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Case Report

Late Mammographically Occult Ipsilateral Recurrence of Ductal Carcinoma in Situ Presenting as Skin-Perforating Ossifying Fat Necrosis: A Case Report

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Abstract

Background: Fat necrosis is a commonly known consequence of breast-conserving therapy and sometimes calcifies over time. Although calcification-related skin ulceration is rare, metaplastic ossification within breast fat necrosis represents an even more uncommon complication.

Case presentation: A 69-year-old woman presented 23 years after breast-conserving surgery and adjuvant radiotherapy for left-sided breast cancer with a hard, spiculate, progressively painful mass at the original treatment side. The lesion had subsequently ulcerated and perforated the overlying skin. Mammography performed four months earlier had been assessed as BI-RADS 2. Symptom-driven local excision was undertaken for a presumed calcified area of fat necrosis based on the clinical and radiological findings. Unexpectedly, histopathological examination revealed a 2.1 cm Ductal Carcinoma In Situ (DCIS) without associated microcalcifications.The excised mass showed extensive dystrophic calcification with metaplastic ossification and focally formed bone marrow.

Conclusions: A progressively enlarging, symptomatic calcifying fat necrosis of the breast should not be dismissed as a purely cosmetic or benign problem. When excision is performed, a complete histopathological evaluation is mandatory. DCIS without associated microcalcifications can be mammographically occult, particularly within a heavily calcified post-surgical bed.

Keywords: Breast-conserving therapy; Ductal carcinoma in situ; Fat necrosis; Late local recurrence; Mammographically occult; Osseous metaplasia; Shared decision making

Background

Fat necrosis is a common sequela of Breast-Conserving Therapy (BCT), resulting from surgical trauma and radiation-induced tissue injury, and may evolve over time into coarse dystrophic calcifications with a typically benign mammographic appearance (BI-RADS 2) [1]. Metaplastic ossification with formation of marrow spaces within breast fat necrosis is extremely rare, and cutaneous perforation of such a lesion has only been reported exceptionally worldwide [2]. Ductal Carinoma In Situ (DCIS) is most commonly detected mammographically through associated microcalcifications, which may result from dystrophic mineralisation of comedo-type necrosis within distended ducts [3,4]. Accordingly, suspicious microcalcifications represent a conspicuous mammographic finding that typically prompts further diagnostic evaluation [5]. However, DCIS without mammographically detectable calcifications does occur, and in

case of histological comedonecrosis approximately 6 % to 8 % may not be accompanied by radiologically visible calcification, leaving the underlying DCIS potentially mammographically occult [6,7]. We describe a case in which both phenomena converged: an ossifying fat necrosis perforating the skin prompted a purely symptom-directed excision, which incidentally uncovered a mammographically occult DCIS 23 years after primary breast cancer treatment.

Case Presentation

In 2003, at the age of 46 years, the patient was diagnosed with hormone receptor-positive invasive breast carcinoma of no special type in the left breast. She underwent breast-conserving surgery with sentinel lymph node biopsy, followed by secondary axillary lymph node dissection. Final pathological examination revealed a 23 mm tumour (pT2) with metastasis in one of 21 axillary lymph nodes (pN1). Staging investigations showed no evidence of distant metastatic disease. The patient subsequently received adjuvant chemotherapy consisting of four cycles of epirubicin and cyclophosphamide, followed by four cycles of docetaxel. This was followed by whole-breast radiotherapy and five years of adjuvant endocrine therapy with tamoxifen. Relevant comorbidities included Parkinson‘s disease, arterial hypertension, obstructive sleep apnoea, non-toxic goitre, depression, and morbid obesity (body mass index 44 kg/m²). At presentation, the patient had an Eastern Cooperative Oncology Group (ECOG) performance status of 1.

