Neuroscience and Neurosurgery

Clinical History and Surgical Intervention for Temporal Lobe Epilepsy with Hippocampal Sclerosis: A Case Study

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Abstract:

This article presents a case study of a 32-year-old patient with drug-resistant temporal lobe epilepsy caused by right hippocampal sclerosis. The patient's clinical history includes recurrent seizures characterized by loss of contact, chewing movements, facial automatism, and left upper limb hypertonia. Despite various antiepileptic medications, the symptoms persisted, accompanied by mild cognitive deficits. Diagnostic evaluations revealed marked right hippocampal atrophy and interictal epileptic discharges in the bilateral temporal regions. The patient underwent non-selective right amygdalo-hippocampectomy, resulting in a significant improvement in cognitive functioning post-surgery. The article discusses the rationale behind surgical intervention and potential complications. The findings highlight the effectiveness of surgical treatment for temporal lobe epilepsy due to hippocampal sclerosis and the need for individualized approaches in choosing the surgical technique.

Clinical history

A 32-year-old patient presents with convulsive seizures characterized by loss of contact, chewing movements and facial automatism, as well as hypertonia of the left upper limb. Four episodes per month. Often the episode is preceded by a feeling of fear and epigastric discomfort. The neurological examination shows only a certain slowness in the execution of daily tasks, without focal neurological deficits, with a preserved memory. He is taking lamotrigine 300mg daily, oxcarbazepine 1800mg daily and clobazam 20mg daily without adequate monitoring. He presented with generalized febrile seizures at age 2 years, treated with phenobarbital with adequate control and discontinued at age 4 years. At the age of 16, he began to exhibit the current symptoms. He has been treated with carbamazepine, phenytoin, topiramate before, with no resolution of the chart.

Propaedeutics

He underwent a brain MRI which showed atrophy of the right hippocampus suggestive of hippocampal sclerosis. In-unit video-EEG monitoring for 72 hours showed an interictal pattern of spines in the bilateral temporal regions. Two electroencephalographic seizures with onset in

the right anterior temporal region. Neuropsychological evaluation shows mild cognitive deficit, preserved verbal memory, and moderate loss of nonverbal memory.

Treatment

Surgical intervention is recommended with non-selective right amygdalo-hippocampectomy. The procedure was uneventful and after the surgery he had no more seizures. He continues to take anticonvulsant medication. A proposal to reduce the dosage is considered after 1 year of surgery in the absence of new convulsions.

Rational

Diagnostic :

Syndromic:

Drug-resistant epileptic syndrome

Topographic:

Right mesial temporal lobe Etiologic: Right hippocampal sclerosis

Treatment:

Surgical treatment with hippocampectomy tonsillectomy has been shown to be significantly more effective than drug treatment for temporal lobe epilepsy due to hippocampal sclerosis(Wieser & Yaşargil, 1982)(Engel Jr et al., 2010)(Langfitt & Wiebe, 2008)(Wiebe et al., 2001). Regarding the surgical technique, there is no clear definition in the literature of the best approach between trans-sylvian or trans-temporal selective access and anterior temporal lobectomy followed by amigdalo hippocampectomy.(Abosch et al., 2002; Adada, 2008; Bate et al., 2007; Elliott et al., 2018; Helmstaedter et al., 2004; Schramm, 2008)

