SLEEP EEG IN THE DIAGNOSIS OF EPILEPSY

Atilla Erdem, M.D., Aytaç Yiğit, M.D., Adnan Güvener, M.D., Y. Şükrü Çağlar, M.D.

University of Ankara, Medical Faculty, İbn-i Sina Hospital,
Department of Neurosurgery (AE, YŞÇ) and Neurology (AY, AG)

Turkish Neurosurgery 1 : 124-129, 1990

SUMMARY :

In this study sleep EEG recordings of 20 epileptic patients with different tyses of seizures have been evaluated. Sleep EEG recordings were found to be helpful in detecting epileptic discharges of the patients whose waking EEGs failed to demonstrate specific abnormalities. Also, we had the occasion to record the epileptic attacks of two patients during sleep EEG recordings.

KEY WORDS :

Epilepsy, Paroxysmal Activity, Sleep EEG Recordings.

INTRODUCTION

The Sleep-waking cycle appears to play an important role in the incidence of epileptic seizures and interictal spike activity(5). The stages of sleep have been shown to differentially affect various types of seizures (6,11). Therefore long-term sleep recordings constitute a well accepted method for the diagnosis of epilepsy (1,3).

Interest in sleep records of epiletics was greatly stimulated when Gibbs and Gibbs stressed the important role of sleep tracings in the EEG diagnosis of temporal lobe epilepsy (4). During subsequent years, the School of Montpellier and their principal proponents, Passouant and Cadilhac, became deeply involved in sleep EEG studies of various forms of epileptic seizure disorders.

Passouant, Cadilhac and their collaborators reported the remarkable suppression of seizure discharges of petit mal epilepsy during REM sleep and augmentation of spike activity in these patients during NREM sleep (2,8,9). In contrast, they reported that ictal spike activity of focal and temporal lobe epilepsy was exaggerated during REM. In this study, we summarized the results of sleep EEG recordings of 20 patients examined in our Sleep Research Laboratory.

MATERIAL AND METHOD :

This study included 20 epileptic patients with different types of seizures. Nine of them had grand-mal seizures, five had partial seizures with elementary symptomatology, and six had partial seizures with complex symptomatology.

Examinations were done in the Department of Neurosurgery of İbni-Sina Hospital.

Each patient underwent an all-night sleep EEG recording in a partially soundproof room. Eight symmetrical cortical leads, horizontal electrooculogram and electromyogram of the chin were simultaneously monitored.

Sleep stages were analysed according to the criteria of Rechtschaffer and Kales(10). Paroxysmal activity (P.A.) was defined as:spike (S), spike wave (S.W.), polyspike (P.S.), sharp ware (S.W.) and recruiting rhythm (R.R).

During each monitored night, we evaluated the distribution of P.A. during waking, NREM sleep stages and REM sleep.

RESULTS

From nine patients who had grand mal seizures, three (% 33) had P.A. during waking, seven (% 78) during NREM sleep stages (Fig.1,2) and only one (% 11) during REM sleep. Focal P.A. occurred in six of seven patients with P.A.

From five patients who had partial seizures with elementary symptomatology, three (% 60) had P.A. during waking, four (% 80) during NREM sleep stages and only one (% 20) during REM sleep. All patients with P.A. had focal P.A.

From six patients who had partial seizures with complex symptomatology, three (% 50) had P.A. during waking, five (% 83) during NREM sleep stages and two (% 33) during REM sleep. Focal P.A. occured in

three patients and generalized P.A. in two of all five patients with P.A.

Results are summarized in Table 1.

On the other hand, we had the occasion to record two epileptic attacks which occured during sleep (Fig.4).

