Post-stroke seizure

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ABSTRACT

Objectives: This study was designed to estimate the incidence of seizures in patients with stroke and its relative frequency with each type of stroke, to find the frequency of early and late seizures, recurrent seizure, and the EEG findings.

Methods: This is a cross sectional study that enrolled 176 randomly selected patients with stroke admitted to Al-Yarmouk, Teaching Hospital, Baghdad, Iraq during the period between October 1998 and June 2001. Out of these, 42 patients with post-stroke seizure were chosen to undergo thorough clinical examination and investigations.

Results: Seizures had been observed in 42 patients with stroke (23.9% of the sample). Single seizure without recurrence had been observed in 83.3% of those with post-stroke seizures (35 patients). Electroencephalograph results showed abnormal findings in 66.6% of those with post-stroke seizure (28 patients). Twenty-five patients (59.5%) of those with post-stroke seizure had ischemic stroke according to brain CT scan. In addition, this study revealed that 69.1% of the seizures were primary generalized seizures and 38.1% were partial seizures. In this study, it was found that 50% of the patients (21 patients) had early onset seizure, namely, within the first week, while only 14.3% of them had seizure during the 3rd week after the stroke event.

Conclusions: This study indicated that post-stroke seizures are quite a common problem in the management of patients with stroke but they are usually single without recurrence. Ischemic stroke is the most common cause of post-stroke seizure, and generalized seizure is the most common type. In addition, this study indicated that the initial 2 weeks after stroke carry the highest risk for stroke patients to have a seizure.

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Although the annual incidence and death rates from stroke have declined steadily in the developed countries during the last few decades, stroke remains the third leading cause of medically related deaths and the second most frequent cause of neurologic morbidity in the developed world.[1] Neurological, cardiac and systemic complications during the first days to weeks after stroke can cause substantial morbidity and mortality.[2] Stroke could be regarded as the most frequent cause of epilepsy in adults, especially in those over 60 years.[3] The frequency of cerebrovascular etiology of epilepsy is estimated at 3-30% and the rate is significantly higher in studies carried out in the developed world.[4,5] Most stroke patients with epilepsy have just one attack, recurrent attacks of seizure are observed in just 3-4% of stroke patients. Acute or remote history of stroke is the most common etiology of status epilepticus in the elderly.[6,7] Seizure is more common in ischemic (infarction) stroke than that due to hemorrhage. Involvement of the cortical region is seen in most of the patients with seizure, approximately 86% of the lesions involved cortical areas exclusively or in addition to subcortical areas on CT scan of the brain.[8] In cases of subcortical infarction, epileptic seizures tend to occur early after stroke and have a lower one-year recurrence risk.[9] Lesion location and stroke subtype are strong determinants of the risk of epileptic seizure, even after adjusting for stroke severity.[10] The presence of large cortical infarcts and the presence of apparently preserved cerebral tissue within the infarcted area

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could be regarded as predictive factors for seizure development in patients with stroke. Although seizures are rare in patients with lacunar infarction, the presence of associated leukoaraiosis increases the risk of epileptic seizure. In addition, the risk is also increased in those patients with other medical problems known to lower seizure threshold, such as renal failure.[11]

This study had been designed for determination of the frequency of post-stroke seizure, the frequency of EEG and brain CT scan abnormalities, frequency of partial and generalized seizure, and detection of the relative frequency of early and late onset seizures.

Methods. This is a cross sectional study that enrolled 176 patients with stroke. The sample had been randomly selected from patients admitted to Al-Yarmouk Teaching Hospital, Baghdad, Iraq during the period between October 1998 and June 2001. From this sample, 42 patients with seizures during their hospital admission were chosen to be the main sample of this study and were subjected to thorough physical examination and laboratory investigations including complete blood picture, erythrocyte sedimentation rate, fasting blood sugar, blood urea & electrolytes, EEG and CT scan of the brain.

