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Original Article

ISOLATED SUPRACLAVICULAR LYMPH NODE METASTASIS IN PRIMARY BREAST CARCINOMA: A MULTIMODALITY IMAGING DIAGNOSIS OF A RARE PATTERN OF SPREAD

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ABSTRACT

Breast carcinoma commonly metastasizes to axillary and internal mammary lymph nodes, while isolated supraclavicular lymph node metastasis (ISLM) without axillary involvement is rare. We report a 70-year-old female who presented with a painless left supraclavicular swelling and an unexamined left breast mass. Imaging, including ultrasonography, contrast-enhanced CT, PET/CT and histopathological examination revealed a left breast lesion and ISLM, with no axillary or distant metastases. The patient underwent left mastectomy with sentinel lymph node biopsy, followed by adjuvant chemotherapy, radiotherapy including the supraclavicular region, and endocrine therapy. This case highlights the diagnostic challenge of ISLM, emphasizing the role of multimodal imaging and histopathologic confirmation. Early recognition and aggressive multimodality treatment can achieve locoregional control and favorable outcomes, supporting curative-intent management in selected patients with ISLM.

الملخص

يُعد سرطان الثدي من الأورام التي تنتشر عادةً إلى العقد اللمفاوية الإبطية والثديية الداخلية، بينما يُعد الانتشار إلى العقد اللمفاوية فوق الترقوة دون إصابة إبطية حالة نادرة. نعرض حالة لامرأة تبلغ من العمر 70 عامًا راجعت المستشفى بسبب تورم غير مؤلم في منطقة فوق الترقوة اليسرى مع وجود كتلة غير مفحوصة سابقًا في الثدي

الأيسر. أظهرت الفحوصات التصويرية، بما في ذلك الموجات فوق الصوتية والتصوير المقطعي المحوسب المعزز بالصبغة والتصوير البوزيتروني المقطعي، إضافة إلى الفحص النسيجي، وجود آفة في الثدي الأيسر مع نقيلة منفردة في العقدة فوق الترقوة اليسرى دون أي دليل على انتشار إبطي أو نقائل بعيدة. خضعت المريضة لاستئصال الثدي الأيسر مع خزعة العقدة الحافرة، تلاه علاج كيميائي وعلاج إشعاعي يشمل منطقة فوق الترقوة، إضافةً إلى العلاج الهرموني. وتبرز هذه الحالة التحدي التشخيصي للنقائل المعزولة فوق الترقوة، مؤكدةً أهمية الفحوصات التصويرية متعددة الوسائط والفحص النسيجي. كما يظهر أن التعرف المبكر والعلاج المكثف متعدد التخصصات يمكن أن يؤدي إلى سيطرة موضعية جيدة ونتائج علاجية واعدة، مما يدعم نهج العلاج الشفائي في المرضى المختارين الذين يعانون من هذا النمط النادر من الانتشار.

Keywords: Breast Carcinoma, Supraclavicular Lymph Node, Isolated Supraclavicular Lymph Node Metastasis, Biopsy, Locoregional Therapy.

1. INTRODUCTION

Breast carcinoma is the most commonly diagnosed malignancy and a leading cause of cancer-related death among women worldwide, [1] its clinical behavior is strongly influenced by patterns of regional lymphatic and distant spread. [2] Lymph node (LN) metastasis is considered as the most important predictor of overall recurrence and survival of breast cancer. [3] While axillary and internal mammary lymph nodes are the usual sites of regional metastasis [4], involvement of supraclavicular lymph nodes (SCNs) is uncommon, occurring in only about 1–4% of primary breast cancer cases without distant metastasis. [5]

Isolated supraclavicular lymph nodes metastasis (ISLM) as the only detectable site of regional or distant disease is a rare presentation and therefore poses diagnostic and therapeutic challenges. [5, 6] Such a presentation can be synchronous with the primary tumor or metachronous (occurring after initial treatment), and when present it has historically been associated with worse outcomes than isolated axillary disease. [2, 5-7] Under current staging, such cases are classified as N3c (stage IIIC), reflecting their prognostic and therapeutic significance. [8]

Given its rarity, diagnosis of ISLM typically requires a multimodal approach. Imaging techniques such as neck ultrasonography (US), computed tomography (CT), and positron emission tomography (PET)/CT which demonstrates a high diagnostic value for SCN involvement, while US and CT remain useful, especially where PET/CT is unavailable. [9-11] Ultimately, histopathologic confirmation via biopsy remains the gold standard to establish metastatic involvement and exclude alternative etiologies such as lymphoma or benign reactive nodes. [9, 12]

