Nocturnal Frontal Lobe Epilepsy: Sporadic Versus Familial Cases

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A lot of clinical and neurophysiological studies on patients with abnormal nocturnal motor and behavioural phenomena have been performed during the last thirty years. The etiologic conclusions of these studies were often in conflict between an epileptic or non-epileptic origin. The systematic use of nocturnal video-polysomnography has largely improved the diagnostic yield in patients with clusters of nocturnal motor events. We performed an extensive clinical and video-polysomnographic study in 147 patients complaining of repeated abnormal nocturnal motor and/or behavioural phenomena. On the basis of a detailed clinical assessment and of a complete nocturnal video-polysomnographic study we diagnosed 35 patients as having parasomnia, 67 sporadic nocturnal frontal lobe epilepsy and 45 familial (autosomal dominant) nocturnal frontal lobe epilepsy. We found no difference in clinical and neurophysiological data between familial and sporadic cases of nocturnal frontal lobe epilepsy. However, it should be stressed the difference between nocturnal frontal lobe epilepsy and parasomnias. In any case, large and full video-polysomnographical studies are of the utmost importance in order to clarify the real prevalence of both nocturnal (either sporadic and familial form) frontal lobe epilepsy and parasomnias, and to provide a correct therapy. (Sleep and Hypnosis 2000;1:22-25)

Key words: nocturnal frontal lobe epilepsy, sleep, parasomnias.

INTRODUCTION

The paroxysmal motor events during sleep are certainly common (1). In the last decades, the systematic use of nocturnal video-polysomnography has largely improved the diagnostic yield in patients with clusters of nocturnal motor events. Two broad nosological categories have been identified: parasomnias (sleep terror and sleep walking) and nocturnal frontal lobe epilepsy (NFLE). Among the latter, in particular, the frequent absence of clear-cut epileptiform abnormalities on the scalp EEG and the frequent onset of seizures during non-REM sleep, were thought to indicate that the episode were parasomnias. In fact, during the last years, with the large use of nocturnal video-polysomnography, the prevalence of NFLE seemed to be higher than previous suggested (2-10). Moreover, a form of NFLE with clear-cut autosomal dominant inheritance (Autosomal Dominant Nocturnal Frontal Lobe Epilespy ADNFLE, often misdiagnosed as sleep disorder) has been recently delineated (11-14).

The aims of the present study were to identify, on the basis of a full-night video-polysomnography, the differential features, if any, between parasomnia and NFLE and between familial and sporadic form of NFLE.

METHODS

Among the consecutive patients evaluated in our Sleep Disorders Center during a five year period, all

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the subjects complaining of repeated nocturnal motor and/or behavioural episodes underwent to the following study protocol:

- Physical and neurological examinations.
- Detailed sleep interview with parents or the bed partner.
- Electroencephalographic studies during wakefulness.
- Neuroradiological (computer tomography and/or magnetic resonance imaging) examinations.
- Nocturnal video-polysomnography (after an adaptation night to the laboratory) including EEG monitoring (at least eight bipolar leads positioned according to the International 10-20 System), electrooculogram, submental electromyography, EKG and, in most cases, electromyography of arms and legs and abdominal and/or thoracic respiratory movements. During all night the patients had a video monitoring (split-screen system) and the recordings were analysed for abnormal behaviour and/or motor activity. The nocturnal repetitive motor activity was carefully analysed and classified into four classes of episodes: minimal, minor, major and prolonged, according to duration, semeiology and complexity of motor behaviour (13-15):

Minimal: Simple motor acts of body touching (such as scratching or rubbing the nose or head), limb flexion, chewing, facial grimacing, vocalisation, moaning or simple body movements; duration of 3-10 seconds.

Minor: Motor acts with the involvement of more body segments, with purposeful or semipurposeful behaviour, such as gross body movements, change in body position and/or rhythmic movements; duration of 10-30 seconds.

Major: Sudden and abrupt body or segmental movements such as elevation of head and trunk, hyperextension of arms and trunk accompanied by dystonic or clonic movements, fearful expression and panic sensation; duration of 5-30 seconds.

Prolonged: Complex motor behaviour with tonic-dystonic posture, bimanual and bipedal activity, axial movements, shouting, laughing and deep breathing; duration of more than 1 minute.

Sleep was scored according to international criteria (16).

We selected 147 patients (35 with parasomnias, 67 with NFLE and 45 with ADNFLE).

RESULTS

The age at evaluation ranged from 4 to 49 years. There were some differences in clinical features between parasomnias and NFLE, both sporadic and familial forms.

