CONTROL OF BREATHING DURING SLEEP AND ANESTHESIA

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PREFACE

Contrary to the popular belief, "Le sommeil n'est plus milieu sûr" (J. Cocteau, cf. Cl. Gaultier, Pathologie respiratoire du sommeil, La Presse Medicale, 16, 561-563, 1987), and anesthesia is even less safe. Sudden Infant Death Syndrome, Obstructive Sleep Apnea, Ondine's Curse and various respiratory complications of general anesthesia are not so rare; as a matter of fact they happen much too frequently.

The idea of organizing another symposium dealing with breathing in sleep and anesthesia has been discussed almost immediately after we said "good bye" to the Organizers of the excellent Paris meeting "The Regulation of Respiration during Sleep and Anesthesia" (R.S. Fitzgerald, H. Gautier, S. Lahiri eds., Advances in Experimental Medicine and Biology, vol. 99, Plenum, New York 1978).

Taking into account the impressive amount of data that have emerged during the last few years, we have decided that we shall meet and discuss them; we hoped also that the publication of the scientific material might be useful for everybody interested in the physiology and pathophysiology of breathing, anesthesia and sleep. So we met in Warsaw under the auspices of the European Society for Clinical Respiratory Physiology and the Polish Academy of Sciences, we discussed vividly many fascinating papers presented by our Colleagues from Europe and America and Plenum Press has published the proceedings. I hope that the final result will satisfy the reader.

Witold A. Karczewski

CONTENTS

CONCHOPLASTY IN THE TREATMENT OF THE OBSTRUCTIVE SLEEP APNEA SYNDROME

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Upper airway compromise on the level of the nose may be the result of developmental deffects, chronic infections, or trauma. In some cases the patency of the nasal airway may be improved by means of a non-invasive treatment. In this paper we describe the possibilities of surgical treatment in cases where nasal airway compromise is caused by deviated nasal septum with unilateral compensative hypertrophy of the nasal concha or by bilateral hypertrophy of nasal inferior conchae (Kukwa et al., 1988 in press).

For more than ten years narrowed nasal airway is thought to be one of the causes of the disturbances of breathing during sleep (Guilleminault et al. 1976; Lugaresi et al., 1980; Miller, 1982). It is obvious that treatment of such a narrow airway is of great importance, though the optimal method is still being discussed and has not yet been established. Such a method should not only give permanent relief to the symptoms of obstructed nose, but should also preserve its physiological functions, especially for the humidification of inspired air.

On the basis of the experience of many authors and our own, we worked out a special method of the operation, wich safely decreases the size of nasal conchae without any side effects.

METHODS

Forty-eight patients with nasal airway compromise were treated. In 22 cases obstruction was caused by a bilateral hypertrophy of the nasal inferior conchae. In 26 patients the reason of the obstruction was the deviated nasal septum with contralateral compensative hypertrophy of the nasal concha inferior. In all cases subjective symptoms of sleep apnea syndrome were present. In all cases we performed polysomnographic studies before and after surgery.

The surgical treatment was dependent on the type of obstruction, and involved either septoplasty, or septoplasty complemented by conchoplasty.

RESULTS

In the surgical treatment of the nasal airway compromise two points are essential: patency should be regained and the physiological functions of the nose preserved. In all cases with hypertrophied conchae we performed a new type of operation, which was worked out in our clinic.

In all cases PSG revealed apneic episodes before surgery, though only in 31 of them (64.5%) sleep apnea syndrome was diagnosed. After the surgery none of the patients complained of the nasal obstruction and none complained of the crusting or dry nose. In PSG studies performed six months after the operation no apneic episodes were observed in 28 patients (58.3%). In the remaining patients PSG studies revealed the presence of very short apneas, but their quantity was significantly lower than before the treatment.

CONCLUSIONS

Proper elimination of the obstruction in the nasal airway, preserving physiological functions of the nose, is essential in the treatment of obstructive sleep apnea syndrome. The applied method of treatment of nasal airway compromise eliminated the obstruction without disturbing physiological functions of the nose (Mabry, 1981; 1982; Martinez et al., 1983). The relief of the symptoms was permanent and there were no complaints of dryness or crusting in the nose.

REFERENCES

Guilleminault, C., Tilkian, A., and Dement, W.C., 1976, The sleep apnea syndromes, Ann. Rev. Med., 27: 465.

Kukwa, A., Skarzyński, H., Szlenk, Z., and Ryba, M., 1988, Surgical treatment of nasal obstruction. Turbinoplasty, Otolaryngol. Pol., (in press).

Lugaresi, E., Cirignotta, F., Coccagna, G., and Piana, C., 1980, Some epidemiological data on snoring and cardiocirculatory disturbances, Sleep, 3: 221.

Mabry, R.L., 1981, Medical management of the stuffy nose, South. Med. J., 74: 984.

Mabry, R.L., 1982, Inferior turbinoplasty, Laryngoscope, 92: 459.

