

Case Series of Cardiac Metastasis in 3 Cases – An Autopsy Experience, Tertiary Care Centre

Dr. Grishma A Mehta^{1*}, Dr. Ami M Shah², Dr. Hansa M Goswami³

¹Tutor, Department of Pathology, B. J. Medical College, Ahmedabad.

²Assistant Professor, Department of Pathology, B. J. Medical College, Ahmedabad.

³Professor & Head, Department of Pathology, B. J. Medical College, Ahmedabad.

Corresponding Author: Dr. Grishma A Mehta

Email: gamehta239@gmail.com



Abstract

The incidence of secondary cardiac tumours is 2.3% in previous autopsy studies. Common metastasizing tumours to the heart are lung, esophagus, breast, stomach, pancreas, melanoma, and colon. The oral squamous cell carcinoma metastasizing to the heart are reported in few cases. We are presenting three cases, out of which two cases of a 51-year-old and 59-year-old deceased male previously diagnosed with upper esophagus and larynx squamous cell carcinoma, found having multiple metastatic lesions of lung, liver as well as metastatic foci to the heart in histopathological examination of tissues received after conducting autopsy. Another single case of 28-year-old female of adenocarcinoma of unknown origin, possibility of ovarian origin, which shows metastasis to all major organs including heart. The involvement was limited to the myocardium with a normal pericardium and endocardium, which is not common. The case details and relevant clinical discussion of all three cases are described to highlight asymptomatic, metastatic foci of oral as well as laryngeal squamous cell carcinoma to myocardium and one case of adenocarcinoma of unknown origin.

Keywords: Cardiac metastasis, secondary cardiac tumors

Introduction

Primary cardiac tumors are rare tumors with an incidence ranging from 0.001% to 0.28% in literature.¹ The incidence of secondary cardiac tumors has been found to be approximately 2.3% in previous autopsy studies, approximately 132 times more than primary cardiac tumors.² Metastatic tumours spread to the heart from nearby structures are more common than primary tumours. Metastasis to heart appears in patient of advanced stages of the malignancy & as well as relatively rare as they are clinically silent with majority of cases detected in a postmortem examination. The heart is one of the least favored sites for metastasis of patients diagnosed with carcinoma anywhere in the body, only 1.23% have identifiable cardiac metastasis at autopsy.³ This is probably the reason, why cardiac tumors – both primary and metastatic – are least investigated subjects in oncology. Common tumors metastasizing to the heart are lung, esophagus, lymphoma, breast, stomach, pancreas, melanoma and colon.^{3,4} There are few case reports highlighting cardiac metastasis from oral cancers, most of such cases are from squamous cell carcinoma of the tongue and retromolar trigone.^{5,6} Cardiac metastasis from squamous carcinoma of esophagus is a rare event. Case reports of squamous cell carcinoma, metastasizing from the larynx to the heart are still rarer^{7,8} and adenocarcinoma metastasis to heart is rarest one. Heart

metastases are mostly clinically silent and are mostly diagnosed at autopsy.^{3,4} A tumor could spread to the heart through different routes such as direct cardiac extension, bloodstream, lymphatic system, or intracavitary diffusion. Identification of the path of diffusion can be made on the basis of which cardiac structures are primarily affected: for example, pericardial involvement is due to lymphatic spread or even direct extension, while myocardial and endocardial metastases are the result of the heart chambers' being invaded through the bloodstream. The distinction regarding the metastatic pathway is based on a clinical evaluation of the structure of the heart involved or postmortem examination.⁴

Considering that most studies on the incidence of cardiac metastases are based on autopsies, yet no *in vivo* evidence exists as to a possible correlation between hematogenous spread and cardiac metastases.

We hereby report total three cases out of which two cases of squamous cell carcinoma of the upper esophagus and larynx and another single case of adenocarcinoma of unknown origin that metastasized to the liver, lung and heart on gross autopsy examination and diagnosed on microscopic examination as metastasis to multiple organs including heart - metastasis to myocardium.

