Large Heterogeneous Mass in the Right Chambers: A Case Report in Cardio-Oncology

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Abstract

Renal cell carcinoma (RCC) is one of the most lethal cancers. It is frequently associated with the formation of tumor thrombi (TT), an intravascular extension of the tumor. Approximately 4% to 10% of patients with RCC have TT, which can reach the renal vein (10% to 18%), the inferior vena cava (4% to 23%), and, rarely, the right atrium (1%). These thrombi generally accompany advanced tumors, with distant metastases, and they reflect an aggressive biology. Treatment is challenging, especially in metastatic cases, and surgical resection is indicated in the absence of metastases. Anticoagulation remains controversial due to the neoplastic composition of TT. We report the case of a 51-year-old male patient with clear cell RCC and lung and liver metastases treated with pazopanib. The patient presented right heart failure and was diagnosed with extensive TT up to the right atrium, identified by transthoracic echocardiography. In an advanced stage, with clinical deterioration, palliative care was chosen, and the patient died within a few weeks. The diagnosis of TT is crucial to define prognosis and therapeutic strategies. Echocardiography, combined with advanced imaging techniques, plays a fundamental role in differentiating between TT and thromboembolism. This case highlights the importance of a multidisciplinary approach and technological advances for managing complex conditions such as TT, with the goals of early diagnosis and reduced complications.

Introduction

Renal cell carcinoma (RCC) is one of the most lethal cancers, associated with the formation of tumor thrombi (TT), characterized by intravascular tumor extension. RCC represents approximately 3% of all cancers, and it is estimated that 4% to 10% of patients with RCC have some degree of TT. The reported prevalence of venous TT in RCC is 10% to 18% with invasion of the renal vein, 4% to 23% with involvement of the inferior vena cava, and 1% with extension to the right atrium.[1,2]

TT is strongly associated with pulmonary embolism, and it is challenging to distinguish it from thromboembolism by radiographic findings. However, biopsy can assist in definitive diagnosis, although it is rarely performed.[1] Other common outcomes of TT include thrombotic or hemorrhagic complications and death.

With respect to treatment, in the absence of distant metastases, surgical resection is indicated for local control. In metastatic disease, therapy aims to control symptoms, with a primary focus on palliative treatment.[3]

Regarding anticoagulation, it is still debatable, since TT behaves differently from a conventional thrombus, exhibiting organized tumor cells instead of only a fibrin clot.[1,2] Because it is a rare condition and, in the majority of cases, it is diagnosed late, treatment still poses a challenge, especially when the disease is in the metastatic phase.

Keywords

Cardio-Oncology; Renal Cell Carcinoma; Thrombosis; Relatos de Casos

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Case report

We report the case of a 51-year-old male patient, with smoking and alcoholism, who was diagnosed with a clear cell renal tumor, clinical stage IV, with lung and liver metastases. He began treatment with the vascular endothelial growth factor inhibitor pazopanib. He developed significant peripheral edema and ascites and was hospitalized for further assessment.

The patient underwent a transthoracic echocardiogram, which revealed the presence of a large heterogeneous mass with well-defined borders, measuring 8.3 × 4.0 cm in the right chambers, obstructing anterograde flow in the tricuspid valve (mean gradient of 5 mmHg). Subcostal imaging revealed the continuity of the mass in the right chambers with the inferior vena cava, suggesting the presence of an extensive TT. These findings explain the etiology of the clinical signs and symptoms of right heart failure, initially attributed to a possible pulmonary thromboembolism.

During hospitalization, due to difficulties in improving symptoms and signs of clinical deterioration, in addition to the advanced stage of the disease, exclusive palliative care was chosen. The patient died within a few weeks.

Discussion

Intravascular tumor extension is known as TT, which occurs in diverse tumor types, RCC being the most common in adults. Of these, 10% to 18% reach the renal vein only; 4% to 23% reach the inferior vena cava, and only 1% extend into the right atrium. They are generally associated with

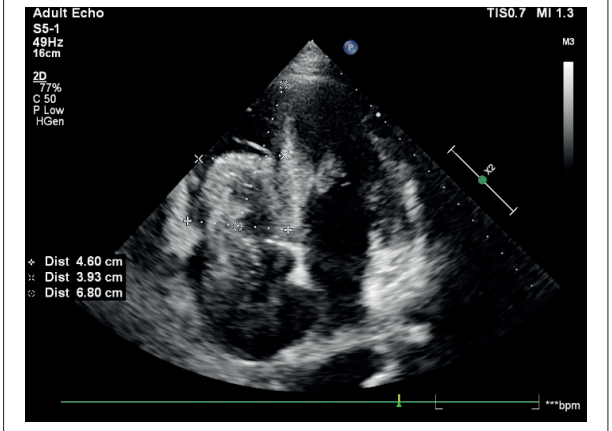


Figure 1 – *Enlargement of the right heart chambers observed in the apical four-chamber view.*

