Cognitive and Neurological Complications of Meningitis at Abbassia Fever Hospital

Thesis

Submitted for partial fulfillment of Master Degree
In Tropical Medicine

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2014

Acknowledgment

First and foremost, I feel always in depth to Allah the most Merciful and the most Gracious. Thanks to Allah who lightened my path to become a student of a noble profession and granted me the ability to accomplish this work.

I would like to express my sincere gratitude and deep appreciation to Dr Iman Mohamed El Gindy Professor of Tropical Medicine Ain Shams University; for her close supervision, support, guidance, patience, valuable instructions, advices and continuous help. I learned from her many, not only in medicine, but also in life.

I am profoundly grateful to Dr Fatma Ahmed Ali El Din Assistant Professor of Tropical Medicine, Faculty of Medicine Ain Shams University, for her guidance, valuable comments and careful supervision .She has generously dedicated much of her valuable time and effort to present this work in an ideal form.

My sincere thanks go to Dr Eman Mohamad Bayoumy , consultant of Neurology, Faculty of Medicine Ain Shams University; for her kind supervision and

faithful guidance. She generously helped me in the neurological part of this work in a supportive, patient and educative way.

I am forever grateful to all my professors and Colleagues I owe them very much for their constant education and advices.

Many thanks for my parents, brothers and sisters, my wife and children for their love, support, patience, and understanding &always praying for me.

Last but not least, no words ever can express my extreme thanks to the patients of whom some were dead and some seriously affected in their struggle with meningitis, without their help, this work could not have seen the light. I ask Allah this work may help patients to have better outcome in the near future .....

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List of Abbreviations

Abb.	Meaning

ADA.....Adenosin deaminase

AFB .....Acid fast bacilli

BBB.....Blood-Brain barrier

CBC.....Complete blood count

CDC.....Centers for Disease Control and Prevention

CTD .....Connective tissue disease

CN .....Cranial Nerve

CNS..... Central nervous system

CRP .....C-reactive protein

CSF.....Cerebrospinal fluid

CT.....Computed tomography

DCL.....Disturbed conscious level

DIC.....Disseminated intravascular coagulopathy

EEG.....Electroencephalogram

ESR .....Erythrocyte sedimentation rate

GCS .....Glasgow coma score

GOS.....Glasgow outcome scale

HIV.....Human immunodeficiency virus

HSV .....Herpes simplex virus

ICP .....Intracranial pressure

IV.....Intravenous

JCV.....John Cunningham virus

MMSE .....Mini Mental State Examination

MRI .....Magnetic resonance imaging

PMN .....Polymorphonuclear leukocytes

RT-PCR .....Reverse transcriptase polymerase chain reaction

SIADH.....Syndrome of inappropriate antidiuretic hormone secretion

SLE.....Systemic lupus erythematosus

TB.....Tuberculous

TNF- α.....Tumor necrosis factor alpha (TNF-α)

WHO.....World health organization

WMS.....Wechsler Memory Scale

INTRODUCTION

Acute infections of the nervous system are among the most important problems in medicine because early recognition, efficient decision-making, and rapid institution of therapy can be lifesaving. These distinct clinical syndromes include acute bacterial meningitis, viral meningitis, encephalitis and other focal infections. Each of these clinical syndromes may present with a nonspecific prodrome of fever and headache, this prodrome in a previously healthy individual may initially be thought a benign illness **(Longo et al., 2012).**

Acute meningitis is clinically defined as a syndrome characterized by the onset of meningeal symptoms over the course of hours to up to several days. Headache is a prominent early symptom, often followed later by a state of abnormal consciousness, or coma **(Tunkel et al., 2010).**

Despite advances in medical care, the introduction of cranial computed tomography (CT) and improvements in intensive care support, the mortality from bacterial meningitis remains high. The global spread of multidrug-resistant bacteria has further complicated the treatment of patients with bacterial meningitis **(van de Beek et al., 2010).**

Worldwide, it has been estimated that 1-2 million cases of bacterial meningitis occur annually. The problem is more significant in resource-poor countries including those in some regions of Sub-Saharan Africa, Southeast Asia, and Latin America **(Franco-Paredes et al., 2008).**

