"VASOSPASTIC DISORDERS OF THE UPPER LIMB"

THESIS

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M. SC.

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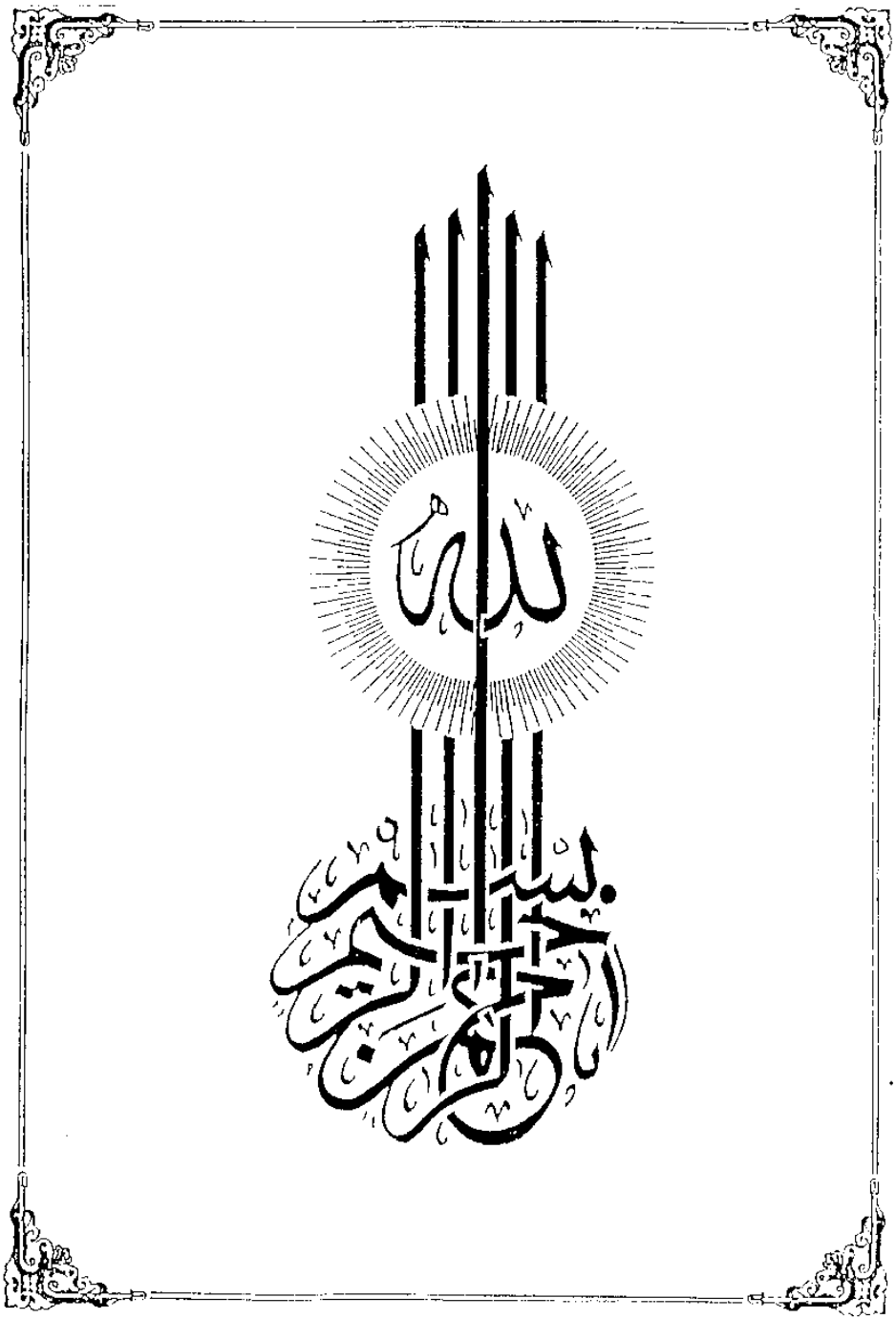
((بسم الله الرحمن الرحيم))



(وقل ربي زدني علما)

THIS WORK IS DEDICATED

TO

MY PARENTS

AND

MY BROTHERS

A C K N O W L E D G E M E N T

I consider myself lucky to work on this thesis under the kind and expert guidance of the outstanding Prof. Dr. Mahmoud Ahmed Naguib. Prof. of General Surgery, Faculty of Medicine, Ain Shams University. I would like to express my supreme gratitude to him for his encouragement throughout his supervision on this thesis.

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INTRODUCTION AND AIM OF THE WORK

Vasospastic disorders of the upper limb are characterized by abnormal lability of sympathetic nervous system or local fault which affect the arterial and venous sides of capillary bed, these lead to reduction of cutaneous blood flow. Sluggish flow of deoxygenated blood causes cutaneous cyanosis, coldness, numbness and pain. That is why these disorders could present a problem, not only for the patient but also for the attending doctors.

The blood vessels in these disorders are structurally normal especially in the early stages, but they are abnormal in the reactivity to the change of environmental temperature. That is why these disorders manifested clinically in attacks or episodes, especially in cold weather. The most important vaso-spastic disorders are:

1) Raynaud's syndrome.
2) Acrocyanosis.
3) Livedo reticularis.
4) Chilblains.
5) Erythromelalgia.

The proper diagnosis of these disorders in general could be difficult on account of diversity of aetiological factors involved in the development and chronicity of these cases. The treatment of these disorders is palliative that is to say there is no cure, uptill now.

