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Radiological Correlations of TNBC Histomorphology

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Introduction

Triple-negative breast cancer (TNBC) is morphologically heterogeneous group of breast cancers (BC) which lacks the expression of the three most commonly evaluated biomarkers (the estrogen receptor [ER], progesterone receptor [PR], and the human epidermal growth factor receptor 2 [HER2] protein).
TNBC is associated with younger age at the time of diagnosis, poorer prognosis with earlier recurrence.
Identification of TNBC morphological and molecular subtypes is essential for understanding their biological behavior and hence treatment options.

Objective

Correlation between histopathological features and mammographic findings associated with TNBC in premenopausal female patients.

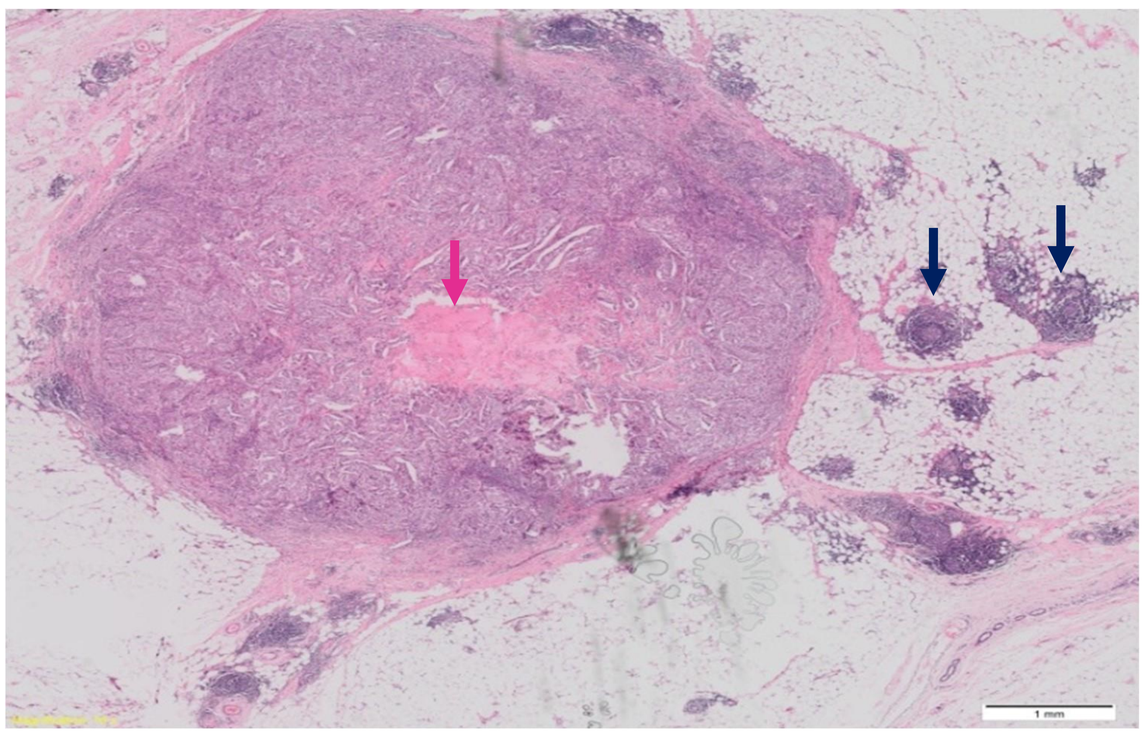

Fig. 2. TNBC Histopathology Obtained from a Definitive Biopsy before Neoadjuvant Therapy
→ Central Necrosis
→ Lymphocytic Infiltration
Department of Clinical and Molecular Pathology, FNOL