Case Reports

1. A 51-year-old deceased male with previously known history of neck malignancy involving upper esophagus was brought to the hospital for autopsy. The complete treatment records of the patient were not available, but he was treated with radiotherapy and hospitalized multiple times. The patient's condition had been worsening, the details of which were not available and he was brought dead to the hospital.

2. Another case of a 59-year-old male person was diagnosed as carcinoma of larynx and on treatment of radiotherapy, autopsy was performed, and external examination revealed a large wound over the right mandible with multiple hard nodules over the right side of face and neck.[Figure 1] On opening the thoracic cavity, multiple foci of consolidation were present involving both the lungs. Gross examination of the liver shows multiple whitish foci while heart was unremarkable; there were no mass lesions indicative of metastatic foci.

In both the cases, on opening of the heart by inflow outflow method left wall myocardium of the heart show whitish foci.[Figure 2]

Microscopic examination of random sections from heart [Figure 3] and hard nodules on neck revealed nests of squamous cells with features of moderately differentiated squamous cell carcinoma, infiltrating within the cardiac muscles [Figure 4] and sections from gross lesions in the lung showed pulmonary edema, congestion, interstitial inflammation, and presence of nests of squamous cells consistent with metastatic moderately differentiated squamous cell carcinoma. Microscopic examination of liver shows metastatic squamous cell carcinoma. Microscopic examination of all other organs like kidneys and spleen were unremarkable.

3. A case of 28-year-old female without any definitive history but she was ill in the last 2-3 month. She was admitted in hospital for two days and USG abdomen/pelvis reported by radiologist as findings are suggestive of haemoperitoneum due to rupture of adnexal cystic structure/ Mass. A female patient had assault/ violence history before 4 days. So, it was a case considering as might be rupture of some internal vital organ. During autopsy on postmortem examination there are presence of small to large whitish foci identified in different organs like lung, liver, spleen. At that time medical officer noted that uterus with solid, globular, hard tumor like structure identified with loss of normal ovarian structure.

-In this 28 year old female case, During gross examination of heart show whitish foci in right ventricular wall & other organs like one lung, liver, spleen & one kidney had multiple whitish foci. Uterus with solid, globular hard mass had solid cut surface with myxoid areas. On microscopic examination of globular hard mass show histology of adenocarcinoma with signet ring appearance & other different organs show histology of metastatic adenocarcinoma along with signet ring cell appearance at places. [Figure 5]



Figure 1. Multiple hard nodules over the right side of neck, Gross Examination.



Figure 2. Myocardium of the heart Gross Examination - whitish foci.



Figure 3. Microscopic examination H & E stain 10x - Nests with features of moderately differentiated squamous cell carcinoma.

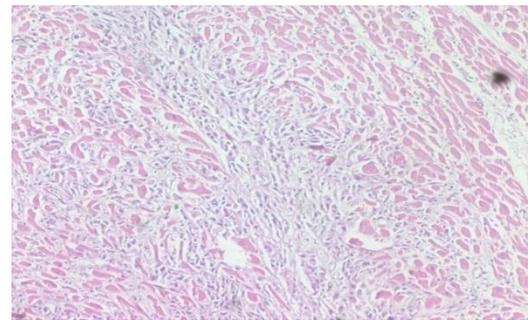


Figure 4. Microscopic examination H & E stain 10x - Moderately differentiated squamous cell carcinoma infiltrating in to cardiac muscle.

