Original Article

Post stroke Epilepsy in Sudan

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Background

Abstract

The aim of this work is to study the clinical presentation of epilepsy among Sudanese patients with stroke.

Methodology

The study was conducted at Elshaab Teaching Hospital. The study population included patients with stroke referred to the hospital from August 2006 to April 2008. The total number of patients studied was 165. Full detailed history and proper clinical examinations were performed on each patient in addition to list of investigations included CT brain and EEG.

Results

Convulsions had been observed in 28 (16.9%) of 165 patients with stroke, it was found that 21 (75%) out of 28 patients with post stroke seizures had occurred in the first two weeks. Sixteen patients had generalized seizure, while 12 patients had partial seizures, 9 of them had simple partial seizures and 3 patients had complex partial seizures. The study showed that 18 patients with ischemic stroke developed seizures while 10 patients with haemorrhagic stroke developed seizures. The EEG showed an evidence of abnormal discharge in 64% of our studied group.

Conclusion

Patients with stroke had higher incidence of epilepsy. Generalized epilepsy was commoner than the partial type among our study group. The majority of those who had epilepsy developed convulsions in the first two weeks following stroke. Seizures were found to occur more common among patients with ischemic stroke.

Keywords: Post-stroke seizure, Sudanese patients
Introduction

Epilepsy is a disorder that disrupts the transmission of electrical signals inside the brain\(^\text{(1)}\). In normal individuals, spread of electrical discharge between cortical neurons is very slow\(^\text{(2,3)}\). In case of epilepsy, there is disturbance of this mechanism resulting in hyper synchronous discharge either localized or generalized\(^\text{(4,5)}\). Epilepsy is either idiopathic when there is no underlying cause or secondary, if there is an underlying cause. The most important classification depends on the spread of electrical activity and the clinical presentation e.g. generalized epilepsy or partial epilepsy\(^\text{(1,2)}\). Partial seizures are either simple or complex. In simple partial seizures, the patient usually remains conscious during the seizure and can later describe it in detail while in complex partial seizures the patient loses his consciousness.

At least two unprovoked seizures are required for a diagnosis of epilepsy\(^\text{(2)}\).

Cerebrovascular disease is an important cause of epilepsy, particularly in elderly people. Post stroke early onset seizures occur within two weeks of stroke onset, while late-onset seizures occur after two weeks\(^\text{(6,7)}\). The incidence in the literature varies greatly from 2.3% to 43%\(^\text{(8,9,10)}\). The prognosis of epilepsy caused by stroke is not clearly different from epilepsy due to other causes. There are several causes for early onset seizures after ischaemic strokes. An increase in intracellular Ca\(^{2+}\) and Na\(^{+}\) with a resultant lower threshold for depolarisation, glutamate excitotoxicity, hypoxia, metabolic dysfunction, global hypoperfusion, and hyperperfusion injury have all been postulated as putative neurofunctional aetiologies\(^\text{(11,12)}\). Seizures after haemorrhagic strokes are thought to be attributable to irritation caused by products of blood metabolism\(^\text{(13)}\). The exact pathophysiology is unclear, but an associated ischaemic area secondary to haemorrhage is thought to play a part. Late onset seizures are associated with the persistent changes in neuronal excitability and gliotic scarring is most probably the underlying cause\(^\text{(14,15)}\). Haemosiderin deposits are thought to cause irritability after a haemorrhagic stroke.

Objective

The objective of this study is to describe the incidence of seizures among adult Sudanese patients with stroke seen in Elshaab Teaching Hospital in the period between August 2006 to April 2008.

Methodology

This is a descriptive cross sectional hospital based study which was conducted at 240 bedded Elshaab Teaching Hospital. There are two neurological units with 42 beds and an intensive care unit.

The study population included 165 epileptic patients referred to the hospital from August 2006 to April 2008. All patients were newly diagnosed and they were not on treatment. At first, 180 patients were included in the study but 15 patients were dropped due to difficulty of follow up, the rest of the patients were followed by the authors until the end of the study period. All patients were adults aged 18years and above. Those who had diagnoses of primary epilepsy, inflammatory brain disease, space occupying lesion and previous trauma were excluded. All patients gave their verbal consent to participate in the study. Those who were unable to give consent, the consent were taken from the family. Ethical clearance was obtained. The diagnosis of stroke and its subtypes was made by a neurologist based on the clinical signs and symptoms. A full detailed history was taken from each patient and a proper systemic and neurological examination was performed by the authors. The history included antecedent symptoms e.g. fever, trauma and family
history of epilepsy, past history of transient ischemic attack (TIA). The presenting symptoms include history of limbs weakness, convulsions, headache and loss of consciousness. The physical signs were grouped into general, systemic and neurological.

The following investigations were done for each patient: random blood sugar, total blood count, L.F.Ts, blood urea, serum sodium, serum calcium, serum magnesium and chest x-ray. ECG, ESR, CRP and potassium were not done.

All the patients had a CT of the brain and EEG. The diagnosis of the CT of the brain was made by a neuroradiologist while the diagnosis of the EEGs was done by a neurophysiologist.

On monthly follow up, patients were carefully interrogated for any new seizures and full records were kept.

A self administered questionnaire was used for data collection. The questionnaire included five sections. The main items in these sections were the type of post stroke seizures, physical examination, neuroimaging and electroencephalograms. The data collected was analyzed using the statistical package program for social science (SPSS).

