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Reoperation of a recurrent temporal lobe epilepsy: a technical case report

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Abstract

Background: The indications for the reoperation of a recurrent temporal lobe epilepsy, the risks, and outcome have not been well documented. The invasive video electroencephalogram (EEG) monitoring and magnetic resonance imaging (MRI) techniques can reveal the residual tissues and their epileptogenic activity so that a reoperation decision can be made.

Case Description: A 30-year-old patient who had recurrent temporal lobe epilepsy and had undergone 2 operations at the same temporal region is presented. After both of these operations, approximately 6 months later, seizures relapsed. Postoperative neuroimaging studies showed residual mesiotemporal tissues at the operative site. The invasive video EEG monitoring revealed epileptogenic activity originating from these residual tissues. After all of these investigations, it was thought that a third operation was indicated, and the patient was operated. Postoperative course was uneventful. No postoperative deficit was observed. Pathological examination was reported as hippocampal sclerosis. He is seizure-free at his third postoperative year.

Conclusions: Complete resection of epileptogenic mesiotemporal structures at the first operation can prevent the necessity for reoperation in defined cases. The MRI and invasive video EEG monitoring techniques can reveal the residual tissues and their epileptogenic activity in a recurrent epilepsy case.

Keywords: Epilepsy; Temporal lobe; Reoperation

1. Introduction

Temporal lobe epilepsy is the most common form of epilepsy, and despite optimal pharmacotherapy, approximately 30% of patients fail to become seizure-free. The most common pathology associated with such intractable temporal lobe epilepsy is hippocampal sclerosis [6].

Seizures recur after surgery for temporal lobe epilepsy in 20% to 60% of patients. Reoperation for a recurrent temporal epilepsy was first reported in 1954 by Penfield. Thereafter, several other series of reoperation for recurrent temporal lobe epilepsies were reported [1,3,7]. In most of these series, the follow-up time was not specified. In the study of Germano et al [3], 40 patients who had undergone reoperation for recurrent temporal lobe epilepsy were reviewed. As a result of this study, they commented that reoperation for recurrent temporal lobe epilepsy provides good seizure control in selected patients and that the preoperative workup for reoperation must include magnetic resonance images to identify residual mesiotemporal structures or lesions. MRI provides the most precise definition of the extent of the previous resections, determines the status of the resection area borders (gliosis, encephalomalacia, and others), and reveals residual mesiotemporal limbic structures, such as amygdala, hippocampus, and others, and other residual or recurrent lesions. They also stated that multifocal EEG abnormalities after the first operation seem to be associated with a poor seizure outcome. More complete resection of the mesiobasal temporal structures during the first operation, even in the absence of intraoperative electrocorticographic abnormalities, can prevent the need

Abbreviations: EEG, electroencephalogram; MRI, magnetic resonance imaging.

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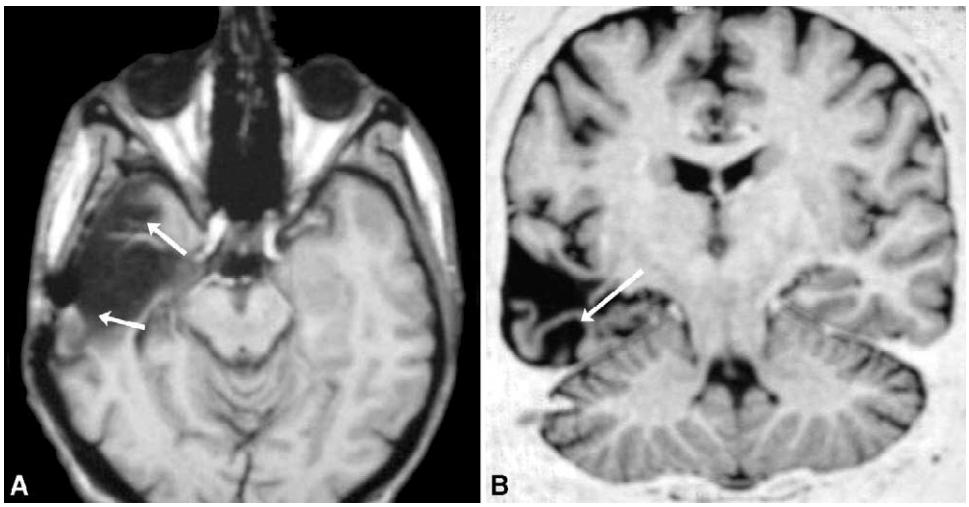

Fig. 1. Remnant tissues shown with arrows in axial (A) and in coronal (B) sections of MRI.

for reoperation in defined cases [3]. There is no consensus among neurosurgeons about how much hippocampus should be excised optimally for the surgical treatment of temporal lobe epilepsy. However, most of the epilepsy surgeons believe that the most common cause of failed temporal lobectomy is the inadequate hippocampal resection [5]. Wyler et al [9] reported that, for recurrent temporal lobe epilepsy, inadequate resection of the hippocampus in particular could be the reason of recurrence. Spencer et al [8] emphasized that as many as 20% of hippocampal foci reside in the posterior hippocampus, which would not be resected with a standard temporal lobectomy.

