PARALYTIC HAND

THESIS

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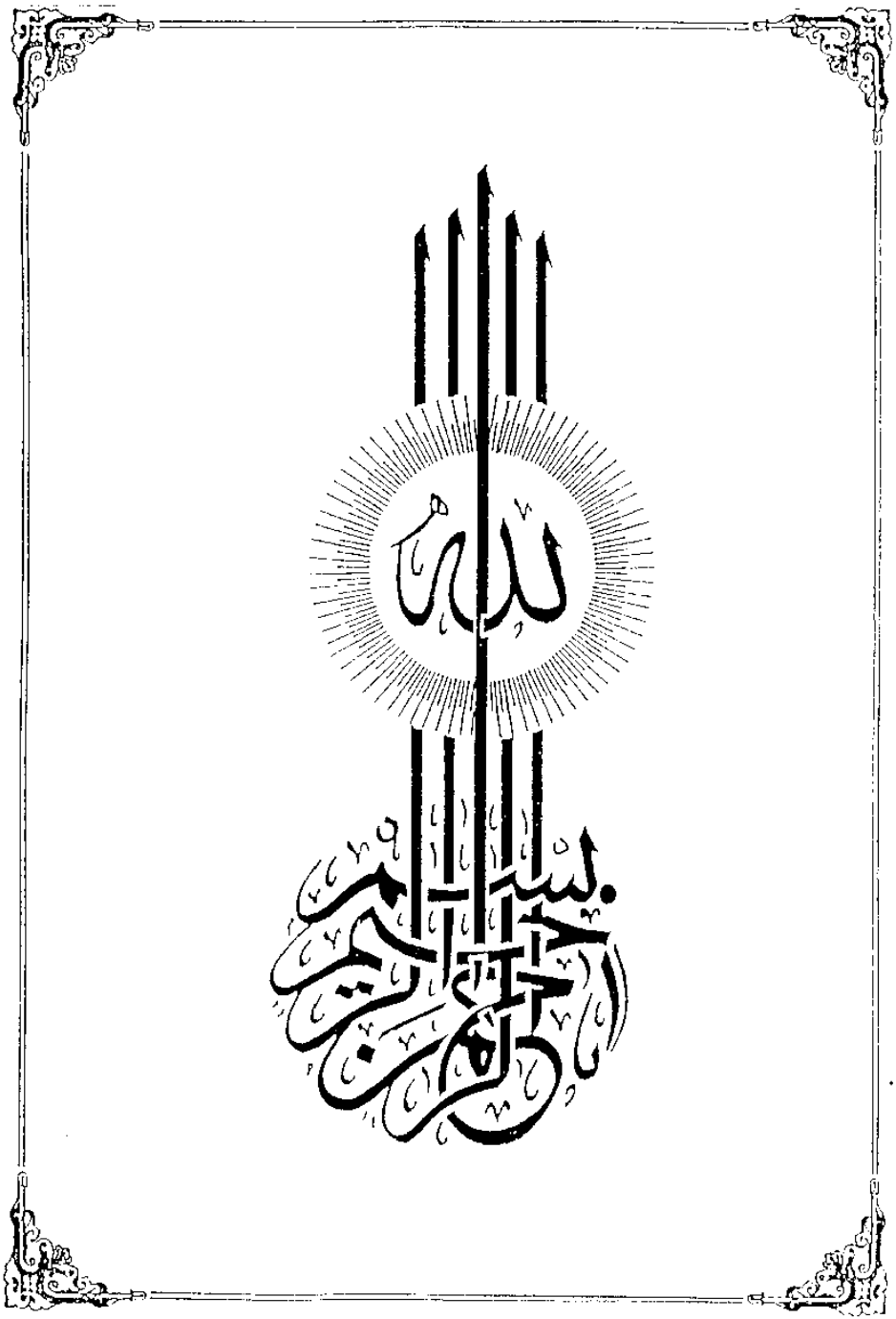

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TO MY PARENTS,

TO MY WIFE DR. SABAH BOULIS, AND

TO DAVID AND MEROLA

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The human hand-its strength and flexibility-is unequaled by any other part of the human body. The fact coupled with concern regarding economic loss, readily explains the psychological disturbances associated with crippling hand injuries.

This intricately engineered device of twenty-seven bones, twenty-four muscles, and thirty joints, and pivotal points has enabled man to climb upwards through million of years of evolution and has set him apart from all other creatures on earth.

The hands served as a means of communication before the development of language.(Curtis, 1971).

The hand has great functional skills. Its immediate adaptability to contour and shape as well as its ability to interpret the surrounding environement as a means of protection to the entire body by its sensitivity to heat and cold, wind and sun, sharp and dull, and vibration and movement.

