

De Novo Sleepwalking Associated with Hyperthyroidism

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We report for the first time in the medical literature three patients with sleepwalking associated with severe hyperthyroidism. Their sleepwalkings were reversed with antithyroid therapy. The authors argue for the presence of symptomatic subgroup of treatable sleepwalkers with hyperthyroidism characterized by the lack past history of sleepwalking, night terrors or other parasomnia, and by the absence of a family history of sleepwalking. (*Sleep and Hypnosis* 2001;3(3):112-116)

Key words: *sleepwalking, parasomnia, hyperthyroidism, antithyroid therapy*

INTRODUCTION

Hyperthyroidism is the most common disorder of the thyroid. Patients typically present with complaints consistent with a hypermetabolic state, including nervousness, weight loss, heat intolerance, palpitation, irritability and tremor (1). The psychiatric manifestations of hyperthyroidism such as fatigue, irritability, insomnia, restlessness, doubts and fears have been recognized since the beginning of the twentieth century (2). It has been suggested that certain psychiatric conditions such as anorexia nervosa and periodic catatonia may be linked to the abnormalities of the hypothalamic-pituitary thyroid axis (3,4). Sleep problems are very common among patients with hyperthyroidism and their poor sleep quality even affects their physical health (5). To our knowledge, sleep-walking as a manifestation of hyperthyroidism has not been reported in the literature. We therefore report here three cases of hyper-

thyroidism with sleepwalking as a presenting feature which was subsequently reversed after the euthyroid state has been achieved.

CASE 1

A 46-year-old man, with negative past history of psychiatric disorders and sleepwalking and the lack of associated night terrors or restless legs, was referred to the psychiatric clinic in December 1984 for management of frequent episodes of sleep-walking, shaky hands, excessive sweating, fatigability, irritability and weight loss of four years duration. In 1983, his wife woke-up one night to find her husband trying to open the door to get out of the room. He did not respond to her statements and according to her, he looked confused and perplexed. Next morning, he had no recollection of what happened on the previous night. Subsequently, he was found asleep at different places of the house and was unable to recall how he got there. However, what really made his wife worried and concerned was that she woke-up one night to find her husband naked and trying to get out of the room through the window. At that time the patient was seen by several general practitioners who prescribed him diazepam that was taken twice daily and multivitamin preparations, but without much benefit. Finally, a brain CT scan was arranged for him to rule out any intracerebral pathology which might have been inducing

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Accepted May 30, 2001

the sleep-walking episodes. As brain CT scan revealed no demonstrable brain pathology he was referred for psychiatric evaluation. On examination, the patient was anxious, restless, diaphoretic, and fidgety with staring eyes, but cooperative. He tried hard to answer all questions put to him. His mood was dysphoric and he wept when his financial affairs and their impact on his family were discussed. He complained of extreme fatigability and there was no suicidal ideation. His speech, though quick, was coherent and there was no evidence of formal thought disorder. The patient denied having hallucinations or delusions and his cognitive functions were intact as tested by simple clinical tests. Physical examination revealed enlarged thyroid. The precordium was hyperdynamic and the resting pulse rate was 110/minute (regular). The neurological examination revealed grossly intact sensorium with exaggerated deep tendon reflexes but with no clonus. No neurological deficits were demonstrated. He had eye signs in the form of lid-lag and lid retraction, but no exophthalmos. Serum electrolytes, blood chemistry and complete blood count were within normal limits. Thyroid function tests showed a total T4 of 354 ng/ml (normal=42-110 ng/ml), T3 of 6.6 ng/ml (normal=0.5-1.5 ng/ml), and TSH assay was not available. Thyroid scan revealed diffuse right sided thyroid enlargement with increased uptake. The chest X-ray was normal and the ECG showed no abnormality apart from sinus tachycardia of 110/minute. EEG was normal. The diagnosis of thyrotoxicosis was made and the patient was treated with neomercazole 10 mg t.i.d. and propranolol 40 mg b.i.d. at the endocrinology clinic. Six weeks later, the patient and his wife reported that his sleep-walking episodes had ceased; coinciding with normalization of his T4, T3 concentrations. Patient was instructed to continue on 15 mg neomercazole daily, however 4 weeks later his wife reported the reoccurrence of sleepwalking, mild nervousness and 1 kg of Wt loss. Patient had admitted to not taking the medications for the last 4 weeks. T4 and T3 concentrations were found to be in the toxic range.

