

Patient history

A 37-year-old non-menopausal patient, no personal or family history of mammary or ovarian neoplasia, referred for assessment of an ACR5 mass of the LIQ of the right breast associated with suspected right axillary node (hypermetabolic PET positive lesions). The patient also has a mass type ACR 4b of LIQ of the left breast. An MRI is performed on 3T scanner with breast dedicated coils, using the following sequences: T1, T2 with fat saturation, and dynamic series after the injection of contrast agent (0.2ml/Kg) pulsed with 35 ml of physiological saline.

Morphological findings

Conventional T2 on axial plane (T2W) shows a low signal intensity in the right (Figure 1) and left breasts (Figure 2). The lymph nodes are also visible on the right side (Figure 1). The lesion of the right breast has an irregular shape and could signify the malignancy. The lesion of the left breast has a more oval shape and has smooth margins, i.e. typically benign. On the MIP (Maximum Intensity Projection) subtraction we can instantaneously detect the lesion areas (Figure 3). MIP imaging allows the rapid identification of areas of maximum enhancement (tumor, node). It must be performed from the early dynamic SE after gadolinium injection. It may be useful for the surgeon in case of multiple lesions to assess the ratios of each lesion. It cannot, however, under any circumstances be measured (and in particular measuring the distance to the nipple) (Ref.1).

In breastscape[®], inside «lesion» tab the subtracted image is fused with the Peak Enhancement threshold at 70% and curve washout (Figure 4). This threshold stands for a pathological biomarker inside the dynamic enhancement information.

In one click on each of the lesions it is possible to obtain their segmentation as well as their different morphological data (volumes, 2D Max, 3D Max) and also the distances to nipple, skin and chest (Figure 5). For each lesion, the dynamic study is completed by the analysis of the enhancement curves (Figure 6) and the different pie charts (Figure 7) obtained automatically.

Following the MR exam, the patient was sent for further biopsy analysis of lesion 3, ACR5, right breast with axillary and retro pectoral lymph nodes, and lesion of the left breast, ACR 4a.



Figure 1



Figure 2



Figure 3



Figure 4 Maps Fusion



Figure 5 Enhancement Curves



Figure 6 Enhancement Curves



Figure 7 Pie Chart Analysis

Histopathology diagnosis

The final histologic examination was confirmed on biopsy of the right and left breast and the immunohistochemical study of the prognostic factors in mammary pathology. The pathological report was the following: the mass of the right breast is a Hypoechoic mass, ACR 5, infiltrating carcinoma of the NOS (ductal) type, grade 3 of malignancy according to Elston and Ellis (3+3+2). Minimal carcinomatous component is presented in situ. The mass of the left breast is a hypoechoic mass that corresponds to breast fibroadenoma. There is no morphological sign of malignancy.

Conclusion

Morphologic and kinetic characteristics of breast lesions are regarded as a major criterion for their differential diagnosis in dynamic Magnetic Resonance Imaging (MRI). MRI can determine the size of the lesion, that could be necessary for surgical removal. breastscape® application was useful for semi-automatic (one click) segmentation of the volume and subtraction of the dynamic phases to obtain a morphological and multi-parametric analysis.

In this case, a cystic and tumoral tissues were correctly assessed. The precise post-processing evaluation is the key of correct functional assessments. An MRI-guided biopsy confirmed the diagnosis of Ductal Carcinoma In Situ (DCIS) of high grade possibly associated with papilloma. The patient was considered for neoadjuvant chemotherapy as part of the PHERGgain protocol.

References :

 Tips and techniques in breast MRI, I. Thomassin-Naggara, I. Trop, L. Lalonde, J. David, L. Péloquin, J. Chopier, Service de radiologie, hôpital Tenon, AP–HP, hôpitaux universitaires Paris Est, 4, rue de la Chine, 75020 Paris, France, Diagnostic and Interventional Imaging Volume 93, n° 11, pages 828-839 (Novembre 2012)

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