Management of ISLM is an area of ongoing debate. Historically considered a poor-prognosis marker often managed with palliative intent, at present, patients with isolated regional SCN involvement may benefit from aggressive multimodality treatment (systemic therapy combined with mainly radiotherapy and surgical approaches), leading to outcomes more similar to locally advanced rather than widely metastatic disease. [13, 14] Nevertheless, the optimal locoregional strategy remains undefined and should be individualized within a multidisciplinary team. [13, 14]

Reporting a case of ISLM in primary breast carcinoma therefore contributes to the limited literature on this rare pattern of spread. Such documentation underscores the importance of a systematic imaging workup, timely tissue diagnosis, and careful staging, all of which have direct implications for treatment planning and prognosis.

2. CASE PRESENTATION

2.1 Patient History and Clinical Examination

A 70-year-old female presented to the Breast and Thyroid Surgery Department with a 5-day history of painless swelling in the left neck. On further questioning, she reported a longstanding, non-tender mass in the left breast that had never been evaluated. She denied systemic symptoms such as fever, weight loss, or night sweats, and had no personal or family history of malignancy.

On physical examination, the patient had left upper limb lymphedema. Palpation revealed a firm, immobile, enlarged left supraclavicular lymph node measuring approximately 1.5 × 1.0 cm. In the left breast, a palpable, irregular, hard mass was noted at the 12 o'clock position, measuring approximately 2 × 2 cm. Examination of the right breast and axilla was unremarkable. The overlying skin was intact without signs of peau d'orange, dimpling, or nipple retraction.

2.2 Imaging and Histopathological Findings

Subsequently, the patient underwent mammography and breast US. Mammography and US of the right breast was unremarkable. In contrast, the left breast demonstrated a high-density, irregular, spiculated mass in the central upper third, associated with architectural distortion, but without suspicious microcalcifications, skin thickening, or nipple retraction (Figure 1). Breast ultrasound revealed a hypoechoic, anti-parallel, irregular lesion at 12 o'clock in the left breast measuring 1.2 × 0.8 × 1.2 cm, with spiculated margins, an echogenic halo, and peripheral vascularity (Figure 2A). Axillary lymph nodes appeared normal (Figure 2B). The lesion was classified as BI-RADS 5, indicating high suspicion for malignancy.

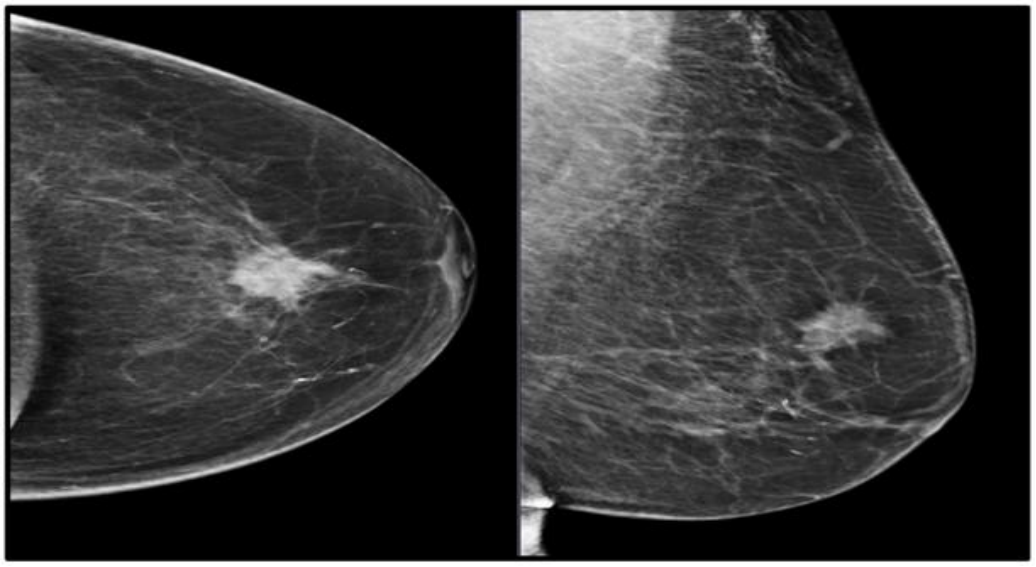

Figure 1. Mammography of the left breast showing a high-density, irregular, spiculated mass in the central upper third, associated with architectural distortion.

