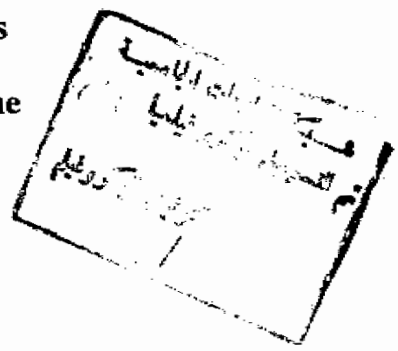
Clinical Study on Paraplegic patients at the Agouza Rehabilitation Center



Thesis submitted in

Partial fulfilment of the requirements

for Master degree in Physical Medicine

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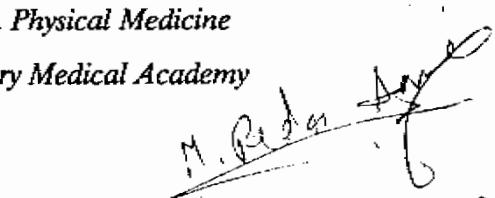

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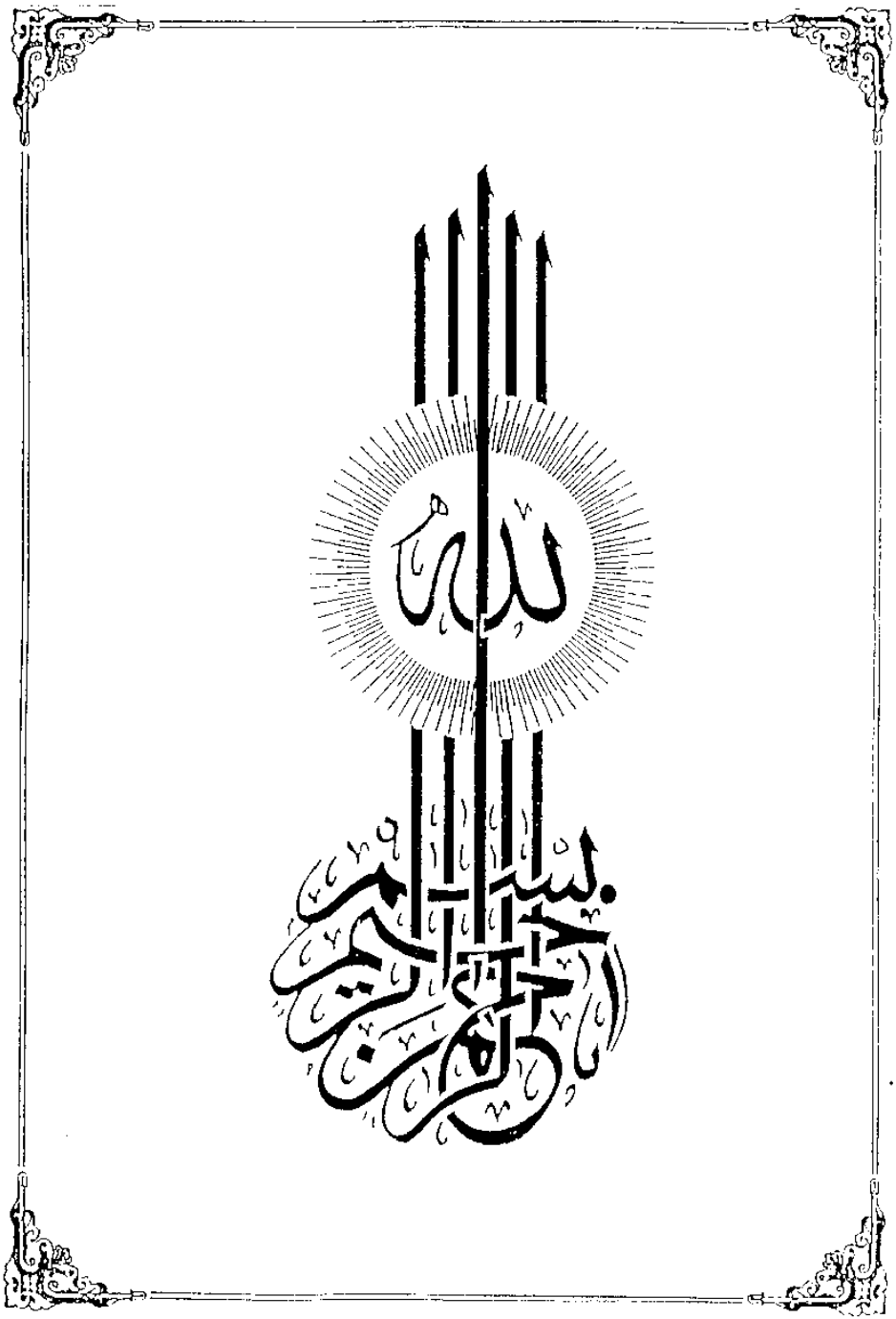
1992.

