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Case Report

A rare case of invasive ductal carcinoma of the breast mimicking a breast cyst: a case report

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ABSTRACT

Breast carcinoma is the most prevalent cancer among women, ranking as the second leading cause of cancer-related deaths and the primary cause of cancer mortality in women aged 40 to 44. Although cystic breast disease is the most common reason for benign breast lumps, intracystic breast cancers are uncommon. Intracystic breast carcinoma (IBC) is sporadic, with some studies reporting it makes up less than 0.1% of all breast malignancies. This report details the case of a postmenopausal woman diagnosed with a large cystic breast carcinoma, highlighting notable radiologic and cytopathologic findings with a review of relevant literature.

Keywords: Intra-cystic breast carcinoma, Complex cystic breast lesion, BIRADS III lesion, Aspiration cytology, Frozen section diagnosis, Modified radical mastectomy

INTRODUCTION

Intra-cystic breast carcinoma (IBC) is an exceptionally rare occurrence, representing less than 0.1% of all breast cancers in some reports. In one study by Rosemond, only three cancers were found out of more than 3000 aspirated cysts.[1] Consequently, the prognosis is favorable, particularly for low-grade cases, with an excellent survival rate.

Intra-cystic breast carcinoma is an uncommon clinical condition, accounting for approximately 0.5-2% of all breast cancer cases. While not classified as a specific histological subtype, it presents as a distinct clinical form and may manifest as an in situ or invasive tumor.

Complex breast cysts pose significant diagnostic and therapeutic challenges, with underlying malignancy identified in 21-31% of cases. Preoperative diagnosis is often difficult, particularly when cysts exhibit features such as a thickened wall, prominent internal septations, or intracystic solid components. These cysts should be evaluated histologically to exclude malignancy, although cytological analysis may yield inconclusive results. Ultrasound-guided biopsy is the preferred diagnostic technique. The optimal treatment approach relies on a careful correlation of clinical presentation with imaging and histopathological findings. In cases where discrepancies arise, complete surgical excision is recommended to thoroughly assess disease extent and guide appropriate treatment.[2]

CASE REPORT

A 65-year-old female came with complaints of a painless lump in the left breast for one year, which on examination was a mobile lump of size 8*8 cm involving all the quadrants, cystic in consistency, with pinchable skin (Figure 1).

The patient had a history of aspiration of the lump twice in the last 6 months, with re-accumulation within a week. Ultrasound mammogram showed a BIRADS III lesion well-defined complex cystic lesion measuring 8×6×8 cm with a thick enhancing wall, with two echogenic solid lesions measuring 1.2×1 cm and 1×0.7 cm in the posterior wall of the cyst (Figure 2).

Aspiration from the cyst was hemorrhagic, and FNAC showed a moderate cellular smear showing numerous neutrophils, macrophages, lymphocytes, degenerated cells in a hemorrhagic background, and was negative for malignancy. An image-guided Tru-Cut biopsy from the solid component was inconclusive twice. Because of the diagnostic dilemma and to arrive at a definitive diagnosis, the patient was planned for an incisional biopsy with an intraoperative frozen section, which turned out to be positive for malignancy, and proceeded with a left modified radical mastectomy. Post-operative histopathological examination revealed a left invasive ductal carcinoma-NOS grade II-pT2N0Mx, ER -ve (2/8), PR -ve (2/8), HER2neu (2+), Ki-67 index of 30% (Figure 3).

Postoperatively, the patient was started on adjuvant therapy with trastuzumab and pertuzumab, and 17 cycles were completed. The patient is now on regular follow-up.

Figure 1: Clinical image.

