Role of Comprehensive Magnetic Resonance Imaging in diagnosis of Epilepsy in Children

Thesis

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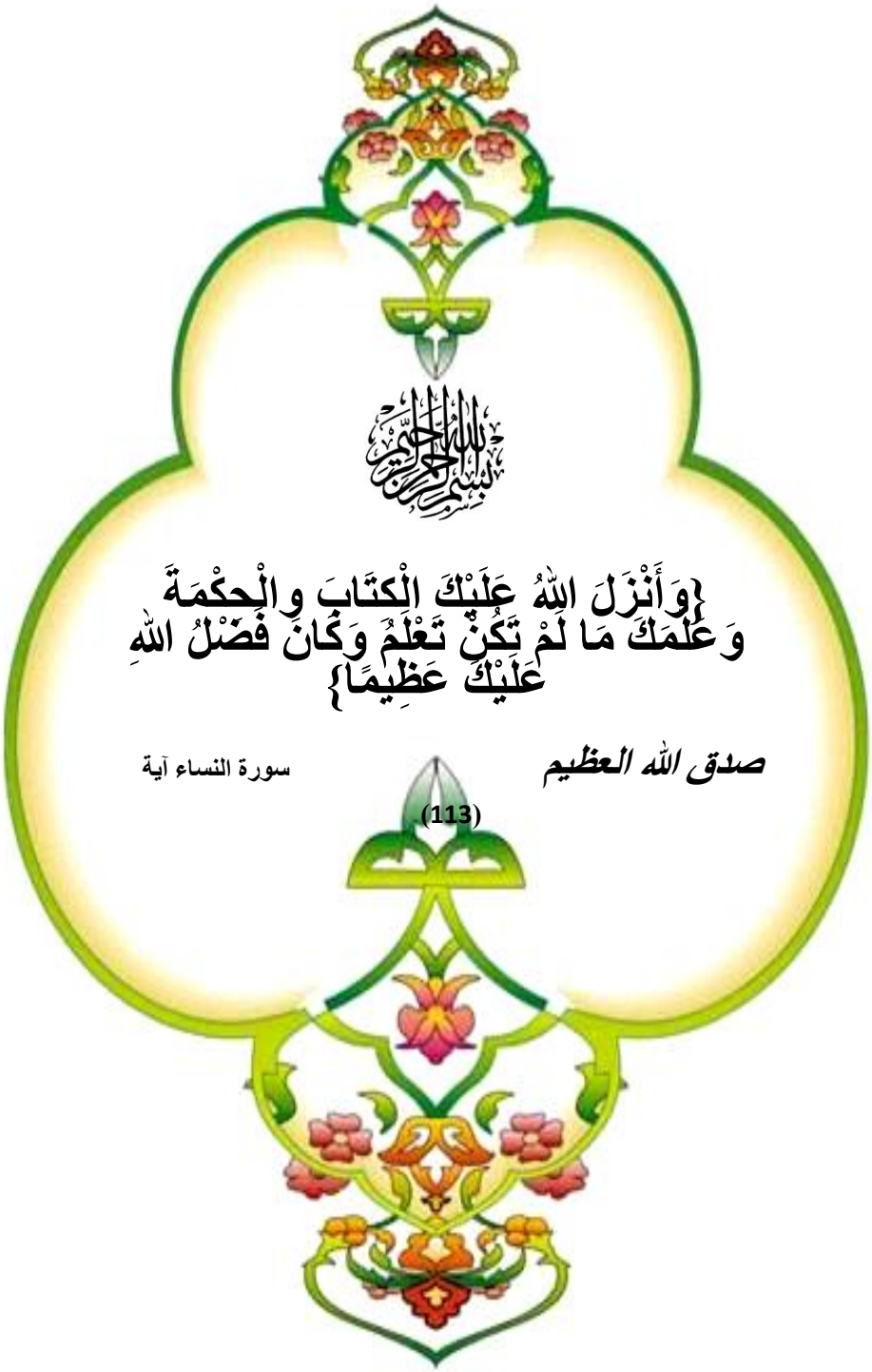

بسم الله الرحمن الرحيم

{وَأَنْزَلَ اللهُ عَلَيْكَ الْكِتَابَ وَالْحِكْمَةَ وَعَلَّمَكَ مَا لَمْ تَكُنْ تَعْلَمُ وَكَانَ فَضْلُ اللهِ عَلَيْكَ عَظِيمًا}

صدق الله العظيم

سورة النساء آية (113)

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List of Abbreviations

ADC ..... Apparent diffusion coefficient

ASL ..... Arterial spin labeling

CBF ..... Cerebral blood flow

CSF..... Cerebrospinal fluid

CT..... Computed Tomograohy

DSC ..... Dynamic contrast-enhanced

DWI ..... Diffusion weighted image

EEG ..... Electroencephalogram

FA..... Fractional anisotropy

FCD ..... Focal cortical dysplasia

FLAIR..... Fluid-attenuated inversion recovery

fMRI ..... Functional magnetic resonance imaging

ILAE..... International League against Epilepsy

MRI..... Magnetic resonance imaging

MTC..... Mesial temporal sclerosis

rCBV ..... relative cerebral blood volume

SWS..... Sturge-Weber syndrome

TSC..... Tuberous sclerosis complex

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ABSTRACT

Background: Epilepsy is a condition characterized by recurrent (two or more) epileptic seizures which are unprovoked by any immediate identifiable cause. Regarding its etiology, it may be of known cause or cryptogenic (presumed to be symptomatic, but the etiology is not known).

