ORIGINAL ARTICLE

Solitary epileptic seizures in the clinical practice
Part I: Etiological factors responsible for their occurrence

Zuzana Martiniskova [1], Branislav Kollar [1], Ivana Vachalova [1], Katarína Klobucnikova [1], Iveta Waczulikova [2], Zoltan Goldenberg [1]

[1] 1st Department of Neurology, Faculty of Medicine, Comenius University, Bratislava
[2] Division of Biomedical Physics, Faculty of Mathematics, Physics and Informatics, Comenius University, Bratislava; Slovak Republic

Correspondence to: Branislav Kollár, M.D., Ph.D.
1st Department of Neurology, Faculty of Medicine,
Comenius University, Bratislava, Slovak republic
PHONE: +421 257 290 147;
E-MAIL: b.kollar@pobox.sk, cyklobrano@gmail.com

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Abstract

BACKGROUND: Approximately 5% of the general population experiences at least one unprovoked epileptic seizure in the lifetime. This is in contrast to the cumulative incidence of epilepsy (approx. 3–4%) and incidence of acute symptomatic seizures (approx. 4%). Nearly 2% of the population experiences a febrile seizure before the 5 years of age. The aim of this article was evaluation of the distribution of acute symptomatic and unprovoked seizures in our patient cohort after the solitary epileptic seizures, as well as determination of particular etiological factors responsible for the occurrence of solitary epileptic seizure.

MATERIAL AND METHODS: Our patient cohort comprised 116 patients experiencing the solitary epileptic seizure, who were hospitalised at the 1st Department of Neurology, Faculty of Medicine of Comenius University and Faculty Hospital in Bratislava, Slovakia over a period of 10 years (January 1, 1997 – January 1, 2007). It is a retrospective analysis of data from case records and health records; eventually we contacted the patients by phone or by sending a questionnaire.

RESULTS: Of the 116 patients there were 32 cases (37.12%) of an acute symptomatic seizure and 84 cases (62.88%) of an unprovoked seizure. In the group of unprovoked solitary epileptic seizures the etiological conclusions were idiopathic and cryptogenic in 35 cases (41.7%) and late symptomatic in 49 cases (58.3%). The most frequent etiological factor in the group of acute symptomatic seizures was alcohol (40.6%). In the subgroup of late symptomatic seizures the etiology was mostly vascular (17.85%).

CONCLUSION: Data management of etiological factors responsible for the solitary epileptic seizure confirmed a need for a thorough evaluation of the first epileptic seizure.

INTRODUCTION

An epileptic seizure may be conceptualized as a paroxysmal pathological process in the brain of a heterogeneous etiology with heteromorphic clinical and electrophysiological manifestation. It is conditional on the specific malfunction of a localized population of cortical neurons defined by a formation of paroxysmal depolarization shift with an occurrence of a train of action potentials. Hypersynchronization of a great neuronal population elicits EEG changes and clinical picture of a seizure that depends on the localization of epileptic neurons in the cortex and magnitude and spread of their activity.

The epileptic seizure is characterized by:
- paroxysmal, transient and quantitative or qualitative loss of consciousness,
- paroxysmal motor, sensitive, sensory, mental or vegetative symptomatology,
- electrophysiological and biochemical epiphenomena.

