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Incidental fallopian tube metastasis from synchronous invasive carcinoma of no special type: a case report

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Abstract

This article reports a rare case of synchronous metastatic breast cancer presenting as an incidental, radiologically occult fallopian tube metastasis discovered after surgery for a presumed benign ovarian lesion. A 55-year-old postmenopausal woman underwent bilateral adnexectomy for a suspected right ovarian serous cystadenofibroma. Histopathological examination confirmed the benign right ovarian lesion but identified a malignant epithelial focus in the fimbrial portion of the left fallopian tube. The lesion was positive for CK7, GATA-3, ER, and PR, negative for CK20 and PAX8, with preserved E-cadherin expression, supporting metastatic invasive carcinoma of no special type (NST) of mammary origin. Further staging revealed a left breast primary with ipsilateral axillary lymphadenopathy and diffuse bone metastases. The patient received palliative spinal radiotherapy followed by abemaciclib, letrozole, and denosumab. This case highlights that fallopian tube metastasis may occur in invasive carcinoma of NST and may be clinically and radiologically occult.

Introduction

Breast cancer is the second most frequently diagnosed malignancy worldwide and the most common cancer among women, accounting for approximately 2.3 million new cases (11.6% of all new cancer diagnoses) and over 660,000 deaths globally in 2022[1].

Although breast cancer most commonly metastasizes to the bone, liver, and lungs, metastatic involvement of the female genital tract represents an uncommon pattern of disease dissemination[2]. Among gynaecologic metastatic sites, ovarian involvement represents the most frequently reported manifestation, although ovarian metastases from breast cancer remain rare[3].

These metastases are disproportionately observed in patients with invasive lobular carcinoma (ILC), which exhibits a distinct metastatic behaviour compared with the more common invasive carcinoma of NST[4 5 6].

This peculiar tropism has been associated, at least in part, with the characteristic loss of E-cadherin expression in ILC, resulting in a discohesive growth pattern and a higher propensity for dissemination to unusual anatomical sites[5 7].

While ovarian metastases from breast cancer may occur in both ILC and invasive carcinoma of NST, metastatic involvement of extra-ovarian gynaecologic sites, including the fallopian tube, appears to be exceedingly uncommon and has been predominantly described in association with ILC[3]. Fallopian tube metastases from breast cancer are rarely reported, and the available literature mainly consists of isolated case reports or small case series[5]. To the best of our knowledge, incidental fallopian tube metastasis from invasive carcinoma of NST in the setting of synchronous metastatic disease represents an exceptionally rare clinical presentation. Herein, we report a case of incidental fallopian tube

metastasis from invasive carcinoma of NST identified at the diagnosis of synchronous bone metastatic disease.

Results

Clinical presentation and adnexal findings:

Our patient is a 55-year-old postmenopausal woman with no significant past medical history who underwent bilateral adnexectomy in April 2026 for a suspected right ovarian cystic neoplasm identified during routine gynaecological examinations.

Histopathological examination revealed a right ovarian serous cystadenofibroma without atypical features, while the left ovary showed only simple serous cysts. A malignant epithelial neoplastic lesion was identified in the fimbrial portion of the left fallopian tube, and immunohistochemical staining showed positivity for cytokeratin 7 (CK7) and GATA-3 (Fig. 1, a-b), negativity for CK20 and PAX8, and positivity for E-cadherin (Fig. 1, c), supporting the diagnosis of metastatic invasive carcinoma of NST of the breast involving the fallopian tube, with diffuse ER expression (98%), PR positivity (20%), HER2 negativity (score 0), and a low Ki-67 proliferative index (5%).

Breast and pathological assessment:

Subsequently, the patient underwent bilateral mammography that revealed a 30-mm area of architectural distortion in the upper outer quadrant of the left breast (BI-RADS 5), associated with suspicious ipsilateral axillary lymphadenopathy. Ultrasound-guided core needle biopsy confirmed an invasive carcinoma of NST of the breast with E-cadherin staining (Fig. 2), Grade 1, positive for ER (99%) and PR (95%), with a low proliferative index (Ki-67, 5%). HER2 immunohistochemistry was scored as 2+, with no gene amplification detected by chromogenic in situ hybridization (CISH). Ultrasound-guided biopsy of a suspicious ipsilateral axillary lymph node also confirmed metastatic breast carcinoma (ER 99%, PR 95%, HER2 1+, Ki-67 10%).

