A Case of Mitral Valve Metastasis From Breast Carcinoma Mimicking as a Mitral Valve Regurgitation

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Abstract- Metastatic involvement of cardiac valve and pericardium mimicking a cardiac valve pathology accompanied with cardiac tamponade is a rare phenomenon. These metastases commonly arise from the lymphoreticular system, the pulmonary system, and breast. Metastatic spread of breast carcinoma to the cardiac valve is exceedingly rare, and only two case reports have been detected in English literature so far. We report a rare case of a patient with adenocarcinoma of the breast, which presented with severe mitral valve regurgitation and pericardial effusion which was managed urgently with mitral valve replacement. Our case shows the probability of combined metastatic pericardial and valve involvement in patients with breast adenocarcinoma. The patient was treated with mitral valve replacement and intrapericardial infusion of cisplatinum drug to control possible recurrent effusion.

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Keywords: Breast neoplasm metastasis; Cardiac valve; Tamponade; Pericardial effusion

Introduction

Most of cardiac neoplasms are metastatic from an extracardiac malignant origin. Primary neoplasms of the cardiac origin are not common, with an incidence of 0.001-0.02% in a postmortem study (1). Approximately 1.4% of these primary neoplasms are malignant, and other ¾ of these primary heart neoplasms are benign, with myxoma accounting approximately for more than 60% of benign heart neoplasms. Adenocarcinoma is the most common primary malignant tumor of the breast. The most common location of breast carcinoma metastasis is to the bone, pulmonary system, followed by the axillaries lymph node chain (2). The mitral valve is a rare location of breast carcinoma metastasis with the left atrium (LA) as the rarest site (3-5). Surgical management of metastatic breast carcinoma is usually accomplished in symptomatic patients. We reported an unknown case with tamponade and mitral valve regurgitation that after further evaluation, the patient had a metastatic breast carcinoma in the pericardium, left atrium (LA), and the mitral valve.

Case Report

A 45-year-old female was admitted to our center for management of a severe pericardial effusion demonstrated by transthoracic echocardiography (TTE), 12 hours earlier. At admission, she complained of respiratory distress and chest pain. TTE not only showed a severe pericardial effusion but also revealed severe eccentric jet due to mal-coaptation of leaflets. Five years earlier, she had been treated for left breast carcinoma with lumpectomy, combined with chemo and radiotherapy. In cardiac angiography room, an echo-guided pericardial centesis was performed, but due to intra-pericardial fibrin strand, it was not effectively drained. The laboratory exam for the pericardial fluid was as the following data: glucose, 40 mg/dl, and lactate dehydrogenate, 400 U/L; white blood cell, more than 2000/uL; with high leukocytes, count (50%).

These findings were consistent with inflammatory exudates. In another hand, cytohistologic and microbiological evaluations revealed negative findings (Figure 2). Thus, the pericardial exudate was thought to be a reactive effusion resulting from severe regurgitation of the mitral valve. A chest X-ray revealed enlargement of cardiac silhouette, but both lung fields were normal. Coronary angiography was normal. TTE revealed severe regurgitation without the presence of LA mass or

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thrombosis on the mitral valve (Figure 3). Despite pericardial drainage, the dyspnea worsened and became intolerable on 6th days of admission. Then the patient underwent an emergent median sternotomy for both drainages of exudative fluid and mitral valve replacement or repair with the use of cardiopulmonary bypass (CPB). In the intraoperative exploration, the pericardium was thick, but no any evidence of abnormal deposition except for some fibrin material was found. Due to the unstable hemodynamic condition, CPB was instituted quickly. After the opening of the left atrium, we identified a normal appearing mitral valve except for anterior leaflet shrinkage and fibrotic evolution that are resulting in mal-coaptation of the valve. The fibrotic lesion originated from the central part of the anterior leaflet and led to an inversion of the valve orifice. After further evaluation for evidence of intra-atrial clot or mass, we removed the valve with preservation of the papillary muscles and replaced with 31 number carbomedics Sorin group. On pathologic examination of the valve specimen, a metastatic deposit was detected, and malignant cell consistent with breast adenocarcinoma was confirmed. Figure 1 after valve replacement, the respiratory distress was resolved. In a follow-up at 12th days of surgery, echocardiography showed the normal function of the prosthetic mitral valve with no evidence of the left atrial tumor, but pericardial effusion was continued to 2nd weeks of the postoperative course and stopped in the 18th day of operation. After four days, effusion was ceased, and the drain was removed. After he recovered from intensive care unit she was discharged to home with no respiratory distress in the 30th days of operation, she received combination of chemotherapy with 5-fluorouracil and mitomycin-C, and in follow-up she lived her life without any recurrence of pericardial effusion symptoms or prosthetic mitral valve malfunction due to tumor recurrence, however in the recent outpatient clinic follow-up, which was performed 18 months after operation, she was again hospitalized to our center complaining of hemoptysis. The hemoptysis was massive and recurrent and lead to intubation and death.

