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Circling seizures

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Twelve cases with circling seizures are presented with their clinical, electroencephalographic and radiological findings. Four patients had symptomatic partial epilepsy, five had cryptogenic partial epilepsy, and the remaining three had idiopathic generalized epilepsy. Three of the patients with symptomatic partial epilepsy had frontal lesion, and one had parito-occipital lesion. Turning direction had no lateralizing value in patients with partial epilepsy. Based on our study we conclude that circling seizures may occur in different epileptic syndromes and epilepsies. In cases with symptomatic partial epilepsy, lesions are mostly located in frontal lobes but also in parietooccipital areas.

Key words: rotatory seizure; circling seizures; seizure; epileptic syndromes.

INTRODUCTION

In circling seizures, patients turn around their axis one or more times. Circling movement may be a manifestation of a simple partial seizure, may represent automatism of complex partial seizure, or may precede a generalized tonic–clonic seizure. Seizures with rotatory movements have been reported mostly in cases with frontal or temporal lesions[1–5] and rarely in idiopathic generalized epilepsy[6,7], cryptogenic partial epilepsy[8] or in patients with thalamic lesion[9]. In this study we present 12 patients with circling seizures and discuss their clinical, electroencephalographic and radiological features. We also make epilepsy classification of the cases.

PATIENTS AND METHODS

The patients have been evaluated between 1986–1994 by one of the authors in the Neurology Outpatient Clinic of Hacettepe University Hospital. Turning movement has been reported spontaneously by all of the patients. Only patients with complete turn (360°) during their seizures were included. Interictal scalp EEGs, cranial computed tomography (CT) or cranial magnetic resonance imaging (MRI) were performed in all patients. Pathological diagnosis was obtained in two patients who underwent surgery. Classification of epilepsies was done according to the international classification of epilepsies and epileptic syndromes, developed in 1989[10]. In the patients with partial epilepsy, comparisons of circling direction with EEG lateralization and/or neuroimaging findings were done.

RESULTS

Patients' data are summarized in Table 1. Three of the patients had idiopathic generalized epilepsy (two patients with juvenile myoclonic epilepsy have been reported previously[11]), five had cryptogenic partial epilepsy, four had symptomatic partial epilepsy. Three of the patients with symptomatic partial epilepsy had frontal lesion (Figs 1–3), one had parietooccipital encephalomalasic lesion (Fig. 4). Histopathologic diagnosis could be done in two patients with frontal lesion who underwent surgery. One patient (Patient 2) had grade 3 astrocytoma, the other (Patient 3) had oligodendroglioma. In their follow-up, circling seizures ceased in the patient with oligodendroglioma, and rare complex partial seizures continued in the other. In the patient with parietooccipital lesion, 2–3 seizures in a month continued with primidone and phenytoin combined therapy. In cases with idiopathic

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Table 1: Clinical, EEG and neuroradiologic findings of cases. GTCS, generalized tonic–clonic seizure. Turning directions are indicated by left (L) and right (R) in analogy with lesion lateralization. F, female; M, male

