Braz J Otorhinolaryngol.
2013;79(5):546-54.

DOI: 10.5935/1808-8694.20130099

ORIGINAL ARTICLE

BJORL.org

Gustatory and olfactory dysfunction in laryngectomized patients

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Keywords:
laryngectomy;
olfaction disorders;
taste disorders.

Abstract

After total laryngectomy surgery, nasal airflow is moved permanently to the tracheostomy opening, compromising the contact of odorant molecules with the nasal cavity, which may reflect changes in the olfactory and gustatory perception in these individuals.

Objective: To evaluate the functions of smell and taste in total laryngectomized patients. Study design: a study of series.

Method: The sample included a group of 25 patients submitted to total laryngectomy and another group of 25 patients who did not underwent the procedure. The taste function was evaluated by gustatory strips of filter paper. To assess the olfactory function we employed the Brief Smell Identification Test.

Results: Among the laryngectomized patients there was more hypogeusia (80%, $p < 0.05$), as well as hyposmia (88%, $p < 0.001$), alone and concomitant (72%, $p < 0.001$). Concerning flavor discrimination, the bitter taste did not differ between the groups - which was different from the other flavors. In the olfactory aspect, laryngectomized patients performed worse in detecting warning and food-related odors. We found that a history of smoking and alcohol consumption were significantly more frequent among laryngectomized patients.

Conclusion: We found a decrease of gustatory and olfactory functions in total laryngectomized patients in this study.

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Paper submitted to the BJORL-SGP (Publishing Management System - Brazilian Journal of Otorhinolaryngology) on March 19, 2013;
and accepted on June 29, 2013. cod. 10818.

INTRODUCTION

After total laryngectomy surgery, nasal airflow is permanently transferred to the tracheostome, compromising the arrival of odorant molecules to the nasal cavity[1,2]. The decrease in olfactory (hyposmia) and gustatory (hypogeusia) perceptions of individuals undergoing this intervention is often reported in the literature[3,4]. Currently, it is considered that the laryngectomy may cause these changes due to the interruption that occurs in the respiratory tract, as well as by changes in the epithelial structure of the nasal mucosa and in the sensorineural feedback[5,6].

These sensory changes are less frequently investigated in clinical practice, since the loss of verbal communication, pulmonary complications and the psychosocial problems are evident after this surgery, and more often rehabilitated.

The present study aimed to evaluate the smell and taste perceptions in patients submitted to total laryngectomy, compared with non-laryngectomized individuals, by means of two quantitative tests.

METHOD

Study Group

We had a group of 25 patients who underwent total laryngectomy for cancer and a comparison group of 25 individuals without laryngectomy, regardless of gender and education.

The exclusion criteria for both groups were: a history of smell and taste disorders, use of medications that could impair the functions analyzed, as well as if at the time of collection the patient had rhinitis, sinusitis, and inflammatory processes in the stomatognathic system.

We had an odds-ratio of 10.22 for the group of laryngectomized individuals, our sample counted with 50 subjects, representing a 99.9% proof power, with a significance level of 0.05.

Smell Test

To assess the olfactory function we used The Brief Smell Identification Test - B-SIT (Sensonics Inc.®, Haddon Hts., NJ 08035) from the University of Pensilvânia[7]. The test consists of presenting 12 scents (cinnamon, turpentine, lemon, smoke, chocolate, roses, paint thinner, banana, pineapple, gasoline, soap, onions), contained in microcapsules of urea-formaldehyde polymers of 10-50 micrometers, fixed in strips contained in the bottom corner of 12 pages of a single booklet.

The test was of rapid administration, establishing a relative degree of olfactory function loss through percentiles.

Taste test

The instrument used to evaluate the gustatory function was based on the test validated by Muller *et al*.[8]. Strips of filter paper 8 cm long and 2 cm^2 were impregnated with different concentrations of the following flavors: salty, sweet, bitter, sour; there were also two strips with distilled water (unflavored) used to validate the study; totaling 18 strips. We used the following concentrations: sour - 0.3 g/ml, 0.165 g/ml, 0.09 g/ml and 0.05 g/ml citric acid; bitter - 0.006 g/ml 0.0024 g/ml , 0.0009 g/mL to 0.0004 g/ml quinine sulphate; sweet - 0.4 g/ml, 0.2 g/ml, 0.1 g/ml and 0.05 g/ml sucrose; salty - 0.25 g/ml 0.1 g/ml 0.04 g/ml and 0.016 g/ml sodium chloride.

The strips were placed on the middle of the volunteer's tongue at a distance of approximately 1.5 cm from the tip of the tongue, and the test began with the lowest concentration. After evaluating each strip, the volunteer rinsed his mouth with water to remove any residue.

In accordance with recommendations in the literature,[8] the taste test was conducted at least one hour after the last feeding, ingestion of any drink (except for water), having smoked or having brushed the teeth.

Statistical Analysis

The data was organized in an Excel® spreadsheet and analyzed using the SPSS version 17.0 software. For data analysis purposes we used the chi-square, Fisher's exact and ANOVA tests.

To classify the study subjects from both groups, as for their gustatory function, we used nine correct answers out of a total of 16 concentrations tested as the cutting point; classifying as hypogeusia a total less than or equal to 9; and normogeusia a total number of correct answers greater than 9. For sweet, salty and sour gustatory stimuli, the perception was classified as hypogeusia when the total number of correct answers was less than or equal to two. For the bitter gustatory stimulus, hypogeusia was considered when there was one or less correct answer[8].

Proper olfactory function, according to age and gender, was classified as hyposmia when the total number of correct answers vis-à-vis the olfactory stimuli was less than nine, following the guidelines for B-SIT® application[7].

Variables related to age and number of correct answers vis-à-vis the olfactory and gustatory stimuli were expressed as a mean, standard error of the mean; with respective confidence intervals at 95% level.

To compare the mean values between the groups, we employed the ANOVA test and, to compare the distributions of absolute and relative frequencies, we used the Person's chi square or Fisher's exact tests. We employed a significance level of 0.05 for all tests.