Aim of study: Establishment of comprehensive magnetic resonance imaging protocol for children with epilepsy and its role in diagnosis.

Patients and Methods: This study included selected 229 children with epilepsy, referred to Radilodiagnosis department at Ain shams University Hospitals from the departments of Pediatric, Neurology and Neurosurgery departments as well as outpatient clinics with age ranged from one month to 18 years Patient with contraindication to MRI were excluded.

Results: Our study include 229 children with epilepsy, normal MRI is seen in 111 cases (48.5%) MRI findings specific to the cause of epilepsy was found in 118 cases (51.5%).123 of our cases presented with seizures only with normal neurological examination

Conclusion: MRI is the imaging modality of choice in the evaluation of pediatric patients presenting with epilepsy. Epilepsy in children having many causes. The comments etiology is diffuse brain atrophy represented about 43 cases (18.7%) of present study.

Keywords: Apparent diffusion coefficient, International League against Epilepsy, Diffusion weighted image

Introduction

INTRODUCTION

Epilepsy is a group of neurological diseases characterized by epileptic seizures that are the result of excessive and abnormal cortical nerve cell activity in the brain ***(Fisher et al., 2014).*** About 1% of people worldwide (65 million) have epilepsy, and nearly 80% of cases occur in developing countries ***(Thurman et al., 2011).***

In 2013 epilepsy resulted in 116,000 deaths, up from 112,000 deaths in 1990. The most common type (60%) of seizures are convulsive; of these, one-third begin as generalized seizures from the start, affecting both hemispheres of the brain; two-thirds begin as partial seizures (which affect one hemisphere of the brain), which may then progress to generalized seizures; and the remaining 40% of seizures are non-convulsive, which present as a decreased level of consciousness and usually last about 10 seconds ***(Wang et al., 2017).***

In order to diagnose and find out its etiology, there are many neuro-radiological investigations that can be utilized. These include x-ray of skull, pneumocephalography, carotid angiography, CT and MRI. In this context, the revolutionary

introduction of MRI for evaluation of seizures has been a great boon, both for the diagnosis of cerebral lesions as well as clinical management of patients with neurologic disorders.

The superiority of Magnetic Resonance Imaging (MRI) over X-ray, Computed Tomography (CT) scanning in terms of sensitivity and specificity for identifying the aetiology of epilepsy in both adults and children is firmly established. The most common abnormalities identified are Hippocampal Sclerosis (HS), Malformations of Cortical Development (MCD), vascular malformations, tumours and acquired cortical damage ***(Wang et al., 2017).***

The principal clinical applications of MRI are to identify the structural basis of epilepsy and patients, who are suitable for surgical treatment. Rapid advances are being made in MRI techniques, so that patients who were previously regarded as being MRI negative may have relevant abnormalities, which can be identified with contemporary optimal imaging. MR imaging has emerged as the more diagnostically relevant and most valuable tool for preoperative localization of epileptogenic focus because of its excellent soft tissue contrast, allowing for detailed depiction of anatomy, freedom from beam–hardening artifact in basal brain that occur with CT and capacity for multiplanar imaging ***(Wang et al., 2017).***

The diagnosis of epilepsy with the help of MRI has made this diagnostic tool beyond compare to other investigations. Postoperative MR may detect reasons for failure such as inadequate resection and can monitor tumour recurrence on follow up imaging. MRI is especially useful for prognosticating postoperative seizure control ***(Wang et al., 2017).***

Imaging children under general anaesthesia is becoming routine and preferred by operators because it ensures patient conformity and provides a more controlled environment. The main goals of paediatric sedation/general anaesthesia (S/GA) vary according to the specific imaging procedure, but generally encompass anxiety relief, pain control and control of excessive movement ***(Arlachov et al., 2012).***

The American Academy of Pediatrics defines the goals of sedation in the paediatric patient for diagnostic and therapeutic procedures as follows: to guard the patient's safety and welfare; to minimise physical discomfort and pain; to control anxiety, minimise psychological trauma and maximise the potential for amnesia; to control behaviour and/or movement to allow for the safe completion of the procedure; and to return the patient to a state in which safe discharge from medical supervision, as determined by recognised criteria, is possible (**American Academy of Pediatrics, 2006).**

Aim of the Work