Trauma – Induced Brain Changes In Cases of Closed Head Injuries

Thesis submitted in the partial fulfillment
of The M.D. Degree in Forensic Medicine

By
Noha Sadek El Sayed Ibrahim
M.Sc. forensic Medicine
Medicolegal Examiner-Ministry of Justice

Under supervision of
Prof. Dr. Magdi Mahmoud El- Meligui
Professor of Forensic Medicine & Clinical Toxicology
Faculty of Medicine – Ain Shams University

Prof. Dr. Hanaa Mohammed Abdel Rahman
Professor of Forensic Medicine & Clinical Toxicology
Faculty of Medicine – Ain Shams University

Dr. Rasha El-Hossiny Abou Anza
Lecturer of Forensic Medicine & Clinical Toxicology
Faculty of Medicine – Ain Shams University

Dr. Haidy Farid Abdel Hamid
Lecturer of Anatomy
Faculty of Medicine – Ain Shams University

Faculty of Medicine – Ain Shams University
٢٠٠٧

List Of Charts

List Of Charts

List of Contents

List Of Figures

List Of Figures

List Of Figures

h

List of Abbreviations

ACA	Anterior cerebral artery
AI	Axonal injury
BBB	Blood brain barrier
CBF	Cerebral blood flow
CBV	Cerebral blood volume
CHI	Closed head injury
CNS	Central nervous system
cong.	Congestion
CPP	Cerebral perfusion pressure
CSF	Cerebrospinal fluid
CT	Computerized tomography
DAI	Diffuse axonal injury
EDH	Extradural / epidural hemorrhage
Fig.	Figures
GCS	Glasco coma scale
Hge.	Hemorrhage
HI	Head injury
hs	Hours
Hx & E	Hematoxylin and Eosin
ICH	Intracerebral hemorrhage
ICP	Intracranial pressure
MCA	Middle cerebral artery
MHI	Mild / minor head injury

ml	Milliliter
mm	Millimeter

List of Abbreviations

MMA	Middle meningeal artery
MRI	Magnetic resonance imaging
MSB	Martius scarlet blue stain
PCA	Posterior cerebral artery
RBCs	Red blood corpusles
SAH	Subarachnoid hemorrhage
SDH	Subdural hemorrhage
TAI	Traumatic axonal injury
TBI	Traumatic brain injury
VS	Vegetative state
vs	Versus

Acknowledgment

"First of all thanks to Allah"

I would like to present my sincere thanks and appreciation to **Prof. Dr. Magdi El-Meligui**, Professor of Forensic Medicine and Clinical Toxicology Faculty of Medicine, Ain Shams University, for his kind guidance and constant encouragement.

I would like to express my deepest gratitude to **Prof. Dr. Hanaa Mohamed Abdel Rahman**, Professor of Forensic Medicine and Clinical Toxicology Faculty of Medicine, Ain Shams University, for her great unlimited help, meticulous supervision, constant encouragement and guidance throughout this work.

I would like to present my sincere thanks to **Dr. Rasha El-Hossiny** Lecturer of Forensic Medicine and Clinical Toxicology Faculty of Medicine, Ain Shams University, for her great support, constant encouragement and close supervision throughout this work.

I would like to present my sincere thanks to **Dr. Haidy Abdel Hamid** Lecturer of Anantomy Faculty of Medicine, Ain Shams

University, for her great help, close supervision and constant guidance throughout this work.

I would like to present my sincere appreciation to **Dr. Hanan Hosny** MD Pathology, Specialist of Forensic Pathology, Medicolegal Administration for her great help and participation in this work.

I am deeply indebted to **All My Professors** and **Colleagues** in the Forensic Medicine and Clinical Toxicology Department, Faculty of Medicine, Ain Shams University, for their effective help and enthusiastic cooperation.

My deep thanks and great feelings extend to **All My Colleges** at the Medicolegal Administration - Cairo, Ministry of Justice, for their warm kindness and continuous support.

Last but not least, I wish to thank **All Members of My Family** for their real help, kind care and reassurance throughout my whole life.

Noha Sadek

Introduction

Blunt head injury is a leading cause of death and disability; it may affect the activities of daily life and increase the risk of re-admission to hospitals with subsequent death, and it can lead to ongoing neuropsychological deficits ***(Pickett et al.,*** ٢٠٠١***)***.

Trauma to the head may damage the scalp, skull or brain. The most important consequence of head trauma is traumatic brain injury (TBI). Head injury may occur either as a closed head injury or as a penetrating head injury, as when a bullet pierces the skull. Severe injuries can be fatal because of profound brain damage ***(Smith,*** ٢٠٠٦***)***. Many deaths occur before admission to hospital and most of those occurring after admission happen within the first month ***(Pentland et al.,*** ٢٠٠٥***)***.

A head injury may cause damage both from the direct physical injury to the brain and from secondary factors, such as; lack of oxygen, brain swelling, and disturbance of blood flow. Both closed and penetrating head injuries can cause swirling movements throughout the brain, tearing nerve fibers and causing widespread bleeding or a blood clot in or around the brain. Swelling may raise pressure within the skull and may block the