

CASE REPORT

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Ocular Metastases in Breast Cancer: A Multidisciplinary Approach to Diagnosis and Management

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ABSTRACT

INTRODUCTION: Breast cancer is a globally prevalent malignancy with diverse clinical presentations. Understanding metastatic sites like ocular tissues is vital due to their impact on prognosis and treatment strategies. Ocular metastases from breast cancer, though rare, can contribute significantly to metastatic cases. They can even serve as the first sign of advanced disease, highlighting the need for vigilance.

METHODS: This study utilized a comprehensive literature review to analyze ocular metastases in breast cancer. Cases were examined for time intervals between initial diagnosis and ocular metastasis. The review also assessed manifestations during systemic progression. Methods included patient data analysis, literature synthesis, and case presentation.

RESULTS: The analysis showed that 40.4% of patients identified ocular metastasis as their initial sign of advanced breast cancer. Patients exhibited varying time intervals between diagnosis and ocular metastasis, underlining the unpredictable nature of progression. Furthermore, 59.5% developed ocular metastases during systemic progression. This emphasizes the importance of considering ocular symptoms for both early and advanced stages.

CONCLUSION: Breast cancer ocular metastasis presents unique challenges and requires a multidisciplinary approach. Through case presentation, we illustrated the complexity of diagnosis and treatment. Ocular symptoms, even ocular migraines, should raise suspicion of metastasis. Collaboration among specialists, along with advanced imaging and tailored therapies, is crucial for accurate staging and treatment. Continued research and multidisciplinary efforts are vital for improved patient outcomes.

KEYWORDS

ocular metastasis

INTRODUCTION

Breast cancer is a global malignancy known for its diagnostic complexities due to diverse clinical manifestations. Metastasis to distant organs significantly affects prognosis and treatment strategies, underscoring the need to understand challenges associated with metastatic sites like ocular tissues.¹ Breast cancer management's evolution has improved survival rates but also increased uncommon metastatic occurrences, such as metastasis to the optic nerve, uveal tract, and lacrimal

glands.² Among these, ocular metastases from breast cancer have drawn attention due to infrequent appearance. Rare ocular metastases notably contribute to breast cancer cases, accounting for up to 13% of metastases.² Interestingly, these metastases can manifest as the initial indication of the disease, implying potential de novo stage IV diagnoses.² A thorough review of the literature revealed that approximately 30-50% of ocular metastases originate from breast cancer.² This subset of patients exhibited varying time intervals between breast cancer diagnosis and ocular metastasis onset, ranging from

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1 month to 25 years. Additionally, within reviewed cases, 40.4% of cases presented with eye metastases as the initial presentation of breast cancer, while 59.5% developed ocular metastases as the only site of metastasis or during the systemic progression of previously diagnosed breast cancer.² This underscores the critical need to remain vigilant for ocular symptoms, even in individuals with earlier-stage breast cancer histories, as these manifestations might signal advanced stage IV disease emergence.²

CLINICAL PRESENTATION

A 58-year-old female initially perceived an ulcerating wound on her left breast as a spider bite and opted for home treatment with antibiotics purchased online. However, after 1 month of no improvement and worsening symptoms, she sought medical attention at an urgent care. She was labeled as non-urgent and was referred to see a breast surgeon 2-3 weeks later. Examination revealed diffuse erythema, skin thickening, and a 4-5cm fungating mass on the left breast, extending to the superior and lateral breast and fixed to the chest wall. An enlarged left axillary lymph node indicated neoplastic involvement. Imaging showed skin thickening in the left breast, with a large lobulated mass deep within at 12:00, measuring approximately 4.3 x 5.3 x 4.9 cm. Other lobulated masses with indistinct borders were detected along the retro areolar region and the anterior left upper-outer breast, measuring around 2.5 x 1.2 cm. Enlarged left axillary lymph nodes measured up to 2.8 cm.

