

Case Report

Metaplastic Breast Carcinoma with extensive osseous differentiation: A rare case report

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Abstract

Metaplastic Breast Carcinoma (MBC) is very rare, and metaplastic carcinoma with osseous differentiation is even rarer. Here we report a case of metaplastic breast carcinoma with extensive osseous differentiation. A 65 year's female presented with the complaint of lump left breast for the last 6 months. Fine Needle Aspiration Cytology (FNAC) suggested carcinoma breast. Modified radical mastectomy was performed. Histopathologically, the neoplasm consisted of invasive ductal carcinoma of no special type with an osseous metaplastic component and showed a direct transition from carcinoma to the osseous elements. It is necessary to distinguish the different types of metaplastic carcinomas and distinction between benign and malignant metaplastic (osteoid) elements should be taken into consideration.

Keywords: Metaplastic Breast Carcinoma, Osseous differentiation, Immunohistochemistry

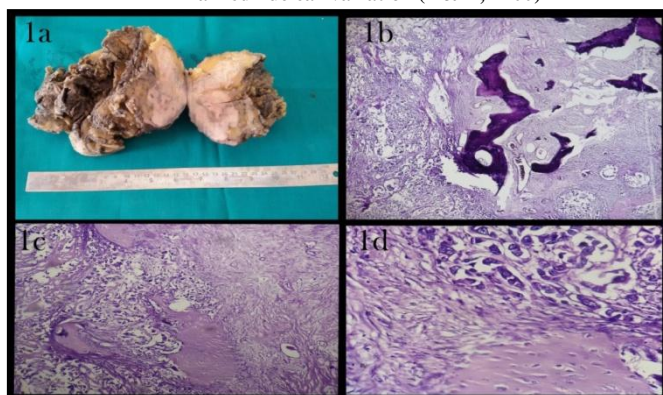
1. Introduction

Metaplastic Breast Carcinoma (MBC) is a rare and histologically diverse subtype of breast carcinoma. It accounts for less than 1% of all breast cancers.^{1,2} It comprises a heterogeneous group of neoplasms characterized by an intimate admixture of adenocarcinoma with areas of spindle, squamous, chondroid, and osseous differentiation.³ Breast cancer with cartilaginous and/ or osseous metaplasia is a special type of invasive breast cancer and has been reported to occur in only 0.003-0.12% of breast cancer cases.⁴ Osseous metaplasia is an exceptionally rare component in metaplastic breast carcinoma.⁵ We report a case of metaplastic breast carcinoma with extensive osseous differentiation and discuss the related literature.

2. Case Report

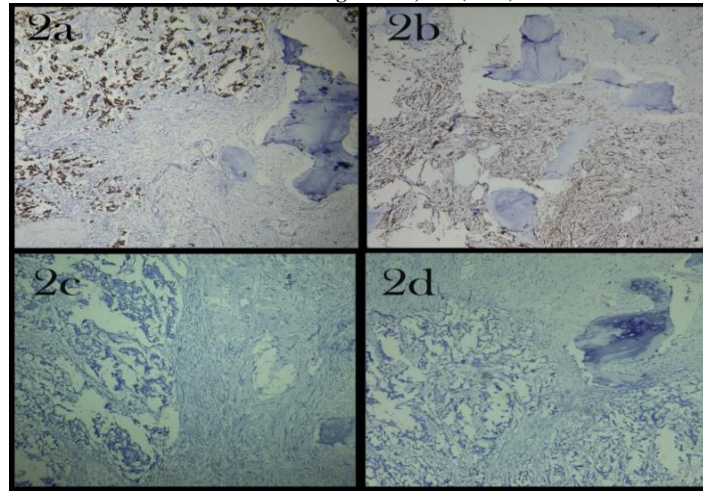
The patient was 65 years old woman with chief complaints of lump in her left breast for the last 6 months. Examination revealed a hard lump with ill defined boundaries and a diameter of 8x6 cm, involving almost whole of the outer half of left breast. Overlying skin showed redness and ulceration and was fixed. Left axillary lymph nodes were palpable. A clinical diagnosis of carcinoma left breast was proposed. Chest X ray, Ultrasound abdomen and pelvis, biochemical and haematological investigations were within normal limits. Pre-operative Fine Needle Aspiration Cytology (FNAC) was done and suggested a diagnosis of invasive ductal carcinoma left breast. Modified radical mastectomy left breast was done and specimen was sent for histopathological examination. Gross examination revealed a tumor measuring 8x5x4cm which was poorly circumscribed with infiltrative margins, reaching upto skin and 1cm away from the resected base. Cut surface of the tumor was grey white (Fig 1a). Microscopic examination showed invasive ductal carcinoma of no special type with an extensive osteoid component (Fig 1b). The trabecular osteoid lay in a vascular, bland stroma containing osteoblastic cells (Fig 1c). Invasive cancer cells transformed to the metaplastic lesion without intervening spindle cells. The carcinoma cells were arranged in sheets, nests or trabeculae with marked nuclear variation (Fig 1d). Ductal carcinoma in situ was not found in the tumor. The mesenchymal component comprised 50% of the tumor. All the 14 lymph nodes isolated from the specimen were negative for tumor.

