Case Report

iMedPub Journals
http://www.imedpub.com

JOURNAL OF NEUROLOGY AND NEUROSCIENCE
ISSN 2171-6625

2015
Special Issue

DOI: 10.21767/2171-6625.S10004

Extreme Delta Brushes in Pediatric Anti-N-Methyl-D-Aspartate Receptor Encephalitis

Maria A. Montenegro, Angélica Lizcano, Fernando Cendes and Marilisa M. Guerreiro

Department of Neurology, FCM Unicamp, Rua Tessália Vieira de Camargo, 126, CEP: 13083-887; Campinas, SP, Brazil

Corresponding author:
Maria Augusta Montenegro

guga.32@hotmail.com

Department of Neurology, FCM Unicamp, Rua Tessália Vieira de Camargo, 126, CEP: 13083-887; Campinas, SP, Brazil.

Tel: 55 19 35217372

Abstract

Anti-N-Methyl-D-Aspartate receptor (NMDAR) encephalitis is probably the most common paraneoplastic encephalitis. In children, seizures, behavioral disturbances and abnormal movements are the most frequent symptoms. Electroencephalogram is abnormal in most patients. We report a child with anti-NMDAR encephalitis presenting extreme delta brushes in the EEG. This new EEG feature is described in patients with anti-NMDAR encephalitis, mostly adults. The identification of this EEG pattern may guide to an early diagnosis and treatment of anti-NMDAR encephalitis.

Keywords: NMDA receptor encephalitis; Electroencephalogram; Extreme delta brush

Received: July 13, 2015; **Accepted:** August 05, 2015; **Published:** August 07, 2015

Citation: Montenegro MA, Lizcano A, Cendes F, et al. Extreme Delta Brushes in Pediatric Anti-N-Methyl-D-Aspartate Receptor Encephalitis. J Neurol Neurosci. 2015, S1.

Introduction

In 2007 Dalmau et al. [1] described 12 women with prominent psychiatric symptoms, amnesia, seizures, frequent dyskinesias, autonomic dysfunction, and decreased level of consciousness associated with teratoma and antibodies anti-N-Methyl-D-Aspartate receptor (NMDAR) [1]. Since then, anti-NMDAR encephalitis has been increasingly recognized not only in adults but also in children.

The objective of this study is to report the clinical and EEG findings of a child with anti-NMDAR encephalitis, with emphasis on a recently described EEG finding called extreme delta brush.

Case Report

This six-year-old boy was admitted at our University Hospital showing agitation, involuntary movements characterized by asymmetric fast movements of high amplitude of arms and legs, more frequent at the right side. He could not recognize his family and was not able to talk. Twenty days prior to his admittance to the hospital, he had two complex focal seizures lasting one or two minutes each. At this time also appeared abnormal movements and behavioral changes that progressively worsened.

Neurological examination showed severe somnolence with no eye contact. He had bilateral choreoathetosis, mostly in the right arm and leg. He had normal muscle strength, normal deep tendon reflexes, and normal cranial nerves. Gait and coordination could not be evaluated due to his extreme somnolence. Signs of meningeal irritation were absent.

Brain MRI was normal. Cerebral spinal fluid showed red blood cells=3/mm^3, ellcount=5/mm^3, glucose=80 mg/dL and protein=16 mg/dL. EEG showed diffuse slowing associated with rhythmic delta activity 1-3 Hz with superimposed bursts of rhythmic 20-30 Hz beta frequency activity on each delta wave (**Figure 1**). Antibodies against NMDA receptor were positive in both cerebral spinal fluid and serum.

Extensive investigation for tumor was negative. We started valproic acid (40 mg/kg/day) for seizure, risperidone (2 mg/day) for extrapyramidal and behavior symptoms, and clonazepam 0.1 mg/kg/day for all symptoms. Seizures and choreoathetosis were easily controlled, but not the agitation.

He was treated with intravenous gammaglobulin (400 mg/kg/day for 5 days) followed by prednisolone (30 mg/kg/day for 5 days) with poor improvement. One cycle of 500 mg/m^2 of cyclophosphamide was administered. One week after the beginning of this treatment, he started to show slow behavior improvement.

