

Predictors of Early Seizures in Patients with Acute Ischemic Stroke

Hussein M. Hussein Metwally, Emad F. Shahin, Mahrous I. Seddeek and Ahmed A. Nassar

Neurology Department of Al-Azhar University Hospitals (Al-Hussein and Bab –Alsharea Hospitals), Egypt.
dr_ahmedabdelfattah86@yahoo.com

Abstract: Background: early seizures (ES) may complicate the clinical course of patients with acute stroke. The aim of this study was to assess the predictive factors for early seizures in patients with first-ever stroke. **Patient and methods:** A total of 100 consecutive patients with first-ever stroke, admitted to our stroke and neurology department, were included in this study. Early seizures were defined as seizures occurring within 14 days from acute stroke. Patients with history of epilepsy were excluded. **Results:** About 13 patients (13%) had early seizure. We had 6 women and 7 men. The mean age was 60.3 ± 10.5 . They were significantly more common in patients with cortical involvement, severe and large stroke, and in patient with cortical associated hemorrhage. **Conclusion:** Early seizures occurred in about 13% of patients with acute stroke. In these patients cortical involvement, large infarction and hemorrhagic transformation are the predictive factor for ES.

[Hussein M. Hussein Metwally, Emad F. Shahin, Mahrous I. Seddeek and Ahmed A. Nassar. **Predictors of Early Seizures in Patients with Acute Ischemic Stroke.** *N Y Sci J* 2016;9(12):111-113]. ISSN 1554-0200 (print); ISSN 2375-723X (online). <http://www.sciencepub.net/newyork>. 20. doi:[10.7537/marsnys091216.20](https://doi.org/10.7537/marsnys091216.20).

Keywords: Predictor; Early Seizure; Patient; Acute Ischemic Stroke

1. Introduction

Stroke is the most common cause of acute symptomatic seizures in the elderly population (*Ramsy et al., 2004*). Although, there are different timing-based definitions of stroke-associated ES, most authors identify early seizures as those occurring within 7–14 days after acute stroke onset. Seizures occurring after this time window are defined as late seizures (*Paciaroni et al., 2008*). This distinction underlies possible differences concerning the pathophysiology of and risk factors for early and late seizures. Seizures subdivided in the acute phase into immediate seizure (within 24h) and early (within 2 weeks) (*Camilo and Goldstein, 2004*).

Stroke increase the risk of seizures by several folds and the reported relative risk of developing seizures after stroke as compared to general population is as high as 35 times (*Burn et al., 1997*).

Symptomatic seizures have been reported to occur in 2 to 33% of patients with acute stroke (*Ryvlin et al 2006*). The reported wide range of percentages is probably explained by the analysis of retrospective studies, different window for defining ES (range 1–30 days) and the inclusion in the analysis of patients with different types of stroke.

Several studies have tried to identify the predictive factors for ES after acute ischemic and hemorrhagic stroke with controversial results. Stroke severity, hemorrhagic stroke, and cortical involvement were the predictive factors more often reported (*Bladin et al 2000; Lamy et al 2003*).

2. Methods

Patients were be recruited from Neurology department of Al-Azhar University Hospitals (Al-

Hussein and Bab -Alsharea Hospitals) during the period between April 2016 to October 2016. **The patients were selected according to the following criteria**

Inclusion criteria:

All Patients with first ever acute ischemic stroke presented within the first 24 hours of their symptoms.

Patients were followed up for 14 days for the occurrence of seizures. During the follow-up period patients were classified into two groups; seizure Group (group A) and control group (group B).

Exclusion criteria:

- 1- Patients with history of epilepsy,
- 2- Transient ischemic attack, cerebral vein thrombosis.
- 3- Cerebral hemorrhage, subarachnoid hemorrhage.
- 4- Preexisting neurological conditions with various neurological deficits (such as stroke, head trauma and hypoxic ischemic encephalopathy).
- 5- Positive family history of epilepsy.
- 6- Patient treated by surgery within 7 days.

