

Metaplastic Breast Carcinoma Masquerading as a Benign-Appearing Complicated Cyst: A Case Report and Literature Review

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Abstract

Metaplastic breast carcinoma (MpBC) is a rare and aggressive breast cancer, and its squamous subtype often forms a cystic, necrotic mass that can mimic a benign cyst. We report a 48-year-old woman with a family history of breast cancer and a long history of benign proliferative breast disease, including atypical lobular hyperplasia, who developed a palpable right breast cyst with internal debris (a complicated cyst), classified as Breast Imaging Reporting and Data System (BI-RADS) category 2 on ultrasound. The cyst was sampled four times over eight months. The first three aspirations (months 1, 3, and 7) were all negative for malignancy, although the cyst enlarged to about 4 cm and once yielded blood-stained fluid. Magnetic resonance imaging (MRI) then showed a complex cystic lesion with focal wall thickening (BI-RADS 4A), and a fourth, ultrasound-guided fine-needle aspiration showed atypical cells. Excision revealed a grade 3 metaplastic carcinoma with squamous differentiation in multiple foci with involved margins. The tumor was estrogen receptor (ER) low positive (2%), progesterone receptor (PR) negative, and human epidermal growth factor receptor 2 (HER2) negative, with a Ki-67 proliferation index of 80%, and the patient was referred for chemotherapy and re-excision. A review of published cases showed that squamous and metaplastic breast carcinomas are often first managed as cysts, abscesses or hematomas, and that needle aspiration frequently misses the diagnosis. A cyst that recurs, enlarges, yields bloody fluid or develops wall thickening should undergo core needle biopsy of its wall or solid component rather than serial aspiration, particularly in women with prior atypia or a family history of breast cancer.

Categories: Obstetrics/Gynecology, General Surgery

Keywords: case report, complex cystic breast mass, diagnostic delay, fine-needle aspiration, metaplastic carcinoma, squamous cell carcinoma of the breast

Introduction

Metaplastic breast carcinoma (MpBC) is a rare and heterogeneous group of invasive carcinomas in which the neoplastic epithelium differentiates, partly or entirely, into squamous or mesenchymal elements such as spindle cells, cartilage, or bone [1]. The fifth edition of the World Health Organization (WHO) Classification of Breast Tumours, published in 2019, recognizes six subtypes: low-grade adenosquamous carcinoma, fibromatosis-like metaplastic carcinoma, spindle cell carcinoma, squamous cell carcinoma, metaplastic carcinoma with heterologous mesenchymal differentiation, and mixed metaplastic carcinoma [1]. Apart from the two low-grade forms, these tumors are high-grade and behave aggressively [1,2].

MpBC accounts for less than 1% of invasive breast cancers in most series (reported range 0.3% to 1.5%) [1-3]. In an analysis of 892 cases from the National Cancer Data Base, MpBC presented with larger tumors than invasive ductal carcinoma (29.5% vs 65.2% were T1), was more often poorly differentiated (67.8% vs 38.8%), and was rarely estrogen receptor (ER) positive (11.3% vs 74.1%), yet was less often node-positive [3]. Most tumors are triple-negative, meaning that they lack ER, progesterone receptor (PR), and human epidermal growth factor receptor 2 (HER2) expression. They also show basal-like features, that is, a gene expression profile resembling the basal (myoepithelial) cells of the breast ducts. These include epithelial-to-mesenchymal transition (EMT), a process in which tumor cells lose epithelial adhesion and acquire migratory, mesenchymal properties, and alterations in the phosphatidylinositol 3-kinase (PI3K)/protein kinase B (AKT) signaling pathway and the epidermal growth factor receptor (EGFR) [4]. Despite sharing this phenotype, MpBC has worse survival than other triple-negative cancers, spreads mainly through the bloodstream to the lungs and bones, and responds poorly to standard chemotherapy [2,4].

Early diagnosis is made difficult by the deceptively benign imaging appearance of many metaplastic tumors. MpBC typically presents as a rapidly growing, palpable mass, and ultrasound often shows complex

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echogenicity with solid and cystic components caused by necrosis and cystic degeneration [5]. Compared with T-stage-matched ductal carcinomas, metaplastic tumors were less often irregular on mammography (16% vs 74%) and less often showed posterior acoustic shadowing on ultrasound (9% vs 49%), features radiologists rely on to recognize malignancy [6]. Round or oval shape, circumscribed margins, and posterior acoustic enhancement therefore overlap with fibroadenomas and complicated cysts [2,7]. On magnetic resonance imaging (MRI), high T2 signal from the necrotic component is a characteristic finding, although it must be distinguished from mucinous carcinoma and other necrotic tumors [8]. The squamous subtype is the most likely to be cystic because it forms a cavity lined by atypical squamous cells and filled with necrotic and keratinous debris [2].