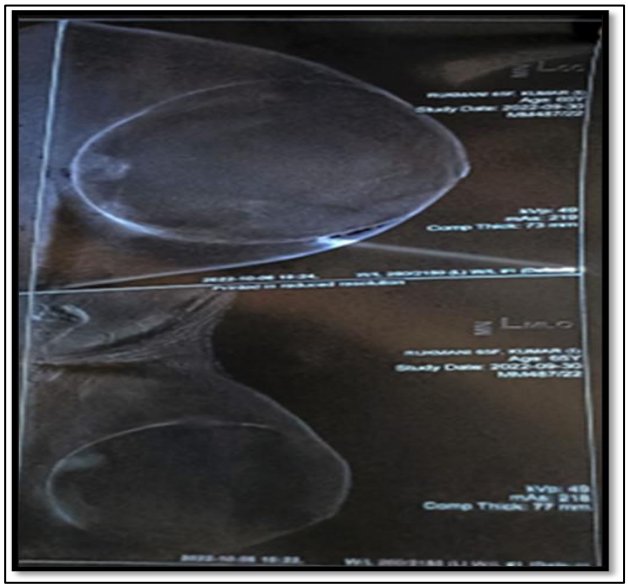

Figure 2: X-ray mammogram.

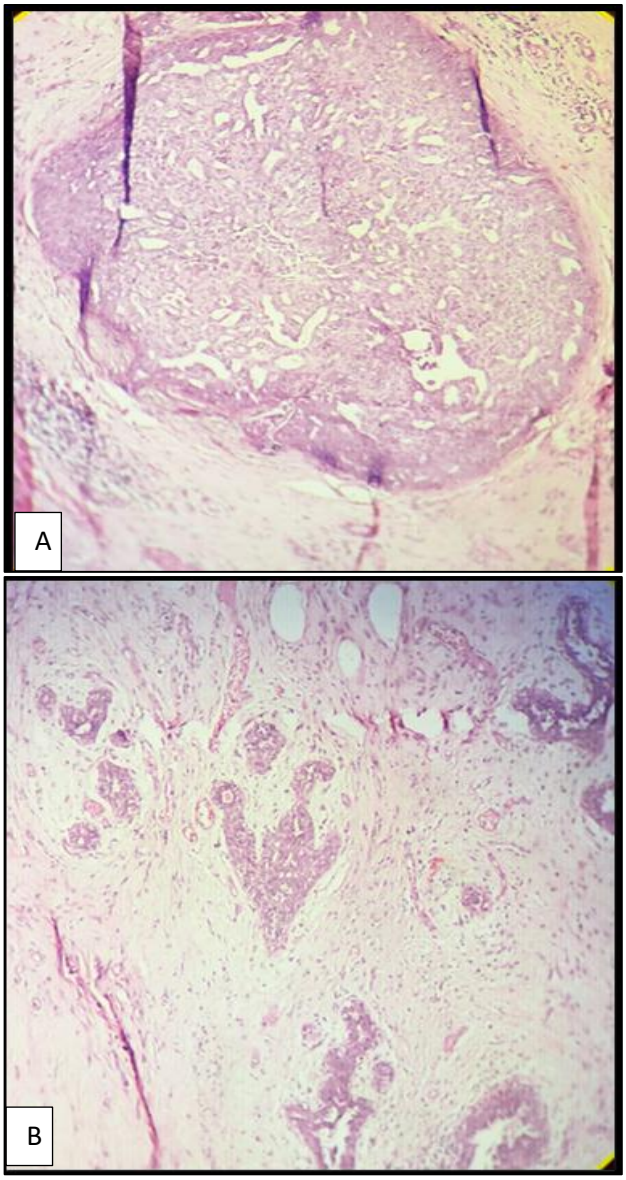

Figure 3 (A and B): Postoperative histopathological images- invasive ductal carcinoma NOS, grade II.

DISCUSSION

IBC is a very rare condition, accounting for less than 1.2% of all breast cancer cases. It most often affects postmenopausal women, typically in their fifth and sixth decades of life, although there have been a few rare cases reported in men. There is no established consensus on the tumor's pathogenesis or its spread through regional lymphatics.[2]

IBC usually presents as a relatively large palpable breast mass, and patients tend to be older than those with other types of breast cancer. The average age of IBC patients was 73.3 years, significantly older than the 53.6 years noted for other breast cancer patients. Similarly, Van Den Wildenberg reported that patients with IBC were, on average, ten years older than those with other breast cancers.[3]

