ULNAR NERVE LESIONS

Essay

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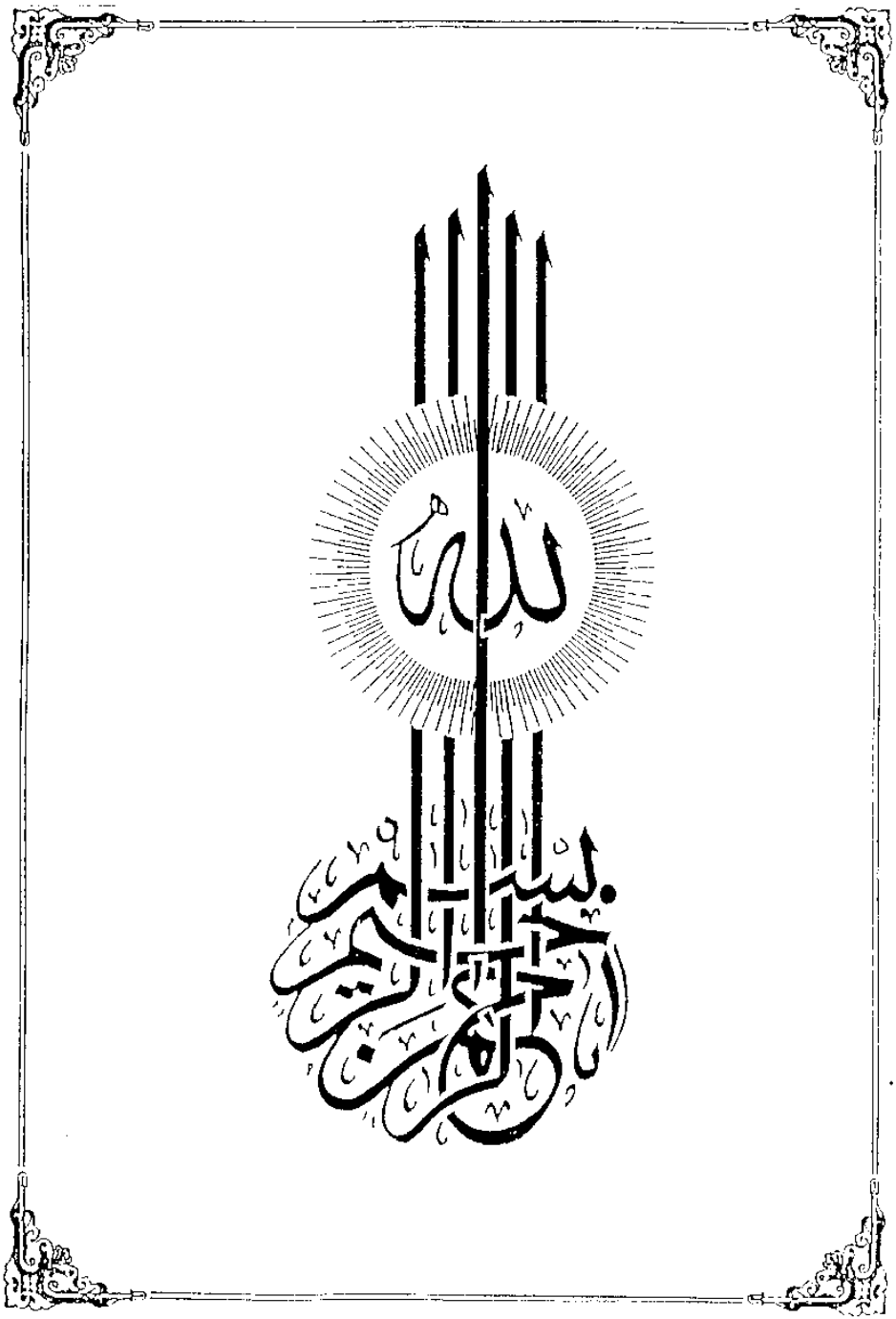

Contents

INTRODUCTION

I. Introduction

Surgery of the peripheral nerves is a child of war and it was born a century ago. The first organized investigation of nerve injuries was undertaken during the American Civil War, and work begun in May 1863 at an army hospital in Turner's Lane, Philadelphia with Silas Weir Mitchell in charge (Seddon, 1972).