To My Parents
My Wife and Daughter
For Their Love, Devotion and
Patience.



AKNOWLEDGEMENT

I would like to express my deepest gratitude to Asst. Prof. **Dr. Fatma kamel Mohamed** and to Lecturer. Prof. **Dr. Nora Saad Allah Haroun.** For their kind supervision. Continuous and judicious guidance during the progress and accomplishment of this work.

I am also very grateful to Prof. **Dr. Hatem El-Ebiary,** Head of Physical Medicine Departement. Ain Shams University. For his kind and continuous encouragement in the accomplishment of the work.

May I also thank **Dr. Mohamed Reda Awad,** Head of the Agouza Rehabilitation center for his Sincere help throughout this study.

It is also a pleasure to acknowledge my senior staff and colleagues in Physical Medicine Deptartement. For their help and cooperation which contributed in the accomplishment of this work.

CONTENTS

INTRODUCTION AND AIM OF THE WORK

The percentage of paraplegic patients is gradually increasing in the whole world due to wars and car accidents. Between 500 & 600 people in Great Britain fracture their spines every year. In addition to these their are victims of spinal cord injury or disease from many other causes.

Of all the cases admitted to spinal units approximately 70 percent are traumatic. The majority of traumatic cases approximately 50%; are the result of road traffic accidents. Industrial accidents account for approximately 26%. Sporting injuries 10% as well as home accidents approximately 10%.

Eighty percent of the traumatic cases are found to have fracture; dislocation; 17% fractures only; and a very small percentage are found to have involvement of the spinal cord with no obvious bony damage to the vertebral column e.g. those with whiplash injuries. the most vulnerable areas of the vertebral column would appear to be :

(1) Lower cervical C_5 - C_7.

(2) Mid - thoracic T_4 - T_7.

(3) Thoraco-lumbar T_{10} - L_2.

The non traumatic cases are mainly the result of transverse myelitis ; tumors and vascular accidents.

Thrombosis or hge of the anterior vertebral artery causes ischaemia of the cord with resulting paralysis.

Spinal cord damage resulting from either injury or disease may produce tetraplegia or paraplegia depending upon the level at which the damage has occured.

Tetraplegia is partial or complete paralysis involving all four limbs and the trunk; including the respiratory muscles; as a result of damage to the cervical spinal cord.

paraplgia is partial or complete paralysis of both lower limbs and all or part of the trunk as a result of damage to the thoracic or lumbar spinal cord or to the sacral roots (Bromely, 1981).

The aim of this work is a full assessment of paraplegic patients at the Agouza Rehabilitation Center.

This assessment is physical; functional; social; vocational and psychological. This will be done to evaluate the ordinary program which is practised for the paraplegics at the Agouza Rehabilitation Center for a period of six months.

REVIEW OF LITTERATURE

Anatomy of the spinal cord

The spinal cord (medulla spinalis) is the elongated cylindrical part of the C.N.S. which occupies most of the vertebral canal. It's average length is 45 cm, and its weight is about 30 gm, it extends from the cranial border of the atlas to the cranial border of the second lumbar vertebrae, this level is a subject to variation (Jit and Charnalia, 1959).

The spinal cord is enclosed in three membranes or meninges; these are, from without inwards, the dura, arachnoid and pia maters, which are separated from each other by subdural and subarachnoid spaces, the latter being occupied by the cerebrospinal fluid.

Continuous cranially with the medulla oblongata and narrows caudally to a sharp tip, the conus medullaris; from its apex the filum terminale; a fine connective tissue filament; descends to the dorsum of the first coccygeal segment.

In transverse width the spinal cord varies from level to level, their are enlargement at cervical and lumbar levels.

The cervical enlargement supplying the upper limbs; its maximmum circumference about (38 mm) being in the sixth cervical.

The lumbar enlargement similarily corresponds to innervations of the lower limbs; its greatest circumference about (35 mm) of the twelfth thoracic vertebrae.

Fissures and sulci mark the external surface of the spinal cord. An anterior median fissure and a posterior median sulcus and septum divide the cord into symmetrical right and left halves.