This appearance places squamous MpBC within the broader problem of the cystic breast lesion. In the Breast Imaging Reporting and Data System (BI-RADS) lexicon of the American College of Radiology (ACR), a simple cyst is anechoic and circumscribed, a complicated cyst contains homogeneous low-level internal echoes or debris, and a complex cystic and solid mass contains both anechoic and solid components, such as a thick wall, thick septations, or an intracystic mass [9]. Simple and complicated cysts are almost always benign (BI-RADS 2 or 3) and can be aspirated or followed. In contrast, complex cystic and solid masses carry a substantial risk of malignancy and warrant biopsy (BI-RADS 4): in a sonographic-pathologic series of 150 cystic lesions, none of 38 complicated cysts was malignant, whereas 18 of 79 complex cystic lesions (23%) proved malignant [9]. A tumor that has become cystic through necrosis can therefore be misclassified as a benign cyst, and aspiration of its fluid may yield only debris and degenerated cells.

We report a squamous MpBC that presented as an enlarging, apparently benign complicated cyst in a 48-year-old woman with a family history of breast cancer and a long history of atypical benign breast disease. Three consecutive cyst-fluid aspirations were negative, a fourth aspiration showed atypical cells, and the diagnosis was made at excision about nine months after the first ultrasound. The aim of this report is to describe how serial aspiration of an enlarging cyst delayed the diagnosis of a necrotic carcinoma and to review published cases of squamous or metaplastic breast carcinoma that were first managed as benign disease, in order to identify the clinical, imaging, and cytological features that should prompt core needle biopsy. The report follows the CARE guidelines [10].

Case Presentation

Background and risk profile

The patient is a 48-year-old woman with a family history of breast cancer in a paternal aunt, diagnosed in her 40s. She had no personal history of cancer, and her only other medical condition was thyroid disease diagnosed two years earlier. Her breasts were heterogeneously dense (ACR breast density category C) with extensive fibrocystic change, and she had been followed at our breast unit for 17 years for benign breast disease.

At age 31, during pregnancy, fine-needle aspiration (FNA) of a left breast nodule showed ductal epithelial cells with mild to moderate nuclear atypia, negative for malignancy and favoring a fibroadenoma. Excision of the 2.5 cm nodule (frozen section negative) showed a lactating adenoma, partly fibroadenoma, with secretory gestational hyperplasia, pregnancy-related nuclear atypia and mitotic activity, and focal infarction.

At age 34, ultrasound showed a postoperative hypoechoic area at left 3 to 4 o'clock (24 mm), a similar area at left 12 o'clock (14 mm), and several circumscribed nodules in both breasts, up to 12.5 mm. Three lesions were excised (left 3 o'clock, left 12 o'clock, and right breast). Histology showed fibroadenomatoid hyperplasia and, in the left breast, a focus of atypical lobular hyperplasia with pagetoid extension (LIN2; E-cadherin negative, CK34βE12 positive). Both breasts showed columnar cell lesions with focal atypia, sclerosing and apocrine adenosis, duct ectasia, and pseudoangiomatous stromal hyperplasia. Left nipple discharge cytology was negative.

At age 36, ultrasound showed an 8.5 mm fibroadenoma at left 3 o'clock and a 13.5 mm septated cyst at left 2 o'clock, with no lesion in the right breast.

At age 37, a left lumpectomy showed a 1 cm fibroadenoma with fibrocystic change, sclerosing adenosis, apocrine metaplasia, and columnar cell metaplasia with hyperplasia and atypia (DIN1a, flat epithelial atypia).

Between ages 38 and 44, ultrasound at age 38 showed postsurgical change at the right 12 o'clock position and small cysts. MRI at ages 38 and 40 showed fibrocystic change without suspicious enhancement (BI-RADS 3). Mammography and ultrasound over the following four years were stable.

Surveillance before presentation (months -26 to -8)

At month -26 (age 45), mammography showed a new 18 mm partly obscured nodular density in the right breast without suspicious calcifications. Ultrasound correlated it with an 18.6 × 10.4 mm lobulated, deep

lesion at 7 to 8 o'clock, interpreted as a dense cyst or fibroadenoma (BI-RADS 3). FNA showed uniform glandular cells, some with enlarged nuclei, in large sheets with a few myoepithelial cells, "most consistent with fibroadenoma, partly atypical," and biopsy was recommended. MRI in the same month showed a 15 × 13 mm lobulated mass in the lower right breast at 6 o'clock, about 7 cm from the nipple, with high T2 signal, a type I enhancement curve, and an apparent diffusion index above 2, considered a probable fibroadenoma (BI-RADS 3). The lesion was managed as a fibroadenoma with ultrasound follow-up; no core biopsy is documented. It remained unchanged in month -20 (17 × 10 mm, BI-RADS 3) and month -15 (18 × 10.5 mm, BI-RADS 2), when a new 6 mm superficial nodule was seen at right 11 o'clock.

At month -9 (age 47), MRI again showed the presumed fibroadenoma at right 6 o'clock (13 × 9 mm, type I curve) and a 10 mm spindle-shaped type I lesion at nipple level. It also described a new area in the right upper outer quadrant at 10 o'clock, near the anterior chest wall, with convergence of glandular tissue, increased enhancement, and a type II (plateau) curve. This was interpreted as focal adenosis, and repeat imaging after six months was recommended (BI-RADS 3 at clinical review). Screening mammography at month -8 showed smooth nodular densities in the upper half of the right breast, probably cystic (density category C, BI-RADS 3). The recommended six-month MRI was not performed; the next imaging was the ultrasound at presentation (month 0).