Following her initial breast cancer diagnosis, the patient underwent annual mammographic surveillance. Mammography performed in March 2026 was assessed as BI-RADS 2 in a breast with ACR density category b. It demonstrated a coarse calcification consistent with post-treatment fat necrosis, which had progressively increased in size over time but was classified as a benign macrocalcification (Figure 1). In July 2026, the patient presented to the University Breast Centre in Frankfurt with a known, progressively enlarging calcified lesion of the left breast. Clinical examination revealed a firm, sharply protruding mass at the 5 o’clock position, fixed to and perforating the overlying skin, with extension towards the caudal and dorsal aspects (Figure 2). The lesion had become increasingly painful and interfered with the patient‘s daily activities. No other suspicious findings were identified in either breast, and the axillary lymph nodes were clinically unremarkable. Ultrasound demonstrated a markedly echogenic structure with dense posterior acoustic shadowing corresponding to the palpable abnormality.

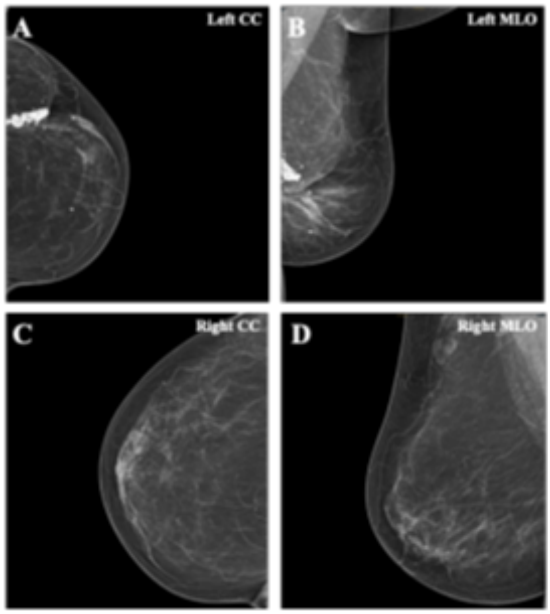


Figure 1: Mammography performed at an external institution in March 2026. Left CC (A) and left MLO (B) views showing coarse calcification in the lower outer quadrant, reported as BI-RADS 2. Right CC (C) and MLO (D) for comparison.

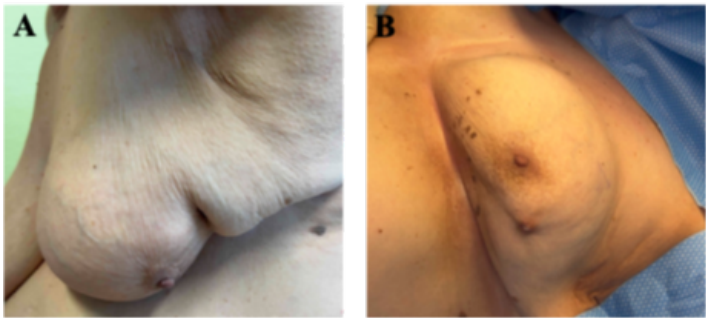


Figure 2: Photograph of the left breast at first presentation (A) as well at first operation (B) showing the perforating lesion at 5 o’clock in the previous operating field.

Local excision was performed with a purely symptom-directed intent, deliberately avoiding more extensive oncoplastic remodelling. A spindle-shaped skin segment overlying the lesion was excised, and dissection was carried along the rod-shaped

calcified mass towards the chest wall (Figure 3). The resulting defect was closed by mobilisation and approximation of the adjacent glandular tissue. The surgical specimen consisted of a rock-hard tissue block, including a 1.9 × 0.3 cm ellipse of skin with attached soft tissue extending to a depth of 6.2 cm. On sectioning, the tissue was extensively calcified and ossified, precluding identification of a discrete lesion. Microscopically, the overlying squamous epithelium was orthokeratotic and free of dysplasia. The subcutis showed extensive circumscribed dystrophic calcification with focal metaplastic ossification and marrow space formation. In the deeper tissue, incidentally included breast parenchyma contained focal intraductal proliferations with moderately enlarged nuclei and comedo-type necrosis, without associated calcification. Histological reconstruction revealed a 21-mm intermediate-grade Ductal Carcinoma In Situ (DCIS) with comedo-type necrosis and no clearly associated microcalcifications. Tumour cells showed strong nuclear positivity for oestrogen and progesterone receptors in 100% of tumour cell nuclei. Resection margins were free of DCIS, however, the minimum margin was multifocally <1 mm and therefore below the recommended 2 mm margin for DCIS. There was no evidence of invasive carcinoma.



