Original Articles

Diagnostic value of ultrasound and color Doppler in identifying axillary lymph node metastases in patients with breast cancer

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Summary

Purpose: The aim of this study was to evaluate the diagnostic ability of ultrasound and color Doppler in axillary lymph node metastases of patients with breast cancer.

Material and methods: A prospective study including 55 patients with primitive, invasive, node negative breast cancer who underwent preoperative axillary ultrasound and color Doppler. Doppler and morphologic ultrasound criteria were applied to the identification of axillary lymph node metastases.

Results: The imagery study of all 55 patients identified a total of 141 nodes; 44 were considered to be positive according to established criteria. The histological examination of the axillary dissection revealed a total of 989 nodes; 77 out of 989 presented metastases; all invaded nodes belonged to 21 patients. The previous imagiologic study was positive for axillary lymph node metastases in 15 out of these 21 patients. A sensitivity of 71.4%, a specificity of 71.4%, a negative predictive value of 80.6% and a positive predictive value of 60.0% were achieved.

Conclusion: The imagery study of the axillary region through ultrasound and color Doppler might be useful in assessing axillary lymph node metastases in patients with breast cancer.

Key words: Breast cancer; Axillary nodes; Ultrasound; Color Doppler.

Introduction

Surgery has always been the classic treatment for breast cancer. However, the surgical procedure has for long been a controversial issue due not only to medical and surgical but also cultural and emotional aspects.

Therapeutic strategies for breast cancer have evolved over time and today the surgical approach tends to be more conservative, less aggressive and with lower morbidity.

Recently, sentinel node technique was introduced [1-3], an apparently accurate method for axillary staging in breast cancer, using blue dye and/or radiolabelled colloids. The objective of this technique is to avoid axillary dissection in selected patients with invasive breast cancer, reserving this procedure only for those with histological positive sentinel nodes or when the sentinel node cannot be identified. Nevertheless, this is an expensive, time consuming and invasive technique.

The aim of our study was to evaluate the diagnostic ability of ultrasound and color Doppler, a non-invasive technique, in identifying axillary lymph node metastases in patients with breast cancer.

Material and Methods

A prospective study carried out at the University Hospital of Coimbra included 55 patients. All patients underwent an ultrasound-guided or open wire-directed surgical biopsy of a breast lesion corresponding to invasive carcinoma. Tumors were T1 or T2, N0 with no indications for neoadjuvant treatment. One of the patients had a bilateral invasive breast cancer.

All patients underwent preoperative ipsilateral axillary ultrasound and color Doppler. Doppler and morphologic ultrasound criteria were applied to the identification of axillary lymph node metastases. Ultrasound morphologic criteria of metastases were node shape and texture. Doppler malignancy criteria included blood vessel density and distribution as well as flow rate.

Positive criteria for metastases were globular shape of the lymph node, cortical irregular thickening, loss of germinal centre echogenicity (Figure 1) and the presence of intranodal hypoechogenic masses (Figure 2). Increased lymph node vascularization presenting vessels mainly in the cortical area (Figure 3) and increased blood flow rates (cut-off at 12 cm) were also considered as indicators of lymph node invasion.

Results

The imagery study of all 55 patients (56 breasts) identified a total of 141 nodes: 44 were considered to be positive according to established criteria and belonged to 24 patients (25 breasts). The histological examination of the axillary dissection revealed a total of 989 nodes: 77 out of 989 presented metastases.

All invaded nodes belonged to 21 patients; the previous imagery study was positive for axillary lymph node metastasis in 15 out of these 21 patients. Six patients had histological lymph node invasion but no malignant ultrasound findings. The other nine patients (10 breasts)

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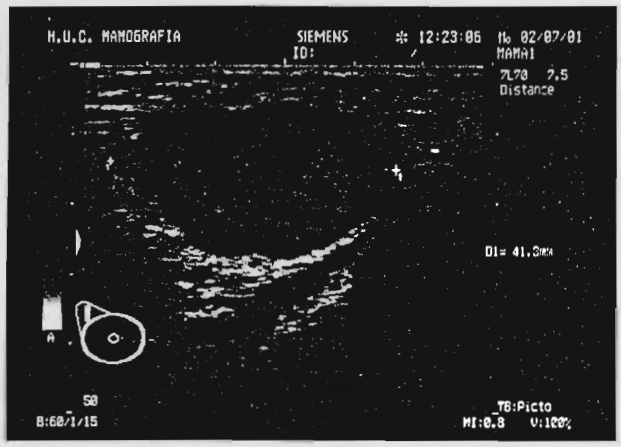

Figure 1. — Suspicious lymph node showing a globular shape, cortical irregular thickening and loss of germinal center echogenicity.

