7. Graversen HP, Blichert-Toft M, Andersen JA, et al. Breast cancer: risk of axillary recurrence in node-negative patients following partial dissection of the axilla. Eur J Surg Oncol 1988;14(5):407-12.
8. Fisher B, Redmon C, Fisher ER, et al. Ten-year results of randomized clinical trial comparing radical mastectomy and total mastectomy with or without radiation. N Engl J Med 1985;312(11):674-81.
9. Saha S, Farrar WB, Young DC. Variation in axillary node dissection influences the degree of nodal involvement in breast cancer patients. J Surg Oncol 2000;73(3):134-7.
10. Grabau DA, Jensen MB, Blichert-Toft M, et al. The importance of surgery and accurate axillary staging for survivial in breast cancer. Eur J Surg Oncol 1998;24(6):499-507.
11. Chetty U, Jack W, Prescott RJ, et al. Management of the axilla in operable breast cancer treated by breast conservation: a randomized clinical trial. Edinburgh Breast Unit. Br J Surg 2000;87(2)163-9.
12. Menard S, Bufalino R, Rilke F, et al. Prognosis based on primary breast carcinoma instead of pathological nodal status. Br J Cancer 1994;70(4)709-12.
13. Giuliano AE, Kirgan DM, Guenther JM, et al. Lymphatic mapping and sentinel lymphadenectomy for breast cancer. Ann Surg 1994;220(3):391-8;discussion 398-401.
14. Krag DN, Weaver DL, Alex JC, et al. Surgical resection and radiolocalization of the sentinel lymph node in breast cancer using a gamma probe. Surg Oncol 1993;2(6):335-9;discussion 340.
15. Veronesi U, Galimberti V, Zurrida S, et al. Sentinel lymph node biopsy as an indicator for axillary dissection in early breast cancer. Eur J Cancer 2001;37(4):454-8.

Diagnostic value of ultrasound and color doppler in identifying axillary lymph node metastases in patients with breast cancer-preliminary results

Daniela Couto, Margarida Dias, Manuela Gonçalo and Carlos F. de Oliveira***
Departments of Gynaecology and *Radiology. University Hospital of Coimbra. Portugal.

Purpose. The aim of this study is to evaluate the diagnostic ability of ultrasound and color Doppler in axillary lymph node metastases of patients with breast cancer.
Methods. Prospective study including 32 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 axillary lymph node metastases identification.
Results. The imagiologic study of all 32 patients identified a total of 84 nodes; 28 were considered to be positive according to the established criteria. The histological examination of the axillary dissection revealed a total of 577 nodes; 27 out of 577 presented metastases. All invaded nodes belonged to 10 patients; the previous imagiologic study was positive for axillary lymph node metastases in 9 out of these 10 patients. A sensitivity of 90.0%, a specificity of 60.8%, a negative predictive value of 93.3% and a positive predictive value of 50.0% were achieved.
Conclusion. The imagiologic study of the axillary region through ultrasound and color Doppler might be useful to assess axillary lymph node metastases in patients with breast cancer.

INTRODUCTION

Surgery has always been the classical treatment of breast cancer. However, the surgical procedure has been, for long, 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, the 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 the axillary dissection in selected patients with invasive breast cancer, reserving this procedure only for those with histological positive sentinel nodes or in whom the sentinel node cannot be identified. Nevertheless, this is an expensive, time consuming and invasive technique.
The aim of our study is 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.

METHODS

Prospective study carried out at the University Hospital of Coimbra included so far 32 patients. All patients underwent an ultrasound-guided or an open wire-directed surgical biopsy of a breast lesion corresponding to invasive carcinoma. Tumors were T1 or T2, N0 with no indication for neoadjuvant treatment. One of the patients had a bilateral invasive breast cancer.

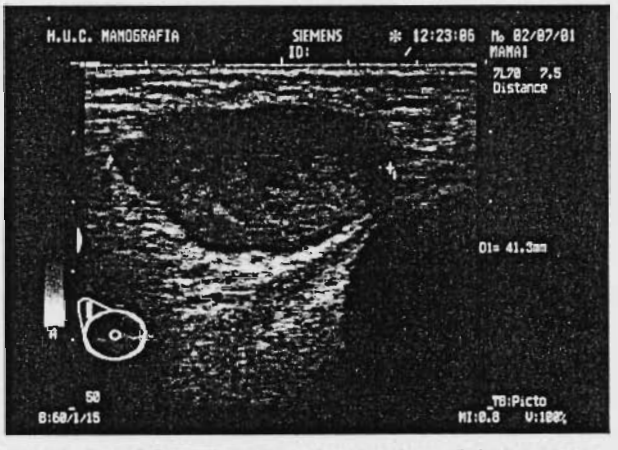

Fig. 1. Suspicious lymph node showing globular shape, cortical irregular thickening and loss of germinal centre echogenicity.

