Abstract: To better understand the clinical features of mass lesions of the tongue, we retrospectively evaluated frequency, recurrence rate, and complications in 296 patients who had undergone surgery for such lesions. The diagnoses were fibroma (43.6%), mucous cyst (14.2%), papilloma (11.8%), hemangioma (7.8%), granuloma (6.4%), lipoma (1.4%), schwannoma (1.0%), ectopic tonsil (0.7%), and other (13.2%). Recurrence was noted in two patients (0.7%). Twenty-two patients (7.4%) developed surgical complications, including lingual nerve paralysis (6.4%), glossodynia (0.6%), and postoperative infection (0.3%). Lingual nerve paralysis was observed in the ventral portion (42.1%) of the tongue, apex (36.8%), lateral border (10.5%), and dorsum (10.5%). When all sites were considered together, there was no significant difference in the number of patients presenting with lingual nerve paralysis ($P = 0.075$). However, there were significant differences in lingual nerve paralysis at the lateral border ($P < 0.05$), apex ($P < 0.05$), and dorsum ($P < 0.001$) but not at the ventral portion ($P > 0.05$) in the size of the patients with versus without it which suggests that the risk of lingual nerve paralysis is higher at the ventral tongue, regardless of tumor size. These results shed light on the clinical features of mass lesions of the tongue.

Keywords: benign tumor; clinical study; fibroma; lingual nerve paralysis; tongue.

Introduction

The tongue is a muscular organ covered by a mucous membrane and four types of lingual papillae. It has a rich supply of nerves and blood vessels and is known for its role in taste. The continuous mechanical movement of the tongue aids in speech, cleaning of the oral cavity, digestion, and swallowing. Clinically, most benign tongue tumors present as painless, slow-growing lesions and are treated surgically (1,2). While such lesions are frequently seen in clinical practice, they can be difficult to diagnose (3). Differential diagnosis is important in the management of such lesions because it affects treatment options and disease outcomes (4-6). Although experienced clinicians continue to have difficulties in diagnosing benign tongue tumors, histopathological examination yields a definitive diagnosis.

Correct diagnosis of benign oral lesions requires careful documentation of clinical characteristics (7). However, to date, no review has addressed benign tongue tumors. Therefore, we reviewed the records of patients presenting with benign tongue lesions histopathologically diagnosed and treated at our hospital. To better understand the clinical features of benign tongue
lesions we evaluated their incidence, recurrence rate, and associated complications.

Materials and Methods
We retrospectively reviewed data for 296 patients presenting with a mass lesion clinically diagnosed as a benign tongue tumor and treated surgically in the Department of Oral and Maxillofacial Surgery at the Nihon University School of Dentistry (Tokyo, Japan) during the period from January 2011 through June 2016. All tongue soft tissue specimens were received by the Department of Oral Pathology at our hospital. Data on age, sex, tumor size and location, recurrence, and complications were analyzed. All study participants provided written informed consent. The study was approved by the appropriate Ethical Review Board of our institution (EP17D018), and the study was conducted in accordance with the Declaration of Helsinki.

In the analysis, the tongue was divided into four anatomical subsites, namely, the lateral border and dorsal, apical, and ventral tongue. Descriptive statistics were used to evaluate the registered data with the Statistical Package for the Social Sciences for Windows, version 24.0 (IBM Corp., Armonk, NY, USA). Statistical significance was defined as $P < 0.05$.

Results
Mean patient age was 44.5 (range, 2-87) years, and the male-to-female ratio was 1:1.13. The largest age groups were age 40–49 years ($n = 60$; 20.3%), 50–59 years ($n = 49$; 16.6%), and 30–39 years ($n = 41$; 13.9%) (Fig. 1). The most frequent lesion sizes were <5.0 mm (27.0%), 5.0–9.0 mm (48.3%), and 10.0–14.0 mm (17.2%) (Fig. 2). The most common tumor sites were the lateral border (37.5%) and apex (33.1%) of the tongue (Fig. 3).

Histopathologically, the lesions were classified as fibroma (43.6%), mucous cyst (14.2%), papilloma (11.8%), hemangioma (7.8%), granuloma (6.4%), lipoma (1.4%), schwannoma (1.0%), ectopic tonsils (0.7%), and others (13.2%), including a granular cell tumor, mucoepidermoid cancer, cystadenoma, inflammatory granulation tissue, and neuroma (Fig. 4).

Tumor recurrence was noted in 2 patients (0.7%): fibromatosis recurred 2 years after initial surgery in one patient, and epithelial hyperplasia recurred 4 years after initial surgery in the other patient. Both lesions were histopathologically diagnosed and treated as scar tissue.

Twenty-two patients (7.4%) developed surgical complications, including lingual nerve paralysis ($n = 19$; 6.4%), glossodynia ($n = 2$; 0.6%), and postoperative infection ($n = 1$; 0.3%). The 19 patients with lingual nerve paralysis were analyzed and compared with those...
without lingual nerve paralysis (Fig. 5A-B). The sizes of the 2 groups did not significantly differ (i.e., patients with versus those without lingual nerve paralysis; \( P = 0.075 \), independent \( t \)-test). Further analysis of patients stratified by tumor site showed that the sizes of the 2 groups significantly differed for the lateral border and apical and dorsal tongue (\( P < 0.05 \), \( P < 0.05 \), and \( P < 0.001 \), respectively; independent \( t \)-test) but not for the ventral tongue (\( P > 0.05 \)).

