

Cardiac metastasis in colon cancer: A case report

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Images from complementary tests are shown with patient's consent.

Abbreviation

CT: cardiac tumor

ABSTRACT

Cardiac masses are a diagnostic and therapeutic challenge. They are often found incidentally and assessment eventually confirms the presence of a heart tumor. They are neoplasms that originate in any layer of the heart and are divided into primary and secondary. The primary ones have a 0.001 - 0.03% incidence in autopsies, contrasting with the 20-40 times higher frequency of the secondary ones. We present the case of a 28-year-old patient diagnosed one year before with infiltrating transverse colon adenocarcinoma in whom intra-abdominal lymph node chain metastases were confirmed three months ago, receiving surgical treatment and chemotherapy. Later, he began with tachycardia and presented to his health care center where a transthoracic echocardiogram was performed, which showed a tumor-like image in the right ventricle. The CT-scan showed an unresectable complex tumor mass and the patient died at home, under palliative care, a month or so after discharge.


Keywords: Heart neoplasms, Neoplasm metastasis, Colon cancer, Multidetector computed tomography

Metástasis cardíaca en paciente con cáncer de colon: Informe de un caso

RESUMEN

Las masas cardíacas constituyen un reto diagnóstico y terapéutico. Muchas veces se descubren casualmente y la evaluación confirma, finalmente, la presencia de un tumor cardíaco. Estos son neoplasias originadas en cualquier capa del corazón y se dividen en primarios y secundarios. Los primarios tienen una incidencia en autopsias de 0,001 - 0,03%, que contrasta con la frecuencia 20-40 veces mayor de los secundarios. Se presenta un paciente de 28 años de edad diagnosticado 1 año antes de adenocarcinoma de colon transverso infiltrante, en quien hace 3 meses se constató metástasis a cadena ganglionar intraabdominal y se realizó tratamiento quirúrgico más quimioterapia. Posteriormente comenzó con taquicardia y acudió a su centro de salud donde se le realizó un ecocardiograma transtorácico que constató una imagen de aspecto tumoral en ventrículo derecho. Por tomografía se demostró una masa tumoral compleja inoperable y el paciente falleció en su hogar, bajo cuidados paliativos, un mes y medio después del egreso.

Palabras clave: Tumores cardíacos, Metástasis de la neoplasia, Neoplasias del colon, Tomografía computarizada multidetector

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INTRODUCTION

Cardiac masses are often a major diagnostic and therapeutic challenge. In many cases cardiac masses are discovered incidentally on disease surveillance and subsequent evaluations ultimately confirm the presence of cardiac tumor (CT). Cardiac tumors are neoplasms that rarely arise from any of the layers of the heart¹; other types of cardiac masses such as thrombi or vegetations are much more frequent^{2,3}.

According to Estévez *et al.*⁴ Senac, an outstanding pathologist, stated: "...The heart is an organ too noble to be attacked by a primary tumor...". Certainly an iconic phrase within the historical background. Later, one of the oldest references to a CT documented in the literature dates back to the first half of the 16th century when Boneti reported the finding of the first intracardiac tumor in post-mortem studies. Lymburner, in 1934, published the first relevant series on CT that consisted of a total of 226 cases related entirely to autopsy findings⁵. Cardiac tumors are divided into primary and secondary. Primary CTs are quite infrequent and their incidence in autopsies ranges between 0.001 and 0.03%^{1,4}. Benign or malignant neoplasms that may grow from any cardiac tissue are among them. Secondary or metastatic CTs

are 20-40 times more frequent than primary CTs and their incidence in autopsies ranges from 1.7% to 14%². When intracardiac masses are found or suspected, there is a strong tendency to think of possible primary tumors of the heart, although these are actually much less frequent than malignant metastatic tumors⁶.

