Postural Effect on Obstructive Sleep Apnea: Sitting Versus Supine

Ki-Hwan Ji, MD
Department of Neurology, Inje University Busan Paik Hospital, College of Medicine, Inje University, Busan, Korea

Postural effects on breathing are evident in most patients with obstructive sleep apnea. However, the impact varies depending on an individual's habitual sleeping position. Here, an age 40 obese male with typical sleep apnea symptoms is presented. He had a habit of sleeping with his back on the head of the bed in a sitting position, two or three times nightly. Polysomnography showed severe obstructive sleep apnea. However, during sitting positional sleep, the obstructive events disappeared, and sleep became stable.

Keywords Obstructive sleep apnea; Sitting position; Supine position.

INTRODUCTION

An age 40 male presented with snoring, apnea, and sleep choking. He was 185 cm tall and weighed 123 kg (body mass index of 35.9 kg/m²). The modified Mallampati score was 4. He had taken medication for hypertension and dyslipidemia, and had a history of depression. His Epworth Sleepiness Scale was 10. He had consumed two to three bottles of alcoholic beverage in a week, but he had stopped smoking seven years ago. He had a peculiar sleep habit in that he sleeps sitting with his back on the back of the bed several times a night, and then sleeps lying down when his buttocks numb. The polysomnography excluded obesity hypoventilation syndrome. Sleep latency and rapid eye movement (REM) sleep latency was 24.5 minutes and 238 minutes, respectively. Sleep efficiency was 78.7% and waking after sleep onset was 61 minutes. He slept in a supine position for 60.1% of his total sleep time. The total apnea-hypopnea index (AHI) was 68.6/h (supine AHI, 84.5/h and non-supine positional AHI, 44.7/h). Interestingly, non-REM AHI was 71.4/h, but REM AHI was only 12/h. The arousal index was 61.2/h and most arousal episodes were accompanied by respiratory disturbances. The nadir of oxygen saturation was 74%. He slept in a habitual sitting posture between 02:50 and 03:50, and he had REM sleep and N3 sleep only during this period. Only hypopnea appeared five times during REM, and no respiratory event occurred during non-REM (Fig. 1).

It should be noted that REM sleep and N3 sleep had occurred only when the patient slept in a sitting posture, because a decrease in breathing events led to decrease in arousal episodes and sleep fragmentation, and thus an improvement in overall sleep quality.

Postural changes from supine to sitting led to a greater pharyngeal cross-sectional area and lesser passive closing pressure [1-3]. Sitting posture reduces the effect of gravity on the vertical axis of the pharynx and increases pharyngeal wall tension, so it improves upper airway patency [1,2]. Lung volume is also increased during sitting than in supine posture [3], but nasal resistance was lowest during sitting when awake [4]. Sitting posture is more ad-
vantageous for the dynamics of nocturnal breathing than supine posture, in patients with obstructive sleep apnea (OSA). As a result, the total number and severity of the breathing events decrease in a sitting position [1]. As sleeping in a sitting upright posture in humans is uncommon, and is limited to special cases such as an irresistible short sleep or in the case of a monk, the reason why the patient slept in this unusual posture is likely to have been a self-rescue measure to relieve the burden of breathing events. Natural sleeping in a sitting posture during PSG has rarely been reported. Additionally, studies on postural effects have focused on a comparison between the supine and lateral position, or based on the results of experimental studies on a partially upright position in anesthetized patients undergoing surgery. When we define positional OSA as an AHI in the supine position that is greater than at least twice that of the other position, half of the patients with OSA have positional OSA [5]. Positional therapy is limited, but effective in some patients with OSA.

This interesting picture captures the dramatic postural effect on sleep-disordered breathing, and highlights dynamic changes of upper airway collapsibility according to sleeping posture in OSA.

This study followed the principles of the Declaration of Helsinki and was approved by the Inje University Busan Paik Hospital Institutional Review Board (BPIRB#: 2022-05-017).

Availability of Data and Material
All data generated or analyzed during the study are included in this published article.

Conflicts of Interest
The author has no potential conflicts of interest to disclose.

Funding Statement
None

REFERENCES