

# Case report: narcolepsy type 2 due to the optic nerve infection of Herpes zoster virus

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## Case report

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# Abstract

**Rationale:** Despite the acknowledged importance of environmental risk factors in the etiology of narcolepsy, there is little research on this topic. The optic nerve infection of Herpes zoster virus as a trigger for narcolepsy has not been investigated.

**Patient concerns:** A 63-year-old male carpenter complained of excessive daytime sleepiness (EDS) over the past 3 years.

**Interventions:** Treated with duloxetine hydrochloride enteric dissolution capsule (Cymbalta) 120mg after breakfast and clonazepam tablets 0.5mg before sleep.

**Outcomes:** General examination showed no abnormalities of his heart, lungs, or abdomen. Neurological examination showed no positive sign. The blood routine and biochemical examination were normal. Denied having been vaccinated against the flu or having been infected with the flu virus. He scored 17 on the Pittsburg sleep quality index, 22 on the Epworth sleepiness scale, 40 on the self-rating anxiety scale, and 69 on the self-rating depression scale. The multiple sleep latency test data showed 2 periods of sleep-onset rapid eyes movement period across 4 successive tests; the average sleep latency was 7.9 minutes, and the rapid eyes movement latency was 1.2 minutes. Treated with duloxetine hydrochloride enteric dissolution capsule (Cymbalta) 120mg after breakfast and clonazepam tablets 0.5mg before sleep, the patient's EDS symptoms disappeared immediately. He scored 6 on the Epworth sleepiness scale. During our follow-up three months later, he remained well with no complications.

**Diagnosis:** We diagnosed the patient with narcolepsy type 2 according to the 3rd Edition of International Classification of Sleep Disorders (ICSD-3).

**Conclusion:** The patient suffered from EDS and was diagnosed with narcolepsy type 2. The narcolepsy type 2 was linked to viral infection of the optic nerve. Optic nerve virus infection may affect the sleep-pondering pathway.

## 1. Introduction

Narcolepsy is a rare central hypersomnia with an estimated prevalence of 0.02%, and it exists in 2 forms, narcolepsy type 1 and type 2[1] Narcolepsy type 2 is characterized by excessive daytime sleepiness (EDS) and pathological manifestation of rapid eyes movement sleep (REM sleep) (hypnagogic hallucinations, sleep paralysis, or sleep onset REM sleep) [2]. Secondary narcolepsy may be caused by viral infection, encephalitis, etc. There have been many reports of narcolepsy caused by the flu virus or its vaccine [3–5]. But there was no report on the relationship between narcolepsy and Herpes zoster virus. Here, we report a case of narcolepsy type 2 caused by the optic nerve infected with Herpes zoster virus.

## 2. Report Of Case

A 63-year-old male carpenter (Chinese) suffered from EDS over the previous 3 years (2015). He was admitted to our hospital in 2018. Daytime sleepiness without obvious inducement. He can quickly fall asleep when he was working or watching TV, wake up a few minutes later, and relapse several times throughout the day. Accompanied by loss of muscular tension, cataplexy, can speak, but the words are fuzzy. No abnormality in breathing, defecation or urination, no limb convulsions, no headache, no vomiting, numbness of limbs or movement disturbance. Occurrence of disease was transient, a few seconds to several minutes can be alleviate. From time to time after waking up to find themselves unable to control their own body, unable to move, conscious, a few minutes can be alleviated. Mood is a bit poor, accompanied by bosom frosty, flustered, giddy body discomfort. He had no headaches, dizziness, paralysis, numbness, or convulsions. He had no past medical history of mental stimulation, head trauma, drug abuse, hypertension, or diabetes. His family and relatives had no similar EDS complaints. General examination showed no abnormalities of his heart, lungs, or abdomen. Neurological examination showed no positive sign. He was visited several hospital after April 2015: diagnosed as "sleep disorder", treated with "Nicergoline 10mg/day and Flupentixol and Melitracen Tablets (Deanxit) 2 tablets/day"; Diagnosed as "mixed anxiety and depression disorder, sleep disorder", treated with "Sulpiride 25 mg/day, Citalopram Hydrobromide Capsules 20 mg/day, Buspirone Hydrochloride Tablets 5 mg/day and Oxazepam Tablets 15 mg/ day". No significant improvement were observed after treatment. He was admitted to our hospital in February 2018. Inpation for 15 days, outpatient follow-up for half a year.

Previous health status: Right eye was infected with herpes zoster virus in 2015. Denying the history of "heart disease", "coronary heart disease", "diabetes", "nephritis" and "cerebrovascular accident", denying the history of infectious diseases such as "hepatitis" and "tuberculosis", denying getting an influenza vaccine, denying the history of major surgical trauma, denying the history of blood transfusion and blood product application, denying the history of food and drug allergy.

The blood routine and biochemical examination were normal except: Triglyceride 2.53mmol/L $\uparrow$ , total cholesterol 5.37mmol/L $\uparrow$ , low-density lipoprotein cholesterol 3.88mmol/L $\uparrow$ ,(hypersensitive) C-reactive protein 7.46mg/L $\uparrow$ . The serum was negative for antibodies against hepatitis C, syphilis, and Acquired Immune Deficiency Syndrome (AIDS). No abnormalities were found on head Magnetic Resonance Imaging (MRI). Plain Computed Tomography (CT) scan of the chest: 1. Fibrous calcification in the lower lobe of the left lung. 2. Aorta broadening, aortic wall and coronary artery calcification, and left ventricle slightly enlarged. 3. See the calcification of the right liver.

