

## A case of vastus lateralis muscle metastasis of tongue carcinoma

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### Abstract

Distant metastasis is the most important prognostic factor for head and neck cancer. This report presents the case of a 50-year-old man with distant metastasis of tongue carcinoma to the vastus lateralis muscle which presented to Nihon University Itabashi Hospital, Tokyo, Japan. Tumourectomy was performed with a diagnosis of tongue carcinoma (cT2N0M0, Stage II). Seven months later, radical neck dissection was performed for lymph node metastasis to a left supraclavicular lymph node. In addition, metastasis was then detected outside the neck dissection region. Tumourectomy and radiotherapy (50 Gy) were, therefore, added to the treatment regimen. However, left-sided vastus lateralis muscle metastasis was then observed. To the best of our knowledge, this is the first report of distant metastasis of oral squamous cell carcinoma to the vastus lateralis muscle.

**Keywords:** Distant metastasis, Tongue carcinoma, Vastus lateralis muscle.

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### Introduction

In head and neck cancer, distant metastasis is the most influential prognostic factor,<sup>1</sup> and distant metastasis rates vary considerably by race, region, and institution. Distant metastasis rates have been reported clinically as 5%-24% and 17%-57% in two separate reports.<sup>2,3</sup> In head and neck cancer, the main sites of distant metastasis are the lungs, bone, mediastinum, skin, and liver. Rare metastases to the brain, myocardium, and diaphragm have also been reported.<sup>1</sup> Similarly, in oral squamous cell carcinoma (OSCC), the sites of distant metastasis are often the lungs, bone, or mediastinum, while vastus lateralis muscle metastases are extremely rare.

In this report, a case of tongue cancer with vastus lateralis muscle metastasis is described. To the best of our knowledge, this is the first report of a case of vastus lateralis muscle metastasis of tongue carcinoma.

### Case Report

In September 2018, a 50-year-old man, developed a

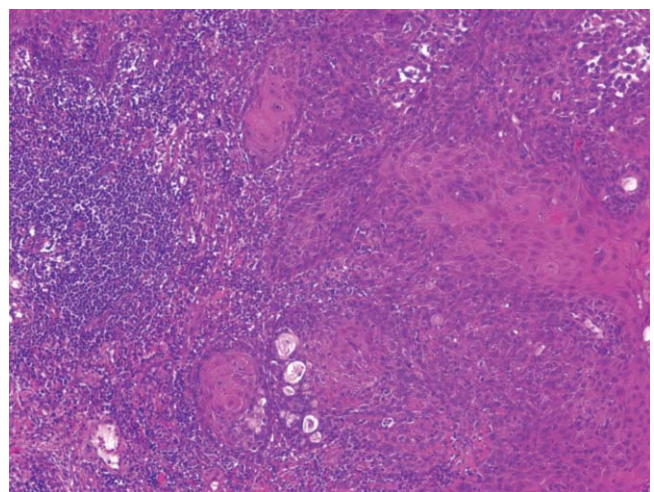
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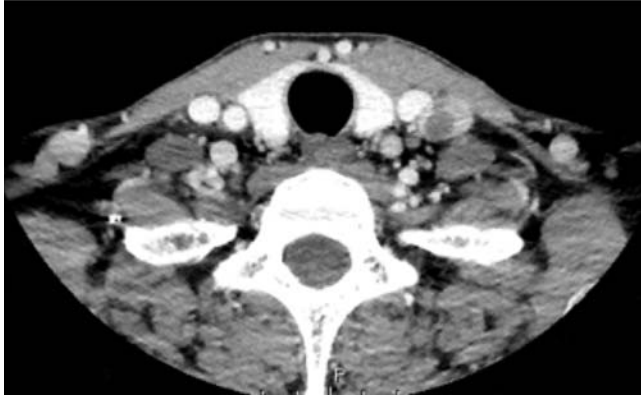


**Figure-1:** Initial examination, left tongue carcinoma is seen.

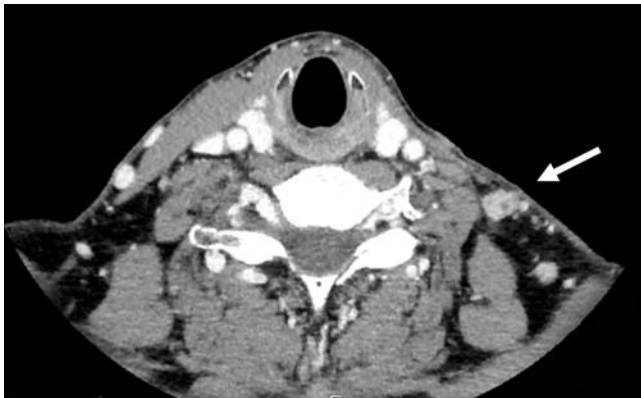
painless ulcer on the left side of his tongue from a bite wound. The wound did not heal, and he subsequently visited Nihon University Itabashi Hospital, Tokyo, Japan. His medical history included ureterolithiasis, but there was no relevant family history. No factors generally



**Figure-2:** H&E stain shows that dysplastic cells during differentiation in the stratified squamous epithelium form irregular follicles. In addition, the tumour cells are proliferating like stromal cells (10×).

