Comparison of anatomic, physiological and subjective measures of the nasal airway in patients with obstructive sleep apnea

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INTRODUCTION

Nasal obstruction may be related to obstructive sleep disordered breathing leading to fragmentation and poor quality of sleep, resulting in daytime sleepiness, fatigue and cognitive impairment. However, with regard to the role of the nose in the pathophysiology of OSAS, the literature is scant and controversial.

The study intends to compare validated measures of the nasal airway: rhinometric (acoustic rhinometry), physiological (nasal peak inspiratory flow), and subjective experience (questionnaire data) and correlate them with polysomnography variables in a group of Obstructive Sleep Apnea (OSA) patients. The goal of this study is to contribute to the elucidation of the role of OSA in the nose.

METHODS AND MATERIAL

A transversal study of 47 adult patients with OSAS and 20 healthy controls (NON-OSAS group), included upright and supine Acoustic rhinometry measures (Minimum Cross sectional Area (MCA) and volume), NPIF measurements, ENT exam: nasoscopy, rhinometry – as well as subjective measures and polysomnography variables.

The study was performed between October 2008 and May 2009 at Sleep Institute of Federal University of São Paulo-UNIFESP.

There was a significant difference between OSAS group and NON-OSAS group in Ewart somnolence scale. Bertic and clinical symptoms and anatomic nasal alteration. No significant differences in the measures of acoustic rhinometry and NPIF were found between OSAS and NON-OSAS group. The NPIF measurements can predict the apnea-hypopnea index in the OSAS group. There were significant correlations between nasal volume with questionnaire data and NPIF with MCA.

Comparison between patients with OSAS and NON-OSAS group was performed adjusted by age, sex and body mass index (BMI). Data were analysed through 2-way ANOVA, Chi-square, t-test and multivariant linear regression.

RESULTS

Sixty-seven patients were included in this study, 47 with OSAS and 20 patients NON-OSAS. In the OSAS group 14 (29.8%) were female and 33 (70.2%) were male, matched by age: 53.2 ± 9.07 years. In the NON-OSAS group 7 (35%) were female and 13 (65%) were male and the age average was 53.7 ± 9.7 years. The mean of BMI was 28.9 ± 4.3 Kg/m² in OSAS and 28 ± 2.54 Kg/m² in NON-OSAS (p<0.05), neck circumference 38.3 ± 4.2 cm in OSAS and 35.7 ± 3 cm in NON-OSAS (p<0.01). There was a significant difference between NON-OSAS group and NON-OSAS group in Ewart somnolence scale (p<0.01), Berlin scale (p<0.01) and clinical symptoms (p<0.01). No significant differences of the measures of acoustic rhinometry and NPIF were found (p>0.05) between OSAS group and NON-OSAS group. The parameters of acoustic rhinometry were lower in patients in supine position compared to a seat position (p<0.03) (Figure 1).

The apnea-hypopnea index (AHI) and other variables were evaluated by multivariate linear regression and supported that the NPIF can predict the AHI in the OSAS group (Figure 2).

By analysing the measures of subjective evaluation (questionnaire data), anatomical (MCA and Volume) and functional (NPIF), results demonstrated significant correlation between nasal volume of acoustic rhinometry measures with the higher score of questionnaire data, (Figure 3) and the smaller NPIF measures with the smaller MCA of acoustic rhinometry measures in supine position (Figure 4). Scatterplots of points that allow the comparison of the values obtained in each of the tests studied are shown below.

DISCUSSION

This was the first study of patients with OSA that evaluated the nose airway using subjective techniques (questionnaires) and objective techniques (rhinometry and NPIF), and mainly conclude that the questionnaires and nasal examination (rhinostomy and nasal endoscopy) were the parameters that showed statistical differences between the OSAS and control groups. These methods could be easily performed in Otalaryngology. The measures of acoustic rhinometry and NPIF showed no difference between OSAS patients and controls.

CONCLUSIONS

The best evaluation of nasal breathing among patients with obstructive sleep apnea can be achieved with rhinoscopy and nasofibrolaryngoscopy. Questionnaires such as Ewart somnolence scale and Berlin scale together with clinical symptoms and anatomic nasal alteration analysis are valuable tools to improve the investigation of patients with OSAS.

REFERENCES