Further evaluation revealed a lobulated mass in the right breast, measuring 1.1 x 1.3 cm. Amidst various masses, an unchanged 4 mm circumscribed mass was noted within the medial right breast. Histopathological analysis confirmed invasive carcinoma (ductal) in both breasts, with varying grades. The left breast exhibited triple-negative receptor status, while the right breast showed ER+/PR+Her2- receptors, with estrogen receptor positivity in 49.9% of cells at strong intensity and progesterone receptor positivity in 34.7% of cells at strong intensity. Staging studies indicated multiple metastatic sites, including bilateral lung nodules, skeletal metastases, mediastinal, and hilar adenopathy. Before initiating treatment for

metastatic disease, the patient reported a 3-day ocular migraine characterized by non-relenting pain in the frontal and orbital area, along with scintillating scotomas and nausea that did not improve. A brain MRI at the emergency room revealed bilateral ocular metastases.

Comparison with a previous CT head scan indicated enhancing perichoroidal tissue in both globes, confirming metastatic involvement. Treatment initiation included Taxol administration; however, radiation therapy of the orbits was not pursued as visual symptoms stabilized during chemotherapy. Despite these efforts, the patient's condition deteriorated over a month, marked by declines in pulmonary status while on Taxol and pembrolizumab, increased fatigue requiring IV hydration, acute shortness of breath and desaturation diagnosed with acute pulmonary edema and pneumonia during infusion center visits, and progression of metastatic lesions, including new liver involvement. Ultimately, the patient and family opted for comfort care.

In summary, the clinical findings of this case highlight the aggressive nature of metastatic breast cancer, characterized by ulcerating breast lesions, diffuse skin involvement, and multiple metastatic sites, including the lungs, skeleton, and brain. Despite prompt initiation of treatment, including Taxol administration and radiation therapy for ocular metastases, the patient's condition deteriorated rapidly, underscoring the challenges in managing advanced metastatic disease.

In the CC projection image (Figure 1), a large central mass is prominently visible. The circular marker highlights the precise location of the mass, while an arrow points towards the area of skin thickening and nipple retraction.

In the MLO projection image (Figure 2), a diffuse central mass is circled. Additionally, a star marks the presence of abnormal-appearing axillary lymphadenopathy.

The CC projection image (Figure 3) depicts a marked mass in the right breast, which is indicated by the circled area.