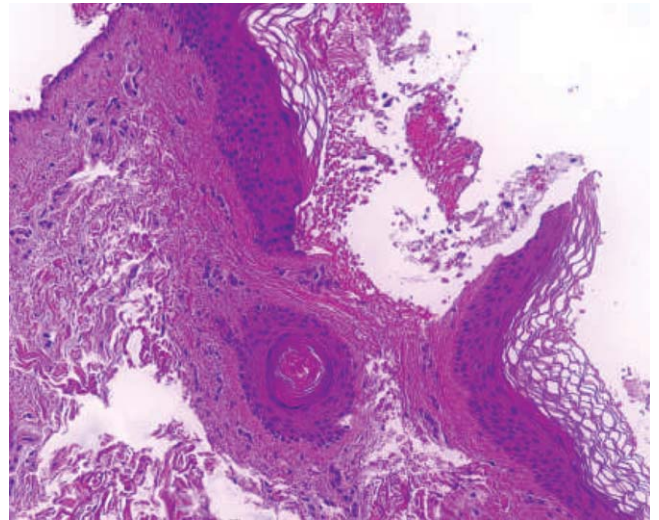


**Figure-3:** CT scan, axial view, showing an enhancing lesion in left supraclavicular lymph node.



**Figure-4:** CT scan, axial view, showing an enhancing lesion outside the region of neck dissection.

associated with tongue carcinoma were present, such as drinking alcohol, smoking cigarettes, or marijuana use. On initial examination, his height was 173cm, and his weight was 64 kg, which indicated that his nutritional status was good. Furthermore, blood tests showed: WBC 5200/ $\mu$ L, Hgb 14.4 g/dL, AST 13 U/L, ALT 10 U/L, CRE 0.86 mg/dL, UN 10.6 mg/dL, TP 6.6 g/dL, Alb 4.5 g/dL, HIVAgAb (-), HBsAg (-), and HCVAb (-). Oral hygiene care or dental treatment was adequate, but an ulcer measuring 20  $\times$  20mm<sup>2</sup> was observed on the left side of the tongue (Figure-1). Subsequently, computed tomography (CT) and magnetic resonance imaging (MRI) showed no metastasis to the submandibular, cervical, or supraclavicular lymph nodes. Incisional biopsy of the tongue lesion led to a histopathological diagnosis of squamous cell carcinoma (Figure-2). Subsequently, positron emission tomography-computed tomography (PET-CT) was performed. However, PET-CT detected no-metastasis to the regional lymph nodes or remote organs. The diagnosis of cT2N0M0, Stage II was therefore reached. In November 2018, tumourectomy was performed under general

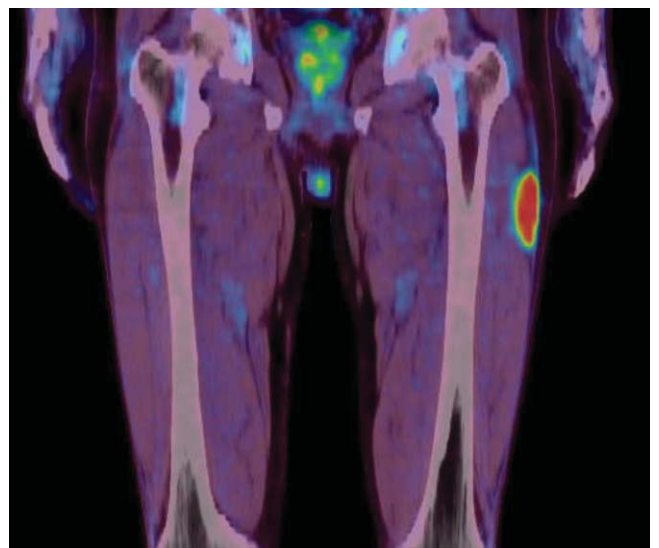


**Figure-5:** H&E stain shows that the nuclei of the tumour cells are observed to scatter with irregularities in form and size. It is also observed that tumour cells are multinucleated (10 $\times$ ).

anaesthesia. After the surgery, the patient was followed-up every month. In addition, CT and MRI were performed every three months.

In April 2019, metastasis was detected in a left supraclavicular lymph node with no recurrence at the left side of the tongue (Figure-3); at that time, no other metastasis was detected on CT and PET-CT. Furthermore, blood tests showed no abnormalities. Left-sided radical neck dissection was, therefore, performed in June 2019.

Subsequently, metastasis outside the region of neck dissection was detected by CT in October 2019 (Figure-4). Tumourectomy was, therefore, performed at the left side



**Figure-6:** PET-CT imaging shows left vastus lateralis muscle metastasis.

of the neck. In addition, radiotherapy (50 Gy) was added to the left side of the neck.