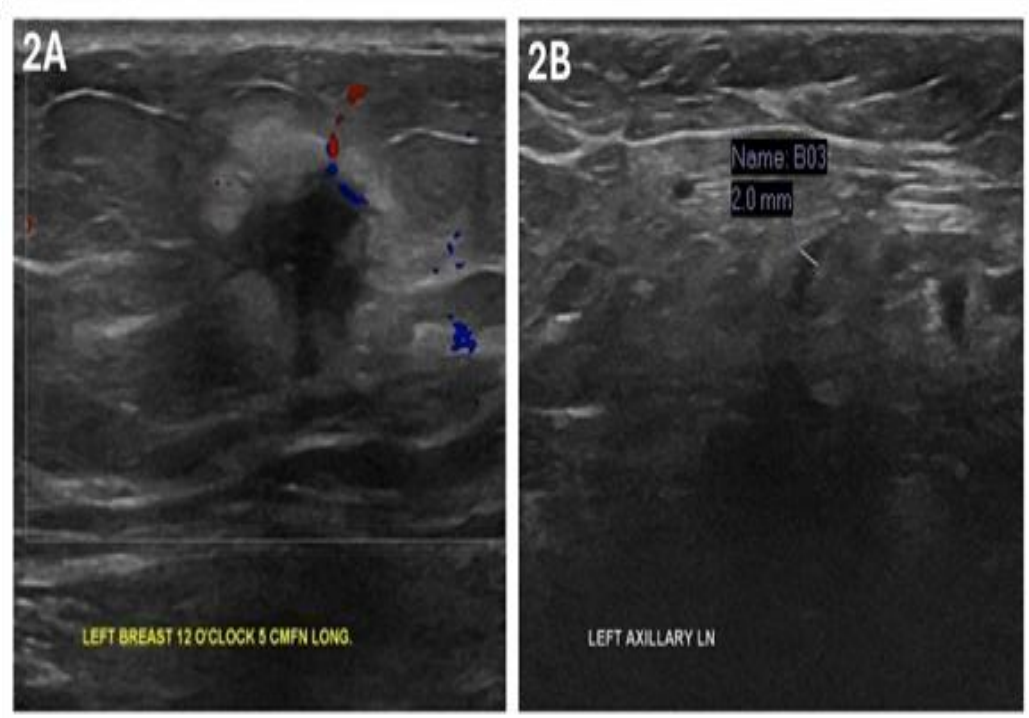

Figure 2A: Figure 2A: Breast ultrasound of the left breast showing a hypoechoic, irregular lesion with spiculated margins, echogenic halo, and peripheral vascularity.

Figure 2B: Ultrasound image of the left axilla showing normal-appearing lymph nodes

The patient then underwent a contrast-enhanced CT of the neck and chest which confirmed a spiculated soft tissue mass in the left breast measuring approximately 1.9 cm and revealed an enlarged left supraclavicular lymph node with features suggestive of malignancy (Figure 3A). No axillary or distant metastases were detected. Bone scintigraphy (99mTc-MDP) showed mildly increased radiotracer uptake in the left upper extremity, consistent with lymphedema, but no evidence of skeletal metastases (Figure 3B). PET/CT further demonstrated an FDG-avid left supraclavicular lymph node, confirming metastatic involvement, with no abnormal tracer uptake in the axillary region or elsewhere (Figure 3C).