The interval from symptom onset to presentation at hospital is shown in Figure 6. The proportions of patients who visited our hospital within 1, 6, and 12 months of noticing a tongue lesion were 28.0%, 61.1%, and 68.6% respectively. The mean interval to presentation was 18.1 months (Table 1). These proportions did not significantly differ, and lesion size and the interval from symptom onset to presentation at hospital were not correlated (Pearson correlation coefficient, 0.093; \( P > 0.05 \)). The characteristics of most of the present tumors are shown in Table 2.

**Discussion**

Oral soft tissue lesions are frequent in clinical practice. A US study reported oral mucosal lesions in approximately...
27.9% of patients aged ≥17 years (3). However, some oral tumors are uncommon, and clinical diagnosis can thus be challenging. Although several case reports have been published (4-6), no statistical reviews have been conducted to date. To our knowledge, this is the first clinical study of benign mass lesions of the tongue that have been diagnosed and treated histopathologically.

The present male-to-female ratio was 1:1.13. The Japanese National Population Census of 2011 reported that 127,799,000 people lived in Japan, including 62,184,000 men and 65,615,000 women. In comparison to the male-to-female ratio of the Japanese population, women were over-represented in our sample. This is consistent with the findings of prior studies of reactive oral lesions (8-12), which reported a higher proportion of women affected. It is unclear if women are more likely to develop oral lesions or more likely to seek treatment for such lesions. Future studies of this question are warranted.

Although the interval from symptom onset to presentation at hospital did not significantly differ between subgroups, most of the present patients presented to hospital within 1 year of symptom onset, which is consistent with the findings of a previous clinical report (4). We hypothesized that this interval would be correlated with lesion size, but this was not the case (Fig. 6). In the present study, more than 30.0% of patients visited the hospital later than 1 year after symptom onset. Delays in diagnosis and treatment are associated with worse outcomes; thus, patients should be informed of the risk of developing oral lesions and the need for early diagnosis and treatment.

Tumor recurrence was observed in two patients, at 2-4 years after initial surgery. Management of oral lesions is crucial, both for malignant and benign tumors. The possibility of recurrence should be considered before and after treatment. Careful patient follow-up, either direct or indirect, and long-term cooperation with home dentists are essential in addressing the risk of recurrence.

The rate of postoperative complications in this study was 7.4%. In an analysis of lesion site and size, the risk of lingual nerve paralysis was higher for operations involving the ventral tongue. We hypothesized that the risk of lingual nerve paralysis would be positively associated with lesion size, but this was not the case. In addition, the present findings suggest the risk of lingual nerve paralysis for operations involving the ventral tongue regardless of the size. Lingual nerve paralysis can occur at any site on the tongue. Fortunately, all the present patients who developed lingual nerve paralysis recovered completely after mecobalamin treatment (mean interval to complete recovery, 76.2 days; range, 6-352 days). Few systematic reviews have investigated the clinical administration and mechanisms of mecobalamin, which is primarily used for treatment of peripheral neuropathy and hyperhomocysteineemia (13,14). The present findings suggest that it is safe and effective for treatment of postoperative lingual nerve paralysis, one of the most frequent complications, and should be discussed with patients before treatment.

A previous study reported that computed tomography and magnetic resonance imaging (15) were ineffective for evaluation of small masses of the tongue. In contrast to other parts of the body, the tongue is easily accessible during clinical examination. None of the present patients reported pain or functional disorder that affected quality of life. One patient received a diagnosis of mucoepidermoid cancer: the 6.0 × 6.0 mm lesion had been clinically diagnosed as a benign tumor before biopsy. No recurrence was observed. Early intervention might avoid development of more serious disease. We believe that early histopathological examination without long-term observation should be the standard approach to confirm a clinical diagnosis and treatment plan and would improve outcomes.

Visual inspection and palpation of lesions are the typical methods used for clinical diagnosis of early oral disease. Although the consensus has been that specialists are more accurate than general dental practitioners in diagnosing such conditions, some studies (3,16) reported no significant difference between specialists and generalists in the concordance rates for clinical and histopathological diagnoses of oral mucosal lesions. Interestingly, the concordance rate for benign tumors was lower for the specialists than for the generalists. There is some concern that experienced clinicians may not consider tongue lesions to be serious, because benign tumors grow slowly and are painless. However, patients with tumors tend to feel anxious about diagnosis and histopathological examination, as they are concerned about the possibility of surgery, the risk of malignancy (or premalignancy), and the possibility of recurrence and complications. As mentioned above, one of the present patients had a malignant tumor. Patients are usually anxious to receive the diagnosis after an examination. Therefore, patients should be educated about common oral diseases. Future studies are likely to improve understanding and treatment of patients with mass lesions of the tongue.

**(Conflict of interest)**

The authors have no conflict of interest to declare.
References