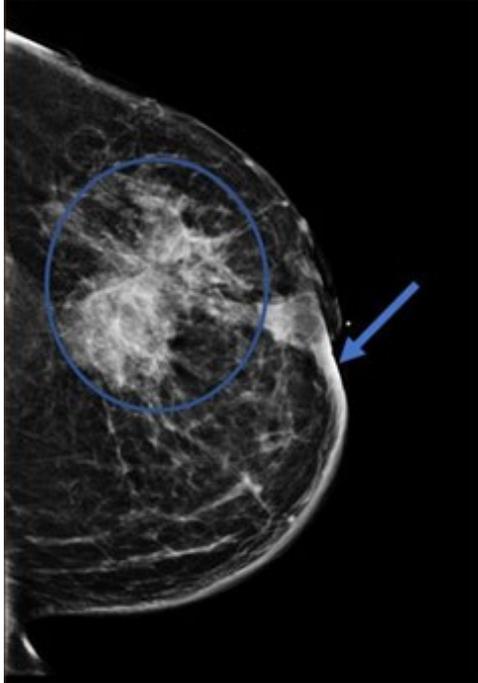


FIGURE 1: Left Breast CC Projection

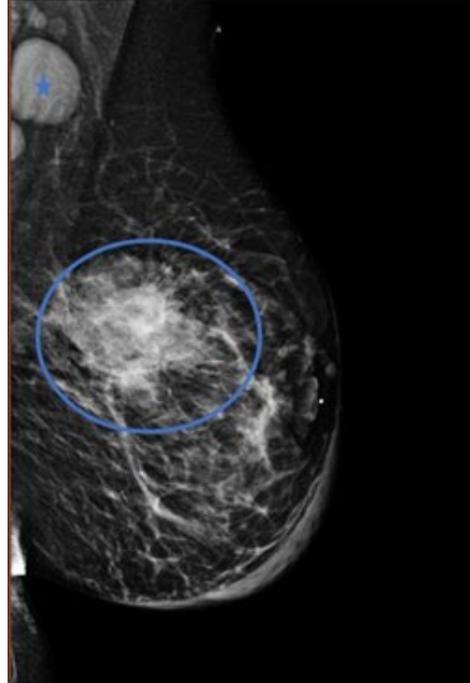


FIGURE 2: Left Breast MLO Projection

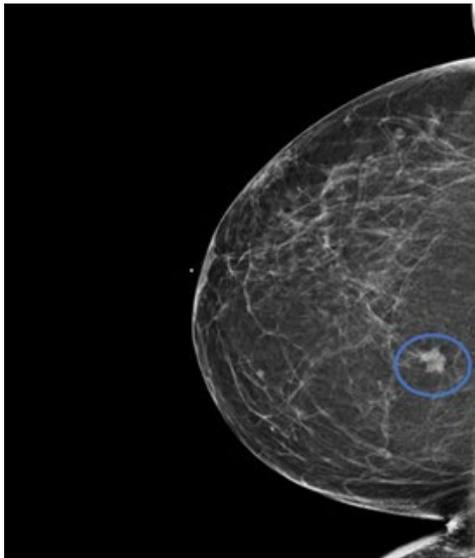


FIGURE 3: Right Breast CC Projection



Figure 4 shows the MLO projection of the right breast, providing further visualization of the breast anatomy.

Figure 5 displays a CT head scan with an arrow pointing to the ocular metastasis, emphasizing its presence.

Figure 6 presents an MRI head sagittal view with an arrow indicating the ocular metastasis, confirming its involvement.

DISCUSSION

Breast cancer ocular metastases affect various eye structures, from the orbit and conjunctiva to the eyelids and intraocular components.¹ Symptoms vary based on location and extent of involvement, often causing delayed diagnoses or misinterpretations.^{2,3} Ocular indicators include blurry vision, eye pain, redness, proptosis, double vision, eyelid swelling, or the presence of a visible mass.^{2,3} Uveal tissue,

