DOI: 10.7860/JCDR/2018/36393.12355

Original Article

Physiology Section

Role of EEG in Diagnosing Abdominal Epilepsy Patients

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ABSTRACT

Introduction: Abdominal Epilepsy (AE) is an uncommon cause of paroxysmal abdominal pain. It is very challenging to diagnose a case of AE. This entity is less recognised as there is paucity in report and its literature.

Aim: To find out AE amongst individual suffering from chronic recurrent abdominal pain with the help of clinical manifestations and Electroencephalography (EEG) changes.

Materials and Methods: This was an observational, analytic study done for a period of three years at tertiary care hospital. The cases having recurrent abdominal pain were studied for EEG abnormalities showing sharp wave and spike wave pattern. All the data were analysed and studied by using software SPSS version 2.0.

Results: Total of 30 cases of AE was studied for EEG abnormalities. The age range was from 5 to 35 years. The mean age group affected was from 8 to 10 years. The male to female ratio was 1:1.7. The main clinical presentation was pain in abdomen which was observed in all the cases. Other symptoms were nausea, vomiting, diarrhoea, bloating, blurring of vision, confusion, etc. The EEG changes were noted in temporal region in 18(60%) cases, fronto-temporal in three (10.01%) cases, generalised in eight (26.66%) cases. The focal sharp wave and spike wave pattern was recorded in 20 (66.66%) cases, generalised sharp wave and spike wave pattern in 10 (33.33%) cases.

Conclusion: The common epileptiform EEG abnormality pattern noted was focal sharp wave and spike wave pattern. Recurrent abdominal pain is usually overlooked and remains undiagnosed. If it is properly investigated with EEG it will be helpful for better management of patients.

Keywords: Convulsions, Electroencephalography changes, Paroxysmal abdominal pain, Spike wave pattern

INTRODUCTION

Epilepsy is a common medical and social disorder or a group of disorders which is remarkably uniformly, distributed around the world with no racial, geographical, or social boundaries. AE is well described entity among the paediatric age group however it is also noted in adult population [1,2]. Various clinical presentations were noted which are related to both gastrointestinal and Central Nervous System (CNS) manifestation. The pathophysiology of AE remains unclear. The high index of suspicion is essential for the diagnosis of AE after exclusion of other possible causes. The patients having unexplained paroxysmal gastrointestinal complaint with/without associated CNS symptoms and signs, should be evaluated for EEG abnormalities and if abnormal EEG is found, the therapeutic trial of anticonvulsant medication should be given and response to it has to be carefully looked for. The use of single drug and if possible the lowest dose is required to control disease in many of these cases. The present study was conducted with an aim to find out AE amongst individual suffering from chronic recurrent abdominal pain with the help of clinical manifestations and EEG changes.

MATERIALS AND METHODS

An observational, analytical type of study was done in Department of Physiology at tertiary care hospital in rural area Malakapur, Taluka-karad, Maharashtra, for a period of three years from Jan 2011 to Dec 2013. This study was approved by Institutional Ethical Committee and informed consent was taken from participants. The cases having history of unexplained chronic abdominal pain for more than one year and not responding to routine treatment were studied. Neonate and children below age of 5 years and known patient on antiepileptic treatment were excluded from the study. Preliminary data protocol was prepared which includes name, age, sex, history of abdominal pain, site duration, frequency etc. Detailed medical, family history, past history was noted. Comprehensive history of birth and developmental disorders, neurodeficit, history of febrile illness, etc., were noted. All relevant biochemical, haematological, microbiological, radiological x-ray abdomen, USG abdomen etc., investigations were noted. Total 30 consecutive cases from hospital having history of unexplained chronic abdominal pain were studied. Investigations of these patients for cause of abdominal pain were done to exclude any intestinal visceral diseases. Patients were referred for EEG. EEG recording is a dynamic procedure. EEG machine is a powerful and complex biological amplifier. It is recorded on a 16-channel Brainwave EEG machine; electrodes are placed according to 10-20 system. Each electrode consists of disc or cup connected to an insulated wire.

