

Cardiac Metastasis from Carcinoma Gall Bladder: A Rare Case Detected on Autopsy

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Abstract

Metastasis to the heart is uncommon compared to other organs, posing notable diagnostic challenges. Incidence in autopsy studies typically ranges between 0.7% and 3.5%. Lung, breast, and hematologic cancers are the main sources of such metastases, leading to varied clinical presentations and severe complications. Postmortem viscera from a 47 year old male with a suspected history of jaundice. Only limited information was available. Gross examination showed a solid mass in the gall bladder with areas of hemorrhage and necrosis, while no other abnormalities were observed in other viscera received. Brain examination showed congested blood vessels, while heart sections exhibited atypical cell deposits in the pericardium and myocardium. Coronary arteries displayed pathological thickening. Lung and liver sections also displayed similar metastatic atypical cell deposits, infiltrating tissue and causing necrosis. Gall bladder examination revealed irregular glandular formations lined with polygonal tumor cells positive for cytokeratin. The final diagnosis based on histomorphological features and immunohistochemistry confirmed gall bladder adenocarcinoma metastasising to the heart, liver and lungs.

Keywords: Carcinoma, cardiac metastasis, gall bladder, rare.

Introduction

Cardiac metastasis is relatively rare as compared to metastases in other organs. This may be due to the heart's unique microenvironment due to continuous movement and high blood flow within the heart, which hinder the attachment and proliferation of cancer cells. The incidence of secondary metastatic tumors involving the pericardium, myocardium,

major blood vessels or coronary arteries ranges from 0.7% to 3.5% in autopsy studies of the general population and can increase to 9.1% in individuals with known malignancy.^{1,2}

Typically, cardiac metastasis from various types of tumors such as lung cancer, breast cancer and hematologic malignancies, contributed to around 36-39%, 10%-12% and 10%-21% respectively.³ The

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clinical presentation is nonspecific and varies based on their location and size. Cardiac involvement can be life threatening in the form of lethal arrhythmias or many are asymptomatic and incidentally identified posthumously.^{4,5}

Imaging tests are vital for detecting cardiac metastases, providing essential information about the size, location, and dynamics of cardiac masses from various tumors. These insights are crucial for understanding their implications on patient health.^{6,7} While imaging studies can aid in diagnosing cardiac metastasis, tissue histology remains the most reliable method for distinguishing between neoplastic and non-neoplastic masses.⁸

Case Report

Post mortem viscera of a 47 year old male was received in the department of pathology with alleged history of jaundice. No other significant details regarding past history or investigations were available in the post mortem papers. Piece of brain, whole heart, pieces of lung and liver were received. Piece of brain weighed 50 gm and measured 9x4x1cm. Specimen of heart weighed 220 gm and measured 10x8x3 cm. On cutting open, the right ventricular wall, left ventricular wall and interventricular septum thickness were 0.3 cm, 1.3 cm and 1.1 cm respectively. The circumferences of tricuspid, pulmonary, mitral and aortic valves are 10.6, 8.0, 9.0 and 68 cm respectively. The stump of aorta measures 25 cm, in length. Both the coronaries were traced as far as possible. A piece of lung weighing 60 gm & measuring 9x5x4.5 cm. No abnormality was identified in the various viscera pieces on gross examination. Piece of liver weighed 230 gm and measuring 10x9x6 cm along with attached gall bladder at base of liver piece. On cut section, gall bladder revealed a solid grey white mass almost filling the cavity measuring 4x3.5x2 cm with focal areas of hemorrhage and necrosis. There adjacent mucosa shows mucosal irregularity and thickening.

Microscopic examination from brain showed no significant pathological change. Representative sections from heart revealed deposits of atypical cells arranged in small groups and ill-formed glands in the pericardial tissue and reaching upto myocardium.

Sections from right and left coronary arteries revealed the presence of pathological intimal thickening. Sections from pieces of lung and liver also revealed multiple foci of similar metastatic deposits of atypical cells arranged in papillary and glandular pattern as seen in the heart. Sections from gall bladder revealed irregular, angulated or poorly formed glands lined by polygonal tumor cells with enlarged nuclei showing vesicular chromatin, prominent nucleoli or sheets of pleomorphic tumor cells with bizarre nuclei. The tumor cells were positive for cytokeratin and negative for vimentin and S-100. The foci of tumor deposits infiltrating the myocardium were highlighted by cytokeratin. The final diagnosis on the basis of histomorphological features and IHC was given as gall bladder adenocarcinoma with metastasis to heart, liver and lungs.



