Romanian Journal of Rhinology, Vol. 2, No. 6, April - June 2012

ORIGINAL STUDY

Simultaneous soft palate and posterior pillars bipolar radiofrequency (RaVoR™) application in patients with mild obstructive sleep apnea syndrome (OSAS) and associated snoring

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ABSTRACT

BACKGROUND. A prospective non-randomised office-based study was designed to investigate the effects of bipolar radiofrequency (RaVoR™) simultaneously applied to the soft palate and pillars in snorers with mild (AHI<25, average BMI=31.3) sleep apnea.

MATERIAL AND METHODS. Sixteen patients, fulfilling the inclusion and exclusion criteria, where treated according to the previously published own surgical method that uses electrodes conceived by the first author in cooperation with Sutter Medizintechnik (Freiburg/Germany). The only associated intervention was the partial uvulectomy performed in four patients with elongate uvula. Preoperative and two and six months postoperative sleep studies, patient's examinations and interviews were carried out in all patients.

RESULTS. The reducing in AHI was moderate in all patients. Subjective improvement of the oral respiration and a relief in the throat was reported. Snoring was variably reduced in 10 (75%) patients. Enlargement of the palatopharyngeal space (posterior pillar "velarisation") could be observed. After the combined intervention, a generally mild oedema and odinophagia were observed. Only the partial resection of the uvula caused transient difficulties in swallowing for the patient.

CONCLUSION. Although the improvements in objective sleep study parameters were not spectacular, the short term observations suggest that the method can be retained as an interesting minimally invasive alternative to more radical tissue-resection type interventions. The study assesses the suitability of our surgical palatal approach in an office-based setting. More operations as well as long-term evaluation is required.

KEYWORDS: snoring, sleep apnea syndrome, velar and posterior pillars radiofrequency, bipolar electrodes

INTRODUCTION

The velar radiofrequency of the soft palate has been a popular treatment option for habitual snoring. The most commonly treated areas are the lower turbinates in the nose and the soft palate and the tongue base in the oropharynx. In the years 2001, 2008 and 2004 the first author has published[1,2,3] his results with an innovative electrodes set (Figure 1) manufactured by Sutter Medizintechnik (Freiburg/Germany) and in 2009 we have published[4] our first results with a new bipolar electrode ("webbing electrode") designated for the posterior pillars tissue volume reduction. The aim of our current study is to evaluate the impact of velar and pillar bipolar radiofrequency practiced together in patients with mild sleep apnea and, according to the clinical examinations, in patients with high probability of palatal snoring factor.

Many patients suffering from snoring and mild sleep apnea syndrome show deep-drawn posterior pillars (Figure 2) with excess mucosal tissue ("webbing"). Resection of these excess tissues is an effective treatment option, but not always practical for an office setting. Our no-cut (except the uvula) surgical approach can be made with the electrodes devel-

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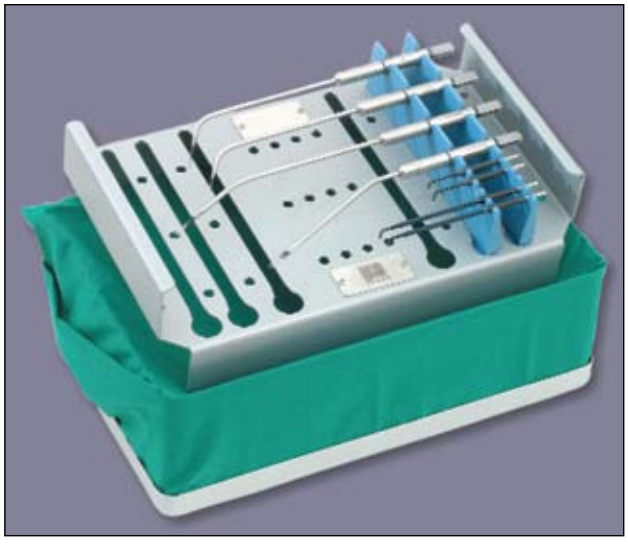