Figure 3: Intraoperative photograph of the specimen removed during the initial local excision. The rigid, heavily calcified lesion is shown adjacent to a ruler for size reference.

Following multidisciplinary discussion, management options including re-excision, mastectomy, endocrine therapy, and clinical and imaging surveillance were discussed with the patient. Given the incomplete removal of the symptomatic lesion, focally close but negative margins, the patient‘s age and comorbidity profile, and the strongly hormone receptor-positive biology of the DCIS, a risk–benefit assessment was undertaken jointly with the patient. Radiotherapy was not considered feasible because the affected breast had previously received whole-breast radiation. Due to the patient’s BMI, it was not technically possible to carry out the scan in a closed MRI scanner Given the unexpected diagnosis and the associated psychological distress, the patient ultimately elected to undergo completion mastectomy following detailed counselling regarding the available management options.

Three weeks after the initial operation, a modified radical mastectomy with resection of the pectoralis major fascia was performed. In the densely scarred area between the 4 and 6 o’clock positions, partial resection of the pectoralis major muscle was necessary to achieve complete removal of the residual calcified tissue from the chest wall. Intraoperative specimen radiography demonstrated a central area of increased density with spiculated extensions and extensive associated calcifications, without suspicious soft-tissue or calcified components at the resection margins (Figure 4).

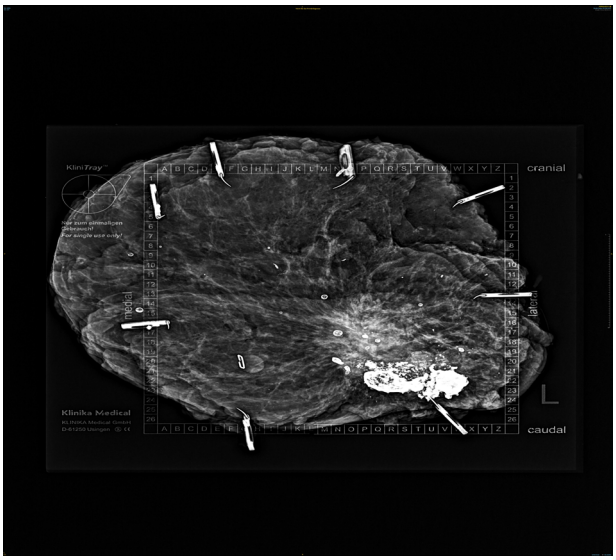


Figure 4: Specimen radiograph of the mastectomy specimen showing a central density with spiculated extensions and extensive associated calcification.

The 790 g mastectomy specimen contained a 3.1 cm heavily calcified and ossified area adjacent to a 2.8 cm haemorrhagic defect corresponding to the previous excision cavity. Histology showed chronic resorptive giant-cell inflammation, confluent dystrophic calcification, fibrosis, and pronounced necrobiotic change consistent with prior treatment. Despite extensive histological sampling, no residual DCIS was identified. Based on the previous histology, the DCIS was considered completely excised with margins >1 cm. The postoperative course was uneventful, with uncomplicated wound healing and no relevant postoperative complications at follow-up. At the multidisciplinary tumour board, adjuvant endocrine therapy was discussed, but not recommended following an individual risk–benefit assessment and

discussion with the patient, alongside tumour-specific follow-up. After counselling, the patient refused further endocrine therapy.

