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Case Report

Surgery for Refractory Epilepsy: A Case-Report and Brief Literature Review

Claudio J. Turco[1]*, Gonzalo V. Pedrosa Carbel[1], Belia R. Altamirano Brasca[1], Agustín Maccio[1] and Franco G. Cuevas[1]

[1]Hospital Tránsito Cáceres de Allende; Córdoba, Córdoba, Argentina.

***Corresponding Author:** Dr. Claudio J. Turco, Hospital Tránsito Cáceres de Allende; Córdoba, Córdoba, Argentina.*

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Abstract

Epilepsy is a prevalent condition affecting a great proportion of the population. It is estimated that one third of epilepsy cases are refractory to medical treatment. Surgery for refractory epilepsy has increasingly evolved over the last decades. Early neurosurgical consultation and case-by-case analysis is of paramount when surgical indication is done, in order to diminish long-term complications, and improving patients' quality of life. In this work we describe a case of an 18-year-old boy with epileptic syndrome refractory to medical therapy and offer a brief literature review.

***Keywords:** refractory epilepsy – epilepsy surgery – frontal lobectomy – surgical outcomes.*

Introduction

Medically refractory epilepsy is defined as *the persistence of seizure activity despite appropriate treatment with two or more antiepileptic drugs (AED).* In a recent metanalysis and systematic review performed by Alva-Díaz et al. it was estimated that the prevalence of the nosological entity in Latin America was 14.09 per 1000 inhabitants, while the incidence was 1.11 per 1000 person-years. (1) The case-fatality rate was 1.04 per 100,000 inhabitants in a report from the Pan-American Health Organization. (2) It is estimated that about one third of patients with epilepsy are refractory to medical therapy. (3)

Epilepsy is associated with a wide spectrum of comorbid conditions that are related to the impairment it produces over patients' quality of life, AED adverse event profile, or both. These includes medical as well as psychiatric comorbidities, accounting for a range of 26.8% to 84% of patients with epilepsy suffering for at least one comorbidity including but not limited to, depression, anxiety, trauma, stroke, attention deficit hyperactivity disorder and bone disease. (4)

Since this condition causes a considerable impairment in quality of life, same scenario is observed when assessing the economic burden of the disease, incurring in a higher cost related to controlled epilepsy at a significant level. (5, 12)

There are several causes of epilepsy that are amenable to surgical treatment, such as temporal mesial sclerosis (the most common cause), brain tumors, arterio-venous malformations, encephalomalacia from stroke or trauma, focal cortical dysplasia and cryptogenic epileptic foci. (3) Time-to-surgery is an important aspect when evaluating prompt treatment since it has been shown that early surgery in some contexts improves outcomes and decrease disability long-range. (6-8)

This work emphasizes the clear importance of early neurosurgical referral, assessment and treatment in order to avoid complications related to the quality of life of patients with refractory epilepsy, and the potential improvement of seizure control and functional outcomes.

Case presentation

An 18-year-old male was admitted to Iturraspe Regional Hospital for seizures refractory to medical treatment. He was diagnosed at age 14 with epilepsy syndrome and he was treated with phenytoin, levetiracetam, valproic acid and clonazepam.

The semiology of seizure was generalized clonic seizures with no aura, that started with jerky movements and automatisms of the left upper arm, continued with 4 limb clonic movements with eye deviation toward the left side and lasted for approximately 1 minute. Several months prior to presentation, seizure frequency was 1-3 every month, evolving to 1 -3 each week and lastly, 5-10 seizure episodes per day with prolonged post-ictal stage, motive of admission and medical treatment.

The patient did present with other comorbid conditions related to his epileptic syndrome: alcohol and marihuana abuse disorders, a grade B face and right arm burn and features of untreated depressive disorder.

During hospital stay, the patient developed status epilepticus that required intensive care unit admission and management with anesthetic agents and airway management to cease seizure activity.

A brain magnetic resonance imaging (MRI) was performed in order to assess any structural abnormality that might have caused the syndrome. No relevant finding was encountered. (Fig. 1)

