Vol 2 | Issue 1 | Pages 48-50

Journal of Neurodegenerative Disorders
ISSN: 2642-4274

Review Article

DOI: 10.36959/459/598

Epilepsy Increase in the Elderly: Role of not Evolutive Epileptogenic Brain Lesions (NEEBLs)

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Abstract

Epilepsy in the elderly is a very debated case because much depends on the causes and associated pathologies. In particular, in the presence of comorbidity it is often difficult to find an effective and safe antiepileptic therapy that does not interfere with other drugs and therefore must be personalized. New-onset epilepsy in the elderly is caused by two types of cerebral lesions: The first concerns progressive, evolutive lesions, on which one can intervene, such as tumors or cerebrovascular pathologies, often acute. The second includes stabilized, chronic, non-evolutive lesions (NEEBLs), such as cortico-subcortical atrophy, gliosis, porencephaly, encephalomalacic cavities. They are all related to the results of cerebral insults. In these cases, antiepileptic therapy is the only remedy and often has to take into account associated pathologies, vascular or psychiatric. The literature offers little on NEEBLs, although some data reports a percentage of around 30% and this is a high and significant and underestimated finding, if one thinks that is added to cases of new-onset epilepsy in the elderly caused by progressive lesions. Therefore there is to be expected in the future an increase in epilepsy in the elderly, due to the increase of the age of life.

Keywords

Epilepsy, Gliosis, Cerebral Atrophy, Elderly Epilepsy, Brain Insults

Introduction

Symptomatic epilepsy increases with age increase, thus being the new-onset epilepsy of the elderly. Epileptogenic lesions typical of the adult are represented by tumors, cerebrovascular malformations, ischemic and hemorrhagic stroke, post-traumatic insults [1]. These lesions are cause of new-onset epilepsy in adults, revealing acute or subacute form evolutive lesions. On the contrary, there are non-evolutive epileptogenic brain lesions (NEEBLs), already stabilized and chronic, such as cortical-subcortical atrophy, gliosis, porencephalic and encephalomalacic cavities, cerebrovascular and post-traumatic brain injury outcomes, constituting cause of new-onset epilepsy in the elderly [2,3].

Material and Methods

We report a survey of 150 old people, we visited for cognitive function deficits, impaired memory and attention, confusion, depression, but also sensory and motor abnormalities. Age was between 65-82 years (mean age 73.8), 92 males, 58 females. Brain CT and MRI had shown mainly atrophic lesions in 130 patients, malacic areas in 7 patients, as outcomes of surgical procedures to haemorrhagic accidents and tumors, gliosis in 13, as post-traumatic brain injuries and infectious diseases outcomes. Epileptic seizures were reported in 45 subjects, about 30% of all, 30 of which manifested generalized seizures, 15 partial seizures. Particularly, partial seizures developed between malacic outcomes. Electroencephalogram showed paroxysmal activity only in 10 patients, while slow wave activity was found in the remaining. AED treatment was started, using levetiracetam first choice drug in both partial and generalized seizures, followed by phenobarbital, topiramate, however taking into account the associated comorbidity, as depression and cognitive deficits. Results were good, regarding the control of seizures, that was full, while antidepressant drugs were modulated and personalized patient to patient, maintaining effectiveness and safety. None of patients experienced side-effects from AEDs.

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Accepted: December 04, 2018

Published online: December 06, 2018

Citation: Chirchiglia D (2018) Epilepsy Increase in the Elderly: Role of not Evolutive Epileptogenic Brain Lesions (NEEBLs). J Neurodegener Disord 2(1):48-50

