Epilepsy & Behavior Reports 14 (2020) 100388

Contents lists available at ScienceDirect

Epilepsy & Behavior Reports

journal homepage: www.elsevier.com/locate/ebcr

Acquired epileptiform aphasia: 44 years after diagnosis

Regina Jokel [a,*], Keith Meloff [b]

[a] Baycrest Health Sciences, Rotman Research Institute, University of Toronto, Toronto, Ontario, Canada
[b] Section on Neurology, Ontario Medical Association, Toronto, Ontario, Canada

ARTICLE INFO

Article history:
Received 26 May 2020
Received in revised form 13 August 2020
Accepted 16 August 2020
Available online 31 August 2020

Keywords:
Acquired epileptiform aphasia
Landau-Kleffner syndrome
Language impairments
Follow-up

ABSTRACT

We report a case of a 48-year-old woman who was diagnosed with Landau-Kleffner syndrome (LKS) at the age of 4 and reassessed by the same neurologist four decades later. While her seizures abated by the time she was 12 years old, she was left with chronic aphasia, despite receiving optimal care. Although she graduated from high school, started her own family, and was gainfully employed, she was vulnerable in situations that required clear communication. This case reflects successful management of an otherwise debilitating condition and reminds us of the vulnerability of adults with LKS and their need for a life-long support.

Landau–Kleffner syndrome (LKS) is a rare childhood disorder subsumed under the umbrella of Acquired Epileptiform Aphasia (AEA) [1]. It appears in healthy young children who develop paroxysmal electroencephalographic changes in their brain activity. Clinical manifestations of AEA include auditory agnosia and gradual deterioration of speech and language. Due to its heterogeneity, the exact prevalence of LKS may be difficult to establish. The available epidemiological studies provide a wide range of prevalence from 1:1000 [2] to 1:1,000,000 in children aged 5–19 and 1:300,000 to 410,000 in children aged 5–14 [3]. The literature on functional outcomes reflects the benefits of seizure control and the devastating scarcity of cases with full recovery. Best outcomes are seen with the onset after age six and early speech therapy [4].

We report the case of LR, a 48-year-old right-handed woman with LKS. Her functional recovery was satisfactory but she was left with language impairments. LR was developing normally as a child and reached all developmental milestones until she was 3 ½ years old. Then, over several weeks, her speech deteriorated from sentence level, to phrases, to words, and, finally, to pointing, instead of naming objects. Gradually, she ceased responding to spoken language but still reacted to nonverbal auditory cues, such as a phone ringing, indicating normal hearing. She could not speak or understand language and her verbal communication was described as non-functional. At age 4, her IQ was 106; at age 5, her IQ was scored at 85. A sleep EEG at that time revealed bilateral temporal lobe epileptiform discharges. She was treated with antiseizure medication (mainly primidone) until age 12, which eliminated the EEG abnormalities and clinical seizures but her language disorder did not improve.

LR was fortunate to have a caring family who made sacrifices to provide effective intervention. Early in the course of her illness, the family moved to a city with a school for the deaf, where she learned sign language and basic oral communication skills. With social and educational support, she graduated from high school for the deaf. She married in her 20s and raised two healthy and well-adjusted children. At the time of her current assessment, she worked full time as a courier with a clean driving record. She took no other medications than Primidone in childhood and reported being otherwise healthy. She did not see a neurologist since her seizures abated. There is no family history of neurological or psychiatric disorders. In 2017, because of her decreased command of language, LR was defrauded while trying to lease a car. With her father's assistance, she launched a legal case against the car dealer. Her legal counsel requested an evaluation by a speech-language pathologist and neurologist for the purpose of court proceedings. A unique aspect of this case is that LR was assessed at age 4 and then 44 years later, by the same neurologist (KM).

Throughout the assessment, she asked the examiner to speak slowly and appeared to read lips well but, due to occasional comprehension problems, she asked for repetitions or clarifications. Her spontaneous speech was fluent and informative, but intelligibility was impaired by '*deaf speech*': vowel prolongations, reduced pitch and prosody, poor articulation of some sounds and consonant clusters and omission of final consonants.

LR was a slow and inaccurate "namer". She knew what the items were, as indicated by her descriptions, but could not name many of them correctly (e.g., globe: "*earth, world*", harmonica: "*harmie*", igloo: "*Eskimo*").

Her auditory recognition of single words was intact but reflected a childhood receptive vocabulary (4th percentile). She understood personally relevant sentences and verbal commands that were

* Corresponding author.
E-mail address: rjokel@research.baycrest.org (R. Jokel).

https://doi.org/10.1016/j.ebr.2020.100388

grammatically straightforward and based in context. More complex grammatical structures (e.g., sentences with abstract concepts or passives) yielded consistent errors, attesting to higher level linguistic deficits.

Her oral reading was slower, notably with misarticulations, reduction of consonant clusters and omissions of final consonants (e.g., *klink* for *clings*, *pronunce* for *pronounced*). She misread words that were not in her vocabulary (e.g., *aksent* for *ancient*).

LR's ability to match easy written paragraphs to pictures was 60% correct, reflecting limited comprehension of written language. Overall, she demonstrated mild-to-moderate language impairments despite being functionally independent. Cognitive screening revealed intact orientation to time, place and person. She was cognizant of current events and major political characters. Her abstract thinking was impoverished (e.g., proverb interpretation), because of concrete language and concepts taught in school. She noted differences but not similarities between items from the same semantic category (e.g., *watch* and *calendar*: "*They are not similar*"). She was able to generate several possible outcomes of a single cause and many possible causes of a single outcome.

