A complete atrioventricular block secondary to myocardial metastases of lung cancer. A case report

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A metastatic involvement of the heart is an uncommon phenomenon in clinical practice; it is more frequent in patients with end-stage disease and a wide tumor spread. The clinical diagnosis is very difficult because there are no early symptoms and most often, the presence of metastases in other sites, such as lung and lymph nodes, may determine a misunderstanding of the clinical picture.

We report the case of a young male (44 years old) with a complete atrioventricular block due to metastatic myocardial involvement from a primary occult lung cancer. The first symptom of the disease was a syncopal spell. In spite of permanent pacemaker implantation, the patient died suddenly and unexpectedly after 3 days. Autopsy revealed an anaplastic carcinoma of the right lung hilus. The myocardium was invaded by numerous metastatic nodules, particularly in the interventricular septum and in the left ventricular wall.

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Introduction

Clinically evident cardiac metastases from malignant neoplasms are uncommon, although they are more frequent than primary cardiac tumors[1-5]. The most commonly involved primary tumors are carcinoma of the lung and breast, lymphoma and malignant melanoma[3].

Metastatic cardiac involvement occurs most often during the end stage of the malignant disease, associated with wide spread of the tumor and it is generally diagnosed at autopsy.

Here, we report the case of a young male with a complete atrioventricular block secondary to metastatic myocardial involvement of a primary occult lung cancer.

Case report

A 44-year-old Caucasian male was admitted to our hospital because of a syncopal spell. Electrocardiography showed a complete atrioventricular block requiring positioning of a temporary pacemaker, followed by implantation of a permanent double-chamber device (Fig. 1A). Echocardiography documented only a mild pericardial effusion with a normal left ventricular function (ejection fraction 53%). Chest X-ray showed a bilateral pleural effusion with a concomitant mediastinal enlargement. Based on these data and clinical symptoms, the patient was submitted to total body computed tomography scan that confirmed bilateral pleural effusion and identified the presence of multiple mediastinal, supraclavicular and intra-abdominal lymph nodes (Fig. 1B). Esophagogastroduodenoscopy was normal. Biochemical and hematological tests were in the normal ranges. The patient died suddenly and unexpectedly after 3 days.

Autopsy revealed an anaplastic carcinoma of the right lung hilus (Fig. 1D), multiple metastases in the mediastinal, intra-abdominal and left supraclavicular lymph nodes, in the pancreatic head, and in the right kidney, and a moderate pleural and pericardial effusion with signs of acute pulmonary edema.

In addition, the myocardium was invaded by numerous metastatic nodules, particularly in the interventricular septum and in the left ventricular wall (Fig. 1C). The single largest nodule was as much as 3 cm in diameter and was localized at the interventricular septum involving about 90% of the wall thickness. There was no evidence of metastatic involvement of cardiac chambers.

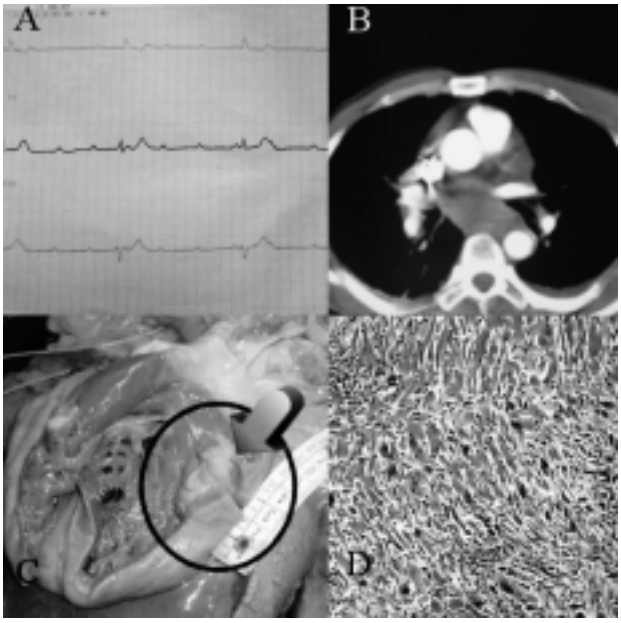

Figure 1. Panel A: *the electrocardiogram shows a complete atrioventricular block.* Panel B: *computed tomography scan evaluation at the level of the great vessels.* Panel C: *macroscopic examination at autopsy. A metastatic nodule is evident in the interventricular septum* (arrow). Panel D: *the microscopic examination (200×) shows an anaplastic carcinoma.*

Discussion

Tumors that metastasize to the heart from other organs occur 100 to 1000 times more commonly than primary cardiac tumors[3]. Metastatic spread to the heart has been identified in approximately one fifth of all patients who have metastatic cancer with lung carcinoma being the most primary tumor[6-8]. Myocardial metastases, which are rarely diagnosed *ante mortem*, are often associated with the end stage or with generally widespread metastases. Symptoms of cardiac metastases may vary, depending on the site and extension of the lesions. Treatment varies depending on the pathology of the primary tumor. However, treatment usually aims just at symptom relief[6,8].

A number of theories have been advanced to explain the route of involvement of the heart by metastatic carcinoma, including: 1) embolic tumor seeding by hematogenous spread or by invasion through the thoracic duct into the right side of the heart; 2) direct invasion through the lymphatics of the heart; 3) contiguous spread to the heart from local malignancies[8]. The most common sites for metastatic disease in the heart are the pericardium and the epicardium. Less frequent sites include the endocardium, myocardium and cardiac chambers. The right side of the heart is more commonly involved than the left. The less frequent involvement of the myocardium could be explained by the relatively low myocardial blood flow (approximately 240 ml/min) compared with that in other organs such as the bone (600 ml/min) or brain (750 ml/min). Local factors and molecular interactions between the target organ and cancer cells are also important in determining the patterns of metastatic spread[8]. The clinical diagnosis of heart metastases is difficult because there are no early symptoms. The principal forms of presentation include dyspnea, symptoms of pericarditis, arrhythmias and sudden death. Transthoracic echocardiography is often useful in searching for evidence of metastases but computed tomography scan and magnetic resonance can be more effective, particularly in the evaluation of the right heart, mediastinum, and paracardiac structures or in patients with emphysema and chest wall deformities[6].

The involvement of the cardiac conduction system and complete atrioventricular block by a metastatic tumor is well known but extremely rare[9]. In the present case, the only symptom of an occult lung cancer was a syncopal episode secondary to a metastatic involvement of the ventricular septum and the His bundle, determining a complete atrioventricular block. Surprisingly, there was no tumor involvement of the cardiac chambers, being the myocardium the only cardiac site of metastases.

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