THE USE OF UNENHANCED DOPPLER SONOGRAPHY IN THE EVALUATION OF SOLID BREAST LESIONS

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ABSTRACT:

Del cura *et al* studied the doppler parameters in solid breast lesions and based on that postulated that doppler alone was not a good modality in determining malingancy of a lesion. However the detection of null or reversed diastolic flow on spectral Doppler imaging is an infrequent but highly consistent finding in malignant lesions.

INTRODUCTION:

Carcinoma breast is the second most common malignancy in females and a cause of large morbidity and mortality. Though the peak presentation of this is in above 40 years age group a possibility of the same is there is younger age group. An atypical presentation and unequivocal clinical findings warranty a need for further evaluation. An atypical malignancy with no classical sonological features of malignancy may be passed off as a benign lesion. Such lesions may not be preceded to tissue diagnosis. Thus the need for an additional aid in determining the propensity of a lesion being benign or malignant is important.

Tumor angiogenesis is found in all malignant lesions. This angiogenesis causes new, irregular and disorganized vessel formation. These vessels tend to show vessels with altered flow mechanics. These properties of the position, pattern and flow parameters was studied by Del cura *et al* and the findings in the malignant and the benign lesions were analyzed for their statistical significance.

REVIEW:

The main aim of this study was to investigate differences in Doppler sonography features between benign and malignant breast lesions and between malignant lesions with different prognostic factors and to propose diagnostic criteria for Doppler sonography of breast lesions. The sonographic criteria for differentiating between benign and malignant lesions are widely accepted. However, there is no such consensus regarding using Doppler sonography to diagnose these lesions. Several studies have used different Doppler sonography criteria—both qualitative and quantitative—to differentiate between benign and malignant lesions of the breast and to predict various prognostic factors such as axillary infiltration or grade of the tumor. These investigations have used both pulsed and color Doppler sonography. The results obtained have not always matched, so the usefulness of Doppler sonography in diagnosing breast cancer is not

currently defined.

The aim of this study was to determine the usefulness of both pulsed and power Doppler in predicting the malignancy of lesions and determining the prognosis of carcinomas. Power Doppler sonography was used in this study. Some prior studies used colour Doppler sonography for the evaluation, but possibility of the smaller vessels and vessels with slow flow not being detected is high. This limitation was overcome by usage of power Doppler ultrasound in this study. This study stated that color flow was more frequently seen in malignant than benign lesions However, they also said that based on their statistical analysis the sensitivity, specificity, positive and negative predictive values for this were low. The RI and PI values were found to be significantly higher in malignancy and although an overlap in these values was observed it was suggested that an RI of greater than 0.99 or a PI of greater than 4 were malignant. No significant relationship was found between PI, RI, or flow visualization on power Doppler sonography and tumor grade or lymph node involvement in cancers. There are various other studies done with some proving the efficacy of the Doppler evaluation based on the qualitative and quantitative criteria's and large number also disproving the use of Doppler. Del cura et al quoted that though there were many studies which postulated the presence of vascularity within a lesion as a positive point towards malignancy, however in their study which was one of the largest sample size they found no such correlation. This they suggested could be secondary to the bias in sample selection as the previous studies mostly included malignant palpable lesions. Some studies have shown that there is higher vascularity in the malignant tumors with axillary involvement and suggested that it would be useful for prognostication. However there were contradicting studies too. Del cura et al in their studies found a similar finding of increased vascularity with axillary involvement however they also said that the differences between both the groups was not found to be statistically significant. The prospective study over a period of 2 and half years was done involving 800 solid breast nodules with the use of power Doppler sonography. All of the lesions studied finally underwent tissue diagnosis for confirmation. In the technique utilized to demonstrate the vascularity was appropriate by usage of power Doppler, increasing the gain, and reducing the scan area. They also included a part of adjacent parenchyma thereby providing an adequate comparison for the same. Once the vessels were identified, 3 spectral waveforms were obtained, and the Doppler indices were calculated and averaged. This reduced the chances of errors in obtaining indices. The vessels that are found could have been categorized based on their pattern and division. Moon et al. (2000) observed in their study of 50 patients with palpable breast cancers, by using power doppler USG vascularity was detected in 73–84% of cases. The presence of penetrating vessels as a marker for malignancy produced a sensitivity of 68%, specificity of 95%. Sehgal *et al*. (2000) in their study of 74 patients stated that quantitative Doppler imaging could be used reliably to evaluate patterns of vascularity in the breast masses. Although the malignant masses exhibited a strong gradient in vascularity, core > periphery > surrounding tissue, the benign masses had relatively uniform distribution of vascularity. Svensson *et al*. (2002) in a study of 351 fibroadenomas and 117 cancers showed that the vascular morphology of abnormal masses was proving to be a useful aid in prediction of malignancy. The typical position of normal vessels with a straight or gently curved path were helpful in their distinction from pathological vessels which tend to be numerous, tortuous and abnormally positioned. Similarly, vessel branching was found to be a predictor where the greater and closer the branching, the greater the likelihood of malignancy. Ei Ueno et al. in their study suggested that malignant lesions were hypervascular, with tortuous vessels, direct and spotty pattern and

mosaic luminal colour filling. The benign lesions were found to be relatively hypovascular or avascular, and the vessels were found to be linear and marginal, with a monophasic colour tone The results of the study from the onset of the number of the lesions studied, to the age groups involved, nature of lesions, surgical outcome and finally leading to the Doppler evaluation and deriving the statistical outcome the entire dictation appears well documented and outlines the general outcome of the study. The tabulations appear lucid and clear and portray the statistical analysis findings, however the scatterogram used appears a bit difficult to interpret.

CONCLUSION

Finally Del cura et al summarizes the study by stating that Doppler should be used in conjunction with conventional sonography for a more appropriate characterization of certain indeterminate lesions. Central vessels are seen significantly in malignancy. They found that the detection of null or reversed diastolic flow on spectral Doppler imaging is an infrequent however highly consistent finding in malignant lesions. This finding has not been suggested by other studies till now. The Doppler songography was also found inadequate to predict the prognosis of patients with breast carcinoma.

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