These differences are summarized as follows (Table 1)

Table 1. Clinical features of patients

	NFLE	PARASOMNIAS
Age at onset (years)*	11.8 – 6.3	usually < 10
Attacks/month (number)*	36 – 12	< 1 to 4
Clinical course	increasing or stable	decreasing/diseappering
Movement semiology	stereotypic	polymorphic
Attacks onset	any time during the night	first third of the night
Attacks distribution	2 non-REM (65 %)	slow wave sleep

* Mean – SD

Concerning the epileptic attacks there was no difference between sporadic and familial forms of NFLE. The clinical and neurophysiological data are summarized in Table 2.

Table 2. Clinical and neurophysiological data in sporadic and familial cases of Nocturnal Frontal Lobe Epilepsy

	Sporadic cases	Familial cases
Number of patients	67	45
Male to female ratio	1.83	1.65
Age at evaluation (mean – SD, years)	26.2 – 8.7	24.6 – 7.2
Age of onset (mean – SD, years)	12.6 – 9.0	11.7 – 7.8
Pts with persistence of seizures throughout adult life (%)	97	95.5
Pts with morning tiredness and/or difficulty in waking (%)	44.8	46.7
Pts with seizures also during wakefulness (%)	31.3	35.5
Pts with normal MRI findings (%)	94.0	97.8
Pts with normal daytime EEG (%)	94.0	91.1
Pts with ictal or interictal sleep EEG epileptiform abnormalities (%)	53.7	53.3
Brief (minimal and minor) motor attacks (mean – SD, n)	37.4 – 10.2	35.8 – 9.8
Major or prolonged motor attacks (mean – SD, n)	2.7 – 3.5	3.0 – 3.1
Patients responding to AEDs (cnz and/or cbz) (%)	80.6	77.8

The seizures began in childhood, usually persisting throughout adult life. There was a wide spectrum of complexity and severity, ranging from urinary incontinence to violent behaviour. There was a wide intra-familial variation in the severity of seizure disorder. There also was considerable intra-individual variation in seve-

rity, during the different periods of life, with an age dependent degree of severity. The seizures were prolonged and frequent in the childhood and adolescence and tended to decrease in complexity and frequency during adulthood, although they rarely disappeared.

About one third of the patients reported some seizures also during wakefulness. Almost one half of the patients reported daytime complaints as difficulty in waking, morning tiredness and/or excessive daytime sleepiness.

The video-polysomnographic recordings showed a wide spectrum of episodes, ranging from repeated stereotypic brief motor attacks (classified as Minimal and Minor episodes) to Prolonged Attack, with complex and bizarre behaviour, assumption of abnormal posture, dystonic bipedal and/or bimanual movements, shouting and/or unintelligible mumbling.

The recorded episodes occurred during non-rapid eye movements sleep, both stage 2 and stage 3-4. The patients showed a normal sleep profile. In any case, no diference was found between sporadic and familial cases in all sleep parameters.

The EEG findings during wakefulness and sleep are shown in Table 3. Ictal epileptiform abnormalities dominant over frontal areas were found in about 30 % of patients. While the daytime EEG was often (> 90 %) normal, the EEG during sleep showed interictal epileptiform abnormalities frontally dominant in about 50 % of patients.

In about two third of patients carbamazepine, clonazepam or their association were able to greatly reduce nocturnal seizures in frequency and complexity, and, in some cases, to completely control them.

Table 3. EEG findings in sporadic and familial cases of Nocturnal Frontal Lobe Epilepsy

Patients with	Sporadic cases	Familial cases
Epileptiform abnormalities during daytime EEG	6.0	8.9
Interictal epileptiform abnormalities over frontal areas	47.8	53.3
Ictal epileptiform abnormalities over frontal areas	31.3	35.5
Ictal rhythmic slow activity over frontal areas	44.8	46.7
Ictal diffuse background flattening	8.9	11.1
Normal interictal and ictal EEG	23.9	24.4

DISCUSSION

Either sporadic and familial NFLE are disorders often difficult to diagnose because their clinical manifestations are usually limited to brief motor seizures during sleep. The differential diagnosis from benign parasomnias is difficult from the history alone. Moreover, in these patients, the EEG studies during wakefulness (and often also during sleep) are usually normal. On the other hand, a full nocturnal video-polysomnographic study, althought expensive and needing specific rooms and trained technical-medical staff, is diagnostic in a large part of cases (17,18).

In any case, a full video-polysomnographic study should be proposed to all the patients complaining of repeated nocturnal motor, autonomic and behavioural episodes, in order to provide a correct diagnosis: in particular, NFLE should be suspected in presence of paroxysmal nocturnal motor attacks characterized by abrupt onset, stereotipy, high frequency in the same night and persistence into adulthood. In these patients with NFLE is of utmost importance to provide a correct diagnosis, as an anti-epileptic therapy usually controls both nocturnal and diurnal seizures as does on daytime somnolence.

Finally, it seems to be no difference in clinical and neurophysiological data between familial and sporadic cases of NFLE.

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