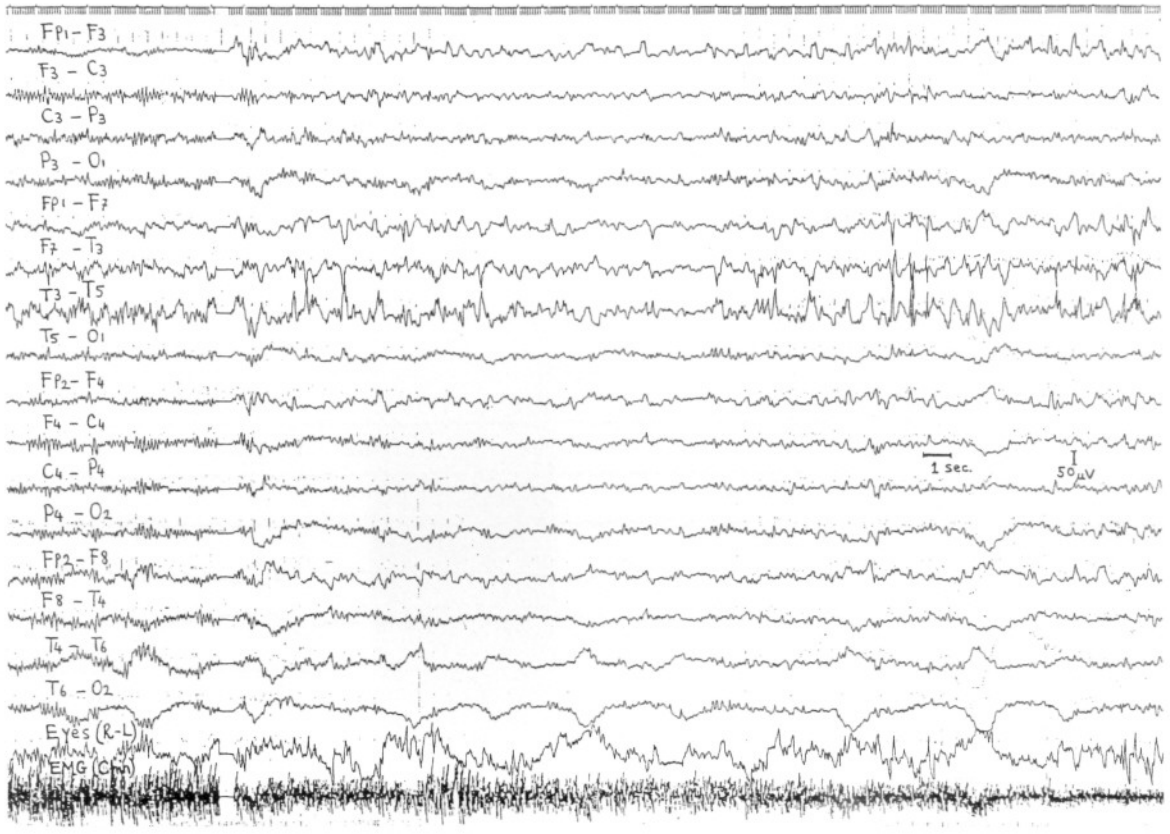

Fig.1 : Pattern of spike discharge at T3 electrode localization during the transitional stage between stage I and II of NREM sleep.

TABLE : 1

Grand mal seizures	**WAKING**	**NREM**	**REM**
With P.A.	3 (33 %)	7 (78 %)	1 (11 %)
Without P.A.	6 (67 %)	2 (22 %)	8 (89 %)
TOTAL	9 (100%)	9 (100%	9 (100%)
Partial seizures with complex symptomatology	**WAKING**	**NREM**	**REM**
With P.A.	3 (50 %)	5 (83 %)	2 (33 %)
without P.A.	3 (50 %)	1 (17 %)	4 (67 %)
TOTAL	6 (100%)	6 (100%)	6 (100%)
Partial seizures with elementary symptomatology	**WAKING**	**NREM**	**REM**
With P.A.	3 (60 %)	4 (80 %)	1 (20 %)
Without P.A.	2 (40 %)	1 (20 %)	4 (80 %)
TOTAL	5 (100%)	5 (100%)	5 (100%)

P.A. : Paroxysmal Activity
NREM : Non-Rapid Eye Movement Sleep
REM : Rapid Eye Movement Sleep

