Soft palate radiofrequency and uvulectomy for the treatment of snoring: medium-term results.

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ABSTRACT

Objective: To assess the outcomes of radiofrequency treatment of the soft palate in snoring, followed by uvulectomy in case of insufficient results.

Methods and patients: A retrospective study to evaluate the impact of velar radiofrequency on chronic snoring was performed. Between 1999 and 2002, eighty-five patients with chronic snoring or with mild obstructive sleep apnea syndrome (OSAS) were treated with velar radiofrequency from 1999 to 2002. The soft palate was targeted using radiofrequency over three successive sessions. A secondary uvulectomy during a fourth session was performed among patients that had no initial improvement. A visual analog scale graded from 0 to 10 was used to evaluate the magnitude of residual snoring. A score of more than 5 out of 10 was considered satisfactory.

Results: Seventy-four patients were analyzed. We observed satisfactory results in 66.2%. In 51 patients treated with velar radiofrequency, 62.7 % had satisfactory results, while the success rate was 74% in the 23 patients that also underwent a secondary uvulectomy. The success rates were 72.7 % and 56.6% when the body mass index (BMI) was <27 and ≥27, respectively.

Condusion: In this study, velar radiofrequency treatment significantly improved snoring, however a multicenter study is required to confirm the need to combine velar radiofrequency with uvulectomy. BMI < 27 Kg/m^2 appears to be an important factor in determining success.

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INTRODUCTION

In the majority of cases snoring is caused by excessive vibration of the soft palate during sleep and results in discomfort for the patient and his close family. Snoring has been treated medically or surgically since 1980. The first technique was uvulopalatopharyngoplasty (UPPP) as described by Fujita [1]. Other techniques, i.e. velar radiofrequency, have been used because of considerable side-effects and a moderate long term success rate with surgery. The principle of velar radiofrequency consists of applying a radiowave of low frequency using a generator [2]. The passage of the radio wave (from 1.7 to 4 Mhz in the case of the Ellman Surgitron) induces volatility of tissue by ionic agitation of water molecules and causes cutting or coagulation of tissue, depending on the wave signal used. In a short period this results in fibrosis and increases the rigidity of the soft palate.
The aim of our study was to assess radiofrequency treatment of the soft palate in snoring, to be followed by uvulectomy when results of radiofrequency treatment were insufficient.

MATERIALS AND METHODS

This was a single center retrospective study of 85 adult patients with uncomplicated chronic snoring or with mild sleep apnea syndrome (apnea / hypopnea index < 15/hour), documented by polysomnography. Snoring should have induced significant social discomfort for the patient and his close contacts. Patients were treated with velar radiofrequency between 1999 and 2002 in the Ear, Nose and Throat department of University Hospital of Brest. Three surgeons carried out radiofrequency treatment sessions. Before the treatment patients were informed that the mean success rate according to literature was 60 to 80%.

In this retrospective analysis, were included adult patients with uncomplicated snoring or with mild sleep apnea syndrome; patients that underwent at least one session of radiofrequency; patients with controlled aggravating factors for snoring, (i.e. body mass index [BMI] ≤ 30 at time of testing) and in whom nasal obstruction had been treated beforehand.

Patients with BMI > 30 kg/m^2 were excluded at the first visit, weight loss was recommended and a visit with a dietician was proposed.
After putting in place these dietary measures and reduction of BMI to less than 30, these patients could be included secondarily in the study.

Were excluded patients that could not answer a telephone survey for any reason; patients with absolute or relative contraindications to velar radiofrequency or local anaesthesia (Table 1).
Residual nasal obstruction after a well-managed therapy and tonsillar hypertrophy were not exclusion criteria.

1. Technical protocol

Each patient with snoring underwent clinical examination. This examination included rhinoscopy to assess the nasal septum, inferior turbinate bones and nasal valve and determinate the presence of nasal obstruction. An additional endobuccal examination was done to evaluate dental articulation, size of palatine tonsils, uvula shape and length, and the widths of the anterior (palatoglossal arch) and posterior (palatopharyngeal arch) pillars. In addition, the Mallampati score (I -IV) and vomiting reflex were estimated.
- In case of an additional nasal obstruction in the clinical examination, we carried out beforehand
- either a surgical treatment by means of a septoplasty (for septal deviation, 5 patients)

- or turbinate radiofrequency with the same device and a bipolar resterilised catheter (for inferior turbinate hypertrophy, 4 patients).

