

Cardiac Metastases of Malignant Melanoma

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Malignant melanoma has the heart metastasis rate of 50 - 71%, which seems to be the highest among other malignancies. When a patient presents with cardiac metastases of melanoma, the disease has already spread through the body and therefore hardly curable. This brief review tried to introduce this important condition and discuss its frequency, presentation, diagnosis, histologic findings and treatments.

Keywords: Melanoma; Neoplasm Metastasis; Heart Neoplasms

1. Introduction

Literally two types of tumors can involve the heart including primary and secondary ones. Primary tumors are quite rare with a prevalence of 0.001% to 0.03% in autopsies (1). Secondary tumors are 20 to 40 times more prevalent (2, 3). Approximately 75% of primary tumors are benign and 25% malignant. Benign myxoma is the most common form of primary tumors; whereas, sarcomas and cardiac lymphomas are the most common primary cardiac malignancies (2, 4, 5). Secondary tumors with heart invasion include lung and breast cancers, malignant melanomas, Hodgkin's and non-Hodgkin's lymphomas, primary gastrointestinal malignancies and sarcomas with extracardiac origin (6).

The incidence of melanoma increases by 2 - 7% annually which is faster than any other type of malignancies, a fact which has led to major concerns in many countries (7-9). The most important feature of melanoma is its extremely high propensity to develop metastasis (9). In 1820, William Norris proposed the term "melanotic heart" for the first time (3, 10). Since then, numerous cases of malignant melanoma have been described in the literature (3). Malignant melanoma has the heart metastasis rate of 50 - 71%, which seems to be the highest among other malignancies (11). When a patient presents with cardiac metastases of melanoma, the disease has already spread through the body and therefore it is hardly curable (3, 12). Single metastasis is scarce. Metastases may be found in right or left side of the heart, but bilateral metastases are frequently seen (13). Like lymphoma and leukemia, malignant melanoma mostly metastasizes hematogenously to the heart.

2. Argument

This brief review tried to introduce cardiac metastases

of malignant melanoma and discuss its frequency, presentation, diagnosis, histologic findings and treatments.

Different presentations of malignant melanoma have been reported. Only about 10% of patients with cardiac metastases have clinical symptoms. Nonspecific symptoms include irritability, dyspnea, pedal edema, cough, anorexia, fatigue, tachycardia, dysrhythmia, palpitations and chest pain (14-16).

This tumor can invade any parts of the heart, but the involvement of some structures like the valves is very rare. Single or multiple masses can be found in any cardiac chambers. The right atrium is mostly affected, which can disperse emboli resulting in cerebrovascular accidents or transient ischemic attacks (17). Many patients exhibit nonspecific symptoms and thus this condition is rarely diagnosed antemortem (18). Other presentations are due to cardiac chamber filling defects. Symptoms of right ventricular outflow tract obstruction and transient obstruction of left/right ventricular inflow have also been reported (19). Melanotic metastases can less commonly lead to symptoms of coronary stenosis (20) or recurrent syncope (21). Review of literature showed that involvement of each cardiac chamber may cause the disease presentations (22, 23).

Echocardiography is the most useful imaging modality for evaluating cardiac metastases (5). Transthoracic echocardiography has been extensively used, but it may miss the metastases in patients with poor echo window and in small cardiac masses. Therefore, transesophageal echocardiography with its higher sensitivity and specificity is recommended for better evaluation of the location and its periphery and the interference with internal cardiac structures (23, 24). Although tumor size, its localization, borders, origin, extension and resectability can be evalu-

ated, details such as characterization may be incomplete and cardiac magnetic resonance (CMR) can be helpful (25). The wide field of view of CMR improves the evaluation of the tumor and structures around it for surgical planning and helps determination of the pericardial involvement (4); moreover, the tumor invasion to mediastinal structures can be precisely measured. The characteristic feature of malignant melanoma is hyperintense signal on T1-weighted images in contrast to other tumors that produce low signal intensity (4).

Although melanoma generally spreads via hematogenous routes, lymphatic and direct extension of disease is reported. Given the hematogenous spread of disease, cardiac metastases are typically multifocal and may involve any parts of the heart, including the epicardium, myocardium and pericardium and may also be presented as an intracavitary mass (25, 26).

The histologic diagnosis of malignant melanoma was first made postmortem, but owing to early detection of metastases with new imaging modalities, definite antemortem diagnosis and pathologic examination are possible (18). Specimens can be obtained by echocardiography guided transvenous biopsy or after resection of the mass (27).

Unfortunately when a patient presents with cardiac involvement, the disease is well spread and there is limited life expectancy (5). The treatment of choice for these cases is palliative therapy (9). However, in minority of cases, when the metastasis is limited to the heart, complete resection is recommended. Adjuvant systemic therapy is administered when there are metastases in heart and other organs, while the heart mass is not flow limiting (6). In disseminated cases, curative therapy is impossible but in obstructive masses or when cardiac function is compromised or when there are significant symptoms of recurrent emboli, resection of the mass or debulking resection is advised. Decision making about surgery should be based on different parameters such as the total tumor burden, the sites of extracardiac invasion and tumor progression rate (24). Both the quality of life and the natural course of disease should be considered to determine the surgery plan. Long intervals of remission have been reported.

3. Conclusions

Malignant melanoma has the highest rate of metastases to the heart. Due to recent improvements in the treatment of this disease, long survival is possible. On the other hand, using newer imaging modalities, metastases are detected earlier. Physicians should keep in mind the likelihood of metastasis and plan an accurate study of the heart in initial staging and follow-up of patients diagnosed with melanoma (9). Transesophageal echocardiography has higher sensitivity compared to transthoracic echocardiography and also cardiac magnetic resonance can be used to define the mediastinal involvement (3). Considering tumor characteristics, its burden, size and location, physician decides to perform

palliative surgery, complete resection, adjuvants systemic or palliative therapy (3).

