Journal of Population Therapeutics & Clinical Pharmacology

RESEARCH ARTICLE
DOI: 10.53555/2q993p19

CASE SERIES OF METAPLASTIC CARCINOMA OF BREAST IN A TERTIARY CARE CENTER OF ROHILKHAND REGION

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ABSTRACT

Background: Metaplastic carcinoma of breast is a rare, high-grade subtype of invasive breast carcinoma, accounting for less than 1% of all breast malignancies. It is characterized by a heterogeneous composition of both epithelial and mesenchymal elements and is typically triple-negative for hormonal receptors, making its management particularly challenging.

Aim: We aimed to describe the clinicopathological characteristics of metaplastic carcinoma of breast diagnosed over a two-year period at the Department of Pathology, SRMS IMS, with a focus on histological subtypes and immunohistochemical (IHC) patterns.

Methods: This retrospective observational case series was conducted in the Department of Pathology, SRMS IMS, Bareilly, after approval from the Institutional Ethics Committee. Seven histologically confirmed cases of Metaplastic carcinoma were included. Clinical data, histopathological features, and IHC profiles were reviewed from departmental archives. All patients provided informed consent. Parameters evaluated included age, tumour laterality, size, histological differentiation, and IHC markers (ER, PR, HER2/neu, PanCK, P63, SMA, CK7, and P40, P63, Vimentin). Descriptive analysis was performed. No formal statistical test was applied due to the limited sample size.

Results: All patients were female, with ages ranging from 35 to 58 years (mean: 48 years). Right-sided involvement was more common. Tumour sizes ranged from 10 cm to 30 cm. Spindle cell was the predominant histologic pattern (3 cases) followed by Heterologous Mesenchymal differentiation, Squamous Cell, Low Grade Adenosquamous, Mixed Metaplastic Carcinoma (1 each).

Conclusion: Metaplastic carcinoma is a morphologically diverse, aggressive neoplasm requiring accurate histopathological subtyping and IHC correlation for diagnosis.

Keywords: Metaplastic carcinoma; cancer; mesenchymal differentiation; spindle cell differentiation; mixed metaplastic breast carcinom

INTRODUCTION

Metaplastic carcinoma is a rare and aggressive subtype of breast cancer, constituting less than 1% of all malignant breast neoplasms. It is histopathologically defined by the presence of at least two distinct cellular components, most commonly an admixture of epithelial and mesenchymal elements.[1] This heterogeneity distinguishes it from other more common breast cancers and contributes to its complex biological behaviour. Metaplastic carcinoma of breast typically exhibits combinations of invasive ductal carcinoma with additional components such as spindle cells, squamous cells, chondroid, or osseous tissue. The presence of these divergent elements reflects metaplastic transformation within the tumour, resulting in its unique morphological spectrum.[2] More than 90% Metaplastic carcinoma lack expression of ER, PR. However, Metaplastic carcinoma carries an even worse prognosis due to its limited response to systemic therapy and high-grade histology. [2,3] Moreover, these tumours tend to present as rapidly enlarging masses, often larger than 2 cm at diagnosis, yet with relatively infrequent axillary lymph node involvement. The aggressive nature of metaplastic carcinoma is further underscored by its frequent resistance to conventional chemotherapeutic agents and its limited responsiveness to hormonal or targeted therapies. On molecular profiling, metaplastic carcinoma of breast is categorized under the basal-like subtype of breast cancers, exhibiting gene expression patterns associated with poor therapeutic outcomes.[3] Owing to its rarity, histological diversity, and therapeutic challenges, metaplastic carcinoma of breast remains a difficult entity to manage, necessitating further research into tailored treatment strategies and prognostic markers.

Clinical Features

The clinical presentation of metaplastic carcinoma exhibits notable differences from that of conventional invasive ductal carcinoma (IDC). In literature, the median age at diagnosis for metaplastic carcinoma ranges between 48 and 59 years. [4-6] The disease typically presents as a rapidly enlarging palpable breast mass, and tumours are frequently larger than those seen in typical breast cancers, often exceeding 2 cm in size.[7] Despite this significant tumour burden, Metaplastic carcinoma is associated with a lower frequency of axillary lymph node involvement compared to IDC. The reported incidence of axillary nodal metastases ranges from 6% to 26%, [4,14-17] markedly lower than the more than 50% nodal involvement typically seen in larger invasive ductal carcinomas. [8-12]

MATERIAL AND METHODS

This retrospective case series was conducted in the Department of Pathology at Shri Ram Murti Smarak Institute of Medical Sciences (SRMS IMS), Bareilly, over a period of two years. A total of seven histologically confirmed cases of metaplastic carcinoma of the breast were included in the study. All patients were female, and the cases were selected based on histopathological diagnosis recorded in departmental archives.