Index lesion (months 0 to 8)

At month 0 (age 48), the patient presented with a palpable lump in the right breast. Ultrasound showed a cyst with proteinaceous debris (a complicated cyst) at right 2 o'clock corresponding to the palpable finding, reported as "20 cm" (a typographical error; 20 mm was recorded at clinical review). Other proteinaceous cysts measured up to 13 × 7.5 mm, and the axillary nodes were normal (BI-RADS 2).

The cyst was then sampled four times over eight months: three cyst aspirations (months 1, 3, and 7), all negative for malignancy, followed by a fourth, ultrasound-guided FNA at month 8, which showed atypical cells.

At month 1 (aspiration 1), a cyst with slightly irregular margins was aspirated. Cytology showed sparse glandular cells without significant atypia, foamy histiocytes, lymphocytes, neutrophils, and proteinaceous material. No malignancy was found, and follow-up was advised.

At month 3 (aspiration 2), the cyst had refilled to 4 cm. Ultrasound-guided aspiration yielded blood-stained fluid with abundant erythrocytes, cellular debris, and inflammatory cells on a proteinaceous background. The findings were reported as compatible with cyst content, without malignancy, and ultrasound follow-up was planned in three months.

At month 7 (aspiration 3), ultrasound at clinical review showed a large cyst with a thick wall. Aspiration of 4 mL from this mixed-composition cyst showed a few glandular cells with mild atypia, sparse epithelial clusters probably from the cyst wall, foamy histiocytes, and lymphocytes, interpreted as cystic change without definite malignancy. Right nipple discharge cytology on the same day showed a few glandular cells with mild atypia and was negative. Breast MRI was requested.

Between months 7 and 8 (MRI and FNA 4), MRI at month 7 showed a complex cystic lesion measuring 4.2 × 4.2 × 3.4 cm in the right upper outer quadrant at 10 to 11 o'clock with focal wall thickening, classified as BI-RADS 4A (Figure 1); a separate small lesion at 11 o'clock was considered a fibroadenoma. Ultrasound-guided FNA at month 8 then showed low cellularity with foamy histiocytes, erythrocytes, inflammatory debris, and a few isolated, degenerated atypical cells of probable epithelial origin with hyperchromatic nuclei and irregular nuclear membranes. An intracystic neoplasm could not be excluded, and surgical excision was recommended.

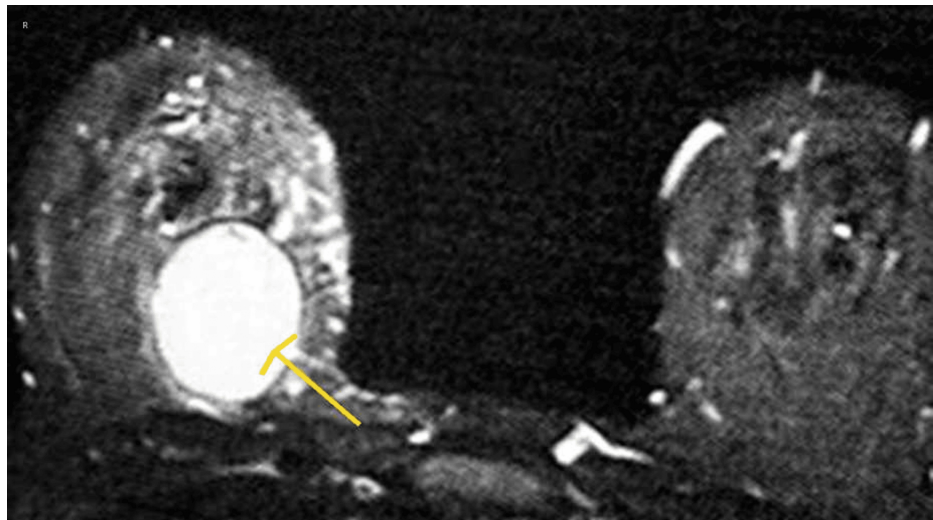


FIGURE 1: Breast magnetic resonance imaging at month 7

Axial fat-suppressed T2-weighted (TIRM) image showing a large, round, high-signal cystic lesion in the right breast (arrow). The right breast is displayed on the left side of the image.

Surgery and histopathology

At month 9, the patient underwent excision of the right breast cystic lesion (upper outer quadrant, 10 to 11 o'clock) with level I oncoplastic reconstruction; no frozen section was performed. The specimen consisted of multiple fragments, the largest measuring $7.5 \times 3.8 \times 1$ cm and the smallest $2.1 \times 2 \times 1.5$ cm, with scattered firm foci up to 3.2 cm.

Histology showed multiple scattered foci, up to 3.2 cm, of a high-grade carcinoma with the morphological and immunophenotypic features of metaplastic carcinoma with squamous differentiation and keratinization, grade 3. The foci lay mainly at the periphery of the fragments, consistent with cystic degeneration of the tumor, and extended to the surgical margins. There was ulcerative inflammation and tumor necrosis, and no in situ component. Lymphovascular invasion could not be confirmed because of artifacts, and fragmentation prevented measurement of the maximum tumor diameter.

