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ABSTRACT

Memory assessment is a crucial step in the pre-surgical assessment of temporal epilepsy. Indeed, it participates to a certain extent in the process of localization of the epileptogenic zone and also makes it possible to anticipate the possible risks of surgical treatment on the memory.

We propose to specify the contribution of memory evaluation in 60 patients' candidates for temporal epilepsy surgery, in terms of localization of the "epileptogenic zone" and in the appreciation of the risk of postoperative memory decline.

I. INTRODUCTION

During the preoperative assessment, the neuropsychological results, particularly in terms of memory evaluation, participate to a certain extent in the process of localizing the epileptogenic zone. They also make it possible to anticipate the possible risks of a surgical treatment on memory and language.

We propose to specify the contribution of memory evaluation in 60 patients' candidates for temporal lobe epilepsy surgery, in terms of localization of the "epileptogenic zone" and in the appreciation of the risk of postoperative memory decline. We present a case of a patient who has one of the most extended survival lengths reported in the literature despite unusual multisite metastases but deteriorated rapidly due to very aggressive cranium metastasis.

II. PATIENTS AND METHODS

1. Population studied

We included in our study 60 patients on the following criteria:

- Severe, drug-resistant temporal lobe epilepsy (at least 03 major antiepileptics at optimal doses have been tried as monotherapy and in association with an evolutionary decline of at least 02 years);

Keywords
memory,
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- Age less than 50 years;
- Presence of a temporal lesion on brain MRI;
- Patients whose "epileptogenic zone" is clearly defined at the end of the non-invasive pre-surgical exploration.
- Patients operated on for epilepsy surgery with a regulated temporal lobectomy with broad hippocampal resection.

2. Applied methods

- We have studied hemispheric dominance in all of our patients.
- We specified the anatomical lesions found on brain MRI and we separated the patients into two groups (one group with hippocampal sclerosis and another with a lesion of another nature).
- We also specified the lateralization of the "epileptogenic zone" and the extent of the surgical procedure (hippocampus resected or not).
- An overall intellectual efficiency (MMS) and memory (verbal and visual) assessment was performed on all of our patients. The exploration of verbal memory was carried out by the Grober and Buschke test. As for visual memory, it was assessed by the DMS-48 test. The frequency of memory disorders was evaluated pre-operatively in the whole population and was then evaluated according to the associated lesions and the lateralization of the "epileptogenic zone"
- The development of postoperative memory disorders was specified in all patients and was then studied according to the preoperative memory status and the nature of the lesions found on MRI).

3. Place and period of the study

The patients were recruited from the Epileptology consultation of the department of Neurology of Bab El Oued University Hospital over a period from January 2010 to December 2019.

III. RESULTS

Distribution of patients according to manual dominance:

100% of patients are right-handed.

Distribution of patients according to the nature of the lesion found on MRI:

32 patients had hippocampal sclerosis on brain MRI (53%) and 28 patients had a lesion of another nature (Neuroepithelial dysembryoplastic tumours, Gangliogliomas and finally Cavernomas) (47%).

Distribution of patients according to the lateralization of the epileptogenic zone:

The lateralization of the epileptogenic zone was on the left (dominant hemisphere for language) in 27 patients (45%) and on the right (minor hemisphere) in 33 patients (55%).

	Number of patients	Percentage %
Presence of memory deficit	39	65
Absence of memory deficit	21	35
Total	60	100

Table 1. Frequency of preoperative memory disorders in all operated patients.

A memory deficit is found preoperatively in 65% of operated patients.

	Epileptogenic zone on the left (dominant hemisphere)		Epileptogenic zone on the right (minor hemisphere)	
	Number of patients	Percentage %	Number of patients	Percentage %
Deficit of the visual memory	00	00	33	100
Deficit of the verbal memory	27	100	00	00
Total	27	100	33	100

Table 2. Nature of memory deficit according to the lateralization of "the epileptogenic zone".

All the patients with an epileptogenic zone lateralized on the left (dominant hemisphere) have a deficit in verbal memory and all patients with an epileptogenic zone on the right (minor hemisphere) have a deficit in visual memory.

	Group with Hippocampal Sclerosis		Group with another lesion	
	Number of patients	Percentage %	Number of patients	Percentage %
Presence of memory deficit	30	94	09	32

Absence of memory deficit	02	06	19	68
Total	32	100	28	100

Table 3. Frequency of preoperative memory disorders according to the nature of the lesion.

