

Case Report
Head and Neck Oncology

Soft-tissue metastasis of osteosarcoma to the submental vestibule

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Y.-K. Chen, C.-H. Chen, L.-M. Lin: *Soft-tissue metastasis of osteosarcoma to the submental vestibule. Int. J. Oral Maxillofac. Surg. 2006; 35: 1068–1071.* © 2006 Published by Elsevier Ltd on behalf of International Association of Oral and Maxillofacial Surgeons.

Abstract. A case of metastatic osteosarcoma in the submental vestibule of the oral cavity and the lung is described in an 18-year-old male with primary osteosarcoma occurring in the sacrum. Dissemination of osteosarcoma to other organs, especially early to the lung, is common, but its metastasis to the oral mucosa has been rarely reported. The patient presented 6 years after initial diagnosis, suggesting the need for careful long-term follow-up of patients with osteosarcoma. This case also illustrates that immunohistochemical staining of osteocalcin is useful to confirm the histological diagnosis of oral soft-tissue metastasis.

Accepted for publication 24 April 2006

Osteosarcoma is the most common primary neoplasm of bone, typically affecting the metaphysis of the femur or tibia in children and young adults, and is the third most common malignancy in adolescents¹. About 6–7% of all osteosarcomas occur in the maxillofacial region, mainly affecting the jaw¹⁰. Osteosarcomas metastasize early, particularly to the lungs¹⁰. An extensive search of the literature revealed only 2 previous well documented cases of metastatic osteosarcoma affecting the oral soft tissues^{3,13}. Here, a third case of this type is reported in which an osteosarcoma in the sacrum metastasized to both the lung and the vestibule of the oral cavity.

Case report

An 18-year-old male patient was referred with a painless, non-tender and dome-

shaped submucosal swelling over the submental vestibule area that had been present for approximately 1 week. Intraoral examination showed a well demarcated and elastic soft mass measuring 2.5 cm × 3 cm in diameter, covered with oral mucosa of normal appearance. Computerized tomography (CT) revealed a soft-tissue mass over the right submental vestibule without bony involvement (Fig. 1A). The patient reported a history of osteosarcoma affecting his left sacrum that had been diagnosed in another hospital approximately 6 years back (i.e. 1999). This had been treated with chemotherapy alone, mainly using methotrexate, without any other surgical intervention or radiotherapy treatment. Unfortunately, further histological and clinical details could not be obtained. About 1 month

before the appearance of the oral lesion the osteosarcoma recurred (Fig. 1B) and on the basis of magnetic resonance imaging (MRI) data, it was strongly suspected that the primary tumour had metastasized to the lungs (Fig. 1C). The clinical possibility was then considered that the osteosarcoma had further metastasized to the submental vestibular area. To confirm this diagnosis, an incisional biopsy of the affected area was taken under local anaesthesia and sent for microscopic analysis. Histological examination of the specimen revealed a proliferation of atypical osteoblast-like cells with hyperchromatic nuclei and formation of scattered neoplastic osteoid tissue beneath an intact stratified squamous cell epithelium (Fig. 2A and B). The tumour cells stained positive for osteocalcin (Fig. 2C), but were negative

