International Journal of Advanced Multidisciplinary Research
ISSN: 2393-8870
www.ijarm.com
DOI: 10.22192/ijamr Volume 8, Issue 1 -2021

Research Article

DOI: http://dx.doi.org/10.22192/ijamr.2021.08.01.009

Role of MRI in evaluation of Epileptic patient

Dr Anju Yadav[1], Dr Bir Singh Yadav[2], Dr Nikhil Sharma[3], Dr Vishal Goyal[4]

[1] MD Radiology, Department of Radiology, Maharaja Agrasen Medical College, Agroha, Hisar, Haryana- 125047
[2] MD Psychiatry, Shanti Mission Hospital, Model Town, Hisar, Haryana – 125001
[3] MD Radiology, Department of Radiodiagnosis, S.N. Medical College, Agra -282 002
[4] MD Radiology, DM Neuroradiology, Vishal Diagnostics, Model Town, Hisar, Haryana - 125001

Keywords

Imaging,
brain, protocol,
MRI,
Seizures,
epilepsy

Abstract

Background: MRI plays an important role for the accurate diagnosis in patients with epileptic disorder. Accurate etiology and diagnosis of epilepsy is important for an effective medical or surgical management. MRI is the most sensitive and specific imaging technique for identification of epileptogenic substrates, based on imaging findings. The present study aims to find the spectrum of imaging findings of first onset epilepsy on MRI in developing country. **Methods:** A total of 100 patients, those referred from various outdoor/indoor departments with the history of seizure were included after fulfilling the inclusion criteria. Detailed history, appropriate clinical examinations and biochemical investigations were recorded. All MRI scans were performed on Super conductive 1.5 Tesla Philips Intera MRI scanner. Sequences were used according to MR Imaging protocol of seizures. Observation was made and analysed using descriptive tools and scientific methods.
Results: Out of total 100 patients included in the study, 61 were male and 39 were females. Slight male preponderance was noted with male to female ratio of 1.51:1. Maximum patients were of 2nd decade (27 %) followed by 3rd decade (26 %). GTCS was the most common clinical diagnosis constituting (58%) cases. This is followed by myoclonic seizures (8.0 %). Unclassified accounts for 24 %. The MRI findings were normal in 33 (33%) cases and revealed spectrum of abnormalities in 67 (67%) cases.
Conclusions: The present study was a prospective study. Spectrum of MRI findings related to vascular, developmental, infection and neoplasm was identified. MRI is noninvasive modality with no radiation hazard, excellent gray white matter resolution and multiplanar imaging capability. MRI helps in detection of subtle lesions responsible for seizures. Present study observed that MRI with appropriate imaging protocols add sensitivity and specificity in evaluation of seizures.

*[2]Corresponding Author: Dr. Bir Singh Yadav.

Introduction

Seizure is a paroxysmal alteration in neurologic function resulting from abnormal excessive neuronal electrical activity and usually a symptom of focal or generalized brain abnormality. Epilepsy is a chronic condition characterized by recurrent seizures unprovoked by an acute systemic or neurologic insult. [1]

Epilepsy is a major public health problem in developing countries like India. Out of the 50 million people with epilepsy worldwide, most of them reside in developing countries. There are approximately 10 million people suffering with epilepsy in India and the prevalence is seen to be dominating the rural (1.9%) compared to urban population (0.6%) [2].

An epileptic seizure is a clinical manifestation of abnormal, excessive neuronal activity arising in the grey matter of the cerebral cortex. Up to 10% of population will have at least one seizure in their lifetime, but only 2% of the population will develop epilepsy. Approximately, 34 to 76 new cases per 100,000 diagnosed every year. [3] In order to diagnose and find out the etiology of the lesion, there are many neuro-radiological investigations that can be utilized. These include x-ray of skull, pneumocephalography, CSF examination, carotidangiography, EEG, 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 imaging of epilepsy has vastly changed since the end of the 20th century. Prior imaging with Computed Tomography (CT) scanning infrequently revealed the pathologic substrate for epilepsy [4]. MR imaging has revolutionized the evaluation of epilepsy and it is superior to CT for detection of structural abnormalities. The initial low-field strength MRI though increased the diagnostic numbers; it has its own limitation sand could identify only the neoplasms, encephalomalacia and vascular malformations [5].

Materials and Methods

The following study explains the role of MRI in depicting the etiology and spectrum of MRI findings in patients with seizure disorder.

This is a Prospective study conducted on 100 patients with clinical impression of seizures who were subjected to MRI scanning. A detailed history was taken and clinical examination was done. The points noted were duration of illness, type of seizures, and any associated illness. Detailed clinical and neurological examination was done to find any neurological deficit. Based on the history and examination, a clinic etiological diagnosis was made. The procedure was briefly explained to the patient including the risks of contrast examination.

An Informed consent to participate was obtained from the subjects. The patients underwent EEG to locate the epileptogenic focus before they were subjected to MRI. All patients were classified according to the most widely used classification of epileptic seizure ILAE principally [6] based on clinical seizure type and interictal EEG findings. Patients were subjected to MRI scan of the brain on superconductive 1.5 Tesla Magnetom Symphony Maestroclass MRI scan (Siemens AG Co. Relangen).

Inclusion Criteria: 1.All patients who presented with seizures. 2. Patients of both sex, irrespective of their religion, age or socio-economic status.

Exclusion Criteria

Patients with known contraindication to MRI, such as pacemakers, metallic implants, or aneurysmal clips.

Statistical Analysis

The data were analyzed by SPSS. Statistical analysis was done by using percentages and proportion.

Results

Out of total 100 patients included in the study, 61 were male and 39 were females. Slight male preponderance was noted with male to female ratio of 1.51:1. Maximum patients were of 2nd decade (27 %) followed by 3rd decade (26 %) (Table 1). GTCS was the most common clinical diagnosis constituting (58%) cases.

