

Research Paper

Radiofrequency ablation of the lateral palatal space for snoring



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Received 12 April 2017

Available online 23 June 2017

KEYWORDS

Snoring;
Radiofrequency;
Somnoplasty;
Radiofrequency
ablation;
Inferior turbinate
reduction;
Turbinoplasty

Abstract *Objective:* Pilot study to examine the effect of radiofrequency ablation (RFA) of the lateral palatal fat pad in patients with socially-disruptive snoring.

Method: Snoring outcomes and complications were compared between a group of patients with treated with RFA ablation of the lateral soft palate fat pad with or without inferior turbinate reduction (8 patients) and another group undergoing inferior turbinate reduction alone (12 patients).

Results: Snoring loudness and bothersomeness improved in the palate but not inferior turbinate group. Pain was mild and no major complications were observed.

Conclusion: The study supports RFA ablation of the lateral palatal space as a potential low morbidity procedure for snoring.

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Introduction

Snoring is a common nuisance affecting almost half of males and a third of females between 30 and 60 years of age.¹ It results from increased upper airway resistance and airway flutter during sleep. Progression may lead to obstructive sleep apnea (OSA). Snoring's bothersomeness often leads sufferers to seek treatment. Treatments include weight loss, smoking/alcohol cessation, positional therapy, and oropharyngeal exercises. Use of mandibular advancement devices, nasal devices, and continuous positive airway

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Peer review under responsibility of Chinese Medical Association.



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pressure (CPAP) are other mechanical alternatives. Multiple surgical procedures have also been proposed.

The present study introduces a novel technique that aims to ablate a fat pad in the lateral palate (supratonsillar fat²) using radiofrequency ablation (RFA) to decrease snoring. This contrasts to RFA of the midline muscular palate initially described by Powell et al³ and others⁴ which although reduces snoring with low serious adverse effects, requires multiple treatments with variable outcomes. While the current technique is conceptually similar, it differs in being directed towards a lateral anatomic space containing "supratonsillar fat".

Anatomy

The lateral palatal space is bounded medially by the curving fibres of palatopharyngeus, laterally by the superior constrictor muscle, inferiorly by the superior pole of the tonsil, medially and ventrally by the palatoglossus muscle, and ventrally by the mucosa of the palate (Figs. 1 and 2). The space is somewhat pyramidal in shape, wider and deeper inferiorly near the tonsil, and tapering superiorly towards the hamulus. The space contains a variable amount of fat, the removal of which exposes the boundary structures and opens the area to make it amenable to various surgical techniques. To our knowledge, and upon review of literature and anatomy texts, this space has not previously been described, nor has its surgical importance clearly outlined. It

is however, a critical space and outcomes from palatal surgery that are reconstructive/repositioning by nature are influenced by awareness of this key surgical anatomy.

Methods

Study design

Following approval by the IRB of the Medical College of Wisconsin, a retrospective chart review of RFA office based snoring surgeries was performed. RFA aimed at the lateral palatal space ($n = 8$) was performed with Coblation (Arthrocare, Smith Nephew, Austin TX). Six of these had simultaneous treatment of the inferior turbinates. Twelve patients with only inferior turbinate reduction were used as a comparison group. Pre-operative and post-operative Epworth sleepiness scale, NOSE, snoring loudness and bothersomeness (10 point visual analog) scales were assessed.

Procedure

Following lidocaine with epinephrine 1% injection into the area of the lateral palatal space, the RF probe was inserted near the tip of the hamulus into the region of the lateral palatal space. Device activation often created an audible crackling/popping noise indicating correct placement

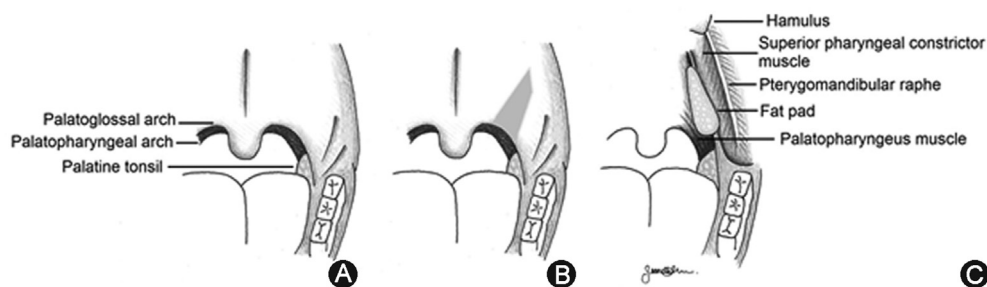


Fig. 1 Anterior representation of the oropharynx showing lateral palatal space. A: Anterior view with mucosa intact. B: With location of lateral palatal space shaded and location of RF ablation depicted. C: Mucosa removed and showing the lateral palatal space with supratonsillar fat lateral to the palatopharyngeus muscle and medial to the superior pharyngeal constrictor muscle.