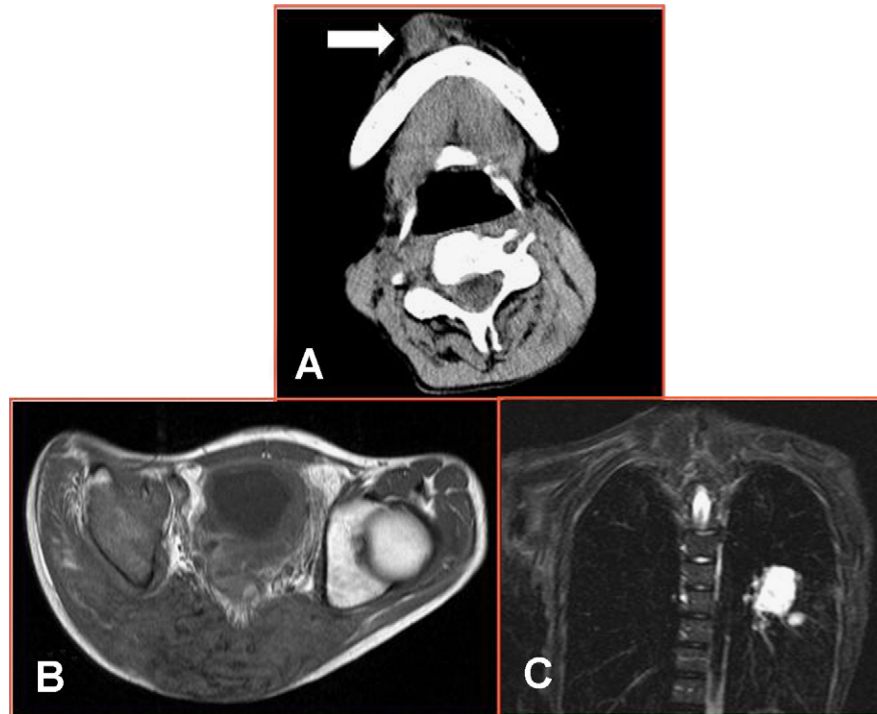


Fig. 1. CT revealed a soft-tissue mass (arrow) over the right submental vestibule without bony involvement (A), recurrence of the osteosarcoma (B) and lung metastasis (C) was highly suspected from MRI.

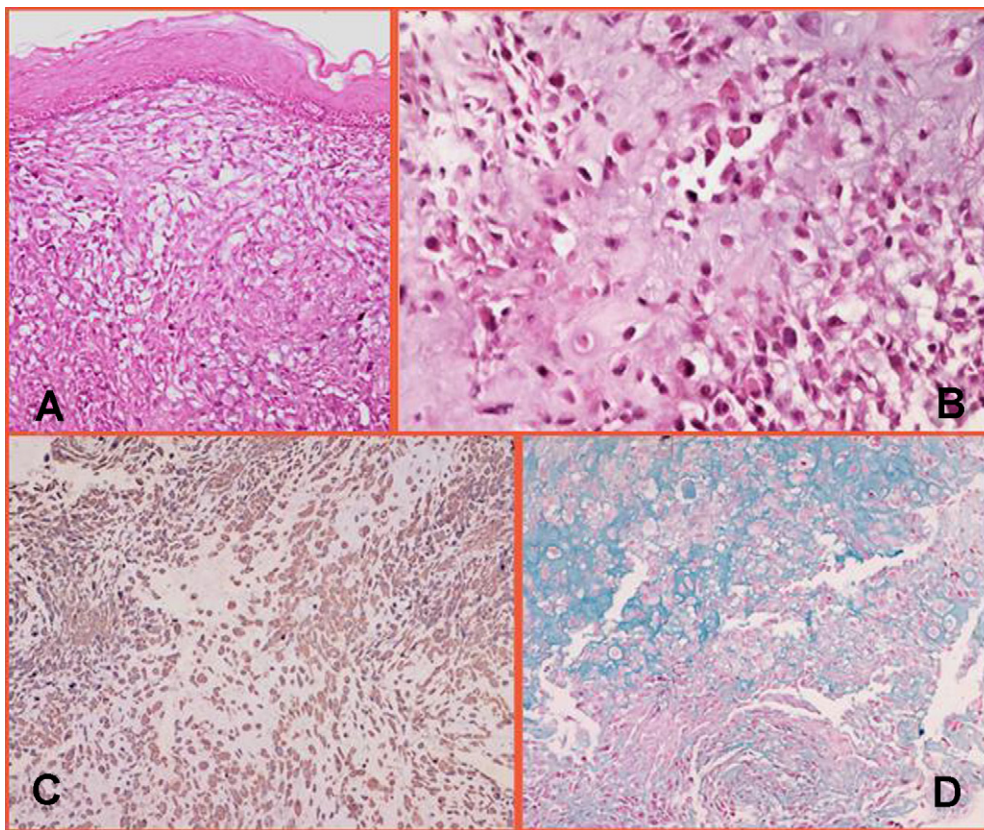


Fig. 2. Photomicrographs showing a proliferation of atypical osteoblast-like cells with hyperchromatic nuclei and formation of scattered neoplastic osteoid tissues beneath an intact stratified squamous cell epithelium. (A) Haematoxylin and eosin (H&E) stain ($\times 40$) and (B) H&E ($\times 100$); (C) tumour cells stained positive for osteocalcin ($\times 100$); (D) neoplastic osteoid tissues stained positive with alcian blue ($\times 100$).

for S-100, CAM 5.2 (monoclonal anticytokeratin 8, 18), leukocyte common antigen and desmin. The neoplastic osteoid tissue stained positive with alcian blue (Fig. 2D). These data confirmed the diagnosis of metastatic osteoblastic osteosarcoma affecting the oral submental vestibular area. Unfortunately, the patient died approximately 1 week after diagnosis, before the planned chemotherapy regime could begin.

