

Metastatic Colorectal Cancer to the Right Ventricle

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Abstract Colorectal cancer (CRC) is the third most common cancer worldwide. Cardiac metastasis from CRC is extremely rare with only a few cases reported, with the clinical presentation being silent in over 90% of cases. Here we discuss a case of 62-year-old male who presented with abdominal pain, distention, and weight loss. Computed Tomography (CT) chest/abdomen showed a multiseptated left hepatic lobe lesion, bilateral lung nodules, and a mass-like hypodensity in the right ventricle (RV). A transesophageal echocardiogram (TEE) confirmed the RV mass with normal cardiac function. A liver biopsy showed metastatic colorectal adenocarcinoma. Two months after diagnosis, the patient developed progressive abdominal distention, shortness of breath, and pedal edema. Hospice care was initiated after he did not tolerate palliative chemotherapy, and he passed away three months later. Metastatic cardiac involvement secondary to CRC is extremely uncommon. From 1948 to 2007, the incidence of cardiac metastasis was noted to be 2.3-18.3% in the literature. The clinical presentation is silent in 90% of cases. Symptoms can range from being asymptomatic to chronic fatigue and shortness of breath due to reduced cardiac output, to sudden cardiac death from embolization of metastatic tumor. Metastatic cardiac tumors progress rapidly and have poor outcomes. It is crucial to recognize the underestimated prevalence of cardiac metastasis as it may have implications for the management and prognosis of CRC. Given the asymptomatic presentation of cardiac metastasis in the context of CRC, future integration of genetic sequencing may help delineate further guidelines on screening for cardiac metastasis.

Keywords: colorectal cancer, cardiac metastasis, Adenocarcinoma, right ventricle/metastasis, pathology

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1. Background

Colorectal cancer (CRC) is the third most common cancer in both men and women worldwide. Approximately 20% of patients present with metastasis on initial diagnosis. [1] Metastasis in colorectal cancer can occur lymphatically or hematogenously. The most common sites include the liver and lungs. Cardiac metastasis, however, is extremely rare with only a few cases reported in the literature. It is crucial to recognize the possible underestimated prevalence of cardiac metastasis as it may have implications for the acute and chronic management of CRC. The clinical presentation is typically silent in over 90% of cases. [2]

2. Clinical Presentation

The case describes a 62-year-old male presenting with generalized abdominal pain for 4 weeks, worsened with

food, and associated with early satiety and unintentional weight loss of 7 pounds over the past 6 months. CT of the abdomen with intravenous contrast showed an ill-defined, multiseptated, hypodense lesion occupying the left hepatic lobe, with similar discrete lesions within the right hepatic lobe measuring up to 3.1 cm. (Figure 1) There was a small amount of free fluid within the abdomen and pelvis. Both lung bases demonstrated numerous nodular densities measuring up to 8 mm, and a mass-like hypo density within the right ventricle of the heart measures 4.9 x 2.4 cm, either right ventricular thrombus versus metastatic disease (Figure 2) confirmed with a CT of the chest with intravenous contrast. The patient's lab work was pertinent for an elevated carcinoembryonic antigen (CEA) of 413.4 ng/ml, and carbohydrate antigen 19-9 (CA 19-9) of 157.6 U/ml while alpha-fetoprotein was normal. Alkaline phosphatase was elevated at 231, albumin reduced at 3.4 and a white blood count elevated at 12.3. (Table 1) His social history was pertinent for alcohol intake every other week and 2-pack-year smoking history. He had no illicit intravenous drug use or blood transfusion history.

Table 1. Lab values of the patient noted on the first visit

	Lab values	Reference range
CEA	413.4 ng/ml	0 – 3.0 ng/ml
CA 19-9	157.6 U/ml	0 – 37 U/ml
Alpha-feto protein	< 2.0 ng/ml	0 - 8.4 ng/ml
Alkaline phosphatase	231 U/l	33 – 120 U/l
Albumin	3.4 g/dl	3.5 - 4.9 g/dl
WBC	12.3 bil/l	3.5 - 10.1 bil/l

The patient subsequently developed increased fatigue and exertional shortness of breath, associated with orthopnea and lower limb edema. A transthoracic echocardiogram and subsequent transesophageal echocardiogram (TEE), revealed a mass attached to the free wall of the right ventricle that measured 4.2 x 2.8 cm in size (Figure 3). The left ventricle was of normal size and wall thickness with an ejection fraction of 60%. The right ventricle was of normal size and systolic function, with mild tricuspid and pulmonic valve regurgitation.

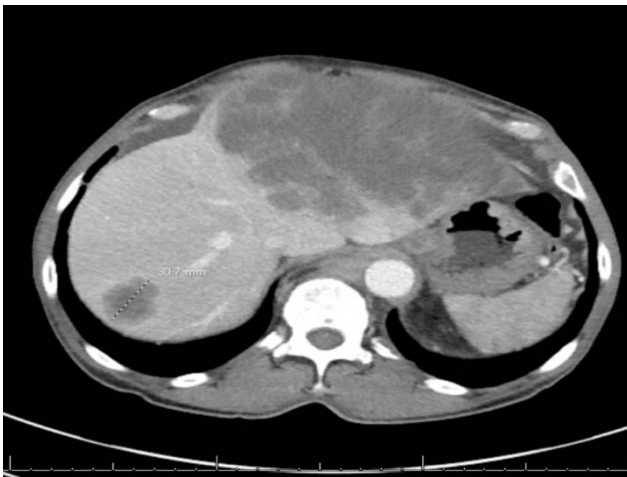


Figure 1. Multiple ill-defined lesions within the right & left hepatic lobes



Figure 2. Mass-like hypo density within the right ventricle of the heart measures 4.9 x 2.4 cm, either right ventricular thrombus versus metastatic disease