A memory deficit is found in 93% of patients with hippocampal sclerosis and only in 32% of patients with a lesion of another nature.

	Number of patients	Percentage %
Post-operative decline	9	15
No effects	51	85
Improvement	00	00
Occurrence of global amnesia	00	00
Total	60	100

Table 4. Postoperative memory status in all operated patients.

Postoperative memory decline is noted in 15% of operated patients. No cases of global amnesia have been noted.

	Group with pre-operative deficit		Group without pre-operative deficit	
	Number of patients	Percentage %	Number of patients	Percentage %
Post-operative decline	00	00	09	43
No effects	39	100	12	57
Improvement	00	00	00	00
Total	39	100	21	100

Table 5. Postoperative memory status based on the presence or absence of a preoperative memory deficit.

No patient had a memory decline in the preoperative memory deficit group; whereas a decline is noted in 43% of the cases in the group without preoperative deficit.

	Group with Hippocampal Sclerosis	Group with another lesion

	Number of patients	Percentage %	Number of patients	Percentage %
Post-operative decline	02	06	07	25
No effects	30	94	21	65
Improvement	00	00	00	00
Total	32	100	28	100

Table 6. Postoperative memory status depending on the nature of the lesion found on MRI.

No patient had memory decline in the hippocampal sclerosis group; while a decline is noted in 25% of cases in another lesion group.

IV. DISCUSSION

The high frequency of memory disorders found in our series confirms the data in the literature. Indeed, temporal lobe epilepsy is the greatest provider of memory disorders observed in epileptic patients [1]. Patients with hippocampal sclerosis were more likely to have a preoperative memory deficit than patients with other lesions. These results agree with the data in the literature; indeed, the presence of hippocampal sclerosis, whether right or left, appears to be a predictive factor for the presence of memory impairment in a patient with temporal lobe epilepsy [2; 3]. In addition, the severity of the memory deficit appears to be correlated with the degree of neuronal loss of the diseased hippocampus [4]. It has also been shown that when temporal lobe epilepsy is linked to a structural lesion of another nature, disorders of verbal memory are correlated with left hippocampal neuronal loss [5].

In our series, the nature of the memory deficit observed in right-handed patients depended on the side on which the epileptogenic zone was lateralized. Indeed, the deficit concerned in all cases the verbal memory when the epileptogenic zone was lateralized on the left (dominant hemisphere) and the visual memory when the epileptogenic zone was lateralized on the right (minor hemisphere). This observation is consistent with the data in the literature which recognizes a lateralizing value for the memory deficit [6]. Indeed, temporal lobe epilepsies concerning the dominant hemisphere are characterized by a deficit in verbal memory [7; 8; 2; 9] and temporal lobe epilepsies concerning the

minor hemisphere (the right for right-handers) can be associated with a deficit of non-verbal memory [10; 11; 12].

The risk of a memory deficit after an anterior temporal lobectomy is much greater when the preoperative memory efficiency is normal [13; 14; 15; 16; 17]; This could be explained by the fact that the absence of a preoperative memory deficit suggests that the hippocampus concerned by the excision is still functional.

The data from our study confirm this view; indeed, patients who underwent an intervention comprising a large hippocampal resection with a preoperative memory deficit, did not degrade their memory scores postoperatively. This could be explained by the fact that the preoperative deficit suggests a loss of the function of the hippocampus concerned by the resection.

This favourable postoperative outcome in terms of memory is also noted in patients with hippocampal sclerosis with a correct preoperative memory score. This recalls the favourable prognostic value, in terms of memory, of the presence of hippocampal sclerosis (see above). Indeed, the presence of unilateral hippocampal sclerosis (especially when it is severe) with a correct memory score, is compatible with a loss of hippocampal function compensated by the contralateral side.

Finally, no global amnesia was noted due to the absence of signs indicating a dysfunction of the contralateral hippocampus, such as the case of simultaneous impairment of verbal and visual memory. This notion underlines the major interest of memory evaluation in the context of the pre-surgical assessment of temporal lobe epilepsy surgery.

IV. CONCLUSION

During the preoperative assessment of temporal epilepsies, the results of the memory assessment participate to a certain extent in the process of localization and lateralization of the epileptogenic zone.

They also make it possible to anticipate the possible risks of a surgical treatment on the memory.

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