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Periodic limb movements in sleep: to treat or not to treat?

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Abstract

Background: Approximately 50% of our patients with sleep disturbances have periodic limb movements in sleep (PLMS). We have found that a high PLMS index is not correlated with the severity of symptoms on the Epworth Sleepiness Scale or response to pharmacologic therapy for restless legs syndrome (RLS)/PLMS. We hypothesized that differences in rhythm of contraction, predominance of periodic leg movements (PLMs) in different sleep stages, or PLM interval might distinguish responders from nonresponders.

Methods: We analyzed the hypnograms of 20 consecutive patients with PLMS, noting the number of PLMs and the PLM intervals in different sleep stages, the PLMS index, and the percentage of PLMs that led to arousals.

Results: We distinguished two groups of patients. The 13 patients in group A had a PLM arousal percentage of 10.9 ± 5% (mean ± SD), compared with 41.9 ± 9% for the seven patients in group B. Group B had a lower PLMS index. Group A showed little variance in PLM intervals and experienced more delta sleep.

Conclusions: PLMS index was not correlated with arousals. A strict rhythm of contractions was associated with fewer arousals and better quality of sleep. This subgroup may not benefit substantially from specific RLS/PLMS therapy.

Keywords: Restless legs syndrome; Periodic limb movements in sleep

1. Introduction

Restless legs syndrome (RLS) is sometimes called 'the most common disorder never heard of', and the description may be apt. RLS was described as early as 1672 by Thomas Willis [1], and in 1945 Karl-Axel Ekbom coined the name restless legs syndrome when he further described this sensorimotor disorder [2]. In the1960s he and other authors found a prevalence of 5% [3,4], a figure that was later shown to be too low. Newer data suggest a prevalence of 10–15%, increasing with age [5–7]. Coccagna and Lugaresi found in 1968 that patients with RLS also had periodic limb movements during sleep. These movements were further described and defined as periodic limb movements in sleep (PLMS) by Coleman in 1980 [8], and we know now that approximately 80% of RLS patients have PLMS [5]. The overall prevalence of PLMS is, however, unknown. Some people have these repetitive muscle contractions during sleep without knowing it. They have no subjective feeling of discomfort from their limbs during wakefulness, and if they are awakened by such limb movements, they do not know why. Identification of PLMS with or without RLS requires an all-night physiologic recording of sleep (polysomnogram) that includes a recording of the anterior tibialis electromyogram.

PLMS have been reported to occur in about 30% of people 50 or more years old [9]. They can start in childhood, but prevalence increases with age [7]. A considerable number of people suffering from difficulties in initiating and maintaining sleep may have PLMS contributing to their complaint of poor sleep.

People coming to our sleep laboratory have complaints of sleep disturbances, excessive daytime sleepiness, and/or other symptoms of insufficient sleep. Most of them have already been excluded from having obstructive sleep apnea syndrome or snoring problems. Approximately 50% of our patients are found to have PLMS, according to the American Sleep Disorders Association criteria [10]. A majority of these patients, if questioned carefully, report a history of RLS, but some do not. The clinical task is then to determine whether or not PLMS are responsible for their sleep problems. Since PLMS are found to be so common, at least among the elderly [9], one could ask whether they have any pathologic relevance at all.

In our experience, a high PLMS index [7] neither relates to the severity of symptoms measured by Epworth Sleepiness Scale scoring nor predicts whether patients will respond to pharmacologic treatment (levodopa or dopamine agonists). Some respond while others do not. Since a finding of PLMS is common among our patients, we need an instru-