Preparation of the patient: Routine examination of patient was done. Before doing EEG, the scalp hair was well shampooed and washed with water to remove all oil. Electrodes were applied on the scalp with the help of electrode paste. Standard EEG was run with low filter on 1 Hertz or 0.5 Hertz and high filter on 70 Hertz with speed 30 mm/s. RMS EEG-24 machine by Medicare Chandigarh was used and EEG was recorded in montages A, B and C. Activation procedures like hyperventilation and photic stimulation were used. The recording was taken in each montage for three minutes and patient was asked to perform hyperventilation for three minutes. Post hyperventilation record was taken for two minutes in montage A, photic stimulation was done for three minutes with eyes open and eyes closed in montage B. EEG was recorded in sedation, resting awake state, activation procedures like hyperventilation and photic stimulation. EEG abnormalities were noted. The pattern of epileptiform EEG abnormalities, location, etc was interpreted.

All the data were analysed and studied by using software SPSS version 2.0.

RESULTS

The total of 30 cases was studied. The age range was from 5 to 35 years. The age group affected most was from 8 to 10 years i.e., 12 cases (40%) as shown in [Table/Fig-1]. Two cases were reported in adults in age group of 30 and 35 years. There were 11 males and 19 females. The male to female ratio was 1:1.7. The commonest clinical presentation was pain in abdomen noted in all cases. Associated sign and symptoms were nausea, loss of appetite, vomiting, giddiness, loose motion, confusion, lethargy, etc., as shown in [Table/Fig-2]. The common epileptiform EEG abnormality pattern noted was focal sharp wave and spike wave pattern recorded in 20 (66.66%) cases, generalised sharp wave and spike wave pattern in 10 (33.33%) cases as shown in [Table/Fig-3]. The focus of localisation was at temporal region origin in 18 (60%) cases, fronto-temporal in three (10.01%) cases, parieto-temporal in 1 (3.33%) case, generalised in 8 (26.66%) cases as shown in [Table/Fig-4]. The antiepileptic drugs were given. Patients were initiated on oxycarbamazepine 20 mg/kg/day daily dose. They were kept on regular follow up. The antiepileptic drugs dose was gradually tapered and observed for any side effects. The response to oxycarbamazepine was observed for a period of 2 years. It showed gradual reduction in the number of episodes of abdominal pain which was observed at 1 to 3 month at initial disease course to nil. This gradual favourable significant improvement was noted within 6 month period in most of cases.

Age group (in year)	No. of cases	Percentage
5-7	04	13.33
8-10	12	40.00
11-13	05	16.67
14-16	07	23.33
17-35	02	06.60
Total	30	100

[Table/Fig-1]: Age-wise distribution of abdominal epilepsy cases.

Clinical presentations	No of cases	Percentage
Recurrent abdominal pain	30	100%
Nausea	10	33.33%
Repeated Vomiting	02	06.66%
Diarrhoea	02	06.66%
Bloating	04	13.33%
Blurring	06	20.00%
Confusion	04	13.33%
Lethargy	09	30.00%
Other-diziness, hunger, pallor, etc.,	07	23.33%

[Table/Fig-2]: Clinical presentations of abdominal epilepsy cases.

EEG activity	No of cases	Percentage
Focal sharp wave and spike wave pattern	20	66.66
Generalised sharp wave and spike wave pattern	10	33.33
Total	30	100

[Table/Fig-3]: EEG pattern distribution of abdominal epilepsy cases.

Focus of epileptogenic activity	No of cases	Percentage
Temporal	18	60.00
Generalised all over	08	26.66
Parieto-temporal	01	03.33
Frontal-temporal	03	10.01
Total	30	100

[Table/Fig-4]: Sitewise distribution of abdominal epilepsy cases.

DISCUSSION

Abdominal Epilepsy (AE) is a very rare clinical entity. Many times it can be overlooked in the differential diagnosis and treated differently. AE is considered to be part of simple or complex partial seizures as per International League against Epilepsy [3]. AE is a rare epileptic phenomenon occurring in any age of patients. If patient is having unexplained paroxysmal abdominal pain, exclusion of abdominal visceral pathology, loss or alteration of consciousness etc. AE should be suspected. In such cases, the confirmed diagnosis is given with epileptiform EEG abnormalities and/or a good response to antiepileptic drugs [4-6].