During World War-II, neurosurgical centers for the army were established in the United States by Glen Spurling and in England by Seddon (Wright and Simmons, 1980). Now and from the economic point of view, nerve injuries occur, however, not only in warfare but also in civil life, so that their recognition and effect management are still of great economic and industrial importance (Mercer and Duthie,1967).

For the management of damaged peripheral nerves the surgeon must arm himself with three weapons: detailed knowledge of the anatomy of the limbs, the special skills of the neurologist, and in operative surgery, a delicacy of touch that lies between those of the neurosurgeon and of the otologist (Seddon, 1972).

The wound that injuries a nerve often damages neighbouring structures-bones, joints, blood vessels

and tendons-and it is therefore, desirable that the surgery of peripheral nerves should have a wide range of skills. Moreover reconstructive operations are sometimes necessary if a nerve cannot be mended or fails to recover satisfactorily after repair (Seddon, 1972).

Peripheral nerves-including the ulnar nerve-may be injured - by metabolic, infectious or collagen diseases, malignancies, endogenous or exogenous toxins, thermal, chemical, or mechanical trauma (Wright and Simmons, 1980).

However, the commonest cause of injury is an open wound regardless the causative agents (Seddon, 1972).

Orthopaedic surgeon is concerned with lesions that have a mechanical basis and with those that lend themselves to reconstructive surgery (Adams, 1983).

As a result of the new techniques of the peripheral nerve surgery, and follow up of cases, many previous gaps in our knowledge have now been filled and while long-accepted views in some cases have been strengthened, in the other cases, old beliefs and practices have had to be modified or even wholly rejected (Mercer and Duthie, 1967).

Seddon (1972) stated that, the ulnar nerve is injured, or otherwise deranged more frequently than any other nerve in the body. So the ulnar nerve has a special importance because of two factors: the frequency of injury, and its responsibility for innervation of the majority of the small muscles of the hand (Hollinshead, 1974). The latter are responsible for adjusting the position and for carrying out the finer skilled movements of the digits (last, 1978).

Open wounds, especially at the wrist, are the most common cause of injury, but compression or irritation of the nerve at the wrist or elbow is not rare. The functional loss of ulnar nerve is predominantly a motor one. Loss of all interossei and the adductor pollicis interferes seriously with the strength and effectiveness of both grasp and prehension. Finally there is a fact which can not be denied by anyone, the results of surgical repair of the ulnar nerve are the poorest (Seddon, 1972; D'Ambrosia, 1977; Wright and Simmons, 1980).