The term cardiac metastasis describes the extension of a tumor that is either adjacent to or distant from any cardiac structure⁷. These tumors may affect primarily the pericardium (59% of cases) while the myocardium and endocardium may be involved in only 29% and 12%, respectively. On very few occasions, metastases spread to more than one area of the heart⁶.

We present a peculiar case of cardiac metastasis resulting from colon cancer.

CASE REPORT

We present the case of a 28-year-old man, previously healthy up to approximately one year before admission due to diagnosis of a poorly-differentiated, serosa-infiltrating, mucoproduative, colon adenocarcinoma. We later found intra-abdominal lymph node

Table. Complementary test results.

| Complementary | Result |
|--|---|
| Hemoglobin | 120 g/L |
| Electrocardiogram | Sinus rhythm with heart rate 102 beats/minute and indeterminate frontal plane QRS axis. Incomplete right bundle branch block. Negative T in leads II, III, aVF and V ₁ -V ₅ (Figure 1). |
| Echocardiogram | Complex mass in relation to the right ventricle. |
| Abdominal ultrasound | Liver 2 cm fingerbreadths below the costal margin. Segment close to the right supra hepatic vein with echogenic image of 11.5 mm in diameter. Images of peripancreatic adenopathies up to 32 mm in diameter, multiple periaortic adenopathies up to 53 mm in diameter and left iliac chains up to 21 mm in diameter are observable. |
| Contrast-enhanced tomography of the thorax and abdomen | <ul style="list-style-type: none"> • Nodular thickening of the lower left posterior mediastinal pleura up to 23 × 11 mm and left diaphragmatic pillar up to 11 mm. • Mediastinal and perivascular adenopathies of 6 and 5 mm. • Unusual image of a cardiac tumor of varying density in the right ventricle bilaterally invading the pulmonary artery branches mostly to the right, with partial filling defect including distal branches (Figure 2). • Right adrenal gland of undefined T-appearance. • Lytic image with sclerotic 5 mm borders in posterior wall of L5 and S1. |
| Histology of the colon tumor | <ul style="list-style-type: none"> • Tumor size: 9 × 3.5 cm. • Poorly differentiated, mucoproduative, serosal-infiltrating adenocarcinoma. • 29 adenopathies, 27 of them metastatic with capsular infiltration. • Perivalvular/intravascular infiltration. |

metastases and surgical treatment with chemotherapy were immediately implemented. Weeks later, he presented with general malaise, fatigue, varying lower back pain and tachycardia. He sought for medical help at his health facility where a transthoracic echocardiogram was performed revealing a 4 × 2 × 5 cm tumor-like image in the right ventricle, involving more than 70% of the muscle. He was urgently referred to the hospital for possible surgical treatment.

Physical examination revealed skin and mucous membranes discoloration, ventricular tachycardia at 110 beats per minute and hepatomegaly (2 cm fingerbreadths below the costal margin).

Complementary test results are shown in the **table**.

Diagnosis and treatment

The case was concluded as infiltrating colon adenocarcinoma with metastasis to regional lymph nodes and possibly to the liver, as well as presence of an intracardiac mass in the right ventricle probably related to metastasis.

Home palliative care was decided in view of the patient's severe and highly complex situation. After considering all the evidence and risk-benefit ratio, it was decided not to initiate cardiovascular surgical treatment due to the advanced stage of disease and high risk of death during surgery.

COMMENT

The heart is an infrequent site of metastasis of any malignancy, although the reasons for its rarity have not been well established; yet, they represent a

unique pattern. Contrary to what was observed in older series, the incidence of cardiac metastases in cancer patients increased significantly after 1970, mainly due to the improvement of imaging techniques^{1,2,8}. Such metastases can reach the heart via hematogenous spread, lymphatic spread, direct extension or transvenous spread from the inferior vena cava. The most frequent are pericardial (69%), followed by epicardial (34%), myocardial (32%) and endocardial (5%)⁹.

