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Original article

Relationships between perceived chewing ability, objective masticatory function and oral health-related quality of life in mandibulectomy or glossectomy patients with a dento-maxillary prosthesis

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ABSTRACT

Purpose: This preliminary study examined whether the type of surgery performed for head and neck lesion was associated perceived chewing ability, objective masticatory function, and oral health-related quality of life (OHRQoL) in patients who required a dento-maxillary prosthesis postoperatively.

Methods: Thirty-eight patients with a dento-maxillary prosthesis were divided into three groups according to the type of surgery received: marginal mandibulectomy, segmental mandibulectomy with bony reconstruction, or glossectomy. Perceived chewing ability, objective mixing ability, and OHRQoL were evaluated using a food intake questionnaire, color-changeable chewing gum, and the Geriatric Oral Health Assessment Index (GOHAI), respectively. Differences in the scores obtained by the three measures were compared between the surgical groups using the Kruskal–Wallis test, and associations between the scores in each group were analyzed by Spearman's rank correlation analysis.

Results: Objective mixing ability was found to be significantly low only in patients who underwent glossectomy. No other measures differed significantly between the surgical groups. Perceived chewing ability and objective mixing ability were significantly associated in the marginal mandibulectomy and glossectomy groups but not in the segmental mandibulectomy group. Furthermore, GOHAI score was significantly associated with perceived chewing ability and objective mixing ability in the marginal mandibulectomy group.

Conclusions: Within the limitations of this study, the present findings suggest that the type of surgery received might influence food mixing ability. Associations among food mixing ability, perceived chewing and OHRQoL are not accountable depending on the type of surgery received, indicating the presence of other contributing factors to be considered.

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1. Introduction

After surgery for head and neck lesion, patients may experience major problems due to impaired masticatory function. Such function is usually restored with the placement of a dento-maxillary prosthesis. Masticatory function can be assessed by objective measurements such as masticatory efficiency, bite force, and food mixing ability. The latter refers to the ability of patients to mix test foods [1]. The severity of food mixing ability impairment in patients after mandibulectomy and/or glossectomy has been reported to differ according to the type of surgery the patients received [2,3]. Masticatory function can also be evaluated subjectively from, for example, patient perception of chewing ability. In fact, a number of researchers have reported positive relationships between objective masticatory efficiency and subjective perception of chewing ability in edentulous patients with complete dentures [4,5], partially dentate patients with removable or fixed partial dentures [6], and mandibulectomy patients with a dento-maxillary prosthesis [7].

Impairment of masticatory function is regarded as one of the most serious oral health problems. For instance, perceived chewing ability showed a significant relationship with oral health-related quality of life (OHRQoL) [8,9], a comprehensive measure of patient reported outcome. One of the most common instruments used to evaluate OHRQoL is the Geriatric Oral Health Assessment Index (GOHAI) [9]. A study investigating head and neck cancer patients who underwent resection and posterior reconstruction found that their GOHAI-determined OHRQoL was decreased postoperatively, while their generic health-related quality of life (HRQoL), as measured by Short Form-36 Health Survey (SF-36) was largely maintained [10]. Moreover, the factors affecting HRQoL were found to be different between maxillectomy patients and mandibulectomy and/or glossectomy patients [11].

To better understand the effect of maxillofacial prosthetic treatment after removal of head and neck lesion on oral health status, it is necessary to clarify whether an association exists between OHRQoL and oral functions, measured objectively and subjectively. To the best of our knowledge, the impact of type of surgery on perceived chewing ability, objective masticatory function, and OHRQoL, and possible associations between them, has not been reported for these patients.

Against this background, this study examined the effect of type of surgery for head and neck lesion on masticatory function and OHRQoL in patients requiring a dento-maxillary prosthesis postoperatively. Given the substantial differences in OHRQoL reported between maxillectomy patients and mandibulectomy or glossectomy patients [11], we investigated patients who underwent marginal mandibulectomy, segmental mandibulectomy with bony continuity reconstruction, and glossectomy in this study. The null hypothesis of this study was that treatment outcomes as measured by perceived chewing ability, objective masticatory function, and OHRQoL would not be related to type of surgery performed for head and neck lesion in patients who required a dento-maxillary prosthesis postoperatively.

2. Materials and methods

2.1. Participants

This cross-sectional study was conducted at the Department of Maxillofacial Prosthetics of Tokyo Medical and Dental University Dental Hospital. Inclusion criteria were having undergone mandibulectomy or glossectomy for head and neck lesion, patient satisfaction with a dento-maxillary prosthesis (i.e., did not require adjustment at enrollment), and having worn the prosthesis for at least 6 months. Exclusion criteria were having an implant-retained prosthesis, having undergone surgical resection within the previous year or segmental mandibulectomy without bone continuity reconstruction, and inability to speak, read, or understand Japanese. In accordance with these criteria, 38 consecutive patients (18 woman, 20 men; mean age, 69 years; age range, 38–87 years) were examined. Between January 2013 and July 2014. The study protocol was approved by the Ethics Committee of Tokyo Medical and Dental University (Approval No. 865), all participants received a written and verbal description of the study and provided written informed consent prior to participating in the study.

The patients were divided into three groups according to the surgery they received: marginal mandibulectomy, segmental mandibulectomy, or glossectomy. All the patients in the segmental mandibulectomy group underwent mandibular bone continuity reconstruction.

2.2. Clinical and demographic characteristics

Intra-oral photographs and clinical examination details from the patients' medical records were gathered for age, sex, mandibulectomy characteristics, glossectomy characteristics, reconstruction type, pathological diagnosis, and number of mandibular teeth and occlusal units (1 unit corresponds to a pair of occluding premolars, and 2 units corresponds to a pair of occluding molars) [3] (Table 1).

2.3. Evaluations

2.3.1. Perceived chewing ability

Patient perception of chewing ability was rated using a food intake questionnaire [12,13] consisting of 35 food items classified into 5 grades based on food hardness (Table 2). The participants rated their ability to chew each of the 35 food items using the following scale: 0, cannot eat; 1, can eat with difficulty; and 2, can eat easily. An additional 2 categories of ''do not eat because of aversion'' and ''have not eaten since starting to wear dentures'' were scored as 0. The points for each grade were summed and the masticatory score (MS) calculated as follows:

$$\mathrm{MS} = \frac{(A + 1.14B + 1.30C + 1.52D + 3.00E)}{111.4} \times 100\%.$$

2.3.2. Objective masticatory function

Objective masticatory function was measured using the food mixing ability test. This test uses chewing gum that progressively changes from yellowish-green to red as it is chewed (XYLITOL;