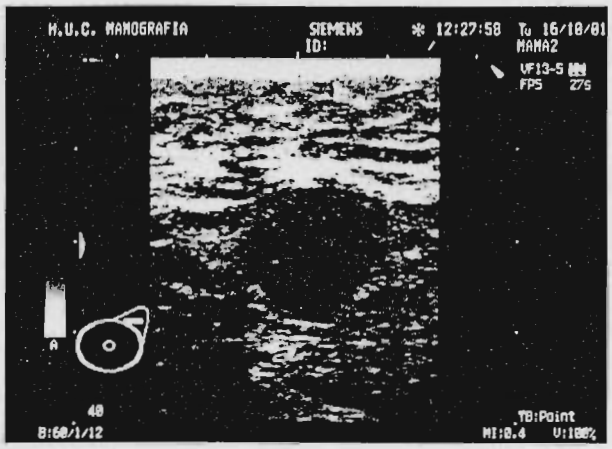

Fig. 2. Intranodal hypoechogenic mass.

All patients underwent preoperative ipsilateral axillary ultrasound and color Doppler. Doppler and morphologic ultrasound criteria were applied to the axillary lymph node metastases identification. 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 (fig. 1) and the presence of intranodal hypoechogenic masses (fig. 2). An increased lymph node vascularization presenting vessels mainly in the cortical area (fig. 3) and increased blood flow rates (cut-off at 12 cm/s) were also considered as indicating lymph node invasion.

RESULTS

The imagiologic study of all 32 patients (33 breasts) identified a total of 84 nodes: 28 were considered to be positive according to the established criteria and belonged to 17 patients (18 breasts). The histological examination of the axillary dissection revealed a total of 577 nodes: 27 out of 577 presented metastases.

All invaded nodes belonged to 10 patients; the previous imagiologic study was positive for axillary lymph node metastasis in 9 out of these 10 patients. One patient only had histological lymph node invasion but no malignant ultrasound findings. The other 8 patients (9 breasts) whose ultrasound evaluation was suspicious did not have metastases on the histological examination (table 1). In the last case, the ultrasound evaluation showed a lymph node

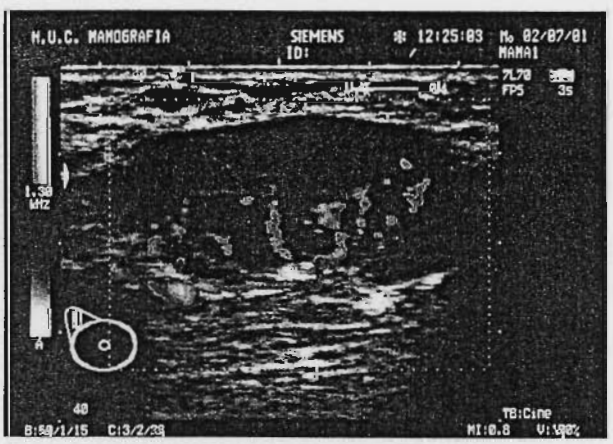

Fig. 3. Suspicious lymph node with increased vascularization presenting vessels mainly in the cortical area.

TABLE 1. **Results of the ultrasound and histological lymph node evaluation of 32 patients**

N.°	TNM	Ultrasound/Doppler (n = 84)		Histology (n = 577)	
		pos	neg	pos	neg
1	T1cN0M0	0	0	0	10
2	T1cN0M0	2	0	0	22
3	T1cN0M0	1	2	0	33
4	T1cN0M0	1	4	0	15
5	T1cN0M0	6	0	4	25
6	T1cN0M0	0	0	0	16
7	T1bN0M0	0	1	0	9
8	T2N0M0	0	2	0	6
9	T1bN0M0	0	3	0	27
10	T2N0M0	1	2	0	23
11	T2N0M0	0	1	0	12
12	T2N0M0	0	4	0	17
13	T1cN0M0	2	0	0	19
14	T1cN0M0	0	4	0	18
15	T1bN0M0	0	2	0	13
16	T1bN0M0	1	3	2	8
17	T1bN0M0	1	2	0	17
18	T1bN0M0	1	0	1	16
19	T1bN0M0	1	0	1	11
20	T1cN0M0	0	0	0	15
21	T1bN0M0	3	2	1	16
22	T1cN0M0	1	0	1	23
23	T1cN0M0	1	3	1	10
24	T1bN0M0	1	3	1	24
25	T1cN0M0	2	0	13	14
26	T1cN0M0	1	2	0	13
27	T1bN0M0	0	1	0	14
28	T1cN0M0	0	0	0	16
29	T1bN0M0	0	1	0	14
30	T1cN0M0	0	3	0	20
31	T1cN0M0	1	4	2	15
32	T1bN0M0	1	2	0	23
33	T1cN0M0	1	5	0	26
Total		28	56	27	550

N.°: breast reference number; pos: positive; neg: negative.

True positives (9) | True negatives (14)
False positives (9) | False negatives (1)

with cortical irregular thickening 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 9 true positives, 14 true negatives, 9 false positives and 1 false negative. A sensitivity of 90.0%, a specificity of 60.8%, a negative predictive value of 93.3% and a positive predictive value of 50.0% were achieved.

