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Case Report
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Correlation Between the Extent of Microcalcifications Seen on Contrast-Enhanced Mammography and Surgical Specimen after Neoadjuvant Chemotherapy: Case Report

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Introduction

Neoadjuvant Chemotherapy (NACT) is indicated as the initial treatment in many cases of malignant breast cancer, as it can reduce the size of the tumor and regional metastases, in addition to providing prognosis and guiding the conduct of the remainder of the treatment according to the behavior of the lesion(s) after neoadjuvant chemotherapy [1].

NACT is a primary systemic therapy prior to surgery. It consists of a combination of chemotherapy based on anthracyclines and taxanes [2,3]. This treatment is usually carried out in eight cycles and then an assessment of the preoperative therapeutic response is made.

The response to NACT is varied and depends on a series of factors, such as the type, size, extension of the tumor, among others. Such a response may be complete, partial or with disease progression. This assessment should be as accurate as possible, as it will guide future management. The role of radiological imaging is fundamental in this context, especially when a morphological and functional method is associated. Today, Magnetic Resonance Imaging (MRI) is still considered the standard exam for this purpose, but mammography with contrast (CEM) is a fast, effective and more available alternative [4].

Contrast-Enhanced Mammography (CEM) is a mammography that uses iodinated contrast to visualize areas of breast enhancement, which represent vascularization similar to magnetic resonance imaging [5]. After the injection of this intravenous contrast, two images are acquired: One of low energy, which represents a digital mammogram, and another recombined one that evaluates the functional pattern of angiogenesis. This morphological and functional combination has increased its sensitivity and specificity in detecting lesions when compared to digital mammography alone [6]. Therefore, CEM allows the morphological and functional assessment of breast alterations, making it very useful in identifying lesions with high metabolic activity and in the follow-up after neoadjuvant chemotherapy.

In this report and brief bibliographical review, we present the case of a 52-year-old woman, with a histopathological diagnosis of non-special type invasive breast carcinoma, whose attending physician opted for the use of CEM to monitor tumor activity after neoadjuvant chemotherapy and surgical planning.

Case Presentation

A 52-year-old asymptomatic woman with no family history of breast cancer presented a group of pleomorphic microcalcifications in the middle portion of the Superolateral Quadrant (QSL) of the left breast on synthesized mammography, 2.4 cm long and 4.1 cm apart of the Nipple-Areolar Complex (NAC) (Figures 1-3), better visualized at tomosynthesis. CEM was then performed to assess the actual extent of microcalcifications and showed intense and heterogeneous enhancement in the middle portion of the QSL of the left breast, which extends 4.0 cm beyond the area of microcalcifications (Figure 4, 5). The timely ultrasound scan showed the presence of three irregularly

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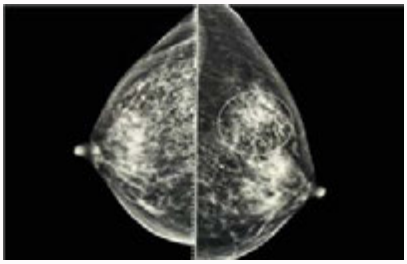

Figure 1: Nipple-Areolar Complex.

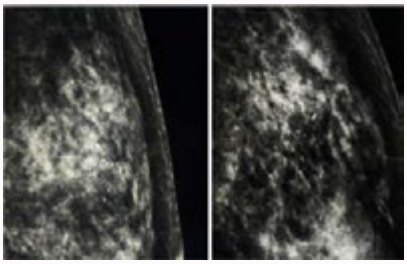

Figure 2, 3: Enlargements of the Figure 1.

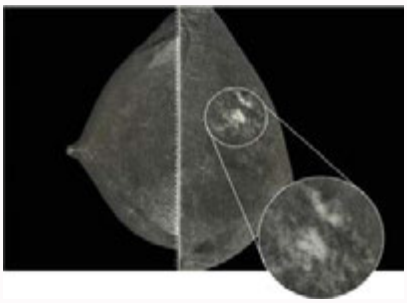

Figure 4: Microcalcifications.

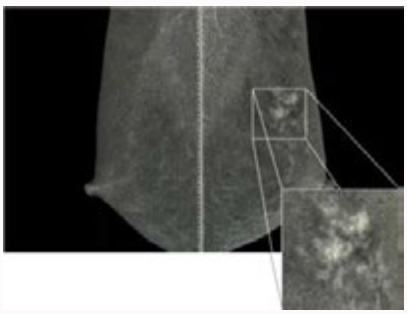

Figure 5: Microcalcifications.

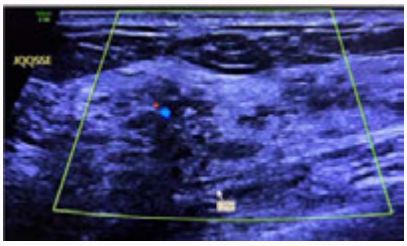

Figure 6: Ultrasound scan.

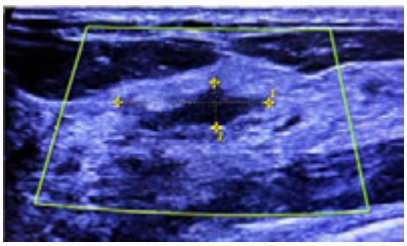

Figure 7: Ultrasound scan showed the presence of three irregularly shaped solid nodules.

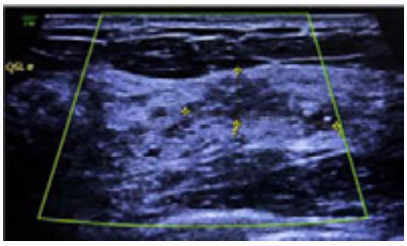

Figure 8: Ultrasound scan showed the presence of three irregularly shaped solid nodules (1.0 cm × 0.9 cm).