Although the vasospastic disorders are the cause of great discomfort to the patients yet the pathogenesis, diagnosis and treatment are not well understood. So the aim of this work is to study these disorders in more detail and try to elucidate some points as regard the diagnosis and the treatment which may help in decreasing the discomfort.

I feel that the field of vasospastic disorders should be shared by more than one speciality, in which the co-operation of general surgeon, physician and dermatologist are seeked.

ARTERIAL SUPPLY TO THE UPPER LIMB

The upper limb is supplied by the axillary artery, which is continuation of third part of subclavian artery at the outer border of the first rib. It continues at the lower border of teres major as brachial artery. The latter descend in the arm which terminates at the level of neck of radus by dividing into radial and ulner arteries. These two arteries descend in forearm to reach the hand to supply it.

Blood Supply to the Hand:

a) Blood Supply of the Skin:

The skin is supplied by two plexuses; subcutaneous one from which branches pass to supply the skin gland, and hair follicles, and dermal one from which cappillary loops supply the papillae (Gray, 1959).

The veins begin as fine channels at the bases of the papillae. These join subcutaneous veins which end in larger veins. Arteriovenous anastomosis between arterioles and venules are found in the palmer spaces of the fingers, nail beds, thener and hypothener eminences which are called "Glomera". The anastomosis regulate the body temperature (Davis 1967).

b) Blood Supply to the Hand Itself:

This is achieved by superficial and deep palmer arches and posterior carpal arch.

- Superficial Palmer Arch:

This is the arterial arcade that lies superficial to everything in palmer compartment i.e, in contact with the deep surface of pulmer aponeurosis. It is formed by direct continuation of ulnar artery beyond the flexor retinaculum. On the radial side it is usually completed by the superficial palmer branch of radial artery. It lies across the centre of the palm, at level with the distal border of out stretched thumb. From its convexity four palmer digital arteries pass distally. The most medial of these passes to ulnar side of the little finger, the remaining three pass to the webs between the fingers, where each divides into two vessels that supply adjacent fingers. The thumb side of the index finger and thumb itself are not supplied from the superficial arch (Last 1978).

But supplied by two branches from radial artery:

- The first is princeps pollicis artery arises deep to the oblique head of adductor policis and divides into two digital branches for the pulmer surface of the thumb.

- The second is radialis indices artery which may arise from the proximal part of princeps pollicis artery. It runs on lateral side of indix finger (Mahran Z. et al 1972).

- Deep Palmer Arch:

This is an arterial arcade that is produced by the terminal branch of radial artery, which gains the palm by passing between the oblique and transverse heads of adductor pollicis. It runs across the palm at the level with proximal border of outstretched thumb. The deep branch of ulnar nerve lies within its concavity. The arch is completed by the deep branch of ulnar artery. From its convexity three palmer metacarpal arteries pass distally and in the region of metacarpal heads anastomose with the digital branches from the superficial arch. Branches perforate the interosseous space to anostomose with the dorsal metacarpal arteries. Their accompanying veins drain most of the blood of the palm into the dorsal venous arch. Branches from anterior carpal arch anastomose with the deep palmer arch.

- Posterior Carpal Arch:

It is an arterial anastomosis between radial, ulnar

and anterior interosseous arteries. It lies on the back of the carpus and sends dorsal metacarpal artiries distally in the intermetacarpal spaces, deep to the deep tendons. These split at the webs to supply the dorsal aspect of adjacent fingers. They comunicate through the interosseous spaces with the palmar metacarpal branches to deep palmer arch. Companion veins bring blood from the palm into the dorsal venous arch. The latter lies in the subcutaneous tissue i.e. "superficial to extensor tendons", proximal to the metacarpal heads and drains on the radial side into cephalic vein and on the ulnar side into the basilic vein (Last 1978).

* Digital Neuro-Vascular Bundle:

Lies immediately deep to the interdigital ligament, here the nerves lie on palmer side of the arteries and here beth divide to supply the side of adjacent fingers, the nerve dividing more proximally than artery. The lumbrical tendon lies beneath the vessels. The digital artery, supplying epiphyseal end, arises in the middle segment of each finger and does not transverse pulp. The remainder of the bone is supplied by terminal

branches of digital arteries which must be involved sooner or later in pulp infection and necrosis will result, but even if this segment of bone dies, almost complete reconstruction can be achieved from adjacent undameged proximal end.

* Nerve Supply to the Skin of the Hand:

The skin is supplied by cutaneous nerves which may end by free fibrils in dermis or may develop specialised end organs in the dermis and subcutaneous tissues. The fingertip is rich in cutaneous nerve supply (Davis 1967) (Last 1966).

Sympathetic supply to upper limb

- Origin and Relay:

The preganglionic fibres arise from third to sixth or seventh thoracic levels, with the possibility that the second may also contribute some neurones. They relay in middle and inferior cervical ganglia and thoracic 1-2 ganglia.

- Course of Innervation of Blood Vessels:

The post-ganglionic nonmyelinated fibers enter mainly the lower trunk of brachial plexus and reach the arterial and venous systems by way of median, ulnar and to lesser extent the radial and musculo-cutaneous nerves and their branches.
As they approach the skin, the fibers become much more numerous with greatest number in superficial vesseles especially at the distal portion of extremities.

- Termination of Sympathetic Fibers:

The nonmyelinated sympathetic fibers end in adventitia of blood vessels by forming perivascular strands of plexuses. From the latter, secondary fibars arise which penetrate the madia and give off smaller fibrils, ultimately terminating in the proximity of muscle cells (Abramson D.I. 1974).
It is better to know that the wall of arterial and precapillary sphincter is composed of smooth muscle arranged in helical fashion.