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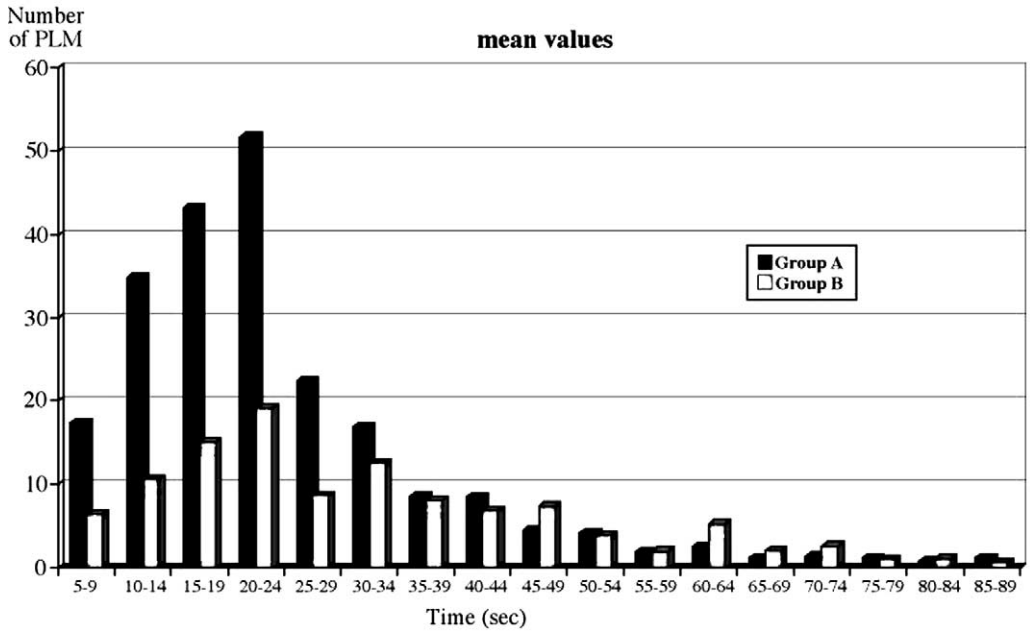

Fig. 1. Mean values for periodic limb movement intervals.

ment to sort medication responders from nonresponders. We hypothesized that differences in the rhythm of the contractions, periodic limb movement (PLM) predominance in different sleep stages, or the PLM interval could explain why some patients benefit from treatment and some do not.

2. Methods

In this study we analyzed 20 consecutive patients with PLMS, eight women and 12 men, age 38–76 years, with a mean age of 54 years [7]. We analyzed their hypnograms, noted the number of PLMs and the PLM intervals in different sleep stages, the PLM index, and the number and percentage of PLMs that led to arousals.

We routinely perform full-night polysomnography, including five-channel electroencephalography (EEG) (F4–C4, C4–P4, C3–C0, C0–C4, and A1–C4 according to the international 10–20 system), EMG from the masseter muscle, electrooculography horizontally and vertically, respiratory movements, airflow via thermistor, electrocardiography, EMG from the tibialis anterior bilaterally, snor-