Table 1: Contraindications to radiofrequency therapy

Absolute contraindications	Relative contraindications
- Anticoagulant or antiplatelet treatment - Presence of a cardiac pacemaker - Velar cleft or pre-existing velar insufficiency - Presence of moderate or severe sleep apnea syndrome (SAS) (apnea/hypopnea index >15/h) on polysomnography - non-cooperative patient	- prominent vomiting reflex - Allergy to local anaesthetics

A general polysomnography was performed for each patient to measure time and intensity of snoring (Deltamed, Paris, France). Polysomnography was carried on during a one-night hospitalization in the sleep unit of functional neurological investigation group at our hospital. Data was registered via several sensors: a position sensor, sensors for naso-buccal, thoracic and abdominal respiration and a snoring sensor.
Oxygen saturation was measured continuously and eye movements were detected by electrodes placed on the eyelids. The software carried out a calibration of the different parameters together with automatic detection of respiratory and neurological events during sleep and created user-definable analytical report in terms of sleep apnea syndrome.
Three sessions of radiofrequency 8 weeks apart were proposed to patients. In case of dissatisfaction at the end of study on the part of the patient or the partner, uvula resection was planned during a 4th session.

A SURGITRON 4 Mhz (ELLMAN, New York, U.S.A.) was used in coagulation or cutting mode for uvulectomy.

The costs of the catheter were covered by the patients. The average price for the catheter was about 148 US dollars. The catheter was unique for each patient and was sterilised and reused every 3 sessions or until a uvulectomy was performed.

For anesthesia of the soft palate the patient initially gargled with 5% xylocaine spray for 5 minutes before injection of 2 capsules of 3% Scandicaine without adrenalin (1.8 mL) (SEPTODONT, Saint Maur, France) using a dental syringe and truncated needle.

Velar radiofrequency was performed using three impacts: the middle was situated on the superior third of the soft palate and the other two on the right and left laterals at the same level, 75-90° from the mid-line (Figure 1). Each impact lasted 30 seconds in coagulation mode and delivered 500 J.

Uvulectomy was performed in the cutting mode using the same catheter with a power of 50 W. Haemostasis was maintained with the same catheter using the cutting mode and at the same power.
Analgesia with Palier I (acetaminophen) was prescribed for pain.

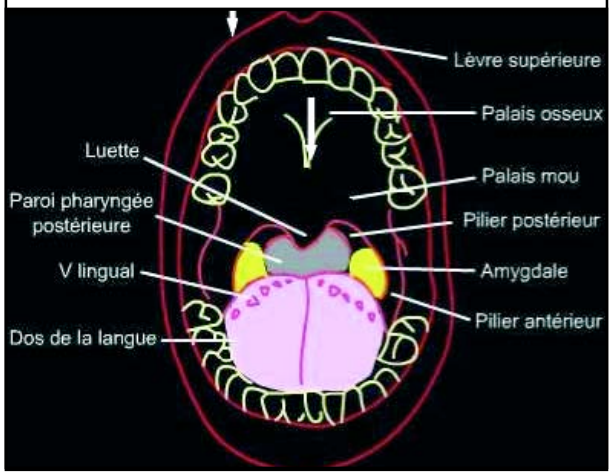
2. Assessment of tolerability

Patients were asked to contact the department in case of persisting pain in spite of acetaminophen administration. In case of concerns regarding complications (post-operative infection and necrosis), the patient was requested to attend for urgent consultation. During every new session the patient was questioned about the tolerability of the technique and invited to rate pain on a scale between 0 (absence of pain) and 10 (maximal pain that the patient could endure).
In cases of an uvulectomy, a cold and thick textured diet was suggested for the evening after the procedure and on the following day. Afterwards all patients returned to their normal diets. The patients were requested to come back and consult urgently in the case of complications (pain, inability to resume usual diet on the third post-procedure day, or bleeding); otherwise an immediate global clinical examination was not planned. All patients were followed-up from 6 to 8 weeks after treatment.