For each patient, a comprehensive review of medical records was performed. Clinical information regarding age, gender, laterality of the tumour, and duration of symptoms was collected. Gross findings such as tumour size were recorded from surgical specimens. Detailed histopathological evaluation was conducted using haematoxylin and eosin-stained slides to assess tumour morphology and classify the subtype of metaplastic carcinoma.

Histological variants included Heterologous mesenchymal differentiation, Spindle cell carcinoma, Squamous cell carcinoma, Low grade adenosquamous carcinoma, and Mixed metaplastic carcinoma. Relevant immunohistochemistry (IHC) markers, including PanCK and CK7, were applied to confirm

epithelial origin and support diagnosis in ambiguous cases. All data were systematically compiled and descriptively analysed to highlight the morphological spectrum of metaplastic carcinoma of breast encountered in this centre.

RESULTS

Our study describes 7 cases of Metaplastic carcinoma of the breast. All were female with age range from 35 to 58 years with a mean age of 48 years. The duration of symptoms before presentation ranged from 6 months to 1 year. The more common laterality was right. Tumour size varied from 10 cm to 30 cm.

Histologically Spindle cell was the predominant histologic pattern note in 3 cases, The remaining 4 cases included one each of Heterologous Mesenchymal differentiation, Squamous Cell, Low Grade Adenosquamous, Mixed Metaplastic Carcinoma. All cases were confirmed on histopathology and supported with immunohistochemical (IHC) markers including PanCK, CK7, P63, SMA, Vimentin and P40. Hormonal receptor status (ER, PR, HER2/neu) was assessed, with most cases being triple negative. A detailed clinicopathological profile of all seven patients is summarized in **Table 1**.

Table 1: Clinicopathological Profile of Patients with Metaplastic Breast Carcinoma

Age	Specimen Laterality	Size	Histologic Grade	IHC
35 years	Left	11 ×7 × 5 cm	Metaplastic carcinoma with Heterologous Mesenchymal Differentiation	Pan cytokeratin, SMA, P40, Vimentin- positive ER, PR, HER2/neu- negative
,40 years	Left	13 × 11.5 × 10 cm	Spindle Cell Carcinoma (Metaplastic Carcinoma)	P63, Pan CK, SMA - positive; ER, PR, HER2/neu - negative
48 years	Left	3 × 2 × 2.5 cm	Mixed metaplastic carcinoma	CK7, P40 - positive; ER, PR - negative; HER2/neu - positive
50 years	Right	4.5 × 2.5 × 2 cm	Spindle Cell Carcinoma (Metaplastic Carcinoma)	PanCK, P63, SMA- positive; ER, PR, HER2/neu- negative
52 years	Right	12 × 10 × 5 cm	Spindle Cell Carcinoma (Metaplastic Carcinoma)	PanCK, P63, SMA – positive ER, PR, HER2/neu- negative
53 years	Right	30 × 20 × 15 cm	Low grade adenosquamous carcinoma (Metaplastic Carcinoma)	PanCK, P63- positive; ER, PR, HER2/neu - negative
55 years	Right	5 × 4 × 3 cm	Squamous Cell Carcinoma (Metaplastic Carcinoma)	P63, P40- positive ER, PR, HER2/neu- negative

Out of 7 cases of Metaplastic breast carcinoma, Spindle cell Carcinoma was the most common accounting for 3 cases, remaining 4 cases showed Heterologous Mesenchymal Differentiation, Low

grade adenosquamous, Squamous Cell Carcinoma, Mixed metaplastic carcinoma accounting for 1 case each.