Fig 1a- Gross photograph of MRM specimen showing poorly circumscribed tumor with infiltrative margins and grey white cut surface. **Fig 1b-** Microphotograph showing invasive ductal carcinoma with extensive osteoid component (H& E; x40). **Fig 1c-** Microphotograph showing osteoid with bland stroma (H& E; x100). **Fig 1d-** Microphotograph showing carcinoma cells arranged in sheets, nests with marked nuclear variation (H& E; x400)



Immunohistochemical staining was also performed. The carcinomatous component was positive for cytokeratin (Fig 2a). The mesenchymal component showed positive staining for vimentin (Fig 2b). All the tumor cells were negative for ER and PR (Fig 2c, 2d). The tumor was also negative for HER2/ neu overexpression and showed a low Ki-67 index. The final diagnosis was metaplastic breast carcinoma with extensive osteoid differentiation. The patient showed no clinical or radiographic evidence of recurrence at 6 month follow-up.

Fig 2a- Immunohistochemically, the carcinomatous component shows positivity for cytokeratin (x100). Fig 2b- Immunohistochemical staining shows positive staining for vimentin in mesenchymal component (x100). Fig 2c & 2d- The tumor cells show negative immunostaining for ER, PR (x100).



3. Discussion

The term metaplastic carcinoma was first introduced by Huvos *et al.*⁶ Histologically; it is a poorly differentiated heterogeneous tumor containing ductal carcinoma cells admixed with areas of spindle, squamous, chondroid or osseous elements. The World Health Organization (WHO) classifies MBC into epithelial type and mixed type. Epithelial type MBC is, in turn, classified into (1) squamous cell carcinoma, (2) adenocarcinoma with spindle cell differentiation, and (3) adenosquamous carcinoma. Mixed type MBC is classified into (1) carcinoma with chondroid metaplasia, (2) carcinoma with osseous metaplasia, and (3) carcinosarcoma.⁷ The matrix producing subtype contains overt carcinoma with a transition to cartilaginous and/ or osseous stromal matrix without a spindle component.⁸ Adenocarcinomas showing heterologous osteoid or cartilage differentiation are generally reported together and as a result there is limited information on either as a separate entity.⁹

The clinical presentation of MBC has several differences from the presentation of other invasive ductal carcinoma (IDC). The median age at the time of presentation ranges from 48 to 59 years.^{2,10} MBC commonly presents as a rapidly growing mass, and it has been consistently reported to present larger than typical breast cancers generally greater than 2cm.^{2,11} MBC presents with axillary nodal involvement less frequently than standard invasive breast cancer, despite the larger tumor size. Our patient also had large, rapidly growing tumor mass with no metastatic tumor deposits in any of the 14 axillary lymph nodes. In patients with metaplastic carcinoma containing heterologous elements, the correlation between nodal metastasis and survival or recurrence is not clear. Compared with other types of breast cancer, this type of carcinoma without nodal metastasis does not always predict a favourable prognosis.^{11,12} Metaplastic Breast Carcinoma (MBC) rarely exhibits nuclear immunoreactivity for ER and PR.¹¹

Expression of markers p53, retinoblastoma protein, HER/ 2neu, Epidermal growth factor receptor and cyclin D1 does not correlate with clinicopathologic features such as patient's age, tumor size, tumor type and relative proportion of metaplastic elements.¹² Tse *et al.*¹³ reported a positivity of ER in only 4 of the 34 cases (12%) and PR in only 3 of the 34 cases (9%). Expression of Cerb B2 was also low, being only 15%. Chhieng *et al.*¹² analyzed the expression of ER and PR in 24 of 32 cases in their study. None of these tumors showed nuclear reactivity for ER or PR in the adenocarcinoma or heterologous components and only one case was positive of ER and PR in the intraductal carcinoma component. In MBC, poor prognosis is associated with high predominance of intervening spindle cells, high cellularity, high mitotic activity and high nuclear pleomorphism similar to sarcoma. The presence of a sarcomatoid metaplastic element in carcinoma of the breast, be it chondroid, osteoid, or unspecified in nature, is a poor prognostic factor, especially when it predominates the histological findings.⁹ The osseous foci in metaplastic carcinoma may appear histologically benign or malignant and it is not clear what proportion of these have malignant (osteosarcoma) or benign osseous differentiation because carcinomas with osseous differentiation have generally been put together with those displaying chondroid differentiation.¹²

