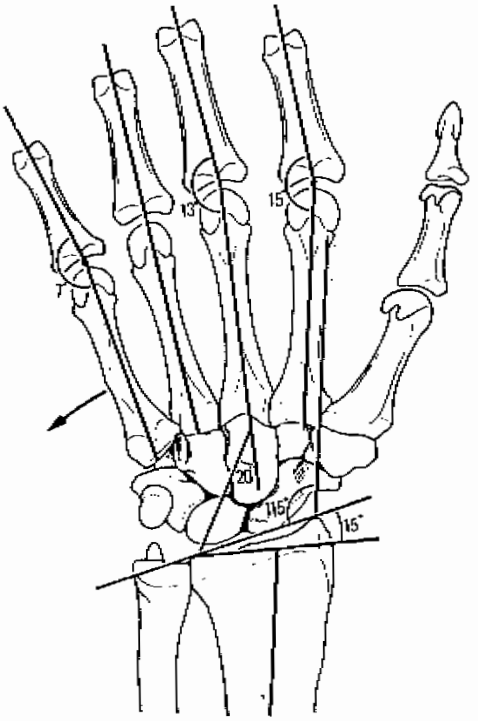
The medial surface is square and articulates with lunate.

-Lateral surface is Traiongular with its apex on styloid process, articulates with scaphoid.

- Anteriorly: - The articular margin is smooth area to which is attached the very strong anterior ligament of wrist joint.

- Laterally: - The pyramidal styloid process where the tendon to bracnio-radialis insert.

- Posteriorly, shows two grooves between the ulnar notch and the Listre tubercle, The deeper one for extensor pollicis longus and a medial shallower groove for extensor digitorum and extensor indicis muscles.



The physiologic angles between the different skeletal structures of the hand. The articular surface of the distal end of the radius is directed ulnarly at an angle of approximately 15 degrees. The axis of the lunate forms an angle of approximately 20 degrees with a straight line passing through the capitate and third metacarpal. The axis of the second metacarpal is in line with the longitudinal axis of the radius. The longitudinal axis of the proximal phalanges is inclined ulnarly to the metacarpal axis approximately 15 degrees for the index, 13 degrees for the middle, and 7 degrees for the fifth finger. Only the first phalanx of the ring finger is in line with the axis of its metacarpal. The angle between the radial border of the second metacarpal and the lower border of the distal end of the radius is 115 degrees (Schapiro).