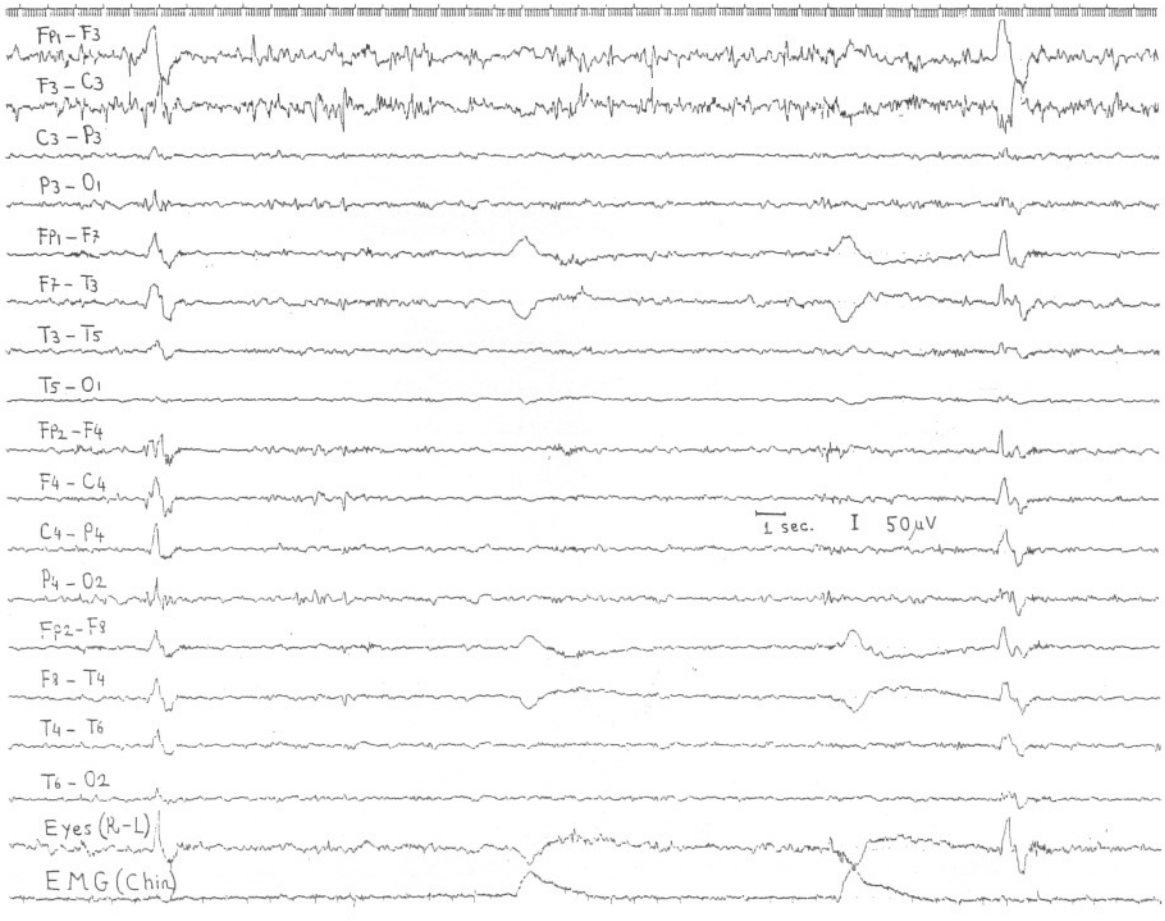

Fig.2 : Spike discharges at F3 electrode localization during NREM sleep in a patient with secondarily generalized epilepsy. Notice "K" complexes and sleep spindles which characterize stage II of NREM sleep.

DISCUSSION

In our study, P.A. appeared to occur most frequently during NREM sleep stages, independently of the type of seizure (Fig.5). Therefore, NREM sleep can be considered as a "convulsant agent", as was proposed by Passouant(7).

By contrast, REM sleep was distinguished by the decreased frequency of P.A., which was most marked for grand mal seizures (Fig.3). This result is consistent with other studies reporting that REM sleep prevents generalized discharges (2,8).

On the other hand, during REM sleep, the frequency of P.A. was found to be higher in partial seizures with complex symptomatology than in other types of seizure, but the limited number of patients examined in this study inhibits further comparison.

CONCLUSIONS

This study shows that :

1. Sleep EEG recordings are helpful in the detection of P.A. in epileptic patients whose waking EEGs fail to demonstrate specific abnormalities