**Results**

Out of 165 patients with stroke, 72 were male and 93 were female and out of 28 patients with post stroke seizure, 12 were male and 16 were female. The age distribution among patients with stroke (n=165) and patients with post stroke seizure (n=28) was shown in Tables 1 and 2 respectively.

### Table 1: Patients with stroke

<table>
<thead>
<tr>
<th>Age group</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-40</td>
<td>24</td>
<td>14.50%</td>
</tr>
<tr>
<td>41-60</td>
<td>61</td>
<td>37.00%</td>
</tr>
<tr>
<td>61-80</td>
<td>78</td>
<td>47.30%</td>
</tr>
<tr>
<td>&gt;-80</td>
<td>02</td>
<td>1.20%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>165</strong></td>
<td><strong>100.00%</strong></td>
</tr>
</tbody>
</table>

### Table 2: Patients with post stroke seizures

<table>
<thead>
<tr>
<th>Age group</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-40</td>
<td>2</td>
<td>7.2%</td>
</tr>
<tr>
<td>41-60</td>
<td>13</td>
<td>46.40%</td>
</tr>
<tr>
<td>61-80</td>
<td>13</td>
<td>46.40%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>28</strong></td>
<td><strong>100.00%</strong></td>
</tr>
</tbody>
</table>

The study showed that 42 patients had haemorrhagic stroke while 123 patients had ischemic stroke. Those who had post stroke seizure, 10 patients had haemorrhagic stroke while 18 patients had ischemic stroke. Out of 28 patients with post stroke seizures, 16 had generalized seizure while 12 patients had partial seizure (9 had simple partial seizure while 3 patients had complex partial seizure). Regarding the onset of seizure, 21 had seizure in the first two weeks while 7 patients had seizure after two weeks following the stroke. The brain CT scan findings among 10 patients with post haemorrhagic seizure showed that, 2 patients had frontal haemorrhage, 7 patients had parietal hemorrhage while one patient had temporal haemorrhage. CT scan of 18 patients with post ischemic stroke seizure showed that 4 patients had frontal infarct, 8 had parietal, 4 had temporal and 2 patients had occipital infarct. Out of 18 patients with post ischemic stroke seizure three had 2 lesions on the CT scan. The EEG revealed an evidence of abnormal cerebral discharges in 18 patients (66%).

**Discussion**

We define post-stroke seizure as "single or multiple convulsive episode/s (fit/s) after stroke and thought to be related to reversible or irreversible cerebral damage. Early onset seizures tend to occur within two weeks of stroke onset and thought to result from cellular biochemical dysfunction, while late-onset seizures tend to occur after two weeks and thought to be caused by gliosis. The risk
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of occurrence of single or recurrent seizures among adult Sudanese patients with stroke during the study period (9 months) was 16.9%, this is higher than what was reported by Moskowitz E et al, Hauser WA et al, and Viitanen M et al respectively, but lower than what was mentioned in study done in Iraq and Iran, sometimes it is very difficult to attribute the occurrence of seizures to stroke alone because there may be other factors like malaria or electrolyte disturbances (16,17,18,19,20). This variability may be due to the fact that our sample size was small in comparison with other studies. In our studied group, the mean age of patients was 70 years ranging from 18-89 years, this was found to be similar to what was mentioned in literature(21). The number of female patients with stroke in this study, (56%) may be due to high rate of risk factors of cerebro vascular accident (CVA) like thrombophilia, antiphospholipid syndrome, vasculitis and hyperlipidemia among Sudanese females as was reported by Abdelgadir et al(22). But the ratio between male and female was found to be equal regarding post stroke seizures. This finding is different from what was reported worldwide and this can be explained by the fact that the incidence of post stroke seizures following haemorrhagic stroke was more common among males in our study subjects. There was high frequency of generalized seizures among our studied group which is similar to other reports(23,24,25). Seizures occurred more frequent within the first two weeks after stroke which is in agreement with what was reported by other researchers(26,27,28). The study did not estimate the post stroke seizures that evolved into epilepsy because the time of follow up of our studied group was short. The risk of seizures after stroke was high in ischemic stroke (64.3%) in comparison with haemorrhagic stroke (35.7%), this was different from other reports(29,30), 86% of the lesions involved cortical areas exclusively or in addition to sub cortical areas on CT scan of the brain, so the frequency of seizures was found to be more when the lesion confined to the cortical area(31,32,33). The detection of epileptiform discharge on EEG examination was found to be more common among our studied group, it can be considered as an important predictor for the future complications e.g. development of epilepsy(34,35,36,37). Four out of 28 patients with post stroke seizures died during the follow up, three of them had haemorrhagic stroke while only 5 patients with stroke without seizure died during the nine month follow up indicating that post stroke seizure worsen the prognosis of stroke among our studied group.

Due to short duration of our study it is very difficult to find out whether there is any relation between severity, duration of stroke and seizures.

In conclusion the frequency of seizures among adult Sudanese patients with stroke was found to be more common in our studied group. Generalized seizures were found to be more common than partial one. The seizures that occurred within the first two weeks were found to be more frequent than late onset seizures. Our results indicate that post-stroke seizures are more common among patients who have experienced cerebral infarction rather than haemorrhage.
References