Obstructive sleep apnea – Case report and literature review

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Abstract: The obstructive sleep apnoea syndrome is one of the most commonly encountered disorders that affects sleep. It is characterized by recurrent episodes of complete or partial collapse of the upper airways, which interrupts the sleep through repeated short awakening periods. It leads to daily sleepiness, which decreases coordination, attention and vigilance, and subsequently increases the risk of work accidents.

We present a case report of a driver diagnosed with obstructive sleep apnoea and treated in the Clinic of Occupational Medicine, and we review the current literature on this topic. In order to achieve a better identification of employees at risk and to decrease the number of work related accidents, we have proposed the implementation of a practical approach of this condition through the annual occupational medicine examination, based on current international recommendations.

Key Words: obstructive sleep apnoea, occupational medicine screening, work related accidents.

Sleep is a fundamental function of the human body. Many studies conducted in the past decades demonstrated that the lack of sleep increases the risk of road and work accidents, causing 20% of the road accidents and major industrial catastrophes/disasters [1].

The obstructive sleep apnea syndrome (OSA) is one of the most commonly encountered disorders that affects sleep and is characterized by recurrent episodes of complete or partial collapse of the upper airways, which triggers its interruption by repeated short awakening periods. Consequently, patients with OSA experience excessive daytime sleepiness, with decreased professional performances, slower reaction time, diminished attention and ability to make decisions [2, 3].

This condition/disease triggers, among other consequences, an increased risk for work and road accidents.

Although the condition itself has been described for a long time, its effects on traffic accidents have only been confirmed over the past years.

CASE PRESENTATION

A 49 years old male, professional driver who ceased smoking 4 years earlier, was admitted in the Clinic of Occupational Diseases in Bucharest, with a suspicion of a spinal disc herniation of professional etiology, complaining of lumbar pain radiating on the dorsal side of the left lower limb, with impaired walking on the heels and toes.

On clinical examination the findings were: a BMI (body mass index) of 39.5 kg/m²; neck circumference 43 cm, enlarged abdomen with adipose tissue (abdominal circumference 111 cm), scar on the right calf following surgery (tibial fracture immobilized with plating and nails, after a road accident), high blood pressure (170/100 mmHg) under hypotension treatment, positive Lassegue

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on the left side at 45 degrees.

His medical history revealed a 6-year history of arterial hypertension and a dyslipidemia syndrome under anti-hypertensive treatment. Two years earlier he had been involved in a road accident in which he suffered a comminuted a tibial fracture.

His professional history shows that he is a professional driver on a passenger bus, works 12-hour shifts followed by 24 hours off-duty, having 2 complete routes per shift during which he ensures transportation for approximately 30 people per journey. The lengthy sitting position has an important bearing on the lower limbs, which are overstressed and exposes the driver to frequencies of 2-20 Hz, both potentially causative risk factors for the lumbar column affliction.

The patient confirms he was involved in two road accidents over the last 3 years; both accidents took place outside his working hours and there were no victims. In the latest accident he collided with a pillar by the side of a road; the accident took place about 1 year before, around 5 a.m., when the driver fell asleep while driving.

Lumbar spine IRM showed the dehydration of the L4-L5 intervertebral disk, with a minimal posterior protrusion and degenerative changes at the level of the vertebral areas adjacent to L4 – L5. The diagnosis after the neurosurgery examination was: Hyperalgesic lumbar vertebral discopathy. L4-L5 disk protrusion. No surgery recommended.

The following tests had pathologic values: increased values: glycemia (134 mg/dL), glycate hemoglobin (6,8%), tryglicerides (165 mg/dL), total cholesterol (260 mg/dL) and uric acid (6.5 mg/dL); decreased HDL cholesterol (35 mg/dL), suggesting the typical paraclinical features of the metabolic syndrome.

The two driving accidents that took place in the past 3 years, one of which following a brief moment of snoozing while driving in an obese man, with metabolic syndrome (high blood pressure, obesity, hypertriglycerides, diabetes mellitus) raised the suspicion of a sleep disorder causing daytime sleepiness (DS).

The Epworth sleepiness scale showed a high degree of sleepiness, the recorded score being 16 [4], and the 6-point score based on the STOP Bang questionnaire highlighted the suspicion of obstructive sleep apnea [5].

The nighttime polygraphy confirmed the diagnosis of severe obstructive sleep apnea, with an elevated apnea-hypopnea index (AHI) – 42 occurrences/hour, with multiple short awakening periods and nighttime desaturation (Fig. 1).

The patient was provided with a continuous positive airway pressure (CPAP) device with a fixed water pressure of 10 cm. The re-evaluation after 5 weeks of treatment with CPAP showed a favourable clinical evolution and the disappearance of an important number of occurrences, the remaining AHI being 1/hour, along with a significant decrease of daytime sleepiness (Epworth score: 9).

DISCUSSIONS

The case presented is a typical one for OSA; it was accidentally discovered while the patient was admitted in the clinic for a different medical problem.

The lack of screening for daytime sleepiness and OSA in current medical practice made our patient endanger a total of over 1300 people/month, (the persons he was transporting monthly). The earlier diagnosis of OSA and the adequate treatment with CPAP may have prevented the two road accidents in which he was involved in over the past 3 years.

