Clinical Paper
Head and Neck Oncology

Squamous cell carcinoma of the anterior tongue: is tumour thickness an indicator for cervical metastasis?

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Abstract. The incidence of squamous cell carcinoma (SCC) of the tongue accounts for 90% of all malignancies affecting the oral cavity and oropharynx. The distribution between the anterior and posterior tongue is equal. Nodal metastasis is dependent on various factors including tumour thickness, site, size, differentiation, and perineural and perivascular invasion. There is increasing evidence of a close correlation between tumour thickness and metastasis. A retrospective study covering the 16-year period from 2000 to 2016 was performed. Eighty-one patients with anterior tongue SCC were included. The only primary treatment was surgery. All patients were T1/T2N0M0 stage. Sixty-five patients underwent local excision with simultaneous selective neck dissection; 29 of these patients were confirmed to have occult metastasis. Sixteen patients underwent local excision only as an initial treatment. Four of them subsequently developed neck metastasis within a 6- to 18-month period. The results of this study support recent publications associating tumour thickness with nodal disease. Therefore, it is postulated that prophylactic neck dissection should be considered when the tumour thickness of anterior tongue SCC exceeds 5 mm, in order to prevent lymphatic spread and improve the survival rate.

Head and neck cancer has an incidence of over 500,000 cases annually worldwide.[1] The most common intraoral site for head and neck cancer is the tongue, with squamous cell carcinoma (SCC) of the oral tongue being the predominant malignancy.[2] Although male patients have a higher incidence, female incidence is on the rise. With regard to age, the distribution is also changing from middle age to young adults.[3]

The main mode of treatment of stage I and II (T1N0/T2N0) oral tongue cancer is primary resection with or without cervical lymphadenectomy. The requirement for elective neck dissection in a clinically negative neck is the matter of dispute.[4] Nodal metastasis is dependent on various parameters: T stage of the primary tumour, tumour differentiation, tumour thickness, vascular invasion, perineural invasion,

and mode of invasion at the tumour–host border.

The presence of lymph node metastasis at the time of diagnosis is a strong indicator of a poor outcome, with local and regional recurrence.[5] In general, elective neck dissection is indicated when the risk of occult lymph node metastasis is greater than 20%.[6]

Two prospective randomized trials showed no statistically significant survival benefits for elective neck treatment.[7,8] Both of these studies represented a relatively small number of patients. One study focused on oral cancer generally, while the other study had a short follow-up. Retrospective reviews are inconclusive, and only a few studies elucidating the survival benefits following radiation to the neck are available.[9]

Despite these controversies, it is widely accepted that the management of neck relapse after a period of observation is more challenging, due to the high incidence of extracapsular spread. On the other hand, a routine policy of prophylactic neck treatment would expose a high number of patients to an unwanted treatment.

Thus far, there is a lack of reliable indicators of metastasis for oral cancers. Moreover, the current TNM staging only defines the primary tumour in two dimensions.

Several studies support a strong correlation between tumour thickness in the oral tongue and the presence of neck metastasis.[10–14] The exact pathophysiology of tumour thickness and cervical nodal involvement is not fully understood. Lymphatic channels are present in the submucosal plane, so when the tumour invades the deeper tissues this often results in regional metastasis. However, the actual measurement of the tumour thickness is controversial.[15] In some cases tumour thickness is measured from its most protuberant point to the deepest point of invasion; in other cases, it is measured from the extrapolated line, along the oral mucosa, to the deepest point of invasion.[16]

Tumour thickness can be measured preoperatively by intraoral ultrasound.[17] Magnetic resonance imaging (MRI) is also considered to be an effective tool. Furthermore, an incisional biopsy can give some information on tumour depth, but this method is not reliable as the failure rate can reach up to 24%.[18] More studies are now focusing on optimizing the tumour thickness measurement preoperatively.[19,20] It is vital, therefore, to determine the relationship between tumour thickness and neck node metastasis.

The present study evaluated the histopathological features, in particular tumour thickness, in patients with stage I/II oral tongue SCC. These patients were treated with partial glossectomy with or without neck dissection and had not undergone any pre-surgical treatments. It is important to analyse the statistical significance of all parameters.

Materials and methods

This was a retrospective study covering the 16-year period from 2000 to 2016. The medical records of 81 patients who were treated for stage I/II SCC involving the anterior two-thirds of the tongue were reviewed. None of the patients had previously undergone chemotherapy or radiotherapy. Clinical/operative notes and imaging and histological reports were available for all of the cases.

Clinicopathological features including age, sex, tumour location, histological grade, tumour thickness, and clinical stage were evaluated and their relationships to clinical metastasis were determined. None of the patients had regional or distant metastasis detectable at the time of surgery. Tumours were staged according to the American Joint Committee on Cancer. Tumours were graded as well-differentiated, moderately differentiated, or poorly differentiated.

Three surgeons were involved in patient management. Two surgeons practiced local excision only for the N0 neck, whereas the third surgeon performed primary resection with elective neck dissection of levels I to IV for the N0 neck. 'Node-positive cases' in this study refers to cases in which positive cervical nodes were identified based on a histological diagnosis after neck dissection. 'Node-negative cases' refers to the case in which no lymph node metastasis was found after histological analysis of the lymph nodes. Postoperative radiotherapy was given to those patients who had close/positive margins with cervical metastasis.

Tumour thickness was measured from the adjacent normal mucous membrane to the deepest point of invasion, as described by Moore et al.[16] An ocular micrometer was used and measurements were recorded to the nearest 0.1 mm. Multiple sections of the tumour were studied to identify the area with the minimum thickness.

Analysis of the critical value of tumour thickness

The specificity and sensitivity of different cut-off points were evaluated: tumour thickness of 3 mm, 4 mm, 5 mm, and 6 mm. Using these data, Youden's index of the different cut-off values was evaluated to determine the thickness that gave the most conclusive results. The value of the index ranges from −1 to 1; a zero value result is obtained when a diagnostic test gives the same proportion of positive results for groups with and without the disease, i.e. the test is of no use.

A tumour thickness of 5 mm was found to be the best cut-off for the present series, because Youden's index for this measurement was closest to 1 and therefore would give the most conclusive results of the four measurements (Table 1).

Statistical analysis

The data were analysed using IBM SPSS Statistics version 22 (IBM Corp., Armonk, NY, USA). Data were truncated at 5 years, since this is when routine follow-up of patients usually ends. Kaplan–Meier survival curves were used to assess time to death and time to disease recurrence. Survival curves were compared between those with tumours ≤5 mm thick and those with tumours >5 mm thick. They were also used in comparisons between those with neck dissection and those without neck dissection using the log rank test (with a significance level of 5%). Cox proportional hazards regression was used

Table 1. Sensitivity, specificity, and Youden's index for tumour thickness cut-off points.

Tumour thickness (mm)	Node negative	Node positive	Sensitivity	Specificity	Youden's index
≤3	21	2	93.94	43.75	0.3769
>3	27	31			
≤4	22	4	87.88	45.83	0.3371
>4	26	29			
≤5	27	5	84.95	56.25	0.414
>5	21	28			
≤6	31	9	72.73	64.58	0.373
>6	17	24			