Case Report

Squamous Cell Carcinoma of the Tongue with Metastasis to Myocardium: Report of a Case and Literature Review

Ali Shafiq,1 Fatima Samad,1 Eric Roberts,1 Jonathan Levin,2 Ubaid Nawaz,3 and A. Jamil Tajik1

1Aurora Cardiovascular Services, Aurora Sinai/Aurora St. Luke’s Medical Centers, Milwaukee, WI, USA
2BayCare Clinic Radiology, BayCare Health System, Green Bay, WI, USA
3Department of Hematology and Oncology, Vince Lombardi Cancer Clinic, Aurora BayCare Medical Center, Green Bay, WI, USA

Correspondence should be addressed to A. Jamil Tajik; publishing14@aurora.org

Received 12 February 2019; Accepted 16 July 2019; Published 17 October 2019

Academic Editor: Assad Movahed

Copyright © 2019 Ali Shafiq et al. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

This is a case of a 43-year-old man who in 2014 was diagnosed with oral squamous cell carcinoma involving the tongue. He underwent extensive surgery that involved right tongue cancer resection and reconstruction with a free flap graft from his right forearm. He then was started on chemotherapy and radiation. Surveillance computed tomography in December 2016 showed a cardiac lesion in the left ventricular apex, which was confirmed by further echocardiography and cardiac magnetic resonance imaging. A biopsy of the mass revealed metastatic squamous cell carcinoma. He was deemed to not be a surgical candidate and continued on palliative chemotherapy. The patient had a very poor prognosis and eventually succumbed to the disease, highlighting the importance of surveillance imaging in such cases. A high index of suspicion on the part of the physician is needed to help in the early identification of these patients.

1. Introduction

Oral cancer is the 6th most common cancer in the world, with 9 out of every 10 oral cancers being oral squamous cell carcinomas (OSCCs). The tongue is involved in more than 50% of OSCCs [1, 2]. Although OSCCs may frequently metastasize to regional areas, distant metastasis—especially secondary involvement of the myocardium—is extremely rare. Most of these cases are generally diagnosed only at autopsy given that many patients are asymptomatic at the time of initial diagnosis. The risk factors most commonly associated with OSCCs are alcohol use, tobacco use, betel quid (combination of the betel leaf, areca nut, and lime), and female sex [2]. This is the main reason that OSCCs are prevalent in countries where there is frequent use of betel quid, such as on the Indian subcontinent. However, there has been a dramatic increase in the rate of OSCCs in the US over the last 30 years [3]. The most commonly cited reason for this rise is an increase in infection with high-risk human papilloma virus (HPV) [4]. We present a rare case of a young male diagnosed with OSCC, which, despite aggressive surgery and chemotherapy, eventually metastasized to his heart.

2. Case Presentation

A 43-year-old man with a history of leukoplakia underwent biopsy of his oral mucosa in 2010; it revealed moderate to severe dysplasia. He remained asymptomatic until 2014 when he felt a mass in his tongue. A computed tomography (CT) scan of the head and neck showed a density in the right tongue with no cervical lymphadenopathy. Biopsy revealed squamous cell carcinoma (SCC). A staging positron emission tomography (PET) scan demonstrated evidence of ipsilateral cervical lymph node involvement. He underwent right tongue resection, and reconstruction with a free flap graft from his right forearm. Pathology revealed a 3 cm, invasive, well-differentiated SCC of the keratinizing subtype. The patient received 2 months of chemotherapy with
cisplatin and radiation. A PET scan was done in May 2015 that showed complete remission.