Martinez, S.A., Nissen, A.J., Stock, C.R., and Tesmer, T., 1983, Nasal turbinate resection for relief of nasal obstruction, Laryngoscope, 93: 871.

Miller, W.P., 1982, Cardiac arrhythmias and conduction disturbances in the sleep apnea syndrome. Ann. J. Med., 73: 317.

DISTURBED PATENCY OF THE UPPER AIRWAY AND ITS CONSEQUENCES

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Every ENT (Ear, Nose and Throat) surgeon meets many patients, both adults and children, suffering from disturbances of upper airway patency. Usually the obstruction is at the level of the nose, nosopharynx or pharynx (Guilleminault et al.,1976). Disturbed patency of the upper airway due to the hypertrophy of tonsills or adenoid is discussed in another paper (Skarżyński et al., this volume). Separate discussion is needed, concerning the problem of nasal airway compromise in patients with sleep apnea syndrome. In this paper we present the consequences of chronic upper airway compromise. A typical patient with mild obstruction of the airflow in the upper respiratory routes presents himself to an otolaryngologist after many years of unsuccessful treatment performed by cardiologists, neurologists or psychiatrists. Not before the authors working on the problem of disturbances of breathing during sleep have proposed a new syndrome in otorhinolaryngology, such patients were fully diagnosed and treated (Simmons and Hill, 1974). The basic examination is an all-night monitoring of many parameters of the blood and functions of the organism - a polysomnographic study (PSG). In patients with upper airway compromise PSG reveals many pathologies in circulatory system function (Orr and Shappell, 1975; Lugaresi et al., 1980) namely the increase in blood pressure and lung circulation, disturbances of the heart rhythm and significant changes in ST - T in ECG examination. Retrospective epidemiologic studies confirmed more frequent pathology in circulatory system in the patients with apneas during sleep. It is possible that sleep apnea may be one of the etiologic factors of the hypertension and of some of the heart diseases (Lugaresi et al., 1980; Miller, 1982).

The aim of this paper is to present the results of investigations performed on patients hospitalized in an intensive cardiologic care unit, who, besides their heart problems, suffered from an upper airway compromise.

METHODS

The material was based on 26 patients treated in an intensive

cardiologic care unit. All the patients, besides cardiologic problems had a disturbed patency of the upper airway. In all cases ENT examination revealed the cause of obstruction. In 11 cases it was a deviated nasal septum, in 4 - a hypertrophy of the nasal conchae inferior, in 8 - nasal polyps and in 3 - large tonsills. All the patients underwent a PSG examination and after cardiologic treatment they were submitted to surgery eliminating the obstruction in the airflow. Six months after the operation once again a PSG study was performed on all of them.

RESULTS

The cardiologic problems of our patients were: in 4 cases bradycardia, in 16 cases - disturbances of the heart rhythm (atrioventricular second degree block, ventricular extrasystole), in 7 cases - arterial hypertension. After the acute phase of these pathologies all patients were controlled and the reason of airway obstruction revealed. Each patient underwent PSG studies. In all cases PSG exhibited apneic episodes and in 14 cases the apneas occured in a number justyfing the diagnosis of sleep apnea syndrome (53.8%). After surgery all the patients reported that they "feel better" and especially "emotionally stronger". Six months after surgery all patients underwent another study and a complete cardiologic and laryngologic examination. In all cases a significant improvement in their heart and lung function was noted. None of the patients suffered from hypertension. In four cases some disturbances in the heart rhythm were still present , but only trivial. From the group of 14 patients with the sleep apnea in 4 cases there was no improvement in PSG, but in the remaining 10 there were no apneas at all, or only 5 - 7 per hour. In all cases from the group of 12 patients in whom we did not diagnose sleep apnea there was a significant improvement in the second PSG examination. So, to sum up, no improvement was observed in 15.3% of the whole material and in 29.1% of the group with the diagnosis of sleep apnea.

CONCLUSIONS

In many cases of the chronic upper airway compromise a sleep apnea syndrome develops. Some of these patients are after many years hospitalized in cardiology boards for acute disturbances of the circulatory system. The physical examination is not always capable of revealing a real etiologic factor of their problems. The analysis of our investigations suggests that in such cases an ENT examination and a PSG study may be of great help. In our inconspicuous material the disturbances of the circulatory system were in 84,7% caused by upper airway compromise.

REFERENCES

Guilleminault, C., Tilkian, A.G., and Dement, W.C., 1976, The sleep apnea syndromes, Ann. Rev. Med., 27: 465.

Lugaresi, E., Coccagna, G., and Crignotta, F., 1980, Some epidemiological data on snoring cardiocirculatory disturbances,Sleep, 3: 221.

Miller, W.P., 1982, Cardiac arrhythmias and conduction disturbances in the sleep apnea syndrome, Ann. J. Med., 73: 317.

Orr, W.C., and Shappell, S.D., 1975, REM sleep and cardiac arrhythmias, Circulation, 52: 519.