Preoperative diagnosis is challenging, as there are no imaging findings specific to IBC. On mammography, IBC may appear as a high-density mass with well-defined or partially circumscribed margins, depending on the extent of the tumor's involvement with the surrounding breast tissue. Microcalcifications are rare. Ultrasonography typically reveals a well-defined, predominantly cystic, heterogeneous hypoechoic mass with projections from the cyst wall. Upon gross examination, the tumor often presents as a mural lesion that protrudes from the cyst wall, filling various portions of the cyst.[4]

Breast cysts are among the most frequent types of breast masses and can occur in up to 10% of women during their lifetime. They are most common between the ages of 35 and 50, particularly during the perimenopausal years. However, breast cysts are rare in older women, with only 5% occurring in those over 59 years of age. Cysts are categorized into three types: simple cysts (classified as ACR2 in the BI-RADS lexicon), complicated cysts (ACR3), and complex cysts (ACR4). Simple cysts, which account for 25% of cases, have smooth, thin walls and generally require no intervention. Only 0.2-0.8% of all breast cysts are associated with intracystic tumors.[5]

Complex cystic masses are characterized by both cystic and solid components, a thick wall (>0.5 mm), thick internal septations (>0.5 mm), and the presence of an intracystic or solid mass with cystic areas. These masses are detected in 5% of women undergoing ultrasound. Four types of breast cyst based on ultrasonographic features: type I (masses with a thick wall, thick internal septa, or both), type II (intracystic masses with discrete solid mural lesions), type III (masses with mixed cystic and solid components, with at least 50% cystic), and type IV (predominantly solid masses with central or eccentric cystic areas), with increased risk of malignancy in type III and IV lesions. Factors linked to increased malignancy risk include lesion size over 2 cm, ill-defined margins, a resistance index above 0.7, suspicious mammographic findings, and abnormalities in axillary lymph nodes.[6]

The most common benign causes of complex cystic breast masses include hematoma, abscess, fat necrosis, phyllodes tumors, and papillomas. However, malignancy has been identified in 23-31% of complex cystic masses, with the primary malignancies being encapsulated papillary carcinoma, solid papillary carcinoma, poorly differentiated invasive ductal carcinoma, mucinous carcinoma, medullary carcinoma, metaplastic carcinoma, breast sarcoma, and, in rare cases, metastases.[7]

Encapsulated papillary carcinoma (EPC), also known as intracystic papillary carcinoma, is an uncommon breast cancer, accounting for 0.6% to 1% of all breast cancers, and is the most common variety that occurs intracystically. Grossly, EPC appears as a friable or nodular tumor within a cyst, while microscopically, it consists of papillary carcinoma nodules enclosed by a thick capsule. Rakha et al reported that 3% of EPC cases exhibit high-grade characteristics, which are often larger, hormone receptor-negative, and more likely to involve stromal invasion.[8]

Complex cystic breast masses can present significant diagnostic challenges for interventional radiologists. There is no established consensus on the best management of incidentally discovered complex cysts. Mammography may show complex cysts as lesions with indistinct margins and a density higher than that of the surrounding breast tissue. Ultrasound findings typically include a thickened wall, thick internal septations, and an intracystic mass, often with posterior acoustic enhancement. These are classified as BI-RADS 4 lesions, necessitating histological confirmation through percutaneous biopsy.[7]

Magnetic resonance imaging (MRI) of complex cystic breast masses may reveal enhancement of the solid components and fluid signal characteristics in the cystic areas. Features such as washout enhancement and irregular walls are indicative of malignancy. Popli et al studied 50 patients with complex breast cysts using advanced MRI techniques, including dynamic imaging, diffusion-weighted sequences, and MR spectroscopy.[9] They found that heterogeneous contrast enhancement, a type III kinetic curve, diffusion restriction, and a tall choline peak were strong predictors of malignancy.

Several diagnostic methods have been employed for complex breast cysts, including fine-needle aspiration (FNA) biopsy, core needle biopsy, vacuum-assisted percutaneous biopsy, and complete excision.