2. Material and methods

2.1. Patient and preoperative workup

Our patient was a 30-year-old, left-handed man. He had graduated from a university and was working as a translator. He had been having epileptic seizures for 14 years. Although a sufficient amount of medical treatment (carbamazepine, valproic acid) had been given, epileptic seizures continued to occur 3 to 4 times per week.

It was learned from his history that he was operated first in 1993 and for a second time in 1998 for temporal lobe epilepsy in 2 different centers and that approximately 6 months after each operation, seizures restarted at the same frequency.

After the neuropsychological investigations and Wada test, the right hemisphere of the patient was determined as dominant and the memory tests of the patient revealed no deficit.

In the axial sections of the MRI, the remnant tissues belonging to the hippocampus and surrounding gliotic tissues were seen. In the coronary sections, the remnants of the hippocampus and superior temporal gyrus, and some postoperative gliotic tissues were also seen (Fig. 1A and B).

Initially, noninvasive video EEG monitoring was performed, but sufficient information about the lateralization of

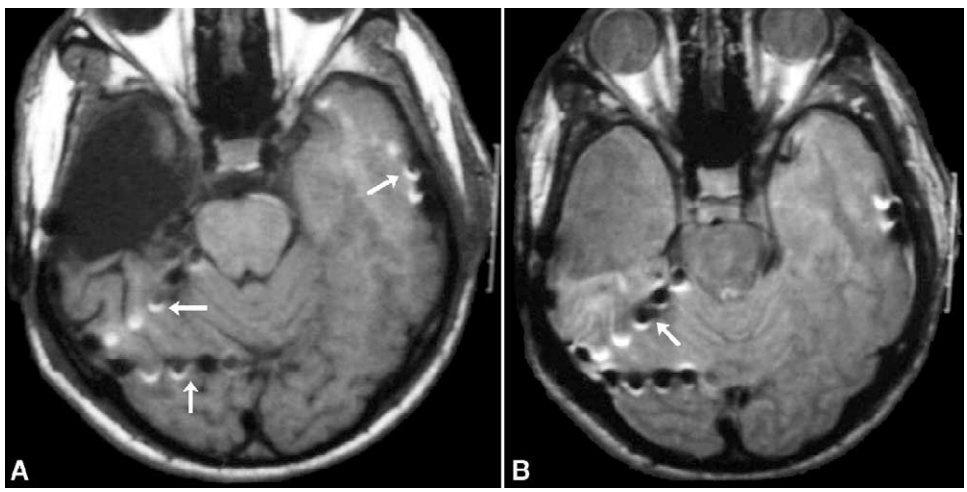

Fig. 2. A: Subdural strip electrodes seen in axial section of MRI (arrows). B: Hippocampus centralized by subdural strip electrodes seen in axial section of MRI (arrow).

the seizures could not be detected by this technique. As a result, invasive video monitoring was planned.

Subdural strip electrodes, localized on the temporobasal, parietal, and occipital lobes on the right and on the anterior temporobasal and frontal parts of the left hemisphere, were placed via burr holes. A new MRI was taken after this procedure, and the electrodes that were placed on the left temporal, right temporobasal, and right occipital lobe were visualized (Fig. 2A).

The distal contacts of the strip electrode that was placed on the right temporobasal region centralized the hippocampal remnant tissues (Fig. 2B).

During the invasive video EEG monitoring, 3 seizures were recorded. One was a simple partial seizure, and 2 were complex partial seizures; 1 aura was also recorded. Two of the seizures originated from the right and 1 from the left temporal lobe. In the interictal EEG, both temporal lobes showed epileptogenic activity, and there was no spreading out of the temporal lobes. The results of the invasive video EEG monitoring were explained to the patient in detail. The existence of another epileptogenic activity on the left temporal lobe, which was independent from the right, was given as explanation for lack of seizure control after the operations. Together with the patient, it was decided to operate for the third time.

2.2. Previous surgical procedure

The first and second operations of this patient were performed in 2 different institutions, by 2 different neurosurgeons, in 1993 and 1998. After both operations, the seizures restarted after 6 months.

2.3. Technical aspects of reoperation

When planning the surgery of this patient, a new MRI was done, and we then performed firstly noninvasive (scalp) and then invasive video EEG monitoring. The results of the invasive video EEG records were inspected by the neurology department. Two months after the invasive monitoring, we performed the third operation for epilepsy.