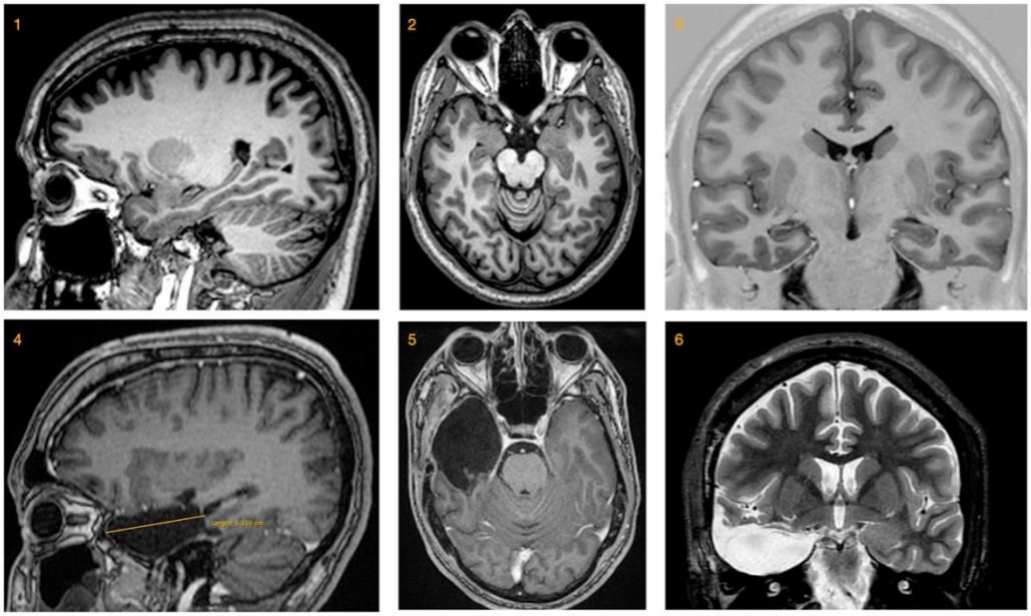


Figure: MRI (coronal, axial and sagittal) pre and postoperative of surgery with anterior temporal lobectomy for right hippocampal sclerosis.

Images 1, 2, 3: preoperative MRI showing right hippocampal sclerosis. Images 4, 5, 6: Postoperative MRI showing excision of the neocortex (5.3 cm) and mesial structures.

Discussion

There is still controversy about the influence of more selective procedures in surgery for temporal lobe epilepsy. Despite the varied results of articles on the subject (Helmstaedter et al.2004, Adada et al. 2008), there is a trend toward better results in seizure control with anterior temporal lobectomy and better memory and language preservation with selective procedures, emphasizing the importance of assessing language and memory before surgery to define the surgical technique. Whenever possible, the choice of access route should be made individually for each patient, based on neurophysiological and imaging findings. In countries with a cost limitation for extended propaedeutics, anterior temporal lobectomy may be the best option for the proper control of seizures with minimal additional morbidity.

As this is a case report, the analysis of results should not be extrapolated and conclusions regarding the best surgical technique cannot come from this work

Early complications

- wound infection

- CSF fistula

- Visual field defect due to Meyer's loop injury.

- motor deficit due to perioperative arterial lesion (1.4% in our series)(Costa et al., 2019)

- speech disorders in surgeries on the dominant side, usually transient (less than 4% in our series)

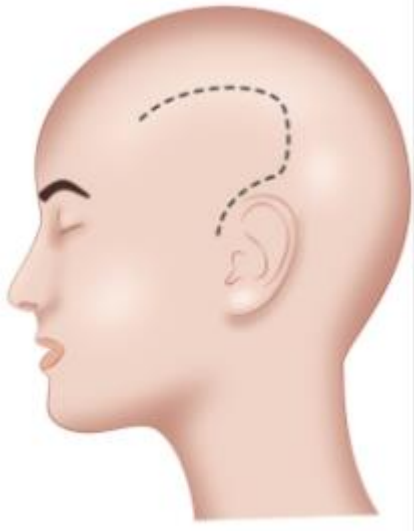
- Psychiatric disorders (depression, obsessive compulsive disorder)

Late complications

- Seizure recurrence (62% seizure-free in 10 years)