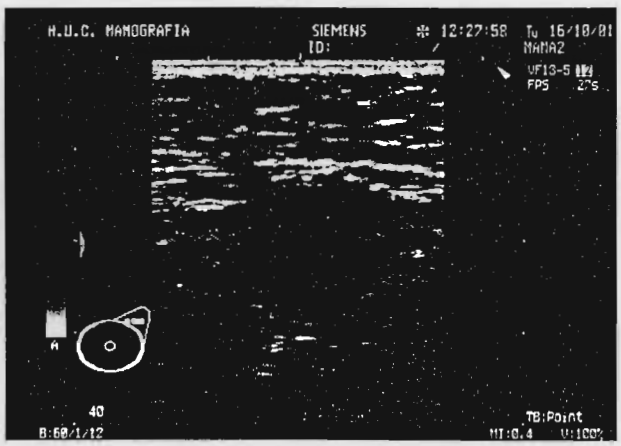

Figure 2. — Intranodal hypoechogenic mass.

Figure 3. — Suspicious lymph node with increased vascularization presenting vessels mainly in the cortical area.

Table 1. — *Results of ultrasound and histological lymph node evaluation of 55 patients (No.: breast reference number; pos: positive; neg: negative).*

No.	pTNM	Ultrasound/Doppler (No. = 127)		Histology (No. = 870)	
		pos	neg	pos	neg
1	T1c N0 M0	0	0	0	10
2	T1c N0 M0		0		22
3	T1c N0 M0		2		33
4	T1c N0 M0		4		15
5	T1c N0 M0	6	0	4	25
6	T1c N0 M0	0	0	0	16
7	T1b N0 M0	0	1	0	9
8	T2 N0 M0	0	2	0	6
9	T1b N0 M0	0	3	0	27
10	T2 N0 M0		2		23
11	T2 N0 M0	0	1	0	12
12	T2 N0 M0	0	4	0	17
13	T1c N0 M0		0		19
14	T1c N0 M0	0	4	0	18
15	T1b N0 M0	0	2	0	13
16	T1b N0 M0	1	3	2	8
17	T1b N0 M0		2		17
18	T1b N0 M0	1	0	1	16
19	T1b N0 M0	0	1	1	11
20	T1c N0 M0	0	0	0	15
21	T1b N0 M0	3	2	1	16
22	T1c N0 M0	0	0	1	23
23	T1c N0 M0	1	3	1	10
24	T1b N0 M0	1	3	1	24
25	T1c N0 M0	2	0	13	4
26	T1c N0 M0		2		13
27	T1b N0 M0	0	1	0	14
28	T1c N0 M0	0	0	0	16
29	T1b N0 M0	0	1	0	14
30	T1c N0 M0	0	3	0	20
31	T1c N0 M0	1	4	2	15
32	T1b N0 M0	0	3	0	23
33	T1c N0 M0	0	6	0	26
34	T2 N0 M0	1	3	2	10
35	T2 N0 M0	2	0	9	4
36	T2 N0 M0	0	3	0	15
37	T2 N0 M0	0	3	1	19
38	T1a N0 M0	0	2	0	18
39	T1a N0 M0	0	2	0	10
40	T2 N0 M0		1		17
41	T1c N0 M0	0	0	2	19
42	T2 N0 M0	0	2	1	17
43	T2 N0 M0	1	2	4	23
44	T1b N0 M0	0	2	0	16
45	T1c N0 M0	2	1	1	13
46	T1c N0 M0	0	7	0	20
47	T1a N0 M0	0	2	0	12
48	T1b N0 M0	0	3	0	30
49	T2 N0 M0		0		15
50	T1c N0 M0	2	0	10	15
51	T2 N0 M0	0	1	7	11
52	T1a N0 M0		2		27
53	T2 N0 M0	3	0	1	25
54	T1b N0 M0	0	1	0	12
55	T2 N0 M0	5	0	12	5
56	T1b N0 M0	0	1	0	19
		44	97	77	912

□ true positives (15) □ true negatives (25)
■ false positives (10) ■ false negatives (6)

whose ultrasound evaluation was suspicious presented no metastases in histological examination (Table 1). In one case ultrasound evaluation showed a lymph node with cortical irregular thickening and therefore the node was considered suspicious. Although the histological examination had been negative for invasion and, consequently, it was classified as a false positive, there was tumoral embolization of the subcapsular lymphatic vessels.

Overall, we had 15 true positives, 25 true negatives, ten false positives and six false negatives. A sensitivity of 71.4%, a specificity of 71.4%, a negative predictive value of 80.6% and a positive predictive value of 60.0% were achieved.

Conclusion

Should the results achieved so far be confirmed, then we may have identified a technique useful in predicting axillary invasion. This will avoid a significant number of axillary dissections in women with operable breast cancer.

Being an inexpensive, innocuous, non-invasive method, it is an attractive complement to the sentinel node technique.

In order to enhance the specificity and sensitivity of this technique we are now performing fine needle aspiration of ultrasound suspicious axillary nodes. These results will be published as soon as possible.

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