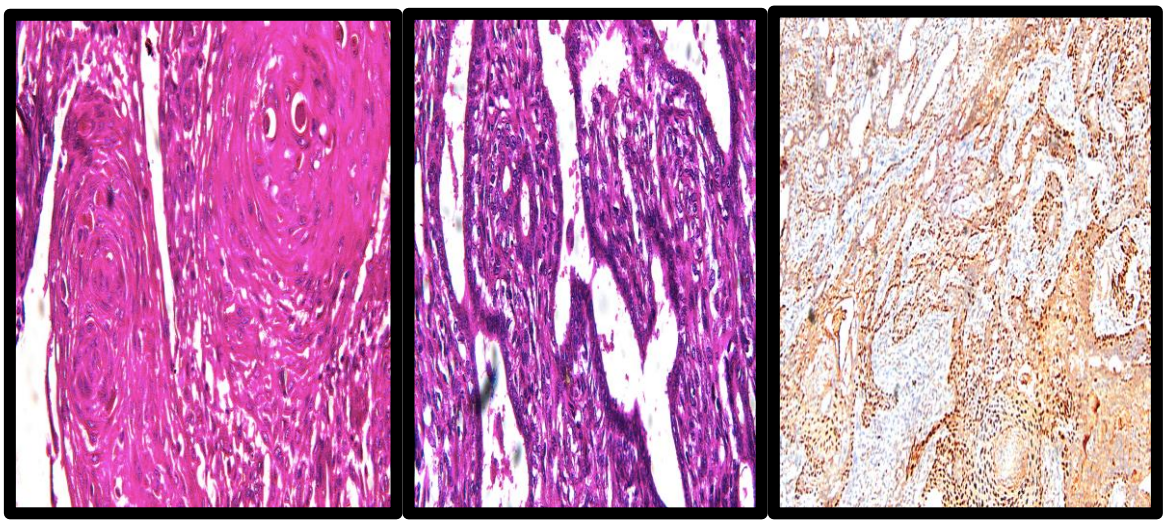

Figure 1 : Metaplastic Carcinoma. Low Grade Adenosquamous carcinoma. (A) H&E-stained section reveals focal squamoid differentiation. (B) Section features infiltrative glands showing bland cytology. (C)IHC: Tumor cells are positive for PANCK.

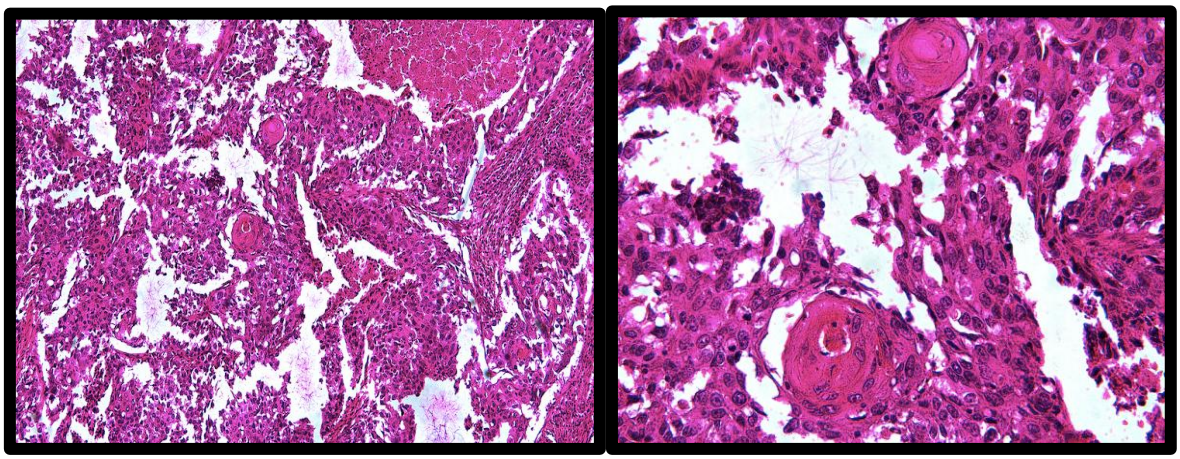

Figure 2 : Metaplastic Squamous Cell Carcinoma. Variable degree of squamous cell differentiation is noted. Focal keratin pearl formation is also seen

