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Case report

Hypnic headache : a case report with polysomnography

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Abstract

We report on a case of nocturnal headache attacks fulfilling the criteria for hypnic headache syndrome. Using an overnight polysomnography, one nocturnal headache attack was captured during the REM phase of sleep. Quality of sleep was poor with desaturation episodes. However, the hypnic headache attack was not associated with oxygen desaturation. This additional case supports the view of a relationship between the hypnic headache syndrome and the REM sleep stage. Lithium therapy decreased the intensity and frequency of headache attacks.

Key words : Headache ; polysomnography ; sleep ; sleep stages ; REM sleep ; lithium.

Hypnic headache syndrome (HHS) is a rare headache disorder first described by Raskin in 1988 (Raskin, 1988), and has also been called clockwise headache or alarm clock headache. Since then, more than 70 similar cases have been reported in the literature (Evers and Goadsby, 2003). It is generally assumed that HHS is an idiopathic headache disorder. Although HHS was not included in the 1988 classification of the International Headache Society (IHS) (Headache Classification Committee of the International Headache Society, 1988), it has been proposed that HHS should be classified as one of the miscellaneous headaches unassociated with structural lesions (group 4 of the IHS classification) (Evers and Goadsby, 2003).

We report on a case of HHS as defined by the criteria suggested by Evers and Goadsby (2003) (table 1). An overnight polysomnography was performed to search for a possible relationship with a particular sleep stage.

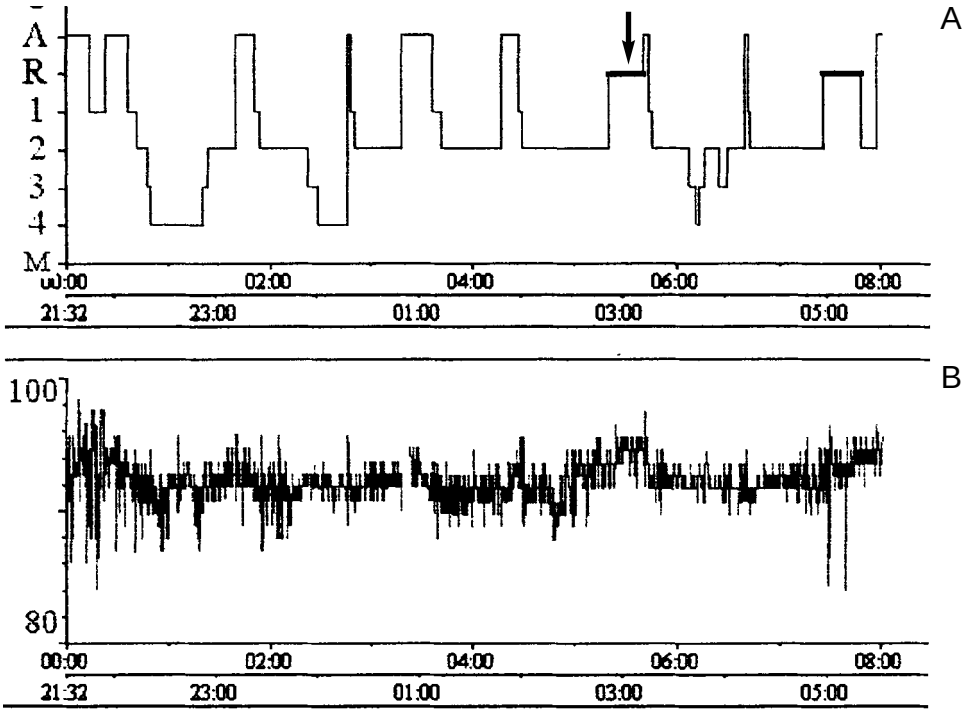
Case report

A 60-year-old woman was admitted to our headache outpatient clinic for a 3-year history of dull headache attacks occurring every night. She had been suffering from essential hypertension since three months, which was successfully treated by an association of lisinopril (20 mg) and hydrochlorothiazide (12,5 mg). She had no history of migraine, other types of headache, or neurological disease. There was no family history of headache. The attacks always occurred between 3 and 5 o'clock and their duration was between 60 and 120 minutes. She had one attack per night. The pain was moderate (6/10 on a visual analogue scale), always right sided, and was qualified as a «pressure». It started from the right side of the nose and rapidly radiated to the entire right face. Autonomic symptoms, such as lacrimation, ptosis, miosis, rhinorrhea, conjunctival injection, and flush or edema of the cheek, were absent except for a right blocked nostril. There were no nausea, photophobia or phonophobia. Headache didn't worsen by physical activity. She did not suffer from diurnal headache.