Discussion

Fat necrosis after BCT is common, and coarse dystrophic calcifications are a well-recognized benign mammographic finding. What distinguishes this case is the extent of mineralisation: histology demonstrated not only dystrophic calcification but also metaplastic ossification with marrow formation. This may explain the unusual clinical behavior. Progressive expansion of such an ossified mass against a thinned, previously irradiated skin envelope provides a plausible mechanism for the subsequent transcutaneous perforation [1,2,8,9]. The most instructive aspect of this case is that the DCIS was not obscured by the adjacent macrocalcification but was intrinsically mammographically occult. Mammographic detection of DCIS frequently relies on associated microcalcifications, which may result from mineralisation of comedo-type necrosis. However, this process is facultative rather than obligatory, as comedonecrosis can occur with or without associated microcalcification [3,10]. Given the size and comedo-type necrosis of the lesion, associated calcification might have been expected. Its absence may be related to the strongly oestrogen receptor-positive phenotype, as mammographic calcifications have been reported to be inversely associated with hormone receptor positivity [4,11]. The BI-RADS 2 categorisation four months before diagnosis therefore represented an appropriate interpretation of the available imaging rather than a diagnostic oversight. Detection was further complicated by the heavily scarred, previously irradiated tissue and by marked posterior acoustic shadowing caused by the adjacent ossified lesion on ultrasound.

Magnetic resonance imaging was not performed at any point during this episode because the patient could not fit into the MRI scanner due to her body weight and size. Contrast-enhanced MRI can detect DCIS on the basis of tumour-associated vascular permeability and neoangiogenesis rather than calcification and is therefore not dependent on the mammographic feature that was absent in this case [3,12]. However, its specificity may be limited in a heavily scarred, previously irradiated breast. Whether MRI would have prospectively identified the lesion cannot be determined retrospectively. Nevertheless, this sequence of events raises the question of whether a symptomatic, progressively enlarging post-treatment lesion warrants additional cross-sectional imaging before being considered benign. Consensus guidelines define a 2 mm margin as adequate for DCIS treated with breast-conserving surgery and whole-breast radiotherapy [13]. In this patient, the minimum margin was multifocally below 1 mm. However, re-irradiation was not considered feasible The decision-making process consequently required an individualised assessment of the expected absolute benefit of further surgery against its potential morbidity, taking into account the patient‘s comorbidities and individual recurrence risk rather than applying margin thresholds in isolation [13].

The patient‘s decision diverged from this recommendation and was influenced by the distress of receiving an unexpected diagnosis 23 years after she had considered her breast cancer treatment complete. The mastectomy specimen contained no residual disease, retrospectively supporting the initial clinical assessment. However, the patient‘s decision remained reasonable, as it was made under genuine prospective uncertainty. This case illustrates that a defensible clinical recommendation and an equally defensible patient choice may diverge, and that the eventual surgical outcome is not the appropriate standard against which either should be judged. Several limitations should be acknowledged. As breast MRI could not be realized, its potential ability to prospectively detect the mammographically occult DCIS remains unknown. Finally, the proposed mechanism linking progressive ossification to transcutaneous perforation is necessarily inferential.

Conclusion

A symptomatic, progressively enlarging calcified lesion after breast-conserving therapy should not be regarded as a purely cosmetic problem. Histopathological examination should include any incidentally sampled breast parenchyma, irrespective of a benign preoperative assessment. Comedo-type DCIS may occur without associated microcalcifications and can be mammographically occult, particularly within a previously irradiated and heavily calcified post-surgical bed. In this setting, a BIRADS 2 categorisation of the calcified lesion does not necessarily exclude an adjacent or incidentally sampled malignancy.

Declarations

Ethics approval and consent to participate: Not applicable. Formal ethics approval was not required for this case report according to institutional policies and local regulations.

Consent for publication: Written informed consent was obtained from the patient for publication of this case report and any accompanying images.

Availability of data and materials: Data sharing is not applicable as no datasets were generated or analysed.

Competing interests: The authors declare that they have no competing interest.

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Authors' contributions: AH and MB contributed equally to the conception, clinical and scientific work-up of the case and

jointly drafted the manuscript. FK and MBP contributed to the interpretation and critical discussion of the case and supported manuscript development. CS was responsible for the clinical management and surgical treatment of the patient, provided the clinical data, and supervised the project. All authors critically revised the manuscript, approved the final version, and agreed to be accountable for all aspects of the work.

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