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Research Article

Gustatory Changes Following Mandibular Third Molar Surgery: A Systematic Review of the Literature

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Abstract

The purpose of this study was to systematically review studies to measure the incidence of gustatory changes because of LN damage following Mandibular Third Molar (M3M) removal. A computerized search of the several databases and references cited in the various studies was performed to identify eligible articles. The primary predictor variable was taste changes after M3M surgery. Five published studies acceptable for detailed analysis according to predetermined inclusion and exclusion criteria. In the 5 selected articles, incidence of gustatory changes were 0-38.3%, and 2.9% of the pooled studies. Taste disturbance as a result LN deficit in M3m surgery in not uncommon complication especially in patients with high difficulty index score.

Keywords: Wisdom tooth surgery; Taste disturbance; Gustatory deficit; Neuro-sensory deficit

Introduction

The removal of mandibular third molars (M3M) is the most common surgical procedure associated with Lingual Nerve (LN) damage [1,2].

LN is anatomically related to third molar area; within the periosteum in the lingual or distal side of third molar; that makes it at risk when lingual flap is reflected [3], lingual flap retractor is used [4], and/or when tooth extracted using lingual split technique [5]. Moreover, the anatomic variation on LN and the fact that panoramic radiography cannot preoperatively predicts of LN injury [6], the surgeon is often not able to avoid this complication.

LN injury may result in a variety of neurosensory deficits like anesthesia, paresthesia, dysesthesia, hypoesthesia and/or a change in taste perception of food and drink (hypogeusia or ageusia [7,8]. It is very disabling complication causing many problems for patients like tongue biting, drooling, burns from hot food and drinks, and a burning sensation of the tongue [7].

This systematic review aimed to identify all available relevant studies in the literature related to gustatory changes because of LN damage in M3M surgery, and to determine the incidence and time course of these changes.

Materials and Methods

Electronic search, including PubMed, Scopus, and the Cochrane Library were performed. In addition; the online databases of the Journal of Oral and Maxillofacial Surgery; International Journal of Oral and Maxillofacial Surgery; British Journal of Oral and Maxillofacial Surgery; Oral Surgery; Oral Medicine; Oral Pathology; Oral Radiology as well. Search performed for all years available up until 10/July/2018. Only articles published in English were included. The following key words/terms were used in search: third molar or wisdom tooth combined with paresthesia, dysesthesia, taste, gustatory function, neurosensory deficit, neurosensory disturbance and sensory nerve impairment.

The authors carried out the search individually. The abstract of each article was viewed and the full text was downloaded if it was considered relevant to the inclusion criteria of the study:

1. Articles relevant to lingual nerve deficit caused by M3M surgery;

2. Articles list the gustatory deficit that the subjects experienced based on clinical objective taste testing.

3. Articles must be randomized clinical trials, controlled clinical trials, or prospective clinical studies.

4. Studies were also selected if contain data of interest among other findings.

A second-round search was carried out using the references of all included articles that met the inclusion criteria. Any disagreement between authors solved by consensus.

Due to a limited number of studies, and the considerable differences in study design, it was not possible to determine the risk of bias of included studies.

Then, the variable of interest in the results of all selected studies were analyzed as "mixed group" of studies to assess taste deficits among patients undergoing M3M extraction.

Results

A computer searches resulted in 191 potentially relevant articles. A review of the reference lists in these articles yielded another 23 articles, giving a total of 214 articles.

In the first round of evaluation, 206 article were excluded from the study: eighty-two articles only assessed paresthesia and/or dysesthesia of LN. Twenty-five articles were review, case reports, case-series, and technical notes. Twenty-five articles related to mental/inferior alveolar nerve deficit. Twenty-three duplicated articles. Twenty-one

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Table 1: Articles for the final review and the incidence of taste disturbance and other LN deficits presented in these articles.

Study	Study design	Number of M3M surgeries	Age of patients, Mean (SD)	Type of surgery	Number (%) of patients with taste disturbance	Number (%) of patients with other LN deficits	Neuro-sensory evaluation
Shafer *et al.* [12]	Pros.	17 patient (bilateral) N=34	15-28, 21.1 (3.7)	Standard buccal approach	1 (2.9%) patient with temporary deficit	1 (2.9%) patient with temporary deficit	Preop,1 and 6 m after surgery
Gülicher and Gerlach [13]	Pros.	687 patient, N=1106	About 25.8 year	Standard buccal approach With lingual periosteal elevator to protect LN	13 (1.2%) patients with temporary deficit, 1 (0.09%) of them permanent deficit.	23 (2.1%) patients with temporary deficit,, 3 (0.3%) of them permanent deficit.	After surgery – 6 months
Akal *et al.* [14]	Pros.	27 patient (bilateral) N=54	17-28, 21.32 (3.6)	Standard buccal approach	0	0	Preop,1 and 6 m after surgery
Ridaura-Ruiz *et al.* [15]	Pros.	16	≥55, 26.9 (11.2)	Standard buccal approach	0(only salt taste tested)	0	Preop.,1 week, and 1 mafter surgery
Anand *et al.* [16]	RCT	60	NA	Standard buccal approach	23 (38.3%)	Not assessed	Preop. And 1 week after surgery
Total		1270			37 (2.9%)	*24(2%)	

M3M: Mandibular third molar; LN: Lingual nerve; NA: Not available
*Results of only 4 studies.

