Paediatric Stroke

Essay

Submitted for Partial Fulfillment of Master Degree
*in **Neuropsychiatry***

By

Hamed Shater Elarab Ali
(M.B.B.Ch.)

Supervised by

Prof. Dr. Mahmoud Haroun El-Balkimy
Professor of Neuropsychiatry
Faculty of Medicine - Ain Shams University

Prof. Dr. Naglaa Mohamed El-Khayat
Assistant Professor of Neuropsychiatry
Faculty of Medicine - Ain Shams University

Dr. Ali Soliman Ali Shalash
Lecturer of Neuropsychiatry
Faculty of Medicine - Ain Shams University

Faculty of Medicine
Ain Shams University
2009

List of Contents

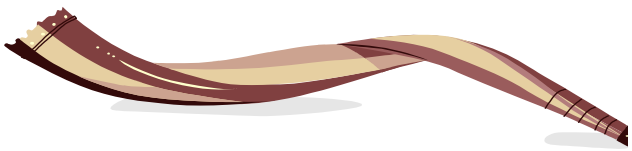
Acknowledgment

First and foremost grateful to Allah the most kind and merciful for helping me to achieve this work.

I would like to express my profound gratitude and respect to ***Prof. Dr. Mahmoud Haroun El-Balkimy,*** *Professor of Neuropsychiatry, Faculty of Medicine, Ain Shams University, for his valuable care, constructive criticism and continuous encouragement throughout the whole work. It was by his continuous guidance that this work has come to light.*

I would like to express my deepest thanks and gratitude to ***Prof. Dr. Naglaa Mohamed El-Khayat,*** *Assistant Professor of Neuropsychiatry, Faculty of Medicine, Ain Shams University, for her valuable assistance and kind supervision in conveying her experience to complete this work.*

I would like to express my deepest thanks and gratitude to ***Dr. Ali Soliman Ali Shalash,*** *Lecturer of Neuropsychiatry, Faculty of Medicine, Ain Shams University, for his valuable assistance and kind supervision in conveying his experience to complete this work.*



Hamed Shater Elarab

List of Tables

List of Figures

List of Abbreviations

AAC····· Alternative and augmentative communication
ACT ····· Anticoagulation therapy
AD ····· Autosomal dominant
AFOs ····· Ankle-foot orthoses
AIS····· Arterial ischemic stroke
APTT ····· Activated partial thromboplastin time
AR ····· Autosomal recessive
ASA ····· Acetylsalisylic acid
AT-III ····· Antithrombin III
AVMs ····· Arteriovenous malformations
CNS ····· Central nervous system
CSE····· Cardiac source of embolism
CSF····· Cerebrospinal fluid
CSVT……..Cerebral sino-venous thrombosis
CT····· Computed tomography
CTA ····· CT angiography
CVT ····· Cerebral venous thrombosis
DAFOs····· Dynamic ankle-foot orthose:
DWI ····· Diffusion-weighted imaging
EDAS····· Encephalo-duro-arterio-synangiosis
EEG…….Electroencephalogram
HIV ····· Human immunodeficiency virus
HS····· Hemorrhagic stroke
ICA ····· Internal carotid artry
ICH ····· Intracerebral hemorrhage
ICP····· Intracranial pressure

List of Abbreviations (Cont.)

ICU ····· Intensive care unite

INR ····· International normalized ration

IPH ····· Intraparenchymal hemorrhage

IPSS ····· International Pediatric Stroke Study

ITP ····· Immune thrombocytopenic purpura

IVH……..Intraventricular hemorrhage

LMWH ····· Low molecular weight heparin

MCA ····· Middle cerebral artery

MELAS ····· Mitochondrial myopathy, encephalopathy, lactic acidosis, and stroke like episode

MMD ····· Moya moya disease

MRA ····· Magnetic resonance angiography

MRI ····· Magnetic resonance imaging

MRV ····· Magnetic resonance venography

MTHFR……Methylenetetrahydrofolate reductase

NHDS…….. National Hospital Discharge Survey

OWRS ····· Osler-Weber-Rendu syndrome

PAPS ····· Primary antiphospholipid antibody syndrome

PET ····· Positron emission tomography

PFO ····· Patent foramen ovale

PMM ····· Phosphomannomutase

PT ····· Prothrombin time

PTT ····· Partial thromboplastin time

RCT**……**Randomized controlled trial

rTPA ····· Recombinant tissue plasminogen activator

List of Abbreviations (Cont.)