Tuberculous meningitis is a life-threatening form of tuberculosis and is the most common form of central nervous system (CNS) tuberculosis **(Girgis et al., 1998).**

There is little information about the severity and distribution of the different types of sequelae. Additionally, the financial burden that families incur in caring for disabled individuals is commonly not calculated or is underestimated. Data are especially poor from low-income countries, where the risks of infection are highest and care is least accessible **(Edmond et al., 2010).**

Bacterial meningitis is associated with high mortality and risk of neuropsychological sequelae **(Ramakrishnan et al., 2009).**

After bacterial meningitis, patients are at high risk of cognitive impairment **(Hoogman et al., 2007).**

Research on cognitive outcome in bacterial meningitis is scarce and often with methodological shortcomings **(Weisfelt et al., 2006)**.

Mortality and serious long-term sequelae still occur in about 50% of patients with tuberculous meningitis **(Anderson et al., 2010).**

Patients suffering from viral meningitis may experience cognitive impairment following the acute course of the disease **(Damsgaard et al., 2011).**

Fungal meningitis is a serious disease caused by a fungal infection of the CNS mostly in individuals with immune system deficiencies **(Liu et al., 2012).**

Outcome is frequently assessed by the Glasgow outcome scale (GOS), which is a well validated scale with good interobserver agreement (**Weisfelt et al., 2006)**.

Inpatient hospital audit and peer review has improved markedly over the past decade, but post-discharge care has not received the same attention **(Edmond et al., 2010)**.

AIM OF THE WORK

The aim of this work was to study and clarify the different cognitive and neurological complications in patients diagnosed with meningitis and presented to Abbassia fever hospital.

INTRODUCTION TO MENINGITIS

Anatomy of the meninges:

The meninges are an important connective tissue envelope investing the brain. Their function is to provide a protective coating to the brain and also they participate in the formation of blood–brain barrier. Understanding their anatomy is fundamental to understanding the location and spread of pathologies in relation to the layers **(Patel and Kirmi, 2009)**.

The cranial meninges also form the supporting framework for arteries, veins, and venous sinuses; and enclose a fluid-filled cavity, the subarachnoid space. The meninges are composed of three membranous connective tissue layers **(Fig 1)**:

- Dura mater (dura): tough, thick external fibrous layer.
- Arachnoid mater (arachnoid): thin intermediate layer.
- Pia mater (pia): delicate internal vascular layer.

The arachnoid and pia are continuous membranes that make up the leptomeninx. The arachnoid is separated from the pia by the subarachnoid space, which contains cerebrospinal fluid (CSF). This is a clear liquid similar in constitution to blood; it provides nutrients but has less protein and a different ion concentration. CSF is formed predominantly by the choroid plexuses within the four ventricles of the brain. CSF leaves the ventricular system of the brain and enters the subarachnoid space, where it cushions and nourishes the brain **(Fig 2) (Keith et al., 2010)**.

Dura mater

The dura mater consists of two layers, an external periosteal layer and an internal meningeal layer . The two dural layers are indistinguishable except where they separate to enclose the dural venous sinuses **(Tank, 2005)**.

Dura mater is thick, dense and fibrous. It is predominantly acellular, and consists mainly of densely packed fascicles of collagen fibres arranged in laminae. The fascicles run in different directions in adjacent laminae, producing a lattice-like appearance which is particularly obvious in the tentorium cerebelli and around the defects or perforations that sometimes occur in the anterior portion of the falx cerebri. The meningeal layer of the dura is reflected inwards to form four septa, namely the falx cerebri, falx cerebelli, diaphragma sellae and tentorium cerebelli that partially divide the cranial cavity into compartments **(Standring, 2008).**

In the skull, the outer layer of the dura mater is closely applied to the inner table of the skull and corresponds to the periosteum. It does not only have connective and supportive functions but also may play a role in the formation of the cranial bones. This outer portion of the dura mater contains the meningeal arteries and veins, which form grooves in the inner table of the skull **(Sze, 1993).**

Spinal dura mater forms a loose sheath round the spinal cord, extending from the foramen magnum to the second sacral vertebra. Thereafter it encloses the filum terminale and fuses with the periosteum of the coccyx **(Fig 3)**. It is an extension of the inner layer of cerebral dura mater and is separated from the periosteum of the vertebrae and ligaments within the