

NCPAP FOR THE TREATMENT OF OBSTRUCTIVE SLEEP APNEA

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SUMMARY — Nasal continuous positive airway pressure (NCPAP) represents a real advance in the management of obstructive sleep apnea (OSA). Our data show that except for awakenings, all sleep and respiratory parameters were significantly improved ($p < 0.05$) in favor of the group treated with NCPAP. A main problem with NCPAP is the acceptance by the patient; it also may disturb the sleep, at least, on short term basis and, in a small number of patients, it does not correct the apneas. In our patients series, males responded better to NCPAP than females.

Tratamento da apnéia obstrutiva do sono pelo NCPAP

RESUMO — O tratamento da apnéia obstrutiva do sono pelo NCPAP (pressão positiva contínua nasal) vem se tornando rotina, pois este tratamento substitui a traqueostomia em muitos casos. O NCPAP, às vezes, não é tolerado pelo paciente, constituindo este fato um óbice ao seu uso mais abrangente. De maneira geral, todos os índices da polissonografia mostraram modificações estatisticamente significantes, exceto para o número de despertares completos. Este fato indica que os parâmetros que avaliam a qualidade do sono não seguem aqueles que avaliam a função respiratória em alguns pacientes. Em pequeno número de pacientes, esta modalidade de tratamento não funciona. Por outro lado, nossos dados revelaram que os pacientes do sexo masculino respondem melhor ao NCPAP que os do sexo feminino e que o quadro da apnéia é mais grave no grupo feminino, aparecendo mais precocemente. Estes dados são preliminares e foram obtidos para uma amostra pequena, necessitando de confirmação em uma série maior de pacientes.

Three new treatments for OSAS have appeared lately in the medical literature^{2,11,13}. Uvulopalatopharyngoplasty (UPPP), gastroplasty and NCPAP were introduced to substitute tracheostomy, previously, the only effective treatment available^{1,3,5,6}. Gastroplasty and UPPP have specific indications respectively morbid obesity and redundant oropharyngeal tissue. Because NCPAP has a more wide range of indications, in our Center, patients with OSA are routinely tried on this form of treatment. Some patients are treated with NCPAP on a temporary basis, until a more definitive treatment such as UPPP or weight reduction is accomplished. Long term follow up of patients responsive to NCPAP have been reported^{8-10,12}. Our analysis in this study is in reference to the effectiveness of NCPAP on a short term basis.

METHODS

We studied 22 patients, evaluated at Baptist Memorial Hospital Sleep Disorders Center in Memphis, who were tested with NCPAP the night following the diagnostic polysomnography (PSG) documenting OSA. The PSG consisted of the electroencephalogram (EEG) recorded from C3-A2 and C4-A1, chin-electromyogram (EMG), leg-EMG, nasal and buccal

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thermocouples, thoracic and abdominal strain-gauges and blood O₂ saturation monitoring. The PSG were recorded in noise attenuated room with constant temperature around 23°C. The patients were monitored by low light video-camera with infra-red illumination as well microphones. The analysis of the recordings were done according to Rechtschaffen and Kales criteria (7). The data were submitted to statistical analysis by Wilcoxon rank test, comparing before and after treatment indexes. For the purpose of this research, we considered the apnea index (AI), the number of apneas per hour of sleep, less than 5 for males and up to 1 for females as being normal. The target point of maximum improvement for normal sleep were the parameters set forth by Williams et al. (15).

RESULTS

The clinical and polysomnographic characteristics of our sample are presented in tables 1 to 4.

Sex	n	Age (yrs) range	WT (lbs) range	HT (ft) range
Male	16	49.2 (28-75)	243.7 (180-345)	6'10" (5'7"-6'4")
Female	6	37.0 (31-61)	267.8 (179-338)	5'4" (5'1"-5'6")

Table 1 — Clinical characteristics of the patients with OSA. WT, weight; HT, height; n, number of patients.

Parameter	Before	sd	After	sd	P ≤ 0.05
Apnea Index	45.0	28.0	8.0	10.0	s
O ₂ saturation %	64.6	12.9	84.9	8.5	s
* of arousals	287.6	186.4	56.9	44.0	s
* of awakenings	4.2	2.6	5.0	5.0	ns
Slow wave sleep %	6.7	2.6	21.7	5.0	s

Table 2 — Sleep parameters before and after NCPAP. sd, standard deviation; s, significant; ns, non significant.