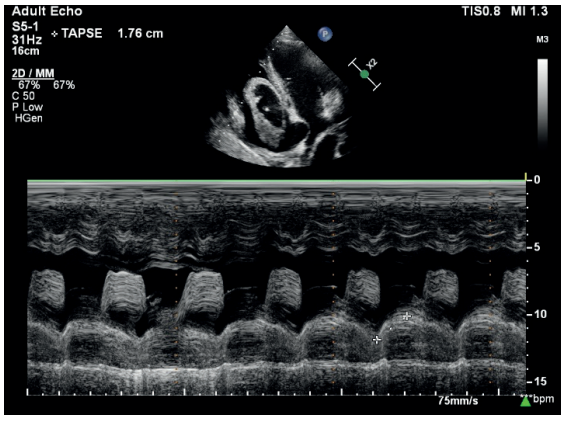


Figure 2 – *Preserved right ventricular systolic function based on TAPSE.*

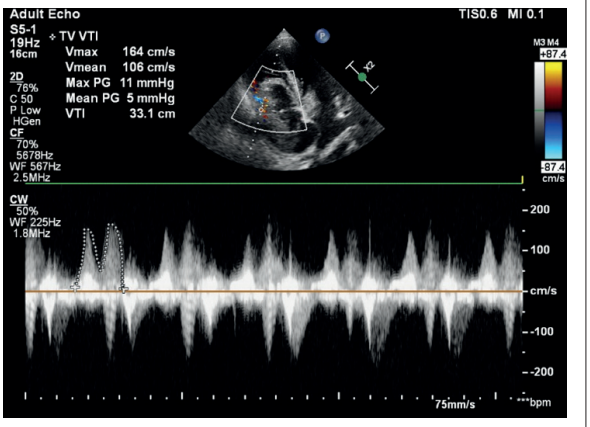


Figure 3 – *Turbulent flow and a mean gradient of 5 mmHg across the tricuspid valve (relative obstruction due to mass protrusion).*

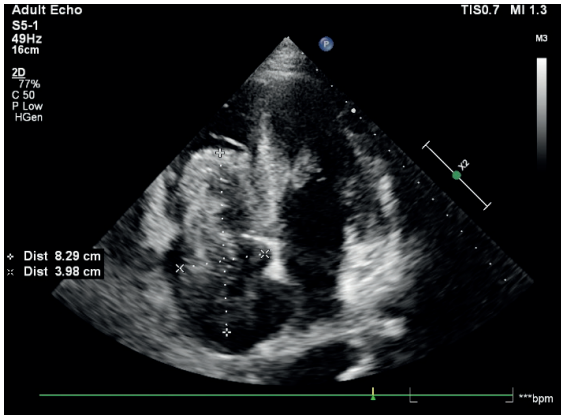


Figure 4 – *Dimensions of the mass within the right heart chambers.*

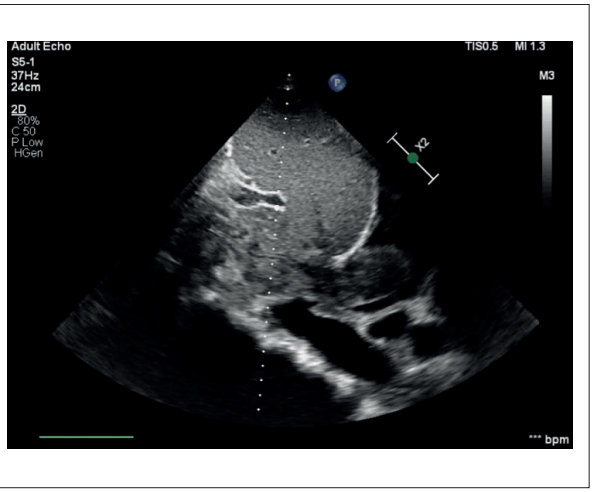


Figure 5 – *Mass in the inferior vena cava.*

larger tumors and advanced stages, often accompanied by distant metastases, which reflect a more aggressive biology and may explain the worse prognosis.[4]

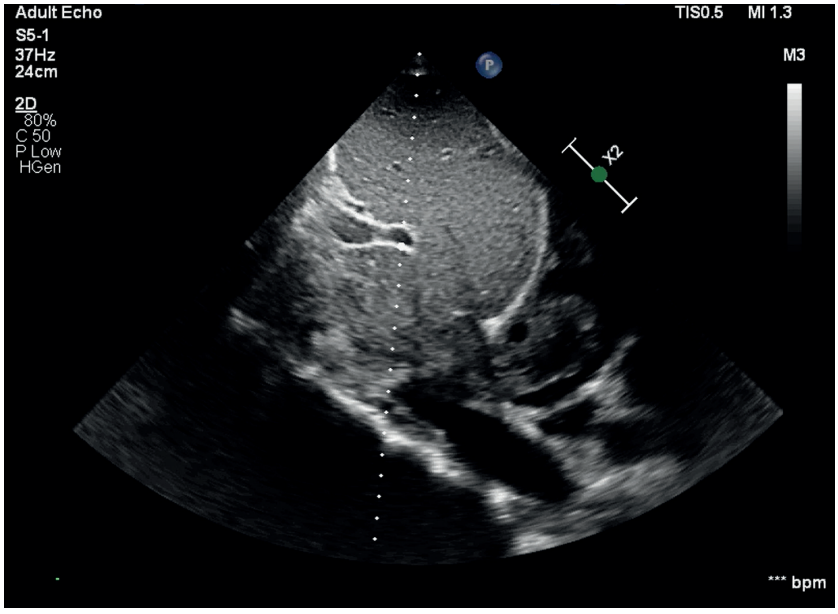
Patients without associated metastases may undergo tumor resection, including the TT, by means of various techniques. Anticoagulation is debatable, given that the behavior of TT differs from simple thrombi due to the presence of organized neoplastic cells. In 1.5% to 3.4% of patients with TT, embolization to the pulmonary arteries may occur, mainly during the intraoperative period, and this complication is associated with a high mortality rate (up to 75%). It is noteworthy that TT, in spite of their extension, are not considered metastases. Moreover, there is a possibility of recurrence of the TT after the initial resection. Diagnosis of TT implies a 65% greater chance of mortality.[5]