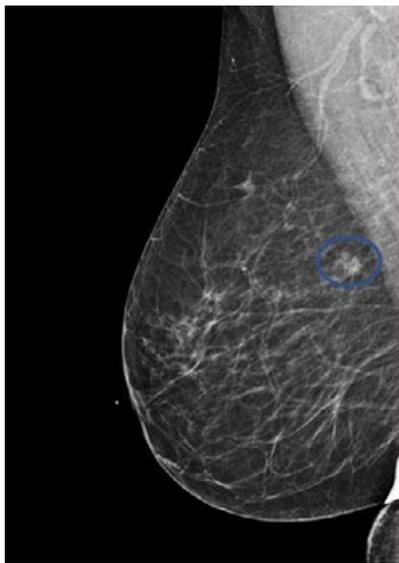


FIGURE 4: Right Breast MLO Projection



FIGURE 5: CT Head Scan

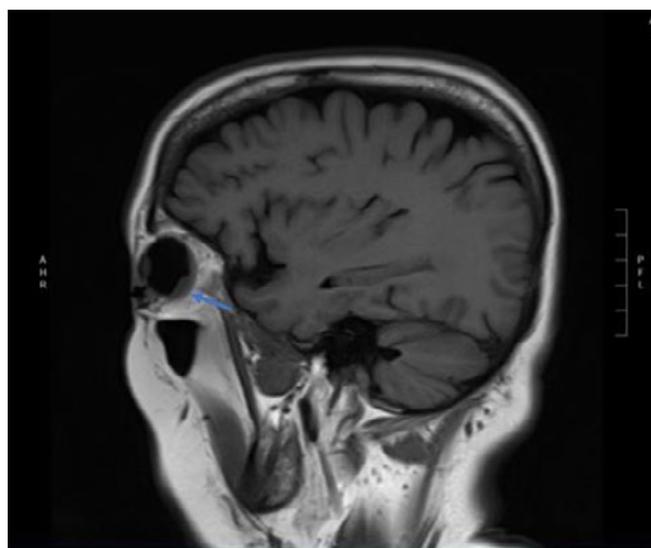


FIGURE 6: MRI Head Sagittal View



particularly the choroid, is a favored site for breast cancer metastatic growth within the eye.^{4,5} Choroidal metastases lead to symptoms like visual impairment, metamorphopsia, and serous retinal detachment.^{4,5} Iris, optic disc, and ciliary body involvement manifest with ocular pain, visual disturbances, and intraocular pressure changes.^{1,3-8} A comprehensive ophthalmic evaluation is key for diagnosing breast cancer ocular metastasis. This includes measuring visual acuity, slit-lamp examinations, and imaging like ultrasound, computed tomography (CT), or magnetic resonance imaging (MRI).⁹ Early and precise diagnosis is crucial for effective treatment strategy and patient outcomes. Managing breast cancer ocular metastasis demands a multidisciplinary approach, involving ophthalmologists and oncologists.^{1,10} The choice of technique for treatment depends on factors like ocular metastasis number, localization, visual prognosis, and life expectancy.^{10,11} Local therapies like surgery and radiation address ocular metastases, aiming to improve visual function and alleviate symptoms. Surgical interventions remove localized masses and debulk tumors.^{10,11} Radiation therapy precisely treats, shrinking metastatic lesions for local disease control.^{1,11}

In recent years, intraocular injections, particularly intravitreal therapies, have offered a promising avenue for managing ocular metastases. Anti-vascular endothelial growth factor (anti-VEGF) therapy, like bevacizumab, effectively treats ocular neovascularization and related complications.¹² These targeted therapies deliver medication directly, minimizing systemic side effects while maximizing efficacy.¹² A significant study explored anti-VEGF therapy outcomes in breast cancer ocular metastases, revealing improved visual acuity and reduced symptoms.¹² Inhibiting VEGF-mediated angiogenesis regressed neovascularization and alleviated retinal and choroidal involvement, enhancing patient comfort and visual function.¹² A case report by Papageorgiou et al. highlighted systemic treatment efficacy. A 45-year-old woman with HER2 positive breast cancer developed metastatic lesions in the left choroid and optic nerve Sheath.¹³ Combined chemotherapy (paclitaxel) and anti-HER2 monoclonal antibodies (trastuzumab) led to significant improvements, including choroidal focus resolution and optic nerve sheath blood flow absence after 9 months.¹³ Positive outcomes underscored combined

paclitaxel and trastuzumab efficacy in managing HER2-positive breast cancer ocular metastases.¹³

Additionally, palliative care plays a significant role in managing advanced breast cancer ocular metastasis.¹⁴ Its focus is symptom relief, improving quality of life, and providing emotional support for patients and families.¹⁵⁻¹⁷ In conclusion, breast cancer ocular metastases demand a comprehensive, collaborative approach.¹⁰ Local therapies like anti-VEGF treatment and paclitaxel-trastuzumab combination therapy promise to improve visual outcomes and alleviating ocular metastases-associated symptoms.¹³ Systemic interventions and palliative care contribute to comprehensive patient care, addressing ocular and systemic disease aspects.¹⁰⁻¹⁷

In addition to the insights provided, it is essential to acknowledge certain limitations. Breast cancer ocular metastases affect various eye structures, leading to a spectrum of symptoms that can result in delayed diagnoses or misinterpretations.^{2,3} While local therapies such as surgery and radiation aim to improve visual function and alleviate symptoms, they may not always be feasible or effective, particularly in cases with extensive metastatic involvement or in patients with poor overall health.¹⁸ Despite these limitations, ongoing research and advances in treatment modalities offer hope for improved outcomes in the management of breast cancer ocular metastases.

CONCLUSION

The presented case emphasizes the importance of timely diagnosis and multidisciplinary management of breast cancer ocular metastasis, emphasizing the need for heightened awareness among healthcare professionals due to its rarity, which can lead to delayed recognition. Ocular symptoms like migraines in breast cancer patients should raise suspicion of potential metastatic involvement. Collaboration between specialists, thorough ophthalmic examination, and advanced imaging are pivotal in accurate staging and tailored treatment approaches encompassing local and systemic therapies.

This case highlights the importance of continuous



research on ocular metastases and ocular migraines, as demonstrated by the delayed recognition of ocular metastases despite presenting with ocular migraines. The intricate interplay between breast cancer and ocular metastasis, confirmed by brain MRI revealing bilateral ocular metastases, necessitates advancements in diagnostic techniques and targeted therapies. The utilization of multidisciplinary collaboration, coupled with innovative treatments such as Taxol administration and orbital radiation therapy initiated upon diagnosis, reflects a proactive approach to addressing ocular metastasis. Furthermore, this case highlights the need for enhanced awareness among healthcare professionals to promptly recognize and manage ocular manifestations of metastatic disease, ultimately aiming to improve patient outcomes and quality of life.

AUTHOR AFFILIATIONS

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