Discussion

Studies on NEEBLs are very few, because research has focused in the past on epilepsy in elderly caused by acute cerebral lesions, treatable surgically or not, and with pharmacological treatment. The percentage of such epileptogenic lesions is variable, from the literature, going from a range of 4% to 31%, average 17.50% [1,4]. New-onset epilepsy in the elderly is often difficult to diagnose, since in older patients can be unwitnessed or present with atypical symptoms, also for the association with other diseases, mainly cognitive. In this study, we correlated the new-onset epilepsy in elderly subjects with the presence of stabilized brain lesions. We have found a high percentage of epilepsy in patients examined, having considered the 30% an interesting result compared with the literature data. The fact that it does reflect is the high percentage of epileptic elders presenting NEEBLs, about 30%, as evidenced by the literature. It is a percentage that is added to epilepsy secondary to acute brain injury and this is the interesting fact, which makes the NEEBLs a condition perhaps underestimated and not well known. A deepening of NEEBLs: Cortico-subcortical atrophy is considered a major cause of epilepsy in the elderly, with both partial and generalized seizures. Neuroimaging techniques, in particular brain MRI, reveal atrophic lesions in a precise way. Brain MRI shows in atrophic cerebral lesions changes in gray matter and white matter. The grey matter shows a dilation of the sulci and the fissures, while the white matter shows small hyperintensities. In the general population the prevalence of white matter hyperintensities ranges from 11-21% in adults aged around 64 to 94% at age 82 [5,6]. Pathological findings in regions of white matter hyperintensity include myelin pallor, tissue rarefaction associated with loss of myelin and axons. Gliosis is another finding, as a reactive change of glial cells in response to damage to the central nervous system, in serious form leading to the formation of a glial scar. It is thought that the glial scar limits edema and prevents neuronal regeneration in the CNS by blocking regenerating axons from entering the damaged areas. With gliosis there is the release of cytokines, growth factors, and extracellular matrix proteins, which may be involved in immune response, neuroprotection, or possible further damage. The term “reactive gliosis” normally refers to massive hypertrophy of astrocytes; however, it is apparent that gliosis is inherently reactive. Gliosis is considered as a result of many pathologies of central nervous system, such as traumatic, ischemic, hemorrhagic lesions. Encephalomalacia is a term describing loss of brain parenchyma, ending result of its necrosis following ischemic and hemorrhagic events, traumatic brain injury, surgical procedures outcomes. The term is often used to describe blurred cortical margins and decreased consistency of brain tissue. Cystic cavities are formed in correspondence of the damaged area, both of small and large size. Multicystic encephalomalacia refers to the formation of multiple cystic cavities of various sizes in the cerebral cortex of neonates and infants following injury, most notably perinatal hypoxia-ischemic events. Encephalomalacic areas are considered highly epileptogenic [6-8]. An interesting aspect of the elderly NEEBLs concerns the comorbidity and associated pathologies of the psychiatric type of these subjects [7]. Depression, psychotic disorders, confusion, agitation are symptoms and pathologies that can misdiagnose epileptic seizures, being this one of the reasons why they are undervalued. Electrophysiological investigations such as electroencephalogram and brain MRI are very useful, respectively, to reveal the presence of signs of epilepsy, although often the electroencephalogram does not show any critical signs, either to find parenchymal signs of neuronal cell necrosis. NEEBLs are added to the evolutive lesions, such as tumors or vascular. Epilepsy in the elderly thus is in considerable increase. However, there is a substantial difference between the two types of epileptogenic lesions: While the evolutive lesions can be treated surgically or with antiepileptic drugs (AEDs), NEEBLs which are chronic stabilized lesions, they can be treated only with drugs. This often creates problems with coexistence in these subjects of associated pathologies, usually of psychiatric type, that potentially create contraindications with respect to the use of AEDs.

The fact that NEEBLs epilepsy has such a high percentage of about 30% is really interesting and the literature data is more or less agreed on these numbers. It is to be considered that this percentage is destined to increase, due to the increase of the average age of life. Epilepsy secondary to this type of injury is a nosological entity in itself, which requires a right and timely diagnosis as well as a proper and personalized therapy.

Conflict of Interest

To the best of our knowledge and belief, there is no document correlated with possible conflicts of interest, sources of financial support, corporate involvement, and patent holdings for each author needing attaching.

The author/s declare do not have competing interests and accept terms of conditions concerning ethical conduct.

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DOI: 10.36959/459/598