CONCLUSION

Should the preliminary results achieved so far be confirmed, then we may have identified a technique with a high diagnostic accuracy for 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 alternative to the sentinel node technique.

References

1. Krag DN, Weaver DL, Alex JC, et al. Surgical resection and radiolocalization of the sentinel node in breast cancer using a gamma probe. Surg Oncol 1993;2(6): 335-9.
2. Giuliano AE, Kirgan DM, Guenther JM, et al. Lymphatic mapping and sentinel lymphadenectomy for breast cancer. Ann Surg 1994;220(3):391-8.
3. Veronesi U, Paganelli G, Galimberti V. Sentinel-node biopsy to avoid axillary dissection in breast cancer with clinically negative lymph nodes. Lancet 1997;349:1864-71.

Tratamiento quirúrgico del cáncer de mama en sus estadios iniciales

José Díaz-Faes García
Fundación de Estudios Mastológicos. León.

Desde el punto de vista quirúrgico, y de forma ciertamente arbitraria, se considera cáncer de mama en estadio inicial al tumor que tras el diagnóstico es subsidiario inicialmente de tratamiento quirúrgico conservador de la mama. Esta actitud se lleva a cabo actualmente en la mayoría de los carcinomas *in situ* y microinvasores, que conforman el estadio 0 del cáncer de mama; en el estadio I, integrado por los carcinomas infiltrantes $T_1N_0M_0$ y en los $T_1N_1M_0$, $T_2N_{0-1}M_0$, con T de menos de 3 cm y $T_0N_1M_0$, que forman parte del estadio II.
La mastectomía radical de Halsted fue la intervención quirúrgica estándar para el tratamiento de cualquier tipo de cáncer de mama desde 1894 hasta bien mediado el siglo XX. En los años siguientes, el perfeccionamiento de los equipos de radioterapia y la sistematización de su empleo en el cáncer de mama hicieron que paulatinamente se fuera optando por una cirugía menos radical. A principios de los años ochenta del pasado siglo dos estudios prospectivos aleatorizados realizados en pacientes con cáncer de mama en estadios I y II, comparando una mastectomía radical de Halsted frente a una mastectomía radical modificada, proporcionaron los mismos resultados tanto en relación con el control local como con la supervivencia[1,2]. Por ello, la mastectomía radical modificada se convirtió en la terapia quirúrgica estándar para el cáncer de mama operable.
A pesar de que algunas instituciones llevaban ya muchos años realizando cirugía conservadora de la mama asociada a radioterapia con resultados muy satisfactorios, la aceptación universal de la cirugía conservadora no se consiguió hasta que se conocieron los resultados de un ambicioso ensayo llevado a cabo con tal fin, aprobado por un comité de expertos de la Organización Mundial de la Salud (OMS) en 1969.
En el *Istituto per lo Studio e la Cura dei Tumori de Milán*[3] se comparó para pacientes con tumores iguales o menores de 2 cm y axila clínicamente negativa la mastectomía radical clásica de Halsted con una cuadrantectomía con linfadenectomía axilar completa, seguida de radioterapia sobre el volumen mamario. Las pacientes que presentaban ganglios axilares afectados recibieron en ambos brazos del ensayo doce ciclos de quimioterapia adyuvante con ciclofosfamida, metotrexato y 5-fluorouracilo. La cuadrantectomía significaba en sus inicios la exéresis completa del cuadrante que contenía la neoplasia, incluyendo la piel del mismo y la aponeurosis pectoral subyacente; hoy se efectúa o bien una resección cuneiforme amplia, incluyendo una porción de alrededor de 1 cm de tejido sano en torno al tumor, con o sin un huso de piel supraadyacente al mismo o una tumorectomía simple con márgenes macroscópicamente libres de tumor. La linfadenectomía del ensayo de Milán incluyó los tres niveles ganglionares y para facilitarla se procedió a la extirpación del músculo pectoral menor. La radioterapia fue administrada entre 15 y 20 días después de la cirugía y procedía de una unidad de cobalto o de un acelerador lineal de 6 MeV, a través de dos campos tangenciales opuestos, a una dosis de 50 Gy sobre el volumen mamario. Se efectuó una irradiación adicional de la cicatriz con 10 Gy proporcionados por un equipo de ortovoltaje.
Los resultados de este estudio y de otros desarrollados en todo el mundo[4-8] pusieron de manifiesto que el tratamiento conservador de la mama era tan satisfactorio para pacientes con ganglios negativos como positivos, y aunque el control local era superior con mastectomía, la recidiva local, cuando se producía, era controlable en la mayoría de los casos y no afectaba a la supervivencia.
Por ello, la *National Institutes of Health Consensus Conference*[9] concluyó afirmando en 1991 que «el tratamiento conservador de la mama es un método apropiado para pacientes con cáncer de mama en estadio I y algunos en estadio II y es preferible porque conservando la mama proporciona, además, una supervivencia equivalente a la mastectomía».
Se ha pasado así de tener que justificar, hace unos pocos años, un tratamiento conservador a tener que justificar hoy una mastectomía. No obstante, 10 años después quedan todavía una serie de cuestiones pendientes que