

ULNAR CLAW HAND

ESSAY

Submitted in partial fulfillment for
Master Degree

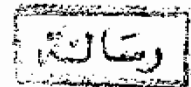
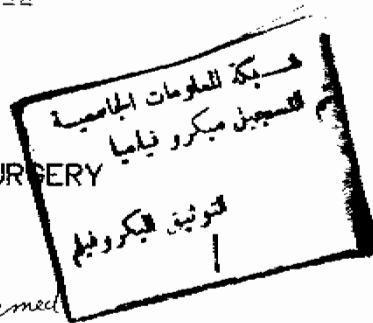
In

ORTHOPAEDIC SURGERY

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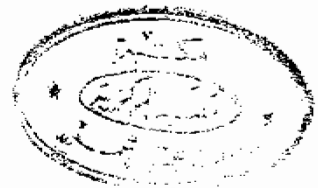
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INTRODUCTION

correct the claw hand deformity (Sundararaj and Mani, 1984).

Some anatomical facts, etiology, pathology and clinical picture may enable the surgeon to operate satisfactory in case of ulnar claw hand deformity.

ANATOMY

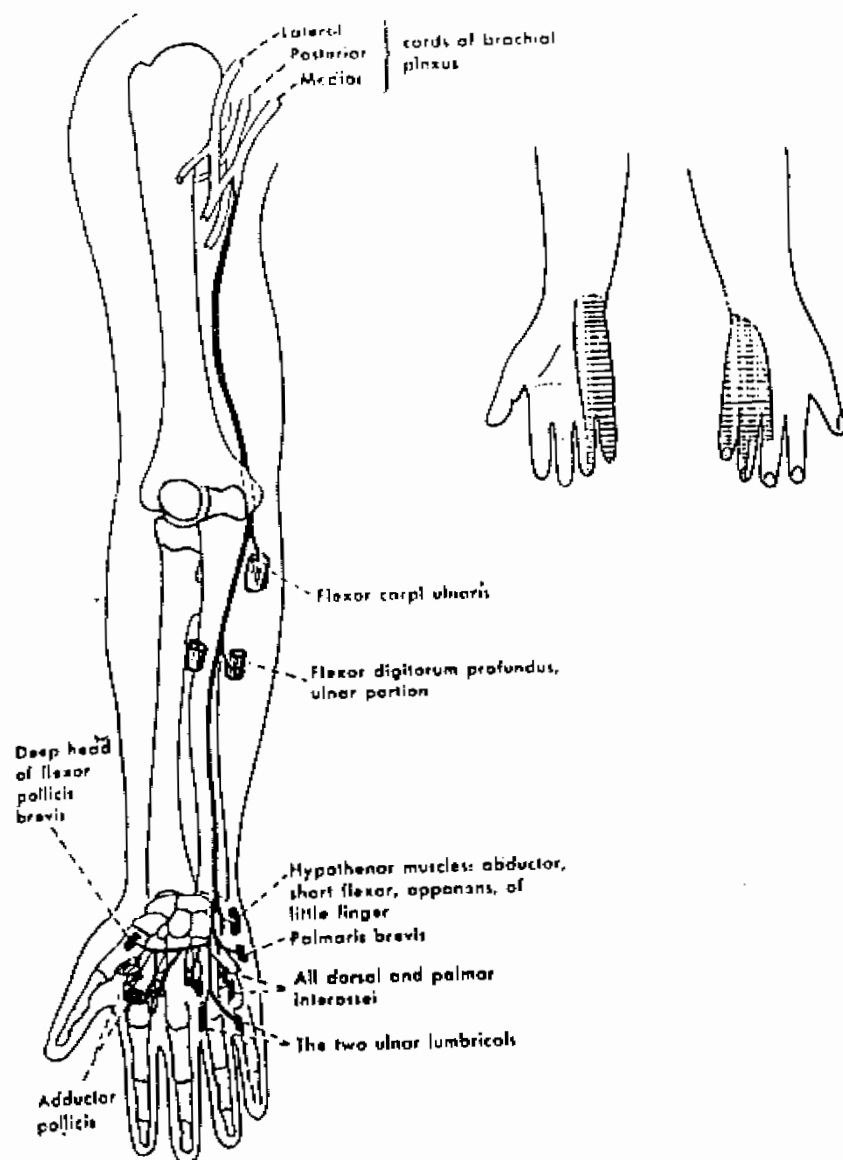


Fig. 1. Ulnar nerve and its branches

innervation of the hand muscles (Hollenshead, 1974). In some rare cases the median nerve may carry all the fibres to the short muscles of the hand and gives most of these to the ulnar nerve. In such cases a severance of the ulnar nerve above the elbow is not followed by paralysis of the small muscles of the hand (Gardner et al., 1975).

II- COURSE:

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\* In the axilla: The ulnar nerve descends between the axillary artery and vein and posterior to the cutaneous nerve of the forearm, these structures are resting on the posterior wall of the axilla and under cover of the lower fibres of pectoralis minor (Romanes, 1972; Sunderland, 1978).

\* In the upper arm: It runs downward posteromedial to the brachial artery, thus paralleling the median nerve (Hollenshead, 1974).

In this part, the median nerve is placed lateral to the artery, and the medial cutaneous nerves of the arm and forearm are located antro-medially. These structures descend in the groove outlined by the coracobrachialis laterally and the long head followed by the medial head of triceps posteriorly (Sunderland, 1978).

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is firmly bound down to the underlying triceps. At the point of separation of the two zones, ulnar nerve injury may take place with the fracture of the humerus (Sunderland, 1978).