Sleep deprivation triggers all the mechanisms involved in the onset and maintenance of chronic vascular inflammation: increased level of pro-inflammatory cytokines type IL6 and TNF alpha, the activation and increase of macrophages and neutrophils, the decrease of antioxidant capacity at the level of the capillary endothelium and the occurrence of insulin resistance [6-8]. In this patient, the chronic effects of sleep deprivation contributed to the metabolic syndrome, an independent risk factor for road accidents.

Taking into account the two road accidents in an overweight professional driver who stated that the second accident happened after he had fallen asleep while driving, it was mandatory for the driver to undergo screening for OSA. In this respect, the Romanian legislation does state the contraindication for professional drivers with severe OSA to obtain the aptitude to work [9]. Although, this legislation is in force, the diagnosis is frequently omitted, as was the case here, because the screening is not used systematically, neither as part of the occupational medicine examinations, nor during the examinations to obtain the driving license. One of the main reasons for the condition to be under-diagnosed is the fact that patients have limited access to specialists and specialized laboratories for diagnostic purposes and these medical examinations and tests are not included in the health
insurance or in the insurance against occupational risks. OSA and work related accidents

OSA is the condition with the highest relative risk to lead to road accidents, among all the afflictions that represent counter indications for driving. The relative risk (RR) for road accidents is 3.4 times higher in OSA suffers, a higher risk than the RR for any other pathology [10, 11].

An American study conducted in 2008 identified OSA as one of the most important causes of road accidents; drivers who suffer from OSA have a 2 to 5 times greater risk to be involved in a road accident [12]; the study also showed that CPAP treatment reduces daytime sleepiness, restores wakefulness and thus decreases the risk of road accidents [13].

National surveys in the USA estimated that a driver who fell asleep while driving was involved in 7.0% of all accidents in which a passenger vehicle was involved, in 13.1 % of the accidents causing serious injuries of a person and in 16.5 % of deadly accidents [14]. Starting from the idea that accidents caused by vehicles (VA) represent one of the main causes for mortality and morbidity through the world [15], including Europe, the European Sleep Research Society conducted the study „Wake-Up Bus” in which 12.434 (professional and amateur drivers) from 19 countries were interviewed on line with the purpose to draw up an estimate regarding sleepiness while driving. The mean prevalence calculated on the basis of the answers was 17% for sleepiness at the wheel, 7% for accidents connected with sleepiness at the wheel (13.2% of the accidents involved victims that needed medical care and 3.6% caused the death of victims) [16]. In Romania 33.4% of the respondents rated themselves as SDE sufferers (Epworth score > 10), and, as far as the prevalence of road accidents following sleepiness was concerned, Romania ranked 5th out of all respondent countries, with 1.3% prevalence and 1.4% mean global prevalence [16].

In 2014 in Romania the incidence of deaths following road accidents was 91 deceased people/1 mil inhabitants. Romania ranks 2nd in Europe after Letonia, with a number of fatalities almost double compared to the European average of 50.5/1 million inhabitants. [17] The economic impact of road accidents is extremely important, reaching 160 billion Euro every year [18]. A total of 1.3 millions people die annually around the world and another 2-50 millions are left significantly impaired. It is expected that VA will become the 4th cause of death worldwide in 2030 [19].

A large number of the road accidents are work accidents, being caused both by the drivers transporting goods or passengers (accidents in the field of transportation), and by those who work in different domains and drive the company car for work purposes. The later situation also includes the accidents taking place while the employee drives the company car from home to work. The result of an epidemiologic study conducted in France showed that 10-30% of the adult population and 30-40% of the employees complain of sleep disturbances causing SDE, which is considered an important risk factor for work accidents, road accidents, increased absenteeism at work and days of temporary work incapacity [20-21].

In Europe, over 39% of the work accidents that resulted in the death of the employees were road accidents, the main incriminated cause being “the loss of control of the vehicle” for accidents resulting in deaths as well as for the non-fatal ones. The maximum frequency was found in the employees working in transportation (truck and car drivers) in the 25-34 years age group; 23.8% of the accidents took place between midnight and 6:00 am [22], a period in which wakefulness and performance are at low levels [23].

The results of the WuB study in Romania showed that 44.4% of the road accidents happened during working hours, which meant that they should be recorded as work accidents [24].

In order for this intention to be fulfilled, the occupational medicine norms should include mandatory screening for all groups at risk from a professional point of view, as well as the need to confirm or discard the diagnosis in the somnology laboratories.

The recommendation of the European experts (New Standards and Guidelines for Drivers with Obstructive Sleep Apnea syndrome) [24] can be summarized in the following decision making algorithm (Fig. 2).

CONCLUSIONS

The obstructive sleep apnea syndrome is associated with an increased risk for road and work accidents.

The identification of employees at risk is consequently very important. Our case, although tracked

Figure 2. Decision making algorithm for establishing the aptitude for driving.
down long after the onset of the clinical manifestations, is one of the few cases found before causing major problems at the work place, taking into account the large number of people transported. 

For such cases not to represent an exception, it is absolutely necessary to implement an adequate legislation, which will allow the diagnosis and treatment to be affordable. The network of occupational medicine offices/departments must be involved in the screening, diagnosis and monitoring of the efficiency of the treatment in patients with OSA. The decrease in the number of fatalities following road accidents, as well as Romania’s integration in the current European trend can only be achieved by adopting a coherent legislative and procedural framework.

Conflict of interest. The authors declare that they have no conflict of interest concerning this article.

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