Wargotz and Norris¹⁴ reported that patients with MBC with histologically benign heterologous elements without intervening spindle cells have favourable survival rate. In MBC, poor prognosis is associated with high predominance of intervening spindle cells, high cellularity, high mitotic activity and high nuclear pleomorphism similar to sarcoma.⁹ The presence of a sarcomatoid metaplastic element in carcinoma of the breast, be it chondroid, osteoid or unspecified in nature, is a poor prognostic factor especially when it predominates the histological findings.¹⁵ MBC have demonstrated a high potential for distant metastasis, particularly in the lung, even if the axillary lymph nodes are negative.¹⁶ According to Lim *et al.*¹⁷ patients with non- triple negative metaplastic carcinoma had poorer prognoses than those with triple negative breast cancer. Our patient had triple negative metaplastic carcinoma with benign heterologous elements and low Ki-67 index. It has also been reported that different morphological subtypes have different prognoses, therefore, subclassification of metaplastic carcinoma is necessary.⁹

The principles of treatment for metaplastic carcinoma are the same as those for invasive ductal carcinoma, but considering the higher rates of both local and distance recurrence, further research studies will be required to develop targeted treatments so that the clinical outcome improves.

4. Conclusion

Metaplastic breast carcinoma with extensive osseous differentiation is rare. The distinction between different types of metaplastic carcinoma, especially between benign and malignant metaplastic (osteoid) elements should be emphasized.

References

1. Luini A, Aguilar M, Gatti G. Metaplastic carcinoma of the breast, an unusual disease with worse prognosis: the experience of the European Institute of Oncology and review of the literature. *Breast Cancer Res Treat* 2007; 101:349-53.
2. Tavassoli FA. Classification of metaplastic carcinomas of the breast. *Pathol Annu* 1992; 27(2):89-119.
3. Rauf F, Kiyani N, Bhurgni Y. Metaplastic carcinoma of breast, an intriguing rarity. *Asian Pac J Cancer Prev*. 2006; 7(4):667-71.
4. Tsukuda K, Tsuji H, Kunitomo T, Aokage K, Miyake T, Nakahara S, Masuda H. Breast Cancer with Cartilaginous and/ or Osseous Metaplasia diagnosed by lymph nodal metastasis: A case report. *Acta Med Okayama* 2009; 63(6):367-71.
5. Pollock JM, Green A, Donnell C, Dyess DL, Tucker JA. Metaplastic breast carcinoma with osseous differentiation: A case report. *South Med J* 2006; 99:168-70.
6. Huvos AG, Lucas JC Jr, Foote FW Jr. Metaplastic breast carcinoma: rare form of mammary cancer. *NY State J Med* 1973; 73:1078-82.
7. Tavassoli FA, Devilee P. World Health Organization classification of tumors. In World Health Organization classification of tumors. Lyon, France: IARC Press; 2003:37-41.
8. Ayar S, Dysee L, Carter E. Matrix producing carcinoma: A rare variant of metaplastic breast carcinoma with heterologous elements. *Breast J* 2010; 16:420-23.
9. Lang R, Fan Y, Fu X, Fu L. Metaplastic breast carcinoma with extensive osseous differentiation: a report of two cases and review of the literature. *Tumori* 2011; 97(4):e1-e5.
10. Al Sayed AD, El Weshi AN, Tulbah AM. Metaplastic Carcinoma of the breast, clinical presentation, treatment, results and prognostic factors. *Acta Oncol* 2006; 45:188-95.
11. Chao TC, Wang CS, Chen SC, Chen MF. Metaplastic carcinomas of the breast. *J Surg Oncol* 1999; 71:220-25.
12. Chhieng C, Cranor M, Lesser ME, Rosen PP. Metaplastic Carcinoma of the breast with osteocartilaginous heterologous elements. *Am J Surg Pathol* 1998; 22:188-94.
13. Tse GM, Tan PH, Putti TC, Lui PCW, Chaiwun B, Law BKB. Metaplastic carcinoma of the breast: a clinicopathological review. *J Clin Pathol* 2006; 59:1079-83.
14. Wargotz ES, Norris HJ. Metaplastic carcinomas of the breast: V. Metaplastic carcinoma with osteoclastic giant cells. *Hum Pathol* 1990; 1142-50.
15. Kurian KM, Al- Nafussi A. Sarcomatoid/ metaplastic carcinoma of the breast: a clinicopathological study of 12 cases. *Histopath* 2002; 40:58-64.
16. Rayson D, Adjei AA, Suman VJ, Wold LE, Ingle JN. Metaplastic breast cancer: prognosis and response to systemic therapy. *Ann Oncol*. 1999; 10:413-9.
17. Lim KH, Oh DY, Chie EK, Han W, Im SA, Kim TY et al. Metaplastic breast carcinoma: clinicopathologic features and prognostic value of triple negativity. *Jpn J Clin Oncol*. 2010; 40:112-8.