Sleep Apnea Syndrome Treated by Repair of Deviated Nasal Septum*  

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Sleep apnea syndrome (SAS) often presents a difficult therapeutic problem to the clinician since many of the accepted modes of therapy are associated with only partial success or with a number of long-term complications. We present three patients with obstructive SAS in whom dramatic clinical improvement occurred following repair of a deviated nasal septum. The subjective improvement was associated with a diminution in the number and duration of obstructive apnea episodes as observed during a standard sleep study. Because of its simplicity and low rate of complication, we propose that repair of a deviated nasal septum be further evaluated as a mode of therapy for this condition.

Sleep apnea syndrome (SAS) is characterized by recurrent apnea during sleep, primarily during stages 1/2 in non-REM sleep. The apnea lasts more than 10 seconds and occurs more than 30 times per sleep period. Clinically, there is heavy snoring during sleep, excessive daytime somnolence, decreased intellectual capacity, and in approximately half the cases, obesity. There are three types of apnea: central, in which all breathing efforts cease; peripheral, in which breathing efforts continue, but air flow ceases as a result of upper airway obstruction; and mixed, in which central-type apnea evolves into the obstructive type. The apneic episodes are often associated with hypoxemia and arousals. Treatment modalities include: weight loss, tracheostomy to bypass the upper airway obstruction, and respiratory stimulants such as progesterone, and propranolol. However, there are major difficulties with each of these modes of therapy. Weight loss by diet is often unsuccessful because of poor patient cooperation. Long-term tracheostomy is fraught with complications, and drug therapy is at best only partially successful. Thus, alternate modes of therapy must be sought.

We present three patients with documented SAS in whom dramatic clinical improvement occurred following repair of a deviated nasal septum. This clinical improvement was associated with a decrease in the number and duration of apneic episodes measured in a standard sleep study.

Materials and Methods

Whole night polysomnographic recordings were performed in the conventional way. Variables measured included EEG, electrooculogram, and electromyogram (recorded from the sternocleidomastoid); the sleep periods were seven hours. Sleep stages were scored according to standard criteria. Respiratory movements were detected by the use of a strain gauge respiratory belt tied around the lower thorax, and air flow at the nose and mouth was detected by use of nasal and oral thermistors.

Each patient underwent a complete ear, nose, and throat examination. The extent of obstruction to the nares was estimated clinically. Nasal septal repair was done by a standard submucosal resection performed under local anesthesia.

All patients underwent lung function testing including measurements of forced expiratory flows, lung volumes, and ventilatory responsiveness to CO₂.

Case 1

A 56-year-old man of European extraction was referred to the pulmonary clinic because of continually falling asleep at his job and loud snoring at night. Physical examination revealed: weight—110 kg, approximately 80 percent obstruction of the right nostril by a deviated septum, and a normal cardiopulmonary system. Pulmonary function testing was normal. A sleep study revealed approximately 300 episodes of apnea with an average duration of 25 sec. Approximately 60 percent of the apneas were peripheral. The patient was unable to follow a weight reduction diet. A six-week trial of therapy with medroxyprogesterone acetate (80 mg a day in four divided doses) failed to lead to clinical improvement. Full patency of the right nostril was restored following repair of the deviated septum. The patient noticed a marked clinical improvement in his symptoms with almost complete disappearance of his daytime somnolence. Repeat sleep study eight weeks following surgery showed that the number of apneas was now 106 per sleep period with an average duration of 15 sec. At the time of his sleep study he was receiving no medication and his weight was unchanged.

Case 2

A 44-year-old man of North African origin presented to the pulmonary service complaining of excessive daytime sleepiness. Because of the frequent napping, he was forced to quit his job as a construction worker. He also had loud nighttime snoring, and impotence. Physical examination revealed: weight—119 kg, complete obstruction of the left nostril, and a normal cardiopulmonary system. Pulmonary function testing was normal. The patient could not follow a diet, and an eight-week trial of medroxyprogesterone (80 mg/day in four divided doses) failed to lead to clinical improvement. Sleep study revealed 290 apneas per sleep period with an average duration of 25 sec, 80 percent of which were peripheral. Following submucosal resection of the deviated septum, examination revealed nearly complete patency of the left nasal passage. Within two weeks of surgery, the patient noted a marked diminution of the daytime somnolence. A repeat sleep study done six months following surgery showed that the number of apneas per sleep period had decreased to

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Manuscript received December 6; revision accepted March 28.
A 40-year-old diabetic man of North African origin was referred to the pulmonary service because of severe nighttime snoring, and excessive daytime sleepiness to the point of interfering with his work as a glass worker. Examination revealed: weight, 70 kg; complete obstruction of the left nostril; and a normal cardiopulmonary system. Sleep study showed 350 apneas per sleep period with an average duration of 40-50 sec, all of which were peripheral. Within two to three weeks following submucosal resection of the septum, the patient noted dramatic diminution in his daytime somnolence. Repeat sleep study performed 12 months following surgery showed dramatic improvement with only 40 apneas per sleep period, most of which were central. At the time of the repeat sleep study, his weight was 71 kg and the patient was receiving no medication.

A further point of note is that all three of these patients were observed to be nasal breathers on the sleep examination as shown by the pattern of air flow in the nasal and mouth thermistors.

**DISCUSSION**

The three SAS patients described here responded clinically and objectively to repair of a deviated nasal septum. It should be noted that none of these patients complained of obstructed breathing or any other nasal symptoms. In two, weight loss and treatment with medroxyprogesterone acetate was unsuccessful. There are a number of reports in the literature describing an association between upper airway obstruction and breathing disturbances during sleep. Nasopharyngitis in children, for instance, is associated with an increase in the frequency and duration of apneic spells during sleep. Simons et al. described a case of hypopnemia associated with nasal septal deviation which was successfully treated with submucosal resection. However, data from a post-surgery sleep study were not provided. The same authors also reported that repair of the nasal septum did not improve the condition of three other patients suffering from SAS. Several authors have found that sleep disturbances occur in normal subjects following temporary occlusion of the nares. Zwillich et al. demonstrated a decrease in the depth of sleep and an increase in the number of apneic episodes with complete nasal occlusion. Lavie et al. showed an increase in the number of microarousals associated with nonapneic breathing and an increase in the amount of awake time during the sleep period of subjects under these circumstances. Data from the same laboratory also demonstrated that in two-thirds of their sleep apneic hypersomnolent patients, physical examination revealed an upper airway abnormality (nasal septal deviation, hypertrophy of the adenoids, etc). Several of these patients, ie, those suffering from hypopneas during sleep, improvement in symptoms and sleep study was noted following nasal septal repair.

Regarding the mechanism of improvement in SAS following repair of the nasal septum, there are at least two possibilities: upper airway obstruction could lead to apneas via disturbed reflex mechanisms, possibly trigeminally or vagally mediated, which normally act to preserve airway patency in the presence of negative airway pressure. If this were the case, then it would be expected that a nasal as opposed to oral breathing pattern would predispose to the development of apnea during sleep. All three of our patients demonstrated nasal breathing during their sleep studies, which is consistent with direct mechanical effects as being the mechanism of production of apneas.

A potential advantage of repair of a deviated nasal septum in the treatment of SAS is its very low rate of complication and it can be performed under local anesthesia. Furthermore, even partial success may be worthwhile and obviate the need for other modes of treatment. On the basis of our observations, therefore, we recommend that repair of a deviated nasal septum should be further evaluated as a form of therapy in the treatment of symptomatic sleep apnea syndrome.

**REFERENCES**