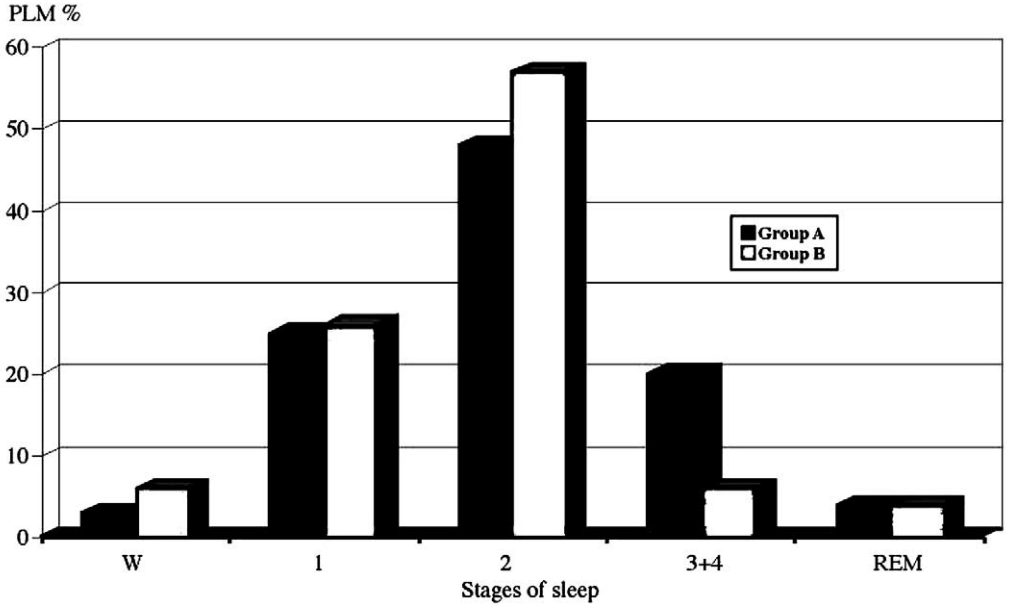

Fig. 2. Periodic limb movements in the different stages of sleep.

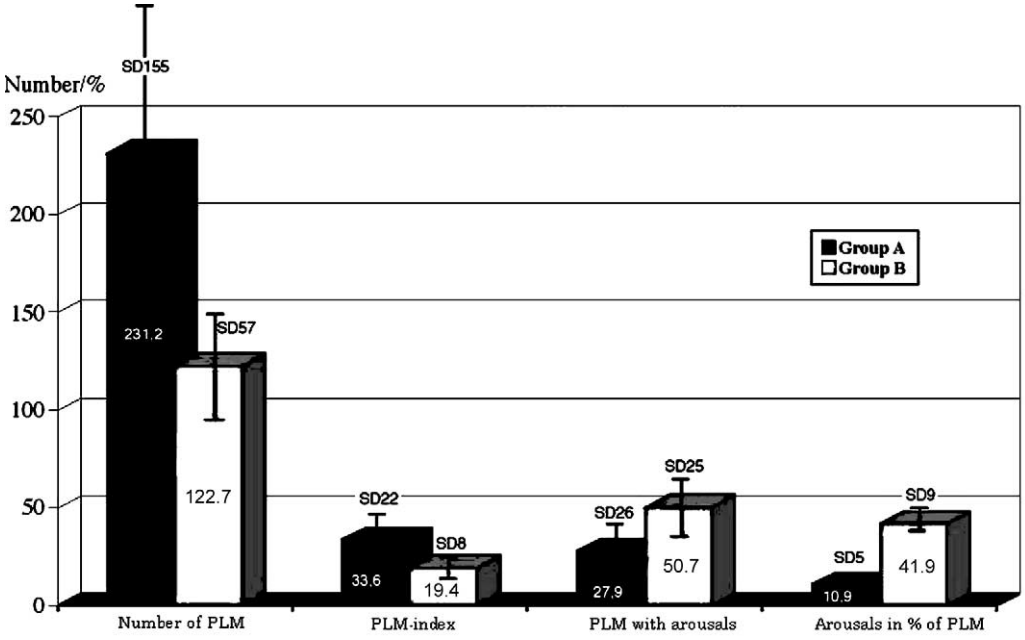

Fig. 3. Periodic limb movements reflecting quality of sleep?

ing, body position, and oxygen saturation. The patients are also monitored on video.

3. Results

Most of the patients showed a steady rhythm with 20–25-s PLM intervals (Fig. 1), and PLMs were most often seen in stage 2 (Fig. 2). Some patients seemed to be disturbed by the contractions, i.e. they led to arousals, while others did not. Therefore, they were divided into two groups. Thirteen of the patients had far fewer arousals due to contractions, with a PLM arousal percentage of 4–20% (mean $10.9 \pm 5\%$ (SD)), and formed group A. The remaining seven patients had a PLM arousal percentage of 34–55% (mean $41.9 \pm 9\%$), and were referred to as group B. The latter had significantly more arousals despite the fact that both the number of PLMs and the PLMS index were far less than in group A (Fig. 3). The patients in group A typically showed only a small variance in the PLM intervals, i.e. the