2. As a long-term EEG model, sleep EEG recordings may provide the opportunity to record spontaneous seizures.

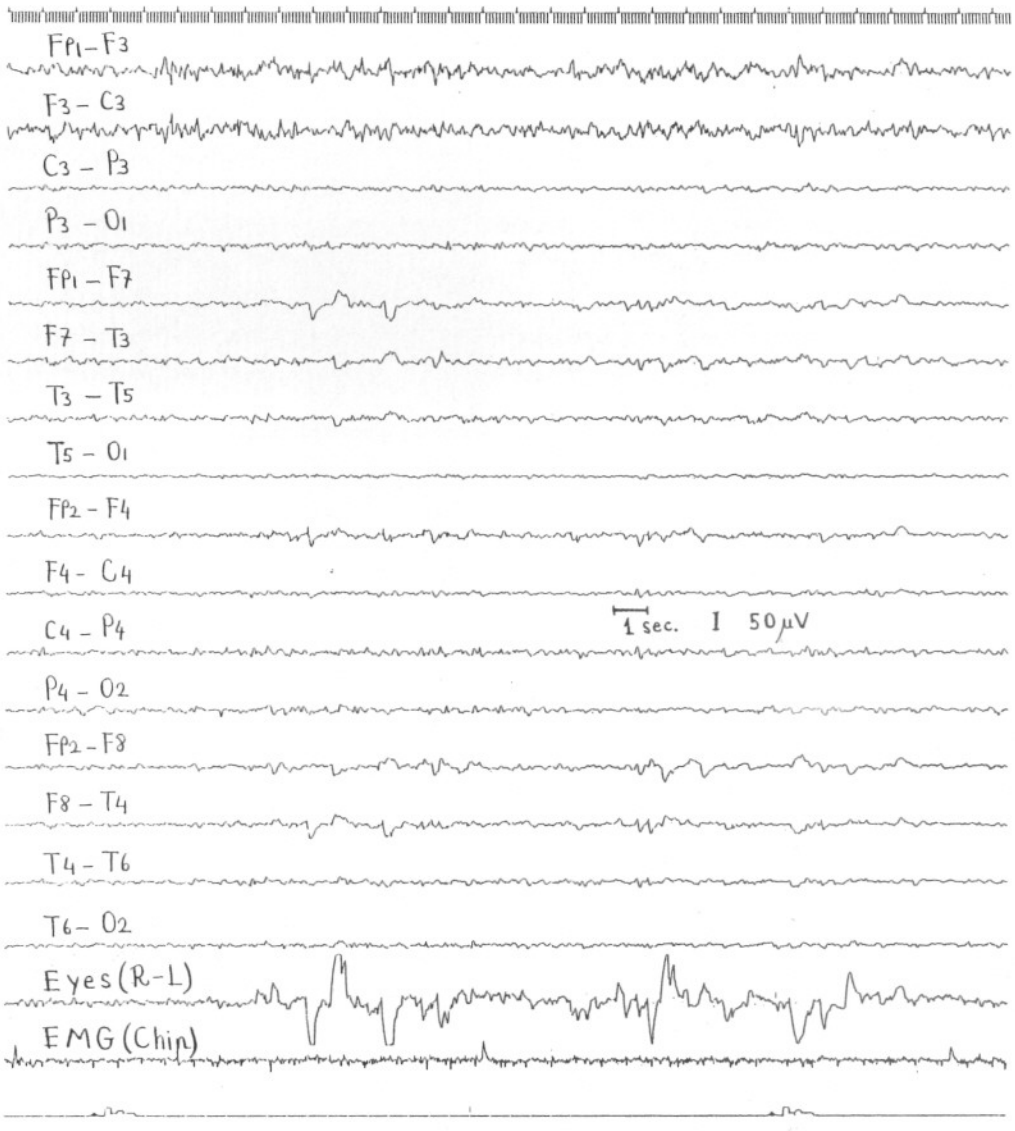

Fig.3 : REM Sleep recording of the same patient as in Fig.2 Notice the remarkable suppression of spike dicharges at F3 electrode localization.

REFERENCES

1. Bancaud J, Talairach J, Bordas-Ferrer M, et al:Les acces epileptiques au cours du sommeil de nuit (etude stereoelectroencephalographique). Rev Neurol 110:314, 1964
2. Cadilhac J, Passouant P:Colloques Internat CNRS de Paris, 127:555, 1965
3. Gastaut H, Batini C, Broughton R, el al:Etude electrographique des manifestations paroxystiques, non-epileptiques, au cours du sommeil nocturne. Rev Neurol 110:309-310, 1964
4. Gibbs EL, Gibbs FA:Diagnostic and localizing value of electroencephalographic studies in sleep. Assoc Res Nerv Ment Dis 26:366-376, 1947
5. Passouant P:Semeiologie electroencephalographique du sommeil normal et pathologique. Rev Neurol 83:545-559, 1950
6. Passouant P, Cadilhac J, Delange M, et al:Indications apportees par l'etude des divers stades du sommeil sur la Arch Franc Pediat 19:1389-1397, 1962
7. Passouant P.:Historical views in sleep and epilepsy. In:Sleep and Epilepsy. Ed.Sterman MB, Shouse MN Passouant P, New York Academic Press, 1982, pp.1-6
8. Passouant P, Cadilhac J, Philippot M:Rythmicite du petit mal au cours du sommeil, decharges rythmiques generalisees et localises. Rev Neurol 84:659, 1951
9. Pessouant P, Cadilhac J, Latour H:Renseignements apportes par la stimulation auditive au cours du sommeil des epileptiques. Rev Neurol 84:619-623, 1951
10. Rechtschaffen A, Kales A:A Manual of Standardized Terminology, Techniques and Scoring System for Sleep Stages of Human Subjects. Los Angeles, Brain Information Service/Brain Research Institute, UCLA, 1968
11. Scollo-Lavizzari G, Pralle W, De la Cruz N:Activation effects of sleep deprivation and sleep in seizure patients:An electroencephalographic study. Europ Neurol 13:1-5, 1975