3. Assessment of efficacy

The efficacy of treatment was judged by the partner or close family (adults in the family or close relatives sleeping close by in a case of absence of a partner) by an analog scale (AS) that calculated the total subjective improvement in snoring and summarized the satisfaction level of the partner. This scale was created by standardisation of collected telephone responses. The partner (or close family) was asked to rate the AS for total improvement of snoring. The scale was valida-

Figure 1: Oral cavity with the three target regions for velar radiofrequency indicated.



ted by our medical team from 0 (the partner found snoring unchanged or worsening) to 10 (the partner was completely satisfied, did not hear snoring any longer). Values above 5/10 demonstrated a positive change for the partner. Only responses above 5/10 (the partner was satisfied and found improvement in snoring) were considered as treatment success. This assessment took place at the beginning and at the end of the study.
The statistical significance of numerical results was calculated by using a Chiχ^2-test.

RESULTS

1. Technical aspects

Eighty five patients underwent the procedure. Eleven could not be reached by phone and were excluded from the study. Seventy four patients were studied between January and April 2004, at an interval of 14 to 38 months after their last session (mean interval 28 months). There were 22 female and 52 male patients (sex ratio 1 /2.4) aged from 26 to 72 years (mean age 49.4 years). Five patients lived alone and were self-assessed.
Pre-treatment clinical examination showed that 43 patients (58%) presented with a long uvula (length > 12-15 mm). BMI varied from 17 to 30 kg/m2 (mean BMI 26.3); 30 patients had a BMI between 27 and 30 Kg/m2 and 44 patients had a BMI < 27. Initial polysomnography showed a total snoring time from 1 to 65% (mean 16%) from total sleep time, with a sound intensity from 74 to 95 dB (mean 82 dB).

Forty patients had three sessions and 23 patients underwent uvulectomy during the 4th session.
Eleven others included in the study did not follow the complete protocol: 3 patients had only one session (session was not continued because of a prominent nausea reflex, which was underestimated at the previous visit) and results were considered as non-satisfactory. Eight patients had 2 sessions: 6 patients did not continue the procedure because of a lack of improvement at the end of first two sessions or for other reasons, which were not herein described. Results were judged as non-satisfactory. Two had a symptomatic improvement but did not want to carry on. Results were considered as satisfactory.

2. Follow-up assessment

The mean interval was 28months

A. Pain and complications
Patients treated by radiofrequency and by uvulectomy had pain scores < 3 in 92.2% (47/51) and 91.3% (21/23) respectively. The difference was not statistically significant (p=0.99). Only 11 patients (14.8%) had analgesic treatment (acetaminophen) for more than two days. Eight patients (10.8%) reported dysphagia for more than two days. None of the patients remarked on either transitional or definitive voice changes or nasal regurgitation even in the group with uvulectomy. The only recorded complication was velar necrosis that healed after 3 weeks.

B. Efficacy
In 74 patients a partner level of satisfaction of more than 5/10 on the analog scale was observed in 66.2 % of cases. The mean AS score in this cohort was 5.30; 6.88 in 49 satisfied patients and 2.20 in 25 non-satisfied patients.
Twenty three patients had an uvulectomy, 17 were satisfied with the results: partners and patients were satisfied in 74% of cases (p=0.347) in this group. Before uvulectomy the mean score was 2.39 and afterwards 5.57.
Fifty-one patients received only radiofrequency treatment, 32 were satisfied with the results (30 of the 40 patients that had 3 sessions and 2 of the 11 patients that received only 2 sessions). The level of satisfaction was 62.7% in the case of radiofrequency treatment.
Considering the limited number of patients that underwent uvulectomy (23 of 74 patients), the additional success level was not significant (p= 0.347).
Satisfactory results were achieved in 56.6% (17 of 30) of the group of patients with BMI ≥27 kg/m2 compared with 72.7% (p=0.151) of the patients with BMI < 27 kg/m2 (32 of 44 satisfied patients).
In the overweight patients, health and diet advice was given. We did not compare the weight of the patients before and after treatment by radiofrequency as the data on the final weight were not always registered. It was also impossible to take into account the weight during phone survey, which was carried out 28 months after the treatment.

DISCUSSION

In this study, radiofrequency treatment was associated with satisfaction in 66.2% of patients.