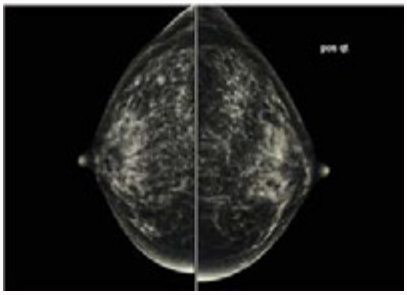

Figure 9: NACT, CEM.

shaped solid nodules, with an angled margin, heterogeneous, with intermingled and vascularized calcifications, in the QSL of the left breast, smaller than 1.0 cm × 0.9 cm (Figures 6-8).

An ultrasound-guided biopsy was then performed. After the result, she received the histopathological diagnosis of invasive breast carcinoma of the non-special type and underwent NACT treatment. The attending physician opted for the use of CEM to monitor tumor activity and surgical planning.

After the fourth cycle of NACT, CEM was repeated, and this time no areas of anomalous enhancement were seen in the early and late phases, however, the pleomorphic microcalcifications already described persisted. It was concluded that there was a complete response to NACT, that is, the disease went into remission (Figures 9-11).

The assistant Mastologist followed with a bilateral adenomastectomy. We performed the correlation of the chemotherapy response seen in the CEM images with the anatomopathological report, which observed an irregular, white, poorly delimited and firm area, measuring 7.0 × 4.0 × 3.0 and absence of viable residual neoplasia in the evaluated sample, corresponding to a rate of complete therapeutic response already seen by CEM.

The CEM acquisition protocol before and after neoadjuvant chemotherapy was performed using dual-energy mammography approximately two minutes after intravenous injection of iodinated

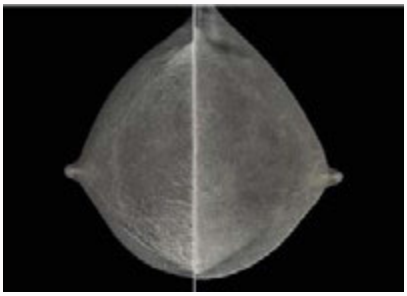

Figure 10: NACT, CEM.

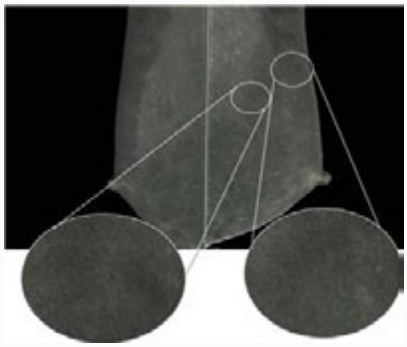

Figure 11: NACT, CEM.

contrast medium in a volume of 1.5 ml/kg of weight, without exceeding 150 ml, in the injection pump at 3 ml/sec. The Mediolateral Oblique (MLO) views were performed on the left and right breast, followed by the Craniocaudal view (CC) in the same sequence, equivalent to the early phase of the examination, and in the seventh minute, positioning and image capture were repeated only on the breast left, corresponding to the late phase. The examination was performed and monitored by a radiologist, a nurse, a nursing technician and a mammography technician.

The images generated were those of low energy and recombined. The low ones aim at the study of microcalcifications and the recombined ones at the evaluation of areas of enhancement.

The images of this case were acquired by the Senographe Pristina™ mammography unit and Voluson™ E10 ultrasound from the company GE Healthcare, at the Instituto de Mama do Amazonas LTDA (IMAM), at the Sensumed Diagnostics by Image Clinic, Manaus, Amazonas, Brazil.

Discussion

Similar to MRI, CEM helps to assess the extent of the disease and response to NACT [7], as the behavior, size and extension of the residual tumor is analyzed. The presence or absence of residual disease, when not correctly evaluated, can lead to an incomplete or radical surgical procedure, leading to shorter survival and greater comorbidity [8].

Approved for use in 2011 by the Food and Drug Administration of the United States of America, CEM has several indications, is performed in a shorter time, is cheaper compared to MRI, has similar sensitivity and specificity rates to detect lesions. Furthermore, this type of examination has no relationship with menstrual periods, obesity, claustrophobia or breast density [7].

The CEM after NACT showed a good correlation between its imaging findings and the size of the residual tumor by the histopathological result. Therefore, a careful evaluation of these images must be carried out, including the precise measurement of the tumor to avoid overestimation or underestimation, since the objective is to evaluate the existence of residual, stable disease, in progression or if there has been complete remission [8].

Among the selected works, we highlight the one by Barra, who in 2017 confirmed the feasibility of performing CEM in the control after neoadjuvant CT and the good agreement between imaging and histopathological findings [9].

The presented case showed concordance between the extension of the suspicious area in the anatomopathological specimen (7.0 cm × 4.0 cm × 3.0 cm) with the enhancement area beyond the microcalcifications in the CEM (4.0 cm). Together with this finding, the complete response to NACT in the surgical specimen was confirmed, which showed absence of viable residual neoplasia in the evaluated samples.

Conclusion

In addition to having good sensitivity and specificity in detecting suspicious lesions, CEM helps in the follow-up and planning of chemotherapy and/or surgical treatment. In this case, we proved that this exam is able to estimate not only the extent, but also how the neoplasm responds to neoadjuvant chemotherapy treatment, solidifying the method as a practical and alternative to magnetic resonance imaging.

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