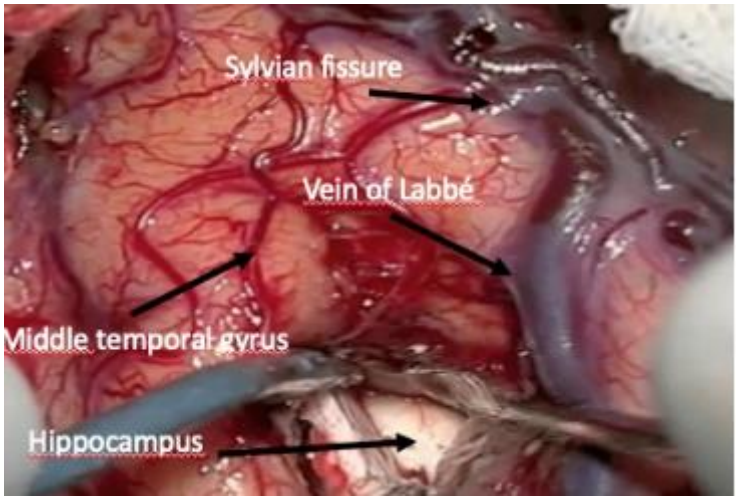
Disclosure

The authors declare that there is no conflict of interest related to this article

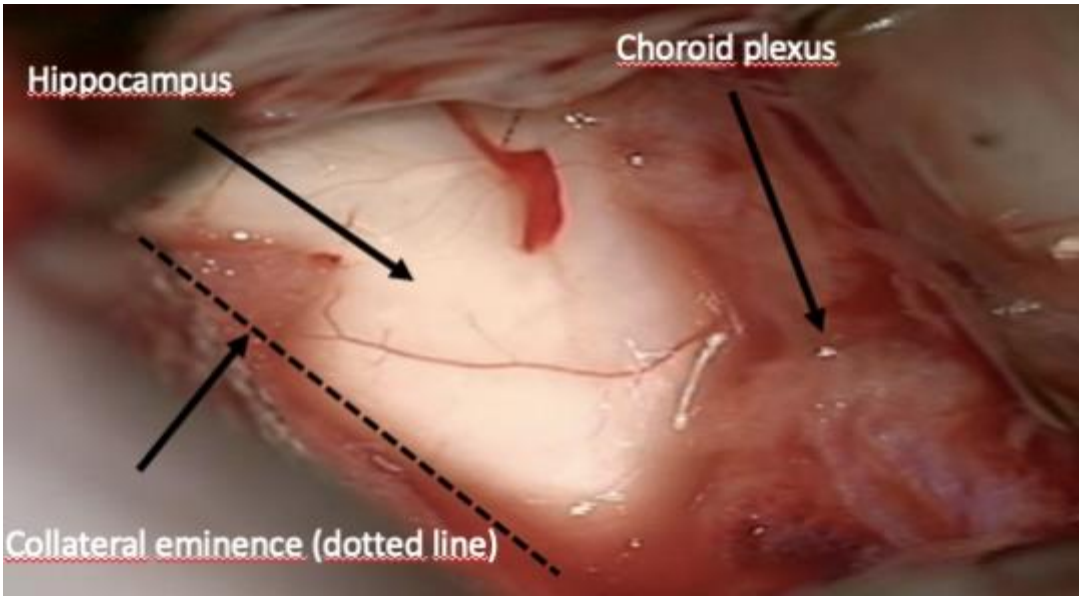


Temporal craniotomy with exposition from the zygoma to the sylvian fissure and as anterior as possible.