After two months, the aggressive behavior and severe agitation persisted. A second cycle of IVIg (400 mg/kg/day for 5 days) followed by a second cycle of cyclophosphamide was

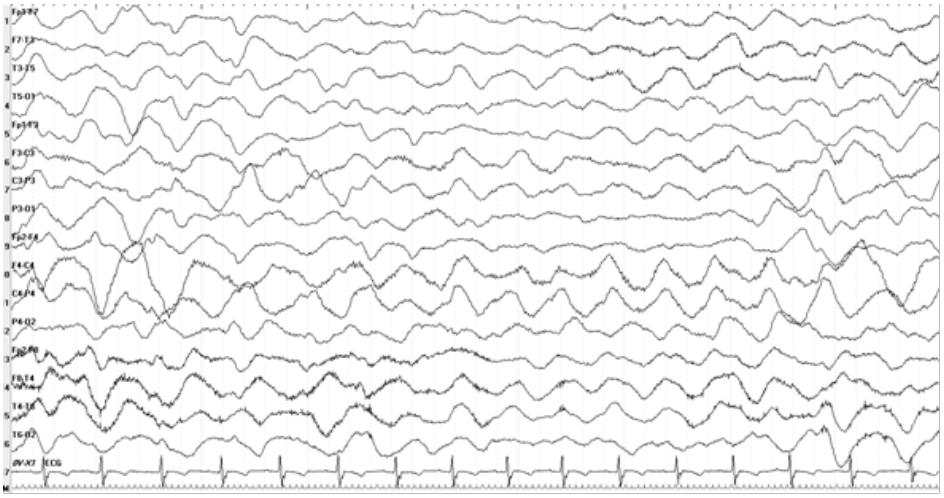

Figure 1 EEG showing diffuse slowing characterized by rhythmic delta activity 1-3 Hz with superimposed bursts of rhythmic 20–30 Hz beta frequency activity on each delta wave. The patient was somnolent and in use of valproic acid. During this EEG he did not present any abnormal movements.

administered, following prednisolone 1 mg/kg/day for 3 months. Risperidone was increased to 4 mg/day and clonazepam to 0.18 mg/kg/day.

Six months after the first symptom prednisolone and clonazepam were tapered off. Since then, his symptoms improved dramatically. He was able to go back to school and neurological examination was normal.

After 18 months he remains with normal neurological examination and behavior. All medications were tapered off. The only complaint is poor school performance. Neuropsychological examination to address cognitive impairment was not performed.

Discussion

Anti-NMDAR encephalitis is probably the most common paraneoplastic encephalitis [2]. Since the description of anti-NMDAR encephalitis in adults, it has been increasingly recognized in children, comprising 40% of all cases. Children often do not have tumors; and dysautonomia and hypoventilation are also less frequent than in adults. Seizures, behavioral and abnormal movements are the most frequent symptoms [3].

The diagnosis is confirmed by the demonstration of the antibody anti-NMDAR. Cognitive deficits constitute a major long-term morbidity of anti-NMDAR encephalitis [4].

Electroencephalogram (EEG) is abnormal in most patients, usually showing non-specific slowing. Epileptiform abnormalities might be present sometimes with electrographic seizures [5]. Slow, rhythmic delta activity predominates in the catatonic-like stage. This activity is not associated with abnormal movements and does not respond to antiepileptic drugs [3,6].

Recently, a new EEG feature was described in 30% of adult patients with anti-NMDAR encephalitis. The authors described a rhythmic delta activity 1-3 Hz with superimposed bursts of rhythmic 20–30 Hz beta frequency activity "riding" on each delta wave. The name extreme delta brush applies because of its resemblance to the waveforms seen in premature babies [7].

The most distinctive EEG pattern in the acute phase of anti-NMDAR encephalitis is probably a non-ictal rhythmic delta or theta slow activity independent of movements or clinical status. It is also unresponsive to medications [8].

Extreme delta brush is a pattern that can be observed in some of the patients with anti-NMDAR encephalitis, but it is not a constant feature. Its presence appear to be associated with a more prolonged illness, although the specificity of this pattern is unclear [9].