Discussion

Metastases in the mouth and jawbone are rare, accounting for 1% of all malignancies¹. Three large case surveys^{6,7,9} showed that osteosarcoma is a very uncommon primary source of metastases in the mouth. HIRSHBERG et al.⁶ found that only 9 cases out of 390 patients with osteosarcoma developed metastatic tumours in the jawbone, and only 1 out of 157 cases developed metastases in the oral mucosa⁷, and NISHIMURA et al.⁹ reported 1 of 47 osteosarcoma cases had metastatic tumours in the mouth and jaws. To the best of the authors' knowledge, there are only 3 well documented cases of metastatic osteosarcoma of the oral mucosa, including this one, that have demonstrated histological proof of soft-tissue metastasis together with radiographic evidence confirming that there was no bony involvement^{3,13}. In the present case, radiographs (CT, panoramic radiography, intraoral periapical radiography) showed neither bone destruction nor bone defect^{3,13}. In contrast, SHAPIRO et al.¹² reported, using oblique lateral radiography, that both maxillary gingiva and right retromolar pad area metastases in a 53-year-old woman, in whom the primary site was the breast, were accompanied by a cupped-out bony defect below the mandibular lesion.

Multiple metastases of osteosarcoma commonly occur, and frequently involve the lungs¹, and this finding was also the case for 2 out of the 3 patients who developed oral soft-tissue metastases (ref. 13 and the case described here). In the present patient, the primary osteosarcoma had metastasized to both the oral cavity and lung; in the case described by SUZUKI et al.¹³ multiple metastases were present in the lung and lumbar vertebrae, in addition to those found in the mandibular gingiva, but in the case described by CARNELIO et al.³ the oral soft-tissue metastasis occurred in isolation, without any other detectable distant metastases. In contrast

to 1 study that showed that the majority of the patients who had oral metastases of osteosarcoma were aged between 40 and 60 years², the 3 patients who had soft-tissue oral metastases were relatively young. They included a 22-year-old man¹³ and two 18-year-old men (ref. 3 and present case), and each had different primary tumour sites: the femur¹³, tibia³ and sacrum (present case). Oral metastases were found after the primary tumours had been diagnosed in all the 3 patients^{3,13}, also each in a different site. In 1 case the metastasis was in the right mandibular gingiva¹³, the second in the palatal mucosa near the maxillary right third molar³ and in the case reported here the tumour had metastasized to the submental vestibule.

Common clinical signs and symptoms were noted in the 2 previously reported cases of oral soft-tissue metastasis^{3,13}, as both showed an exophytic, ulcerated/easily bleeding mass. The case described here was different because a non-ulcerated submucosal mass was present instead. Owing to the small number of reported, cases it is not yet possible to describe a characteristic clinical presentation of oral metastatic osteosarcoma. Despite being an uncommon finding, oral metastases remain a clinical possibility in patients with known primary osteosarcomas, although it is essential to take a biopsy in order to reach a definitive diagnosis.

Generally, 2 criteria must be met to categorize a malignant neoplasm as metastatic. Firstly, there must be a histologically defined primary tumour and, secondly, the metastatic lesion must be histologically identical to the primary one¹⁴. In the present case, despite the lack of detailed information about the exact histological subtype of the primary osteosarcoma, the histological diagnosis of osteosarcoma had been made. Both conventional H&E staining and immunohistochemical staining with osteocalcin, a well characterized bone-specific protein produced by osteoblasts¹¹, confirmed the osteoblastic origin of the tumour cells. Osteocalcin has been regarded as a reliable marker for osteoblastic osteosarcoma⁵. As a result, it can be confidently concluded that the current case is indeed a metastatic soft-tissue lesion arising from the original osteosarcoma that occurred 6 years back. Because the patient had a history of primary osteosarcoma, the possibility of an oral extra-skeletal osteosarcoma could also be ruled out.

The optimal treatment for oral soft-tissue metastases of osteosarcoma is sur-

gical mandibular resection. This is because it remains possible that there are small metastatic deposits present in the jawbone¹³, although radiographic examinations show no pathological change. In the 2 previously reported cases^{3,13}, surgical resection with adjuvant chemotherapy/chemoradiation therapy was used to treat the tumours. Chemotherapy and/or radiotherapy regimes have also been successfully adopted⁴. In the present case, the patient died very shortly after the diagnosis of the metastatic lesion so there was no opportunity for the planned chemotherapy treatment to take place. In comparison to the very poor prognosis for patients with metastases to the lung and other sites⁸, the clinical outcome of these 3 oral soft-tissue metastatic cases was highly variable, as the 2 other reported cases^{3,13} survived surgical and adjuvant chemotherapy/chemoradiation treatment.

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