Sex	Effective	Partial	Ineffective	Not tolerated
Male	12	2	1	1
Female	1	3	2	0

Table 3 — NCPAP effectiveness according to sex.

Parameter	Improved	Worsened	Not changed
Arousals	21	1	0
Awakenings	7	10	3
Slow wave sleep	19	3	0

Table 4 — Effect of NCPAP on some sleep parameters.

COMMENTS

NCPAP worked very well for all sleep parameters, except for the number of awakenings. It is interesting to note that males with apneas predominate over females, but apnea indexes were higher in females. The mean age was lower for females than for males. Females were heavier than males, even without weight correction for sex. NCPAP was more effective for males than for females, when measured by apnea indexes after treatment. While not all patients improve on NCPAP¹⁴, it has become the most important short term treatment for obstructive apneas in addition to being effective as long term therapy for some patients^{4,9,10}. In this present series, 3 patients didn't improve on NCPAP and 1 did not tolerate it. Partial improvements were observed in 5 cases. The patients who did not respond to NCPAP as measured by apnea index had continued to have abnormal sleep parameters. On the other hand, patients who improved their apnea indexes on NCPAP either did not improve the sleep parameters or in some cases even became worse (Table 4), a fact that is of some concern in long term NCPAP therapy. This problem may impact long term compliance rate.

REFERENCES

1. Cook WR, Osguthorpe JD — Obstructive sleep apnea: diagnosis and treatment. *J South Carol Med Assoc* 81:647, 1985.
2. Fujita S, Conway W, Zorick F, Roth T — Surgical correction of anatomic abnormalities in obstructive sleep apnea syndrome: uvulopalatopharyngoplasty. *Otolaryngol Head Neck Surg* 89:923, 1981.
3. Guilleminault C, Dement WC — The sleep apnea syndrome. *Am Rev Med* 27:465, 1976.
4. Issa FG, Sullivan CE — The immediate effects of nasal continuous positive airway pressure treatment on sleep pattern in patients with obstructive sleep apnea syndrome. *EEG Clin Neurophysiol* 63:10, 1986.
5. Krieger J, Kurtz D — Treatment of obstructive sleep apnea. *Lancet* 2:1177, 1984.
6. Krieger J — Sleep apnea: from the needles of Dionysius to continuous positive airway pressure. *Arch Intern Med* 143:2301, 1983.
7. Remmers JE, Sterling JA, Thorarinsson B, Kuna ST — Nasal airway positive pressure in patients with occlusive sleep apnea. *Am Rev Resp Dis* 130:1152, 1984.
8. Sanders MD, Gruendl CA, Rogers RM — Patients compliance with nasal NCPAP therapy for sleep apnea. *Chest* 90:330, 1986.
9. Schmidt-Nowara WW — Continuous positive airway pressure for long-term treatment of sleep apnea. *Am J Dis Child* 138:82, 1984.
10. Sleeper GP, Strohl KP, Armeni MA — Nasal continuous positive airway pressure for at-home treatment of obstructive sleep apnea: a case report. *Resp Care* 30:90, 1985.
11. Sugerman HJ, Fairman RP, Lindeman AK, Mathers JAL, Greenfield LJ — Gastroplasty for respiratory insufficiency of obesity. *Ann Surg* 193:677, 1981.
12. Sullivan CE, Berthon-Jones M, Issa FG — Nocturnal nasal airway pressure for sleep apnea. *N Engl J Med* 309:112, 1983.
13. Sullivan CE, Issa FG, Berthon-Jones M, Eves L — Reversal of obstructive sleep apnea by continuous positive airway pressure applied through the nose. *Lancet* 1:862, 1981.
14. Wagner DR, Pollack CP, Weitzman ED — Nocturnal nasal airway pressure for sleep apnea. *N Engl J Med* 308:461, 1983.
15. Williams RL, Karacan I, Hirsch CJ — *Electroencephalography (EEG) of Human Sleep: Clinical Applications*. John Wiley & Sons, New York, 1974.