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USE OF STRUCTURAL MRI IN PATIENTS WITH MEDICALLY REFRACTORY SEIZURES

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ABSTRACT

Introduction: Refractory epilepsy is common in patients with structural brain lesions including acquired disorders and genetic abnormalities. Recently, MRI is a precise diagnostic tool for recognition of different structural causes underlying medically intractable seizures.

Objective: To evaluate the usefulness of MRI for detection of brain lesions associated with refractory epilepsy.

Material and methods: 49 patients (20M and 29F; aged 48.6±24.7 years) with refractory epilepsy were included in the study. They presented with partial (46.0%), secondary (31.0%) or primary (23.0%) generalized tonic-clonic seizures. Clinical diagnosis was based on the revised criteria of ILAE. Structural neuroimaging (MRI), EEG recording, and neurological examination were performed

Results: MRI detected different structural brain abnormalities totally in 36 (73.5%) patients, including cerebral tumors (21p), cerebrovascular accidents (5p), hyppocampal sclerosis (3p), developmental malformations (2p), postencephalitic lesions (2p), arachnoid cysts (2p), and tuberous sclerosis (1p). Neuroimaging revealed normal findings in 13 (27.5%) cases. EEG recordings showed focal epileptic activity in 38 (77.6%) patients, including 33 cases with and 5 without structural brain abnormalities.

Conclusion: This study revealed that structural brain lesions are commonly associated with refractory epilepsy. We suggested that MRI is a useful diagnostic method for assessment of patients with uncontrolled seizures or altered epileptic pattern

Key words: structural MRI, refractory seizures, brain lesions

INTRODUCTION

About 30 to 40% of patients with epilepsy have medically intractable seizures classified according to the revised criteria of ILAE (4, 8, 10, 12, 17). Often this refractory epilepsy is associated with various structural brain lesions. Most commonly they include acquired disorders (stroke, trauma, tumor, infection) and genetic abnormalities (tuberous sclerosis, malformations of cortical development, hippocampal sclerosis) (2, 9, 11, 16, 20). Usually the diagnosis is based on the clinical characteristic of seizures, ictal or interictal EEG recordings, structural and functional neuroimaging (1, 6, 13, 15, 22).

Recently, MRI is considered a precise non-invasive technique for recognition of different structural causes underlying intractable seizures (3, 5, 14, 18, 21). Several studies reveal its high diagnostic sensitivity and specificity in refractory epilepsy. Therefore, we decided to study the usefulness of MRI for detection of brain lesions associated with medically refractory seizures.

MATERIAL AND METHODS

A total of 49 patients (29 females and 20 males; aged 48.6±24.7 years) with medically refractory epilepsy were included in the study. All they presented with partial (46%), secondary (31%), and/or primary (23%) generalized tonic-clonic seizures. Clinical diagnosis was based on the revised criteria of ILAE. Structural neuroimaging (non-contrast and contrast enhanced MRI), EEG recording, and neurological examination were performed.

RESULTS

MRI detected different structural brain abnormalities totally in 36 (73.5%) patients, including cerebral tumors (21p) (Figure 1), cerebrovascular accidents (5p), hyppocampal sclerosis (3p) (Figure 2), developmental malformations (2p), postencephalitic lesions (2p), arachnoid cysts (2p) (Figure 3), and tuberous sclerosis (1p) (Figure 4). Neuroimaging revealed normal findings in 13 (27.5%) cases. EEG recordings showed focal epileptic activity in 38 (77.6%) patients, including cases with (33p) and without (5p) structural brain abnormalities.

DISCUSSION

Numerous clinical studies specify that MRI plays an important role in diagnosis of epilepsy (6, 14, 17, 18, 22). Recent data support the usefulness of this non-invasive technique in cases with new-onset or refractory seizures, as well as in patients with neurological deficit (7, 10, 15, 19,

21). In relation to these data, we studied 49 patients with refractory seizures, suspected as having structural disorders of the CNS. Patients presented predominantly with focal seizures that corresponded to the nature of main underlying causes.

Today, MRI is the most appropriate radiological technique for detection of various brain lesions underlying the epilepto- and ictogenesis (2, 8, 11, 16, 20). Evidence exist that MRI successfully visualizes morphological changes in about 80% of patients with epilepsy (5). In correspondence, our own findings revealed presence of different cerebral lesions in 73.5% of patients. In agreement with previous reports, the majority of detected structural abnormalities were brain tumors, followed by sequela of cerebral infarcts, trauma or infections (3, 9, 10, 13, 15, 21). MR images showed typical features of cerebral gliomas and meningiomas, respectively in fourteen and seven of our patients.