Figure 1: Grossly heart shows no abnormality.



Figure 2: Gross examination shows an infiltrative, grey white solid mass in gall bladder with unremarkable liver on cut section.

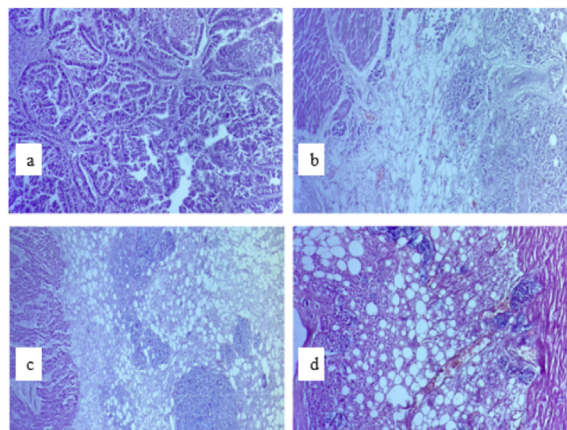


Figure 3 (a) Microphotograph from gall bladder mass shows irregularly shaped glands lined by tumor cells(H & E stain X100), 3 (b, c) Microphotograph showing tumor cells arranged in glandular pattern in the pericardium (H & E stain X100), 3 (d) Microphotograph showing foci of tumor cells infiltrating the adjacent myocardium. (H & E stain X100)

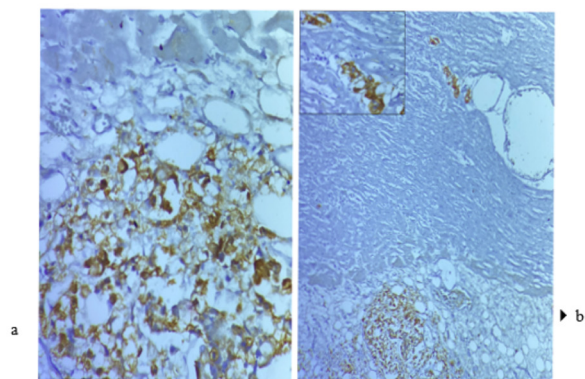


Figure 4a. Microphotograph showing tumor cells in pericardium positive for cytokeratin (IHC cytokeratin X400)

Figure 4b. Microphotograph showing tumor cells in pericardium and myocardium positive for cytokeratin (IHC cytokeratin X100) inset shows tumor cells in myocardium positive for cytokeratin (IHC cytokeratin X400)

Discussion

Metastasis involving the heart is rare and often discovered incidentally during autopsy as more than 90% are clinically silent with only a few cases documented in literature. Studies indicate

that cardiac metastasis are found in 1.5% to 20% of autopsies of cancer patients and merely 0.2% to 6.5% in general autopsy cases.⁸ These metastasis typically are seen in pericardium but can uncommonly affect the endocardium, myocardium or coronary arteries. Common symptoms and signs include difficulty breathing, irregular heartbeat, leg swelling, and chest discomfort.

Various imaging techniques can play important role in the diagnosis of cardiac metastasis. Echocardiography (ECG) is typically the first imaging method used to detect pericardial effusions and evaluate any cardiac metastases. It show presence of nonspecific ST-T-wave changes and new atrial arrhythmias. Chest X-ray may reveal water bottle sign, indicating the presence of a pericardial effusion. Cardiac magnetic resonance imaging (CMR), computed tomography (CT) and positron emission tomography can provide additional noninvasive characterisation of cardiac masses.⁸ Although clinical diagnosis of cardiac metastasis can sometimes be made on imaging but tissue histology remains the most definitive and despite the advances in imaging techniques in recent years, malignant cardiac metastasis are mostly not discovered until autopsy.¹

In a study conducted by Luis M⁹ et al, a total of 1294 adult autopsies were reviewed over a span of 35 years. A total of 124 cases of secondary cardiac tumors were identified out of which 61 cases were confirmed cardiac metastases of solid cancers. The age range of affected individuals was 32 to 85 years. All cases also exhibited multiple extracardiac metastases, with 56 cases (91.8%) showing distant metastases in four or more different organs. The study revealed an incidence of cardiac metastasis at 4.71%, with lung cancer being the primary contributor to cardiac metastases. Carcinoma emerged as the most prevalent histological type observed. Furthermore, the pericardium was identified as the most common site of metastasis.