Authors' Contributions

Study concept and design: Maryam Moshkani Farahani. Drafting of the manuscript: Neda Raeessi and Maryam Moshkani Farahani. Critical revision of the manuscript for important intellectual content: Neda Raeessi and Maryam Moshkani Farahani.

References

1. Farahani Moshkani M, Kazemi Saleh D, Dadjoo Y, Pishgoo B. Left-Sided Angiosarcoma of Heart: A Rare Case. *The Journal of Tehran University Heart Center*. 2009;**4**(1):49-50.
2. Burke A, Virmani R. *Atlas of Tumor Pathology*. Washington, DC: Armed Forces Institute of Pathology; 1996.
3. Farahani MM. Cardiac Tumors. In: Bajraktari G editor. *Echocardiography- In Specific Diseases*. InTech company; 2012. pp. 153-60.
4. Libby P, Bonow R, Mann D, Zipes D. *Braunwald's heart disease: a textbook of cardiovascular medicine*. 8 ed; 2008.
5. Neragi-Miandoab S, Kim J, Vlahakes GJ. Malignant tumours of the heart: a review of tumour type, diagnosis and therapy. *Clin Oncol (R Coll Radiol)*. 2007;**19**(10):748-56.
6. Ekmektzoglou KA, Samelis GF, Xanthos T. Heart and tumors: location, metastasis, clinical manifestations, diagnostic approaches and therapeutic considerations. *J Cardiovasc Med (Hagerstown)*. 2008;**9**(8):769-77.
7. Tronnier M, Semkova K, Wollina U, Tchernev G. Malignant melanoma: epidemiologic aspects, diagnostic and therapeutic approach. *Wien Med Wochenschr*. 2013;**163**(15-16):354-8.
8. Tronnier M, Mitteldorf C. Treating advanced melanoma: current insights and opportunities. *Cancer Manag Res*. 2014;**6**:349-56.
9. Tas F, Mudun A, Kirma C. Cardiac involvement in melanoma: a case report and review of the literature. *J Cancer Res Ther*. 2010;**6**(3):359-61.
10. Norris W. A case of fungoid disease. *Edinb Med Surg J. Edinb Med Surg J*. 1820;**16**:562-5.
11. Klatt EC, Heitz DR. Cardiac metastases. *Cancer*. 1990;**65**(6):1456-9.
12. Chen RH, Gaos CM, Frazier OH. Complete resection of a right atrial intracavitary metastatic melanoma. *Ann Thorac Surg*. 1996;**61**(4):1255-7.
13. Reynen K, Kockeritz U, Strasser RH. Metastases to the heart. *Ann Oncol*. 2004;**15**(3):375-81.
14. Hanfling SM. Metastatic cancer to the heart. Review of the literature and report of 127 cases. *Circulation*. 1960;**22**:474-83.
15. Weinberg BA, Conces DJ, Waller BF. Cardiac manifestations of noncardiac tumors. Part II: Direct effects. *Clin Cardiol*. 1989;**12**(6):347-54.
16. Villa A, Eshja E, Dallavalle S, Bassi EM, Turco A. Cardiac metastases of melanoma as first manifestation of the disease. *J Radiol Case Rep*. 2014;**8**(4):8-15.
17. Cheruvu B, Cheruvu P, Boyars M. An unusual case of metastasis to the left side of the heart: a case report. *J Med Case Rep*. 2011;**5**:23.
18. Bussani R, De-Giorgio F, Abbate A, Silvestri F. Cardiac metastases. *J Clin Pathol*. 2007;**60**(1):27-34.
19. Emmot WW, Vacek JL, Agee K, Moran J, Dunn MI. Metastatic malignant melanoma presenting clinically as obstruction of the right ventricular inflow and outflow tracts. Characterization by magnetic resonance imaging. *Chest*. 1987;**92**(2):362-4.
20. Robin J, Tronc F, Ninet J, Loire R, Milon H, Cordier JF, et al. Primary melanoma of the heart: case report of an association with coronary stenosis. *Eur J Cardiothorac Surg*. 1996;**10**(7):593-4.
21. Ozer N, Yavuz B, Atalar E. Recurrent syncope in a case of metastatic malignant melanoma—an unusual presentation of an uncommon disease. *Eur J Echocardiogr*. 2006;**7**(3):233-4.
22. Gosalakal JA, Sugrue DD. Malignant melanoma of the right atrium: antemortem diagnosis by transvenous biopsy. *Br Heart J*. 1989;**62**(2):159-60.
23. Samiei N, Farahani MM, Sadeghipour A, Mozaafari K, Maleki M.

- Intracardiac metastasis of malignant melanoma. *Eur J Echocardiogr.* 2008;**9**(3):393-4.
24. Gibbs P, Cebon JS, Calafiore P, Robinson WA. Cardiac metastases from malignant melanoma. *Cancer.* 1999;**85**(1):78-84.
25. Allen BC, Mohammed TL, Tan CD, Miller DV, Williamson EE, Kirsch JS. Metastatic melanoma to the heart. *Curr Probl Diagn Radiol.* 2012;**41**(5):159-64.
26. Garbe C, Leiter U. Melanoma epidemiology and trends. *Clin Dermatol.* 2009;**27**(1):3-9.
27. Rubin DC, Ziskind AA, Hawke MW, Plotnick GD. Transesophageal echocardiographically guided percutaneous biopsy of a right atrial cardiac mass. *Am Heart J.* 1994;**127**(4 Pt 1):935-6.