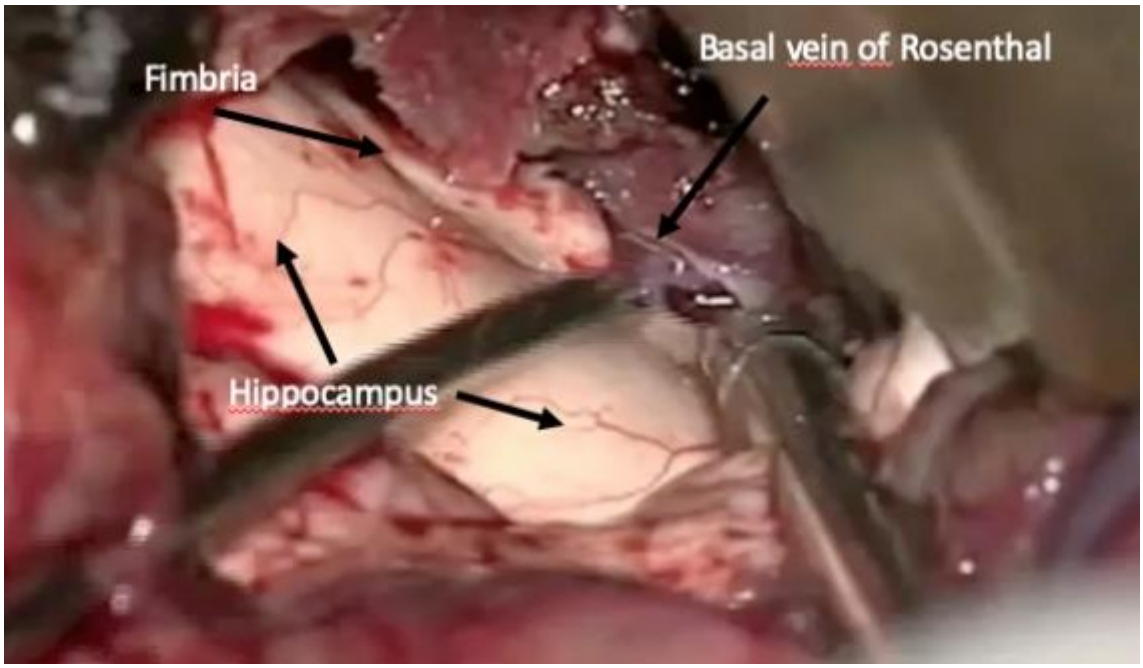
The lateral ventricle and hippocampus lie approximately 3 cm posterior to the temporal pole.



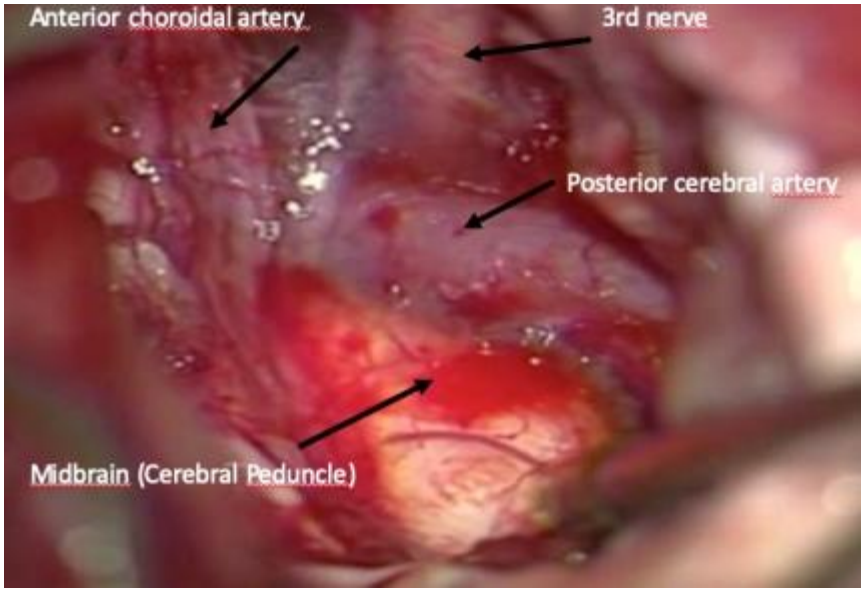
Surgical view after corticectomy of the middle temporal gyrus with exposure of the hippocampus in the lateral ventricle.



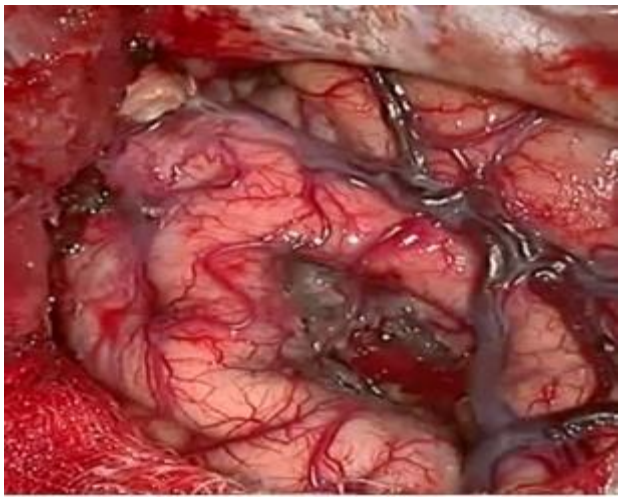
Lateral disconnection of the hippocampus at the level of the collateral eminence (protrusion of the collateral sulcus in the temporal horn of the lateral ventricle).