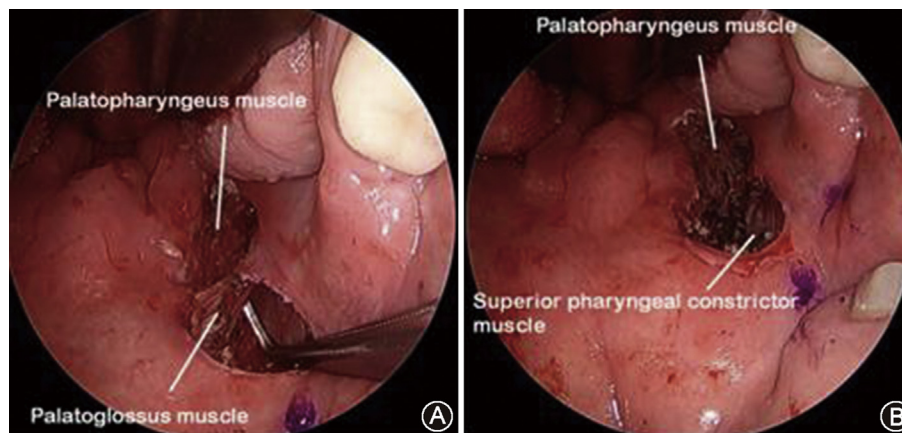


Fig. 2 Intraoperative photo showing lateral palatal space after fat removal and post tonsillectomy. A: Palatoglossus muscle intact with angled hemostat medial to the superior constrictor muscle. B: Palatoglossus muscle cut.

Table 1 Epworth sleepiness scale (ESS), snoring loudness and bothersomeness (10 point VAS), and NOSE scale in the lateral palatal space RFA group.

	Pre-operative	Post-operative	P value
Epworth sleepiness score	4.5 ± 1.5	4.1 ± 1.2	0.84
Snoring loudness (VAS)	6.9 ± 2.5	3.3 ± 1.7	0.004
Snoring bothersomeness (VAS)	8.3 ± 1.2	3.8 ± 2.5	0.003
NOSE scale	6.4 ± 1.2	4.7 ± 1.4	0.15

which indicated ablation of fat instead of muscle. Three or four lesions were then repeated in the area. Amoxicillin (1 g) and prednisone 10–20 mg were given peri-operatively. Pain was controlled with acetaminophen and popsicles; no pain medication was prescribed.

Statistical analysis

Outcomes were analyzed using two way paired *t*-tests for within subjects and an analysis of variance for comparisons between groups. Statistical significance was a *P* value less than 0.05.

Results

Patients who received RFA of the lateral palatal space had significant reduction in snoring loudness and

bothersomeness (4.5 ± 2.9 and 3.6 ± 2.4 units respectively, Table 1 and Fig. 3). No changes in NOSE scale or Epworth sleepiness scores were observed. Patients who received only inferior turbinate RF ablation did not have a significant improvement in snoring loudness or bother (0.3 ± 1.7 and 0.0 ± 2.0 units respectively). There were no reported complications.

Discussion

This study introduces a modified surgical procedure for snoring and a description of relevant palatal anatomy. Radiofrequency ablation of the lateral palatal space has the goal of reducing the volume of the supratonsillar fat and altering the structure and or compliance of the adjoining structures. Removal of the fat during traditional palatopharyngoplasty is thought to alter the lateral pharyngeal wall, and RF ablation may provide a less invasive alternative to modify this tissue.

The anatomy of the region is significant in that the boundaries of the space describe many of the muscles and tissues that are involved in various reconstructive palatopharyngoplasty techniques for sleep apnea. The palatopharyngeus, palatoglossus, and superior constrictor muscles may be directly modified in this space.