In January 2020, at the first follow-up after radiotherapy, a mass was observed on the left thigh, and MRI was performed. MRI showed a tumour,  $40 \times 30\text{mm}^2$ , in the left vastus lateralis muscle. However, blood tests showed no abnormalities. Needle biopsy was then performed, on which histopathological results were consistent with the excised tongue cancer (Figure-5) thus, vastus lateralis muscle metastasis of tongue carcinoma was diagnosed. PET-CT was performed which showed a left vastus lateralis muscle metastasis (Figure-6). Since the patient refused surgical therapy, chemotherapy, or radiotherapy, pain relief was provided at the request of the patient. The general condition of the patient deteriorated, and he died three months later.

Verbal consent was obtained from the patient to publish his case for scientific causes.

## Discussion

At present, PET-CT is considered extremely useful to detect metastases to the regional lymph nodes or remote organs. Imaging evaluation using PET-CT after radical surgery for head and neck cancer is recommended at the time of regression of inflammation, two to three months postoperatively.<sup>4</sup> In addition, PET-CT allows whole-body examinations and is reported to be superior for detecting distant metastases and multiple cancers.<sup>5</sup> This case had shown no metastasis to the regional lymph nodes or remote organs at the time of primary tumourectomy. Therefore, primary tumourectomy and preventive elective neck dissection (PEND) were not performed at the same time. Regarding the rate of distant metastasis, O'Brien et al<sup>2</sup> reported distant metastasis in 46.7% of 122 autopsy cases of head and neck cancer patients. On the other hand, Probert et al<sup>3</sup> reported distant metastasis in 12.3% of 779 head and neck cancer patients, including autopsy cases.

The indications for PEND in the treatment of tongue carcinoma classified as T1-2N0 have been controversial.<sup>6</sup> D'Cruz et al<sup>7</sup> reported the efficacy of PEND for OSCC classified as T1-2N0. On the other hand, Kaneko et al<sup>8</sup> reported that in approximately 70% of cases PEND is likely to be unnecessary. Therefore, PEND should be performed with caution because of the reduction in the quality of life due to postoperative complications.<sup>8</sup> At the present time, the choice between PEND and follow-up is left to the treatment strategy of each institution. In short, the criteria for PEND are unclear. This case was diagnosed as NOMO at the time of initial examination. Therefore, this case did not undergo primary tumourectomy and PEND

simultaneously. Subsequently, the metastasis to the supraclavicular lymph node was observed, and radical neck dissection was, therefore, performed. In addition, metastasis was later observed outside of the radical neck dissection region. Therefore, tumourectomy and radiotherapy were performed. However, metastasis to the vastus lateralis muscle was identified by PET-CT 14 months after primary tumourectomy. Therefore, the existence of micrometastasis to the regional lymph nodes at the time of primary tumourectomy could not be ruled out.

The most common site of metastases of tongue cancer is lung.<sup>9</sup> On the other hand, a rare site of metastases in tongue cancer is the vertebral body. Two cases of lumbar vertebral metastasis from tongue cancer have been reported by Lee et al.<sup>10</sup> In addition, two cases of disseminated metastases of OSCC in the peritoneum have been reported.<sup>11,12</sup> However, no cases of metastasis of OSCC to the vastus lateralis muscle have ever been reported. In other words, this is the first report of distant metastasis of OSCC to the vastus lateralis muscle. At present, the mechanisms underlying distant metastasis to the vastus lateralis muscle are unclear. However, the mechanism of peritoneally disseminated metastases is thought to involve the complex intermingling of lymphatic flow in the left thoracic duct with that in the right lymphatic trunk or between the mediastinal lymphatic trunk and the lymphatic trunk of the abdomen.<sup>12</sup> In addition, it has been suggested that head and neck cancer can metastasise to any region through the left thoracic duct and right lymphatic trunk, following lymphatic flow.<sup>12</sup> On the other hand, haematogenous metastasis of tongue cancer is reported to be rare.<sup>13</sup> The mechanism of distant metastasis to the vastus lateralis muscle in this case was, therefore, thought to involve cell migration from the left supraclavicular lymph node through the sternal canal.

Currently, distant metastasis of head and neck cancer is treated using molecularly targeted drugs and immune checkpoint inhibitors. However, no significant therapeutic effect has been shown. In the present case, the patient refused surgical therapy, chemotherapy, or radiotherapy because of the rapid progression of distant metastases across multiple organs. Pain relief was then provided at the request of the patient.

Keeping in mind the above discussion and the findings of the present case, it can be said that early detection of micrometastases to regional lymph nodes is extremely important for a complete response in head and neck cancer. Regular evaluation by PET-CT is supposed to be an effective method. Therefore, based on the findings of PET-CT, an index and methods for evaluation of the necessity

for PEND in head and neck cancer classified as T1-2N0M0 should be rapidly established. In addition, establishment of a predictive index for lymph node or distant metastasis by PET-CT and methods of evaluation are needed. These are expected to improve the outcomes of cancer therapy.

### Conclusion

A case of metastasis of tongue carcinoma to the vastus lateralis muscle was presented. This is the first report to describe vastus lateralis muscle metastasis of OSCC.

**Disclaimer:** None to declare.

**Conflict of Interest:** None to declare.

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