

CASE REPORTS

Body Position May Influence Oronasal CPAP Effectiveness to Treat OSA

Juliana Araújo Nascimento, BSc^{1,2}; Tômas de Santana Carvalho, BSc^{1,2}; Henrique Takachi Moriya, PhD³; Paulo Henrique Sousa Fernandes²; Rafaela Garcia Santos de Andrade, BSc²; Pedro Rodrigues Genta, MD, PhD²; Geraldo Lorenzi-Filho, MD, PhD²; Naomi Kondo Nakagawa, PhD^{1,2}

¹Department of Physiotherapy, Communication Science and Disorders and Occupational Therapy, Faculdade de Medicina da Universidade de São Paulo, Brazil; ²Sleep Laboratory, Pulmonary Division, Heart Institute, Hospital das Clínicas, Faculdade de Medicina da Universidade de São Paulo, Brazil; ³Biomedical Engineering Laboratory, Telecommunication and Control Engineering Department, Escola Politécnica da Universidade de São Paulo, Brazil

CPAP applied by a nasal mask is the gold standard treatment of obstructive sleep apnea. Oronasal masks are an alternative interface that can be used, especially in subjects with predominant oral breathing. However, oronasal masks have higher costs, are associated with larger leaks and higher residual apnea-hypopnea index, and in some cases may be ineffective.

Keywords: obstructive sleep apnea, continuous positive airway pressure, titration, supine, oral mask

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INTRODUCTION

CPAP applied by a nasal mask is the gold standard treatment of obstructive sleep apnea (OSA). Oronasal masks are an alternative interface that can be used, especially in subjects with predominant oral breathing.^{1,2} However, oronasal masks have higher costs, are associated with larger leaks and higher residual apnea-hypopnea index (AHI), and in some cases may be ineffective. This case report was approved by the local ethics committee (CEP-FMUSP 102/13).

REPORT OF CASE

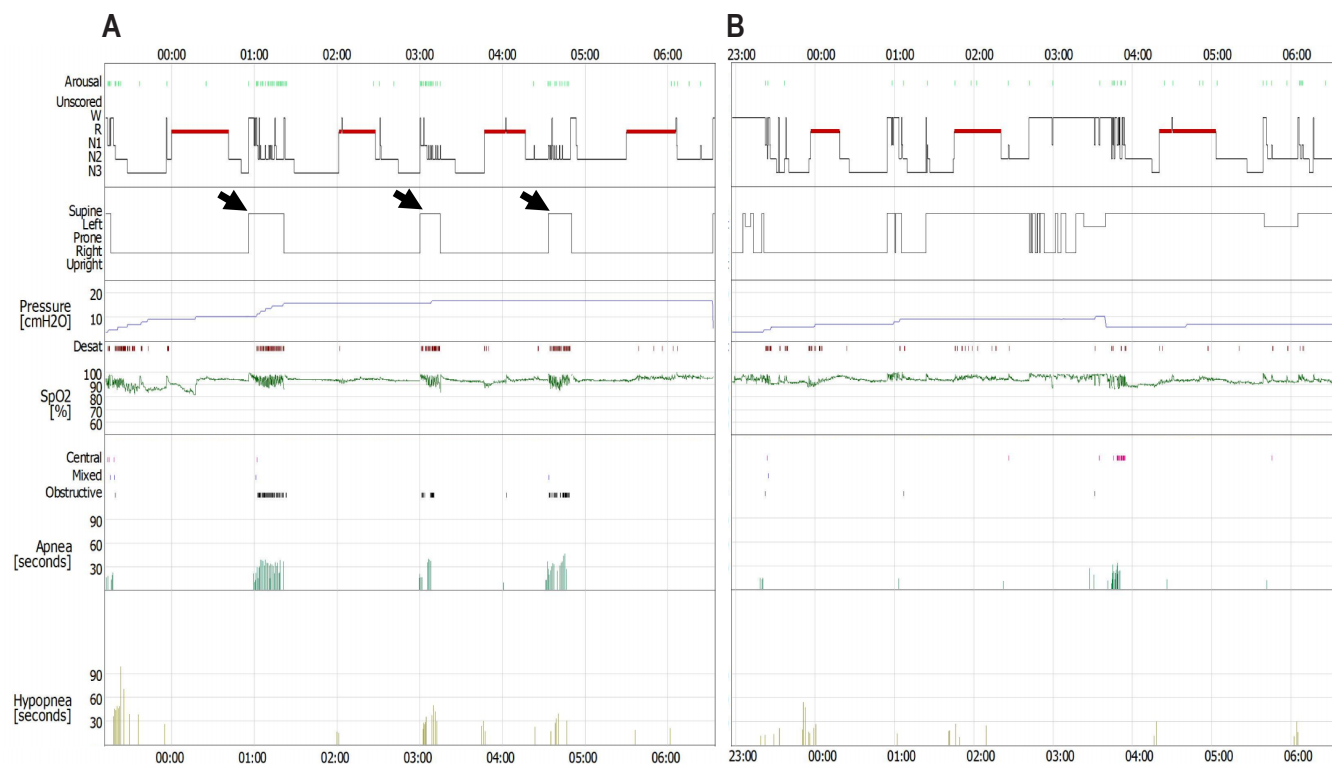
A 60-year-old female had loud snoring with suspected OSA and was referred to the sleep outpatient clinic. She complained of excessive diurnal somnolence (Epworth Sleepiness Scale score = 20). On physical examination, her body mass index was 31 kg/m². She presented a narrow oral cavity (modified Mallampati class IV) with no significant facial anatomy abnormalities. The patient reported difficulty with nasal breathing; however, nasoendoscopy showed no significant nasal obstruction. A full baseline polysomnography (PSG) showed severe OSA (AHI = 80 events/h, minimal oxygen saturation: MinO₂Sat = 58%) that was not dependent on supine position (supine and non-supine AHI = 71 and 88 events/h, respectively). A second PSG for continuous positive airway pressure (CPAP) titration was performed using an oronasal mask. CPAP was titrated up to 16 cm H₂O with persistent residual events (residual AHI = 10 events/h and MinO₂Sat = 84%), which were present at all CPAP levels tested. All obstructive events occurred at the supine position (**Figure 1A**). A third PSG study for CPAP titration was performed using a nasal mask and showed abolishment of respiratory events with CPAP at 7 cm H₂O (residual