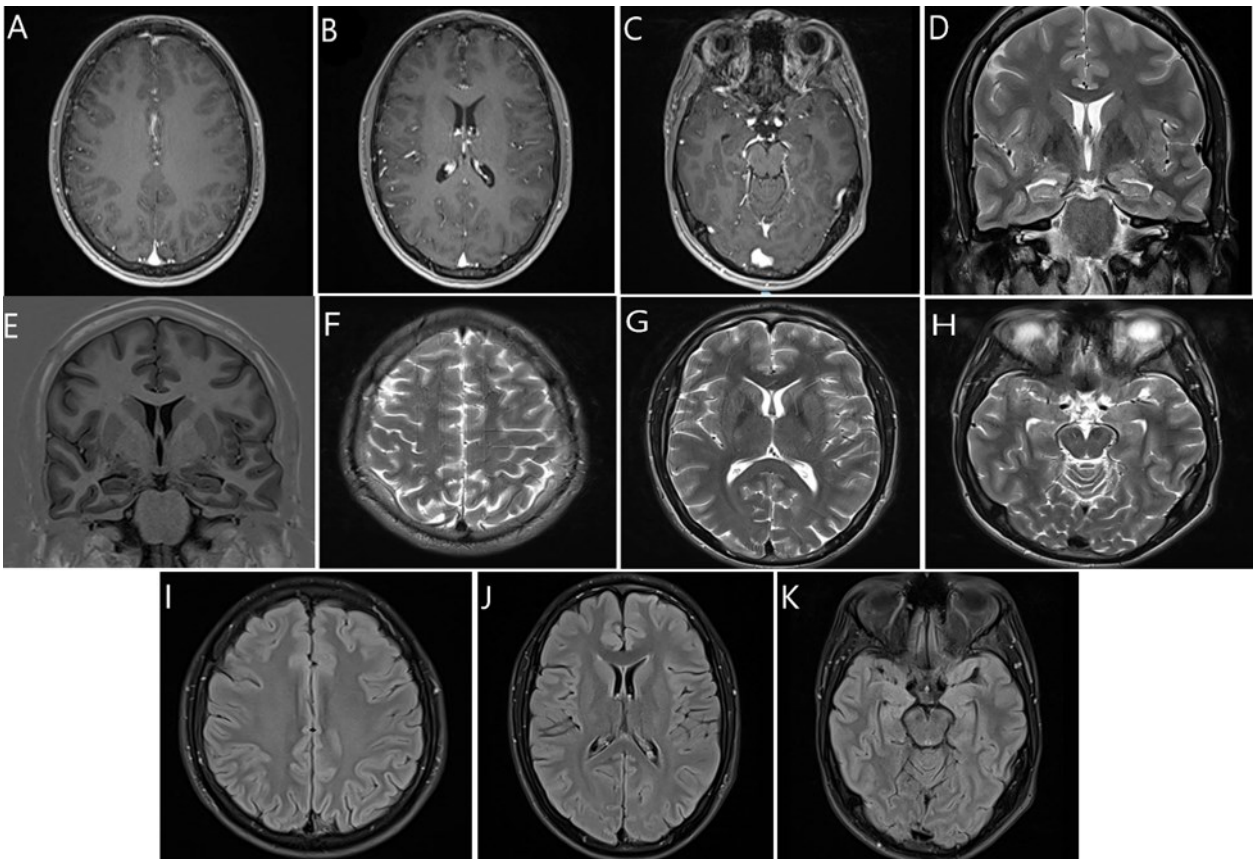

Figure 1: *Selected MRI sections in T1-weighted image with contrast (A-C), T2-weighted image (F-H) and FLAIR (I-K). Coronal sections showing mesial-temporal structures in D and E.*

A 48-hour video electroencephalogram (EEG) was ordered to identify the epileptic focus: during ictal episodes recorded by the study, spikes and slow-waves were found in the right fronto-central region, that rapidly diffused to the entire right hemisphere and afterwards generalized. During the monitoring, around 6-8 similar episodes per 24 hours occurred. (Fig. 2)