General examination was normal, except obesity (116 kg for 169 cm). Blood pressure was normal. Neurological examination was unremarkable. The trapezius muscles were mildly pain-sensitive to finger pressure. Stomatologic examination showed gingivitis, for which local treatment had no effect on headaches. Blood tests only showed moderately high levels of cholesterol (total cholesterol 223 mg/dL ; LDL-cholesterol 150 mg/dL). Cervical and transcranial Doppler ultrasonography was normal. Neurophysiologic evaluation showed a sustained temporal muscle activity. A CT scan of the sinuses and magnetic resonance imaging of the brain were normal. Psychiatric evaluation showed signs of depression according to the DSM-IV criteria.

Polysomnography detected a poor sleep quality (3 arousals/hour) and a mildly decreased oxygen saturation (mean 92% ; 6 minutes under 88%) (Fig. 1). One nocturnal headache attack was captured during the first REM stage of sleep, 5.30 hours after falling asleep, and was not associated with oxygen desaturation. The patient stated that she woke up with a headache starting during a dream.

Numerous treatments, such as indomethacin, paracetamol, antihistaminic, and amitryptiline, failed to improve the headache attacks. Lithium therapy, 500 mg at bedtime, improved the headache



Real time is expressed on the lower X axis ; duration of polysomnography is expressed on the upper X axis.

FIG. 1. — Polysomnography showing the occurrence of one hypnic headache attack during the first REM sleep stage (A, arrow), without simultaneous oxygen desaturation (B).

intensity (3/10 on the visual analogue scale vs. 6/10) and slightly decreased the frequency of attacks (4-5 per week instead of every night).

Discussion

In this case, the characteristics of headaches fulfilled the proposed criteria of HHS (Table 1). Headaches associated with nocturnal sleep have often been perceived as either the cause or result of disrupted sleep. Medical conditions (e.g. obstructive sleep apnea, depression), that may disrupt sleep and lead to nocturnal or morning headache, can be identified on clinical evaluation or by polysomnography. Primary headache disorders which often occur during nocturnal sleep or upon awakening, such as migraine, cluster headache, chronic paroxysmal hemicrania, and hypnic headache, can readily be diagnosed through clinical evaluation and managed with appropriate medication (Table 2) (Dodick *et al*., 2003). According to the IHS classification (Headache Classification Committee of the International Headache Society, 1988), the clinical presentation of headaches in our patient excludes a diagnosis of migraine and paroxysmal hemicrania. Hypnic headache must also be differentiated from cluster headache, notably by the absence of autonomic signs. Our patient only reported a blocked nostril on the side of headache without any other autonomic signs on clinical examination. However, mild autonomic signs (lacrimation, in part with nasal congestion or rhinorrhea, and ptosis) have been reported in about 10% of all the published cases of hypnic headache syndrome (Evers and Goadsby, 2003). Despite a history of hypertension, blood pressure was normal, thereby excluding a nocturnal headache-hypertension syndrome. Brain imaging also ruled out structural lesions. Despite a sustained temporal muscle activity, the absence of diurnal headache attacks and the specific occurrence during the REM sleep stage do not support a diagnosis of depression-related headache. Polysomnography showed several episodes of mildly decreased oxygen saturation at the beginning of sleep, which were due to nocturnal hypoventilation secondary to the patient's obesity. The absence of severe oxygen desaturations rules out an obstructive sleep apnea syndrome, another sleep related headache.

Hypnic headache syndrome is a benign, recurrent headache disorder occurring exclusively during sleep. In the 71 cases reported (Evers and Goadsby, 2003), the female-to-male ratio is 2:1, and the mean age of onset is 63 years. The patients usually suffer from 1-2 attacks per night lasting for about 1 hour. The pain intensity is most often moderate and characterized as dull or throbbing. The headache is commonly diffuse and bilateral, but unilateral localization, mainly frontotemporal, is also found in 40% of cases. The duration of untreated attacks ranges between 15 and 180 minutes. Concomitant symptoms are unusual : nausea in