We emphasize the need for acquiring information about features of the seizure (from the patient himself, eye-witnesses and relatives), personal history oriented on the prenatal, perinatal and postnatal periods, and history of cardiovascular and cerebrovascular disorders, neoplasms, head trauma, habit-forming substances, infectious and psychiatric disorders etc., that are essential for establishment of a proper diagnosis. High-quality history taking still remains the basis of the whole diagnostic process (Kukumberg, 2007). The neurological examination does not contribute to the solution of a question whether the seizures are of epileptic origin. It only enables presuming an eventual brain lesion and potentiality for a structural lesion responsible of the seizure occurrence. Slight injuries of the tongue and oral cavity mucosa or other injuries may indirectly point to a generalized tonic-clonic seizure, however they cannot be regarded as an absolute evidence of experiencing the epileptic paroxysm (differential diagnosis may be e.g. convulsion syncope). The cases of epileptic seizures are classified according to The International Classification of Epileptic Seizures (ICES) published for the first time by The International League Against Epilepsy (ILAE) in 1970 and revised in 1981. This classification is a clinical one related to semiology of the seizures not to their etiology. Therefore it is necessary to exclude an acutely occurring cause responsible for occurrence of the seizure. In such cases we talk about the so-called acute symptomatic seizures. The underlying cause may be structural (e.g. head trauma), metabolic, toxic (e.g. alcohol), or an acute CNS infection, etc. The most frequent acute symptomatic seizures are the febrile seizures. In fact, the acute symptomatic seizures occur more frequently than epilepsy ("unprovoked" seizures). The risk of occurrence during one's life is very high – approx. 5% in males and 2.5% in females. If the acutely occurring cause has been withdrawn or cured without a residuum in the form of a brain lesion, the seizures do not recur (Dasheiff, 1987; Fromm, 1987). The antiepileptic medication is necessary for suppressing the seizures in the acute stage but usually there is no need for treatment continuation after the complete cure of the underlying disease. If the acutely occurring cause was not responsible for this epileptic seizure we talk about a so-called unprovoked seizure. If the patient experiences only one seizure we talk about a solitary unprovoked epileptic seizure; if there are more seizures we talk about epilepsy. If the unprovoked epileptic seizure occurs in relation to a preceding neurological insult, the disorders is regarded as secondary to this insult; we call it the late symptomatic epileptic seizure or late symptomatic epilepsy in case of seizure recurrence. A general principle of treatment for the symptomatic (secondary) epileptic seizures has been a primary effort for resolution of the underlying disease that is the etiological factor responsible for the seizures. Given that it is impossible, the antiepileptic treatment in accordance with the treatment guidelines for individual seizure types (together with adherence to right living, behavioural precautions and concomitant solutions of the social and psychological issues) is indicated (Hovorka *et al*. 2004a; Hovorka *et al*. 2004b; Ošlejšková, 2007). Approximately 5% of the population experiences one unprovoked epileptic seizure in the lifetime (Forsgren *et al*. 1996; Hauser *et al*. 1993; Pohlmann-Eden *et al*. 1994). This in contrast to the cumulative incidence of epilepsy (i.e. at least two unprovoked epileptic seizures) of approximately 3–4% as well as the incidence of acute symptomatic seizures of approximately 4%. The febrile seizure before the age of 5 occurs in approximately 5% of population (Hauser *et al*. 1996).

Comparing the etiology and seizure types in patients experiencing the solitary unprovoked epileptic seizure and epileptic patients Hauser *et al*. (1993) identified a higher number of generalized and idiopathic seizures in the group of patients with the solitary seizure that reflected an increased relapse risk in patients experiencing partial and late symptomatic seizures.

Only about 25% of people experiencing the first unprovoked seizure see the doctor and nearly always the seizure is a generalized tonic-clonic one. Most of the people have no risk factors for the onset of epilepsy, normal neurological examination as well as normal initial EEG (Pedley *et al*. 1995). The occurrence of the first unprovoked epileptic seizure requires always a thorough evaluation. The risk of misdiagnosis is high as non-epileptic seizures make 20–33% of newly-diagnosed cases.

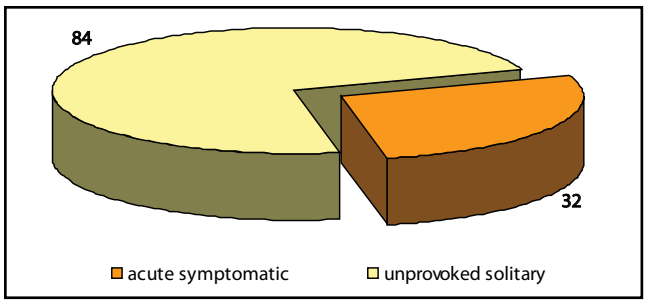

Figure 1. Distribution of acute symptomatic and unprovoked solitary epileptic seizures in our patient cohort (n = 116).

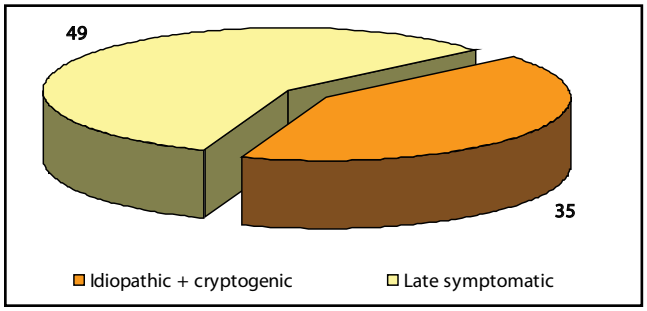

Figure 2. Distribution of idiopathic + cryptogenic versus late symptomatic seizures in the cohort of our patients experiencing the solitary unprovoked epileptic seizure (n = 84).