Immunohistochemistry for pan-cytokeratin, CK14, p63, E-cadherin, CK5/6, CK7, vimentin, calponin, and GATA-3 supported the diagnosis. On prognostic immunohistochemistry, the tumor was estrogen receptor (ER) low positive (2% of tumor cells, weak 1+ staining), progesterone receptor (PR) negative, and human epidermal growth factor receptor 2 (HER2) negative (immunohistochemistry score 0), with a Ki-67 proliferation index of 80%.

The surrounding parenchyma showed focal atypical ductal hyperplasia, flat epithelial atypia, fat necrosis with reactive granulomas from the previous procedures, duct ectasia, fibrocystic change, apocrine metaplasia, and degenerated fibroadenomatoid nodules. The tumor extended to the surgical margins, and because the specimen was fragmented, individual margins could not be assessed. No sentinel lymph node biopsy or other axillary surgery was performed. The pathological stage was therefore pTX (tumor size not measurable in the fragmented specimen) pNX (axilla not staged).

Further management

At multidisciplinary review at month 10, the patient was referred to medical oncology for chemotherapy, with re-operation to be considered because of margin involvement. Staging investigations, genetic testing and treatment outcomes were not yet available at the time of writing.

Timeline

The clinical course is summarized in Table 1. The right breast index lesion was sampled four times in eight months; only the fourth sample, taken after MRI, raised suspicion.

Age or time point	Examination	Key finding	Assessment
Age 31	FNA, left nodule (pregnancy)	Ductal cells, mild to moderate atypia	Negative, favors fibroadenoma
Age 31	Excision, left	Lactating adenoma, gestational hyperplasia	Benign
Age 34	US	Post-operative areas left; bilateral nodules up to 12.5 mm	Follow-up
Age 34	Bilateral excisions	ALH (LIN2) left; columnar cell lesions with focal atypia	High-risk benign
Age 34	Nipple discharge cytology, left	Sparse foamy histiocytes	Negative
Age 36	US	Fibroadenoma 8.5 mm and septated cyst 13.5 mm, left	Benign
Age 37	Lumpectomy, left	Fibroadenoma, DIN1a (flat epithelial atypia)	High-risk benign
Age 38	US and MRI	Fibrocystic change, cysts up to 10 mm	BI-RADS 3
Age 40	MRI	Fibrocystic change	BI-RADS 3
Ages 41 to 44	Mammography and US	Stable, density category c to d	Benign
Month -26	Mammography and US	New 18.6 mm lesion, right 7 to 8 o'clock	BI-RADS 3
Month -26	FNA, right 8 o'clock	Fibroadenoma, partly atypical	Biopsy advised
Month -26	MRI	15 mm mass, right 6 o'clock, type I curve	BI-RADS 3
Months -20 and -15	US	Lesion stable; new 6 mm nodule, right 11 o'clock	BI-RADS 3, then 2
Month -9	MRI	Right 10 o'clock area near chest wall, type II curve	BI-RADS 3; 6-month MRI advised, not done
Month -8	Mammography	Nodular densities, right upper half, probably cystic	BI-RADS 3
Month 0	US	Palpable cyst with debris, 20 mm, right 2 o'clock	BI-RADS 2
Month 1	Cyst aspiration 1	Sparse cells, no significant atypia	Negative
Month 3	Cyst aspiration 2	4 cm cyst, blood-stained fluid	Negative
Month 7	Clinical US, aspiration 3, nipple discharge	Thick-walled cyst; mild atypia	Negative; MRI requested
Month 7	MRI	Complex cystic lesion 4.2 × 4.2 × 3.4 cm, focal wall thickening, right 10 to 11 o'clock	BI-RADS 4A
Month 8	FNA 4, right 12 o'clock	Atypical degenerated epithelial cells	Intracystic neoplasm not excluded
Month 9	Excision with level I oncoplastic reconstruction	Metaplastic carcinoma, squamous, grade 3, foci up to 3.2 cm, margins involved; ER 2%, PR negative, HER2 0, Ki-67 80%	pTX pNX
Month 10	Multidisciplinary review	Referral for chemotherapy; re-operation to be considered	Pending

TABLE 1: Timeline of examinations relative to presentation with the palpable lump (month 0)

Ages are the patient's age at the time; months are relative to presentation with the palpable lump (month 0).

ALH, atypical lobular hyperplasia; BI-RADS, Breast Imaging Reporting and Data System; DIN, ductal intraepithelial neoplasia; ER, estrogen receptor; FNA, fine-needle aspiration; HER2, human epidermal growth factor receptor 2; LIN, lobular intraepithelial neoplasia; MRI, magnetic resonance imaging; PR, progesterone receptor; US, ultrasound.

Discussion

This case shows how a squamous MpBC can pass as a benign cyst through repeated imaging and three negative aspirations (months 1, 3, and 7). Malignancy was first suspected when MRI showed a complex cystic lesion with wall thickening (BI-RADS 4A), and a fourth sample, an ultrasound-guided FNA at month 8, found atypical cells. The diagnosis was confirmed at excision about nine months after the first ultrasound.