Figure 1 RaVoR™ ENT - electrodes set

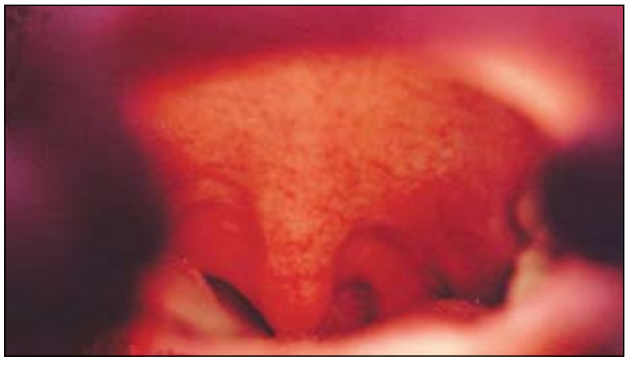

Figure 2 Hyperemic and vaso-dilated soft palate, deep-drawn posterior pillars; snorer and apnoeic subject with indication for palatal radiofrequency therapy

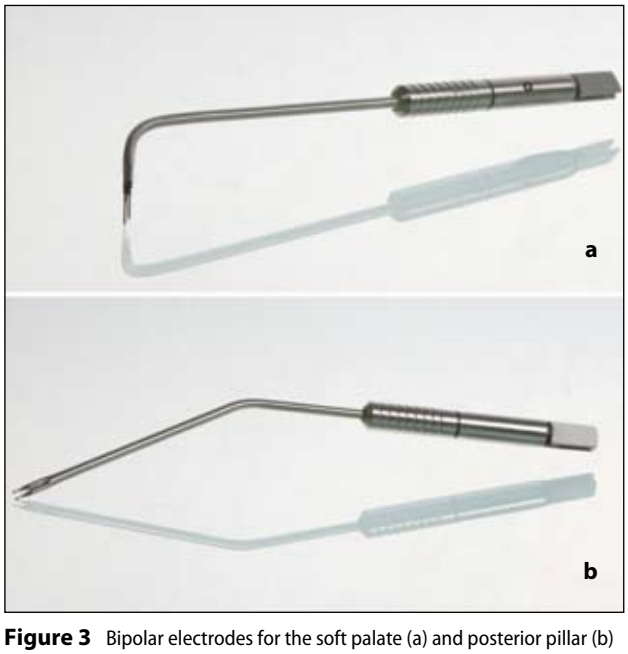

Figure 3 Bipolar electrodes for the soft palate (a) and posterior pillar (b)

oped by the first author in cooperation with Sutter (Figure 3 a, b) and can be performed trouble-free on out-patients. Surgical techniques and the probes design are based on anatomical, physiological and histological[5,6,7] findings.

MATERIAL AND METHODS

The procedure was performed under local anaesthesia in 16 out-patients between 2009 and 2011, combining the velar with posterior pillars radiofrequency in one session, in selected cases of snorers with mild SAS. Because elongation was present in four patients, a partial uvulectomy was associated.

The inclusion criteria were the presence of a mild OSAS (AHI<25, average BMI=31.3) diagnosed by snoring subjects with hypertrophic (Figure 4) or deep drawn posterior pillars, but with free nasal respiration, normal palatine and lingual tonsils, absence of macroglossia, retrognathism and cardiovascular diseases. Preoperative and two and six months postoperative sleep studies, patient's examinations and interviews were carried out in all patients. With the aim of objectively determining the effectiveness of treatment, documented preoperative video-endoscopic observations of the nasopharyngeal (Figure 5) and oropharyngeal isthmus, as well as those of the velopharyngeal space were correlated with the postoperative findings. Histological examinations of the resected uvula tissue and biopsy of a treated pillar helped to evaluate the effects (Figures 6 and 7).