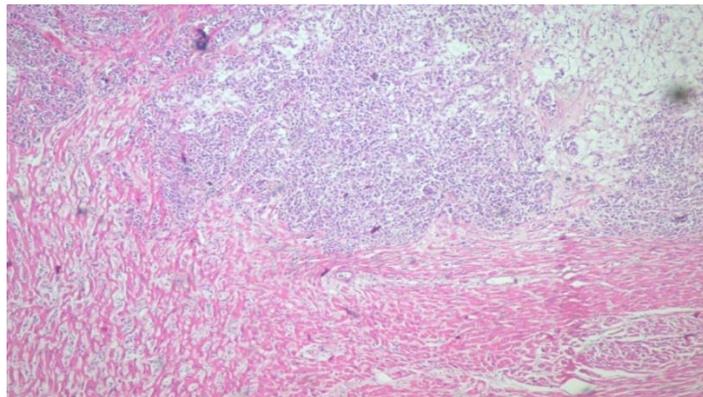


Figure 5. Microscopic examination H & E stain 4x (Scanner) – Adenocarcinoma Metastasis with signet ring cell differentiation.

It was concluded on postmortem examination that the possible cause of death was widespread dissemination of the tumor leading to failure of vital organs including heart and lungs.

Discussion

Primary tumors of the heart are rare, occurring at a frequency of 0.02% in pooled autopsy series.⁵ Secondary or metastatic heart tumors occur comparatively more frequently, with an at least 100 times higher incidence than primary tumors of the heart.⁸

Distant metastasis of oral squamous cell carcinoma have reported lung (55%), bone (12%–37%), and liver (3%–9%) as the most common site of metastasis from oral squamous cell carcinoma.^{9,10} Brain, soft tissues, and skin have also been reported as metastatic sites with lower incidence rates.^{9,10} Cardiac metastases were found in up to 25% of postmortem patients who had died of malignancies.⁷

The most common tumors which metastasize to heart are carcinomas of the lung, breast, esophagus, malignant lymphoma, leukemia, and malignant melanoma.^{7,10} Malignant melanomas frequently metastasize to the heart and represent the tumor with the highest rate of cardiac metastases (in more than half the cases).¹¹ Lymphatic spread tends to give rise to pericardial metastases; hematogenous spread preferentially gives rise to myocardial metastases. Only rarely are endocardial tumor deposits found.

The most common location of cardiac involvement by secondary tumors is pericardium (69.4%), followed by myocardium (31.8%), and endocardium (5%).^{3,4} Both the present cases had metastasis in the myocardium with an unremarkable pericardium and endocardium, which is not so commonly reported. In the present case, the pericardium was not involved on gross and microscopic examination, and the myocardial involvement was probably through the retrograde tracheal and bronchomediastinal lymphatic channels. Metastasis in case of adenocarcinoma could have occurred due to haematogenous spread.

Cardiac metastasis is usually an indicator of widespread dissemination of cancer and occurs in advanced disease with poor prognosis. An autopsy case series that studied more than 18,000 deaths reported the presence of cardiac metastasis in 9.1% of all malignancy-related deaths but found that the heart was the sole target of metastasis in only 1.5% of such cases.⁴

Cardiac metastasis is known to remain clinically silent, possibly because of its small size and the fact that the overall clinical picture is dominated by generalized tumor spread. In fact, most of the cardiac metastasis has been reported on postmortem studies. The involvement of the myocardium may present clinically as arrhythmias and conduction disturbances, depending on the site and size of infiltration within the myocardium. Cardiac metastasis may present with life threatening manifestations including cardiac tamponade from pericardial involvement. The sudden cardiac death due to massive infiltration of the myocardium has been reported.⁷ The present cases have been treated at a different hospital in the past and no records suggesting any symptomatology or investigations pointing towards known cardiac involvement by the tumor were available.

Conclusion

The present cases have been put forth, to highlight the fact that in cases of disseminated malignancies, multiple widespread micrometastatic foci of tumor may be present even in the absence of grossly appreciable lesions in frequently involved organs such as liver and lungs and rarely involved organs like heart, leading to mortality as happened in these cases. Cardiac metastases are rare events and are silent in most of the cases. In the absence of any other metastatic sites, its diagnosis has an impact on intent of treatment. Rarely in the event of solitary metastases to the heart with low volume locoregional disease, more aggressive protocols employing multimodality treatment strategies maybe carried out. Despite this, the prognosis is poor with a short life expectancy.

