Original article

Ictal speech and language dysfunction in adult epilepsy: Clinical study of 95 seizures

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ABSTRACT

Purpose. – To analyze the semiological characteristics of the language and speech disorders arising during epileptic seizures, and to describe the patterns of language and speech disorders that can predict laterality of the epileptic focus.

Method. – This study retrospectively analyzed 95 consecutive videos of seizures with language and/or speech disorders in 44 patients admitted for diagnostic video–EEG monitoring. Laterality of the epileptic focus was defined according to electro-clinical correlation studies and structural and functional neuroimaging findings. Language and speech disorders were analyzed by a neurologist and a speech therapist blinded to these data.

Results. – Language and/or speech disorders were subdivided into eight dynamic patterns: pure anterior aphasia; anterior aphasia and vocal; anterior aphasia and “arthria”; pure posterior aphasia; posterior aphasia and vocal; pure vocal; vocal and arthria; and pure arthria. The epileptic focus was in the left hemisphere in more than 4/5 of seizures presenting with pure anterior aphasia or pure posterior aphasia patterns, while discharges originated in the right hemisphere in almost 2/3 of seizures presenting with a pure vocal pattern. No laterality value was found for the other patterns.

Conclusion. – Classification of the language and speech disorders arising during epileptic seizures into dynamic patterns may be useful for the optimal analysis of anatomo-electro-clinical correlations. In addition, our research has led to the development of standardized tests for analyses of language and speech disorders arising during seizures that can be conducted during video–EEG sessions.

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1. Introduction

Language and speech disturbances happen frequently during partial seizures [1]. These symptoms are more frequent with seizures originating from the temporal lobe, especially in the dominant hemisphere [2,3]. However, previous studies systematically analyzing ictal verbal behaviors during seizures are scarce [3–7], and classification of such language and speech disorders varies from one study to another [3,8]. The present study aimed to analyze the semiological characteristics of language and speech disorders arising during epileptic seizures, recorded by video and electroencephalography (EEG) monitoring, to describe the language- and speech-disorder patterns that can predict the laterality of the epileptic focus.

2. Patients and methods

The present study retrospectively analyzed all consecutive videos of seizures with language and/or speech disorders of patients admitted for diagnostic video–EEG monitoring in our neurology and epilepsy unit between 2002 and 2010. Patients were included if they had focal epilepsy and seizures presenting with language and/or speech disorders, if they had epilepsy onset after language acquisition and if they were fluent in French. Patients were excluded if they had aphasia during an interictal period (complaints of a permanent language disorder or considered aphasia by a neurologist). The history, type and etiology of epilepsy were collected for each included patient. The handedness of each patient was also determined, using the Edinburgh Handedness Inventory, and a few patients had undergone functional magnetic resonance imaging (fMRI) to determine the laterality of language. Superficial EEG recordings were analyzed by a neurologist and a neurophysiologist to determine the onset and propagation of the electrical discharges. The epileptic focus was defined according to the expertise of a multidisciplinary team, and was based on electroclinical correlation studies (surface ictal and interictal EEG–video recordings) and structural and functional neuroimaging findings (MRI and positron emission tomography [PET] studies). Most of the patients had not undergone surgery (data not shown).

All patients underwent standardized language and speech examinations by the same technologist during the video–EEG recording: the tests included closed and open questions; image-naming; word or sentence repetitions; and the execution of simple orders. Language and speech disorders arising during each seizure were then analyzed by another neurologist and a speech therapist blinded from each other and from the EEG results. These disorders were classified as either “negative” or “positive” symptoms [7]: “language-negative symptoms” include anoma (no answer when patient is asked to name a picture or object), word-finding difficulties (patient searches for word corresponding to a picture or object and succeeds or not, or sometimes gives a wrong answer) and impaired comprehension (patient fails to execute simple or complex commands while preserving consciousness); “language-positive symptoms” include paraphasic errors (use of existing but inappropriate words), neologisms (use of isolated non-existent word) and jargon (the entire discourse comprises non-existent words and is therefore incomprehensible); “speech-negative symptoms” include dysarthria (speech is altered by changes in articulation) and hypophonia (diminished volume of speech); and “speech-positive symptoms” include hyperphonia (increased volume and tension in speech) and abnormal vocalizations (vocal sounds composed without phonemes).

Some symptoms can be integrated into both speech and language symptomatology. “Language- and speech-negative symptoms” include mutism (no verbal production, but patient still looks at the tester) and speech arrest (interrupted or blocked speech with no loss of consciousness), whereas “language- and speech-positive symptoms” include speech automatism (repeated use of a syllable or word with no relevance to context) and abnormal verbalizations (spontaneous and inappropriate use of an isolated word or groups of words with no relevance to context).

For the present study, four main dynamic patterns were defined according to symptoms presented during each seizure. Two patterns were associated with language dysfunction: the “anterior aphasia” pattern comprised anoma, word-finding difficulties and/or speech arrest, but with preserved comprehension; and the “posterior aphasia” pattern comprised impaired comprehension, paraphasia, neologism or jargon, but preserved fluency. Two other patterns were associated with speech disorders: “vocal” patterns described abnormal vocalizations or verbalizations and speech automatisms with intact comprehension; while “arthria” patterns described altered speech (dysarthria, hypo- or hyperphonia) with no word-finding difficulties or comprehension disorders.

Because of the frequent overlap between the two main dynamic patterns, the 95 seizures were ultimately classified into 10 different dynamic patterns:

- pure anterior aphasia;
- anterior aphasia and vocal;
- anterior aphasia and arthria;
- pure posterior aphasia;
- posterior aphasia and vocal;
- pure vocal;
- vocal and arthria;
- pure arthria;
- anterior and posterior aphasia;
- posterior aphasia and arthria.

Thus, each seizure was classified into a dynamic pattern according to previous studies of this type of electroclinical correlation.

3. Results

3.1. Cohort characteristics

A total of 44 adult patients (17 males; 40 right-handed, three left-handed and one mixed laterality) presenting with focal seizures with language or speech disturbances were selected. Mean age ± SD at epilepsy onset was 14.5 ± 6.7 years, and
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