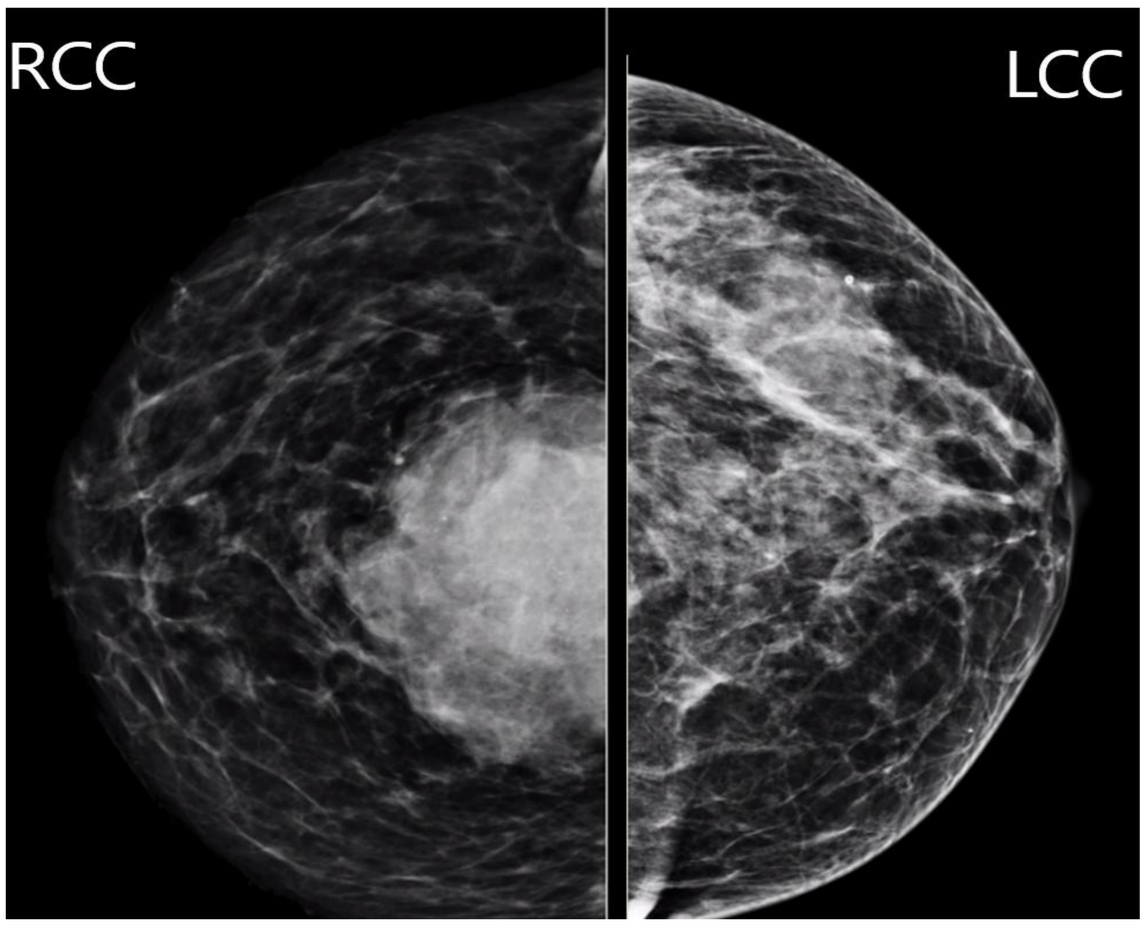

Fig. 1. Mammography of Breast Tissue with Tumor Mass Featuring Calcifications and Obscured Borders in Right Craniocaudal (RCC) Projection compared to Non-tumorous Left Craniocaudal (LCC) Projection
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Methods

From March 2010 to June 2014, 28 premenopausal female patients (mean age, 41 years; range, 26 - 50 years) were diagnosed with TNBC using standard imunohistochemical (IHC) methods. Each patient underwent surgery, chemotherapy and/ or radiotherapy in vary individual sequence at our institution. Their medical records were reviewed to determine age, symptoms, BRCA1/2 mutation (Department of Medical Genetics), time interval between mammographic findings, core-cut biopsy and used therapeutic modality. We also re-examined their histopathological findings including tumor type (WHO classification), grade, tumor size, tumor volume and pathological stage (pTNM classification) and correlated them with assessed mammographic features (breast density, tumor mass and borders).

Results

The majority of our patient's first symptom was a palpable mass (20/28, 71.43%) and had been examined by a mammography within a month from first symptom (25/28, 89.28%), followed by core cut biopsy with an interval of less than 7 days (20/28, 71.43%). One third of patients (10/28, 35.71%) represented positive BRCA1/2 mutation with higher tumor size at the time of diagnosis leading to the necessity of neoadjuvant treatment options. Generally, quadrantectomy with sentinel lymph node dissection was preferred surgical method (17/28, 60.71%) accompanied by neoadjuvant and/or adjuvant therapy (chemotherapy, radiotherapy). In our set of TNBC patients most of them (26/28; 92.85%) were of invasive (ductal) carcinoma NST (non-special type). They were predominantly characterized by higher tumor grade (moderate to mainly poorly differentiated) and size (tumor volume) which were associated with advanced pathological stage (pT2 to pT4). On mammography, TNBC most commonly presented as a mass (60.71%), with a margin type reported to be obscured in 53.6% of cases. Alternatively, TNBC presented as calcifications associated with a mass (32.14%), or as focal asymmetry (3.57%).
Half of the samples with calculated mass volume bigger than 1000mm³ showed radiological mass different than "mass only", while only a quarter with calculated mass volume lower than 1000mm³ showed radiological mass as "mass only".

Conclusion

In premenopausal female patients, TNBC presents as palpable mass with specific histopathological and mammographic findings, lacking typical features of BC, namely microlobulated or spiculated margins and associated suspicious calcifications. Clinical findings support the efficiency of a functioning health care system in FNOL and BRCA1/2 association. Therefore, patient education about early self-examination, radiological and histopathological diagnosis, as well as further research for new molecular therapeutic targets within this heterogenous BC group are of high importance and have a major impact on TNBC prognosis.