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Memory Impairment in Children with Temporal Lobe Epilepsy: a Review

Catarina A. Guimarães*, Li Li Min*, Patrícia Rzezak**, Daniel Fuentes**, Renata C. Franzon*, Maria Augusta Montenegro*, Kette Valente**, Fernando Cendes*, Marilisa M. Guerreiro*

Department of Neurology, State University of Campinas – FCM/UNICAMP

ABSTRACT

Introduction: The authors present a review article on memory aspects of temporal lobe epilepsy in childhood. **Methods:** We performed a search in the literature. **Results:** Temporal lobe epilepsy (TLE) in childhood present with great clinical, electroencephalographic and etiological diversity. The neuropsychological features in children with TLE are not well-defined yet. The relationship between the lateralization of the lesion and performance on memory tests is not established. **Conclusion:** The studies performed in children with TLE show controversy data. This finding may be due to the etiological, clinical and electroencephalographic diversity seen in such group of children. Besides, most studies use different assessments. Therefore, it is clear that more studies are necessary to elucidate which neuropsychological deficits occur in children with TLE.
Key words: childhood, temporal lobe epilepsy, memory, neuropsychological assessment.

RESUMO

Dano de memória em crianças com epilepsia do lobo temporal: uma revisão

Introdução: Os autores apresentam um artigo de revisão sobre memória em epilepsia de lobo temporal na infância. **Método:** Realizou-se levantamento bibliográfico sobre o assunto, acrescido de contribuições pessoais. **Resultados:** Epilepsia de lobo temporal (ELT) na infância apresenta grande diversidade clínica, etiológica e eletrencefalográfica. As características neuropsicológicas de crianças com ELT ainda não estão claramente definidas. A relação entre lateralização da lesão e desempenho na realização dos testes também não está totalmente elucidada. **Conclusão:** Na infância, os resultados dos estudos em ELT em relação aos déficits de memória são controversos. Isso pode estar relacionado à diversidade clínica, etiológica e eletrencefalográfica existente. Além disso, a forma de avaliação entre os estudos é muito variável havendo diferenças quanto à natureza dos testes utilizados. Assim, fica claro que mais estudos são necessários para elucidar o perfil neuropsicológico das crianças com ELT.

Palavras-chave: infância, epilepsia de lobo temporal, memória, avaliação neuropsicológica.

Neuropsychological deficits may occur in adult patients with temporal lobe epilepsy (TLE), particularly when mesial structures are damaged. These patients usually have specific cognitive impairment, mainly related to memory. If damage involves the hippocampus of the dominant hemisphere for language, patients may present with verbal memory impairment[1-2], while damage to the hippocampus of the nondominant hemisphere may result in visual memory impairment[3-5].

In adults, there is a clear-cut relationship between hippocampal injury and memory impairment in patients with left TLE. In patients with right TLE, this relationship

* Department of Neurology – State University of Campinas – FCM/UNICAMP.
** Institute of Psychiatry, University of São Paulo – FMUSP.
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is not as clear[2,6-8]. Memory deficit occurs mainly when epilepsy involves both temporal lobes and the dominant hemisphere[9]. These patients may also present with naming problems[10].

Temporal lobe epilepsy in childhood may present with great clinical, electroencephalographic and etiological diversity. The neuropsychological features that may present in children are not well-defined and there are only a few studies in children with TLE. The relationship between the lateralization of the lesion and performance on memory tests is not well-established [11-12]. Spectroscopy appears to provide a good correlation between unilateral temporal injury and specific cognitive verbal and non-verbal dysfunction[13].

When compared with normal controls, TLE patients show specific mnemonic memory deficits according to the hemispheric specialization[14-17]. This means that verbal memory is impaired in children with left TLE and visual memory is impaired in children with right TLE- a classic finding of memory dysfunction in TLE.

Jambaque et al. (1993) evaluated 28 children with TLE and found that the correlation between visual memory deficit and right TLE was stronger than the correlation between verbal memory impairment and left TLE[16]. Poor visual memory performance was also found when patients with right mesial temporal sclerosis were assessed[18-19]. The authors did not find differences in performance of the two groups (right versus left mesial temporal sclerosis) when verbal tests were used. These findings are not in keeping with recent studies in adults, as higher sensitivity is found in verbal memory tests which usually assess left temporal lobe injury.