A surveillance CT scan done 1 year later, in May 2016, showed left lung lesions suspicious for metastatic disease, and bronchoscopy confirmed SCC of these lung lesions. He then underwent chemotherapy with 2 cycles of paclitaxel, carboplatin, and radiation. A repeat PET scan in September 2016 showed complete response, and the patient decided to proceed with observation. Another surveillance CT scan in December 2016 showed a cardiac lesion in the left ventricular (LV) apex (Figure 1). The patient was referred to our specialized cardiomyopathy clinic. In the clinic, the patient’s physical examination was unremarkable but his electrocardiogram (ECG) showed ST elevations in the anterior and lateral leads suggestive of myocardial injury (Figure 2). He underwent a comprehensive transthoracic echocardiogram, which showed a 4.6 × 2.8 cm mass infiltrating the apical anteroseptal and anterolateral wall segments (Figure 3). The mass had an abnormal texture with less echodensity than the adjacent LV myocardium and was highly suspicious for metastatic disease. The patient underwent a cardiac magnetic resonance imaging (MRI) scan, which demonstrated a 3.3 × 4.2 cm infiltrating lesion within the apex of the LV without early or delayed enhancement (Figure 4(a)). The patient was referred for a right ventricular echocardiogram-guided myocardial biopsy. The

Figure 1: (a, b) Chest computed tomography with contrast shows a mass in the apex of the left ventricle (arrows).

Figure 2: Electrocardiogram shows ST elevations in the anterior and lateral leads.
Figure 3: (a) Transthoracic echocardiogram shows a 4.6 × 2.8 cm mass (arrows) infiltrating the apical, antero-septal-lateral wall segments. (b) Transthoracic echocardiogram shows interval progression of the mass (arrows).

Figure 4: (a) Cardiac magnetic resonance imaging (MRI) demonstrates a 3.3 × 4.2 cm infiltrating lesion (arrows) within the apex of the left ventricle without early or delayed enhancement. (b) Cardiac MRI shows interval progression of the mass (arrows). (c) Cardiac MRI shows the infiltrative tumor mass involving the left ventricular myocardium with features suggesting central necrosis (arrows).

Figure 5: Pathology slide of right ventricular myocardial tissue shows pleomorphic malignant tumor cells (yellow arrows) and cardiac myocytes (white arrows).
pathology immunohistochemical stains (p40 and CK5/6) were consistent with myocardial involvement by metastatic SCC (Figure 5). The patient was started on palliative immunotherapy treatment with pembrolizumab. A follow-up cardiac MRI done 2 months later showed a substantial increase in the size of the mass as well as extension into the right ventricular apex (Figure 4(b)). A repeat PET scan done in March 2017 showed widespread metastasis (Figure 6(a)). The patient’s treatment was switched to palliative combination chemotherapy with 5-fluorouracil, carboplatin, and cetuximab, to which he had a very good partial response. A repeat cardiac MRI done in July 2017 showed some improvement in the overall size of the cardiac mass. However, a cardiac MRI done in December 2017 showed interval progression of the infiltrative tumor mass involving the LV myocardium, with features suggesting central necrosis (Figure 4(c)). A follow-up PET scan showed multiple new metastatic lesions (Figure 6(b)). The patient was admitted to the hospital in February 2018 with worsening dyspnea and acute hypoxic respiratory failure. An echocardiogram showed interval progression of metastasis to the left and right ventricular cavities (Figure 4(c)).

3. Discussion

After the initial diagnosis of the OSCC, these patients usually have routine surveillance for the identification of any metastasis, but it is extremely rare to have secondary involvement of the myocardium. Through literature review, we found only 10 other patients (Table 1) who were found with an antemortem diagnosis of OSCC metastasis to the heart. We therefore present this unique case to raise awareness of this complication.

Among the previously reported cases, most patients were male and the patient age ranged from 36 to 73 years. Dyspnea, with or without congestive heart failure, appeared to be a frequent symptom at the time of diagnosis of the cardiac tumor. Only 1 patient [6] presented with typical angina, with symptoms attributed to the compression of her coronary arteries as a result of the anterior position of the tumor. In 2 patients, there were either no symptoms or nonspecific symptoms such as fever [11] and cardiac metastases were found incidentally on surveillance CT scans (similar to our patient). Although no specific ECG findings were reported, ST segment changes were noted in several of the patients (Table 1). Echocardiography was the cornerstone diagnostic modality to show the cardiac mass, and pericardial effusion appeared to be present in many of these patients [7, 8, 10, 11]. Cardiac MRI was used to define the extent of the cardiac mass in a few of the reported cases, as well as in our patient (Table 1). Surgical resection was attempted in a few of these patients; however, in our case, owing to extensive myocardial involvement, surgical resection was considered high risk and it was felt it would result in incomplete resection. Furthermore, given that it was not producing any degree of midventricular or outflow obstruction, palliative treatment was chosen and instituted.