In this study, among the rest risk factors were cortical heterotopia and mesial temporal sclerosis. Data revealed that hypocampal sclerosis is commonly associated with medically intractable seizures (8, 10, 20, 22). Accordingly, the frequency rate of pharmacoresistant epilepsy in patients with this serious brain pathology varies from 58% to 89%. Based on the literature review, it is known that T2-weighted and FLAIR are the most appropriate MRI sequences used in recognition of mesial temporal sclerosis (8, 14, 18, 20). Respectively, we found the basic MRI features in all 3 cases: reduced volume of hypocampus, alteration of inner architectonic structure, and loss of differentiation between gray and white matter on T1- and T2-weighted sequences, as well as increased signal intensity of hypocampus on FLAIR. Evidently, our radiological investigations confirmed that MRI is a method of choice in diagnosis of developmental malformations.

CONCLUSION

This study revealed that structural brain lesions are commonly associated with refractory epilepsy. Based on our own results and literature review, we suggest that MRI is a useful diagnostic method for evaluation of patients with uncontrolled seizures or altered epileptic pattern. In addition to clinical assessment, EEG, and functional neuroimaging structural MRI improves both the understanding of epileptogenesis and the treatment strategies in structural refractory epilepsy.

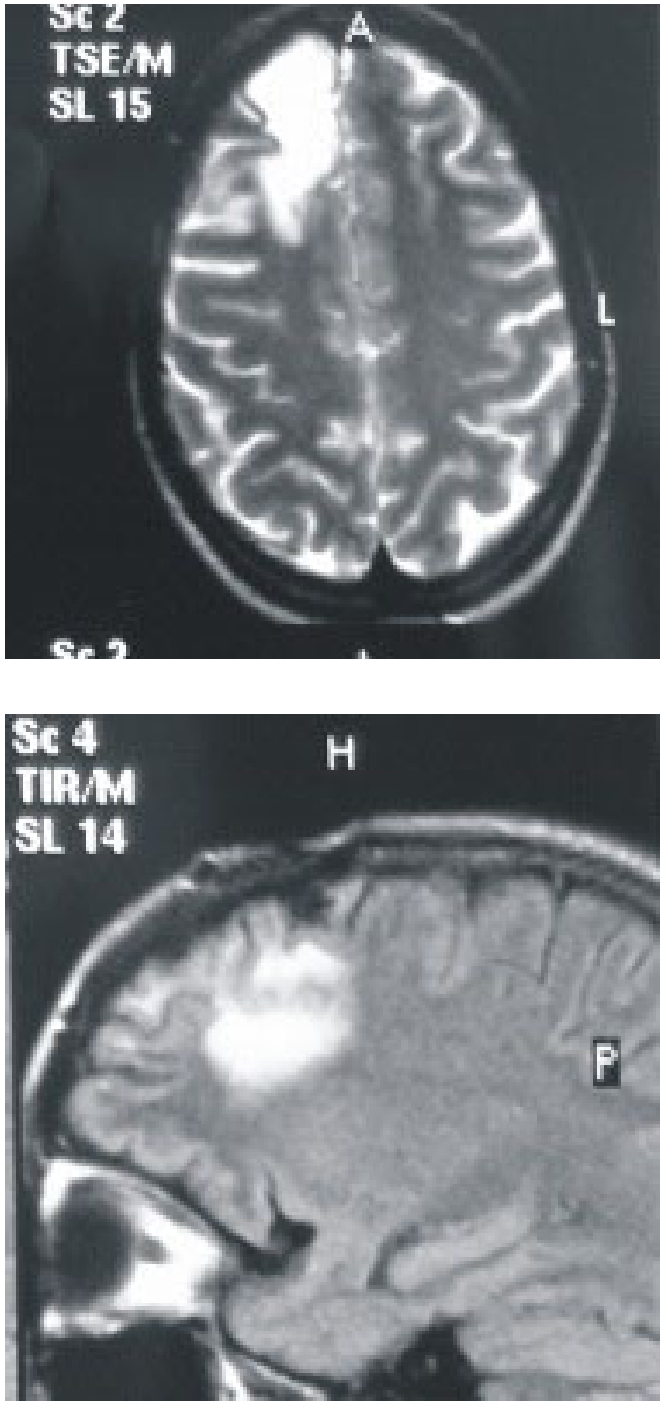

Fig. 1. Recurrent astrosytoma. MRI demonstrates an abnormal increased signal (tumor mass) in the right frontal region.