In another study by Inoue¹⁰ et al 68 year old woman presented with hematemesis, high fever, and right upper quadrant pain, revealing an elastic hard mass upon examination. Imaging confirmed gallbladder carcinoma invading the liver. Biopsy confirmed poorly differentiated adenocarcinoma. Esophagogastroduodenoscopy revealed duodenal

invasion and subsequent examination showed new gastric lesions, both biopsied as poorly differentiated adenocarcinoma. Despite supportive care, she succumbed a month later. Autopsy revealed a large gallbladder adenocarcinoma with widespread metastasis to liver, pancreas, duodenum, kidneys, adrenal glands, lungs, bones, and heart, including pericardial and myocardial tumors with coronary artery involvement. All metastatic nodules were confirmed as poorly differentiated adenocarcinomas.

Gunjiganvi¹¹ et al reported a case of 54 year old woman with a history of laparoscopic cholecystectomy four years prior presented with breathing difficulty and chest pain. Subsequent diagnosis revealed advanced adenocarcinoma. She underwent radical cholecystectomy and chemotherapy, with normal post-treatment scans. However, she developed cardiomegaly, pleural, and pericardial effusion. Despite conservative treatment, her condition deteriorated. Further tests indicated metastatic tumor spread. Surgical intervention drained a massive pericardial effusion, confirming metastatic adenocarcinoma in the pericardium. Despite efforts, her condition worsened, leading to respiratory distress and eventual demise. Histopathological analysis of pericardial tissue confirmed metastatic adenocarcinoma infiltration.

Parmar¹² et al reported a case of 40 year old male, previously diagnosed with gallbladder cancer, collapsed suddenly, leading to a postmortem examination to determine the cause of death. The autopsy revealed a tumor originating from the gallbladder, perforating its upper part, with metastatic nodules found on the liver's surface. The heart, brain, spleen, lung, and kidney specimens were examined. The heart weighed 210g with multiple nodules observed in its walls. Lung and kidney sections showed similar nodules, while the liver displayed various nodules ranging from 1.6 to 4.0 cms. Histopathological analysis confirmed adenocarcinoma infiltration in the gallbladder, liver and nodules in the heart, lung, and kidney, with spleen sections showing congestion only.

Other single case reports have been published for cardiac metastasis from other tumors like study conducted by Siqueira¹³ et al a reported a case of following surgery for recurrent penile squamous

cell carcinoma, a 79-year-old man developed cardiac complications, with autopsy showing carcinoma mimicking endocarditis, confirmed microscopically and another study by Gibbs¹⁴ et al documented two cases of metastatic malignant melanoma where patients presented with nonspecific lung symptoms. One patient had successful surgery to remove a large tumor, relieving symptoms. The other underwent a biopsy of a right ventricular mass, resulting in severe complications and unsuccessful resuscitation, with postmortem confirmation of melanoma

In the present study, there was no history or investigations available in the post mortem papers. Gross examination of heart revealed no abnormality, however the microscopic examination revealed cluster of tumor cells in pericardium and myocardium along with multiple such foci of metastatic deposits of atypical cells in lung and liver also.

Although clinical diagnosis of cardiac metastasis remains challenging, advancements in laboratory techniques enable timely and precise identification. The cases discussed, including ours, underscore the necessity of considering cardiac metastasis in the differential diagnosis in patients presenting with acute coronary symptom in known malignancy cases. Heightened awareness and vigilance are crucial for ensuring timely detection and appropriate management of this condition.

Conclusion

Cardiac metastases are often clinically silent, they should always be considered in any individual with new cardiac symptoms and known malignancy. The clinical sequelae of cardiac metastasis is varied, numerous and depends on the anatomic localisation of tumor. Echocardiography is the initial imaging test for the detection of cardiac metastasis cardiac CT and positron emission tomography/CT may help to further characterise and delineate the extent of both cardiac and extracardiac disease.

Conflict of Interest: There is no conflict of interest

Sources of Funding: Nil

Ethical Clearance: Not required as it is a case report. The identity of the deceased is masked and therefore permission from relatives was not obtained.

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