Systemic staging and treatment:

Contrast-enhanced CT scan confirmed the primary lesion in the left breast with ipsilateral axillary lymphadenopathy, together with diffuse skeletal metastases involving the axial and appendicular skeleton. Due to vertebral metastatic lesions with cortical involvement at D10-D11 and L5 levels, including extension into the left neural foramen at L5, the patient underwent palliative radiotherapy to D10-D11 and L5-S1 spinal levels before starting systemic therapy (1 fraction, 8 Gray).

Serum tumour markers revealed elevated CA15-3 (51 U/mL) and CA125 (46 U/mL), whereas CEA was within normal limits.

Following multidisciplinary discussion, first-line treatment with abemaciclib plus letrozole was initiated and the patient is currently continuing treatment with good clinical tolerance, and a clinical and

instrumental re-evaluation is scheduled in approximately one month to monitor treatment response. In addition, treatment with denosumab was initiated for bone protection.

Discussion

This case describes an incidental finding of fallopian tube metastasis from breast carcinoma following surgery performed for a presumed benign ovarian lesion. Metastatic involvement of the adnexa, and particularly of the fallopian tube, represents an uncommon but clinically relevant manifestation of breast cancer dissemination. These lesions may pose significant diagnostic challenges because they can mimic primary gynaecologic malignancies.

Secondary tumours of the ovary/fallopian tube account for 10–25% of all ovarian malignancies, mostly deriving from colorectal, stomach, breast, and endometrial cancers[8].

The distribution of primary tumours associated with adnexal metastases differs largely when considering the age of the patients, with cases of primary colorectal cancers being generally older than those of breast cancers[9].

The pathogenesis of adnexal metastases remains not fully understood. Hematogenous, lymphatic, and transcoelomic dissemination have all been proposed as potential mechanisms, while metastatic organotropism is believed to result from complex interactions between tumour biology and the ovarian microenvironment. However, no molecular signature specifically associated with ovarian metastasis has yet been identified[8].

Although ILC has a well-recognized propensity for ovarian dissemination, invasive carcinoma of NST remains responsible for a substantial proportion of ovarian metastases simply because it is the most prevalent histological subtype of breast cancer[9].

However, whether this distribution applies to extra-ovarian gynecologic metastatic sites, such as the fallopian tube, remains unclear because of the extreme rarity of reported cases. Therefore, ovarian metastasis should remain part of the differential diagnosis even in patients with invasive carcinoma of NST histology, especially when the immunophenotype is strongly suggestive of a mammary origin.

In our case, the metastatic involvement was clinically and radiologically occult. Preoperative transvaginal ultrasonography did not reveal suspicious adnexal abnormalities, and macroscopic examination of the surgical specimen did not identify any grossly evident lesion. The metastatic focus involving the fimbrial portion of the fallopian tube was detected only on microscopic examination, highlighting the potential for occult adnexal metastases in patients with breast cancer.

Serum tumour markers have limited diagnostic specificity in distinguishing primary gynaecologic malignancies from metastatic disease. In our patient, postoperative evaluation revealed elevated CA125 levels, a finding that may occur in both primary gynaecologic tumours and metastatic involvement,

whereas the concomitant elevation of CA15.3 represented an additional clue toward breast origin. However, serum markers alone were insufficient for definitive classification and the diagnosis relied on histopathological evaluation and immunohistochemical characterization.