The selection of an appropriate biopsy technique should be tailored to each patient and tumor, considering clinical and radiographic factors. Ultrasound-guided percutaneous biopsy is the preferred diagnostic approach for complex breast cysts, though it can be challenging. Aspiration of the cyst fluid may make it more difficult to identify the solid component, so an ultrasound-guided core needle biopsy should be performed immediately after aspiration. Factors such as the internal structure and vascularity of the cyst can help differentiate between benign and malignant intracystic lesions. For predominantly solid masses, a 14-gauge needle is recommended, whereas vacuum-assisted macro biopsy with an 8-10-gauge needle is better suited for predominantly cystic lesions. The use of a post-biopsy marker should be considered to facilitate future interventions.[10]

Several criteria are linked to a higher likelihood of malignancy, including age, the nature of the fluid aspirated, and the presence of a residual mass after aspiration. The size of the cyst is also a strong predictor of malignancy. In a study by Jales et al lesions smaller than 3 cm were found to be benign, while larger lesions

were more likely to be malignant. Berg et al found that complex cysts with features such as a thick wall, internal septations, or intracystic masses were more likely to be malignant.[11] Also, 50% of cystic masses with thick walls, septa, or nodules were malignant, and biopsy was recommended even when margins appeared well-defined.

Cytological analysis of fluid aspirated from complex cystic masses often lacks diagnostic accuracy, with false negatives occurring in 22-37.5% of cases. Factors contributing to these inaccuracies include sparse cellular content, necrotic debris, blood, and degenerative cell changes. While hemorrhagic aspirates should always be sent for cytological evaluation, the diagnostic value of fluid analysis is generally considered low. Elevated carcinoembryonic antigen (CEA) levels in the aspirated fluid may indicate malignancy, as reported by Matsuo et al where the fluid's CEA level was significantly higher than the serum CEA level.[12] Nevertheless, many experts suggest that aspirated fluid should be discarded due to its limited diagnostic value, except in cases of hemorrhagic aspirates, which should be thoroughly examined.

Correlating clinical features with imaging and histopathology is essential for optimal treatment. If there is any discordance between these findings, surgical excision of the entire lesion is recommended. Thorough investigation is required to rule out extramural invasion. Kitada et al reported a 66.7% incidence of extramural invasion in six cases of IBC. Patients with extramural invasion have a higher risk of lymph node metastasis, necessitating a sentinel node biopsy in addition to local treatment.[3]

IBC originating from the cyst wall generally has a more favorable prognosis than other forms of breast cancer. Poorly differentiated carcinomas with cystic degeneration are associated with a poor prognosis, while patients with intracystic papillary carcinoma tend to have an excellent outcome. When invasion beyond cyst wall occurs, lymph node metastases are observed in up to 30% of cases.[13]

Management of IBC includes surgery, radiation, and systemic therapy based on tumor characteristics. Options are lumpectomy or mastectomy, along with sentinel lymph node biopsy for node assessment. Radiation is recommended after lumpectomy to reduce recurrence and may also be used after mastectomy in high-risk cases. Systemic therapy includes hormone therapy for ER/PR-positive tumors, chemotherapy for high-grade or node-positive cases, and HER2-targeted therapy if HER2-positive. Follow-up consists of regular clinical exams and imaging to monitor for recurrence.[14]

CONCLUSION

In conclusion, all breast cysts found in postmenopausal women, particularly those not undergoing hormone replacement therapy, should be treated as potentially suspicious. Routine needle aspiration of palpable breast masses during outpatient visits can aid in diagnosis. If the mass is cystic and bloodstained fluid is aspirated, there is a notable risk of neoplasm, and the fluid should be sent for cytological analysis. A residual mass after aspiration may also suggest malignancy, although it is often due to surrounding fibrocystic changes does not always warrant excision. Mammography should be performed to detect any unexpected abnormalities at the cyst site or elsewhere in the breasts, particularly in cases with non-bloodstained aspirates. Sono-mammography can help further characterize well-defined mammographic shadows. Although the refilling of a cyst is generally not alarming, if the cyst reaccumulates within two weeks, it should be investigated further, as it may indicate malignancy. In cases of discordance, a complete surgical excision is necessary with careful evaluation of the extent of the disease and appropriate treatment.

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