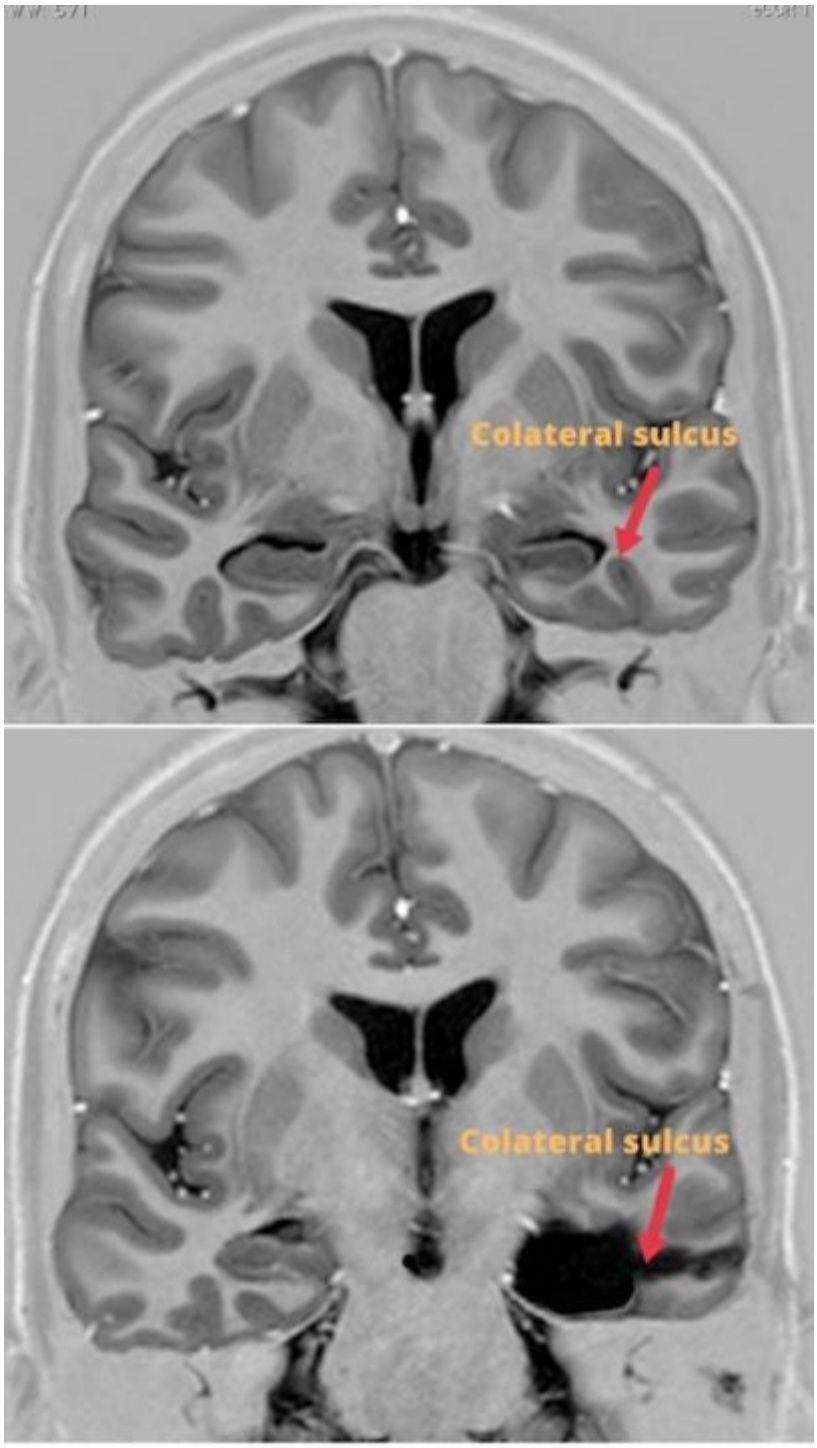
Medial disconnection of the hippocampus at the level of the ambient cistern with visualization of the basal vein of Rosenthal.