SCD ····· Sickle cell disease

SPECT ····· Single photon emission tomography

STA-MCA ····· Superficial temporal artery-middle cerebral artery

STICH……..Surgical Trial in Intracerebral Haemorrhage

STOP..... Stroke Prevention Trial in Sickle Cell Anemia

TCD ····· Transcranial Doppler

TEE····· Transesophageal echocardiography

TGF ····· Transforming growth factor

TIA ····· Transient ischemic attack

TTE····· Transthoracic and transesophageal color-flow Doppler

TTP…….Thrombotic thrombocytopenic purpura

UFH ····· Unfractionated heparin

UK ····· United kingdom

WARRS ····· Warfarin-Aspirin Recurrent Stroke Study

XR ····· X-linked recessive

List of Contents

List of Tables

List of Figures

List of Abbreviations

AAC····· Alternative and augmentative communication
ACT ····· Anticoagulation therapy
AD ····· Autosomal dominant
AFOs ····· Ankle-foot orthoses
AIS····· Arterial ischemic stroke
APTT ····· Activated partial thromboplastin time
AR ····· Autosomal recessive
ASA ····· Acetylsalisylic acid
AT-III ····· Antithrombin III
AVMs ····· Arteriovenous malformations
CNS ····· Central nervous system
CSE····· Cardiac source of embolism
CSF····· Cerebrospinal fluid
CSVT……..Cerebral sino-venous thrombosis
CT····· Computed tomography
CTA ····· CT angiography
CVT ····· Cerebral venous thrombosis
DAFOs····· Dynamic ankle-foot orthose:
DWI ····· Diffusion-weighted imaging
EDAS····· Encephalo-duro-arterio-synangiosis
EEG…….Electroencephalogram
HIV ····· Human immunodeficiency virus
HS····· Hemorrhagic stroke
ICA ····· Internal carotid artry
ICH ····· Intracerebral hemorrhage
ICP····· Intracranial pressure

List of Abbreviations (Cont.)

ICU ····· Intensive care unite

INR ····· International normalized ration

IPH ····· Intraparenchymal hemorrhage

IPSS ····· International Pediatric Stroke Study

ITP ····· Immune thrombocytopenic purpura

IVH……..Intraventricular hemorrhage

LMWH ····· Low molecular weight heparin

MCA ····· Middle cerebral artery

MELAS ····· Mitochondrial myopathy, encephalopathy, lactic acidosis, and stroke like episode

MMD ····· Moya moya disease

MRA ····· Magnetic resonance angiography

MRI ····· Magnetic resonance imaging

MRV ····· Magnetic resonance venography

MTHFR……Methylenetetrahydrofolate reductase

NHDS…….. National Hospital Discharge Survey

OWRS ····· Osler-Weber-Rendu syndrome

PAPS ····· Primary antiphospholipid antibody syndrome

PET ····· Positron emission tomography

PFO ····· Patent foramen ovale

PMM ····· Phosphomannomutase

PT ····· Prothrombin time

PTT ····· Partial thromboplastin time

RCT**……**Randomized controlled trial

rTPA ····· Recombinant tissue plasminogen activator

List of Abbreviations (Cont.)

SCD ····· Sickle cell disease

SPECT ····· Single photon emission tomography

STA-MCA ····· Superficial temporal artery-middle cerebral artery

STICH……..Surgical Trial in Intracerebral Haemorrhage

STOP..... Stroke Prevention Trial in Sickle Cell Anemia

TCD ····· Transcranial Doppler

TEE····· Transesophageal echocardiography

TGF ····· Transforming growth factor

TIA ····· Transient ischemic attack

TTE····· Transthoracic and transesophageal color-flow Doppler

TTP…….Thrombotic thrombocytopenic purpura

UFH ····· Unfractionated heparin

UK ····· United kingdom

WARRS ····· Warfarin-Aspirin Recurrent Stroke Study

XR ····· X-linked recessive

Introduction

The World Health Organization has defined stroke as "rapidly developing clinical signs of focal (at times global) disturbance of cerebral function, lasting more than 24 hours or leading to death with no apparent cause other than that of vascular origin." By conventional clinical definitions, if the neurologic symptoms continue for more than 24 hours, a person is diagnosed with stroke; otherwise, a focal neurologic deficit lasting less than 24 hours is defined as a transient ischemic attack (TIA) ***(Sacco, 2005).***

Pediatric stroke - a cerebrovascular event in a child aged 30 days to 18 years - is estimated to occur in 2 to 3 of every 100,000 children in the United States per year ***(Nield et al.,2006).*** Long-term outcome for survivors of hemorrhagic and ischemic stroke is nearly the same in children ***(Fullerton et al.,2004).***

In the adult patient, atherosclerosis and hypertension predispose to ischemic and hemorrhagic stroke, respectively. Other risk factors include diabetes, elevated lipids, and cardiovascular disease. These risk factors are rare in the pediatric population, however, Strokes in children arise from numerous causes. Cardiovascular disease and sickle cell disease are the most common etiologies. Congenital heart disease has been reported as the leading cause of childhood stroke ***(Carlin and Chanmugam, 2002).***