All patients were subjected to:

1. **Full general and neurological history.**
2. **General and neurological examination.**
3. **Laboratory investigations including.**
 - Routine laboratory investigations (CBC, liver and renal function tests, ESR and lipid profile).
 - Blood glucose level.
 - Serum Na⁺, K⁺ and Ca (total and ionized).
4. **Radiological investigations:**
Computed tomography (CT) brain and magnetic resonance imaging (MRI).

Statistics analysis

Statistical presentation and analysis of the present study was conducted, using the mean, standard deviation, The Wilcoxon tests, linear correlation coefficient, Analysis of variance [ANOVA] tests Paired t-test and chi-square by SPSS. Significant results is considered if p-value < 0.05 and highly significant results is considered if p-value < 0.01.

3. Results.

A total of 100 patients with first ever ischemic stroke were included in this study. ES developed in 13 (13%) cases. The mean age was 60.3 ± 10.5 years. six of the patients with ES (46.16%) were female and seven (53.84%) were male. The ES were simple in 8 cases (61.5%), 2 patients had a status epilepticus and 3 patients had partial seizure with secondary generalization.

Table 1: Clinical features in patients with and without early seizures.

Variables		Patient with early seizures	Patient without seizures	P-value
Total numbers	100	13(13%)	87 (87%)	
Mean age		60.3 +10.5	62.3 + 8.5	0.445
Males	52	7 (53.5 %)	45 (51.5%)	0.888
Females	48	6 (46%)	42 (48.2%)	
Hypertension	48	6 (46%)	42 (48.2%)	0.888
Diabetes	24	3 (23%)	21 (24%)	0.933
Ischemic heart disease	22	3 (23%)	19 (21%)	0.920
Atrial fibrillation	24	2 (15%)	22 (25%)	0.608
Hyperlipidemia	23	3 (23%)	20 (22.9%)	1.000
Hyperurecemia	23	3 (23%)	20 (22.9%)	1.000
Alcohol	22	3 (23%)	19 (21%)	0.920
Disturbed consciousness	24	4 (30 %)	20 (22.9 %)	0.540
Previous TIAs	8	1 (7 %)	7 (8 %)	0.964
Cortical involvement	40	9 (69%)	31 (35 %)	0.021
Large size	41	9 (69.32%)	32 (36%)	0.027
Hemorrhagic transformation	10	4 (30.77%)	6 (6%)	0.007

Table (2): Comparing group A & group B regarding EEG Abnormality

EEG Findings	Patient with ES (n=13)		Patient without ES (n=87)		Chi-square test	
	No.	%	No.	%	X ²	P-value
Abnormal EEG	13	100	35	40.23	16.188	0.000
Slowing:						
▪ Focal	6	85.71	11	91.66	0.166	0.684
▪ Generalized	1	14.29	1	8.33		
Total	7	53.84	12	34.28		
Epileptic activity:						
▪ Focal	4	33.3	7	50	1.272	0.529
▪ Focal with secondary generalization	6	50	4	28.5		
▪ Generalized	2	16.7	3	21.5		
total	12	92.30	14	40		

The clinical features of patients with and without seizure are reported in Table 1, it shows no significant differences between the groups of patients with and without ES. In a univariate analysis, large ischemic stroke (69.2%), cortical involvement (69.2 %) as well as hemorrhagic transformation (30.8) were all more frequent in patients with ES than those without it, see Table 1. No significant differences were observed in terms of the major aetiologies of stroke (cardioembolic stroke and atherosclerosis) between the two groups.

All patients 100% of (group A) had abnormal EEG while 35patients (40.22%) of (Group B) showed EEG abnormality and this difference is statistically significant.

As regard EEG changes, slowing occurred in 7 patients (53.84%) of group A (focal in 6 patients & generalized in one patient) and in 12 patients (34.28%) of group B (focal in 11 patients & generalized in one patient). The difference between the two groups as regard slowing was not statistically significant (P>0.05).

Regarding epileptic activity (spike discharges or sharp-slow wave complex), it was found in 12 patients (92.3%) and 14 patients (40%) of group A and group B respectively and this difference was statistically significant.