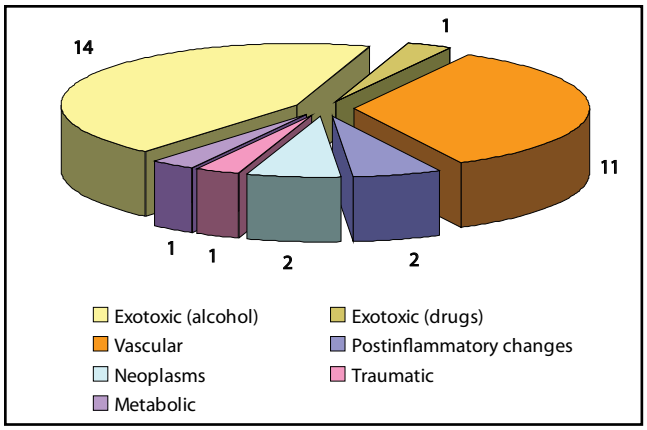

Figure 3. Etiological factors in the group of acute symptomatic solitary epileptic seizures (n = 32).

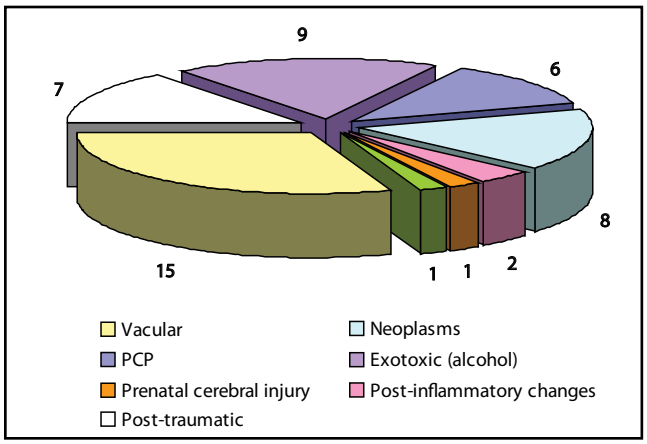

Figure 4. Etiological factors in the group of late symptomatic solitary unprovoked epileptic seizures (n = 49).

MATERIAL AND METHODS

Our patient cohort comprised 116 patients experiencing the solitary epileptic seizure, who were hospitalised at the 1st Department of Neurology, Faculty of Medicine of Comenius University and Faculty Hospital in Bratislava, Slovakia over a period of 10 years (January 1, 1997 – January 1, 2007). Using a retrospective analysis of data from case records and health records we established the etiological factors responsible for the epileptic seizure occurrence. In case of need for data completion we contacted the patients by phone or by sending a questionnaire.

RESULTS

Etiological factors of the acute symptomatic and solitary unprovoked epileptic seizures in our patient cohort:

During the 10-year evaluation period there were 116 patients experiencing the solitary epileptic seizure hospitalised at the 1st Department of Neurology, Faculty of Medicine of Comenius University and Faculty Hospital in Bratislava, Slovakia. Thirty-two (37.12%) had an acute symptomatic seizure and 84 (62.88%) an unprovoked solitary epileptic seizure.

In the group of acute symptomatic solitary epileptic seizure there were 16 generalized and 16 partial seizures. The etiology, and so the immediate cause of the seizures in this group, was the following:

- exotoxic: alcohol – 14 patients (43.37%), addictive drugs (methamphetamine (pervitine) + amphetamine) – 1 patient (3.12%)
- vascular – 11 patients (34.4%)
- inflammatory – 2 patients (6.25%)
- neoplasms – 2 patients (6.25%)
- traumatic – 1 patient (3.12%)
- metabolic (hypoosmolar state) – 1 patient (3.12%)

In the group of 11 patients with the vascular etiology there were 5 cases of acute ischemic stroke and 5 cases of acute intracerebral haemorrhage; there was one case of epileptic seizure in aneurysmal subarachnoid haemorrhage (SAH). Both patients with inflammatory etiology had meningoencephalitis. The two cases of neoplastic etiology were timorous leptomeningeal infiltration and brain metastasis, respectively.