View after resection of the hippocampus, uncus and tonsil.



Final view of the corticectomy.



Pre and post operative MRI

References :

Abosch, A., Bernasconi, N., Boling, W., Jones-Gotman, M., Poulin, N., Dubeau, F., Andermann, F., & Olivier, A. (2002). Factors predictive of suboptimal seizure control following selective amygdalohippocampectomy. *J Neurosurg*, *97*(5), 1142–1151. https://doi.org/10.3171/jns.2002.97.5.1142

Adada, B. (2008). Selective amygdalohippocampectomy via the transsylvian approach. *Neurosurgical Focus*, *25*(3), E5. https://doi.org/10.3171/FOC/2008/25/9/E5

Bate, H., Eldridge, P., Varma, T., & Wieshmann, U. C. (2007). The seizure outcome after amygdalohippocampectomy and temporal lobectomy. *Eur J Neurol*, *14*(1), 90–94. https://doi.org/10.1111/j.1468-1331.2006.01565.x

Costa, B. S., Santos, M. C. V., Rosa, D. V., Schütze, M., Miranda, D. M., & Romano-Silva, M. A. (2019). Automated evaluation of hippocampal subfields volumes in mesial temporal lobe epilepsy and its relationship to the surgical outcome. *Epilepsy Res*, *154*, 152–156. https://doi.org/10.1016/j.eplepsyres.2019.05.011

Elliott, C. A., Broad, A., Narvacan, K., Steve, T. A., Snyder, T., Urlacher, J., Wheatley, B. M., & Sinclair, D. B. (2018). Seizure outcome in pediatric medically refractory temporal lobe epilepsy surgery: Selective amygdalohippocampectomy versus anterior temporal lobectomy. *Journal of Neurosurgery: Pediatrics*, *22*(3), 276–282. https://doi.org/10.3171/2018.4.PEDS17607

Engel Jr, J., McDermott, M. P., Wiebe, S., Langfitt, J. T., Erba, G., Gardiner, I., Stern, J., Dewar, S., Sperling, M. R., Jacobs, M., Kieburtz, K., & for the Early Randomized Surgical Epilepsy Trial (ERSET) Study Group. (2010). Design considerations for a multicenter randomized controlled trial of early surgery for mesial temporal lobe epilepsy. *Epilepsia*, *51*(10), 1978–1986. https://doi.org/10.1111/j.1528-1167.2010.02641.x

Helmstaedter, C., Van Roost, D., Clusmann, H., Urbach, H., Elger, C. E., & Schramm, J. (2004). Collateral brain damage, a potential source of cognitive impairment after selective surgery for

control of mesial temporal lobe epilepsy. *Journal of neurology, neurosurgery, and psychiatry*, *75*(2), 323–326.

Langfitt, J. T., & Wiebe, S. (2008). Early surgical treatment for epilepsy. *Curr Opin Neurol*, *21*(2), 179–183. https://doi.org/10.1097/WCO.0b013e3282f47931

Schramm, J. (2008). Temporal lobe epilepsy surgery and the quest for optimal extent of resection: A review. *Epilepsia*, https://doi.org/10.1111/j.1528-1167.2008.01604.x

Wiebe, S., Blume, W. T., Girvin, J. P., Eliasziw, M., & Effectiveness and Efficiency of Surgery for Temporal Lobe Epilepsy Study Group. (2001). A randomized, controlled trial of surgery for temporal-lobe epilepsy. *N Engl J Med*, *345*(5), 311–318. https://doi.org/10.1056/NEJM200108023450501

Wieser, H. G., & Yaşargil, M. G. (1982). Selective amygdalohippocampectomy as a surgical treatment of mesiobasal limbic epilepsy. *Surg Neurol*, *17*(6), 445–457. https://doi.org/10.1016/s0090-3019(82)80016-5