Ekmektzoglu *et al.*¹⁰ suggested that, in men, lung cancer is the most common cause of metastasis, followed by esophageal cancer and lymphomas; while, in women, lung cancer is also the main cause, followed by lymphomas and breast cancer. Another research found that the percentage of the most common cardiac metastases was higher when the primary tumor started in the pleura (27.8%), pulmonary epithelium (21%), squamous cell carcinoma of the lung (18.2%) and breast cancer (15.5%)^{8,9}. The reported incidences of these metastases from gastrointestinal cancers are low: gastric (8%), pancreatic (6.4%), liver and colon (1.2%). Moreover, they are more frequent on the right side of the heart. The ventricle is the most common site of involvement as it is the main structure where the cardiac venous and lymphatic drainage ends⁸.

Colon cancer is the third most common cause of cancer worldwide. Colon cancer metastases frequently spread through the blood and lymphatic system to the liver, lungs and regional lymph nodes. Cardiac metastases due to colon cancer are usually discovered during autopsies, since pre-mortem diagnosis is extremely infrequent. There are only 14 published cases in the English literature, 7 involving the right ventricle and 3 specifically arising from colon adenocarcinoma^{8,11}. The case of a patient with cardiac metastasis due to colon adenocarcinoma was recently described in Cuba¹². Cardiac metastasis usually occurs as part of multiorgan metastasis in end-stage cancer, although it may happen in very few cases as a sole metastatic site in the heart. On the other hand, intracavitary lesions can be multifocal, although large solitary masses have been described¹³.

The incidence of cardiac metastases in patients with malignant conditions could be underestimated because they are asymptomatic in most cases¹⁴. Among the most frequent clinical findings are: dyspnea, palpitations, syncope, chest pain, peripheral ede-

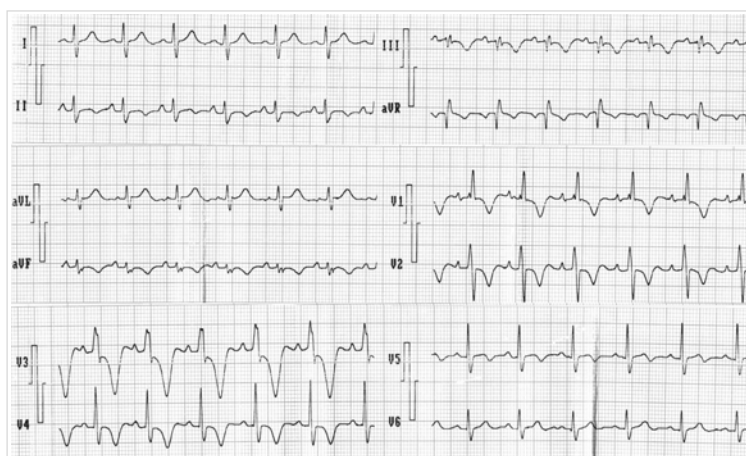


Figure 1. 12-lead electrocardiogram on hospital admission.