Results. Seizures developed in 24 men (57.1% of the total sample) and 18 women (42.9% of the total sample) with a 1.33:1 male to female ratio. The mean age of patients with seizure during the admission for stroke was 58 years. The duration of admission ranged between 3-21 days. This study indicated that seizure had been observed in 42 patients with stroke (23.9% of the total sample). Thirty-five of the 42 patients with post-stroke seizure (83.3%) had single seizure without recurrence, while recurrent seizure had been observed in the remaining 7 patients (16.7%). It had been observed that EEG was abnormal (disorganized background, spike and slow wave) in 28 patients (66.7% of those with post-stoke seizure), while it was normal in the remaining 14 patients (33.3% of those with post-stoke seizure). Computerized tomography scan of the brain had shown features of ischemic stroke (infarction) in 25 patients (59.5% of those with post-stoke seizure). This group includes 16 patients (64%) who developed primary generalized while 9 patients 36% developed partial seizures. This study indicated that 16 patients (38.1% of those with post-stroke seizure) had partial seizures (9 had ischemic stroke, 5 hemorrhagic stroke while only 2 had subarachnoid hemorrhage). However, primary generalized seizure was observed in 26 patients (61.9%) (16 patients had ischemic stroke, 5 patients had hemorrhagic stroke, and 5 patients had subarachnoid hemorrhage) (**Table 1**). Regarding the onset of seizure, it was found that 21 patients (50% of those with post-stroke seizure) developed seizure during the first week of their hospital admission, 15 patients (35.7%) developed seizures during the second week, while only 6 patients (14.3% of those with post-stroke seizure) had seizure during the third week of admission.

Table 1 - Patients' distribution according to brain CT scan findings and type of seizure.

Brain CT scan findings	n	(%)	Type of seizure	n	(%)
Ischemic stroke (infarction)	25	(59.5)	Partial	9	(36)
			Generalized	16	(64)
Hemorrhagic stroke	10	(23.8)	Partial	5	(50)
			Generalized	5	(50)
Subarachnoid hemorrhage	7	(16.7)	Partial	2	(28.58)
			Generalized	5	(71.42)
Total	**42**	**(100)**	**Partial**	**16**	**(38.1)**
			Generalized	**26**	**(61.9)**

Discussion. Post-stroke seizure is a common problem that every physician may face in his clinical practice. Its effect on patients'mortality and morbidity stimulates many research workers to clarify its related demographic and epidemiological factors. In patients over the age of 50 years, the cause of seizures is vascular in approximately 30-40%.[3,4,12] In addition, the development of seizure and particularly status epilepticus can affect the outcome of stroke patients due to the synergistic effect of combined injuries of status epilepticus and cerebral vascular ischemia.[13] The presence of an epileptiform discharge on EEG examination, which occurs in approximately 75% of cases of post-stroke seizure (66.7% of the sample included in this study), is an important predictor for ongoing or recurrent seizures. An early EEG examination is very helpful in making the proper therapeutic decision, taking into consideration that single seizure is not an indication for initiation of anti-epileptic drugs. In addition, epileptiform discharges are important for early recognition of status epilepticus risk.[14,15]

The other important determinant of the post-stroke seizure risk is the lesion location and the stroke subtype. The incidence of seizure in hemorrhagic or ischemic stroke is variable from one study to another. Some studies revealed a higher incidence of seizure among patients with intracerebral or subarachnoid hemorrhages, while others indicated that epileptic seizures are more common among patients with ischemic stroke (this study showed a higher incidence of seizure among ischemic stroke patients, 50% of those with

post-stroke seizure). This variability could be attributed to the variation in sample selection.

The time of seizure onset is an important factor that affects the risk of seizure recurrence and patients'outcome. It is well documented that late onset seizure (after the first week) is associated with a higher rate of seizure recurrence than its rate among patients with early onset post-stroke seizure.[8,15,16] Early onset post-stroke seizure occurs in approximately 50-77% of those with post-stroke seizure (in this study it was 50% of the sample).

Albeit late onset post-stroke seizure is less common than early onset post-stroke seizure (33-50% of those with post-stroke seizure), its effect on the outcome of stroke patients is more pronounced than early onset seizure, which has a negligible effect on the outcome. Recurrent seizure occurs in approximately 30% of patients with early onset post-stroke seizure compared to more than 50% of those with late-onset post-stroke seizure.[5] This epidemiologic phenomenon creates a controversy in making the decision of starting anti-epileptic therapy. Late onset post-stroke seizure responds well to anti-epileptic drugs, which have a marked effect on the outcome and on the prevention of seizure recurrence.[4] Alternately, many studies have indicated that early onset seizures do not require long term anti-epileptic therapy.[4] However, some studies revealed that anti-epileptic therapy for early post-stroke seizure could be regarded as an option in the medical management of post-stroke seizure and indicated that it can also reduce the risk of seizure recurrence but without any influence on the development of recurrent seizures after discontinuing medication.[17]

The other important point that should be considered in the follow up of stroke patients is the type of seizure, namely, whether partial or generalized. Generalized seizure is the most frequent type. Approximately 60% of post-stroke seizures are of the generalized type, followed by the simple partial seizure[3,18] (in this study 69.1% of all post-stroke seizures were generalized).[19]

The duration of follow up is variable, some patients may die, and some do not follow their program of checking, for this reason we cannot determine the percentage of seizures post stroke that evolve into epilepsy.

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