ANATOMY

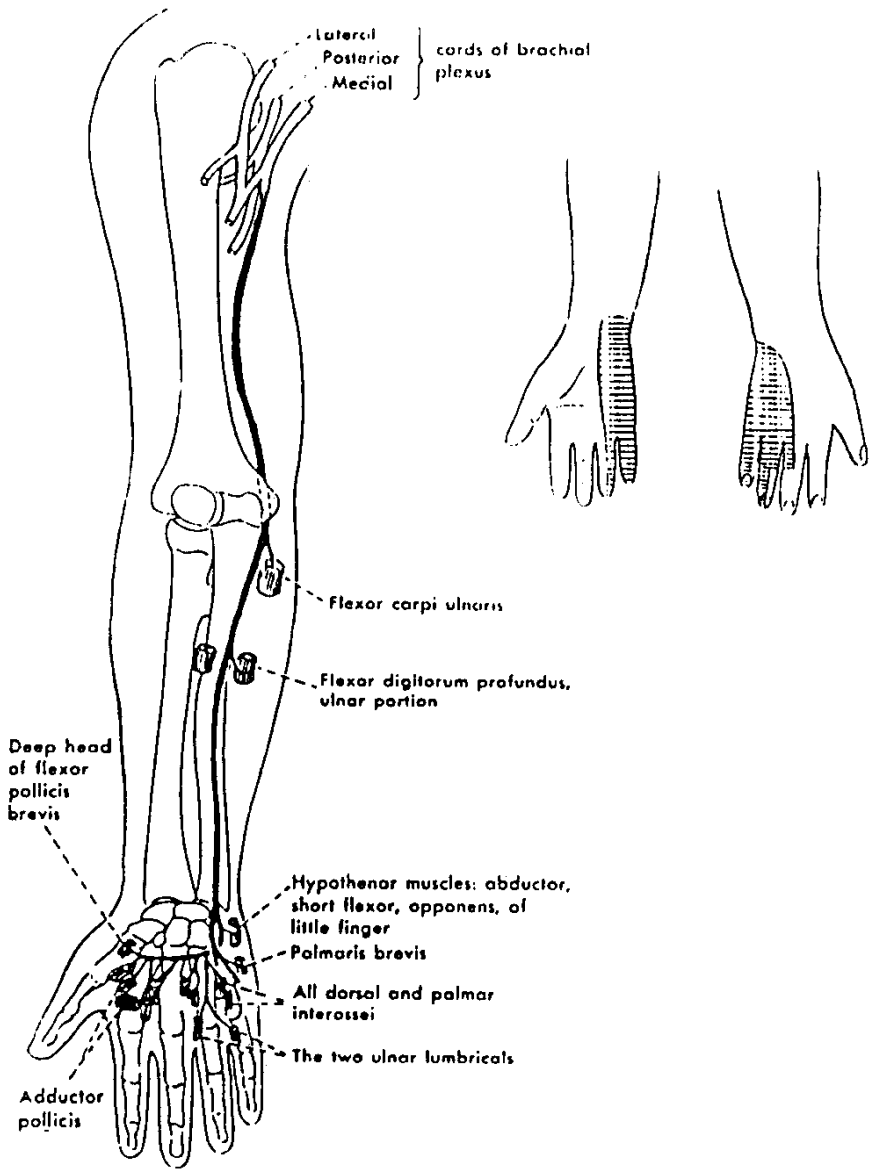

Fig.1. Ulnar nerve and its branches (From Hollinshead, 1974).

II- Anatomy of The Ulnar Nerve

I. Origin:- The ulnar nerve arises from the medial cord of the brachial plexus (C_8 - T_1) (Carpenter, 1977), in more than half of cases the medial cord receives a communication (c_7) either from the lateral cord of the brachial plexus or from the lateral root of the median nerve (Romanes, 1972).

Hollenshead (1974) and Last (1978) stated that a communicating branch may arise from the middle trunk of the plexus, and a twig from t2, may share in the segmental composition of the medial cord. So the medial cord constituent fibres may be (C_7, C_8, t_1) or (C_8-T_1-T_2).

As regards the communication, the ulnar nerve may communicate with the median nerve in the forearm or even in the hand. The median nerve sends a branch either from the main trunk or from its anterior interosseous branch. The above mentioned arrangements gives us a wide variation about the segmental composition of the ulnar nerve, its usual composition is C_7, C_8, T_1 and its apparent variation are C_5-T_1, C_7-T_2 and C_8- T_1 The significance of these communications and variations appears in the anomalous 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 short muscles of the hand (Gardner et al.,1975).

II- 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).

III- 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 antero-medially, these structures descend in the groove outlined by the carocobrochialis laterally and the long, followed by the medial head of triceps posteriorly (Sunderland, 1978).

At the middle of the arm the ulnar nerve pierces the medial intermuscular septum and descends with the superior ulnar collateral artery and ulnar collateral

nerve to the back of the medial epicondyle (Gardner et al.,1975).

The level at which ulnar nerve pierces the medial intermuscular septum is variable; while Hollenshead (1974), Gardner et al.(1975), and Sunderland (1978) stated that ulnar nerve pierces the septum in the middle, Romanes (1972) and last (1978) stated that it pierces the septum in the lower third or in the distal half.
The ulnar nerve occupies a groove on the medial aspect of the medial head of triceps, in this part of its course the nerve is bound to the triceps by a deep fascia that contains muscle fibres from the triceps and is called the arcade of struthers (Sunderland,1978).
As regards the medial intermuscular septum , it is thick and well defined inferiorly where it is attached to the medial epicondyl and the supracondylar ridge. Superiorly it becomes thinner and its attachments less distinct as it is followed upwards. The significance of that is where the nerve passes from the anterior to the posterior compartment of the arm, it is passing from a zone where it is freely mobile to one where it 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).

IV - At the elbow: (Fig. 2)

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 humoral condyle or it may be insecurly 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). Commenly the ulnar nerve enters the forearm within a fibro-osseous 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 condyl, the olecranon, and the medial collateral ligament; this ring is termed the cubital tunnel and represents an important entrapment site (Romanes, 1972; Sunderland, 1978).

V- 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