学位論文の要旨

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論文内容の要旨

INTRODUCTION

The disease-specific survival rates of oral cancer patients have increased with the development of surgical techniques, molecular targeted drugs, and immune checkpoint inhibitors, as well as the application of radiotherapy, represented by intensity-modulated radiation therapy. With an increase in the number of oral cancer patients due to the increased survival rate after treatment and the aging of the population, the number of oral cancer patients living with the sequelae of oral cancer treatment is increasing. According to the current National Comprehensive Cancer Network (NCCN) guidelines, resection is often the first-line treatment for oral cancer. Thus, there is a wide range of sequelae after oral cancer treatment, such as xerostomia, dysphagia, speech disorder, tooth loss, chronic pain, body image concerns, anxiety/depression, trismus, rampant tooth decay, osteonecrosis, and malnutrition. In particular, restriction of food intake is a sequela that can lead to malnutrition. Approximately one-quarter of patients who have undergone oral cancer treatment experience a decrease in food intake. In oral cancer treatment, sudden anatomical structural displacement and lack of motor sequence lead to postoperative impairment of oral function. Hence, there is a need for more suitable methods to evaluate postoperative dysphagia in oral cancer patients. The Matsuda–Kanno classification of postoperative oral dysfunction is useful for comprehending different types of swallowing dysfunction, as previously reported. Briefly, three components were identified using principal component analysis in the Matsuda–Kanno classification. Type I (Transport type) includes masticatory function, Eating Assessment Tool (EAT-10), and tongue pressure. Type II (Oral hygiene type) consists of items related to bacterial counts, oral health perception, and oral dryness. Type III (Occlusal type) consists of occlusal force alone.

Although there are reports that early intervention by a dietitian may improve the nutritional status of patients with oral cancer, two randomized controlled trials could not confirm the effectiveness of this intervention. Therefore, we hypothesized that different types of postoperative oral dysfunction require different nutritional guidance and conducted a study to clarify the relationship between various postoperative oral functions and nutritional status.

MATERIALS AND METHODS

This cross-sectional study collected background data and evaluated the oral function (microorganisms, oral dryness, occlusal force, tongue pressure, masticatory function and eating assessment tool [EAT-10]) of 75 patients from September 2019 to December 2021. the Mini Nutritional Assessment-Short Form (MNA-SF) was used for the subjective assessment of dysfunction in oral cancer patients. Also, Matsuda-Kanno classification was used for the objective assessment. For group comparisons, we used the chi-square test and Mann–Whitney U test with Bonferroni correction after the Kruskal–Wallis test as a multiple comparison method. In addition, a trend test (Jonckheere–Terpstra test) was performed. The multiple regression analysis was conducted with the total MNA-SF score as the objective variable. The study protocol was approved by the Research Ethics Committee of Shimane University.

RESULTS AND DISCUSSION

Patients who were treated for oral cancer, 52 (69.3%) of whom were male. The median age of the patients was 72.0 years (IQR: 64.0–78.0 years). The tongue was the most frequent primary tumor site, and 31 (41.3%) patients had early stage cancer. Surgery alone was the most common treatment (40 patients, 53.3%). Neck dissection and reconstruction were performed in 48 (64.0%) and 47 (62.7%) patients, respectively. The median number of teeth was 16.0 (IQR: 3.0–24.0). The median (IQR) values of oral function measurements were 3.0 (2.0–5.0), 24.8 (21.3–26.7), 245.6 (18.0–443.6), 17.1 (7.5–23.6), 75.0 (15.0–150.0), and 15.0 (4.0–25.0) for microorganisms (grade), oral dryness, occlusal force (N), tongue pressure (kPa), masticatory function (mg/dL), and EAT-10, respectively. The median MNA-SF score (malnourished) was 28 (37.3%).

Multiple group comparisons of MNA-SF scores and related factors showed significant differences in age ($p = 0.025$), body mass index ($p = 0.001$), number of teeth ($p = 0.020$), performance status ($p = 0.005$), tumor stage ($p < 0.042$) and treatment methods (surgery/surgery and adjuvant radiotherapy/surgery and adjuvant chemoradiotherapy; $p < 0.001$).

Multiple group comparisons of MNA-SF scores and oral function measurements showed significant differences in occlusal force, tongue pressure, masticatory function, and EAT-10 levels.

Multiple regression analysis showed a statistically significant association with MNA-SF in terms of masticatory function ($\beta = 0.28$, $p = 0.012$) and EAT-10 levels ($\beta = -0.32$, $p = 0.007$).

The major finding of this study is that multiple oral dysfunctions have an impact on nutritional status. Of these, masticatory function and EAT-10 levels were found to be independent and distinct oral dysfunctions in our previous studies. In addition, the EAT-10 swallowing assessment has traditionally been associated with nutritional status in healthy individuals. Our hypothesis that "different types of postoperative oral dysfunction require different nutritional guidance" is likely to be correct, and our results were reasonable. In other words, the Type I (Transport type) and III (Occlusion type) hypotheses were accepted, but the Type II (Oral hygiene type) oral dysfunction hypothesis was rejected.

Malnutrition may occur due to Type I. In the nutritional instructions for Type I, it is especially important to choose a food texture that facilitates the formation of boluses, which can be transported to the pharynx by gravity. In addition, the use of palatal augmentation prosthesis as a patient specific oral-maxillofacial prosthetic treatment makes it easier to direct the bolus into the esophagus, and rehabilitation with maneuvers on swallowing function is a reinstatement of safe oral intake.

Multivariate analysis did not show a significant association between occlusal force and nutritional status, but Type III suggests the possibility of nutritional impairment showed in multiple group comparisons. Decreased occlusal force is mainly caused by resection of the masticatory muscles (temporalis, masseter, lateral pterygoid, and medial pterygoid muscles) and loss of occluding pairs of teeth due to maxillary or mandibular resection. Decreased occlusal force is mainly associated with decreased intake of vegetables and proteins affecting nutritional status. Therefore, nutritional guidance should pay more attention to the loss of food diversity than food texture. It is also suggested that oral-maxillofacial prosthetic treatment may be useful. The first-line treatment for patients with maxillary or mandibular defects is patient-specific oral-maxillofacial prosthetic treatment using dentures and dental implants. In addition, community collaboration is also important from the perspective of long-term nutritional management following oral cancer treatment.

CONCLUSION

Decreased masticatory function and EAT-10 levels are risk factors for malnutrition. Postoperative oral dysfunction Type I (Transport type) may be a risk factor for nutritional status in patients treated for oral cancer. Further, individual nutritional guidance may be adapted to each type of postoperative oral dysfunction.