This is followed by myoclonic seizures (8.0 %) (Table 2). Unclassified accounts for 24 %. The MRI findings were normal in 33 (33%) cases and revealed spectrum of abnormalities in 67 (67%) cases (Table 3).

Table 1 showing age and sex distribution

Age (years)	Male (number)	Female(number)
<1	1	0
1-10	1	1
11-20	18	9
21-30	15	11
31-40	9	7
41-50	6	4
51-60	7	5
61-70	3	2
>70	1	0

Table 2 distribution of patients on the basis of seizures

Types of Seizure	Frequency	Percentage (%)
Generalised Tonic Clonic Seizure(GTCS)	58	58.0
Simple	3	3.0
Absence	1	1.0
Complex Partial	4	4.0
Complex Partial with Secondary Generalisation	1	1.0
Tonic	1	1.0
Myoclonic	8	8.0
Atonic	0	0.0
Unclassified	24	24.0

Table 3 distribution of patients on the basis of MRI findings

MRI diagnosis	Number of patients	Percentage (%)
Cystic Encephalomalacia with Gliosis	10	10
Arterial Venous Malformation	2	2.0
Acute Infarct	2	2.0
Chronic Infarct	2	2.0
Chronic Ischaemic Small Vessesl Disease	9	9.0
Hydrocephalous	1	1.0
Haemorrhage	2	2.0
Thrombosis	1	1.0
Foci of Demyelination	3	3.0
Hypoxic Injury	2	2.0
Meningitis	1	1.0
Encephalitis	8	8.0
Edema	8	8.0
Granulomas	3	3.0
Atrophy	9	9.0
Neoplasms	5	5.0
Developmental Malformation	1	1.0
Normal	33	33.0

Discussion

Patients presenting with seizures can have wide range of MR imaging abnormalities depending upon the etiology. MRI can reliably identify and localize the intracranial abnormality so that further management can be planned accordingly. Patients presented with seizures of varying duration ranging from few days to few months. GTCS was the most common clinical diagnosis constituting (58.0%) cases followed by myoclonic seizures (8.0%). In this study, 72% patients were aged <40 years, 22% patients among 40-60 years, and 06% patients >60 years. In various studies like , Kaur S et al, and pannang et al, similar age distribution was reported. [6,7] In studies by Murlidhara et al, (64%), Hirani et al, (54%), highest proportion of patients were also aged <40 years.[8] There was male predominance, male 61 (61.0%) and female 39 (9.0%). Male to female ratio was 1.51:1 in our study. Literature reported mild to moderate preponderance of males, as seen in studies by Muralidhar et al, (2.12:1), Hirani et al, (1.17:1), and Sendil et al,(1.63:1).[8-10]

The MR examination revealed normal study in 24 (24%) patients. That indicate most common cause of seizure disorder is idiopathic. Jiménez et al, and Hirani et al, reported a high prevalence of idiopathic seizures in adults (51% and 40%, respectively). [10-11] This study is comparable to study done by Pannag KN et al, (45.7%).[7] However, it is higher than study done by Kaur et al, (30%).[6] which is in accordance to our study (24 %).

The MR examination revealed pathological findings in 67out of 100 patients (67%) which includes, Chronic Ischemic Small Vessels Disease (9.0%), Encephalitis (8.0%), Edema (8.0%), atrophy (9.0%), neoplasm (5.0%), Arterial Venous Malformation, Hydrocephalous, Hypoxic Injury, Acute Infarct & Chronic Infarct with 2 % each. Developmental Malformation, thrombosis & hydrocephalous accounts for 1 % each only. Sinha et al, also observed that MRI brain was normal in44.2%, whereas in remaining patients, MRI revealed ischemic infarcts (16.3%), intracranial hemorrhage(14%), tumor (11.6%), calcified granuloma (7%), NCC(4.6%), and gliosis (2.3%).[12] Similar findings were also noted in study done by Pannag and Ravi et al.[7]

Assessment of the etiology of seizure disorder is a frequently encountered problem in clinical practice. MR imaging plays an important role in the evaluation of patients with seizures as well as in refractory cases. Accurate diagnosis of the etiology of seizure is crucial for providing an effective treatment. MRI has been shown to be highly sensitive and specific in identifying the underlying cause in seizures. With its high spatial resolution, excellent inherent soft tissue contrast, multiplanar imaging capability and lack of ionizing radiation, MR imaging has emerged as a versatile tool in the evaluation of patients with seizures. MR imaging identifies specific epileptogenic substrates as well as determines specific treatment and predicts prognosis. Employing appropriate imaging protocols and reviewing the images in a systemic manner helps in the identification of subtle epileptogenic structural abnormalities. MR imaging is superior neuroimaging with no radiation exposure and the first investigation of choice in epileptic syndrome, acute cerebrovascular disease with seizure, developmental cortical malformations, and vascular malformations. Its ability in identifying subtle lesions, location, extent of the lesions and number of findings are excellent.

Conclusion

Hence, authors conclude that MRI plays a significant role in patients presenting with seizures to confirm or rule out any organic, developmental lesions or to detect residual substrate at the operative site, previously unrecognized epileptogenic substrates and persistent connections in functional hemispherectomies

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Website: www.ijarm.com

Subject: Medical Sciences

Quick Response Code

DOI:10.22192/ijamr.2021.08.01.009

How to cite this article:
Anju Yadav, Bir Singh Yadav, Nikhil Sharma, Vishal Goyal. (2021). Role of MRI in evaluation of Epileptic patient. Int. J. Adv. Multidiscip. Res. 8(1): 124-129.
DOI: http://dx.doi.org/10.22192/ijamr.2021.08.01.009