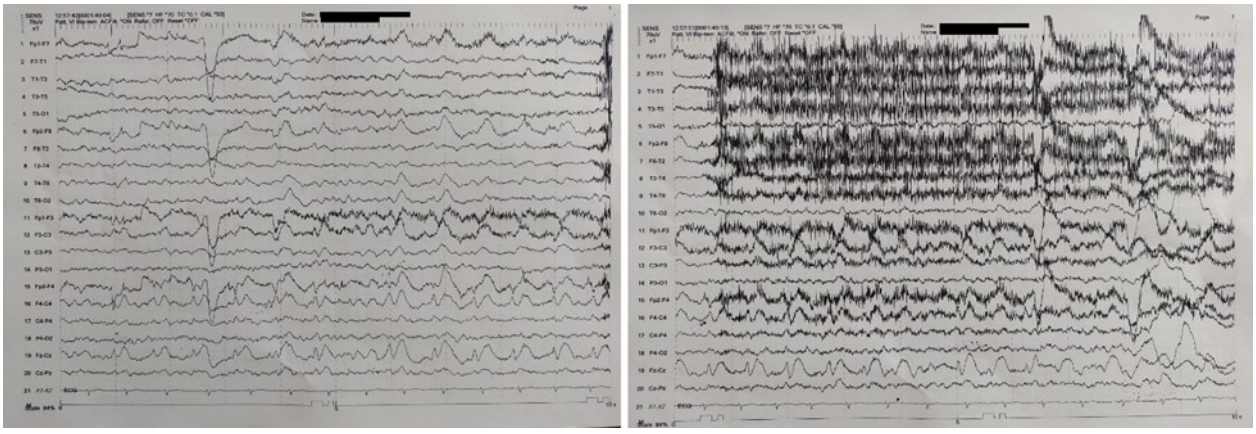

Figure 2: *EEG findings of one of the recorded seizure episodes in video-EEG. See text.*

Because of refractoriness of medical therapy, neurosurgical consultation to our team was made. The case was analyzed, and surgical treatment was offered to the patient's family.

Cortical and subcortical mapping prior to resection was performed under the same surgical intervention. Epileptic area was mainly localized in the superior and middle frontal gyri but also persisted in both polar and pre-motor cortices. A right frontal lobectomy was performed.

During post-operative ICU stay, our patient presented another generalized clonic seizure 24 hours after surgery that lasted for 1 minute and ceased with medical therapy. He presented with mild left hemiparesis of the face and upper limb. He was complicated with ventilation-related pneumonia that was successfully treated with antibiotic therapy. He was discharged 33 days after admission, with same treatment as admission.

At 4-month follow-up, our patient rehabilitated completely the motor deficit, presented mild cognitive impairment and was seizure-free with no focal or generalized seizure activity.

Discussion

Early intervention for defined epileptic focus is paramount in the surgical treatment of epilepsy, since it has been showed that increased quality of life and seizure-free post operative outcomes are significantly enhanced if properly indicated. (6-8) In a randomized control trial by Wiebe et al. where 1-year seizure freedom was assessed, surgical resection of epileptic focus accounted for a significantly greater percentage. (6) Adding to this point, another randomized trial underwent by Engel et al. found that 85% of patients were 2-year seizure free compared to medical treatment alone, where there was no individual seizure-free at the analyzed follow-up time. (10) Furthermore, a metanalysis performed by Jin-Tao et al. found a significant difference as well: a 57% of studied patients were seizure free compared to 15% in the medical treatment group. (9) These findings are relevant to improve detection and prompt diagnosis and management of surgical causes of refractory epilepsy bearing in mind the prolonged time on multiple AEDs, exposure to comorbid associated conditions and decreased quality of life this patient group is at risk of. It is important to depict that by definition, refractory epilepsy consist of a case of epileptic seizure that do not respond to more than 2 AEDs, therefore it is expected that medical treatment groups from studied populations in the consulted literature, will continue to present no or poor response to continued medical treatment, while surgical treatment might represent an improvement to seizure-freedom outcomes. Long-term seizure freedom was assessed in an observational study by Malmgren et al. where 40%-50% of patients maintained freedom of seizures that impaired consciousness at 10 years. (11)

Several studies state that patients with refractory epilepsy typically spend decades until a surgical treatment is considered. (7, 12-15) This fact may be influenced by a group of factors and underlies the importance of further investigations to determine if surgery is indicated for the treatment of specific cases. We agree with the literature that surgical work-up is relevant when assessing patients with epilepsy syndromes.

Safety is an important concern when bearing the possibility of surgery for epilepsy. There are complications inherent to any surgical procedure in the brain, such as infection, cerebrospinal-fluid leakage, neurological deficit, among others. A number of studies appraised the safety of surgical treatment for epilepsy and yielded favorable results compared to medical treatment alone, highlighting the feasibility of surgical treatment when AEDs alone have failed. (16-19) Overall complication rates ranged from 2%-5%, a reasonable result when this type of surgical procedure is indicated, considering the comorbidity that epilepsy adds to the quality of life of patients suffering from this disease. (18, 19) Meticulous assessment and investigation in a patient with epilepsy syndrome is paramount to weigh the cost-benefit relation that underscore the specific case.

Conclusion

Our case report adds another case of refractory epilepsy successfully treated with surgery to the body of medical knowledge in this field, and correlates at some extent to the consulted literature. Our patient presented multiple of the comorbidities that are often found in this group of patients, and there was also a relative delay in considering surgical treatment as a potentially better management. Finally, we consider that more research is needed in the field to answer some inquiries such as optimal time-to-surgery and cost-benefit analysis.

Conflict of Interest

The authors declare no conflict of interest.

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