Neomercazole and beta blockers were recommenced again. Six weeks later, Patient reported disappearance of symptoms including the sleep-walking episodes. Thyroid function tests done six weeks later were found to be within the normal range. Patient was seen last in the clinic in 1989 and was found to be healthy, with no further sleepwalking having occurred. Arrangements were made for him to be followed up subsequently by his family physician.

CASE 2

A 19-year old single female patient, with excellent scholastic achievement, was doing well until October 1998 when the family noticed that she became irritable, nervous, argumentative, quarrelsome and started to lose weight (7 kg in 2 months). Her school performance started to deteriorate, as she was unable to concentrate. In December 1999, she was seen by an internist who suspected hyperthyroidism and confirmed his diagnosis with high T4, and T3 concentrations. She was commenced on neomercazole and propranolol, but unfortunately patient continued to be toxic despite a big dose of neomercazole 30 mg and 80 mg of propranolol daily. Therefore she was referred to the endocrine clinic for further evaluation and treatment. Her parents expressed great concern about her general condition and about episodes of sleep walking which they first noticed in July 1999 and became worse since then. According to her parents she used to walk while asleep inside the house at a frequency of 4-5 times per week. There was no history of sleepwalking, the lack of associated night terrors and restless legs, nor history of sleep walking in any one of her immediate family members. Past medical history was also unremarkable apart from minor menstrual irregularity. Clinical examination showed an anxious young female, with bilateral lid lag, lid retraction, but no visible exophthalmos. Pulse was 120/min. Diffuse nodular goiter was evident, with audible bruit. Limb examination showed white spots over fingernails, and mild non-pitting edema in both lower limbs. Neurological examination was free apart from nasal quality speech, and brisk tendon reflexes all over. Results of laboratory work up including CBC, and blood chemistry showed no specific abnormalities. ECG and Echocardiography were within normal limits. Brain MRI and EEG also were found to be normal. Thyroid function tests revealed highly elevated levels of T3 of 46.08 Pmol/L, (normal=2.58-5.44 Pmol/L) and T4 of 77.2 Pmol/L, (normal=9.1-23.8 Pmol/L). The diagnosis of thyrotoxicosis was made. The persistence of severe symptoms despite treatment with large doses of neomercazole (15 mg TID) and propranolol 40 mg TID prompted us to administer radioactive iodine therapy and this resulted in gradual drop of T3 and T4 concentrations. It was noticed that she continued to have sleep walking until her T4 became within the euthyroid level range. Although the dose of her medications was reduced gradually, patient had remained nearly free of symptoms and sleep walking had ceased com-

pletely. Patient was seen last in May 2000 when she reported a refreshing sleep free from sleepwalking episodes and a full return of normal daily activity.

CASE 3

A 13 year old school boy was referred to the endocrine clinic for management of a suspected hyperthyroidism in February 2000. The boy presented with hand tremors, feeling fatigued, nervousness, and poor concentration of one year duration. His father added that approximately one year prior to the occurrence of the above complaints, the boy was observed to walk during sleep and during that period his parents also noticed that the boy was becoming increasingly anxious and unable to concentrate that resulted in a marked drop in his school performance. According to father one to two episodes of sleep walking were observed per week and in one episode the boy was found trying to open the main gate of the house while asleep. Parents denied that the boy had sleepwalking during childhood, or night terrors and reported also negative family history of sleep walking. According to father the boy reached his developmental milestones normally and had had a reasonably good school record prior to onset of his illness.

Clinically the boy was thyrotoxic with heart rate of 100/min but regular, had moderate diffuse goiter with bruit over it, obvious hands tremor but there was no lid lag, nor evidence of ophthalmopathy. Fundoscopy revealed normal optic discs. The biochemical picture showed severe hyperthyroidism with high free thyroxine (FT4) of 61.22 pmol/L (normal=9.1-23.8), high FT3=38.28 pmol/L (normal=2.58-5.44) and suppressed TSH= 0.036 mIU/L (normal=0.47-5.01). Thyroid antibodies were negative, as well as the rest of blood chemistry. The boy showed marked improvement on neomercazole 30 mg per day and in May 2000, his father reported that sleep walking episodes had ceased completely. The last reading of T3 and T4 concentrations was reported to be normal but with elevated TSH. The dose of neomercazole was therefore reduced and fortunately without the return of sleep walking episodes.