AHI = 2 events/h and MinO₂Sat = 90%) (**Figure 1B**). CPAP titration was performed manually by a sleep technician on both CPAP titration nights.

DISCUSSION

OSA treatment with CPAP was first conceived to be applied by a nasal mask because the pressure through the nose would displace the tongue forward. Early clinical observations showed that oronasal interfaces can be an effective alternative, particularly in patients with nasal issues.^{1,2} However, there is evidence that the use of oronasal interface is associated with higher therapeutic CPAP level, higher leak and lower effectiveness to treat OSA compared to nasal CPAP.^{3,4} The present clinical case describes one patient with severe OSA who was not adequately treated with CPAP via oronasal mask despite high CPAP levels, but was successfully titrated with a nasal mask to a relatively low CPAP level, independent of body position. When there was a coincidence of oronasal CPAP during supine position, obstructive events were not abolished, despite titration up to 16 cm H₂O. In contrast, when lateral decubitus was adopted by the patient using an oronasal interface, a CPAP of 16 cm H₂O was able to control obstructive events, probably by decreasing the collapsibility in the pharynx.⁵ Therefore, the interaction between supine position and the oronasal interface may have resulted in posterior tongue displacement and airway obstruction. Alternatively, the oronasal interface by itself may have led to airway narrowing through posterior mandible displacement, mouth opening, or failure to improve the transmural pressure gradient between nasal and oral cavities, as well as intermediate palatal position resulting from oronasal breathing.⁶ In conclusion, this is a unique case reporting the interaction between supine position and CPAP for OSA treatment

Figure 1



(A) CPAP titration up to 16 cm H₂O showed a residual AHI of 10 events/h. The patient slept in lateral-decubitus during most of the night. However, observe that obstructive events returned in supine (arrows) and were not dependent on CPAP level that was titrated up to 16 cm H₂O. (B) In contrast, nasal CPAP at 7 cm H₂O was effective to abolish respiratory events.

applied through an oronasal interface that resulted in persistency of obstructive events.

ABBREVIATIONS

AHI, apnea-hypopnea index
CPAP, continuous positive airway pressure
OSA, obstructive sleep apnea
PSG, polysomnography

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Address correspondence to: Naomi Kondo Nakagawa, Faculdade de Medicina da Universidade de São Paulo, Av. Dr Arnaldo, 455 room 1150, Sumaré, São Paulo, SP, Brazil - CEP 01246-930; Tel: + 55 11 3061-8529; Fax: + 55 11 3068-0072; Email: naomi.kondo@usp.br

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