LR's neurological examination was normal. Conclusions about her cognitive status were drawn from the language assessment performed by a speech-language pathologist (RJ) and neurocognitive testing carried out by a neurologist (KM). A formal neuropsychological evaluation was not performed, however, LR's occupational history attested to her intact cogntive function. She worked for many years as a delivery person with a clean driving record and no missed deliveries. Based on her past medical, occupational history and social history, current interview and the results of neurological and speech-pathology assessments, LR's psychiatric and neuropsychological status was deemed normal.

The onset and symptomatology of LR's condition was similar to that of other children with LKS, who continue to decline cognitively until, and sometime later in life, the seizures stop. Her relatively successful life (education, family, employment) reflects the importance, of addressing communication, behavioral, mental health and social needs, in addition to the epilepsy care. The medical care improves consistently as we gain a better understanding of KLS, including recent advances in the identification of genetic factors (GRIN2A) and the role of magnetoencephalography in identifying the source of epilepti form activity in the brain. Several informative reviews of treatment options in LKS found steroid treatment to be most successful in improving cognitive function [5] with corticosteroids often reserved for drug-resistant disease because of adverse events [6]. High-dose benzodiazepines and corticosteroids have been successfully used to treat clinical and electroencephalographic features. Various sources report some success with valproate, ethosuximide, levetiracetam, sulthiame, and lamotrigine and, more recently, amantadine [7]. Noteworthy, efficacy has been reported for intravenous immunoglobulin IVIG treatment [8], multiple subpial resections [9] and ketogenic diet [10]. Long-term follow-up assessments are rare, and to our knowledge, this report is the only follow-up with a four-decade time frame. The general lack of follow-up is unfortunate because, despite apparent good recovery, most children with AEA become adults who need lifelong medical, social and economic support. Their persistent language impairment makes them vulnerable and disadvantaged in situations demanding good communication. LR's case underscores the need for resources sensitive to adults suffering the consequences of childhood epilepsy due to AEA who may be left adrift in our society.

Author agreement

RJ assessed LR's language and drafted the manuscript for intellectual content. KM assessed LR's neurological function and revised the manuscript for intellectual content. The manuscript represents an original case study and has not been submitted for publication elsewhere.

Declaration of competing interest

The authors have no conflicts of interest to disclose.

Appendix A. Supplementary data

Supplementary materials: Video files of LR's assessment. The patient agreed to the inclusion of the video clips with the manuscript. Supplementary data to this article can be found online at https://doi.org/10.1016/j.ebr.2020.100388.

References

[1] Landau WM, Kleffner FR. Syndrome of acquired aphasia with convulsive disorder in children. Neurol. 1957;51(5):1241–9. https://doi.org/10.1212/wnl.51.5.1241-a.

[2] Chiofalo N, David P, Breinbauer C, Ferreira J. Polysomnography in the spectrum of acquired epileptiform aphasia. Am J END Technol. 2003;43(1):13–7. https://doi.org/10.1080/1086508X.2003.11079410.

[3] Kaga M, Inagaki M, Ohta R. Epidemiological study of Landau–Kleffner syndrome (LKS) in Japan. Brain Dev. 2014;36(4):284–6. https://doi.org/10.1016/j.braindev.2013.04.012.

[4] Pearl PL, Carrazana EJ, Holmes GL. The Landau-Kleffner syndrome. Epilepsy Curr. 2001;1(2):39–45. https://doi.org/10.1046/j.1535-7597.2001.00012.x.

[5] van den Munckhof B, Alderweireld C, Davelaar S, van Teeseling C, Nikolakopoulos S, Brown KPJ, et al. Treatment of electrical status epilepticus in sleep: clinical and EEG characteristics and response to 147 treatments in 47 patients. Eur J Pediatr Neurol. 2018;22:64–71. https://doi.org/10.1016/j.ejpn.2017.08.006.

[6] Sanchez Fernandez IS, Chapman KE, Peters JM, Harini C, Rotenberg A, Loddenkemper T. Continuous spikes and waves during sleep: electroclinical presentation and suggestions for management. Epilepsy Res Treat. 2013:1–12. https://doi.org/10.1155/2013/583531.

[7] Wilson RB, Eliyan Y, Sankar R, Hussain SA. Amantadine: a new treatment for refractory electrical status epilepticus in sleep. Epilepsy Behav. 2018;84:74–8. https://doi.org/10.1016/j.yebeh.2018.04.018.

[8] Mikati M, Saab R, Fayad MN, Choueiri RN. Efficacy of intravenous immunoglobulin in Landau-Kleffner syndrome. Pediatr Neurol. 2002;26(4):298–300. https://doi.org/10.1016/s0887-8994(01)00402-7.

[9] Morrell F, Whisler WW, Smith MC, Hoeppner TJ, de Toledo-Morrell L, Pierre-Louis SJ, et al. Landau-Kleffner syndrome. Treatment with subpial intracortical transection. Brain. 1995;118(6):1529–46. https://doi.org/10.1093/brain/118.6.1529.

[10] Rubenstein JE, Kossoff EH, Pyzik PL, Vining PG, McGrogan JR, Freeman JM. Brain disorders/neurological experience in the use of the ketogenic diet as early therapy. J Child Neurol. 2005;20(1):31–4. https://doi.org/10.1177/08830738050200010501.