American Journal of Surgery and Clinical Case Reports[R] ISSN 2689-8268 |Volume 9

Case Report Open Access

Emerging Perspectives in Surgical Management of Right Atrial Metastatic Melanoma: Case Report and Literature Review

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Received: 02 Oct 2025
Accepted: 15 Oct 2025
Published: 31 Oct 2025
J Short Name: Ajsccr

Keywords:

Cardiac Surgery; Metastatic Melanoma; Ocular Melanoma; Immunotherapy

Citation:

Liviu Stan, Emerging Perspectives in Surgical Management of Right Atrial Metastatic Melanoma: Case Report and Literature Review. Ame journal of Sur and Clin Case Rep® 2025; V15(1): 1-2

1. Abstract

1.1. Background

Cardiac metastases from malignant melanoma are rare and often asymptomatic, typically diagnosed post-mortem. When symptomatic, they present a unique challenge, and surgical intervention may be considered for palliation or complication prevention.

1.2. Case Presentation

We report the case of a 66-year-old female with a history of ocular melanoma who presented with symptoms of right heart obstruction. Cardiac imaging revealed a right atrial mass, which was surgically resected. Histopathological analysis confirmed metastatic melanoma. Postoperative recovery was uneventful, and systemic immunotherapy was initiated. At 12 months post-surgery, the patient remains alive with stable disease.

1.3. Conclusion

Right atrial metastatic melanoma, though rare, should be considered in patients with a history of melanoma presenting with cardiac symptoms. Surgical resection, in selected cases, may improve survival and quality of life.

2. Introduction

Malignant melanoma is the third most common skin malignancy. Ocular melanoma is the most common primary intraocular malignant tumor in adults, originating predominantly from uveal melanocytes within the choroid, ciliary body, or iris [1]. Corneal primary melanoma is exceedingly rare, with an incidence of approximately 0.04 cases per 100,000 persons [2].

The uveal subtype demonstrates a marked predilection for hepatic metastasis, attributed to its hematogenous spread pattern and underlying molecular alterations, particularly involving the MAP kinase and PI3K signaling pathways [3]. These genetic events are closely correlated with the primary anatomical site and histopathological features, bearing prognostic and therapeutic implications in the era of targeted and immune-based therapies [4].

Cardiac metastases from melanoma, although histologically present in up to 64% of patients at autopsy, are clinically apparent in less than 16% of cases [5]. The right atrium and right ventricle are most frequently involved, given the venous dissemination route, though left-sided and valvular localizations have also been reported [6]. The prognosis remains poor, with a five-year survival rate below 10% in disseminated disease [7].

Surgical excision of cardiac metastases is primarily palliative, aimed at relieving symptoms such as obstruction, tamponade, arrhythmias, or embolic events, and may confer survival benefit in selected patients with limited systemic burden [8].

3. Case Presentation

A 66-year-old female with a history of ocular melanoma treated via enucleation in 2003 presented to the emergency department with dyspnea, tachypnea, and precordial chest pain. Her medical history included total hysterectomy for uterine fibroma (2001) and ongoing endocrine follow-up for thyroiditis, pituitary adenoma, and osteoporosis.

Her chronic medications included cabergoline, perindopril, aspirin, and rilmenidine.

Transthoracic echocardiography identified a 2.6 cm oval, inhomogeneous mass within the right atrium, protruding towards the tricuspid valve during systole. Contrast-enhanced CT confirmed a 4.0 × 3.2 cm right atrial mass and a solitary 1.0 × 0.7 cm nodular hepatic lesion in segment IVa.

Laboratory parameters and cardiac function (preserved LVEF) were within normal limits. Given the preserved functional status, lack of disseminated disease, and potential for hemodynamic complications, surgical excision of the cardiac mass was deemed appropriate.

Coronary angiography revealed non-significant bi-coronary atherosclerotic changes.

3.1. Surgical Approach

The patient underwent median sternotomy under cardiopulmonary bypass. The right atrium was opened obliquely, revealing a darkly pigmented tumor attached to the free wall, adjacent to the inferior vena cava-right atrial junction. Complete excision of the mass was achieved, along with two adjacent smaller lesions. The operative course was uneventful.

3.2. Pathology

Gross examination revealed two dark brown masses: one measuring 3.7 × 2.5 × 2.3 cm, and another 1.0 × 0.6 × 0.4 cm.

Microscopic analysis demonstrated fusiform pigmented tumor cells with occasional mitotic figures. Immunohistochemical staining was positive for S-100, HMB-45, and Melan-A, confirming the diagnosis of metastatic melanoma. Ki-67 was positive in 15% of cells, indicating moderate proliferative activity.

The postoperative course was uneventful, and the patient was discharged in stable condition.

3.3. Follow-Up

The patient initiated systemic immunotherapy with nivolumab. At 12 months post-surgery, hepatic metastases show regression, and her oncological disease remains clinically stable.

4. Discussion

Melanoma is among the malignancies with the highest metastatic potential to the heart. Despite its frequency at autopsy, clinical detection is rare, mainly due to nonspecific symptoms or subclinical progression [9].

In the current case, the first clinical manifestation of metastatic relapse occurred at the level of the right atrium, without evidence of other symptomatic organ involvement. This presentation is unusual, and the mass produced mechanical symptoms that necessitated surgical management.

The uniqueness of this case lies in the survival outcome. While literature generally reports poor prognosis and median survival under 6 months for patients with cardiac melanoma metastases, our patient remains alive at 12 months post-resection, with a favorable response to nivolumab. This supports emerging evidence that surgical metastasectomy, even in metastatic stage IV melanoma, can improve outcomes in selected patients with low metastatic burden and accessible lesions [10].

Additionally, the presence of only a solitary hepatic lesion, potentially responsive to systemic therapy, further justified an aggressive local approach.

5. Conclusion

Cardiac metastases of melanoma are rare and carry a poor prognosis. However, in selected patients with limited systemic disease, good functional status, and surgically accessible tumors, surgical resection can be justified, both for palliation and potential survival benefit. This case highlights the importance of a multidisciplinary approach and the evolving role of immunotherapy in extending survival even in stage IV disease.

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