We administrated 1500 J per session, which is in keeping with the results from previous studies that showed that the higher energy level is more effective and is not associated with more side-effects than lower levels.5 Multi-site radiofrequency improves snoring more effectively and decreases the number of sessions required in comparison with single site treatment. [6]

The technique was well tolerated.

We found few complications of the procedure including those cases with uvulectomy. It was generally effective for the treatment of uncomplicated snoring; however, the assessment remains subjective in the absence of post- treatment polysomnography.

A prospective multicenter European clinical study in 45 patients was conducted by Boudewyns et al. in 2000 to investigate the treatment of simple (usual) snoring by velar radiofrequency. Polysomnography was applied before and after treatment. A three session protocol with only midline targeting at 700 J per session was employed. A clear decrease in snoring was observed in 84 % of cases [5]. Post-treatment polysomnography could possibly explain the difference between our results and results from that previous study.

The importance of uvulectomy and BMI were not significant but a prospective multicenter study could verify this. Uvulectomy appeared to be a factor, which increased the efficacy of radiofrequency treatment. Few studies have demonstrated its importance. Thus, the uvula could play a role in snoring [6].

Dietetic measures seem to increase the chance of success of the treatment, although considering the different results in both groups, this was not statistically significant. Therefore, weight loss in patients with a BMI ≥27 is advisable.

In the multicenter study reported by Boudewyns et al, 84 % of patients registered an improvement in snoring [5]. In a retrospective study of 39 patients Said et al had success in 77% of those treated [8]. In another study, Sandhu et al. reported satisfactory results in 60% [9].

These different studies revealed satisfactory results after radiofrequency in greater than 60% of patients.

Because of the novelty of this technique there are no evaluations of this treatment over more than 3 years and few publications report long term results (more than 1 year). To estimate the efficacy of radiofrequency treatment we were interested only in subjective criteria of satisfaction about snoring as assessed by patients and their partners. Our study was based on a scale created in our department and a result of greater than 5/10 was considered a success. A score of 5/10 was the level at which the patient noticed the beginning of improvement. Our results could be different if a higher grade was used.

Most studies— particularly the study published by Emery in 2000 [10]—assessed criteria related to the intensity and duration of snoring and improvements in the quality of sleep. Parker et al in 2005 [11] used the Epworth Sleepiness Scale (ESS), which estimates 8 life situations when the patient is at risk of falling asleep. ESS was assessed before and after radiofrequency treatment. The Snore Outcomes Survey (SOS) is often associated with the ESS, and emphasises the intensity of snoring and its influence on the conjugal life of the patient [12]. Finally, the Glasgow Benefit Inventory is a general evaluation of patient satisfaction after a surgical operation. [13]. These 3 surveys are coded and permit a comparison among different studies.

Some studies have evaluated the efficacy of radiofrequency therapy using objective data. Unfortunately, we did not perform post-treatment polysomnography. Sandhu et al. assessed polysomnography three months after the third session and compared it with pre-operative data [9]. Black et al performed MRI to assess modification of the soft palate signal and to show the physical effects of radiofrequency [14].

There are large differences in findings in the absence of clear criteria or scales to be used by otolaryngologists. Hence, comparisons between results of different studies remain uncertain which makes their application problematic.

These results tend to show that the results of radiofrequency treatment remain constant over time with a success rate greater than 60% after one year.

Pain was the main tolerability criteria used in our study and was assessed using a visual analog scale. The impact on speech, buccal dryness and the general tolerability of the technique was considered in the study

of Emery et al [10]. We assessed tolerability as the absence of or minimal pain (score<3) which was comparable with other studies.

CONCLUSION

This study underlines that in the absence of contraindications velar radiofrequency alone or in combination with uvulectomy is a useful first-line therapeutic option in the setting of uncomplicated snoring. In spite of its high costs, the good tolerance and the relatively innocuous nature of the procedure make radiofrequency a prime technique for the patient. For the practitioner it is a major alternative to surgical treatment, which demands little investment and is easily administrated under local anaesthesia during consultation. The addition of uvulectomy seems to potentiate the effects of velar radiofrequency. Finally, weight is a known causative factor for snoring and dietary advice should be integrated into the treatment. The main focus of our study was the medium term results of velar radio-frequency, however an evaluation of the benefits of this technique after 3 years would be of interest.

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