

Case report

Did this father's sleep apnea contribute to the inadvertent death of his infant son?

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Received 29 January 2002; received in revised form 27 February 2002; accepted 28 February 2002

Abstract

Sleepiness impairs memory and concentration. We report a case of a patient who inadvertently left his infant son in a car, having forgotten to drop him off at day care. The infant died of heat exposure. There is credible evidence that sleepiness from a combination of sleep deprivation and previously undiagnosed severe obstructive sleep apnea contributed to this tragedy. © 2002 Elsevier Science B.V. All rights reserved.

Keywords: Severe obstructive sleep apnea; Sleep deprivation

1. Introduction

During the summer of 2001 in the Midwest, newspapers reported numerous cases of infants and small children who died of heat exposure after having been inadvertently left in car seats in automobiles by a parent. The parents reported simply 'forgetting' to drop the children off at day care on the parents' way to work. Sleepiness, from whatever cause, interferes with attention, memory, and concentration, and could conceivably play a role in the above-mentioned tragedies.

We report a case in which a father's undiagnosed severe obstructive sleep apnea likely played a role in his infant son's being left in a car seat and dying of heat exposure.

2. Case report

At the time of evaluation, the patient was a 38-year-old married mortgage banker and associate minister. In July 2001, he, his wife, their 2-year-old daughter and 4-month-old son left home at 06:15 h. He dropped off his wife at a bus stop, his daughter at her day care, and was supposed to drop off his son at day care on the way to his office. Instead, he drove straight to work, leaving his son in an infant seat in the

car. Nearly 8 h later, a passerby noted the infant in the car seat, dead from heat exposure. He had no explanation for his forgetting to drop his son at day care. There was absolutely no history of significant psychiatric disease, substance abuse, or child neglect. He was charged with second-degree manslaughter by a grand jury, and his daughter was placed under court protection. Four hundred members of his church congregation signed a petition testifying to his innocence and character.

Two weeks later his picture appeared in the local newspaper. Because the photograph indicated that he had a very large neck, his lawyer was contacted and encouraged to have his client evaluated for possible obstructive sleep apnea.

Seven weeks after the incident, he was evaluated at a sleep clinic. By history, at the time of the event, he was severely sleep deprived. He had been obtaining an average of 6 h of sleep nightly, but felt his preferred sleep requirement was 8–10 h. His sleep restriction was attributed to awakenings in the middle of the night to attend to his children, and to the fact that he had to rise early to drive his family members to work and day care, as his wife did not drive. He also gave a history of socially disruptive heroic snoring with daytime sleepiness and mild cognitive impairment. He occasionally went to his car to sleep during lunch breaks, dozed off during meetings at work, and had fallen asleep while stopped at semaphores. He had gained over 90

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Table 1
PSG/MSLT results before and after effective CPAP administration^a

Parameter	PSG 1: baseline	PSG 2: CPAP titration
Total sleep time (min)	484	338
Sleep efficiency (%)	88	90.7
% NREM stage 1, 2	64.7	59.3
% NREM stage 3, 4	8.9	14.8
% REM	26.4	25.9
AHI (No./h)	50	0 after effective CPAP
Typical desaturation (%)	91	None after effective CPAP
Low desaturation (%)	62	Not available
MSLT mean sleep latency (min)	3.0	10.7
MSLT SOREM	0/5	1/5

^a PSG, polysomnography; MSLT, multiple sleep latency test; CPAP, continuous positive airway pressure NREM, non-rapid eye movement; REM, rapid eye movement; AHI, Apnea and Hypopnea Index; SOREM, sleep-onset rapid eye movement.

pounds over the preceding 5 years, to his current weight of 318 pounds. He denied a history of heart trouble, hypertension, or dependent edema. There was no history of catalepsy.

On examination, blood pressure was 144/98. Neck circumference was 21 inches. Heart and lungs were normal, with no dependent edema. He was 5 feet 9 inches (175.3 cm) tall and weighed 318 pounds (144.2 kg) (body mass index = 47). Pulmonary function studies were not performed.

Two consecutive all-night polysomnographic studies (baseline and continuous positive airway pressure (CPAP) titration) each followed by a multiple sleep latency test were performed (Table 1).

He responded well to nasal CPAP, used it regularly, and noted marked and sustained improvement in daytime alertness. In December 2001, the county prosecutors dropped the manslaughter charges, believing they could not prove beyond a reasonable doubt that the patient acted recklessly in the death of his son. It is believed that the interval diagnosis of obstructive sleep apnea played a role in this decision.

3. Discussion

Sleepiness, from whatever cause, results in impairment of memory, concentration, and other higher executive functions [1–4]. This patient's severe excessive daytime sleepiness resulted from a combination of volitional sleep deprivation and sleep fragmentation due to severe obstructive

sleep apnea. It is likely that the consequences of sleepiness-impaired concentration and memory contributed significantly to this tragic event.

Instances of children dying from heat exhaustion due to being left unattended in automobiles is much more common than generally appreciated (27 reported (likely underreported) cases involving children under age 5 years occurred in the United States in 1999) [5]. Many of these children were unintentionally left in automobiles because a parent 'forgot'. That a large portion of the Kids 'n Cars website has been devoted to such cases underscores the magnitude of this heartrending problem [6].

Such tragic events emphasize the occasionally dire consequences of sleepiness in our society.

References

- [1] Bonnet MH. Sleep deprivation. In: Kryger MH, Roth T, Dement WC, editors. Principles and practice of sleep medicine, 3rd ed. Philadelphia, PA: Saunders, 2000. pp. 53–71.
- [2] Kim HC, Young T, Matthews CG, Weber SM, Woddard AR, Palta M. Sleep-disordered breathing and neuropsychological deficits. A population-based study. *Am J Respir Crit Care Med* 1997;156:1813–1819.
- [3] Adams N, Strauss M, Schluchter M, Redline S. Relation of measures of sleep-disordered breathing to neuropsychological functioning. *Am J Respir Crit Care Med* 2001;163:1626–1631.
- [4] Day R, Gerhardstein R, Lumley A, Roth T, Rosenthal L. The behavioral morbidity of obstructive sleep apnea. *Prog Cardiovasc Dis* 1999;41:341–354.
- [5] Injury Prevention Policy Website: <http://www.safetypolicy.org>
- [6] Kids 'n Cars Website: <http://www.kidsncars.org>