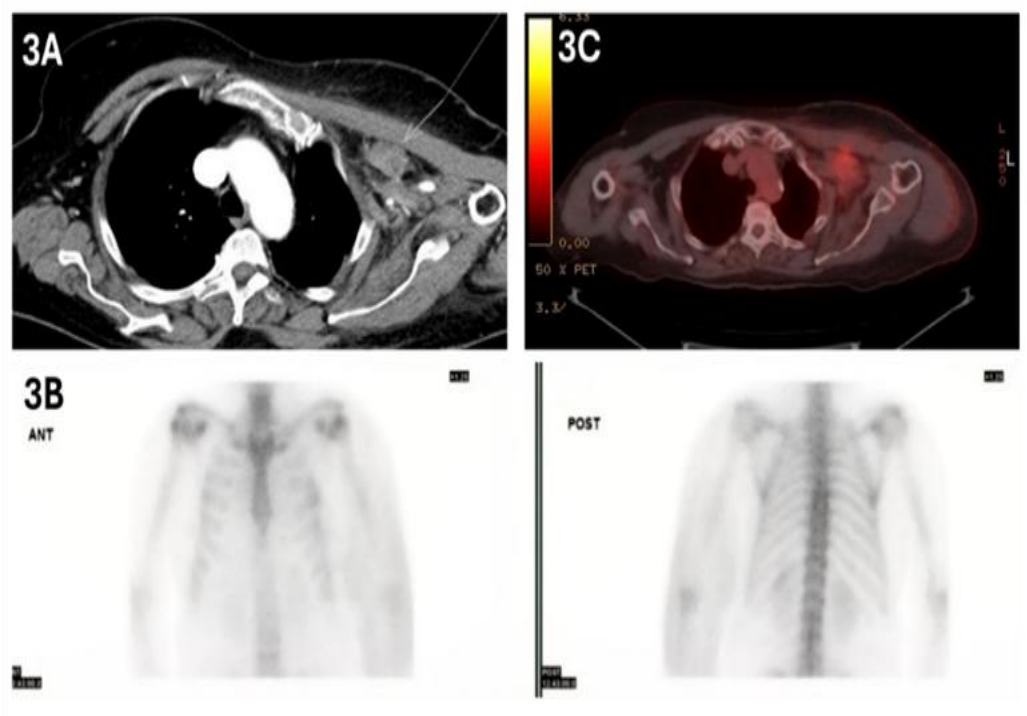

Figure 3A: Contrast-enhanced CT of the neck and chest showing the left breast mass and an enlarged left supraclavicular lymph node. Figure 3B: 99mTc-MDP bone scan showing mildly increased radiotracer uptake in the left upper extremity consistent with lymphedema.

Figure 3C: PET/CT image demonstrating FDG-avid left supraclavicular lymph node without abnormal uptake in the axilla.

Subsequent histopathologic examination of the core needle biopsy from the left breast mass revealed grade II invasive ductal carcinoma of no special type, with tumor cells arranged in sheets and cords within fibrous stroma. Immunohistochemistry showed ER-negative, PR low positive (~2%), HER2-negative (score 0), and a high proliferative index (Ki-67 ~70%) (Figure 4). The Nottingham Histologic Score was 7 (tubular differentiation 3, nuclear pleomorphism 3, mitotic activity 1), corresponding to grade II, and no ductal carcinoma in situ (DCIS) was identified. Biopsy of the left supraclavicular lymph node demonstrated metastatic carcinoma infiltrating fibro-fatty tissue, forming cords and nests with minimal lymphoid tissue (Figure 5A). Immunoprofile of the nodal metastasis was CK7-positive, ER, PR, TTF1, thyroglobulin, and CK20-negative, with HER2-negative (score 0),