Owing to the rare nature of cardiac involvement from primary OSCCs, routine cardiac imaging is usually not undertaken, often delaying this diagnosis. Surveillance CT scans often are done in patients with a primary malignancy and may help to unmask such rare cardiac involvement. Because of the variability in symptom presentation, a high index of suspicion on the part of the physician is needed to help in the early identification of these patients. Echocardiography supplemented with surveillance CT scan should be able to detect early lesions and allow better management strategy, including surgical excision.
### Table 1: Comparison of characteristics between cases reported with oral squamous cell carcinoma with metastasis to the heart.

| Variables                                  | Martell et al. [5] | Werbel et al. [6] | Rivkin et al. [7] | Schwender et al. [8] (patient 1) | Onwuchekwa and Banchs [9] (patient 2) | Hans et al. [10] | Nagata et al. [11] (patient 1) | Nagata et al. [11] (patient 2) | Shinoyama et al. [12] | Shafiq et al. (current study) |
|--------------------------------------------|--------------------|-------------------|-------------------|----------------------------------|--------------------------------------|-----------------|-------------------------------|-------------------------------|-------------------------|-----------------------------|
| Age (y)                                    | 60                 | 61                | 57                | 73                               | 45                                   | 36              | 54                           | 59                           | 71                      | 43                         |
| Sex                                        | Male               | Female            | Male              | Female                           | Male                                 | Male            | Male                         | Male                         | Male                    | Male                        |
| Primary cancer                             | SCC of retromolar trigone | SCC of base of tongue | SCC of base of tongue | Buccal SCC                        | SCC of tongue                         | SCC of tongue   | SCC of base of tongue        | SCC of tongue               | SCC of tongue            | SCC of tongue               |
| At time of diagnosis of cardiac mass       |                    |                   |                   |                                  |                                      |                 |                               |                               |                         |                             |
| Symptoms                                   | Dyspnea and edema  | Angina            | Lower extremity edema | Weakness and dyspnea             | Syncope                              | Palpitations and dyspnea | Dyspnea and hemoptysis | Fever                        | None                    | Ulceration of oral cavity |
| ECG findings                               | Atrial fibrillation| ST depressions and T wave inversions | Atrial fibrillation and ST elevations V2-V6 | Atrial fibrillation | Normal sinus rhythm | ST elevations anterolateral leads | Right bundle branch block | Normal | Right bundle branch block and Q wave | ST elevations I, aVL, and V5-V6 and ST depressions II, III, and Avf | ST elevation anterior and lateral leads |
| Echocardiographic findings                 | Large mass in RV   | Anterior mediasl mass compressing RV outflow tract plus mass in right atrium | Pericardial effusion and RV mass | Large mass at base of RV | Large mass infiltrating anteroseptal LV | Pericardial effusion and hyperechogenic mass involving RV | Pericardial effusion and large mass in left atrium | Pericardial effusion and right atrial mass | Multiple echodense masses in LV | Mass in LV apex |
| Cardiac MRI                                | Yes                | No                | No                | No                               | No                                   | No              | No                           | No                           | Yes                     | No                         |
| Pathology of cardiac mass                 | Metastatic, poorly differentiated SCC | Grade I SCC | Moderately differentiated SCC | Biopsy not done | Biopsy not done | Biopsy not done | SCC                          | N/A                          | SCC                     | SCC                        |
| Treatment                                  | Palliative radiation and chemotherapy | Palliative chemotherapy | Surgical resection attempted but unsuccessful | Surgical resection of mass but died 3 weeks after surgery | Palliative treatment | Palliative treatment | Surgical resection of mass but died 3 weeks after surgery | Palliative radiation and chemotherapy | Palliative chemotherapy | Palliative chemotherapy |

ECG: electrocardiogram; LV: left ventricular; MRI: magnetic resonance imaging; RV: right ventricular; SCC: squamous cell carcinoma.
Disclosure

This case was presented as a poster at the American College of Cardiology 2019 conference.

Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this article.

Acknowledgments

The authors are grateful to Jennifer Pfaff and Susan Nord of Aurora Cardiovascular Services for editorial preparation of the manuscript and Brian Miller and Brian Schurrer of Aurora Research Institute for assistance with the figures.

References

[1] J. P. Shah and Z. Gil, "Current concepts in management of oral cancer – surgery," Oral Oncology, vol. 45, no. 4-5, pp. 394–401, 2009.
[2] E. Attar, S. Dey, A. Hablas et al., "Head and neck cancer in a developing country: a population-based perspective across 8 years," Oral Oncology, vol. 46, no. 8, pp. 591–596, 2010.
[3] N. Howlader, A. M. Noone, M. Krapcho, J. Garshell, D. Miller, S. F. Altekruse, C. L. Kosary, M. Yu, J. Ruhl, Z. Tatalovich, A. Mariotto, D. R. Lewis, H. S. Chen, E. J. Feuer, and K. A. Cronin, Eds., SEER Cancer Statistics Review, 1975-2012, National Cancer Institute, Bethesda, MD, USA, 2015, https://seer.cancer.gov/archive/csr/1975_2012/, based on November 2014 SEER data submission, posted to the SEER web site, April 2015.
[4] E. Benson, R. Li, D. Eisele, and C. Fakhry, "The clinical impact of HPV tumor status upon head and neck squamous cell carcinomas," Oral Oncology, vol. 50, no. 6, pp. 565–574, 2014.
[5] K. Martell, R. Simpson, and D. Skarsgard, "Solitary myocardial metastasis from locoregionally controlled squamous cell carcinoma of the oral cavity," Cureus, vol. 8, no. 6, article e650, 2016.
[6] G. B. Werbel, J. H. Skom, D. Mehman, and L. L. Michaelis, "Metastatic squamous cell carcinoma to the heart. Unusual cause of angina decubitus and cardiac murmur," Chest, vol. 88, no. 3, pp. 468-469, 1985.
[7] A. Rivkin, J. G. Meara, K. K. Li, C. Potter, and R. Wenokur, "Squamous cell metastasis from the tongue to the myocardium presenting as pericardial effusion," Otolaryngology–Head and Neck Surgery, vol. 120, no. 4, pp. 593–595, 1999.
[8] F. T. Schwender, I. Wollner, L. P. Kunju, R. E. Nakhleb, and K. M. Chan, "Squamous cell carcinoma of the buccal mucosa with metastases to the pericardial cavity, lung and thyroid," Oral Oncology, vol. 38, no. 1, pp. 114–116, 2002.
[9] J. Onwuchekwa and J. Banchs, “Early cardiac metastasis from squamous cell carcinoma of the tongue in 2 patients,” Texas Heart Institute Journal, vol. 39, no. 4, pp. 565–567, 2012.
[10] S. Hans, D. Chauvet, B. Sadoughi, and D. F. Brasnu, "Cardiac metastasis after squamous cell carcinoma of the base of tongue," American Journal of Otolaryngology, vol. 30, no. 3, pp. 206–208, 2009.
[11] S. Nagata, K. Ota, M. Nagata, and M. Shimohara, “Cardiac metastasis of head and neck squamous cell carcinoma,” International Journal of Oral and Maxillofacial Surgery, vol. 41, no. 12, pp. 1458–1462, 2012.
[12] M. Shimoyama, F. Kitamura-Sasaka, and C. Shigemasa, “Metastatic cardiac squamous cell carcinoma arising in the left ventricle,” Heart, vol. 85, no. 5, p. 507, 2001.