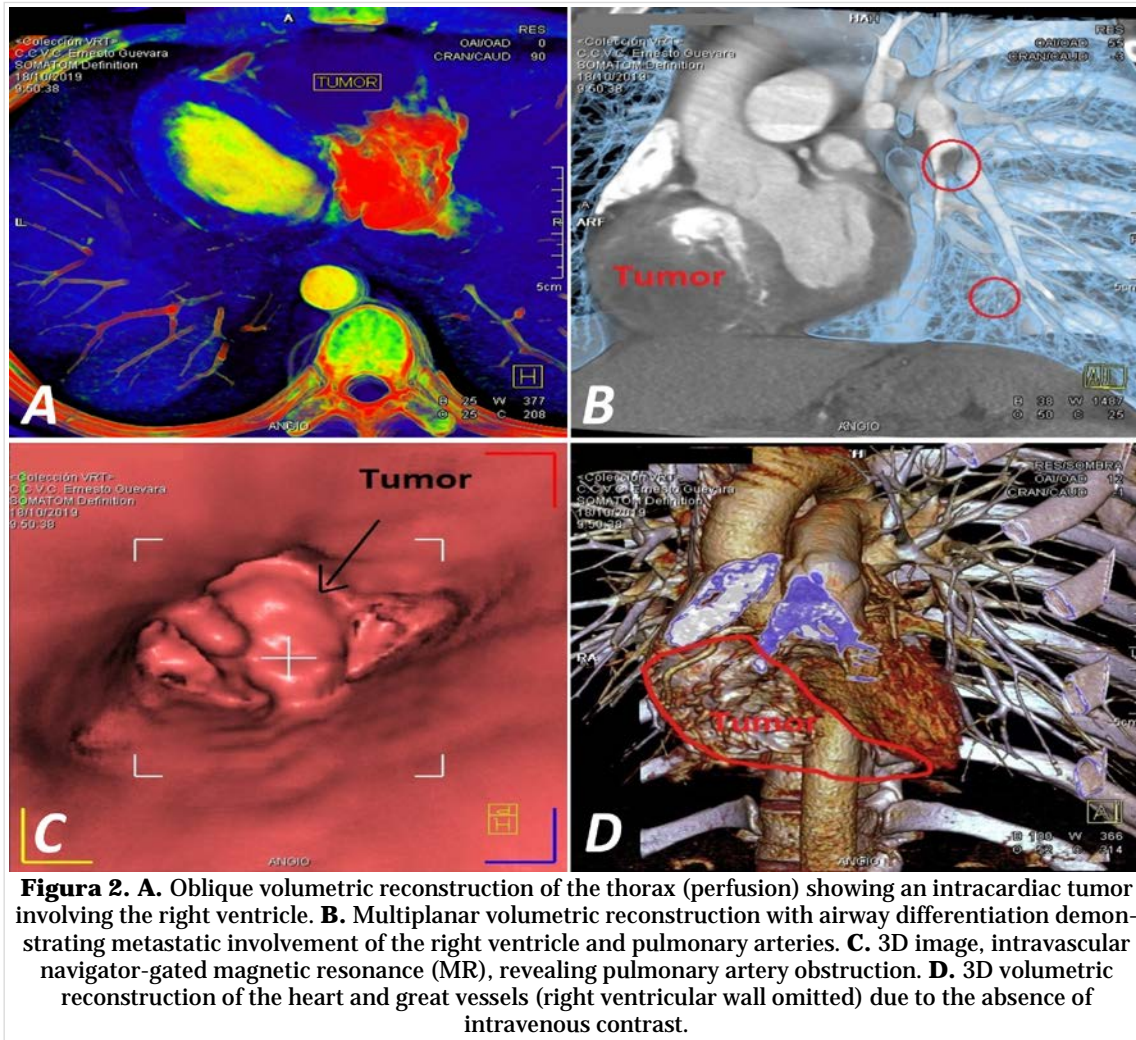


Figura 2. A. Oblique volumetric reconstruction of the thorax (perfusion) showing an intracardiac tumor involving the right ventricle. B. Multiplanar volumetric reconstruction with airway differentiation demonstrating metastatic involvement of the right ventricle and pulmonary arteries. C. 3D image, intravascular navigator-gated magnetic resonance (MR), revealing pulmonary artery obstruction. D. 3D volumetric reconstruction of the heart and great vessels (right ventricular wall omitted) due to the absence of intravenous contrast.

ma and other clinical manifestations of heart failure, murmurs, arrhythmias, heart block, myocardial infarction, cardiac rupture, systemic embolisms and superior vena cava syndrome^{9,13,15}.

Unsurprisingly, the prognosis with a diagnosis of metastatic cardiac disease is poor as 50% of patients die in less than 1 year; therefore, treatment is usually based on palliative techniques¹⁵.

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