In the group of 84 unprovoked solitary epileptic seizures there were 35 idiopathic and cryptogenic cases (41.7%) and 49 late symptomatic cases (58.3%). In the group of idiopathic and cryptogenic solitary epileptic seizures there were 22 generalized (60%) and 13 partial (40%) epileptic seizures. In the group of late symptomatic seizures there were 19 generalized (38.8%) and 30 partial (61.2%) epileptic seizures. Together, there were 41 generalized (48.8%) and 43 partial (51.2%) epi-

leptic seizures in the group of 84 solitary unprovoked epileptic seizures.

The following were the etiological factors in the group of late symptomatic unprovoked solitary epileptic seizures:

vascular etiology –15 patients (17.85%)
post-traumatic – 7 patients (8.33%)
exotoxic (alcohol) – 9 patients (10.71%)
perinatal cerebral injury (PCI) – 6 patients (7.14%)
brain tumours – 8 patients (9.52%)
post-inflammatory changes – 2 patients (2.38%)
prenatal cerebral injury –1 patient (1.19%)
degenerative disorder – 1 patient (1.19%)

Among the etiological factors in the subgroup of generalized symptomatic solitary unprovoked epileptic seizures (19 patients) we observed alcohol in 9 cases (47.4%), PCP in four cases (31%) and degenerative disease of CNS in 1 case (5.2%). In the subgroup of partial seizures (30 patients) there was a vascular etiology in 14 cases (46.6%), previous head trauma in 7 cases (23.3%), tumours in 5 cases (16.6%), and PCP and prenatal cerebral injury in 1 case (3.3%), respectively.

DISCUSSION

The results of our data management of etiological factors leading to the occurrence of solitary unprovoked epileptic seizures differ from data presented in the literature dealing with epileptic patients (Hauser *et al*. 1993; Wyllie, 1997). In our group of patients experiencing the solitary unprovoked epileptic seizure "only" 41.7% of seizures were concluded as idiopathic and cryptogenic. A considerable occurrence of the acute symptomatic solitary epileptic seizures in these patients (37.12%) confirms the need for a paramount exclusion of the acutely occurring cause being a reflection of the occurring epileptic seizure; therefore it is a need for keeping a standardized protocol in patients experiencing an epileptic seizure. Several authors give notice to such considerable occurrence of the acute symptomatic seizures (Annegers *et al*. 1995; Sander *et al*. 1990). Contemporary modern neurology has identified itself unambiguously with the view that epilepsy, in fact, is rather a syndromological unit than a disease "sui generic". The classification work up of epilepsy according to the seizure types and clinical symptomatology took a relatively long time. Presently, there exists a relatively fair concept about the cause of occurrence of this clinical syndrome that has been widely accepted; however, a safe and reliable marking of a certain factor for the real cause is often disputable. A certain structural lesion of CNS, mainly the cortex, has been usually presented as the cause of epilepsy onset. As the structural CNS lesion exists often without epileptic seizures, the issue of a pathoplastic terrain, i.e. trigger mechanisms and genetic factors in the etiology of epilepsy, has been rightfully introduced. (Mattson, 2003; Mulley *et al*. 2003; Noebels, 2003). Choueiri *et al*. (2001) give notice in their works to the importance of genetic factors not only in idiopathic epilepsies and febrile seizures, but also in the symptomatic epilepsies. The factors mentioned have been the reasons for an inability to establish reliably the causing factor (Varsik *et al*. 2001). Moreover, there are a number of cases that happen to be a polyetiological clinical syndromological unit or an incidental coincidence of different etiological factors.

In the relation to the mentioned facts all contemporary results dealing with the etiology of experienced epileptic seizure and epilepsy should be cautiously interpreted. However, it is evident that a thorough adherence to the diagnostic algorithms and improvement of the diagnostic method will lead to a constant decrease solitary seizures and epilepsies diagnosed as idiopathic and cryptogenic. The results presented in our study comply with this statement.

CONCLUSION

Data management of etiological factors responsible for the solitary epileptic seizure confirmed a need for a thorough evaluation of the first epileptic seizure.

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