The accuracy of the fingers in clasp or pinch is nearly miraculous to judge both power and space simulatenously to the tolerance of a fraction of a gram or a part of a millimeter. The eye may at times require artificial magnification to match the performance of the hand.(Milford, 1975).

A surgeon's study of his own hands should give him better appreciation of the manual disabilities of other craftsmen. (Capener, 1956).

It is very easy for the hand surgeon to consider the hand a praiseworthy object of art, but why should the artist himself consider especially the hand, why not the foot, the elbow, or the knee?

The hand and the face are the two most commonly exposed parts of the body. It is a reflection of the entire body in dress, size, contour, and usage. It is an organ of change in colour, shape and coverage; therefore suggesting age, occupation, habits, hobbies, and needs. It not only reflects the body, but the mind and heart with postures of stress, tension, sorrow, happiness, enxiety, and grief, all in a universal language. When the spoken language fails, the hand is called upon to communicate the message by universal symbols.

The hand is highly symbolic, this is especially true in religious sense. Who has not heard of the hand of Buddha or the hand of God; the hand denoting contemplation or the hand symbolizing the trinity.

The favorite blessing given to a friend:
May God hold you in the palm of His hands (Milford, 1975).

ANATOMICAL CONSIDERATIONS

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Skeleton of the hand

The articulated bones of the hand are seen to form a carpus (eight bones), a metacarpus of five bones articulated with it, and the phalanges of the five digits articulated with the metacarpal heads.

The eight carpal bones lie in two raws, a proximal raw consists of the scaphoid, lunate, and triquetral which together form the convexity of a semicircle. The fourth bone, the pisiform, completes the proximal raw by articulating with the front of the triquetral, and so builds up the flexor concavity of the carpus. The distal raw consists of a trapezium, trapezoid, capitate, and hamate, which articulate with the bones of the proximal raw by an s-shaped midcarpal joint.

The thumb metacarpal differs than other metacarpals in being shorter and thicker. Its base articulates with trapezium. The shaft is set at right angle to the plane of the other four, so that its flexor surface faces across the palm

Two phalanges form the thumb, while three phalanges form each finger. (Last, 1981).

Skin and subcutaneous tissue of the hand

The dorsal skin of the hand is lax and lies on loose areolar tissue. The palmar aponeurosis is firmly fixed to the overlying skin by fibrous bands that extend into the subcutaneous fat. The dorsal deep fascia fuses with the extensor tendons. (Turek, 1984).

The palmar deep fascia

It covers the thenar and hypothenar muscles and is intimately attached to these muscles, so that no space exists. The central triangular portion, the palmar aponeurosis, is continuous proximally with the palmaris longus tendon, which assists in flexion of the hand.

The aponeurosis sends extensions distally to fuse with the fibrous tendon sheaths over the proximal phalanges-these aponeurotic prolongations in the distal part of the palm are connected with each other by transversely disposed fasciculi, that cover the digital vessels and nerves and form the superficial transverse metacarpal ligament.

In the middle of the palm, a septum extends deeply from the aponeurosis to the third metacarpal, separating the thenar space from the midpalmar space.

Distally, septa extend from the deep aspect of the palmar aponeurosis to form annular fibrous canals for the passage of flexor tendons, lumbrical muscles, and digital vessels and nerves. Each pair of septa passing deeply to attach to a metacarpal form a canal for passage of the corrsponding tendons to that finger. Between these tendinous passages run the lumbrical muscles and the digital vessels and nerves . (Turek, 1984).

Arterial blood vessels

The radial and the ulnar arteries, each terminate in a superficial branch and a deep branch. The superficial branches form the superficial palmar arch, and the deep branches

form the deep palmar arch. At the level of the wrist, the ulnar artery gives off volar and dorsal carpal branches to form, with similar branches from the radial artery, an arterial wristlet about the carpal bones. The deep palmar arch sends perforating branches between the proximal ends of the metacarpals to connect with dorsal carpal arch. The latter sends small branches distally to empty into digital branches of the superficial arch proximal to their bifurcation.

While the superficial branch of the radial artery contributes to the superficial arch, its larger deep branch passes under the snuffbox tendons and plunges between the two heads of the first dorsal interosseous muscle to reach the palm where it forms the greater part of the deep palmar arch. The superficial arch gives off, digital branches which bifurcate into phalangeal branches immediately deep to the palmar aponeurosis. The arch and the digital branches lie superficial to branches of the median and ulnar nerves, but the relationship is reversed in the fingers. (Turek, 1984).

Nerve supply

A - Motor

The ulnar nerve supplies the flexor carpi ulnaris and the ulnar half of the flexor digitorum profundus. The remainder of flexor - pronator group (flexor carpi radialis, flexor digitorum sublimis, radial half of the flexor digitorum profundus, pronator teres , pronator quadratus , and flexor pollicis longus) .