Simmons, F.B., and Hill, M.W., 1974, Hypersomnia caused by upper airway obstructions: A new syndrome in Otolaryngology, Ann. Otol., 83: 670.

THE EFFECTS OF ADENO- AND TONSILLECTOMY IN CHILDREN WITH SLEEP APNEA SYNDROME

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Every case of disturbances of respiration during sleep with apneic episodes longer than 10 s should always draw our attention. After many investigations it became certain that especially children should be observed closely during all types of upper airway infections, when the patency of the airway is compromised and the risk of apneic episodes increases. Even a limited compromise of the upper airway, when chronic, may lead to a serious pathology in the circulatory system and may provoke the manifestation of disturbances in emotional life.

Simmons and Hill (1974) were first to draw the attention of the ENT surgeons to the chronic upper airway compromise. Most of the workers agree that among possible cases of such state are: nasal septum deviation (Simons et al., 1977), hypertrophy of the lymphoid tissue of the pharynx (Eliascher et al., 1980; Rubin et al., 1983), rhinitis allergica (Lavie et al., 1981). The symptoms of sleep apnea are observed in children with large adenoid and tonsills (Eliascher et al., 1980) and in some cases the effects of such obstruction in the upper airway on the circulatory system are quite serious (Miller, 1984).

The aim of our paper is to present the effects of adeno- and tonsillectomy in children with the diagnosis of sleep apnea. In 12 chidren with sleep apnea symptoms, surgical treatment was applied. Adenotomy or tonsillotomy eliminated an airway obstruction and improvement in quality of night sleep was observed. Operated children improved their school performance, demonstrated better daytime activity and ability to concentrate.

METHODS

The material consists of 12 cases (age 5 - 16) treated in the ENT Clinic for recurring infections of the upper airway and progressing upper airway compromise. In 8 cases upper airway compromise was caused by hypertrophied adenoid and in 4 cases by large tonsills. In all patients we observed somnolescence during the day, lower activity and loss of ability to concentrate at school. In two cases arterial blood pressure was slightly higher. The children snored and breathed through the mouth.

RESULTS

Every child underwent PSG investigation before and after the surgery. In 6 cases the PSG study exhibited disturbances of breathing. Before the surgery apneic episodes were 8 - 25 s long. The number of apneic episodes per hour ranged from 6 to 15. During the apneic episodes PO_2 and PCO_2 changed typically and the range of such changes were in close proportion to the time of the apnea. At the same time we observed disturbances of the heart rhythm. In all cases we did not observe such disturbances after the surgery.

There are five parameters of clinical improvement after surgical treatment: changes in ECG, heart rate, arterial PO_2 and PCO_2, and - first of all - respiratory pattern during sleep. At least there of them were observed in the total of 12 patients. In 8 cases all five parameters were found.

DISCUSSION

Early diagnosis of chronic upper airway compromise in essential. Narrowed upper airway results in many disturbances, both emotional and physiological, leading to the retardation of child's development. After the treatment the children presented better activity and much better school performance, which was observed by themselves and by their parents. In many papers (Eliascher et al., 1980; Guilleminault et al, 1976; Miller, 1984) it was outlined that upper airway compromise seriously disturbs the function of circulatory system function. Our patients did not yet present any such disturbances during physical examination, but a certain pathology was already observed in the PSG studies prior to surgery.

The analysis of the results of our investigation suggests that indications for adeno- and tonsillectomy should be much widened. Such statement may serve as one more voice in the discussion concerning early adenotomy, tonsillectomy or tonsillotomy.

REFERENCES

Eliaschar, J., Lavie, P., Halpern, E., Gordon, C., and Altroy, G., 1980, Sleep apneic episodes as indications for adenotonsillectomy, Arch. Otolaryngol., 106: 492.

Guilleminault, C., Tilkian, A., and Dement, W.C., 1976, The sleep apnea syndromes, Ann. Rev. Med., 27: 465.

Lavie, P., Gertner, R., Zoner, J., and Podoshin, L., 1981, Breathing disorders in sleep associated with "microarousals" in patients with allergic rhinitis, Acta Otolaryngol., 92: 529.

Miller, W.P., 1984, Cardiac arrhythmias and conduction disturbances in sleep apnea syndrome, Ann. J. Med., 73: 317.

Rubin, A-H.E., Eliaschar, J., Joachim, Z., Alroy, G., and Lavie, P., 1983, Effects of nasal surgery and tonsillectomy on sleep apnea, Bull. Europ. Physiopath. Resp., 19: 612.

Simmons, F.B., and Hill, M.W., 1974, Hyposomnia caused by upper airway obstructions: A new syndrome in otolaryngology, Ann. Otol., 83: 670.

Simmons, F.B., Guilleminault, C., Dement, W.C., Tilkian, A., and Hill, M.W., 1977, Surgical management of airway obstructions during sleep, Laryngoscope, 87: 326.