

Case Report

Dual Dilemmas: Managing Primary Breast Melanoma with an Aortic Thrombus

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Abstract

Primary malignant melanoma of the breast (PMMB) is an exceptionally rare entity, accounting for less than 0.5% of all breast cancers and under 5% of malignant melanomas across all tissue types. This case details a rare presentation of a septic 50-year-old female with no significant past medical history, who was found to have a 13 cm x 7cm right fungating breast mass extending into the axilla. This was confirmed to be malignant melanoma on pathology. Following treatment for her sepsis she ultimately underwent surgical resection of the tumor due to uncontrolled bleeding. This case underscores the importance of maintaining a heightened suspicion for atypical presentations of primary melanoma as well as the critical role of surgical management.

Introduction

Primary malignant melanoma is a growing concern globally, with the incidence of cases rising sharply in recent years. In 2020, the global burden of melanoma reached 325,000 cases, marking a 41% increase from the 230,000 cases reported in 2012.¹ Within the United States, melanoma stands as the fifth most common cancer, with an estimated 99,780 new cases and 7,650 deaths in 2022.¹ While melanoma is commonly known as the leading cause of metastasis to the breast from extramammary solid neoplasms, the occurrence of primary malignant melanoma of the breast (PMMB) is exceptionally rare.² In fact, PMMB accounts for less than 0.5% of all breast cancers and less than 5% of malignant melanoma cases across all tissue types.^{3,4} Diagnosing PMMB presents unique challenges, particularly in differentiating it from other breast masses. The positive expression of S-100 is a sensitive indicator for malignant melanoma, however, its diagnostic utility is limited by its expression in 50% of breast cancer cases.⁵ As a result, a combination of positive expressions of HMB-45 and melan-A, alongside S-100, is necessary to achieve higher specificity.⁵ Surgical resection is the cornerstone of treatment for malignant melanoma, often supplemented by chemotherapy, radiotherapy,

and immunotherapy to create a comprehensive treatment strategy.⁶ In general, operable melanomas are treated with wide local excision, with a 1 cm margin being sufficient for lesions less than 1 mm thick, and a 2 cm margin recommended for lesions up to 4 mm thick, as there is limited evidence to support the use of margins wider than 2 cm, even for lesions exceeding 4 mm in thickness.⁶ The authors describe a rare case of a 50-year-old female with no significant past medical history that was found to have 13cm x 7cm right fungating breast mass extending into the axilla confirmed to be malignant melanoma on pathology.

Case presentation

A 50-year-old female with no reported past medical history presented with a chief complaint of syncope and collapse while in the shower. On presentation, she was febrile but hemodynamically stable. Her labs were remarkable for a hemoglobin of 6.2, white blood cell count (WBC) of 37,500, platelet count of 577,000, procalcitonin 2.2, lactate 3.7, albumin 1.9, and sodium 126. On physical exam, a 13cm x 7cm right fungating breast mass extending into the axilla (Figure 1).



Figure 1: Fungating breast mass.

The patient reported it had been present for at least one year. Upon further questioning, the patient reports a 50 pound weight loss over the past year and has not yet sought medical treatment as she was afraid of the possible outcome. A computed tomography (CT) of the head, chest, abdomen, and pelvis revealed the right breast mass had extended into underlying pectoralis with no evidence of adenopathy or distal metastasis, as well as an apparent filling defect in the ascending thoracic aorta. Wound cultures were collected and grew *Prevotella* as well as *Proteus* species. Blood cultures were negative and the patient was started on linezolid and admitted for sepsis and oncologic work up. A follow up CT angiogram of the chest was obtained to better characterize the filling defect in the ascending thoracic aorta and demonstrated a large free floating thrombus. The patient was started on a heparin drip and cardiothoracic surgery recommended observation over intervention due to high likelihood for embolic event. On hospital day 1, surgical oncology was consulted for concerns the breast mass was oncologic in origin and a 3mm punch biopsy was performed. Pathology demonstrated poorly differentiated malignant neoplasm with tumor cells staining positive for S100 and Pannmelanoma (cocktail including tyrosinase, HMB45, and Mart 1), favoring malignant melanoma. Over the next ten days of