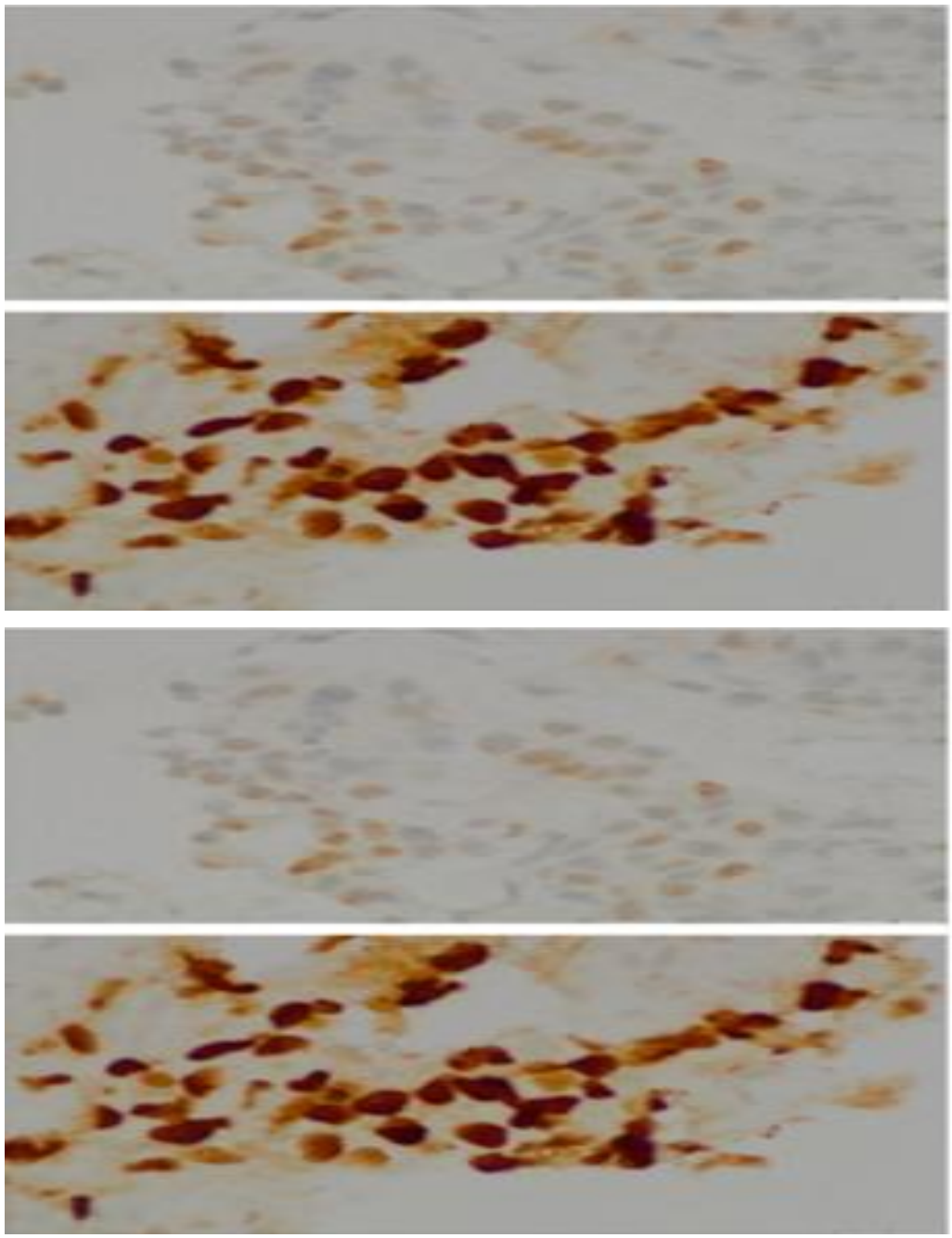

Figure 4: Immunohistochemistry of the left breast core needle biopsy showing ER-negative, PR low positive (~2%), HER2-negative, and high Ki-67 (~70%) proliferative index.

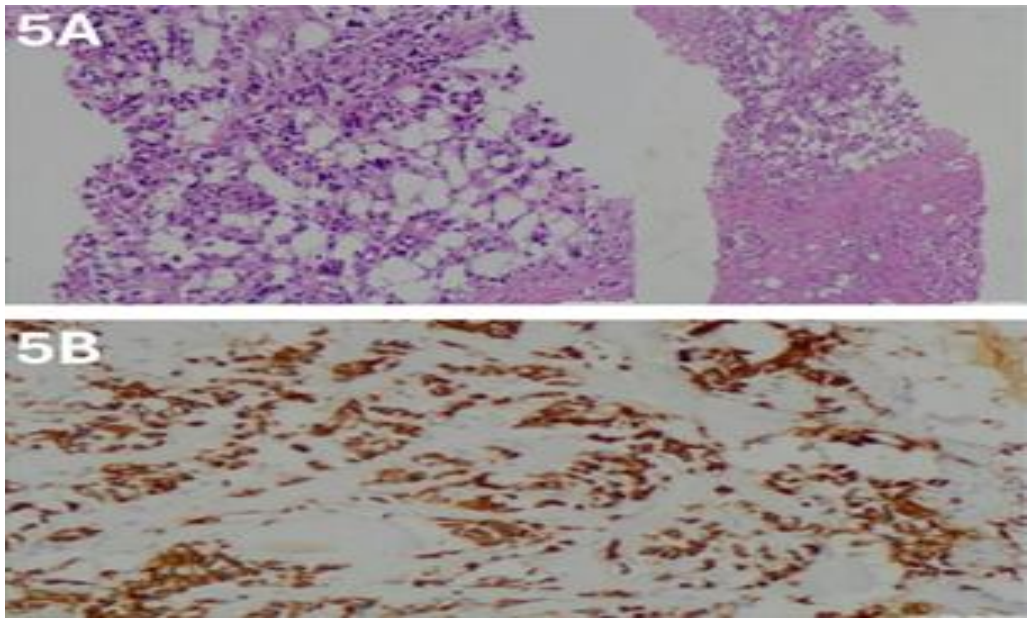

Figure 5A: Core biopsy of the left supraclavicular lymph node showing metastatic carcinoma infiltrating fibro-fatty tissue (H&E stain, ×200).