Table 1

Clinical criteria for hypnic headache

Description : attacks of pain that may be unilateral or bilateral and invariably occur after falling asleep
Diagnostic criteria :
A. Headaches occur at least 15 times per month for at least 1 month
B. Headaches awaken patient from sleep
C. Attack duration of 10-180 minutes
D. Pain is not associated with cranial autonomic features that fulfill a diagnosis of cluster headache and other trigeminal autonomic cephalalgias
E. Patient should not have any of the following features associated with the headache :
   a. Nausea
   b. Photophobia
   c. Phonophobia
   d. Aggravation of headache with routine physical activity
F. At least one of the following :
   a. There is no suggestion of one of the disorders listed in groups 5-11
   b. Such a disorder is suggested but excluded by appropriate investigations
   c. Such a disorder is present, but the first headache attacks do not occur in close temporal relation to the disorder

Criteria proposed by Evers and Goadsby (2003).

Table 2

Differential diagnosis of nocturnal headache

Frequent :
1. Nocturnal occurrence of migraine
2. Nocturnal occurrence of cluster headache
3. Nocturnal occurrence of paroxysmal hemicrania
4. Obstructive sleep apnea related headache
5. Sleep length associated headache (Excessive deep sleep, lack of sleep and sleep disruption)

Uncommon :
1. Turtle headache
2. Exploding head syndrome
3. Nocturnal headache-hypertension syndrome

19% ; mild photophobia, phonophobia, or both in 7%. Migraine and episodic or chronic daily tension-type headache have been reported in some patients (Evers and Goadsby, 2003).

Polysomnography was only performed in 6 patients having had at least one nocturnal headache attack during a sleep recording. The attacks occurred during a REM sleep stage in 5 of them, like in our case, and during sleep stage 3 in one (Dodick, 2000 ; Arjona *et al*., 2000 ; Pinessi *et al*., 2003 ; Evers *et al*., 2003). Sleep quality is commonly normal, except a decreased sleep efficiency and a mildly decreased oxygen saturation down to 70% in some patients including our own case. Sleep apnea has never been reported (Evers and Goadsby, 2003).

The exclusive relationship of HHS with sleep, notably always during the same time of the night, and its tendency to occur in subjects older than 60 years imply a possible association with the changes of sleep physiology occurring in the elderly and the involvement of brain structures responsible for the endogeneous circadian rhythm (Dodick *et al*., 2003). The hypothalamic supra-chiasmatic nuclei (SCN) have afferent and efferent conjunctions with the periacqueductal gray matter, an essential area for the antinociceptive system. They operate as the main biological clock, and stimulate the release of melatonin from the pineal gland. However, the SCN activation progressively decreases with age, reducing the melatonin secretion in the elderly (Leone *et al*., 1995). It is hypothesized that decreased levels of melatonin explain the occurrence of hypnic headache in biologically predisposed subjects (Dodick *et al*., 1998). Efficacy of lithium therapy in some patients supports this view, since lithium increases the plasma levels of melatonin (Chazot *et al*., 1987 ; Pablos *et al*., 1994). Another hypothesis is an impaired serotonin metabolism because lithium also increases the release of serotonin (Treiser *et al*., 1981). In addition, the activity of the dorsal raphe and the locus coeroleus nuclei, which are both connected to the periacqueductal gray matter supporting antinociceptive system, is absent during the REM sleep (Somers *et al*., 1993). It is hypothesized that the function of these nuclei is impaired during this sleep stage in patients with HHS.

Therapy of hypnic headache has been reviewed by Evers and Goadsby (Evers and Goadsby, 2003). Sumatriptan and oxygen inhalation, the first-choice treatment for cluster headache, are not effective in stopping the HHS attacks. Only acetylsalicylic acid can moderately decrease the pain intensity in some patients. For the prevention of attacks, lithium showed the best efficacy in many reports as well as in our case. Antidepressant drugs and beta-blockers are not particularly useful. Indomethacin, known to be efficacious in paroxysmal hemicrania and hemicrania continua, has been suggested to be useful only if the HHS attacks are unilateral, but this therapy was not helpful in our patient. Other drugs, such as caffeine, methysergide, calcium channel blockers, non steroidal anti-inflammatory drugs, and prednisone, do not provide any benefit.

In conclusion, this case of hypnic headache syndrome further suggests that it is an idiopathic disorder associated with REM stage sleep. Lithium therapy is helpful in preventing the attacks.

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