

Chapter (5) Discussion

DISCUSSION

The present study evaluated the accuracy of MR spectroscopy and diffusion technique in the characterization of benign and malignant breast lesions

MR spectroscopy is a non-invasive analytical technique that has been used to study metabolic changes in tumor cells. Several in vivo studies proved that (¹H MRS) discriminates between benign and malignant lesions of the breast by detecting the presence of choline metabolites, a marker of increased cell-membrane turnover in tumors (Bartella, 2006).

Diffusion MRI produces in vivo images of biological tissues weighted with the local microstructural characteristics of water diffusion. The mean or average diffusivity in tissue is quantified by an index called the Apparent Diffusion Coefficient (ADC).

According to the diagnostic criteria adopted in the present study, the total cases of invasive ductal carcinoma were (56 case); among the 56 case only (2 cases) were erroneously diagnosed by MRS. By applying DWI, (3 cases) were not accurately classified by the ADC, the result showed overlap between benign and malignant (ADC > 1.5), this was in contrast to Lalitha and Reddy ^[57], who reported that: using ADC values for the detection of malignant lesions showed a sensitivity of 97.22% and specificity of 100%. For carcinoma insitu (T=5); choline peak in all cases could not be detected, this may be attributed to the small size of these tumors, this was in agreement with Tozoki and Fukuma ^[53], who stated that: ¹H MRS was useful for characterizing breast lesions measuring 15 mm or larger and in contrast to Bartella et al ^[55], who concluded that: proton MR spectroscopy was successfully incorporated into breast MR imaging studies for lesions measuring 1 cm or larger. Whereas (3 cases) were misdiagnosed by DWI, the result showed overlap between benign and malignant; ADC value < 1.5, this was in contrast to Lima et al ^[59], who reported that: quantitative diffusion-weighted MR imaging could be used to identify patients with low-grade DCIS with very high specificity.

All cases of papillary carcinoma (10 cases) were accurately diagnosed by MRS while (2 cases) were misdiagnosed by DWI, the result showed high ADC values (ADC value > 1.5), however the tumors was proved histopathologically to be malignant. Our result cope with Linda et al ^[62], who reported that: Many unusual breast tumors like papillary carcinoma exhibit MRI features similar to those of benign or low suspicious lesions (well defined margins, oval shape and high signal intensity on T2 weighted images) leading to a possible misdiagnosis. Nevertheless an understanding of pathologic features of these tumors, especially tissues content (mucinous, fibrous) and growth pattern, can help to define some specific clues for their diagnosis.

Total cases of malignant phylloid tumors were (2 cases), the two cases were accurately diagnosed by MRS. The 2 cases were proved histopathologically to be malignant

although ADC value was high (ADC value > 1.5), this result cope with Pereira et al ^[60], who reported that: Malignant phyllodes tumor can have high ADC values as a result of cystic areas inside the tumor.

All (7 cases) of lymphoid hyperplasia were accurately diagnosed by MR spectroscopy, this result shows the high specificity of MR Spectroscopy in characterizing benign lesions, this was in contrast to Gary et al ^[51], who reported; Spectroscopy is unable to reveal benign breast lesions and phyllodes tumors of benign and borderline malignancy, while 2 cases were misdiagnosed by DWI, the result revealed overlap between benign and malignant in one case according to ADC value and low ADC value (< 1) in the other case. That was in agreement with Savanna Patridge et al ^[43], who reported that DWI shows potential for improving the PPV of breast MRI for lesions of varied types and sizes, however, considerable overlap in ADC of benign and malignant lesions necessitates validation of these findings in larger studies.

All fibroadenoma cases (T=14) were accurately diagnosed by MRS, Such results indicate that the MRS would be effective in the differentiation between and benign and malignant lesion. DWI result showed overlap between benign and malignant (borderline ADC) in 3 cases. According to the result some cases of fibroadenoma had irregular outlines and other show overlap between benign and malignant in which ADC value was < 1.5 (borderline). However according to Pereira FP et al ^[5], fibroadenomas with a predominant fibrous component have lower ACD values; that was similar in our cases.

6 cases of fibrocystic changes, all were accurately diagnosed by MR spectroscopy whereas 4 cases were misdiagnosed by DWI (ADC value (≥ 1 – < 1.5)), According to Odoguardi et al ^[62], the higher ADC values of cystic or necrotic areas reflect a lack of significant restriction of diffusion of water. False-negative values can be obtained in cystic/necrotic malignancies.

In this study we found that the limitation of MR spectroscopy were in characterizing small size lesions, and for diffusion-weighted imaging was the overlap between benign and malignant in some cases, also patient movement during the acquisition of the diffusion-weighted imaging can lead to inaccurate ADC values.

Despite of these limitations the result of our study suggests that MR spectroscopy is extremely useful technique in characterizing breast lesions with sensitivity of 90% and specificity of 100%. And diffusion technique can provide additional information for the characterization of breast lesions with sensitivity of 96% and specificity of 92%.