Figure 4 Hypertrophic palatopharyngeal muscles/arch; indication for RaVoR™

Figure 5 Nasopharyngeal isthmus and posterior view of the vellum

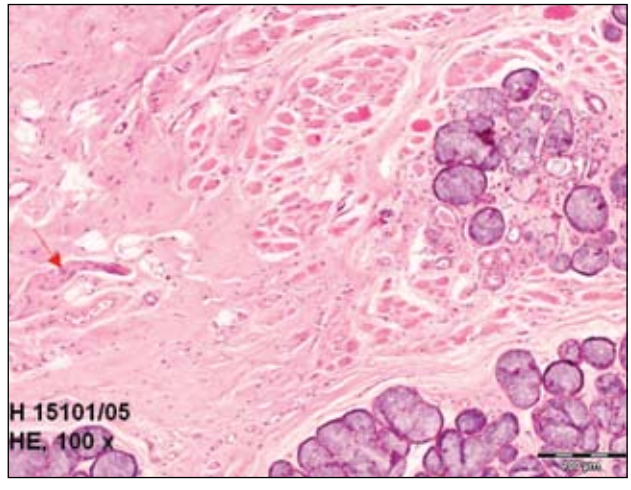

Figure 6 Snorer and apnoeic, partial uvula piece microscopy: stroma fibrosis, nervous fibres (arrow) and important stride muscular atrophy

SURGICAL TECHNIQUE

1. Local anaesthetic spray (tetracaine) is administered while the patient is sitting. Three (2 to 3 ml) injections of lydocaine 1% with adrenaline (1:200.000) are placed along the anterior edge of the velum and above the uvula in the middle of the velum. No injections of the posterior pillars are needed or wished (avoid distension in the target structures).

The application of the radiofrequency energy in the soft palate, in short sessions for about 9 seconds either at 9 watts in the RaVoR™ mode of the Curis (Sutter) electrosurgical unit (Figure 8) or with BM-780 II (power: "2") generator, follows only after the specially designated probe is placed correctly (Figure 9). Because physiologically they acted against the dorsal projection of the vellum, the elevating

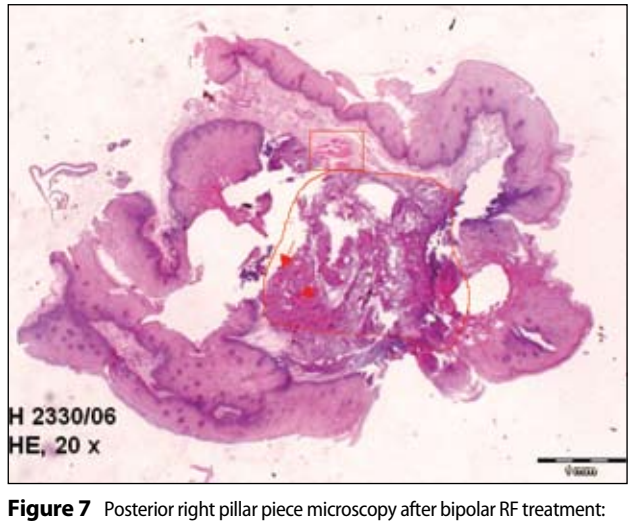

Figure 7 Posterior right pillar piece microscopy after bipolar RF treatment: central stroma coagulation and necrosis (polygon), intravascular fibrin thrombosis (arrows), peripheral rest of atrophic musculature (rectangle)

Figure 8 Curis® radiofrequency unit (Sutter Medizintechnik GmbH, Freiburg, Germany)

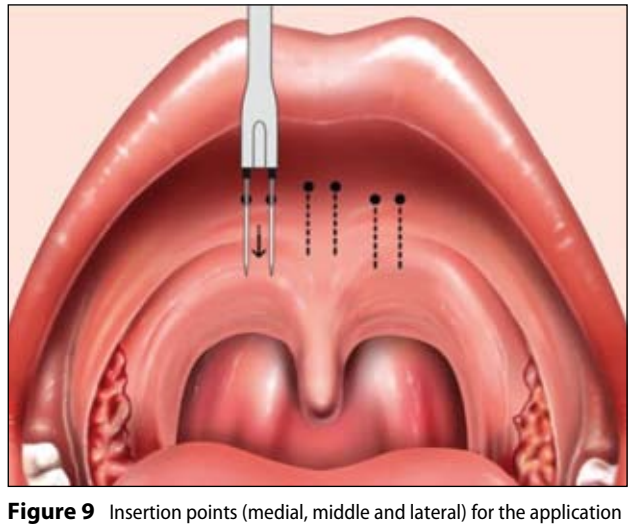

Figure 9 Insertion points (medial, middle and lateral) for the application of RF energy in the soft palate and placement of the bipolar electrode

