Effect of testosterone on motor function in men with traumatic paraparesis

Thesis

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List of Contents

	Page
Introduction	1
Aim of the work	4
Review of literature	
▪ Definition, Epidemiology & Classification of SCI	7
▪ Pathophysiology of SCI	10
▪ Clinical picture & Complications of SCI	19
▪ Testosterone and motor function in SCI	39
▪ Investigations in SCI patients	54
▪ Management of traumatic SCI	62
▪ Rehabilitation of SCI	67
Subjects and methods	98
Results	114
Discussion	140
Summary & conclusion	154
Recommendations	159
References	161
Arabic summary	186

List of Abbreviations

AD	Autonomic Dysreflexia
AD	Autonomic Dysreflexia
ADL	Activities of Daily Living
AFO	Ankle Foot Orthosis
ALS	Amytrophic Lateral Sclerosis
AR	Androgen Receptor
ASIA	American Spinal Injury Association
BP	Blood Pressure
CNS	Central Nervous System
CT	Computed Tomography
DHT	DiHydroTestosterone
DHTP	DiHydroTestosterone Propionate
DSD-DH	Detrusor Sphincter Dyssynergia with Detrusor Hyperreflexia
DVT	Deep Venous Thrombosis
FDA	Food & Drug Adminstration
FES	Functional Electrical Stimulation
FMN	Facial Motor Nucleus
FSH	Follicle Stimulating Hormone
FSH	Follicle Stimulating Hormone
GFAP	Glial Fibrillary Acidic Protein
HFMN	Hamster Facial Motor Neuron
HO	Heterotopic Ossification

HS	Highly Significant
ICU	Intensive Care Unit
KAFO	Knee Ankle Foot Orthosis
LE	Lower Extremity
LH	Lutenizing Hormone
LH	Lutenizing Hormone
LL	Lower Limb
LMN	Lower Motor Neuron
LMWH	Low Molecular Weight Heparin
MEIA	Microparticle Enzyme Immune Assay
MRF	Myogenic Regulatory Factor
MRI	Magnetic Resonance Imaging
NLI	Neurological Level of Injury
NS	Non Significant
NSAIDs	Non Steroidal Anti Inflammatory Drugs
PC	Personal Computer
PE	Pulmonary Embolism
QOL	Quality Of Life
ROM	Range Of Motion
S	Significant
SC	SubCutaneous
SCI	Spinal Cord Injury
SCIWORA	Spinal Cord Injury WithOut Radiological Abnormality
SD	Standard Deviation

SHBG	Sex Hormone Binding Globulin
SPSS	Statistical Package for Social Science
T	Free Testosterone
TLSO	Thoraco-Lumbo-Sacral-Orthosis
TP	Testosterone Propionate
TRT	Testosterone Replacement Therapy
UE	Upper Extremity
UL	Upper limb
UMN	Upper Motor Neuron
US	United States

List of Images

Image 1	Compression fracture of the L1 vertebra with a wedge-shaped vertebral body.	Page 11
Image 2	Lumbar spine trauma. Anterior view of a Chance fracture of the L2 vertebral body. The fracture line follows a horizontal plane through the L2 vertebral body and the transverse processes.	Page 12
Image 3	Drawing of a chance fracture of the thoracolumbar junction. The defect follows an irregular horizontal plane, which results in disruption of the anterior, the middle column, and the posterior column.	Page 13
Image 4	Three-dimensional reconstruction of a CT scan of the thoracic and lumbar spine in a patient with complex injury. The L1 vertebral body is compressed with a severe rotation of the L1 vertebral body under the T12.	Page 13
Image 5	The rodent contusion SCI model, with a necrotic core surrounded by histologically normal-appearing myelinated fibers and portions of grey matter from both dorsal and ventral horns.	Page 16
Image 6	By 60 days post-SCI, there remains only a thin rim of white matter. Massive cell death, causing irreversible damage, in the central core region.	Page 18
Image 7	CT scan of proximal thighs in a paraplegic patient with long-standing SCI. Showing mature HO & large decubitus ulcer overlies the ossification posteriorly	Page 38

List of Images

Image 8	Lumbar vertebral fracture as seen by C.T scan.	Page 75
Image 9	MRI of SCI showing Soft tissue swelling anteriorly, Disruption of the disc, Non-hemorrhagic cord injury.	Page 59
Image 10	Remyelination of the rat spinal cord following transplantation of adult human precursor cells. Normal (A), demyelinated (B), and remyelinated axons (C) of the dorsal column. (D) Remyelinated axons at higher magnification. The anatomical pattern of myelination was similar to that produced by Schwann cells	Page 66
Image 11	(A) Low air loss bed, (B) wheelchair cushions, and (C) air fluidized bed.	Page 72
Image 12	AFO, which is one of the of the first line measurements to prevent and treat L.L spasticity.	Page 90
Image 13	KAFO (knee ankle foot orthosis).	Page 95
Image 14	Takei A5102 Back & Leg Dynamometer.	Page 105
Image 15	Muscle strength measurement by hand held dynamometer.	Page 106
Image 16	Resisted exercises to lower limb muscles on the overhead pulleys.	Page 108
Image 17	Trunk muscles exercises on the wall bars.	Page 109

