Cardiac metastasis of tongue squamous cell carcinoma complicated by pulmonary embolism
A case report

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Abstract
Rationale: Cardiac metastasis is known as a rare complication of head and neck malignancy.

Patient concerns: We present a 58-year-old woman patient with a history of tongue carcinoma who was admitted in emergency department for sudden chest pain. Imaging work-up by computed tomography (CT) and positron emission tomography-computed tomography (PET-CT) diagnosed a cardiac metastasis complicated by intraventricular thrombus and pulmonary embolism.

Diagnosis: Cardiac metastasis from tongue carcinoma complicated by pulmonary embolism.

Interventions: After undergoing 2 cycles of palliative chemotherapy, the patient declined any further treatment.

Outcomes: Patient died 3 months after the diagnosis of cardiac metastasis.

Lessons: Cardiac metastasis should be considered as a differential diagnosis in patients with a history of head and neck malignancy who present non-specific cardiac symptoms.

Abbreviations: 18F-FDG = Fluorodeoxyglucose, CT = computed tomography, ECG = electrocardiogram, IVS = interventricular septum, PE = pulmonary embolism, PET = Positron emission tomography, SUV = standardized uptake value.

Keywords: cardiac metastasis, intraventricular thrombus, pulmonary embolism

1. Introduction

Head and neck carcinoma is the 6th most common tumor, globally. Regional and distant metastases play a pivotal role in prognostic features of this disease. Although it is known to usually metastasize to the cervical lymph nodes, distant metastasis is not infrequently observed. Myocardial metastasis is a rare site of metastasis from head and neck malignancies.[1] However, myocardial metastasis that originated from tongue carcinoma is much less common when compared with other malignancies (1% in head and neck cancers compared with 2–20% in others).[2–4]

It is fundamental to consider the cardiac metastasis as a differential diagnosis when cardiac symptoms are present in a patient with a history of head and neck malignancy.

2. Case presentation

“A ethical approval was waived by the institutional review board of our hospital.”

The patient was a 58-year-old non-smoker woman, who was referred to the Hospital Universitaires de Geneve (HUG), Gabrielle-Perret-Gentil 4, Geneva, Switzerland (e-mail: soonazmalekzadeh@gmail.com).

A 58-year-old woman with a history of a previous heavy smoking was diagnosed in 2005 for a tongue carcinoma classified as pT2pN2cM0. She benefited from a right hemiglossectomy and her treatment was completed by adjuvant radiotherapy. She suffered from multiple episodes of recurrence treated every time by surgery and radiotherapy (60Gy on the tumor site, 48 Gy on the adjacent lymph nodes) until 2015. No recurrence was reported since then.

On July 2016, she was admitted to the emergency department for acute chest pain suspected for pulmonary embolism (PE). A thoracic computed tomography (CT) was undertaken which demonstrated a left lobar PE (Fig. 1). Additionally, a round filling defect was seen in the right ventricle, abutting the interventricular septum (IVS), along with a localized thickening of the apex of the heart (Fig. 2). To better characterize the latter findings, a delayed acquisition was immediately performed which revealed an apical enhancing mass with infiltration of the IVS in contact with the intracavitary thrombus (Fig. 3). Electrocardiogram (ECG) showed a slight ST elevation in V3 and V4. Troponin T was increased to 66 ng/L (>10 ng/L). This value remained stable at further serial controls. The transthoracic echography confirmed the thoracic CT findings and demonstrated an apico-septal hypokinesia.

A complementary positron emission tomography-computed tomography (PET-CT) displayed the cardiac metastasis (Fig. 4) along with hepatic, bone, and muscular secondary lesions. The patient underwent palliative chemotherapy by cetuximab 400mg/m², carboplatin area under the curve 350mg/m², and fluorouracil (5-FU) 1000mg/m². After completion of 2 cycles of chemotherapy (21 days each), the patient declined any further treatment or investigation and asked to be discharged home, where she died 10 days later.

3. Discussion

Rarely reported in living patients, cardiac metastasis is more frequently reported in autopsy, with a prevalence between 1.5%
This difference seems to be due to the silent nature of this condition in the majority of cases. It can be the cause of non-specific clinical manifestations as dyspnea, palpitation, or chest pain. The progression of disease may lead to heart failure, valvular dysfunction, dysrhythmia, conduction disturbance, and even sudden death. It is currently accepted that cardiac metastasis can result from 4 mechanisms: direct extension, blood stream, lymphatic pathway, and intracavitary via inferior vena cava or pulmonary veins.

Cardiac metastasis can be further complicated by tamponade, heart failure, and thromboembolic events that can affect the pulmonary, cerebral, and coronary arteries. To the best of our knowledge, PE due to cardiac metastasis from tongue carcinoma was not priorly reported. This case is the first record of this manifestation. PE was caused by the intraventricular thrombus, which was assumed to result from the apico-septal hypokinesia provoked by cardiac metastasis.

