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The use of serial ultrasound examination for the prediction of pathological complete response in early triple-negative breast cancer patients.

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Background: Pathological complete response (pCR) following neoadjuvant chemotherapy (NAC) is associated with a good prognosis and long-term survival in patients with triple negative breast cancer (TNBC). Imaging offers significant information in monitoring response to neoadjuvant chemotherapy as a complement to conventional tumor assessment by physical examination.

Methods: This is a single institution, retrospective cohort study. The primary objective was to determine whether volumetric measurement by ultrasound examination of the pre-treatment breast tumor size, post-cycle two, post-cycle four and at completion of NAC predicted pCR. Tri-dimensional measurements were used to calculate the volume index. Patients were treated with taxane, anthracycline, and alkylating agents based neoadjuvant chemotherapy. A pCR was defined as the complete disappearance of the invasive cancer in the breast and absence of tumor in the axillary lymph nodes. A radiological complete response (rCR) was defined as no malignant lesions detected by ultrasound (0mm). Receiving operating characteristics (ROC) analysis was used to determine the association between pCR and percentage of tumor shrinkage. Statistical analysis was performed using NCSS version 11 and statistical tests used the significance level of 0.05.

Results: Seventy-eight TNBC patients with a median age of 48 years (range 27-85 years). The population's tumor sizes were classified as T1 = 18 (23%), T2 = 54 (69%), T3 = 6 (8%). Positive glands in 33 (43%) patients and negative glands in 45 (57%) patients. Stage I = 11 (23%) patients, Stage IIA = 40 (51%) patients, stage IIB = 22 (28%) patients and stage III = 5 (6%) patients. The median volume pre-treatment was 18624mm³ (SD = 41284mm³). A pCR rate of 57% was documented. An 80% shrinkage of tumor, following the second cycle of chemotherapy, was associated with a pCR in 74% of responders (specificity 71%, sensitivity 70%). A 93% shrinkage following four cycles of chemotherapy was associated with a pCR in 73% of responders (specificity 62%, sensitivity 81%). A 97% shrinkage upon completion of chemotherapy was associated with a pCR in 70% of responders (specificity 45%, sensitivity 93%). A shrinkage of more than 90% was associated with a pCR in 93% pts (specificity 79%, sensitivity 66%). Radiological CR was associated with a pCR in 84% pts (specificity 70%, sensitivity 68%). Patients attaining a pCR had a mean volume of 877mm³ compared to patient not attaining a pCR with a mean volume of 833mm³ (p < 0,97088).

Conclusion: The breast ultrasound is a useful, non-expensive, non-invasive test to monitor TNBC pts undergoing neoadjuvant chemotherapy. Measurement of the tumor by serial ultrasound is a useful predictor of pCR in these patients. Percentage shrinkage of more than 90% of the tumor at the completion of treatment, is more accurate in predicting pCR compared to radiological CR.