Extreme delta brushes in childhood were described in only a few studies [6,10,11]. In one pediatric series, the frequency of this EEG pattern was only 5% [10]. It remains unclear if the systematic evaluation of continuous EEG of children with anti-NMDAR encephalitis would show a frequency similar to the one found in adults.

Although the specificity of this pattern is unclear, its identification may guide to an early diagnosis and treatment of anti-NMDAR encephalitis [7,12,13]. This is extremely important, because good long-term cognitive outcome may depend on early and aggressive treatment [4].

Declaration of Conflicting Interests

The authors declare no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Author Contribution

All authors participated in the patient care and manuscript preparation.

Funding

Supported by FAPESP.

Ethical Approval

This study was done in accordance with the rules set by the University of Campinas institutional review board.

References

1 Dalmau J, Tüzün E, Wu HY (2007) Paraneoplastic anti-N-methyl-D-aspartate receptor encephalitis associated with ovarian teratoma. Ann Neurol 61: 25-36.

2 Dalmau J, Lancaster E, Martinez-Hernandez E, Rosenfeld MR (2011) Clinical experience and laboratory investigations in patients with anti-NMDAR encephalitis. Lancet Neurol 10: 63-74.

3 Florance NR, Davis RL, Lam C (2009) Anti-N-methyl-D-aspartate receptor (NMDAR) encephalitis in children and adolescents. Ann Neurol 66: 11- 18.

4 Finke C, Koop UA, Pruss H, Dalmau J (2012) Cognitive deficits following anti-NMDA receptor encephalitis. J Neurol Neurosurg Psychiatry 83: 195-198.

5 Dalmau J, Gleichman AJ, Hughes EG (2008) Anti-NMDA-receptor encephalitis: case series and analysis of the effects of antibodies. Lancet Neurol 7: 1091-1098

6 da Silva-Júnior FP, Castro LH, Andrade JQ (2014) Serial and prolonged EEG monitoring in anti-N-Methyl-d-Aspartate receptor encephalitis. Clin Neurophysiol 125: 1541-1544.

7 Schmitt SE, Pargeon K, Frechette ES, Hirsch LJ, Dalmau J, et al. (2012) Extreme delta brush: a unique EEG pattern in adults with anti-NMDA receptor encephalitis. Neurology 79: 1094-100.

8 Nosadini M, Boniver C, Zuliani L (2015) Longitudinal electroencephalographic (EEG) findings in pediatric anti-N-methyl-D-aspartate (anti-NMDA) receptor encephalitis: the Padua experience. J Child Neurol 30: 238-245.

9 VanHaerents S, Stillman A, Inoa V, Searls DE, Herman ST (2014) Early and persistent 'extreme delta brush' in a patient with anti-NMDA receptor encephalitis. Epilepsy Behav Case Rep 2: 67-70.

10 Armangue T, Titulaer MJ, Málaga I, Bataller L (2013) Pediatric anti-N-methyl-D-aspartate receptor encephalitis-clinical analysis and novel findings in a series of 20 patients. J Pediatr 162: 850 - 856.

11 Gitiaux C, Simonnet H, Eisermann M (2013) Early electro-clinical features may contribute to diagnosis of the anti-NMDA receptor encephalitis in children. Clin Neurophysiol 124: 2354-2361.

12 Di Capua D, García-Ptacek S, García-García ME, Abarrategui B, Porta-Etessam J, et al. (2013) Extreme delta brush in a patient with anti-NMDAR encephalitis. Epileptic Disord 15: 461- 464.

13 Wang J, Wang K, Wu D, Liang H (2015) Extreme delta brush guides to the diagnosis of anti-NMDAR encephalitis. J Neurol Sci 353: 81-83.

An Original publication of ImedPub in a Special Issue-**Current Trends in Neurodegenerative Diseases and Medical Procedures**, Edited by **Dr. Jianqi Cui**, Department of Biochemistry and Molecular Biology, School of Basic Medical Sciences, Ningxia Medical University (NXMU), PR China.