AE is relatively an uncommon syndrome and is considered to be one of rare causes of abdominal pain [7]. The patients present with various gastrointestinal symptom like abdominal pain vomiting, nausea, diarrhoea, epigastric sensation, hunger etc., [8-11]. The other non-GI symptoms are pallor, dizziness, lethargy have been reported. In patients abdominal symptoms may be similar to those of the functional gastrointestinal disorder as in irritable bowel syndrome. AE patient's shows tiredness after an episode, and an abnormal EEG is helpful to be distinguished from the latter condition. In the study by Zinkin NT et al., they have reported that abdominal pain (86%), mental status changes (64%), generalized tonic-clonic seizures (36%), lethargy (36%), nausea and/or vomiting (28%), and diarrhea (5%) are common clinical findings in AE [5]. In the patients of AE, the various neurological symptoms, such as convulsions and mental status changes are an important clue which are observed after abdominal pain. However, every episode may not be accompanied by neurological symptoms. In our patient, there were less complaints of neurological manifestations.

In present study the common GI symptom observed was abdominal pain. The pain was mostly at periumbilical localization; however they experienced vague pain all over abdomen. Patients described episode of abdominal pain as severe, sharp sensation with variable duration of few minutes to 10-20 minutes. The pain was recurrent, acute apparently spontaneous in onset and termination. The frequency of pain episodes was variable. It was noted every 1 to 3 month in most of cases. There was associated nausea, vomiting, diarrhoea. In present patients, clinical symptoms were suggestive of a functional abdominal pain but on EEG showed definite abnormalities. Other conditions like focal epilepsy with GI symptoms, abdominal migraine syndrome should be carefully looked for and should be differentiated from AE [12]. In present cases few had headache which was observed for short duration and these were ruled out for any CNS disorders. In this study the common age affected was in the age group of 8 to 10 years, 12 cases, (40.00%). Two adults cases were reported in age group of 30 and 35 years. AE has been reported commonly in children [11,13]. There are very few cases reported among adults [14,15]. Usually in adults, the complaints of abdominal pain is managed with antacids, analgesics, antispasmodics, etc and therefore might be less considered for diagnosis of AE. The EEG is used to detect electrical activity arising in the cerebral cortex. The EEG study plays important role in supporting diagnosis in these cases. Abdominal pain is mainly associated with epileptic discharges of the temporal lobe. Abnormal EEG shows localisation of temporal lobe seizure disorders was most common [16]. The extratemporal origin in parietal, frontal has been observed [17]. It is observed that methods for focus localisation were variable as surface and depth of EEG reporting is not consistent. In present study the localisation was reported commonly at temporal region (60%). The extent may be seen from anterior, mid, temporal leads unilaterally or bilaterally. Initiation was noted focally with secondary generalisation. [18]. The specific abnormalities as EEG revealed epileptiform activity characterised by sharp and spike wave complexes in bilateral

leads mostly in our study. The focal sharp wave and spike wave pattern was recorded in 20 (66.66%) case, generalised sharp wave and spike wave pattern in 10 (33.33%) cases. Bursts, generalised spikes and wave discharges, multiple independent spikes, high voltage waves, are observed. The localization of burst of sharp waves and/or spikes from one or both temporal regions. In these patients, antiepileptic drugs were given. Patient was initiated on oxycarbamazepine 20 mg/kg/day daily dose. They were kept on regular follow-up and observed for any side effects. The response to it was observed for a period of two years. It showed gradual reduction in the number of episodes with gradual favorable and significant improvement within six months period in most of cases. For management of AE various drugs have been used like phenobarbital, carbamazepine, phenytoin, valproic acid etc., [19]. There are no defining recommendations on the drug selection. The drug oxycarbazepine significantly showed improvement in patients of AE. It is essential that specialist is required in early diagnosis of AE and to take appropriate care of individuals. A diagnosis of AE can be complex procedure and vigilant approach can detect many cases who had recurrent paroxysmal abdominal pain.

LIMITATION

The diagnosis for AE can be very challenging, some patients might have been considered to have psychogenic abdominal pain. In early age group (usually below four year) AE can be masked or misdiagnosed as a physical or psychological disorder. Also, there is paucity of reported cases in adults which may be related to failure to suspect and diagnose AE.

CONCLUSION

Recurrent pain in abdomen is usually overlooked and is subject to various routine and expensive investigations. The awareness of AE should be kept by physicians about this rare clinical entity. An EEG is simple, non-invasive procedure in approach towards establishment of diagnosis of these cases. Appropriate treatment of these cases will be effective and it will improve patient's life. AE is one of the rare but easily treatable causes of abdominal pain.

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FINANCIAL OR OTHER COMPETING INTERESTS: None.

Date of Submission: **Apr 13, 2018**
Date of Peer Review: **Jun 04, 2018**
Date of Acceptance: **Aug 27, 2018**
Date of Publishing: **Dec 01, 2018**