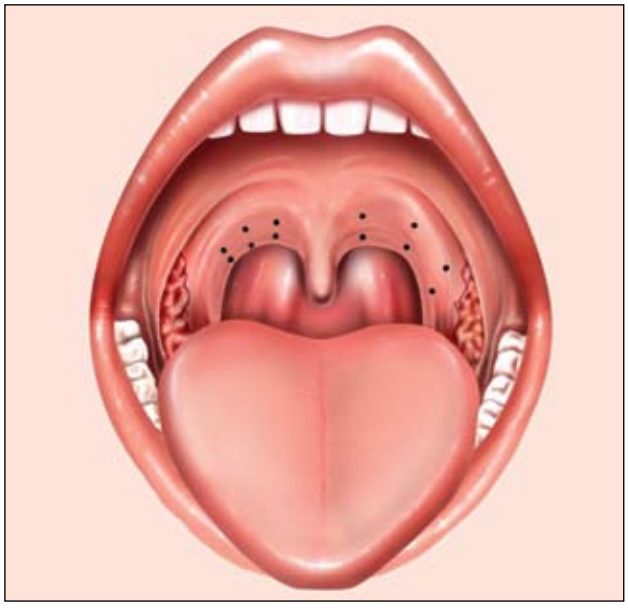

Figure 10 Insertion points for the application of RF energy in the posterior pillars

Figure 11 Moderate oedema of the right palatopharyngeal arch immediately after RF treatment

and stretching peristaphyline muscles must be preserved (no energy applications in the lateral and superior areas) as much as possible.

2. For treatment, each posterior pillar is divided in two or, if wider, three parts where the probe is inserted (Figure 10). Thin and lax pillars tend to resist needle pressure. It may take a few attempts to insert the probe. To ensure correct placement, visual verification is advisable. Each side is treated for about 4-5 seconds at the same parameters as above. A certain discoloration or minor necrosis of the mucosa may be expected and will contribute to the desired effect (Figure 11).

RESULTS

The AHI values were moderately reduced in all patients. Subjective improvement of the oral respiration and a relief in the throat were reported. Snoring was variably reduced in 10 (75%) patients. Enlargement of the retrovelar space (Figure 12) and palatopharyngeal space (posterior pillar "velarisation") could be observed (Figure 13). After the combined intervention, a generally mild oedema and odinophagia were observed. Only the partial resection of the uvula caused transient difficulties in swallowing.

Figure 12 Enlarged retrovelar space

Figure 13 Cranial pillars retracted (velarisation) one week postoperatively

DISCUSSIONS

The reasons for the combined treatment of the oropharyngeal obstructions sites are mainly anatomical and physiological[5,6], but some studies[7,8,9,10] that describe various pathological disturbances of the soft palate in snorers and apnoeics could explain why the stiffening of this structure can be beneficial.

The pillars of the fauces are pull-down muscles[5,6]. In the surgery for snoring and OSAS they could be the key to a satisfactory result. The inconsiderate destruction of the palatoglossus muscle, which prevents the posterior projection of the velum, may compromise the expected result[6]. Contrariwise, the lesion (submucosal weakening or fragmentation), respectively the section of the palatopharyngeus muscle, may project ventrally the vellum, retract the cranial the arch and consecutively enlarge the velo-lingual distance.

Since the principal aim of this study was not to determine exactly the subjective improvement of snoring, no visual or numeric analogue scale was used. However, in contrast with one previous study of our own that showed 86% reduction of snoring, the actual results on snoring seem to be slightly bad (75%). The explication of the difference may consist in the number of cases (double in the first study) and the focus on OSAS patients in the second study. The snoring mechanism[11,12] in the last group is complex, not only palatal or nasopharyngeal, subsequently difficult to cure.

CONCLUSIONS

Although the improvements in objective sleep study parameters were not spectacular, the short term observations suggest that the method can be considered (in selected cases!) as an interesting minimally invasive alternative to more radical tissue-resection type interventions.

In particular (patients with mild OSAS), as an addition to multi-segmental surgery, it may be indicated and justified. Free nasal air flow is a precondition. A long uvula should always be shortened, ideally in a separate operation.

It is noteworthy that there were no preoperative or postoperative complications. The patients tolerated the procedure well and potentially it can be repeated. The study assesses the suitability of our surgical palatal approach in an office-based setting. More operations number as well as long-term evaluation is required.

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