The muscular plane between the palatopharyngeus and constrictor muscles is crossed by the levator palatine muscle superiorly near the eustachian tube.

This preliminary data demonstrates short-term reduction in snoring loudness and bother following a single RFA treatment of the lateral palatal space. This contrasts to the control group with RFA to the inferior turbinates in isolation

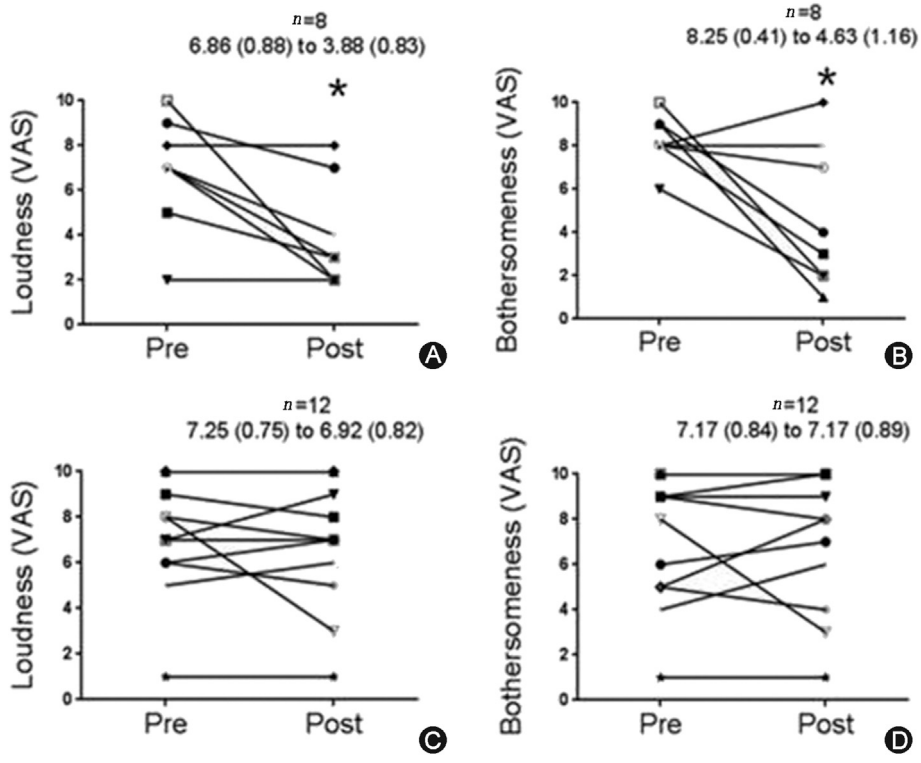


Fig. 3 Pre-operative and post-operative snoring scores (10 point Visual Analog (VAS)). A, B: Palate group; C, D: Turbinate group.

which had little effect. Although this data has limited power due to the small sample size, the modification of treatment locations is a minor change to a currently established procedure that has demonstrated effectiveness and low morbidity.

Conclusion

This limited series offers evidence that volume reduction of the fat in the lateral space and associated scarring alters the properties of the palatopharyngeus and surrounding muscles and reduces phonic vibration. Although further data on effectiveness of snoring reduction, duration of effect, and appropriate patient selection is required, the low risk of major complications makes ablation of this space a potential option for individuals who are already candidates for palatal RF procedures.

References

1. Young T, Palta M, Dempsey J, Skatrud J, Weber S, Badr S. The occurrence of sleep-disordered breathing among middle-aged adults. *N Engl J Med.* 1993;328:1230–1235.
2. MacKay SG, Carney AS, Woods C, et al. Modified uvulopalatopharyngoplasty and coblation channeling of the tongue for obstructive sleep apnea: a multi-centre Australian trial. *J Clin Sleep Med.* 2013;9:117–124.
3. Powell NB, Riley RW, Troell RJ, Li K, Blumen MB, Guilleminault C. Radiofrequency volumetric tissue reduction of the palate in subjects with sleep-disordered breathing. *Chest.* 1998;113:1163–1174.
4. Stuck BA, Sauter A, Hörmann K, Verse T, Maurer JT. Radiofrequency surgery of the soft palate in the treatment of snoring. A placebo-controlled trial. *Sleep.* 2005;28:847–850.

Edited by Jing Li