Patients with obstructive sleep apnea: evaluation of the sensitivity of the peripheral chemoreflex.

Trembach N., Zabolotskikh I.

Kuban State Medical University, Dept of Anesthesiology, Reanimatology and Transfusiology, Krasnodar, Russian Federation

Goal of Study

The aim of the study was to compare the breath-holding test to single-breath carbon dioxide test in the evaluation of the sensitivity of the peripheral chemoreflex in subjects with OSA.

Materials and methods

The study involved 45 patients with OSA, which was determined using overnight standard polysomnography. Patients were divided into 3 groups due to apnea-hypopnea index (AHI): mild (AHI was 5 to 20), moderate OSA (AHI was 20 to 50), and severe (AHI was more than 50).

The breath-holding test was performed by measuring of voluntary breath-holding duration (BHD) after inspiration of a volume equal to 2/3 of the vital lung capacity. The end of breath-hold was determined by a palpation of contraction of the diaphragm. Voluntary breath-holding duration was assessed three times, with 10 min intervals. A mean value of the duration of the three samples was calculated.

Next day

Single-breath carbon dioxide test. 10 breaths of the hypercapnic mixture were taken with intervals of 2 min. Respiratory response to increased FetCO_2 was calculated. The median of all 10 episodes was taken as the sensitivity of the peripheral chemoreflex, expressed in L/min/mmHg.

Results

The average sensitivity of peripheral chemoreflex measured with single-breath carbon dioxide test was 0.38 ± 0.11 L/min/mmHg, 0.43 ± 0.12 L/min/mmHg and 0.54 ± 0.14 L/min/mmHg in mild, moderate and severe OSA, respectively, the average breath-holding duration was 45 ± 13 sec, 42 ± 11 sec and 32 ± 9 in mild, moderate and severe OSA respectively. A significant negative correlation between the results of two tests was noted (-0.81 , $p < 0.05$).

Picture 1. Relationship between BHD and SB-CO₂ in

Conclusion

Peripheral chemoreflex sensitivity increases with the severity of OSA. A breath-holding test may be useful in preliminary preoperative assessment of peripheral chemosensitivity in patients with OSA.

References

1. Narkiewicz K, van de Borne PJ, Pesek CA, et al, Circulation 99:1183-1189, 1999
2. Trembach N et al, BioMed Research International ID 2974852, 2016.
3. Chua TP et al., Eur. J. Clin. Invest. 25: 887-92, 1995