MANAGEMENT OF SPASTICITY DUE TO SPINAL CAUSES

Thesis

Submitted in partial fulfillment of the M.D degree in Neurosurgery

BY

Salem Ahmed Mohamed Abd EL Aziz
M.B, B.Ch. M.Sc

Under supervision of

Prof. Dr. / EMAD MOHAMED GHANEM
Professor of Neurosurgery – Ain Shams University

Prof. Dr. / HISHAM ABDAL SALAM MOHAMED SIMRY
Professor of Neurosurgery – Ain Shams University

Prof. Dr. / WAEL ABDAL MONEM MOHAMED EZZAT
Professor of Neurosurgery – Ain Shams University

Prof. Dr. / WALID AHMED ABDEL GHANY
Assistant Professor of Neurosurgery – Ain Shams University

Faculty of Medicine
Ain Shams University

2014

مناجزة التيبس العضلي الناتج عن الاصابة بالحبل الشوكي

رسالة مقدمة من

الطبيب / سالم أحمد محمد عبدالعزيز

توطئة للحصول على درجة الدكتوراة

في **جراحة المخ و الأعصاب**

تحت إشراف

الأستاذ الدكتور/عماد محمد غانم

أستاذ جراحة المخ و الأعصاب- جامعة عين شمس

الأستاذ الدكتور/ هشام عبدالسلام محمد سمري

أستاذ جراحة المخ و الأعصاب- جامعة عين شمس

الأستاذ الدكتور/ وائل عبدالمنعم محمد عزت

أستاذ جراحة المخ و الأعصاب- جامعة عين شمس

الدكتور/ وليد أحمد عبدالغني

أستاذ مساعد جراحة المخ و الأعصاب- جامعة عين شمس

كلية الطب- جامعة عين شمس

٢٠١٤

بسم الله الرحمن الرحيم

" وقل اعملوا فسيري الله عملكم ورسولة والمؤمنون .. "

صدق الله العظيم

سورة التوبة من الاية ١٠٥

First, thanks are all due for **Allah**, for blessing this work until it has reached its end.

I wish to express my thanks to **Professor *Dr. EMAD GHANEM***, professor of neurosurgery, Ain Shams University, for the valuable supervision and continuous help he has given me since I started this work.

I also wish to express my deepest gratitude to **Professor *Dr. HISHAM SIMRY***, professor of neurosurgery, Ain Shams University, for his inspiring guidance and support throughout this work.

Special and great thanks for **Prof. Dr. *Wael Abdel- MONEM***, professor of neurosurgery, Ain Shams University, to whom I am deeply indebted for constantly encouraging me to develop this work.

I am greatly indebted and honored to work under the supervision of the knowledgeable **Prof. Dr. *WALED AHMED ABD AL GHANY***, assistant professor, Ain Shams University, whom I am very fortunate to be one of his students. His creative ideas, expanded experience and willingness to teach, have pushed me forwards throughout every step of my research.

I also express my thanks to my ***senior colleague*** and to all my ***professors*** and ***colleagues*** in the neurosurgery department, for all the help and advice they have given.

Finally I express my deepest gratitude to my ***Father*** , ***Mather, children*** and beloved ***wife*** who have stood by me and supported me throughout my life and career and especially during this work**.**

Aim of the Work

1. To review the literature of the up-to-date about definition, types, etiology and pathophysiological mechanisms of spinal spasticity.
2. To review the current spinal spasticity examination rating scales.
3. To outline the standard electrophysiological and physical assessment modalities.
4. To evaluate the current modalities involved in treatment of spinal spasticity including the inclusion criteria, exclusion criteria , techniques, complications , efficacy & outcome.

Appendix

Abbreviations	Total abbreviations
BONT	Botulinum toxin
BTX-A	Botulinum toxin type – A
C	Cervical
CNS	Central Nervous Sysetm
CSF	Cerbro Spinal Fluid
CT	Computerized Tomography
DREZ	Dorsal root entry zone
DRT	Dorsal Reticulo-Spinal Tract
EMG	Electromyography
FDA	Food and Drug Administration
I.E	Mean
IOM	Intra-operative monitoring
ITB	Intrathecal Baclofen
L	Lumbar
MAS	Modified Ashworth score
MDT	Microsurgical DREZotomy
mm	Millimeter
MRCS	Medical research council scale
MRI	Magnetic Resonant Image
MRT	Medial Reticulo-Spinal Tract
MS	Multiple Sclerosis
Post.Op	Post-Operative
P-Value	Probability
ROM	Range of motion
R-Test	Correlation Coefficient
Sc	Second
SCI	Spinal Cord Injury
SD	Standard Deviation
SG	Substantia Gelatinosa
SPN	Selective peripheral neurotomy
SPSS	Statistical Program of Social Signs
T	Thoracic
T.M	Transverse Myelitis
U	Unit
UMNL	Upper motor neuron lesion
UMNS	Upper motor neuron syndrome
VST	Vestibulo-Spinal Tract

LIST OF FIGURES

Introduction

The word *spasm* comes from the Greek word, *spasmos*, meaning to pull or drag. *Spasticity* is defined as an involuntary, velocity-dependent, increased resistance to stretch. This definition means that the amount of resistance to stretching is at least partly determined by the speed with which a spastic muscle is stretched **(Burne JA,et.al 2005)**

Spasticity may be static or dynamic in nature. Although many therapeutic and medical interventions can attenuate its effects, spasticity can be severely debilitating **(Young RR ,1994)**

Spasticity can result from any disease process that affects the upper motor neuron within the CNS. Injury to the upper motor neuron decreases cortical input to the descending reticulospinal and corticospinal tracts, which causes weakness, loss of motor control, and reduction in the number of voluntarily active motor units. The reduction of these descending tracts removes the normal inhibition of the reflex arcs within the grey matter of the spinal cord, leading to a hyperactive reflex arc and spasticity **(Mandigo & Anderson, 2006).**

Spasticity inhibits effective use of motor control and strength and can lead to progressive musculoskeletal