Figure 5B: Immunohistochemistry of the supraclavicular node demonstrating CK7 positivity, supporting breast origin.

supporting breast origin (Figure 5B). The right breast and axilla showed no suspicious findings on imaging, therefore, no biopsy was performed as there were no detectable lesions.

Based on clinical, imaging, and histopathologic findings, the patient was diagnosed with grade II invasive ductal carcinoma of no special type of the left breast with solitary ipsilateral supraclavicular lymph node metastasis and no axillary involvement.

2.3 Treatment and Outcome

The patient underwent a left total mastectomy with sentinel lymph node biopsy (SLNB), which was negative for metastasis. The surgical procedure was uneventful, with minimal blood loss, and the patient recovered without complications. Postoperatively, she was referred to the oncology team for adjuvant multimodal therapy including radiotherapy, chemotherapy and endocrine therapy. The patient tolerated the procedures well, and close follow-up

is ongoing with regular clinical examinations and imaging to monitor treatment response, detect potential recurrence early, and manage any long-term sequelae.

3. DISCUSSION

The present case demonstrates the rare occurrence of ISLM from primary breast carcinoma in the absence of axillary or distant metastasis. This unusual pattern challenges the traditional understanding of lymphatic spread, which typically progresses through the axillary nodes before reaching the supraclavicular region. ISLM may arise from aberrant lymphatic channels, transpectoral pathways, or microscopic axillary disease not detectable on imaging.[2, 5, 15-17] In literature, similar atypical presentations, including late contralateral supraclavicular recurrence after many years of treatment and ISLM as the first manifestation of occult or male breast cancer has been reported, highlighting the variability of nodal dissemination and the diagnostic importance of careful assessment.[18, 19]

Given the wide differential diagnosis for supraclavicular lymphadenopathy, including lymphoma, thyroid and lung malignancies, and benign inflammatory causes, accurate diagnosis requires a multimodal strategy.[9-12] Ultrasonography and CT assist in structural evaluation, while PET/CT provides higher sensitivity for identifying metabolically active nodes and excluding distant disease.[9-11] In this case, PET/CT confirmation of an isolated FDG-avid supraclavicular node supported the diagnosis of ISLM, nevertheless, tissue biopsy remained essential to verify metastatic breast carcinoma and rule out alternative etiologies.[9, 12]

ISLM was previously classified as distant metastasis (M1), but the AJCC 2003 revision redefined isolated supraclavicular involvement as regional disease (N3c, stage IIIC), recognizing the potential for long-term control with aggressive therapy.[6, 8, 20, 21] This shift allows for curative-intent management through multimodality treatment, including surgery, radiotherapy, chemotherapy, and other targeted approaches when applicable.[6,22] Current evidence shows that patients with ISLM have significantly better outcomes than those with distant metastasis, though generally worse than node-negative or axillary-only node-positive disease.[2, 5, 23] Several studies demonstrate that aggressive multimodality treatment, including surgery of the primary tumor, radiotherapy to

the supraclavicular fossa, and systemic therapy, can substantially improve survival.[21, 23, 24]

In this patient, the decision to proceed with mastectomy, SLNB, adjuvant chemotherapy, radiotherapy including the supraclavicular region, and endocrine therapy reflects contemporary evidence supporting curative-intent management. This individualized approach is appropriate given the small solitary node, absence of axillary involvement, and good performance status.[13, 14] Nevertheless, optimal management remains debated, particularly regarding supraclavicular lymph node dissection versus radiotherapy alone, as most data derive from retrospective series.[13, 25, 26] Long-term, randomized, prospective studies or pooled registries are needed to better define prognostic factors, refine selection criteria for aggressive locoregional therapy, and standardize follow-up protocols.

4. CONCLUSION

This case highlights that ISLM of primary breast carcinoma, even without axillary involvement, can occur and may represent a locoregional disease amenable to curative-intent therapy. A robust multimodal diagnostic approach, histopathologic confirmation, and tailored multimodality treatment can achieve successful locoregional control. Given the scarcity of data, each such case adds valuable evidence to guide clinicians. Our report supports the rationale for individualized aggressive therapy in selected patients with ISLM highlights the need for continued accumulation of clinical experience and research to inform consensus guidelines.

5. FUNDING

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6. CONFLICT OF INTEREST

The authors declare that they have no financial, personal, or professional conflicts of interest that could have influenced the work reported in this study.

7. GENERATIVE AI DECLARATION

The authors confirm that no artificial intelligence (AI) tools were used in the writing, preparation, or editing of this manuscript. The manuscript is entirely the work of the authors.

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