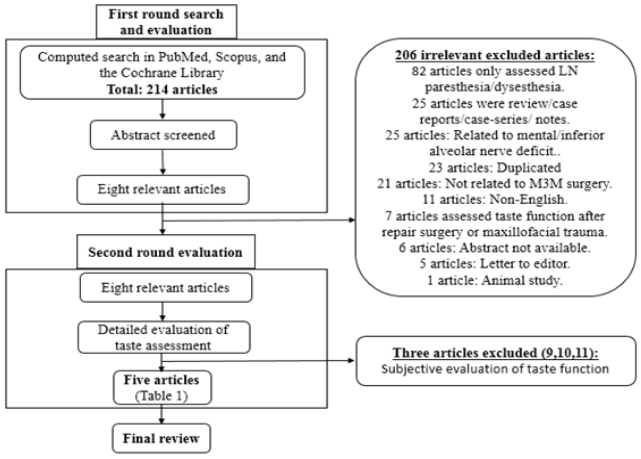

Figure 1: Article selection process.

articles not related to wisdom tooth surgery. Eleven articles published in non-English language. Seven articles assessed taste function of LN after repair surgery or maxillofacial trauma. Abstract not available in six articles. Five articles were letter to editor, and one animal study.

Only eight articles considered eligible and passed through the second round of evaluation. In this round, three articles were excluded; two retrospective studies [9,10] evaluated taste function in subjective way, and correlate patients with taste deficits with neurosensory dysfunction. Another article11 assessed taste function subjectively 3-12 months after surgery.

Five studied were suitable for final review [12-16]. One of the selected studies were randomized clinical trials and 4 were prospective clinical studies (Figure 1, Table 1).

All studies carried out using the standard buccal approach (no chisel, no lingual split technique, no lingual flap reflection) and in one of them, the periosteal elevator used as LN protector [13].

The incidence of temporary taste dysfunction in the included studies ranged from 0- 38.3%, and the combined totals were 2.9%. In contrast, the reported rates of other forms of LN deficits; in four of included studies [12-15]; were 0-2.1%; giving a total of 2%.

Discussion

The LN carries different types of nerve fibers, and joined by the chorda tympani branch of the facial nerve, which contains gustatory, thermosensitive, and mechanosensitive afferent fibers from papillae on the dorsal surface of the tongue [17]. The Chorda tympani-lingual nerve runs medially to the mandible at third molar region where they being most susceptible to damage during surgical procedures [14].

Thorough knowledge of LN anatomy is crucial to avoid or reduce the risk of iatrogenic nerve damage, it is important to know that LN spatial position differ widely from individual to individual, and in the same individual [18]. Also, the level of alveolar process and the inclination of its lingual surface in the M3M region can influence the LN position [19].

Trauma to the LN cannot be predicted by preoperative panoramic radiography, [20] and different methods have been used to evaluate LN spatial position, such as magnetic resonance imaging, [21] ultrasound, [22] but they did not accurately identify and assess anatomic relations of LN to the neighboring structures [23].

Knowledge about the incidence of LN disturbances is particularly important for the surgeon as well as for the patient when evaluating the risk-benefit ratio in M3M surgery [24].

The rate of lingual nerve temporary deficit following M3M surgery ranges 0.1-22% [25]. This wide range due to different risk factors like increasing age, M3M eruption status, pattern of impaction, type of surgical technique, raising of lingual flap, and surgeons' experience. LN may also be damaged as a result of nerve compression by edema, [14] by syringe needle, [26] local anesthetics, [27] and suture at the 3M extraction site [20].

The postoperative evaluation of sensory disturbance is necessary to evaluate the type of the problem and to test the over time-potential improvement [7,28]. The sense of taste could be surveyed objectively by using a kit containing different concentrations of sugar (sucrose), salt (NaCl), citric acid, and quinine hydrochloride.

The sensory tests should be as objectively as possible to avoid patients' bias in subjective reports that may influence results [29,30]. This explain why reviewers excluded three studies [9-11] from this review.

Although Anand et al. [16] in their study not assessed other forms of LN deficits, they reported a highest incidence (38.3%) of taste changes compared with other studies, especially in cases with high extraction difficulty score that need a high level of surgeon's experience. Similarly, researchers found a highly significant correlation between the level of M3M extraction difficulty and incidence of LN deficit [31]. Moreover, Hillerup and Stoltze11 recorded a comparable result of taste deficit (32.6%) when they assessed taste function subjectively.

Akal et al. [14] tested the whole-mouth gustatory function and found non-significant increase in thresholds for all taste sensations compared with preoperative values. The non-documentation of surgical difficulty score and the type of impaction might explain these findings. Similar findings were reported by Ridaura-Ruiz et al. [15]. They observed only slight increase in the salt recognition threshold one week after surgery, which was not significant statistically. Noting that this study comprised limited number of cases and it only consider the salt taste recognition as a sign of gustatory deficit. However salty taste have more predilections for increased taste threshold compared with other tastes as reported by other studies [11,14,15].

Gülicher and Gerlach13 surveyed postoperative sensory impairment over a period of 6 months in more than 680 patients with more than 1100 case of M3M surgery. They reported 1.2% and 0.09% temporary and permanent hypoguesia respectively. Surgeons routinely inserted periosteal elevator on the lingual aspect of the mandible to protect LN and this may accounts for a higher percent (2.1) of other types of LN sensory disturbance were recorded illustrating that not all cases of LN paresthesia or dysesthesia should associated with taste deficit.

Differences among included studies may be related to the fact that that nerve fiber size and myelination may play a role in neurosensory disturbances after LN injury [32].

Assessment of gustatory deficit and recovery was not attempted largely in M3M studies. For future studies, the authors recommend a standardized methodology and follow- up for assessing gustatory deficit following third molar surgery through randomized clinical trials with large sample size to evaluate incidence, type of this neurosensory disturbance and the associated risk factors.

In conclusion, this literature review of prospective studies found that taste disturbance as a result LN deficit in M3m surgery in not uncommon complication especially patients with high difficulty index score.

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