The differential diagnosis between metastatic breast carcinoma involving the adnexa and primary gynaecologic malignancies may be challenging, particularly when clinical and radiological findings are inconclusive. Immunohistochemical evaluation plays a crucial role in establishing the origin of the lesion. Although CK7 and CK20 expression patterns may provide supportive information, additional markers are required for accurate classification. PAX8 negativity argues against a Müllerian primary tumor, whereas GATA-3 expression supports breast origin[1011]. Furthermore, comparison of hormone receptor status, HER2 expression, proliferative index, and E-cadherin expression between the metastatic lesion and the primary breast tumor may provide valuable diagnostic confirmation.

The remarkable concordance between the breast primary, the fallopian tube lesion and the immunohistochemical profile, including estrogen receptor expression, progesterone receptor status, HER2 status, Ki-67 proliferative index, and preserved E-cadherin expression, allowed the lesion to be correctly classified as metastatic breast carcinoma of NST, avoiding misclassification as a primary gynaecologic malignancy.

Surgery had been performed for a presumed benign gynecological condition, and the diagnosis of fallopian tube metastasis was established incidentally through microscopic examination and immunohistochemical analysis. Therefore, the surgical procedure had diagnostic rather than cytoreductive intent.

The unexpected pathological diagnosis prompted complete systemic staging and multidisciplinary discussion, allowing timely initiation of systemic treatment with endocrine therapy combined with cyclin-dependent kinase 4/6 (CDK4/6) inhibition, currently considered a standard first-line approach for patients with hormone receptor-positive, HER2-negative metastatic breast cancer[12].

This case highlights the importance of a multidisciplinary approach involving gynaecologists, pathologists, radiologists, and breast oncologists in the management of unusual metastatic presentations.

The incidental identification of an occult fallopian tube metastasis from invasive carcinoma of NST emphasizes the need for careful pathological evaluation of adnexal specimens, even in the absence of macroscopic or radiological suspicion.

Methods

Case information

This case report was prepared based on the review of the patient's clinical records, radiological findings, laboratory investigations, treatment history, and clinical follow-up. Clinical data were collected and reviewed by the authors involved in the patient's care.

Pathological and immunohistochemical assessment

Histopathological and immunohistochemical findings from the fallopian tube and breast lesions were reviewed by specialist pathologists. The immunohistochemical assessment included cytokeratin 7, GATA-3, cytokeratin 20, PAX8, E-cadherin, estrogen receptor, progesterone receptor, HER2, and Ki-67, according to routine diagnostic procedures.

Declarations

Consent for publication and participation

Written informed consent was obtained from the patient for both participation in this case report and publication of the case report and any accompanying images.

Data Availability

The datasets generated and/or analysed during the current study are not publicly available due to the confidential nature of the patient's personal and clinical data but are available from the corresponding author on reasonable request, subject to applicable privacy and ethical restrictions.

Competing interests

The authors declare no financial or non-financial competing interests.

Ethics

The study protocol was approved by the ethics committee,Comitato Etico Territoriale – Liguria (CET-Liguria), approval no. 329/2026 (ID 15665), on 14 September 2026.

This case report was conducted in accordance with the principles of the Declaration of Helsinki and applicable national ethical guidelines.

Author contributions

MM contributed to the collection and analysis of clinical data, literature review, and drafting of the manuscript. TR contributed to the interpretation of clinical data, drafting and critical revision of the manuscript, and overall supervision of the work. KL contributed to the collection and organization of clinical and diagnostic information. LV contributed to the histopathological and immunohistochemical assessment and interpretation of the pathological findings. FP contributed to the interpretation of clinical and pathological findings and critically revised the manuscript. YLC contributed to the

histopathological and immunohistochemical assessment and interpretation of the pathological findings. LM contributed to the clinical management and interpretation of the case, critically revised the manuscript, and supervised the overall work. All authors read and approved the final version of the manuscript.