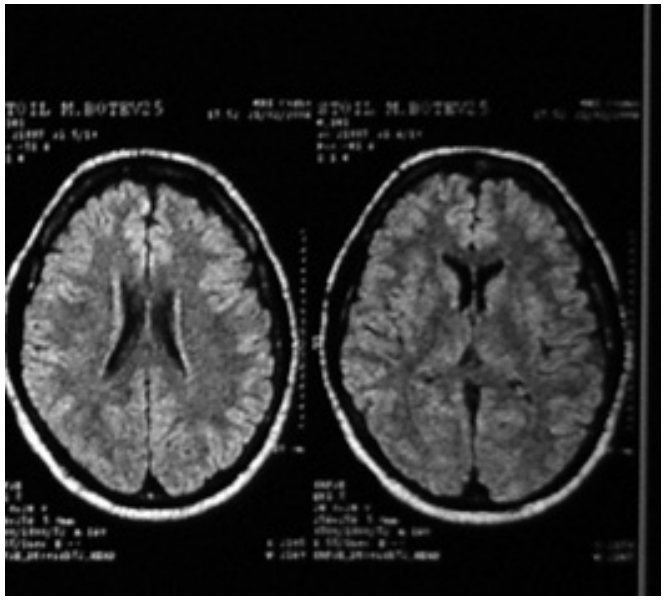

Fig. 2. Mesial temporal sclerosis. MRI demonstrates bilateral hyperintense lesions in the polar part of the Ammon's horn.

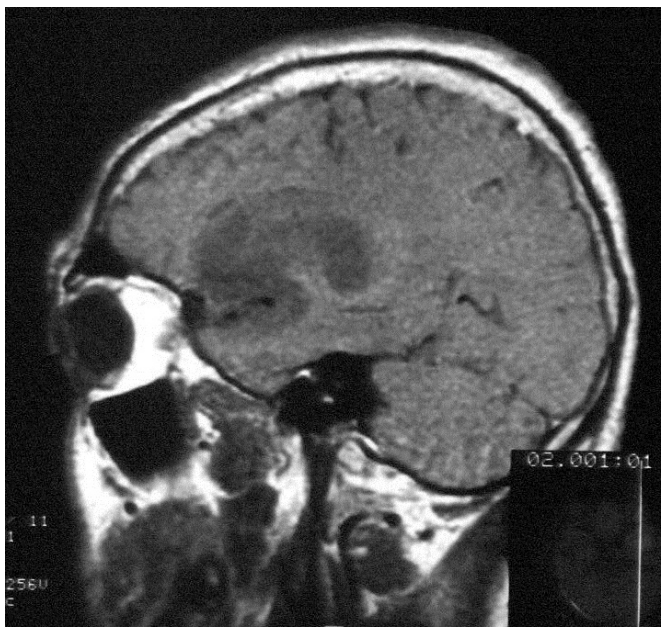

Fig. 3. Arachnoid cyst. MRI demonstrates a sharply-marginated non-enhancing hypointense lesion in the left insular cistern.

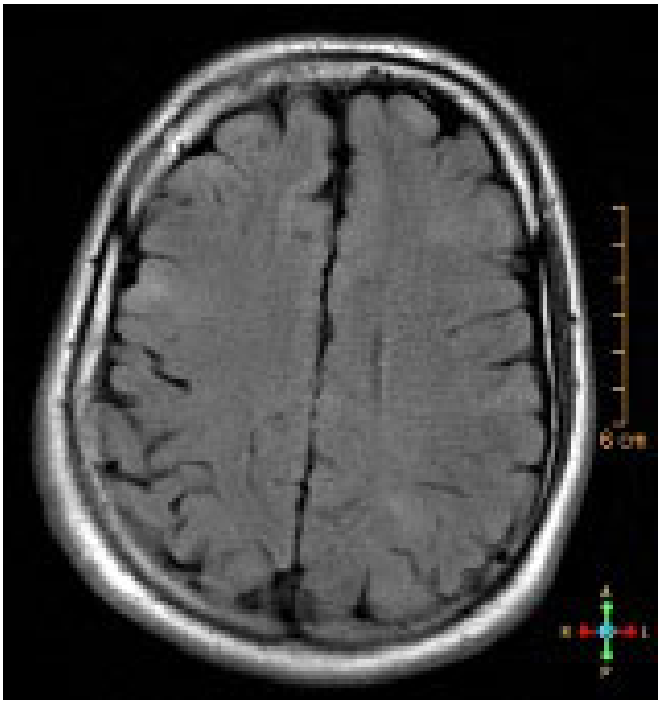

Fig. 4. Tuberous sclerosis. MRI demonstrates multiple cortical and subcortical supratentorial lesions (tubers).

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