Under general anesthesia, a right temporal recraniotomy was performed. It was seen that the superior temporal gyrus remnant was left in its place in the past operations. The remnant of the superior temporal gyrus was excised (Fig. 3A), and then the anterior choroidal artery and choroid plexus were seen. The choroid plexus was reflected superiorly to expose the taenia fimbria. It was noticed that almost all of the body and tail segments of the hippocampus were left in their place at the previous operations (Fig. 3B). The hippocampus was tough and sclerotic. The hippocampectomy was completed, and the uncus and other gliotic remnants were all excised. After surgical hemostasis, the operation was completed (Fig. 3C and D).

3. Results

MRI was used before the operation to demonstrate the presence of residual mesiotemporal structures from the past operations. With the help of invasive video EEG monitor-

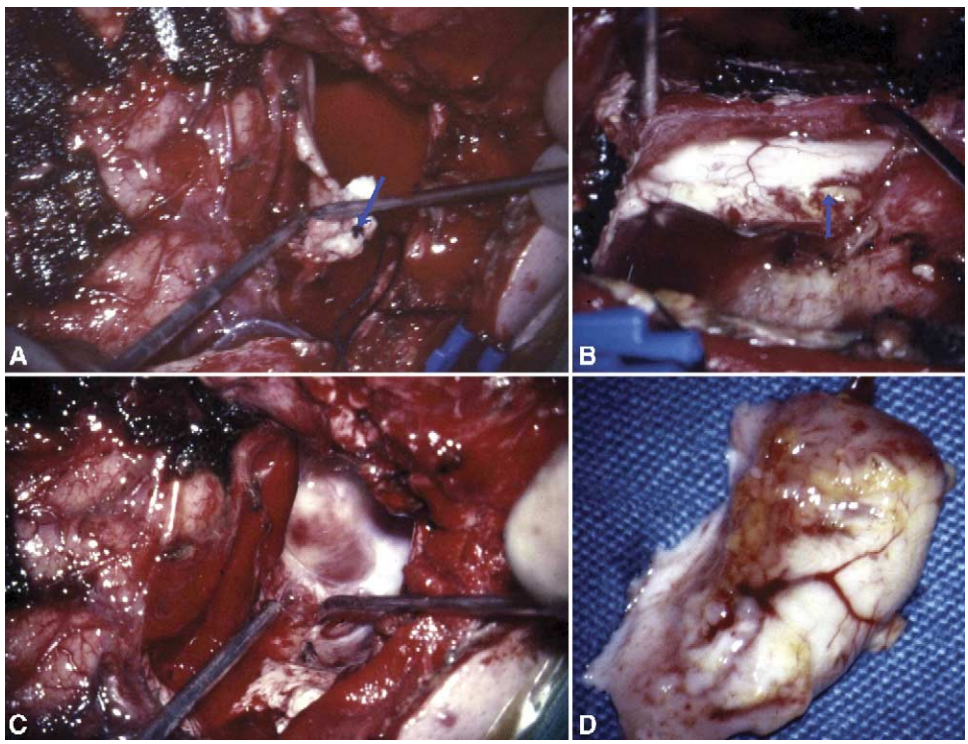

Fig. 3. A: Removal of the remnants of superior temporal gyrus seen in preoperative scene (blue arrow). B: Remnants of hippocampal body and tail, which were left in place at the previous operations (blue arrow). C: Hippocampectomy in the process of being completed. D: Resected specimen of hippocampus.

ing, the epileptogenic activity still present in these residual mesiotemporal structures was recorded.

After the third operation, there was no neurologic deficit, and in the 3-year follow-up, the patient is still seizure-free.

4. Discussion

4.1. Causes of seizure recurrence after surgery

The causes of recurrent seizures after surgery for temporal lobe epilepsy are probably multifactorial. The inadequate surgical procedure, which may be due to inaccurate localization of the epileptogenic area, resulting in insufficient excision of the epileptogenic lesion, leads to the recurrence of epileptic seizures after the surgery [3]. A dual pathology accompanying the mesial temporal sclerosis can also be the reason for recurrence after surgery [7].

The seizure-free ratio of patients who were reoperated ranged between 20% and 63%, and the worthwhile improvement additional to this ratio ranged between 15% and 30% [7].

It has been shown that invasive video EEG monitoring improves seizure outcome after surgery by decreasing mislocalization of the epileptogenic focus [2-4].

Germano et al [3] showed that patients with recurrent epileptogenic seizures after surgery could become seizure-free only with resection of residual mesiotemporal structures. Some genetic factors or scar at the site of the resection may also be the cause of recurrent epileptic seizures.

4.2. Indications for reoperation

The indications for reoperation should include criteria similar to those used for the first operation: (1) epilepsy refractory to documented therapeutic levels of antiepileptic drugs; (2) surface or intracranial EEG recordings, as performed in our case, showing epileptic activity in the residual temporal lobe; and (3) a residual lesion shown by any neuroimaging technique [3].

5. Conclusion

Complete resection of the mediobasal structures of the temporal lobe and removal of the head, body, and part of the tail segments of the hippocampus at the first operation may prevent the necessity of reoperation in patients with temporal lobe epilepsy.

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