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Controversy

Commentary on controversies in sleep medicine Montplaisir et al.: Periodic leg movements are not more prevalent in insomnia or hypersomnia but are specifically associated with sleep disorders involving a dopaminergic mechanism

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1. How should a clinician classify periodic limb movements of sleep?

Montplaisir et al. [1] convincingly argue that periodic leg movements (PLMs) may often be of limited clinical significance. How then should a clinician approach the problem of PLMs found on a polysomnograph (PSG)? I suggest a working classification in Table 1. The *first* category is that of PLMs found in normal subjects, especially in the older population. These may be found, for instance, in a PSG performed for possible OSA, but with negative results for sleep disordered breathing. The second category is that of restless legs syndrome (RLS). The association with RLS is probably closer than that with other sleep disorders as evidenced by the high prevalence of PLMs in RLS, the presence of PLMs during wakefulness in RLS and the occasional case of RLS developing after treatment of PLMs with dopaminergic agents. The 3rd category is that of PLMs associated with other sleep and neurologic disorders, most often as an epiphenomenon of uncertain clinical significance. The final category is that of periodic limb movement disorder (PLMD).

Does PLMD exist? I suggest the following criteria: (1), patients must exhibit symptoms conceivably caused by PLMs. These include insomnia, hypersomnia or, most typically, a clear perception of leg movements causing disruption of the sleep of the patient or sleeping partner; (2), no other sleep disorders are present which could cause the symptoms; (3), a PSG should show a higher frequency of PLMs than expected in normal subjects of the same age; (4), a high percentage of the PLMs should be associated with arousals; (5), dopaminergic agents should result in resolution of the primary symptoms and this should be sustained to avoid a placebo effect. In my experience, rare cases of PLMD so defined do exist, but they are few and far between.

2. Should polysomnography be performed to confirm the diagnosis of RLS?

If PLMs are non-specific, should they be used to help with the diagnosis of RLS? RLS is not considered a routine indication for PSG in the American Academy of Sleep Medicine (AASM) practice parameters [2]. Nevertheless, many sleep specialists use the presence of PLMs on PSG to confirm the clinical diagnosis of RLS. To determine whether this is appro-

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Table 1
Classification of periodic limb movements of sleep

PLMs in normal subjects
PLMs associated with RLS
PLMs associated with other sleep or neurologic disorders (including OSA, narcolepsy, idiopathic hypersomnia, multiple system atrophy)
PLMD

priate, we must apply Bayesian statistics [3]. The post-test likelihood of a disorder depends on the sensitivity of the test (the probability that the disorder is present if the test is positive), the specificity of the test (the probability that the disorder is not present if the test is negative) and the pre-test likelihood (the clinician's estimate of the probability that the disorder is present before performing the test). We need to first decide what is the most appropriate cut-off to use in the interpretation of the test. Montplaisir et al. [4] have used receiver–operator curves to show that eight PLMs/h provides the best cut-off based on the balance between specificity and sensitivity. If a lower cut-off is used, the test becomes less specific (more normal subjects will have a positive test) but more sensitive, while a higher cut-off results in increased specificity but reduced sensitivity (fewer RLS patients will have a positive test).

In Fig. 1, I have compared the pre-test likelihood with the post-test likelihood of RLS using the data

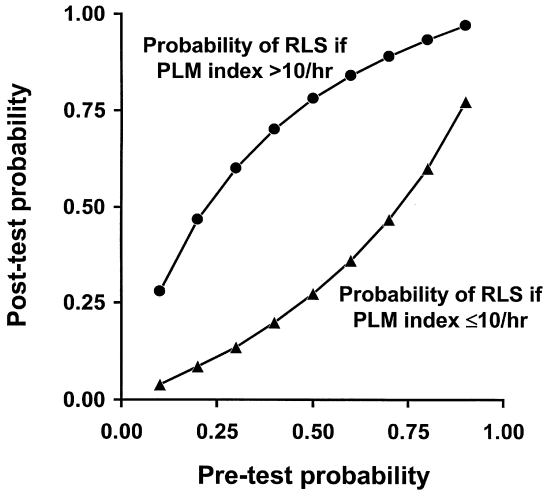

Fig. 1. Pre- and post-PSU likelihood of RLS.

provided by Montplaisir et al. [1]. This assumes a cut-off of ten PLMs/h (close to the eight/h discussed above). The upper graph plots the likelihood of having RLS if the patient has more than ten PLMs/h, while the lower curve demonstrates the probability of having RLS if the PLM index is ten or fewer/h. If the pre-test likelihood is very low, say 10% (close to the frequency of RLS in the general population), then a positive test increases the probability to only 28%, while a negative test only drops it to 4%. Similarly, if the patient fulfills all four diagnostic criteria of the IRLSSG [5] and the pre-test likelihood is thus about 90%, then a positive test only increases this to 97% and a negative test still results in a high post-test likelihood of 77%. However, if the pre-test likelihood is intermediate, say 50% (as might be the case if only two or three IRLSSG criteria were fulfilled), then a positive test would increase the probability to 78% and a negative test would drop this to 27%. If such a patient had a PLM index of greater than 25/h, then the probability of RLS would still rise further to 94% (graph and calculation not shown).

Thus, in selected patients, a PSG for PLMs may in fact have a role to play in increasing the confidence in the diagnosis. However, such patients would need to be selected with care; if the probability of RLS being present is either high or low, the test offers little additional information. It is also possible that a therapeutic trial of a dopaminergic agent may provide the same degree of confidence in a more cost-effective manner, but placebo effect must also be considered. The assumptions underlying the above analysis should also be understood. It is based on a sample of average age of 47 years; [1] if a patient is older, then the specificity of the test may fall because of increasing PLM index reported in apparently normal older subjects [6]. The statistics are based on only 20 patients and 20 normal controls, but the specificity (80%) is close to those of previous studies [7]. One also has to assume that the patients do not have other

sleep disorders with an increased frequency of PLMs, such as OSA, RBD, Parkinson's disease or multiple system atrophy [8]. The same Bayesian analysis can be applied to the suggested immobilization test to assess its use in RLS diagnosis.

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