\* At the elbow: The ulnar nerve lies in the groove on the back of the medial epicondyle of the humerus where it can be felt and rolled against the bone, and it can also be palpated against the medial surface of the coronoid process (Gardner et al., 1975). In very rare cases the ulnar nerve may descend in front of the medial humeral condyle or it may be insecurely lodged behind the epicondyle across which it slips anteriorly in movements of flexion of the forearm (Sunderland, 1978).

The ulnar nerve is more easily compressed against the medial surface of the coronoid process than against the medial humeral condyle (Last, 1978). Commonly the ulnar nerve enters the forearm within a fibroosseous ring formed of the two heads of the flexor carpi ulnaris muscle (the humeral and ulnar heads) and the arching tendinous fibres in between (Osborne's band), the medial humeral condyle, the olecranon, and the medial collateral ligament; this ring is termed the cubital tunnel and represents an important entrapment site (Romanes, 1972; Sunderland, 1978).

\* In the forearm: It lies in between the flexor carpi ulnaris and the flexor digitorum profundus, at the end of the upper third of the forearm, the nerve meets the artery on its radial side and both descend between the two muscles, in the distal part of the forearm the ulnar nerve becomes superficial and lies between the tendons of flexor carpi ulnaris and that of the flexor digitorum superficialis to the ring finger (Romanes, 1977: and Gardner et al., 1975).

\* At the wrist: The ulnar nerve and ulnar artery become somewhat superficially placed and then they pierce the deep fascia and they cross the flexor retinaculum. Here the nerve and artery lie between pisiform medially, the hook of hamate laterally, the palmaris brevis muscle superficially and the pisohamate ligament deeply. This region constitutes another entrapment site known as the ulnar tunnel or Guyon's canal (Sunderland, 1978).

\* At the hand: The ulnar nerve ends in between pisiform bone medially and the hook of hamate laterally, where it divides into superficial and deep branches. The superficial branch supplies the palmaris brevis muscle and divides into two terminal branches at the distal border of the palmaris brevis to supply the skin of the palmar surface of the little finger as well as the medial half of the ring finger. The deep

branch passes between the flexor and abductor digiti minimi, and then it hooks around the hook of hamate within the origin of opponens digiti minimi. It then arches laterally in the concavity of the deep palmar arch and it ends in the first interosseous space. It gives motor branches to the hypothenar muscles: the medial two lumbricals, all the interossei, and finally to the adductor pollicis (Last, 1978).

### III- BRANCHES:

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Romanes (1972), Hollenshead (1974) Gardner et al., (1975) and Last (1978) stated that no branches are given by the ulnar nerve in the axilla and arm. However, Sunderland (1978) in twenty dissected specimens found that a branch to the flexor carpi ulnaris arise at the epicondyle in one specimen, and 4 cm above it in another case while in the remaining specimens there were no branches at or above the epicondyle.

(1) Muscular branches:

(a) In the forearm to the flexor carpi ulnaris and the ulnar half of the flexor digitorum profundus (Gardner et al., 1975). Sunderland (1978) in his study stated that a twig to

the ulnar head of the flexor pollicis longus is given by the ulnar nerve.

(b) In the hand usually the hypothenar muscles, palmaris brevis, the medial two lumbrical muscles, all the interossei, and the adductor pollicis have their nerve supply from the deep branch except the palmaris brevis that is usually supplied by the superficial one (Last, 1978).

Sunderland (1978), in his study on the 14 specimens found that; in one case the palmaris brevis has its nerve supply from the deep branch. Lastly the nerve has been reported sending muscular twigs to the triceps, the flexor digitorum sublimis and the deep portion of the flexor pollicis brevis. The deep portion of the latter muscle is considered a part of the adductor pollicis or the first palmar interosseous (Sunderland, 1978; Last, 1978).

In very rare instances, the short muscles of the hand may be supplied by ulnar nerve alone, and this can be explained by the presence of a communicating branch extending from the median nerve to the ulnar nerve (Romanes, 1972; Gardner et al., 1975).

(2) Cutaneous branches:

(a) Dorsal branch: In the middle of the forearm, the ulnar nerve gives off a large branch which descends between the ulna and the flexor carpi ulnaris, turns posteriorly at the level of the wrist. It is sensory to ulnar third of the dorsum of the hand and the posterior surface of the medial one and half fingers.

(b) Palmar branch: In the lower part of the forearm the ulnar nerve gives off a branch which crosses the flexor retinaculum and supplies the skin on the ulnar third of the palm of the hand (Gardner et al., 1975).

(c) The superficial branch in the hand: Is one of the two terminal branches of the ulnar nerve in the hand, it supplies the palmar surface of the medial one and half fingers (Hollenshead, 1974).

(3) Articular branches:

(a) A branch passes to the elbow joint as the nerve lies in the groove behind the medial epicondyle of the humerus (Romanes, 1972).

- (b) A branch to the distal radio-ulnar joint (Sunderland, 1978).
- (c) A branch to the radio-carpal and carpal joints (Gardner et al., 1975).
- (d) A twig to the carpo-metacarpal joints, metacarpophalangeal and the interphalangeal joints (Sunderland, 1978).

(4) Arterial branch:

The ulnar nerve gives a nerve supply to the ulnar artery in the forearm (Gardner et al., 1975).

MUSCLES SUPPLIED BY THE ULNAR NERVE

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(1) **Flexor carpi ulnaris:**

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According to Last (1978), it has a humeral origin from the common flexor origin and ulnar origin from the medial surface of the medial surface of olecranon and aponeurosis of the posterior border of the ulna. Its tendon is inserted into the pisiform bone, pisohamate ligament and the pisometacarpal ligament. The muscle is innervated by the ulnar nerve, and its nerve fibres are derived segmentally from C6, C7 in 95% of cases, the remaining 5% have their fibres from C8, T1.