admission, the patient continued to have bleeding from the breast mass requiring a total of 7 units of packed red blood cells (PRBCs). Control of the bleeding was further complicated by the patient's need for anticoagulation due to her aortic thrombus. Thus in an effort to limit her need for transfusions, the decision was made to proceed with an operative resection of her breast mass. The patient and her family were explained that while the goal of surgery would certainly be curative, the surgery itself may end up being palliative, at least in the short-term to deal with the continued bleeding issue and to allow her to be properly anticoagulated for her aortic thrombus. Upon arrival to the operating room (OR), a large skin margin approximately 2 cm was delineated around the palpable mass of the right breast including the nipple areolar complex. Dissection was carried circumferentially around the pectoralis major musculature as it was elevated off of the deep tissues. Dissection was then carried cephalad along the superior chest wall and into the axilla such that the pectoralis major was transected in its entirety. The tumor was removed in its entirety and sent for permanent specimen evaluation. The skin was reapproximated superiorly and inferiorly to allow for partial closure and reduce the overall size of the chest wall defect (Figure 2).



Figure 2: Postoperative changes.

A wound vac was placed over the chest wall defect and the patient was transported to the surgical trauma intensive care unit (STICU) for close monitoring. The patient's postoperative course was largely unremarkable and she was downgraded from the STICU on post-op day 2. She is currently being managed by the surgical oncology service awaiting final pathology results to determine further management including reconstruction with plastic surgery.

Discussion

This case is unique in its presentation of PMMB complicated by significant tumor bleeding and an ascending thoracic aortic thrombus necessitating palliative surgical resection to allow for anticoagulation. PMMB can oftentimes present very similarly to poorly differentiated breast neoplasms making for a complicated differential diagnosis. The use of a cocktail of multiple melanocytic markers is vital for accurate diagnosis. The diagnostic approach to PMMB, as illustrated in this case, hinges on immunohistochemical (IHC) analysis, with S100 and Panmelanoma (including markers like HMB45 and Mart-1) being critical in confirming the diagnosis.⁷ Although BRAF and estrogen receptor (ER) testing are commonly considered in breast malignancies, the literature suggests that in the context of PMMB, these tests may not be necessary.⁸ The distinct IHC profile of melanoma, particularly the combination of S100, HMB45, and vimentin positivity, effectively distinguishes it from other histologically similar breast malignancies.⁸ Given the patient's presentation and the IHC findings, the likelihood of this tumor being a melanoma rather than a breast carcinoma is exceedingly high.

The treatment strategy for PMMB aligns with that of malignant melanoma at other anatomical sites. Surgical resection remains the cornerstone of treatment, with wide local excision being the preferred approach. A margin of 2 cm is typically sufficient to ensure complete tumor removal. In fact, the literature shows that total mastectomies are not associated with improved prognosis

in PMMB.⁹ Additionally, comprehensive axillary lymph node dissection is only indicated when preoperative axillary lymph node metastasis is suspected based on preoperative imaging.⁹ One could make the argument that a sentinel lymph node biopsy (SLNB) could have been performed in this case to assist with staging of the tumor as well as reduce the potential need for further extensive lymph node dissection in the future. However, SLNB is not without its own risks and due to the patient's critical condition, this option was deferred. With the patient now remaining clinically stable in the post-operative period, the role of adjuvant chemotherapy and radiotherapy must be discussed. Unfortunately, in PMMB, the efficacy in improving survival is still unclear. Chemotherapy, typically dacarbazine-based, is often reserved for cases with widespread metastases or when surgery is not an option.¹⁰ Radiotherapy is considered in cases where surgical margins are positive, lymph node involvement is extensive, or in cases of local recurrence.^{11,12} However, its impact on overall survival in PMMB is yet to be fully elucidated.

Conclusion

In summary, PMMB is an exceptionally uncommon tumor with a relatively poor prognosis. This case highlights the complexity of diagnosing and managing PMMB, particularly when complicated by life-threatening conditions like aortic thrombus, necessitating a multidisciplinary approach and individualized treatment planning.

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