Case number	Sex, age	Age at onset	Turning direction	Type of other seizures	EEG findings	CT/MRI findings	Classification of epilepsies
1	M, 21	7	L	Simple partial, Complex, partial	Focal epileptic activity with sharp slow wave, sharp and slow wave complexes, on right frontotemporal region.	CT: right parietooccipital encephalomalasic lesion	Symptomatic partial epilepsy
2	F, 31	17	L	Simple partial, Complex partial, GTCS	Epileptic activity with sharp waves, sharp slow waves on fronto-centro-temporal regions, predominantly on the left.	MRI: left frontal contrast enhancing lesion	Symptomatic partial epilepsy
3	F, 45	43	L	GTC seizure with focal onset	Epileptic activity with sharp waves, slow waves on left fronto- centro-temporal region.	CT: left frontal calcified contrast enhancing lesion	Symptomatic partial epilepsy
4	M, 46	45	L	Left focal motor, GTCS	Epileptic activity with sharp waves, sharp slow waves on centro-temporal regions, predominantly on the right.	CT: hypodense lesion on centrum semiovale of right frontal lobe	Symptomatic partial epilepsy
5	F, 41	25	?	GTCS, Complex partial	Epileptic activity with slow wave, sharp slow wave and sharp wave on right centrotemporal region.	MRI: normal	Cryptogenic partial epilepsy
6	M, 25	1	R	Complex partial	Paroxysmal activity with sharp slow waves on temporal regions.	CT: normal	Cryptogenic partial epilepsy
7	M, 19	19	R	Simple partial, GTCS	Paroxysmal activity with slow waves, sharp slow waves on temporo-occipital regions.	MRI: normal	Cryptogenic partial epilepsy
8	M, 32	31	?	GTCS, Complex partial	Epileptic activity with sharp waves, sharp slow waves on right hemisphere, predominantly on temporal region.	MRI: normal	Cryptogenic partial epilepsy
9	M, 28	17	R	GTCS	Paroxysmal activity with slow waves, sharp slow waves on parasaggital and temporal regions.	MRI: normal	Cryptogenic partial epilepsy
10	F, 23	12	?	GTCS	Generalized bilaterally synchronous, 3.5–4 Hz spike and wave, polyspike and wave complexes.	CT: normal	Idiopathic generalized epilepsy
11	F, 52	20	L	GTCS, myoclonic	Generalized bilaterally synchronous, 3–4 Hz polyspike and wave, spike and wave complexes.	MRI: normal	Idiopathic generalized epilepsy
12	F, 37	7	R	GTCS, Absence, myoclonic	Generalized bilaterally synchronous 4–5 Hz spike and wave activity.	MRI: normal	Idiopathic generalized epilepsy

generalized epilepsy, all seizure types were controlled with valproic acid therapy. In cases with cryptogenic partial epilepsy carbamazepine or phenobarbital therapy ceased all seizures in three patients, and diminished seizure frequency in two patients.

All of the patients had complete turn around their axis 1–6 times during their seizures. In all patients circling movements were seen as a part of seizure. In Patients 2, 3, 4 and 6 circling constituted the entire attack, while in the others, circling gave way to a generalized tonic–clonic seizure. Turning direction was known in nine patients and it has not changed from seizure to seizure in these patients. In the patients with frontal lesions, turning direction has been

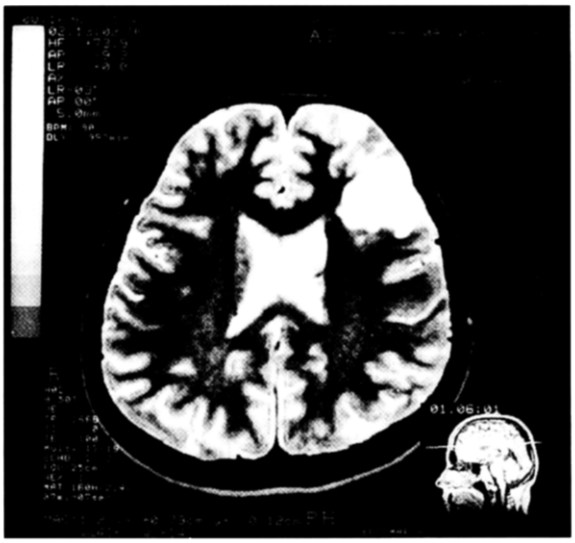

Fig. 1: Case 2. T2-weighted axial MRI showing a hyperintense lesion in left frontal lobe.