Review of the literature

The published evidence consistently shows that squamous MpBC is often cystic, imitates benign disease on imaging, and is underdiagnosed by aspiration cytology. Most data come from retrospective series and case reports, because the tumor is rare.

Definition and pathology

MpBC accounts for less than 1% of breast cancers in most series (reported range 0.3% to 1.5%), and the 2019 WHO classification includes low-grade adenosquamous, fibromatosis-like, spindle cell, squamous, heterologous mesenchymal, and mixed subtypes [1,11]. Most tumors are grade 3 and triple-negative, with basal-like molecular features such as epithelial-to-mesenchymal transition, PI3K pathway alterations, and EGFR amplification [4,12].

Squamous cell carcinoma of the breast forms a central cavity lined by atypical squamous cells, surrounded by infiltrating tumor and reactive stroma [2]. In the MD Anderson series of 33 patients, these tumors were usually hormone receptor-negative and HER2-negative, often overexpressed EGFR, and had a 5-year relapse-free survival of only 26% [13]. In a series of 21 primary squamous carcinomas, at least focal keratinization was associated with better overall survival, whereas a spindle cell component above 10% predicted locoregional recurrence [14].

Imaging

Compared with T-stage-matched ductal carcinomas, MpBC was less often irregular in shape and less often showed spiculated margins, calcifications, or posterior acoustic shadowing [6]. On ultrasound, complex echogenicity with solid and cystic components reflects necrosis and cystic degeneration [5]. In a series of nine metaplastic squamous carcinomas, eight were mixed cystic and solid masses, typically with posterior enhancement and high vascularity on Doppler [15].

On MRI, high T2 signal from the necrotic component is a characteristic feature, and rim enhancement with a nonenhancing center is the most common pattern [2,8]. In the largest imaging series (71 cases), 85% were palpable, and 94% of tumors imaged by MRI showed a solid mass with central necrosis [16]. Cystic degeneration with an enhancing wall has even been proposed as a marker of squamous differentiation during neoadjuvant chemotherapy [17].

Cyst aspiration and cytology

In the series of Berg et al., 18 of 79 cystic lesions with a thick wall, thick septations, an intracystic mass, or a solid component were malignant [9]. Simple and complicated cysts, by contrast, were benign. In 6,782 cyst aspirates, routine cytology detected almost no unsuspected disease, and the authors advised cytology mainly for blood-stained fluid [18]. A later series of impalpable complicated cysts reached the same conclusion [19].

These rules assume the lesion is a true cyst. In squamous carcinoma, cyst formation from central necrosis occurs in about 60% to 80% of cases, and aspiration cytology is less accurate than in ordinary breast cancer [20]. Takahashi et al. first emptied the cyst by aspiration and then performed core biopsy of the residual solid tumor, which allowed a preoperative diagnosis [20]. In a recent report, an MpBC presenting as a cystic and solid mass was misdiagnosed as plasma cell mastitis after aspiration, and the diagnosis was made only after MRI and vacuum-assisted biopsy [21]. Even core biopsy can undercall the lesion, as in a case first reported as high-grade ductal carcinoma in situ [22].

Prognosis and treatment

In a multicenter series of 405 patients, lymph node stage, lymphovascular invasion, and histological subtype predicted outcome, whereas tumor size and grade did not [11]. Squamous and matrix-producing tumors fared better than spindle cell tumors [11]. Nodal involvement is relatively uncommon (15.5% in one series), and spread is mainly hematogenous [2,16].

Response to neoadjuvant chemotherapy is poor. The pathological complete response rate was 11% in one series, with 28% of patients progressing on treatment [23], and only 2% in another series of 44 patients [24]. Both groups suggested that operable MpBC should proceed directly to surgery [23,24].

Hereditary predisposition

In an Italian cohort, 15 of 23 tested patients with MpBC carried a germline pathogenic variant, 13 of them in BRCA1 [25]. In a larger United States cohort, 16.8% of 143 tested patients carried a pathogenic variant, most often in BRCA1 [26]. Both studies support germline testing for all patients with MpBC [25,26]. Key studies are summarized in Table 2.

Study	Design and size	Key finding relevant to this case
Berg et al. 2003 [9]	Sonographic-pathologic series, 150 cystic lesions	18 of 79 complex cystic lesions malignant; biopsy advised
Ciatto et al. 1987 [18]	6,782 cyst aspirates	Routine cytology low yield; use for blood-stained fluid
Velasco et al. 2005 [8]	MRI series of MpBC	High T2 signal reflects tumor necrosis
Hennessy et al. 2005 [13]	33 squamous carcinomas plus SEER data	Triple-negative, EGFR-positive; 5-year relapse-free survival 26%
Yang et al. 2007 [6]	43 MpBC vs 43 matched ductal carcinomas	MpBC looks more benign on mammography and ultrasound
Nayak et al. 2013 [14]	21 squamous carcinomas	Keratinization linked to better overall survival
Rakha et al. 2015 [11]	405 MpBC, multicenter	Nodes, lymphovascular invasion and subtype drive outcome
Langlands et al. 2016 [16]	71 MpBC, imaging review	85% palpable; central necrosis on MRI; 15.5% node-positive
Takahashi et al. 2017 [20]	Case report	Aspiration then core biopsy of solid part gave the diagnosis
Al-Hilli et al. 2019 [23]	18 MpBC treated with neoadjuvant chemotherapy	Complete response 11%; 28% progressed
Wong et al. 2021 [24]	44 MpBC treated with neoadjuvant chemotherapy	Complete response 2%
Ye et al. 2021 [15]	9 metaplastic squamous carcinomas	8 of 9 mixed cystic and solid on ultrasound
Corso et al. 2023 [25]	23 MpBC among 5,226 tested patients	13 of 23 carried a BRCA1 variant
Demarest et al. 2025 [26]	143 MpBC with germline testing	16.8% carried a pathogenic variant, mostly BRCA1
Chu et al. 2026 [21]	Case report	MpBC misread as mastitis after aspiration