The ECG findings of cardiac metastasis, when present, are non-specific and could have a wide spectrum of manifestations: tachycardia, atrial fibrillation, right bundle branch block, low voltage QRS, ST elevation, and/or pathological Q waves. The admitting ECG from the presented case showed a slight ST-elevation which remained unchanged during subsequent control (at 3 and 6 hours). Unchanged slight ST-elevation argued unlikely in favor of acute coronary syndrome. Troponin (T or I) are cardiac proteins that, when elevated, are highly specific for myocardial infarction. However, this increase may only be meaningful in conjunction with a typical clinical presentation of acute ischemia and ECG findings. In the present case, the lack of typical chest pain and ECG modifications argued against the diagnosis of myocardial infarction. An ST-elevation can also be found in PE, but typically involves leads I and III, which was not the case in our patient. This elevation was eventually attributed to the cardiac tumoral infiltration, which has been priorly reported in the literature, as well as the association with high troponin levels.

Imaging studies have a pivotal role in the depiction of cardiac lesions. In the presented case, CT was the initial imaging modality to be performed, because of the clinical suspicion of PE. In spite of the fact that CT was obtained in arterial phase, both the cardiac tumor and the intraventricular clot were depicted by this modality.
technique. Cardiac ultrasound is a good complement to CT to assess the cardiac function\textsuperscript{13}; in the current case, it was useful to identify myocardial hypokinesia as the probable cause for the blood clot formation and, thus, for PE.

In our patient, PET-CT was important to demonstrate the presence of multiple similar lesions in other locations, which was useful for the decision to adopt a palliative therapy.

Surgical resection of cardiac metastasis is controversial, presents limited benefits for prognosis and is usually reserved for isolated lesions that can be entirely resected; it could, therefore, not be considered in our patient. The palliative treatment which was undertaken in the current case, consisted of chemotherapy, using 3 cytotoxic drugs, targeted on tongue metastases. The choice of these 3 agents was a trade-off between their cytotoxic efficacy on the disseminated tumor and their potential cardiac adverse effect, which might have worsened the already impaired cardiac function of the patient. Indeed, while cetuximab is known as a chemotherapy agent with a low cardiotoxicity risk, 5-FU can cause arrhythmia and myocardial infarction which usually occurs during the first to third dose.\textsuperscript{14,15} Cardiac toxicity has also been reported in association with carboplatin treatment, as well as cardioembolic events, especially during the first 2 cycles of treatment.\textsuperscript{16}

In the absence of autopsy, it cannot be determined if the cause of the patient’s death was related to the progression of her oncologic condition or to the cumulative effect of both her heart metastasis and the cardio-toxic side-effect of her treatment.

References
\textsuperscript{[1]} Bussani R, De-Giorgio F, Abbate A, et al. Cardiac metastases. J Clin Pathol 2007;60:27–34.
\textsuperscript{[2]} Werbel GB, Skom JH, Mehlman D, et al. Metastatic squamous cell carcinoma to the heart. Unusual cause of angina decubitus and cardiac murmur. Chest 1985;88:468–9.
\textsuperscript{[3]} Probert JC, Thompson RW, Bagshaw MA. Patterns of spread of distant metastases in head and neck cancer. Cancer 1974;33:127–33.
\textsuperscript{[4]} Karwinski R, Svensten E. Trends in cardiac metastasis. APMIS 1989;97:1018–24.
\textsuperscript{[5]} Wilkes JD, Fidias P, Vaikus L, et al. Malignancy-related pericardial effusion. 127 cases from the Roswell Park Cancer Institute. Cancer 1995;76:1377–87.
\textsuperscript{[6]} Gassman HS, Meadows RJr, Baker LA. Metastatic tumors of the heart. Am J Med 1955;19:357–65.
\textsuperscript{[7]} Ito T, Ishikawa N, Negishi T, et al. Cardiac metastasis of tongue cancer may cause sudden death. Auris Nasus Larynx 2008;35:423–5.
\textsuperscript{[8]} Fiocco M, Krausa MJ. The management of malignant pleural and pericardial effusions. Hematol Oncol Clin North Am 1997;11:253–65.
\textsuperscript{[9]} Astorri E, Bonetti A, Fiorina P. ECG mimicking acute myocardial infarction during heart involvement by lung neoplasm. Int J Cardiol 2000;74:223–6.
\textsuperscript{[10]} Wu AH, Apple FS, Gibling WB, et al. National Academy of Clinical Biochemistry Standards of Laboratory Practice: recommendations for the use of cardiac markers in coronary artery diseases. Clin Chem 1999;45:1104–21.
\textsuperscript{[11]} Daubert MA, Jeremias A. The utility of troponin measurement to detect myocardial infarction: review of the current findings. Vasc Health Risk Manage 2010;6:691–9.
\textsuperscript{[12]} Onwuchekwa J, Banchs J. Early cardiac metastasis from squamous cell carcinoma of the tongue in 2 patients. Tex Heart Inst J 2012;39:565–7.
\textsuperscript{[13]} Reynen K, Kockeritz U, Strasser RH. Metastases to the heart. Ann Oncol 2004;15:735–81.
\textsuperscript{[14]} de Forni M, Mallet-Martino MC, Jaillais P, et al. Cardiotoxicity of high-dose continuous infusion fluorouracil: a prospective clinical study. J Clin Oncol 1992;10:1795–801.
\textsuperscript{[15]} Lenneman CG, Sawyer DB. Cardio-oncology: an update on cardiotoxicity of cancer-related treatment. Circ Res 2016;118:1008–20.
\textsuperscript{[16]} Czajkowsky PM, Moore MJ, Tannock IF. High risk of vascular events in patients with urothelial transitional cell carcinoma treated with cisplatin based chemotherapy. J Urol 1998;160:2021–4.