

## Narcolepsy with Cataplexy Masked by the Use of Nicotine

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This report describes a case of narcolepsy with cataplexy masked by the chronic use of cigarettes and nicotine patches. It has been described that narcoleptic smokers report relief of symptoms by smoking tobacco cigarettes.<sup>1</sup> In addition, a case describing partial treatment of sleepiness using a nicotine patch in an adolescent with narcolepsy was recently reported in this

journal.<sup>2</sup> Our case adds to the growing literature that nicotine may be used to manage symptoms associated with narcolepsy.

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Narcolepsy is thought to be a disorder of REM sleep, with cataplexy representing episodes of REM-related muscle atonia intruding into the waking period. Narcoleptics often report episodes of dreaming during daytime naps, and the diagnosis of narcolepsy is based in part on a mean sleep latency  $\leq 8$  min with  $\geq 2$  REM sleep episodes on naps administered during a daytime multiple sleep latency test (MSLT). REM sleep is partially produced by cholinergic activation of the thalamus, and muscle atonia during REM sleep is triggered by the cholinergic effect on the medial medulla.<sup>3,4</sup> Both nicotinic and muscarinic agonists, as well as acetylcholinesterase inhibitors, have been shown to increase REM sleep.<sup>5-7</sup> Interestingly, although low levels of nicotine administration have been shown to increase REM sleep, high levels of nicotine seem to reduce REM sleep percentage and decrease total sleep time in both animals and humans.<sup>8</sup>

Of interest in our current case, transdermal nicotine patches in nonsmokers have been shown to reduce REM sleep percentage and decrease total sleep time.<sup>9,10</sup> In addition, REM rebound has been shown after stopping nicotine.<sup>10,11</sup>

### REPORT OF CASE

The current case involves an 89-year-old female referred for evaluation of cataplexy-like episodes. The patient describes having infrequent episodes of cataplexy for several years, described as a sensation of temporary loss of strength in her neck and lower extremity muscles, associated with laughing or excessive situational stress. Over the past few years, they have become concerning to her family and friends, as three episodes of body collapse occurred in public, not associated with loss of consciousness or other trauma.

Since her teenage years, she has always felt sleepier than other people, requiring frequent naps during the day, and also describes dreaming during naps. She has been a heavy smoker since early adolescence. After having children, her naps were less frequent while she cared for her 7 children. In her mid-30s, the first “cataplectic” event occurred and was temporally as-

sociated with smoking cessation. After this event, the patient chose to resume smoking about 20 cigarettes per day until her mid-70s when she quit cigarette smoking after being diagnosed with coronary heart disease. At that point, a formal sleep evaluation revealed a history of intermittent sleep paralysis and hypnagogic hallucinations.

The sleep study was conducted in 1995 and contained 7.5 h of sleep with a 4-min sleep onset REM period. An MSLT performed the next day found a mean sleep latency of 3 min, with REM sleep occurring in 4 of 4 naps. Of note, REM sleep occurred in the first epoch of sleep on all naps. HLA typing for narcolepsy found the patient positive for HLA-DQB1-0602 and HLA-DR15.

The patient was offered stimulants at that point; however, she declined them due to concerns regarding potential addiction and rebound effects. Since then, she has opted to use a nicotine patch, which has been effective in controlling her cataplexy. However, over the past 5 years, 3 episodes of cataplexy were noted, most commonly triggered by either surprise or public speaking (e.g., last event occurred when her name was announced for an award at a large conference). On multiple occasions the patient has declined the offer to change to a more standard pharmacotherapy for narcolepsy. Currently, she sleeps for 7-9 h nightly on a regular schedule and naps for 20-30 min, 5-7 times a week. Her family history reveals a mother with very similar symptoms who was told she had narcolepsy in the 1940s. Her mother’s condition was well managed on amphetamines until she passed away at the age of 83, in 1982. This familial linkage further strengthens the diagnosis of narcolepsy.<sup>12</sup>

### DISCUSSION

In this case, it appears that both smoking and the use of a nicotine patch may have partially masked both cataplexy and sleepiness. Therefore, once smoking was discontinued, the patient exhibited both increased sleepiness and cataplexy. The fact that nicotine masked sleepiness is not surprising, given that

nicotine has been shown to improve memory and attention in humans and animals, similar to amphetamines.<sup>13</sup>

The finding in our case is consistent with Bagai and Malow's finding that a nicotine patch helped treat morning sleepiness in a narcoleptic patient without cataplexy.<sup>2</sup> Moreover, in a 2009 survey of narcoleptics by Krahn et al.,<sup>1</sup> it was found that all narcoleptics who had smoked in the past reported reduced daytime sleepiness while smoking, and one survey participant reported reduced cataplexy while smoking. Interestingly, passive smoking was found to be more common in narcoleptics, but active smoking was not increased compared to normal controls.<sup>14</sup> Our findings, as well as previous reports suggest that smoking and nicotine patches decrease the clinical manifestations of narcolepsy, with reduced cataplexy and daytime sleepiness. Based on these findings, we believe further investigation is warranted to look at the role of nicotine in treatment of both cataplexy and excessive daytime sleepiness in narcoleptics.

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## DISCLOSURE STATEMENT

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