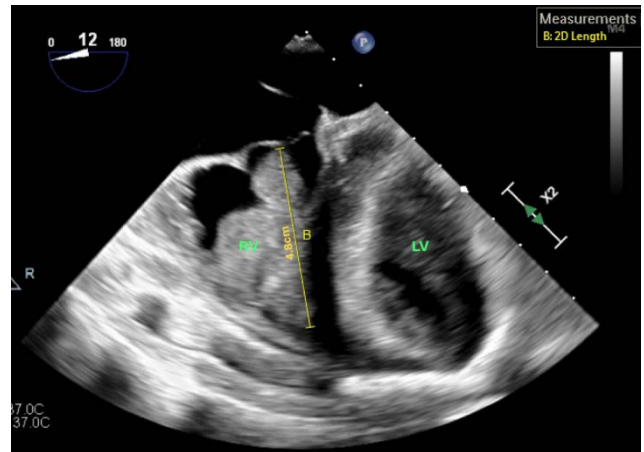


Figure 3. 4.2 x 2.8 cm mass attached to the free wall of RV

Ultrasound-guided biopsy of a liver mass was performed and confirmed to be adenocarcinoma, with colorectal primary malignancy. No surgical intervention was planned due to the advanced stage of the disease, and a positron emission tomography (PET) scan was not done due to the patient's severe pain. He underwent port placement and received one session of FOLFOX as a chemotherapy regimen, and pain management with hydrocodone-acetaminophen and gabapentin. The patient could not tolerate the FOLFOX therapy and chose to pursue home hospice and passed away the next day.

3. Discussion

Metastatic cardiac involvement secondary to CRC is extremely uncommon. From 1948 to 2007, the incidence of cardiac metastasis was noted to be 2.3 - 18.3%. [3] Upon literature review, the average age of diagnosis is 70 years (41 to 81 years) with male predominance. The clinical presentation is silent in 90% of cases. [4] Symptoms can range from chronic fatigue and shortness of breath due to reduced cardiac output, to sudden cardiac death from embolization of metastatic tumor from the right atrium. [5] For solitary cardiac metastasis, surgery may be optimal before bridging to chemotherapy. Metastatic cardiac tumors have an aggressive clinical course and tend to recur regardless of the treatment approach. [4]

There are four main pathways for tumor spread, including direct extension, via the bloodstream, lymphatic system, or intra-cavitary diffusion from inferior vena cava (IVC) or pulmonary veins. [4]

Possible differential diagnoses to consider are vegetations, thrombi, or cardiac myxomas. Transthoracic/transesophageal echocardiography, CT, or MRI would help to have a detailed view of the extent of the tumor. Molecular profiling may have a role in guiding therapy and should be included in work up when possible. [4]

In our patient, TEE showed a 4.2 x 2.8 cm mass attached to the free wall of RV (Figure 2). These findings in addition to recent weight loss, multiple hepatic lesions (with biopsy findings consistent with colorectal cancer),

and pulmonary nodules, we concluded that the patient likely had metastatic cardiac disease.

Metastatic cardiac tumors progress rapidly and have poor outcomes. With solitary metastatic lesions or low disease burden, treatment options include surgical resection versus debulking, with or without chemotherapy. Treatment choice will also depend on comorbidities, genetic profiling, disease burden, and discussion of the risks and benefits. Further studies are needed to define treatment guidelines for these patients. [4]

4. Conclusion

It is crucial to recognize the underestimated prevalence of cardiac metastasis as it may have implications for the management and prognosis of CRC. Given the asymptomatic presentation of cardiac metastasis in the context of CRC, possible future integration of genetic sequencing may help delineate further guidelines on screening for cardiac metastasis in patients with CRC.

List of Abbreviations

- Colorectal cancer (CRC)
- Right ventricle (RV)
- Computed Tomography (CT)
- Transesophageal echocardiogram (TEE)
- Carcinoembryonic Antigen (CEA)
- Carbohydrate Antigen 19-9 (CA 19-9)
- positron emission tomography (PET)

- Inferior vena cava (IVC)
- Cardiovascular magnetic resonance (CMR)

Learning Points

1. Given the asymptomatic presentation of cardiac metastasis, it's important to consider a screening 2D Echo in the follow-up of CRC
2. Metastatic cardiac tumors progress rapidly and have poor outcomes, therefore we should familiarize ourselves with the data available to guide discussion with the patient and patient families
3. Genetic studies of CRC may help predict which patients have a predilection to developing cardiac metastasis

References

- [1] van der Geest L. G. et al.. Nationwide trends in incidence, treatment and survival of colorectal cancer patients with synchronous metastases. *Clinical & experimental metastasis* 32, 457-465, (2015).
- [2] Al-Mamgani A, Baartman L, Baaijens M, de Pree I, Incrocci L, Levendag PC *Int J Clin Oncol.* 2008 Aug; 13(4):369-72.
- [3] Bussani R, De-Giorgio F, Abbate A, Silvestri F. Cardiac metastases. *J Clin Pathol.* 2007 Jan; 60(1): 27-34.
- [4] Sarfraz H, Arain A, Divatia MK, Schwartz MR, Heyne KE. Metastatic colorectal carcinoma to the right atrium: a case report and review of the literature. *Cardiooncology.* 2021 May 31; 7(1): 21.
- [5] Patel SA, Herfel BM, Nolan MA. Metastatic colon cancer involving the right atrium. *Tex Heart Inst J.* 2012; 39(1): 79-83.



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