A posterolateral sulcus exists on each side of and a short distance from the posterior median sulcus, along it the dorsal spinal nerve roots enter the cord. The white substance of the cord between the posterior median and posterolateral sulci on each side is the posterior funiculus.

The region of the spinal cord between the posterolateral sulcus and anterior median fissure is the anterolateral funiculus, which is further subdivided into anterior and lateral funiculi by the issuing anterior roots of the spinal nerves. The anterior funiculus lies medial to the zone of emergence of the ventral roots; whilst the lateral funiculus lies between the roots and the posterolateral sulcus.

The filum terminale; a fine filament of connective tissue 20 cm long; descends from the apex of the conus medullaris. Its cranial 15 cm; the filum terminale internum is surrounded by tubular extensions of the dural and arachnoid meninges.

Beyond this its final 5 cm; the filum terminale externum is closely united with the investing sheath of dura mater. The filum, consisting mainly of fibrous tissue, is continuous at its cranial end with the pia mater of the spinal cord. The central canal of the cord is also continued into the filum terminale for 5 or 6 mm. Continuous with the cord at intervals along it are the paired dorsal and ventral roots of the spinal nerves. These cross the subarachnoid space traverse the dura mater separately; and then unite in or close to their intervertebral foramina to form the spinal nerves. Since the spinal cord is markedly shorter than the vertebral column; the more caudal spinal roots descend for varying distances around and beyond the cord to reach their corresponding foraminae; and in so doing they form largely caudal to the apex of the cord, a divergent sheath of spinal roots; the cauda equina, gathered around the filum terminale in the spinal theca. The ventral spinal roots consist of efferent somatic and, at certain levels, visceral (sympathetic) nerve fibres. The dorsal spinal roots are characterised by ovoid swellings, the spinal ganglia, one on each root just proximal to its junction with corresponding ventral root in its intervertebral foramina.

Each dorsal root fans out into six to eight rootlets which enter the cord in a vertical series along posterolateral sulcus.

Each ganglion nerve cell has a single very short process which almost immediately divides into a medial process entering the spinal cord through the dorsal root and a lateral one which passes peripherally to some form of sensory end organ. The region of the spinal cord associated with a given pair of spinal nerves is described as a spinal segment, but there is no clear indication of segmentation apart from this (Wardwich and Williams, 1973).

Sections in the spinal cord.

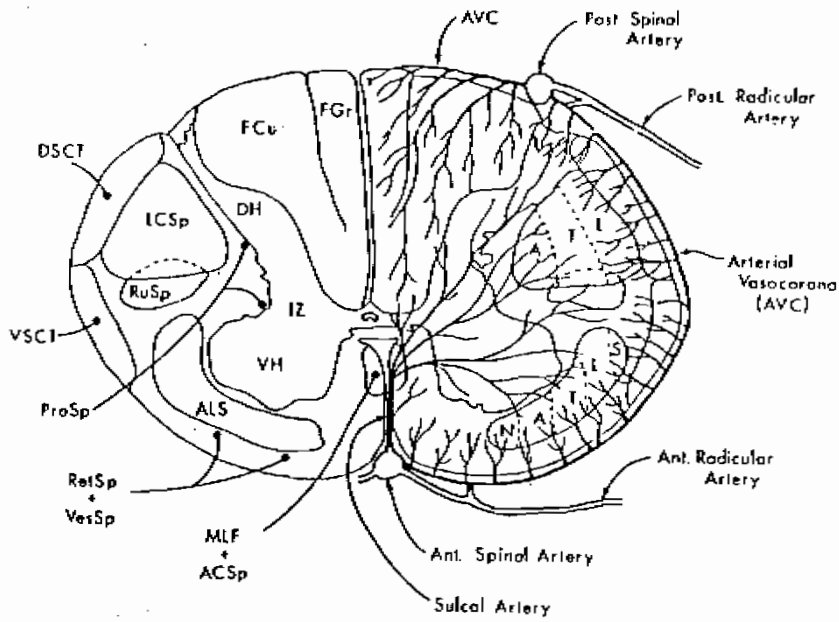


Fig. (1)

Semi-diagrammatic representations of internal blood supply to the spinal cord. This is an actual tracing of a C4 level, with the positions of principal tracts superimposed on the left and the general pattern of blood vessels superimposed on the right.

