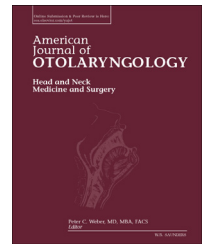


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# Effectiveness of radiofrequency cryptolysis for the treatment of halitosis due to caseums

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## ABSTRACT

**Objective:** To evaluate the effectiveness of radiofrequency (RF) cryptolysis for caseum-induced halitosis.

**Study design:** Clinical retrospective study.

**Setting:** Otorhinolaryngology Head and Neck Surgery Department of Konya Training and Research Hospital in Turkey.

**Subjects and methods:** Thirty-four patients with caseum-induced halitosis were included. Eight were male (23.5%) and 26 were female (76.5%). Their mean age was  $28.29 \pm 9.3$  (range: 17–48) years. The mean duration of complaint of halitosis before RF cryptolysis was  $53.41 \pm 42.6$  months (range: 6–182 months). The Finkelstein test, organoleptic measurements, and visual analog scale (VAS) were performed before and 12 months after RF cryptolysis.

**Results:** Before RF cryptolysis, all patients had a positive Finkelstein's test result, organoleptic measurements revealed that three (8.82%) had serious halitosis, 24 (70.58%) had average halitosis, and seven (20.58%) had mild halitosis, and the mean VAS score was  $6.82 \pm 1.45$ . The follow-up period after RF cryptolysis was 12 months. After the single RF cryptolysis session, 26 patients (76.47%) were negative for Finkelstein's test, organoleptic assessments revealed that 26 (76.47%), six (17.64%), and two (5.88%) showed complete, partial, and no recovery, respectively, ( $p < 0.001$ ), and the mean VAS score was significantly better at  $1.88 \pm 2.5$  ( $p < 0.001$ ). Thirty-two patients (94.1%) exhibited a decrease in VAS score.

**Conclusion:** RF cryptolysis is a cost-effective, safe, and easily applicable modality for the treatment of halitosis due to caseums in the crypts of the palatine tonsils.

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## 1. Introduction

Halitosis can be detrimental to the quality of life of individuals, their families, and their social counterparts [1]. Oral cavity diseases, followed by sinonasal diseases, are the most common causes of halitosis. Other causes are disorders of the respiratory and gastrointestinal systems, liver/renal disorders, and metabolic syndromes [2–5].

The palatine tonsils contain crypts, which are tubular structures extending from the surface to deep into the parenchyma. These crypts can accumulate epithelial waste, keratin debris, and foreign bodies, which can lead to the formation of yellowish malodorous viscous masses called caseums (a Latin name that means cheese) [6,7]. These caseums are often seen in otorhinolaryngology practice and they associate strongly with halitosis because the proteolytic

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anaerobic bacteria in the crypts produce volatile sulfur components (VSCs), namely, sulfur-derivative gases. Several studies that objectively measured VSCs by using a halitometer have confirmed the association between these VSCs and halitosis: they found that patients with halitosis due to palatine tonsil crypt caseums had high levels of VSCs [8-10]. Another study found a statistically positive correlation between the existence of caseums and higher VSC levels [11].

Patients with halitosis due to palatine tonsil crypt caseums also have other complaints, including continuous discomfort or irritation in the throat or the feeling that there is a foreign body in the throat. Tonsils with caseums are also prone to inflammation, hyperemia, and hypertrophy. Caseums can be seen in both sexes, at any age, in all tonsil types, and in one or both tonsils [12].

Several methods have been devised to control or eliminate halitosis due to caseums [12]. While mouthwash, saline flush and antiseptic solutions do not yield satisfactory outcomes, a complete cure can be achieved with tonsillectomy. However, this method is associated with postoperative pain, longer recovery time, and complications as a result of operation and anesthesia [8]. Another approach is radiofrequency (RF) cryptolysis. While RF energy has been used in various medical fields for years, including in tonsillectomy and tonsillotomy, RF cryptolysis has been a relatively recent application. In RF cryptolysis, RF waves are used to create limited thermal damage in the targeted tissue, which later heals via fibrosis. The greatest advantage of this technique is that it is limited to the tissue to which it is applied. In 2011, Tanyeri et al. reported the efficacy and tolerability of RF tonsil ablation for halitosis [13].

There are only a few studies in the recently literature, the use of RF cryptolysis for treatment of caseum-induced halitosis. The present study aimed to investigate the effectiveness of RF cryptolysis in patients with halitosis caused by caseums in palatine tonsil crypts and to contribute at the other studies.

## 2. Patients and Methods

### 2.1. Patients

This retrospective study included 34 patients with halitosis caused by palatine tonsil crypt caseums who were treated with RF cryptolysis between December 2009 and July 2012. Of these patients, 26 were females and eight were males, and the mean age was  $28.29 \pm 9.3$  (range: 17-48 years). This study was approved by the local Research Ethics Committee of Selcuk University Faculty of Medicine, Konya, Turkey. All patients were asked to sign the patient approval form that contained detailed information about the disease and the risk and benefit of treatment.

The medical history of the patients revealed that they had all visited several doctors in the past due to long-term halitosis but their condition had not improved despite various medical treatments. All patients had caseums in one or both tonsils. In all cases, the head, neck, and otorhinolaryngological area were examined before cryptolysis. The nose, nasopharynx, oropharynx, larynx, and hypopharynx were examined by using a flexible fiber optic nasopharyngoscope. Each patient was examined for the presence of all potential causes of halitosis. The same dentist also examined each patient for potential dental and periodontal diseases. Labora-

tory tests were performed to obtain the complete blood count and to determine the urea, creatine, aspartate aminotransferase (AST), alanine aminotransferase (ALT), and pre-prandial blood glucose levels for potential causes. The use of medicines, cigarettes, and alcohol addiction were recorded. Patients with other halitosis-inducing diseases were excluded, as were smokers, alcohol-addicted patients, and patients who took medicines. All patients was treated adequately with saline, benzydamine hydrochloride and betadine gargling and also with oral amoxicillin clavulanic acid 1000 mg BID and metronidazole 500 mg twice daily for 10 days. Patients who do not benefit from treatment were included in the study.

### 2.2. Finkelstein tonsil-smelling test

In all patients, the tonsil-smelling test introduced by Finkelstein et al. was performed before and after RF cryptolysis. The tonsillar tissue was palpated with a gloved index finger. The gloves that were used during this procedure were not made of latex to ensure that there was no latex smell. The test results were recorded as yes, I smell a bad odor (positive) and no, I smell not bad odor (negative) by the three participants (The patient, doctor, and relatives).

### 2.3. Organoleptic measurement

To measure the halitosis of each patient before and after 12 months after a single RF cryptolysis, an organoleptic measurement was performed by asking the patient to blow his or her breath out towards the doctor's face, which was about 10 cm away. The doctor scored the odor according to a 0-5 point scale, where 0 represents no odor, 1 signifies an odor that is barely discernible, and 5 indicates an unbearable malodor. All odor assessments of the patients in the present study were performed by the same doctor.

### 2.4. Visual analog scale (VAS)

The patients and their respective family member were asked to subjectively score the intensity of malodor from 1 to 10 on a VAS before and after cryptolysis. The intensity, frequency, and duration of halitosis were asked the patients and family



**Fig. 1 - Appearance of caseums on the surface of both tonsils after tonsil palpation.**

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