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Figures

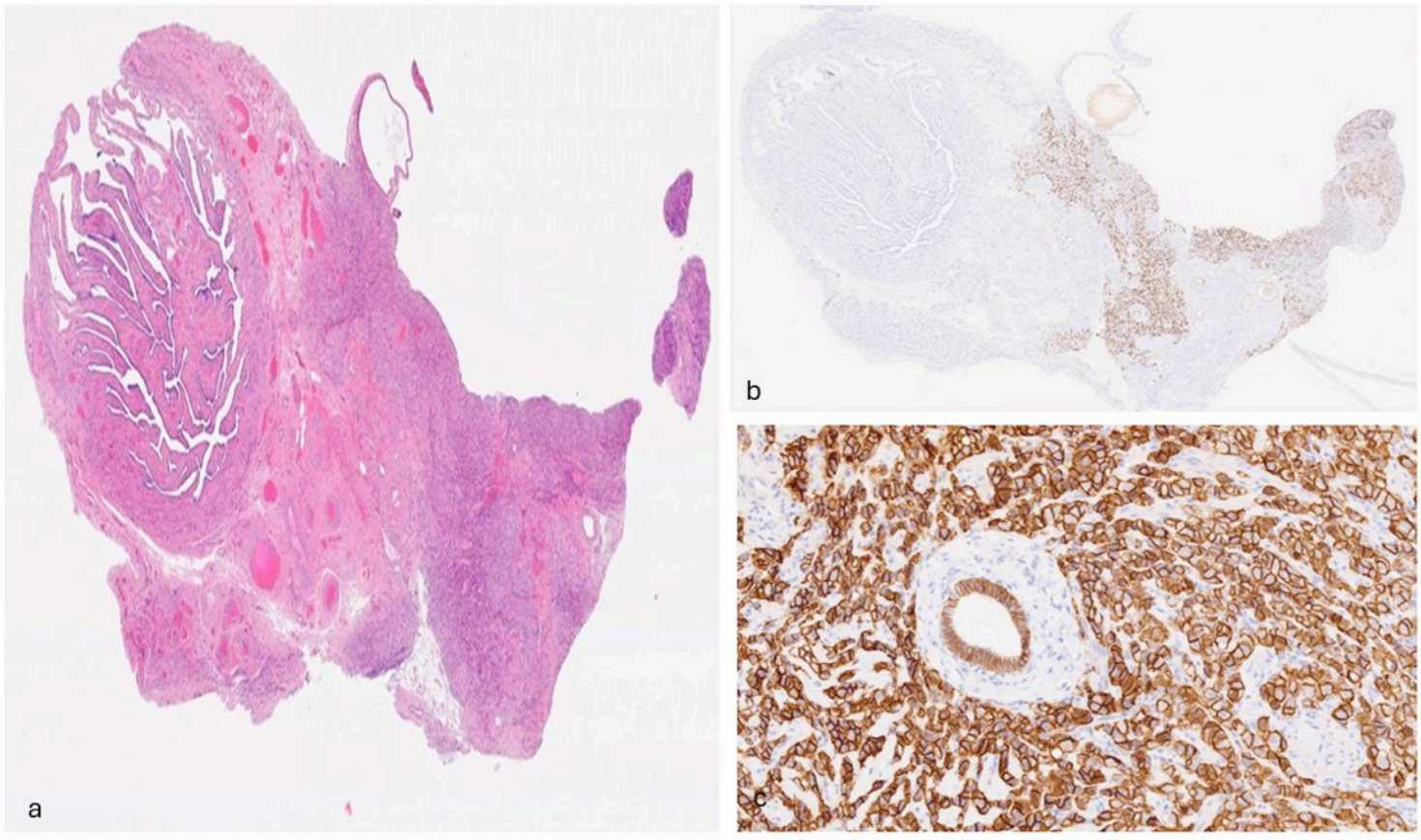


Figure 1

Histopathological and immunohistochemical findings of fallopian tube metastasis. a, Histopathological examination of the fallopian tube showing invasive carcinoma involving the fimbrial portion and extending into the peritubal soft tissue (hematoxylin and eosin staining). b, GATA-3 immunohistochemical staining showing diffuse nuclear expression in the neoplastic cells, supporting mammary origin. c, E-cadherin immunohistochemical staining demonstrating invasive carcinoma of NST surrounding mesonephric duct remnants

