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ORIGINAL ARTICLE

Radiofrequency of the soft palate for sleep-disordered breathing: A 6-year follow-up study

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Abstract
Objective: To determine the long-term (> 3 years) outcome of patients suffering from simple snoring or non-severe obstructive sleep apnea syndrome (OSAS) treated by radiofrequency ablation of the soft palate.
Study design: Observational retrospective study.
Setting: Tertiary care university hospital.
Subjects and methods: Seventy-seven subjects were included between 1999 and 2006. Twenty-seven suffered from mild or moderate OSAS. All patients were treated by radiofrequency-assisted stiffening of the soft palate, with or without uvulectomy. Snoring (assessed on a 10 cm visual analog scale (VAS)), marital status, presence of cardiovascular risk factors or pathologies and follow-up time were evaluated by postal questionnaire.
Results: Mean follow-up time was 6.3 ± 2.3 years. Mean snoring intensity decreased significantly in the immediate postoperative period (8.1 ± 2.9 to 3.5 ± 2.2 cm on VAS). Over the longer term, however, we observed a significant increase in snoring intensity (5.7 ± 2.9 cm), which nevertheless remained below the preoperative values ($P < 0.001$). Bed-partners noticed a relapse of snoring in 92.7% of cases. Nine percent of couples separated. Hypertension and diabetes were diagnosed during follow-up in 12.1% and 6.6% of the subjects, respectively. A majority of patients failed to undergo repeat polysomnography or further treatment.
Conclusion: Relapse of snoring was observed in nearly all patients in the long run, although intensity appears to remain lower than preoperatively. Most patients did not comply with the follow-up instructions and did not seek other forms of treatment when recurrence occurred.

1. Introduction

Chronic snoring can be the cause of a significant social discomfort. Obstructive sleep apnea syndrome (OSAS) can be responsible for excessive daytime sleepiness, metabolic disorders and cardiovascular diseases.

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Many different therapeutic options may be proposed to patients suffering from simple snoring or mild to moderate OSAS. Apart from sleep hygiene, dietary counseling, mandibular advancement appliances, continuous positive airway pressure (CPAP), surgery can be offered. Four techniques targeting the soft palate can be performed: uvulopalatopharyngoplasty (often combined with tonsillectomy), laser treatment, palatal implants and radiofrequency-assisted stiffening. Despite their different modes of action, these procedures share the same goals, which are to reduce the vibration of the soft palate and decrease its tissue bulk. Although there is no gold standard in the treatment of snoring, radiofrequency (RF) has become more popular in the last decade due to its low morbidity and the fact that it shows similar efficacy to the other procedures [1].

The short-term efficacy of this treatment and the persistence in time of its effect on pharyngeal obstruction and soft-tissue vibration may impact on various disease-related parameters, including marital status and cardiovascular variables (particularly when OSAS is present). Because RF is a very simple procedure, some patients underestimate the severity of their condition. This can lead to failure to attend follow-up visits or to undergo repeat polysomnography (PSG). In such cases, residual disease may remain undiagnosed and therefore untreated.

In the literature, good initial results have been documented for velopharyngeal surgery and laser procedures, but their efficacy has been shown to wane over time [2—4].

Few studies have assessed the mid-term results of RF stiffening, but there also appears to be recurrence of symptoms after a few years [5—8]. To our knowledge, no study has attempted to determine the long-term effects of this treatment. Therefore, the main goal of our study was to elucidate clinical outcome in a population of patients with snoring or mild/moderate sleep apnea after RF treatment of the soft palate.

2. Methods

From 1998 to 2006, 228 patients were treated with RF stiffening of the soft palate (with or without shortening of the uvula) in our department. All patients were simple snorers or suffered from mild to moderate OSAS.

Pre-therapeutic investigation included history focusing on marital status, medical history such as hypertension and diabetes, and the Epworth sleepiness scale. A complete otolaryngologic physical examination was performed and body mass index (BMI) was recorded. All subjects underwent polysomnography (level I, II or III). Treatment options were chosen according to morphologic parameters and the apnea/hypopnea index (AHI) and all suitable options were proposed. RF was offered as an option, especially when the velar area was considered clinically to be the main site of vibration or obstruction on physical examination, and in the absence of macroglossia (stages 3 and 4 of Friedman's classification), obesity (body mass index > 30 kg/m^2), patient's complaint of nasal obstruction or AHI > 20/h. The patient had the final choice. The procedures were performed in 1 to 3 sessions, every 8 weeks, until the bed-partner considered the outcome to be satisfactory. RF stiffening was associated to resection of the uvula and/or ablation of the lower part of the soft palate when these were considered clinically to be hypertrophic or elongated, the goal being to treat the whole subsite. Ablative procedures were performed during the first session for some patients and during a subsequent session in others.

Over the studied period, five different RF generators were used, comprising both monopolar and bipolar devices. For soft palate stiffening, Select Sutter (bipolar), Ellman (monopolar), Somnus (monopolar), Coblator (bipolar) and Olympus (bipolar) were used. Uvulectomy and ablation of the lower velum were performed using a diode laser (Diomed) or an RF generator (Select Sutter or Olympus).

All subjects received counseling about the importance of a follow-up visit 2 months after the last session. For patients with known OSAS, repeat polysomnography was prescribed 4 to 6 months after treatment.

Patients were treated according to indications and RF techniques derived from previous studies which had been submitted to our local ethics committee. The present study was retrospective. It was based on the data from the previous studies plus a long-term evaluation by postal questionnaire. Therefore, it did not require specific approval from our local ethics committee.

2.1. Inclusion criteria

Subjects included in this study had a minimum 3 years' follow-up. Each patient had a pre-therapeutic snoring intensity evaluation performed by the bed-partner on a visual analog scale (VAS), 0 indicating no snoring and 10 a snore sound audible in another room or justifying sleeping in a separate bedroom. A short-term VAS was also completed 2 months after the last treatment session. For OSAS patients, AHI between 5 and 20/h was used as a selection criterion. Snoring intensity was a subjective variable, in the ear of the bed-partner. In order not to exacerbate the subjectivity of the assessment, especially in the long term, we only used snoring volume as assessment criterion, and not satisfaction.

2.2. Exclusion criteria

Patients were not included in analysis if they had failed to answer the short- or long-term questionnaires or if their data were not interpretable. Similarly, subjects who had changed bed-partners during the follow-up period were not included in the calculation of the recurrence rate of snoring and of the long-term snore intensity.

2.3. Evaluation of long-term outcome

A postal questionnaire was sent to all included patients. The first section of the survey aimed to evaluate the evolution of the snoring sound. A VAS was filled out by the same bed-partner as at the initial evaluation. If the patient was currently receiving a treatment (oral appliance, CPAP or other), the evaluation had to be undertaken without it. Open questions were asked about possible recurrence of discomfort, its onset, subjective intensity compared to the pre-therapeutic state and intermittent or permanent