TABLE 2: Summary of key studies

Published cases first managed as benign disease

To place the present case in context, we searched PubMed in October 2026 for case reports published from January 2000 to September 2026, using the query breast[Title/Abstract] AND ("squamous cell carcinoma" OR metaplastic OR "epidermoid carcinoma")[Title/Abstract] AND (cyst OR cystic OR intracystic OR abscess OR haematoma OR hematoma)[Title/Abstract] AND "Case Reports"[Publication Type]. The search returned 98 records and was supplemented by a broader search of metaplastic carcinoma case reports. Titles and abstracts were screened, and full texts were reviewed when available in PubMed Central. We included female patients with primary squamous or metaplastic breast carcinoma that was initially diagnosed or managed as a benign condition (cyst, abscess, or hematoma), or in whom preoperative sampling was falsely benign or nondiagnostic. We excluded metastatic squamous carcinoma, carcinoma arising in epidermal inclusion cysts, male patients, low-grade adenosquamous carcinoma, and reports without individual case data. Sixteen reports describing 17 patients were included. They are summarized in Table 3, with the present case in the last row.

Study	Age (y)	Presentation and initial diagnosis	Imaging	Sampling before diagnosis	Final histology; receptors	Treatment; outcome
Tan et al.		Acute breast				

2002 [27] (2 patients)	48; 70	abscess; infection presumed	NR	NR	Squamous cell carcinoma; NR	NR; NR
Grunwald et al. 2004 [28]	45	7 cm palpable mass classified as a cyst on US	US: 4.4 cm cyst with 3.1 cm irregular solid mural mass	Multiple aspiration cytologies negative; core biopsy: invasive carcinoma	Keratinizing intracystic SCC, G2-3, pT2 pN0 (0/15); NR	BCS + ALND, cisplatin/paclitaxel × 6, RT; NR
Matthai and Kini 2004 [29]	68	Cystic breast lesion	NR	Initial FNA missed the diagnosis because of cystic change	Sarcomatoid (metaplastic) carcinoma with cystic change; NR	NR; NR
Gupta et al. 2006 [30]	NR	Breast pain; abscess not responding to antibiotics	NR	Incision and drainage: SCC	Pure SCC; NR	Mastectomy, RT; NED at 3 years
Mokhtar 2009 [31]	69	Breast abscess	NR	Incision and drainage: SCC on cytology and histology	Pure SCC; NR	Mastectomy; local recurrence at 4 months
Damin et al. 2011 [32]	39	Painful breast abscess with sepsis	MG: 3.3 cm irregular mass, BI-RADS 5; US: 3.5 cm irregular mass with fluid	US core biopsy: atypical ductal hyperplasia; debridement and capsule biopsy: carcinoma	Poorly differentiated SCC; ER-, PR-, HER2-	MRM (0/13 nodes), chest wall RT; NED at 2 years
Salemis 2011 [33]	61	Breast abscess	NR	NR	Pure SCC; NR	NR; NR
Hippargi et al. 2014 [34]	55	Cystic breast lump	NR	FNAC: organised haematoma; frozen section: malignant cystic tumor	Biphasic metaplastic carcinoma (carcinosarcoma); NR	Mastectomy; NR
Punzo et al. 2017 [35]	75	5 cm lump; inflammatory cyst, monitored	MG: 3 cm oval opacity with microcalcifications; US: solid-cystic lesion	Cytology C2 (inflammatory cyst); core biopsy B4 after growth at 1 year	SCC; ER-, PR-, HER2 2+ (FISH-), Ki-67 >40%	Excision, then mastectomy (N0); NR
Chahdi and Abdellah 2018 [36]	44	Breast mass diagnosed as a cyst with abscess	MG + US: 5.4 × 5 cm cyst with abscess	Surgical biopsy: SCC	Squamous MpBC; ER-, PR-, HER2-, Ki-67 85%	Mastectomy + ALND, CT, RT; NED at 9 months
Darlington and Anitha 2019 [37]	45	Recurrent abscess drained 3 times in 3 months	NR	Biopsy at referral (8 cm ulcerated mass): SCC	Poorly differentiated SCC; ER-, PR-, HER2-	Cisplatin NAC (poor response), MRM (T4N2, margin positive), RT, 5-FU; died within 6 months
Lane et al. 2020 [38]	66	Presumed cyst	NR	Resection of presumed cyst: MpBC	MpBC; NR	Paclitaxel/carboplatin, nivolumab (synchronous lung adenocarcinoma); breast NED at 24 months
Tomasicchio et al. 2021 [39]	39	3 cm inflamed cyst	MG: inflamed cystic lesion	Cytology compatible with cyst content; segmentectomy: carcinoma with squamous keratinizing features	Metaplastic cystic SCC; ER-, PR-, HER2-, Ki-67 45%	Quadrantectomy + lymphadenectomy, RT delayed; local recurrence at about 4 months, mastectomy, nodal metastases, nab-paclitaxel; no progression at report
Png et al. 2024 [40]	85	Painless lump on anticoagulation; managed as haematoma	MG: dense mass; US: 4.7 cm irregular cystic lesion, recurring at 5.4 cm with septations and a mural nodule	Aspiration: haemorrhagic fluid; vacuum-assisted biopsy of the wall: carcinoma	Metaplastic carcinoma (spindle and focal squamous); NR	Mastectomy + axillary clearance; NR
Loh et al.	57	Breast abscess	NR	Incision and drainage; biopsy: squamous hyperplasia with	Pure squamous MpBC in a cystic papillary lesion;	Wide excision; early local recurrence,