When evaluating the sleep and psychology status by standard assessment scales, he scored 17 on the Pittsburg sleep quality index, 22 on the Epworth sleepiness scale, 40 on the self-rating anxiety scale, and 69 on the self-rating depression scale. An overnight polysomnography (PSG) test was performed immediately after his admission. The PSG data indicated an abnormal sleep, which had a total duration of 431.5 minutes, sleep efficiency of 88.8%, sleep latency of 18.5 minutes, and the ratio of REM sleep that reached 23.3%. The ratio of I stage, II stage and III stage was 36.2%, 40.1% and 0.5%, respectively. The PSG data also indicated a good sleep breath, of which the apnea-hypopnea index was 2.7, the average oxygen saturation (SaO<sub>2</sub>) was 97%, and the minimum SaO<sub>2</sub> was 91%. The day after the PSG night,

multiple sleep latency tests (MSLT) were performed. The MSLT data showed two periods of sleep-onset rapid eyes movement period across 4 successive tests; the average sleep latency was 7.9 minutes, and the REM latency was 1.2 minutes.

According to the 3rd edition of the International Classification of Sleep Disorders (ICSD-3), we diagnosed the case as narcolepsy type 2. The ethics committee of the Hangzhou Seventh People’s Hospital approved the study.

After treatment (Treated with duloxetine hydrochloride enteric dissolution capsule (Cymbalta) 120mg after breakfast and clonazepam tablets 0.5mg before sleep, It was a little nauseous induced by Cymbalta at first), the patient’s EDS symptoms disappeared immediately. He scored 6 on the Epworth sleepiness scale, 7 on the Pittsburg sleep quality index, 36 on the self-rating anxiety scale, and 40 on the self-rating depression scale. During our follow-up 6 months later, he remained well with no complications.

### 3. Timeline

Table 1: timeline

	Diagnoses	Interventions
2014	Herpes zoster virus	
Apr 2015	Sleep disorder	Nicergoline 10mg/day and Flupentixol and Melitracen Tablets (Deanxit) 2 tablets/day
	mixed anxiety and depression disorder, sleep disorder	Sulpiride 25 mg/day, Citalopram Hydrobromide Capsules 20 mg/day, Buspirone Hydrochloride Tablets 5 mg/day and Oxazepam Tablets 15 mg/ day
Feb 18	narcolepsy type 2	Treated with duloxetine hydrochloride enteric dissolution capsule (Cymbalta) 120mg after breakfast and clonazepam tablets 0.5mg before sleep.

### 4. Discussion

The patient showed clinical features of EDS lasting over 3 years. MSLT verified that the average sleep latency was less than 8 minutes and that there were at least 4 sleep-onset rapid eyes movement periods. There were no other EDS-causing reasons, such as sleep insufficiency, sleep breath disorder, restless leg syndrome, delayed sleep-wake phase disorder, drugs, or similar factors. [6] According to the ICSD-3, we diagnosed the case with narcolepsy type 2. His symptoms including cataplexy, excessive daytime sleepiness and the night sleep disorder that were completely consistent with Narcolepsy Type 2, and anti-narcolepsy drugs were also effective in reducing the symptoms, which suggests that our diagnosis is accurate.

We took particular interest in the relationship between the narcolepsy type 2 and Herpes zoster virus infection in this case. Although there have been no reports indicating that the Herpes zoster virus could

cause narcolepsy, the association between the virus infection and sleep has been mentioned in many studies[3–5, 7]. We believed that the patient in this case Narcolepsy type 2 is related to Herpes zoster virus infection based on the following points: 1. Generally, the narcolepsy occurs as an adolescent, with two high morbidity stages being about 15 years old or 35 years old. However, in this case, the patient was given the disease at the age of 60 years old, which we believe is secondary. 2. The onset of Narcolepsy was after the Optic Nerve Infection of Herpes zoster virus, and we also excluded other organic lesions of the brain.

The case presented here raises the possibility that the herpes zoster virus infection may play a role in the pathogenesis of Narcolepsy type 2. Other potential infectious triggers could not be identified in this case and our patient was not immunized with influenza vaccine. Previous literature research did not reveal any reports about the association between the herpes zoster virus and narcolepsy. This might be because there is no association and the combination of the 2 conditions was observed by chance in our patient. Given this fact it is surprising that no cases have been reported so far, but the question whether this is due to underreporting or lack of a causal link, remains open.

## **Abbreviations**

AIDS= Acquired Immune Deficiency Syndrome, CT= Computed Tomography, EDS= Excessive Daytime Sleepiness, ICSD-3= the 3rd Edition of International Classification of Sleep Disorders, MRI= Magnetic Resonance Imaging, MSLT= multiple sleep latency tests, PSG= polysomnography, REM sleep= rapid eyes movement sleep, SaO<sub>2</sub>= oxygen saturation.

## **Declarations**

### **Ethics approval and consent to participate**

The study was approved by the Ethics Committee of the Hangzhou Seventh People's Hospital. The purpose and importance of the study were explained to the participant. Written informed consent was obtained from the patient for publication of this case report.

### **Consent for publication**

Not applicable.

### **Availability of data and material**

All data generated or analyzed during this study are included in this published article.

### **Competing interests**

There are no conflicts of interest.

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## Authors' contributions

Wang Shengdong, Yu Zhenghe were responsible for study design, Han Li, Ren Lishan, Xu You, Liu Wenjuan, Ma Lisha, Wei Youdan were responsible for collecting clinical data and performing the clinical rating. Wang Shengdong, Yu Zhenghe, Xu You were responsible for analysis, and manuscript. All authors contributed to and have approved the final manuscript.

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