Transthoracic echocardiography is the initial imaging modality, whereas cardiac magnetic resonance imaging

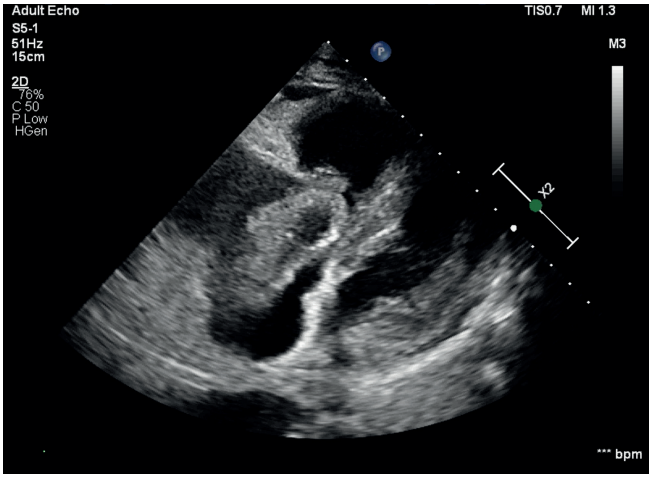
plays an important role in the differential diagnosis between thrombus and cardiac tumor. The associated use of ultrasound enhancement agents in transthoracic echocardiography increases diagnostic accuracy. This finding is decisive in a patient's journey, indicating an unfavorable prognosis and demanding a differentiated surgical approach.

The complexity of TT management reinforces the importance of a multidisciplinary approach. Teams composed of specialists in oncology, cardiology, vascular surgery, and radiology are essential to ensure early diagnosis, personalized treatment planning, and reduced complications. Furthermore, advances in imaging techniques have the potential to enhance detection and differentiation between tumor and non-TT, contributing to more precise treatment and better survival prospects for patients.[6]

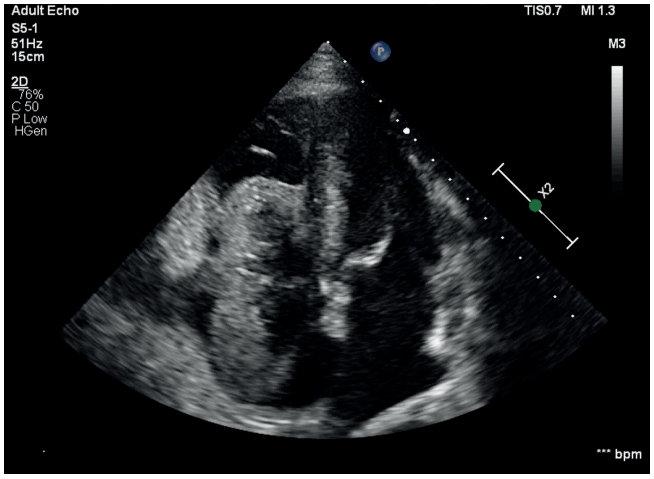
In conclusion, this case highlights the relevance of echocardiography as an essential tool for the diagnosis of pathologies in which the signs and symptoms suggest a cardiac component, in addition to guiding therapeutic management.



Video 1 – *Access: http://abcimaging.org/supplementary-material/2025/3801/2025-0002_RC_Video1.mp4*



Video 2 – *Access: http://abcimaging.org/supplementary-material/2025/3801/2025-0002_RC_Video2.mp4*



Video 3 – *Access: http://abcimaging.org/supplementary-material/2025/3801/2025-0002_RC_Video3.mp4*

Author Contributions

Conception and design of the research, acquisition of data, analysis and interpretation of the data, writing of the manuscript and critical revision of the manuscript for intellectual content: Frigo JPP, Voss TH.

Potential Conflict of Interest

No potential conflict of interest relevant to this article was reported.

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Study Association

This study is not associated with any thesis or dissertation work.

Ethics Approval and Consent to Participate

This study was approved by the Ethics Committee of the Universidade Federal de Uberlândia under the protocol number 7.534.313. All the procedures in this study were in accordance with the 1975 Helsinki Declaration, updated in 2013. Informed consent was obtained from all participants included in the study.

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