2026 [41]				koilocytic atypia (condyloma suspected)	ER-, PR-, HER2-	mastectomy + ALND, RT, CT; NR
Tianqing et al. 2026 [42]	41	Lump treated as abscess (antibiotics, incision and drainage)	At referral: 12 × 8 cm mass; US BI-RADS 4b; MRI BI-RADS 6	Drainage tissue suggestive of SCC; core biopsy: invasive SCC	Squamous MpBC, cT3N0; ER low (about 10%), PR-, HER2 0, Ki-67 90%	NAC (progression), MRM, RT, capecitabine; no recurrence (duration NR)
Present case	48	Palpable lump; benign cyst (BI-RADS 2), recurring after aspiration	US: cyst with debris enlarging to 4 cm; MRI: 4.2 cm complex cyst with wall thickening, BI-RADS 4A	Three aspirations negative (one blood-stained); fourth FNA: atypical cells	Squamous MpBC, grade 3, foci up to 3.2 cm, margins involved; ER low positive (2%), PR-, HER2 0, Ki-67 80%	Excision with oncoplastic reconstruction; chemotherapy and re-operation planned

TABLE 3: Reports of current literature describing similar case

Data were taken from the abstract when the full text was not available.

ALND, axillary lymph node dissection; BCS, breast-conserving surgery; CT, chemotherapy; ER, estrogen receptor; FNA(C), fine-needle aspiration (cytology); MG, mammography; MpBC, metaplastic breast carcinoma; MRM, modified radical mastectomy; NAC, neoadjuvant chemotherapy; NED, no evidence of disease; NR, not reported; PR, progesterone receptor; RT, radiotherapy; SCC, squamous cell carcinoma; US, ultrasound.

Across these 17 patients (median age 56 years, range 39 to 85, where reported), the initial working diagnosis was an abscess in ten [27,30-33,36,37,41,42], a cyst in five [28,29,35,38,39], and a hematoma in two [34,40]. In eight patients, at least one aspiration, cytology, or biopsy before the diagnosis was falsely reassuring or nondiagnostic: cyst-fluid cytology read as inflammatory cyst content [35,39], repeated negative aspirations [28], an FNA that missed the tumor because of cystic change [29], cytology read as an organized hematoma [34], aspiration yielding only hemorrhagic fluid [40], a core biopsy showing atypical ductal hyperplasia [32], and a biopsy suggesting condyloma [41]. The diagnosis was finally made by core or vacuum-assisted biopsy of the solid component in three patients [28,35,40] and by surgical drainage, debridement, or excision in most of the others. All seven tumors with reported receptor status [32,35-37,39,41,42] were progesterone receptor-negative and HER2-negative; estrogen receptor was negative in six and low (about 10%) in one [42], as in the present case. Documented delays ranged from weeks to a year [35,37,40]. Early local recurrence within months was reported in three patients [31,39,41], two of whom had first undergone limited excision of a presumed benign lesion [39,41], and one woman whose abscess had been drained three times died of metastatic disease within 6 months of the diagnosis [37]. By contrast, when the cyst fluid contained malignant cells or an intracystic solid component was recognized and sampled, the diagnosis was made before surgery [20,43-45]. Repeatedly negative aspirations over several months, as in our patient, were described in only one of these reports, an intracystic squamous carcinoma that was finally diagnosed by core biopsy [28].

Why the lesion looked benign

Squamous MpBC typically grows as a cavity lined by atypical squamous cells, with central necrosis and keratin debris [2]. On ultrasound, it often appears round or oval, with posterior acoustic enhancement and a complex cystic structure, features that overlap with benign cysts [5,7,15]. In our patient, the peripheral distribution of the tumor foci and the pathologist's comment on cystic degeneration fit this pattern.