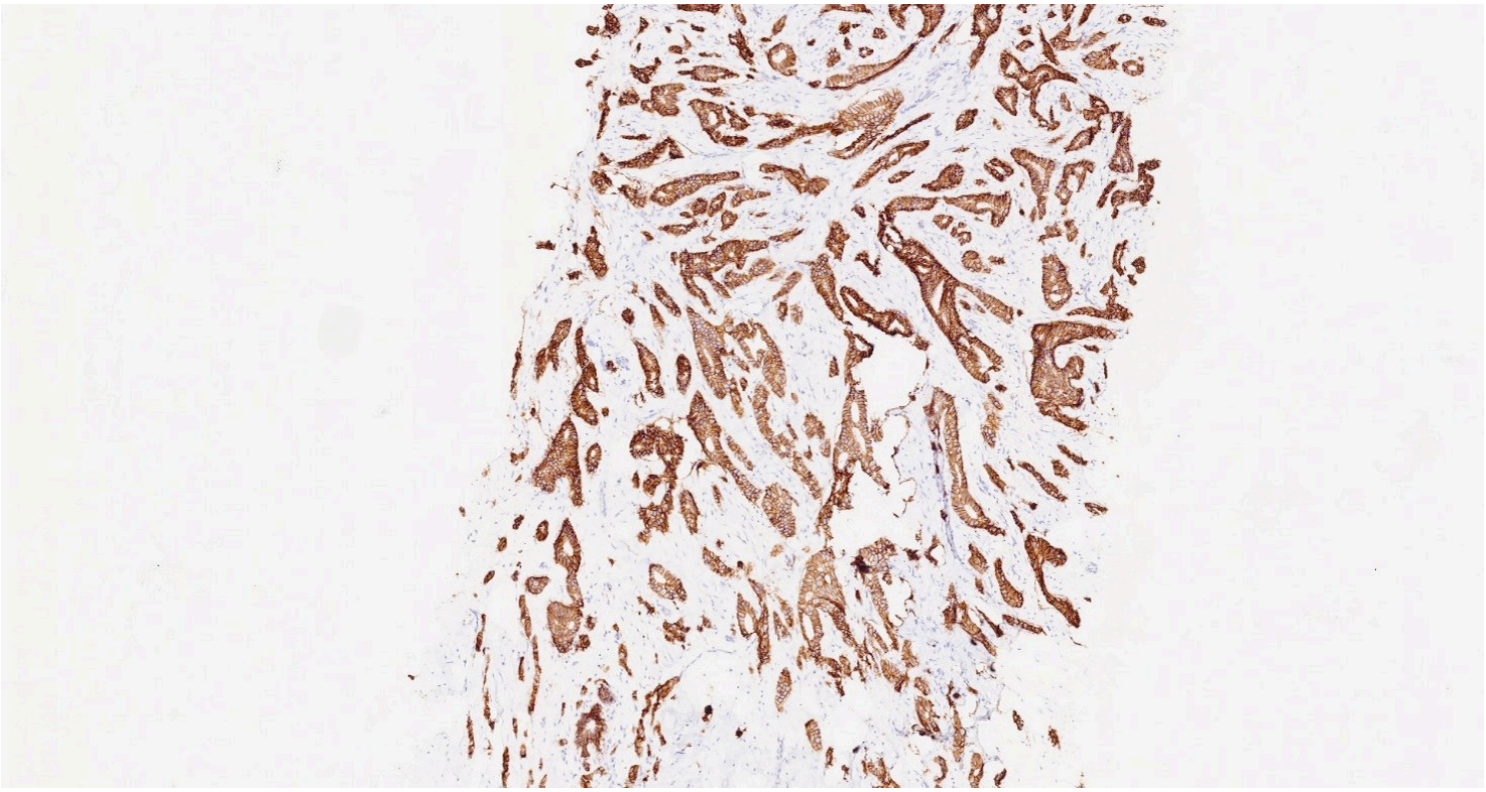


Figure 2

E-Cadherin immunohistochemical staining of the breast lesion

Supplementary Files

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- SupplementaryTable1.docx
- CAREchecklistEnglish2013.docx