List of Tables

Table 1	Descriptive statistics of age and disease duration in both study groups.	Page 113
Table 2	Frequency of each level of injury in all patients.	Page 113
Table 3	Frequency of hypotonia at different levels in all patients.	Page 114
Table 4	Spasticity scores and tendon jerks in all patients.	Page 115
Table 5	Frequency of pathological reflexes in studied patients.	Page 116
Table 6	Frequency of sphincteric control in all patients.	Page 116
Table 7	The mean ASIA motor and sensory scores in all patients.	Page 116
Table 8	Frequencies of different ASIA impairment scales in all patients.	Page 116
Table 9	Muscle strength of both L.Ls of all patients.	Page 117
Table 10	mean serum testosterone level of all patients.	Page 117
Table 11	Comparison between both study groups as regards age and disease duration.	Page 118
Table 12	Comparison between levels of injury in both groups.	Page 118
Table 13	Comparison between both groups regarding hypotonia of L.L muscles.	Page 119

List of Tables

Table 14	Comparison of spasticity scores and tendon jerks.	Page 120
Table 15	Comparison of pathological reflexes between both study groups	Page 120
Table 16	Comparison of urinary and anal sphincters between both groups.	Page 121
Table 17	Comparison between ASIA motor and sensory scores in both groups	Page 121
Table 18	Comparison between both groups as regards ASIA impairment scale	Page 122
Table 19	Comparison between L.L muscle strength in both study groups.	Page 122
Table 20	Comparison between testosterone levels in both study groups.	Page 122
Table 21	Comparison of hypotonia in muscles around knee joint before and after treatment in both study groups.	Page 123
Table22	Comparison of hypotonia in muscles around ankle joint before and after treatment in both study groups.	Page 124
Table 23	Comparison between both groups regarding hypotonia around ankle joint	Page 124
Table 24	Comparison between mean spasticity scores, tendon jerk scores before and after treatment in group I	Page 125
Table 25	Comparison between mean spasticity scores, tendon jerk scores before and after treatment in group II	Page 126
Table 26	Comparison between ASIA motor score before and after treatment in both groups	Page 127
Table 27	Comparison between ASIA sensory score before and after treatment in both groups	Page 129

List of Tables

Table 28	Comparison between muscle strength of both L.Ls before and after treatment in both study groups	Page 130
Table 29	Comparison of both groups regarding spasticity scores and tendon jerks after treatment.	Page 131
Table 30	Comparison of pathological reflexes between both study groups	Page 132
Table 31	Comparison between both study groups regarding anal and urinary sphincter control after treatment	Page 132
Table 32	Comparison between ASIA motor and sensory scores after treatment in both groups	Page 133
Table 33	Comparison between both groups as regards ASIA impairment scale after treatment	Page 133
Table 34	Comparison between muscle strength in both study groups after treatment.	Page 134
Table 35	Comparison of change in muscle strength, ASIA sensory and motor scores between both study groups	Page 134
Table 36	Correlation between disease duration and mean spasticity score	Page 135
Table 37	Correlation between disease duration and ASIA scores and muscle strength of all patients	Page 136
Table 38	Correlation between disease duration and testosterone level before treatment.	Page 137

List of Tables

Table 39	correlation between testosterone level and ASIA motor, sensory scores and muscle strength of both lower limbs before treatment	Page 138
Table 40	Correlation between disease duration on admission and mean spasticity score after treatment	Page138
Table 41	Correlation between disease duration and ASIA scores and muscle strength of all patients after treatment.	Page139
Table 42	correlation between testosterone level and ASIA motor and sensory scores and muscle strength of both lower limbs after treatment	Page 140

Intorduction

Introduction

SCI is a traumatic insult to the spinal cord that can result in alteration of normal motor, sensory and autonomic function. Paraplegia involves the lower extremities and accounts for approximately 45% of SCI. Young men, 15 to 29 years old, account for approximately 80% of the 10,000 patients who have a SCI annually in the United States **(Young et al, 1993) (Staas et al, 1993)**.

Research center for SCI studies in Australia (1999) found that the rate of SCI from traumatic causes is the highest in the age group 15-24 years (about 95%). SCI are subdivided into complete injury with absence of sensory and motor function in the lowest sacral segment, and incomplete SCI with partial preservation of sensory and/or motor functions below the neurological level, which includes the lowest sacral segment. Effect of incomplete SCI varies according to the affected tract. Injury to the corticospinal tract or dorsal columns, respectively, results in ipsilateral paralysis or loss of sensation of light touch, proprioception, and vibration. Unlike injuries of the other tracts, injury to the lateral spinothalamic tract causes contralateral loss of pain and temperature sensation. Because the anterior spinothalamic tract also transmits light touch information, injury to the dorsal columns may result in complete loss of vibration

sensation and proprioception but only partial loss of light touch sensation. Anterior cord injury causes paralysis and incomplete loss of light touch sensation **(Janssen et al, 1989)**.

SCI is associated with changes in endocrine function of the male reproductive system, including testosterone hormone levels which are decreased mostly due to interruption of the pituitary-testicular axis **(Naftchi et al, 1980)**. Testosterone, the gonadal sex steroid hormone, has various effects on numerous body tissues. Beyond its reproductive function, this hormone is responsible for increased muscle mass and decreased risk of osteoporosis **(Kaiser et al, 1995)**.

One of the less known testosterone action is neuroprotection. By definition, the neuroprotection is an effect that may result in salvage, recovery or regeneration of the nervous system, its cells structure and function.These effects are induced directly through an androgen receptor on the neuron **(Hammond et al, 2001) (Tanzer et al, 2004)**.

Abnormally low serum testosterone levels are likely to negatively affect rehabilitation outcomes among men with SCI by increased body fat accumulation, decreased muscle mass and strength, depression and low life satisfaction, all of these health problems may be a caused by or exacerbated by low testosterone levels among men with SCI and interfere with rehabilitation