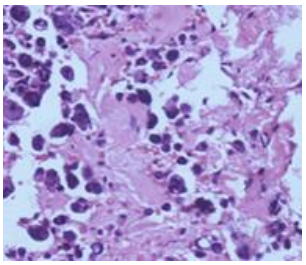

Figure 1. Shows anterior mitral valve and head of papillary muscle involvement by metastatic breast involvement

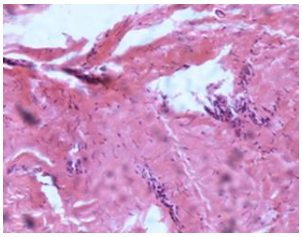

Figure 2. Shows no pericardial involvement by breast carcinoma

Discussion

Generally, 25% of heart neoplasms are malignant. Metastatic heart masses are 30 times more common compared to primary heart neoplasm. The malignancy of the lung is the most common type of metastasis that involves the heart that followed by non-Hodgkin lymphoma, carcinoma of the breast, leukemia, gastric adenocarcinoma, skin melanoma, hepatic, and gastrointestinal carcinoma (6). Metastasis is frequent in late stage and advanced breast carcinoma, and the prognosis is poor. The common sites for metastatic invasion for breast carcinoma are axillaries lymph node and chains, brain and the lung. Although breast carcinoma is prone to lymphatic invasion, the vascular extension is common, and metastasis to the heart chambers is very rare (6,7). Malignant breast neoplasm invading to the cardiac chambers is one of the rare investigated issues in clinical oncology. In the past, the low frequencies of breast carcinoma to the cardiac

chambers have been related to this hypothesis that the heart was not a good nidus for malignant cells. Prichard described that the high metabolic activity of the cardiac muscle, and the high blood flow stream as variables accounting for this low incidence (8). The other exhibited that the low incidence was due to inadequate follow-up or in outpatient in clinic observation. In the past two decades, imaging studies have improved their detection, as the mainstay of clinical follow-up. With the rapid improvement in non-surgical treatment such as chemotherapy and radiotherapy evolution of others modern treatment method such as biotherapy and molecular targeted therapy, distant metastatic sites of tumors are more commonly prone to local therapy for palliation. Approximately five types of malignant neoplasms are known which have a predilection to the heart, these tumors involve the cardiac chambers more often than other types, for example, pulmonary carcinoma, breast, esophageal carcinoma, leukemia, lymphoma and melanoma (9-13). Neoplasm's ability to invade to the cardiac tissue and chambers depends on many different variables, such the molecular biomarkers, biological characteristics and pathologic characteristics of the breast tumors, but also related to the specific myocardial or functional characteristics of heart chambers (14). Except to the central nervous system's malignancies that have not a predilection to cardiac metastases others organ cancer had an incidence of 0.001-0.02 of metastasis to heart. Cardiac metastases from breast commonly occur in subjects during the sixth and eighth decades of life, and there is no sex predilection. In a postmortem study at which a malignant tumor was the cause of death, heart metastases were detected in 9% of subjects (15). Bussani *et al*., exhibited that the highest incidence of cardiac metastasis was detected in subjects diagnosed for mesothelioma of pleura (50%), melanoma (28%), pulmonary cancer (21%) and breast malignancy (16%) ovarian cancer (10%) and lymphoma and leukemia (9.4%) (16). Approximately 75% of all cardiac metastases invade to the pericardium and only 25% extended to the epicardium and the myocardium (17,18). Some malignancies extended to multiple organs and the first location diagnosed could be the most common location of metastatic invasion. Other malignancies have a selective function about their distant metastasis sites; so they pass from multiple organs and specifically colonize in selective distal structures. For unknown reasons, melanoma has a specific tendency for distant metastasis to the cardiac and brain and a 50% of all patients with a diffuse melanoma extension will have a heart deposit at postmortem study. However, the most common sites of breast cancer are bone that followed by, pulmonary system, lymph nodes, hepatic, and central nervous system (19,20,21).

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