Financial support and sponsorship: Nil.

Conflicts of interest: The authors declare that there are no conflicts of interest regarding the publication of this paper.

References

1. WHO Classification of Tumours. Pathology and genetics of tumours of the skin. 3rd ed, 6. Lyon: IARC; 2005.
2. Kallini JR, Hamed N, Khachemoune A. Squamous cell carcinoma of the skin: epidemiology, classification, management, and novel trends. *Int J Dermatol.* 2015 Feb;54(2):130-40. doi: 10.1111/ijd.12553. Epub 2014 Nov 27. PMID: 25428226.
3. Abraham KP, Reddy V, Gattuso P. Neoplasms metastatic to the heart: review of 3314 consecutive autopsies. *Am J Cardiovasc Pathol.* 1990;3(3):195-8. PMID: 2095826.
4. Lam KY, Dickens P, Chan AC. Tumors of the heart. A 20-year experience with a review of 12,485 consecutive autopsies. *Arch Pathol Lab Med.* 1993 Oct;117(10):1027-31. PMID: 8215825.
5. Klatt EC, Heitz DR. Cardiac metastases. *Cancer.* 1990 Mar 15;65(6):1456-9. doi:10.1002/1097-0142(19900315)65:6<1456::aidncr2820650634>3.0.co;2-5. PMID: 2306690.
6. Aerts BR, Kock MC, Kofflard MJ, Plaisier PW. Cardiac metastasis of malignant melanoma: a case report. *Neth Heart J.* 2014 Jan;22(1):39-41. doi: 10.1007/s12471-013-0441-8. PMID: 23821495; PMCID: PMC3890009.
7. Mohle J, Nickloff BJ. Fatal cutaneous squamous cell carcinoma in a forty-three-year-old male. *J Dermatol Surg Oncol.* 1986 Mar;12(3):276-9. doi: 10.1111/j.1524-4725.1986.tb01464.x. PMID: 3950180.
8. Boukhalil P, Debek A. Images in clinical medicine. Squamous-cell carcinoma with pericardial metastases. *N Engl J Med.* 2006 Nov 23;355(21):e24. doi: 10.1056/NEJMicm053597. PMID: 17124011.
9. Kypson AP, Anderson CA, Lochmuller CM, Dizon K, Rodriguez E. Squamous cell carcinoma of the pericardium found during coronary bypass surgery of possible cutaneous origin. *Ann Thorac Surg.* 2007 Nov;84(5):1735-6. doi: 10.1016/j.athoracsur.2007.06.009. PMID: 17954098.
10. Mackenzie KA, Simcock JW, Lainchbury JG, Currie MJ, Lynn KL. Myocardial metastasis of cutaneous squamous cell carcinoma in a renal transplant recipient. *Transplant Proc.* 2009 Dec;41(10):4414-5. doi: 10.1016/j.transproceed.2009.09.056. PMID: 20005411.
11. Annual of pathological autopsy cases in Japan, 24. Tokyo: The Japanese Society of Pathology; 1981, Vol. 55.
12. PRICHARD RW. Tumors of the heart; review of the subject and report of 150 cases. *AMA Arch Pathol.* 1951 Jan;51(1):98-128. PMID: 14789340.
13. Reynen K, Köckeritz U, Strasser RH. Metastases to the heart. *Ann Oncol.* 2004 Mar;15(3):375-81. doi: 10.1093/annonc/mdh086. PMID: 14998838.
14. Goldberg AD, Blankstein R, Padera RF. Tumors metastatic to the heart. *Circulation.* 2013 Oct 15;128(16):1790-4. doi: 10.1161/CIRCULATIONAHA.112.000790. PMID: 24126323.