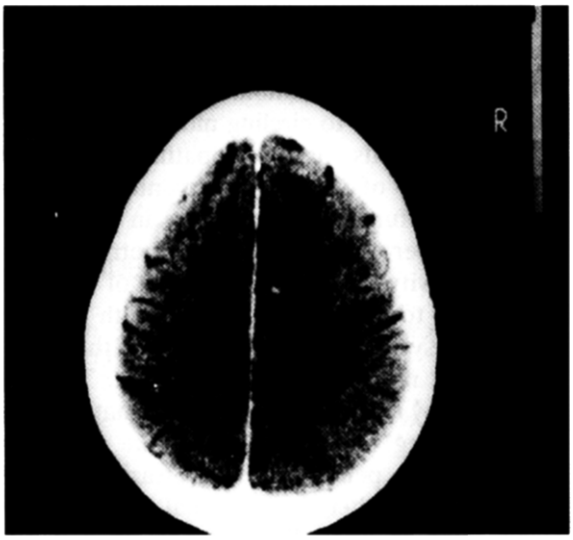

Fig. 3: Case 4. CT scan after administration of intraveneous contrast medium showing a frontal hypodense lesion in right centrum semiovale.

ipsilateral to the lesion and epileptic activity in two patients, and contralateral in one patient. Turning direction in patients with parieto-occipital infarction was contralateral to the lesion. All of the patients with circling seizures have had loss of consciousness during turning movement except Patients 4, 9 and 12. These three patients reported that they were aware of turning movement which occurred just before generalized tonic–clonic seizure in Patients 9 and 12.

DISCUSSION

Circling seizures may occur in patients with symptomatic partial epilepsy, cryptogenic partial epilepsy and idiopathic generalized epilepsy. In cases with symptomatic partial epilepsy, most of our cases had frontal lesions. One patient had parieto-occipital lesion, but EEGs showed epileptic activity on fronto-temporal region. Also the clinical features of this patient's other seizures were of frontal lobe type. Propagation of epileptic activity from parieto-occipital region to fronto-temporal region may yield to the circling seizure. In cases with cryptogenic partial epilepsy, EEG findings and ictal features of other types of seizures are compatible with frontal or temporal lobe seizures. Thus, it seems that frontal or temporal areas may be responsible for the circling seizures. In experimental studies, it was shown that temporal lobe lesions with irritative foci in or near the vestibular association areas produce

Fig. 2: Case 3. CT scan showing a calcified, contrast enhancing lesion in deep left frontal lobe.

Fig. 4: Case 1. CT scan after administration of intravenous contrast medium showing a right parieto-occipital hypodense lesion consistent with encephalomalasia.

circling movement in monkeys[12]. Also, unilateral ablation of frontal cortex by removing frontal lobe inhibition over homolateral vestibular cortical area gives rise to circling movement[13].

Three patients have idiopathic generalized epilepsy (two of them with juvenile myoclonic epilepsy). A functional imbalance in generalized cerebral hyperexcitability or asymmetric dopaminergic activity due to spreading of epileptic discharges to striatum in cases with intrinsic nigrostrial system asymmetry may be the reason for turning movement during seizure. This was supported by an experimental study that demonstrated circling movement and spike and wave discharges in pentamethylenetetrazol administered rats[14]. Other experimenal studies show evidence that the direction of the circling movement was opposite to the side of higher nigrostriatal dopaminergic activity[15–17].

Turning direction may be ipsilateral or controlateral to the lesion side and it has no lateralizing value in our patients with symptomatic partial epilepsy. It is also known for adversive seizures that head turning has no lateralizing value[18,19].

In conclusion, circling seizures may occur in different epileptic syndromes and epilepsies. Classification of epilepsies is necessary for the choice of appropriate treatment. In cases with symptomatic partial epilepsy, lesions are mostly located in frontal lobes. However, lesions on temporal, parietal, occipital lobe may also cause turning movement. Presence of circling seizure in cases with idiopathic generalized epilepsy and lesions in wide areas of cerebral cortex raise the possibility of involvement of the subcortical region. In circling seizures, spread of the epileptic activity to deep brain structures by decreasing or increasing dopaminergic activity may cause ipsiversive or contraversive turning in these patients.

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