DISCUSSION

The three patients we present had sleepwalking associated with classical severe hyperthyroidism of relatively long duration prior to the diagnosis and treatment. The sleepwalking associated with the

three cases without any previous personal or familial history of sleep walking and its remission with treatment and conversion to euthyroid state makes the causal relationship most likely. The return of sleepwalking in the first case after the discontinuation of treatment and the reoccurrence of hyperthyroidism is another indication of the hyperthyroid state as the likely cause, since sleepwalking disappeared again when the patient returned to the euthyroid state. It was not known whether the sleepwalking was typically confined to the beginning of the sleep cycle, or whether it could be distributed across much or most of the sleep cycle. It was also not known to what extent, if any, there was subsequent recall for the sleepwalking episodes, nor whether there was any dream-associated sleepwalking episodes. Under the latest International Classification of Sleep Disorders (ICSD-90) sleepwalking is included under arousal parasomnias, which occur during non-REM sleep and include night terrors, sleepwalking, and confusional arousals (6).

Clinical studies of parasomnias in adults have demonstrated that mental disorders are not causally associated with parasomnias in most cases, although stress can play a precipitating for parasomnia relapses (as well as fever, sleep deprivation) (7,8). Furthermore, parasomnias may have serious consequences, such as self-injuries, and accidental murders or suicides (9,10).

Sleepwalking has been reported in 17% of patients with Tourette's syndrome (11), and in 30% of migraineurs (12), and can be worsened by propranolol (13), lithium and neuroleptics (14), the premenstrual period (15), and road accidents (16). Although a history of sleepwalking is obtained in 62-80% of family members (17), in our cases, family history was negative. Gau and Soong (18) reported that sleep terrors and sleepwalking in childhood are related primarily to genetic and developmental factors and their onset in adolescence may be related to psychosocial factors, but Hublin et al (19) argue that there are substantial genetic effects in sleepwalking in both childhood and adulthood, but this was not the case among our patients. Although sleepwalking and night terrors are often found together (20), this was also not the case in our patients. It is interesting to note that remission was achieved in our patients while they were taking relatively high doses of beta blockers despite the fact that the latter medications can cause or exacerbate sleepwalking. The absence of past history of sleepwalking in childhood, family history of sleepwalk-

ing, association with night terrors and the remarkable response to antithyroid therapy argues for the presence of a subgroup of sleepwalkers probably different from the idiopathic sleepwalkers occurring usually in childhood. This provides support to the findings of Schenck et al (21) who reported that patients presenting with parasomnias associated with neurologic and other medical disorders were different from those patients with idiopathic parasomnias. Although the mechanism behind the pathogenesis of sleepwalking among our hyperthyroid patients remains a mystery, it is believed that sleepwalkers appear to suffer from an abnormality in the neuronal mechanisms responsible for the regulation of slow-wave sleep (22). Bassetti et al (23) reported a single photon emission tomography (SPECT) in a man with a history of sleepwalking. Their findings suggest that sleepwalking arises from activation of thalamo-cingulate pathways and persisting deactivation of other thalamocortical arousal systems.

We speculate the mechanism as follows: Kales and Kales (24) studied the nocturnal psychophysiological correlates of somatic conditions including hypothyroid and hyperthyroid states. They found that hypothyroid patients showed a

decrease in stage 3 and 4 sleep (nonREM), while in hyperthyroid patients the percentage of time spent in stages 3 and 4 sleep was markedly increased. The established fact regarding sleep walking is that it typically occurs when stages 3 and 4 (nonREM) are most prevalent (25). It is also known that sleep deprivation forces the body to go more readily into the deeper stages of sleep (nonREM) (26). We therefore speculate that the combination of prolongation of nonREM sleep induced by hyperthyroidism and the fatigue associated with it, were probably the most likely causes of sleep walking reported in our patients. Finally, we believe that the lack of report associating sleepwalking with hyperthyroidism in medical literature does not necessarily reflect the low prevalence of sleepwalking among hyperthyroid patients but it may indicate either that hyperthyroid patients do not volunteer such information to their doctors for fear of being labeled as mentally ill, or that doctors often fail to enquire about the sleep patterns of their patients. Therefore, it will be worthwhile that this dilemma be solved by conducting a controlled study on hyperthyroid patients, utilising polysomnography that was not performed in our patients, to confirm the diagnosis of sleepwalking.

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