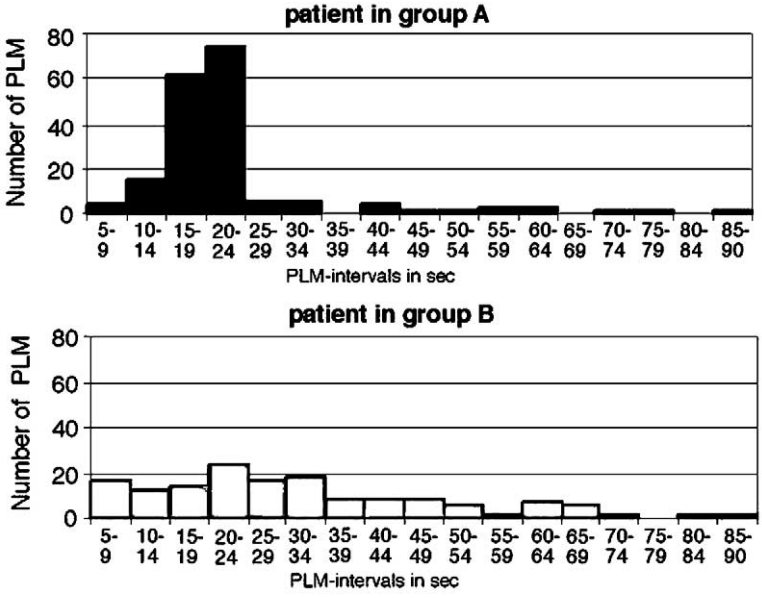

Fig. 4. Examples from both groups.

rhythm of the contractions was strict (Fig. 4). They also experienced more delta sleep; consequently, PLMs could be seen more frequently in stages 3 and 4.

4. Discussion

To assess PLMS, to tell how severe the condition is, and to decide whether the patient needs treatment, we often use the PLMS index. We do not yet know what the contractions stand for, and we do not know whether the number of contractions tells us anything about the severity of the disorder or the risk of progression in severity. What we do know is that arousals due to disturbance factors are detrimental to the quality of sleep.

In our study there was no correlation between PLMS index and arousals. In our opinion, this means that the PLMS index does not reflect the severity of the condition. We find it much more important to evaluate the PLM arousals to assess the severity of the condition. If there is no possibility of analyzing an EEG, one could estimate the spread of the PLM intervals instead, according to our findings. A strict rhythm means less risk of arousals and a better quality of sleep. We expect that this subgroup will not benefit very much from specific RLS/PLMS therapy and might be just as well off without treatment.

This is the focus of our ongoing study.

References

[1] Willis T. De anima brutorum. London: Wells and Scott, 1672.
[2] Ekbom K-A. Restless legs syndrome. Acta Neurol Scand 1945;158(Suppl):4.
[3] Ekbom K-A. Restless legs syndrome. Neurology 1960;10:868–873.
[4] Bornstein B. Restless legs. Psychiatr Neurol 1961;141:165–201.
[5] Montplaisir J, Boucher S, Poirier G, Lavigne G, et al. Clinical, polysomnographic and genetic characteristics of restless legs syndrome: a study of 133 patients diagnosed with new standard criteria. Mov Disord 1997;12:61–65.
[6] Lavigne G, Montplaisir J. Restless legs syndrome and sleep bruxism: prevalence and association among Canadians. Sleep 1994;17:739–743.
[7] Coleman R. Periodic movements in sleep (nocturnal myoclonus) and restless legs syndrome. In: Guilleminault C, editor. Sleep and waking: indications and techniques. Menlo Park, CA: Addison-Wesley, 1982. pp. 265–295.
[8] Coleman R, Pollac C, Weitzman E. Periodic movements in sleep (nocturnal myoclonus): relation to sleep disorders. Ann Neurol 1980;8:416–421.
[9] Ancoli-Israel S, Kripke DF, Klauber MR, Mason WJ, et al. Periodic limb movements in sleep in community-dwelling elderly. Sleep 1991;14:496–500.
[10] Bonnet M, Carley D, Carskadon M, Easton P, The ASDA, et al. Atlas Task Force. Recording and scoring leg movements. Sleep 1993;16:749–759.