Detection of axillary metastases in breast cancer patients using ultrasound and colour Doppler combined with fine needle aspiration cytology

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Summary

The aims of this study were to evaluate the diagnostic value of ultrasonography and colour Doppler combined with fine needle aspiration (FNA) cytology for the detection of non-palpable axillary lymph node metastases in breast cancer patients. Forty patients with operable breast cancer (T1/T2), invasive carcinoma, not submitted to neo-adjuvant therapy, underwent axillary ultrasonography and colour Doppler preoperatively. FNA cytology was performed on axillary lymph nodes presenting ultrasonographic and/or Doppler suspicious features. A total of 542 lymph nodes were surgically removed from the 40 patients; 19 were metastatic lymph nodes. Ultrasound-guided FNA detected metastases in six out of 11 histologically node-positive patients. Sensitivity and specificity in this preliminary study was 55% and 100%, respectively. These are the preliminary results of a prospective study that has the purpose of reducing the sentinel node procedures in breast cancer patients with clinically negative axillae, but positive FNA cytology.

Key words: Breast cancer; Axilla; Lymph node; Ultrasonography; FNA.

Introduction

Lymph node status still remains the most important prognostic factor in breast cancer patients. Axillary lymph node dissection has been performed as a staging procedure for many years. However, this method has a significant morbidity, which led to the introduction of the sentinel lymph node procedure [1, 2]. Still, this technique is time-consuming and the histopathological diagnosis is usually known postoperatively. This study has the purpose to evaluate the accuracy of ultrasonography and colour Doppler in combination with fine needle aspiration cytology for the detection of axillary metastases of clinically negative lymph nodes in breast cancer patients.

Materials and Methods

This is a prospective study that includes 40 patients with operable breast cancer (T1/T2, N0), with a preoperative diagnosis of invasive carcinoma based on a breast biopsy and that were not submitted to neo-adjuvant therapy. Patients underwent ultrasonography and colour Doppler of the axilla preoperatively. FNA cytology was performed in every axillary lymph nodes presenting at least one ultrasonographic and/or Doppler suspicious feature.

Ultrasonographic features evaluated were the shape and the texture of the lymph node. Globular shape, increased thickness of the cortex, hipoechogenic appearance of the germinal center and the presence of nodes within the lymph node were considered positive features. The intensity and distribution of lymph node vascularization and flow velocity was considered as Doppler features. Global increased blood flow, peripheral increased blood flow and high velocity flow were considered positive features.

Ultrasonographic and cytological results were compared with final histological diagnosis.

Results

The mean age of the patients included in this study was 58.5 years (range 38-85 years). All patients underwent modified radical mastectomy or quadrantectomy and axillary lymph node dissection. Invasive carcinoma was histologically diagnosed in all patients; 39 were ductal and one was lobular.

A total of 542 lymph nodes were surgically removed from 40 patients; 19 were metastatic lymph nodes.

Lymph node suspicious features were found on axillary ultrasonography and/or Doppler in ten patients and 11 FNA were performed. Ultrasound-guided FNA detected metastases in six out of 11 histologically node-positive patients. In one patient, two suspicious lymph nodes were found and the FNA cytology revealed the presence of metastases in one node but was negative in the other. Cytological false-negative nodes were observed in two cases and ultrasonography and colour Doppler did not reveal suspicious features in the remaining three. In two patients FNA was performed in a lymph node with suspicious features but the cytological and histological results were negative. There were no false-positive cases.

Table 1 shows the correlation between ultrasonographic and cytological results and TNM classification in true positives. Table 2 shows the correlation between ultrasonographic and cytological results and TNM classification in false negatives.

Sensitivity and specificity of this preliminary study was 55% and 100%, respectively. Positive predictive value was 100% and negative predictive value was 85%.

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Table 1. — *True positives: correlation between ultrasonographic and cytological results and TNM classification.*

Ultrasonography/Doppler suspicious LN (n)	Cytology	Histologically malignant LN (n)	TNM
2	1 malignant 1 benign	7	pT2N1biv
1	malignant	1	pT1cN1bi
1	malignant	1	pT2N1bi
1	malignant	1	pT1cN1bi
1	malignant	1	pT1cN1bi
1	malignant	1	pT2N1bi

LN: Lymph nodes.

Table 2. — *False negatives: correlation between ultrasonographic and cytological results and TNM classification.*

Ultrasonography/Doppler (n)	Cytology	Histologically malignant LN (n)	TNM
1 suspicious LN	benign	1	pT1cN1biii
1 suspicious LN	benign	1	pT1cN1biii
normal	not performed	1	pT1cN1bi
normal	not performed	2	pT2N1biii
normal	not performed	4	pT2N1biii

LN: Lymph nodes.

Discussion and Conclusions

Ultrasound can detect non-palpable axillary lymph nodes and its sensitivity can be increased by the association of Doppler study. On the other hand, FNA can increase the specificity of this technique, which makes this procedure very promising in detecting axillary metastases in breast cancer patients.

Preliminary results of this prospective study are not enough to allow a definitive conclusion. Nevertheless, our data suggests that increasing sensitivity of this technique should be very exciting in reducing the need of sentinel lymph node procedures.

The results of this study are similar to others [3-6], with sensitivity varying from 31 to 63%.

This new technique should be used as a staging procedure in breast cancer patients and can be useful in determining the choice of treatment for individual patients and estimating their prognosis.

Studies must go on to improve the potential of this diagnostic strategy.

References

[1] Giuliano A.E., Kirgan D.M., Guenther J.M., Morton D.L.: "Lymphatic mapping and sentinel lymphadenectomy for breast cancer". *Ann. Surg.,* 1994, *220,* 391.

[2] Giuliano A.E., Jones R.C., Brennan M., Statman R.: "Sentinel lymphadenectomy in breast cancer". *J. Clin. Oncol.,* 1997, *15,* 2345.

[3] Deurloo E.E., Tanis P.J., Gilhuijs K.G., Muller S.H., Kroger R., Peterse J.L. *et al.*: "Reduction in the number of sentinel lymph node procedures by preoperative ultrasonography of the axilla in breast cancer". *Eur. J. Cancer,* 2003, *39,* 1068.

[4] Kuenen-Boumeester V., Menke-Pluymers M., de Kanter A.Y., Obdeijn I.M., Urich D., Van Der Kwast T.H.: "Ultrasound-guided fine needle aspiration cytology of axillary lymph nodes in breast cancer patients. A preoperative staging procedure". *Eur. J. Cancer,* 2003, *39,* 170.

[5] de Kanter A.Y., van Eijck C.H., van Geel A.N., Kruijt R.H., Henzen S.C., Paul M.A. *et al.*: "Multicentre study of ultrasonographically guided axillary node biopsy in patients with breast cancer". *Br. J. Surg.,* 1999, *86,* 1459.

[6] Bonnema J., van Geel A.N., van Ooijen B., Mali S.P., Tjiam S.L., Henzen-Logmans S.C. *et al.*: "Ultrasound-guided aspiration biopsy for detection of nonpalpable axillary node metastases in breast cancer patients: new diagnostic method". *World J. Surg.,* 1997, *21,* 270.

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