As regard the site of epileptic activity: it was focal in 4 patients (33.3%) of group A & 7 patient (50%) of group B & focal with secondary generalization in 6 patients (50%) & 4 patients (28.5%) in group A & group B respectively. The epileptic activity was generalized in 2 patients (16.7%) of group A & 3 patients (21.5%) of group B.

The difference between subtypes of epileptic activity was not statistically significant between both groups ($P > 0.05$).

4. Discussion

In our study, ES occurred in 13% of patients with ischemic stroke, there was no relationship between ES and age, gender, ischemic heart disease, or hypertension,, these results are consistent with the conclusions of previous publications *De Reuck et al. (2005)*. Some previous studies have indicated a relationship between infarct size and ES *Arboix et al. (2003)*, results obtained in our study are in favor of the existence of such a relationship. In another hand we found a strong association between cortical involvement and ES in stroke, this observation has been reported in some studies *Kilpatrick et al., 2002*, but not in others *Berger et al., 2000*, this may be explained by acute cortical irritability, which may not undergo the same physiopathology as vascular epilepsy. We identified hemorrhagic transformation as associated with higher risk of ES in patient with stroke; these results are consistent with previous studies suggestions. No significant differences were established between patients with and without ES in term of the underlying etiologies especially cardioembolic stroke which is reported to be a predictor for ES development (*Jerzy et al., 2008*), which join the results of others similar studies.

This study showed a statistically significant association ($p < 0.05$) between the occurrence of early seizures and abnormal EEG records. All patients (100%) of seizure group had abnormal EEG findings while (40.22%) of the non seizure group had abnormal EEG. Similar results were observed by (*Arboix et al., 2003*) who observed EEG abnormalities in most patients with post stroke seizures, and they added that there were very few cases where no changes could be detected in the EEG. On the contrary (*Gupta et al., 2002*) reported no EEG abnormalities in (18.4 %) &

(17%) of patients with post stroke seizures respectively.

References

1. Arboix A, Comes E, Massons J, et al. (2003): Prognostic value of very early seizures for in-hospital mortality in atherothrombotic infarction. *Euro Neurol*; 50: 78–84.
2. Berger AR, Lipton RB, Lesser ML, et al. (2000). Early seizures following intracerebral hemorrhage: implication for therapy. *Neurology*, 38:1363-1365.
3. Bladin C, Alexandrov A, Bellavance A, et al. (2000): Seizures after stroke: a prospective multicenter study. *Archives of Neurology*; 57: 1617–1622.
4. Burn J, Dennis M, Bamford J, et al. (1997): Epileptic seizures after a first stroke: the Oxford shire community stroke project. *BMJ*; 315:1582–1587.
5. Camilo O and Goldstein LB (2004). Seizures and epilepsy after ischemic stroke. *Stroke*; 35: 1769-1775.
6. De Reuck J, Goethals M, Vonck K, et al. (2005): Clinical predictors of seizures and epilepsy in patients with cerebrovascular disease. *Eur Neurol*; 54:68–72.
7. Gupta SR, Naheedy MH, Elias D, et al. (2002): Post infarction seizures *Stroke*, 19:1477-81.
8. Jerzy PS, Angela YR, Dawn OK, et al. (2008): Incidence of seizures in the acute phase of stroke: A population-based study *Epilepsia*, 49(6):974–981.
9. Kilpartick CJ, Davis S, Tress B, et al. (2002): Epileptic seizures in acute stroke. *Arch. Neurol*, 47:157-160.
10. Lamy C, Domigo V, Semah F, et al. (2003): Early and late seizures after cryptogenic ischemic stroke in young adults. *Neurology*, 60(3):400-404.
11. Paciaroni M, Agnelli G, Corea F, et al. (2008): Early hemorrhagic transformation of brain infarction: rate, predictive factors, and influence on clinical outcome results of a prospective multicenter study. *Stroke*, 39(8):2249-2256.
12. Ramsay RE and Rowan AJ (2004) Special considerations in treating the elderly patient with epilepsy. *Neurology*; 62(suppl. 2):524–29.
13. Ryvlin P, Montavont A, Nighoghossian N (2006): Optimizing therapy of seizures in stroke patients. *Neurology*, 67(12 suppl 4): S3-S9.