Adults and children may use different cognitive strategies to process visual memory. In adults, figure storage utilizes both verbal and nonverbal memory systems which implies a larger brain representation area. In children, as opposed to adults, visual processing is probably predominant and the visual stimulus is stored in visual memory. Thus, the dissociation between visual and verbal memory changes during a lifetime, with language becoming progressively more involved in memory storage[16].

Other studies did not find deficits in specific memory[11,20-24].

Lendt et al. (1999) assessed memory, attention, language and praxis in 20 children (aged 10 and 16 years) before and after temporal lobe resection. In the presurgical evaluation they found no difference between TLE patients and the control group in relation to verbal and visual memory performance. On the other hand, TLE children had a significantly lower level of language performance[11].

The effect of variables such as seizure frequency, neuropathology, seizure onset and duration of epilepsy on neuropsychological functions in children is not well-established[11,16,20].

It appears that neuropathology may be a main factor, as children with dual pathology may have a poorer performance in the presurgical evaluation (including memory) than those with either an isolated tumor or mesial temporal sclerosis. When tumor and mesial temporal sclerosis are compared, differences may not be found[24].

There appears to be a negative influence of the duration of epilepsy on mnemonic functions[11,16,19]. Studies performed in adults reinforce this correlation, showing that a better neuropsychological performance is achieved in patients with a shorter duration of epilepsy[2,25].

POST-SURGICAL STUDIES

In children, the profile of memory impairment after surgery appears to be similar to that in adults[12,21,26]. Adams et al (1990) reported a decline of verbal memory after left temporal lobectomy, but no change after right lobectomy. Patients with Ammon's horn sclerosis appear to be less affected, and those with a better presurgical evaluation had a poorer outcome[21].

Szabo et al (1998) found a significant decline in immediate verbal memory after temporal lobectomy (seven right and seven left), especially in children (7 to 12 years) who had a high presurgical evaluation performance or underwent left rather than right ressections. Significant decline in the postsurgical scores of delayed memory was independent of presurgical performance and the side of the resection[26]. Duglos et al. (1999) reported language-related cognitive decline after left temporal lobectomy[27].

Gleissner et al. (2002) observed that three months after surgery, decline in verbal memory was associated with left resection and high presurgical scores. One year later, however, the children showed some improvement, and this was attributed to the great plasticity of the immature brain[12].

Two studies related a significant effect of the side of surgery on visual memory performance[28-29]. Other authors found neither neuropsychological decline after surgery nor differences between right or left resection in children[11,23,29-30].

Lendt et al. (1999) reported significant improvement both in language and attention performance after temporal resection, but no change in memory[11].

Robinson et al. (2000) described verbal memory improvement in patients who underwent right amigdalo-hippocampectomy and no change in patients who underwent a left sided procedure[31].

Different results on the outcome of memory after temporal lobe surgery in children have been reported, some

findings showing memory decline[12,21,23,26-27] and other data showing no significant change[11,29-33]. The discrepancy may be due to the fact that TLE in childhood is a different condition from TLE in adults, both in terms of clinical features and neuropathology[34].

A recent study evaluated a group of 30 children and a group of adults. Both groups were comparable in pathology, epilepsy onset, side of the lesion and type of surgery. Neuropsychological assessment was performed three and 12 months after surgery. Three months after surgery, both children and adults who underwent left temporal lobe resection showed significant impairment in verbal learning. One year after surgery, however, the children had recovered and were as capable as before surgery while adults still showed deficits. During the first year, children who underwent right temporal lobe resection had improvement in visual memory as well as improved attention function and seizure control. The authors concluded that their data offer further evidence that brain plasticity and neuropsychological function recovery is greater in childhood. This is an important point when early surgery is considered[34].

Conclusion: The studies performed in children with TLE show controversial data. This finding may be due to the etiological, clinical and electroencephalographic diversity seen in such group of children. Besides, most studies use different assessments. Based on this review, it is clear that more studies are necessary to elucidate which neuropsychological deficits occur in children with TLE. This understanding may provide further knowledge on cognitive performance and may help to clarify schooling and social issues that influence the quality of life of children with epilepsy.

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Address correspondence to:
Marilisa M. Guerreiro
Department of Neurology – FCM/UNICAMP
PO Box 6111
CEP 13083-970, Campinas, SP, Brasil