The initial BI-RADS 2 assessment is understandable in a woman with many known cysts. However, the lesion soon showed several warning features: it was palpable, its margins were described as slightly irregular, it grew from about 20 mm to 4 cm within three months, it recurred after aspiration, and it yielded blood-stained fluid. Berg et al. [9] found that 18 of 79 cystic lesions with a thick wall, intracystic mass, or solid component were malignant and recommended biopsy for all of them.

Why cytology was negative

Aspiration of a necrotic carcinoma mostly samples the liquefied center. The viable tumor lies in the wall, so the fluid contains debris, blood, histiocytes, and a few degenerated cells, as in our first three samples. Çelik et al. [2] note that hemorrhage and necrosis raise the risk of inadequate sampling and suggest using Doppler ultrasound to target vascularized, viable tissue. A core needle biopsy of the wall or solid component would likely have given the diagnosis months earlier. Blood-stained cyst fluid, present at the second aspiration, is itself a recognized marker of intracystic pathology [18]. Emptying the cyst and then taking a core biopsy of the residual solid tissue has proved useful in this setting [20].

The high-risk background

The patient had a paternal aunt with breast cancer in her 40s and prior atypical lobular hyperplasia, flat epithelial atypia, and, in the final specimen, atypical ductal hyperplasia. Atypical hyperplasia carries about a fourfold increase in breast cancer risk, affecting both breasts [46]. Her earlier lobular atypia was in the contralateral breast and is a risk marker rather than a precursor of a squamous carcinoma. Still, this background should have lowered the threshold for tissue biopsy of any new or changing lesion.

The MRI at month -9 described a type II enhancing area at 10 o'clock in the right upper outer quadrant, near the chest wall. This is the same location as the 4.2 cm lesion on the month 7 MRI and the carcinoma excised at month 9. The recommended six-month MRI was not performed, and the next imaging, nine months later at presentation (month 0), was an ultrasound that classified the palpable cyst as benign. Whether the month -9 finding was an early sign of the tumor cannot be established retrospectively. However, it shows the value of completing recommended MRI follow-up in a high-risk patient and of correlating ultrasound and MRI findings: the cyst was described at 2 o'clock on ultrasound and at the first three aspirations, at 12 o'clock at the fourth, and at 10 to 11 o'clock on MRI and at surgery.

Implications for management

The excision was fragmented, multifocal, and margin-positive, with no axillary staging, so local treatment is not yet complete, and the multidisciplinary team referred the patient for chemotherapy, with reoperation to be considered. The tumor was ER-low-positive (2%), PR-negative, and HER2-negative, with a Ki-67 of 80%. Under the 2020 American Society of Clinical Oncology/College of American Pathologists (ASCO/CAP) guideline, tumors with 1% to 10% ER-positive cells are reported as ER-low-positive because evidence of benefit from endocrine therapy in this group is limited [47]. Such tumors often resemble triple-negative cancers in their biology and behavior, so we regard this tumor as functionally triple-negative, a profile that matches that of most squamous MpBCs [13]. MpBC metastasizes more often through the bloodstream than through lymph nodes, so systemic staging is part of the initial work-up [2,16]. Response to neoadjuvant chemotherapy is poor, with a pathological complete response in only 1 of 44 patients in one series [24] and in 11% of patients in another [23]. Lymph node stage, lymphovascular invasion, and histological subtype are the main prognostic factors [11]. Within squamous carcinomas, at least focal keratinization, as seen in our patient, has been linked to better overall survival [14]. In the published cases, limited excision of a presumed benign lesion was followed by local recurrence within months [39,41], which supports completion surgery with clear margins in our patient.

Germline testing is strongly indicated. In a cohort of 143 tested patients with MpBC, 16.8% carried a pathogenic variant, most often in BRCA1 [26], and an Italian series found pathogenic variants in 15 of 23 tested patients [25]. A positive result would affect surgical planning and the management of the contralateral breast.

Learning points

The key learning points from this case are as follows: (1) a cyst that is palpable, recurs, grows quickly, or yields bloody fluid is not necessarily a simple cyst; (2) a complex cystic mass needs core needle biopsy of its wall or solid component, not serial aspiration; (3) negative cyst-fluid cytology does not exclude a necrotic carcinoma such as squamous MpBC; (4) prior atypia and a family history should lower the threshold for tissue biopsy; and (5) recommended imaging follow-up intervals should be tracked in high-risk patients.

Limitations

The imaging and cytology reports came from several centers. The pathology report listed the diagnostic immunohistochemical panel without individual results, and the exact age at diagnosis of the patient's aunt was not known. Clock-face positions differed between reports, and the final tumor size could not be measured because the specimen was fragmented. Staging, genetic testing, and treatment outcomes were pending at the time of writing, so survival cannot be reported. The case review was limited to PubMed; several reports could be assessed only from their abstracts, and publication favors unusual presentations, so the table is neither complete nor representative.

Conclusions

Squamous metaplastic breast carcinoma can present as an apparently benign cyst and produce repeatedly negative cyst-fluid cytology. In a woman with prior atypia and a family history of breast cancer, a cyst that recurs, enlarges, or becomes hemorrhagic should be biopsied with a core needle targeting its wall. Earlier tissue diagnosis may allow complete excision with clear margins and timely staging.

Additional Information

Author Contributions

All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

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