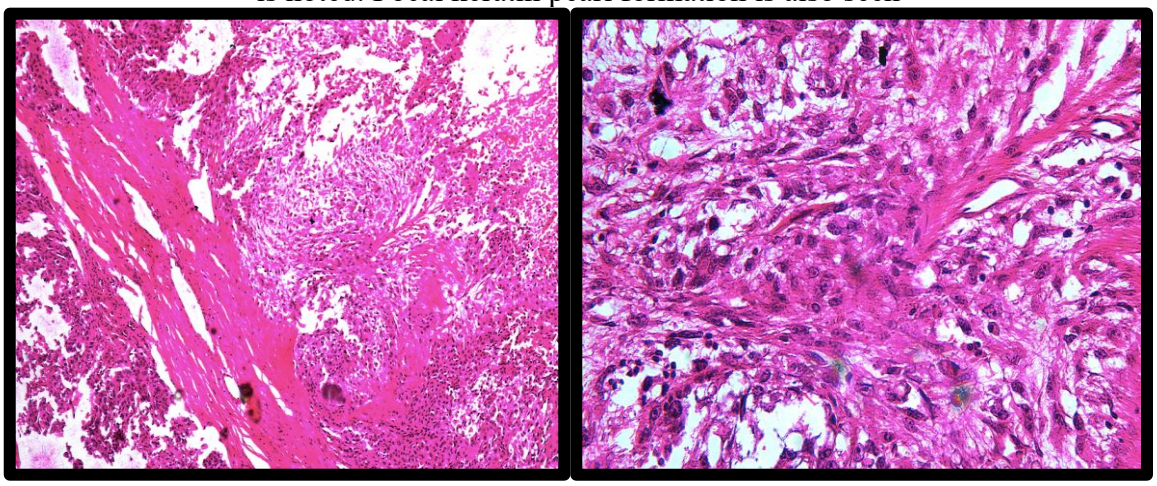

Figure 3: A) B) High grade Spindle cell Metaplastic Carcinoma. Featuring spindle cells arranged in long fascicles.

DISCUSSION

Metaplastic carcinoma of breast is a rarely encountered malignancy, accounting for less than 1% of all breast cancers. It comprises a heterogeneous group of neoplasms characterized by the presence of both glandular and non-glandular components. Based on histopathological patterns, metaplastic carcinoma can also be classified into Squamous cell carcinoma, Low grade adenosquamous carcinoma, Spindle cell Carcinoma, Mixed Metaplastic Carcinoma and Metaplastic carcinoma with heterologous mesenchymal differentiation which includes chondroid, osseous and rhabdomyoid, neuroglial differentiation.

In our study, Spindle cell carcinoma was the most frequently observed histological subtype (3cases), followed by one case each of Low-grade adenosquamous carcinoma, Squamous cell carcinoma, Metaplastic carcinoma with heterologous mesenchymal differentiation and Mixed metaplastic carcinoma. This histological spectrum aligns with findings reported by Luini et al.[1], who evaluated 33 patients with MBC and found a predominance of spindle cell and mesenchymal differentiation, confirming the morphological heterogeneity of these tumours.[1]

Our study also revealed that most tumours were triple-negative for estrogen receptor (ER), progesterone receptor (PR), and HER2/neu. This observation is consistent with the large study by Pezzi et al.[2], who analysed 892 cases from the National Cancer Data Base and reported that MBC typically presents with triple-negative immune profile and aggressive clinical behaviour.[2]

Additionally, Rayson et al.[5] reported that MBC has a poorer response to conventional systemic chemotherapy compared to other forms of invasive breast cancer, further supporting the need for accurate histological classification and tailored management strategies.[5] The larger tumour size in our cases (ranging from 10 to 30 cm) led to the frequent use of modified radical mastectomy (MRM), as breast-conserving surgery is generally reserved for smaller tumours. According to the Surveillance, Epidemiology, and End Results (SEER) database [13], mastectomy is more frequently performed in MBC compared to invasive ductal carcinoma due to the typically larger tumour size at diagnosis.[13] Breast-conserving surgery and adjuvant radiotherapy are generally reserved for smaller tumours. This trend was reflected in our cohort, further underscoring the aggressive clinical nature and delayed presentation associated with MBC.

CONCLUSION

Metaplastic breast carcinoma (MBC) is a rare subtype of invasive breast cancer that accounts for less than 1% of all diagnoses. Our present knowledge of MBC remains limited. The rarity and heterogeneity of MBC, both in biological and morphological features, along with the existence of various classification systems and treatment strategies in the literature, have hindered efforts to gather consistent data. As a result, there is insufficient evidence to establish a definitive and standardized treatment protocol for this uncommon and challenging breast neoplasm.

STRENGTHS

This study highlights the clinicopathological spectrum of metaplastic breast carcinoma from a tertiary care centre, contributing to limited Indian data. It includes detailed histological subtyping and IHC correlation, aiding diagnostic clarity. The uniform pathological review enhances internal validity and provides useful insights into this rare, poorly understood malignancy.

LIMITATIONS

The study is limited by its small sample size, restricting generalizability. It is retrospective in nature and lacks follow-up data on treatment response or patient outcomes. Additionally, molecular subtyping was not performed, which could have offered deeper insights into prognosis and targeted therapeutic options for metaplastic breast carcinoma.

Conflict of Interest: None.

Funding: None.
Ethical Approval: Obtained.
Consent: Written consent secured.

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