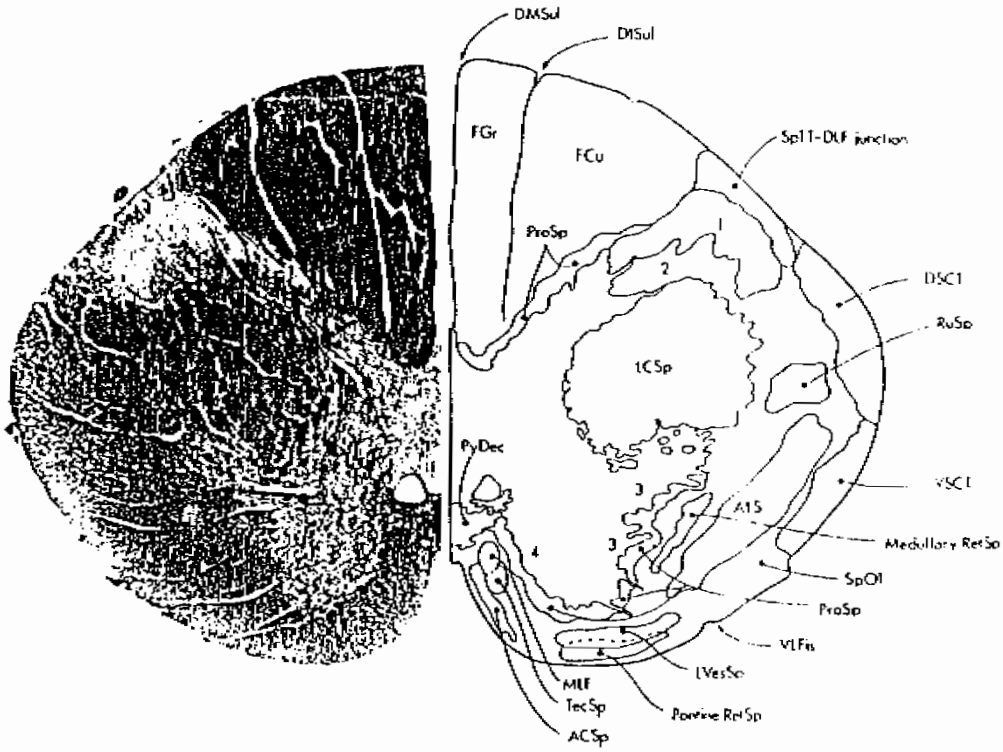
Abbreviations

A	Representation of arm areas.
ACSp	Anterior Corticospinal tract.
ALS	Anterolateral system.

DH	Dorsal Horn.
DSCT	Dorsal Spinocerebellar Tract.
FCu	Cuneate Fasciculus.
FGr	Gracile Fasciculus.
IZ	Intermediate Zone.
L	Representations of leg areas.
LCSp	Lateral Corticospinal Tract.
MLF	Medial Longitudinal Fasciculus.
N	Representation of Neck areas.
ProSp	Propriospinal Fibers.
RetSp	Reticulospinal Tract.
S	Representations of Sacral areas.
T	Respresentations of Trunk areas.
VesSp	Vestibulospinal Tract.
VH	Ventral Horn.
VSCT	Ventral Spinocerebellar Tract.

Fig. (2)

Transverse section of spinal cord at the C1 level. Lateral corticospinal fibers are now located medially toward the pyramidal decussation. AT this level fibers of the spinal trigeminal tract interdigitate with those of the dorsolateral fasciculs.



Abbreviations and Number Key.

ACSp	Anterior Corticospinal Tract.
ALS	Anterolateral system.
DISul	Dorsal intermediate sulcus.

DLF	Dorsalateral fasciculus.
DMSul	Dorsal median sulcus.
DSCT	Dorsal Spinocerebellar Tract.
FCu	Cuneate Fasciculus.
FGr	Gracile Fasciculus.
LCSp	Lateral Corticospinal Tract.
LVesSp	Lateral vestibulospinal Tract.
MLF	Medial longitudinal Fasciculus.
ProSp	Propriospinal Fibers.
PyDec	Pyramidal Decussation.
RetSp	Reticulospinal Tract(s).
RuSp	Rubrospinal Tract.
SpOl	Spinoolivary Fibers.
SpTT	Spinal Trigeminal Tract.
TecSp	Tectospinal Tract.
VLFis	Ventrolateral Fissure.
VSCT	Ventral Spinocerebellar Tract.

1- gelatinosa portion of spinal trigeminal nucleus.

2- magnocellular portion of spinal trigeminal nucleus.

3- area of spinal accessory nucleus.

4- medial motor nuclei.