Acta Medica et Biologica
Vol. 48, No.3, 97-101, 2000

The Incidence of Metastatic Internal Mammary Node Involvement in Patients with T1 Breast Cancer

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Received January 17 2000; accepted September 13 2000

Summary. **Background: It has been recommended that breast cancer patients without clinical involvement of the axilla routinely undergo sentinel node biopsy to obtain important information about the status of the axillary nodes. However, positive internal mammary nodes (i. m. n.) have been documented in patients with histologically negative axillary lymph nodes. The aim of this study was to determine whether an i. m. n. could be the first lymph node to receive malignant cells from a breast tumor.**

Patients and methods: The incidence of i. m. n. metastasis was examined retrospectively in patients with T1 breast cancer. From 1965 to 1991, 74 patients (mean age: 48 years) with T1 breast cancer underwent Halsted mastectomy with i. m. n. dissection at Niigata University Medical Hospital. The i. m. n. dissection included the internal mammary vessels and i. m. n. from the 2nd to the 4th intercostal space. Pathologic specimens were examined by hematoxylin and eosin staining.

Results: The incidence of i. m. n. metastases was 12%. Among 5 patients in whom only one tumor-positive lymph node was identified, all had a positive axillary node.

Conclusion: These results suggest it is highly unlikely an i. m. n. is the first lymph node to receive malignant cells from a breast tumor.

Key words—internal mammary node, breast cancer.

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INTRODUCTION

Axillary lymph nodes are the most common site of metastasis in breast carcinoma[1]. However, complete axillary lymph node dissection offers no survival advantage to the patient[2]. Axillary lymph node dissection is thought to be an important staging procedure in the treatment of breast cancer, and of particular value in the choice of adjuvant therapy.

The sentinel node is believed to be the first lymph node draining a particular tumor[3]. It is accepted that the sentinel lymph node predicts the status of axillary lymph node involvement of patients with breast cancer. It has therefore been recommended that patients without clinical involvement of the axilla routinely undergo sentinel node biopsy to evaluate the status of the axillary nodes[4].

Anatomic concerns related to lymphatic mapping may preclude or influence the successful location of the sentinel lymph node in patients with breast cancer. Medial lesions pose the problem of drainage into the internal mammary node (i. m. n) which exists in the intercostal spaces along the edge of the sternum in the endothoracic fascia (Fg. 1)[5] Intramammary lymphoscintigraphy can be used to define lymphatic drainage patterns in patients with breast cancer. Although sentinel nodes in the axilla can be located, lymphoscintigraphy also identifies patients with lymph drainage to other node groups, including supraclavicular, infraclavicular, and i. m. n.[6-10]. Initial drainage to an i. m. n. may account for some of the missed sentinel nodes in the axilla.

Several extensive studies have revealed that 5% to 10% of patients have i. m. n. metastases in the absence of axillary node metastases, and that the incidence of i. m. n. metastases is significantly as-

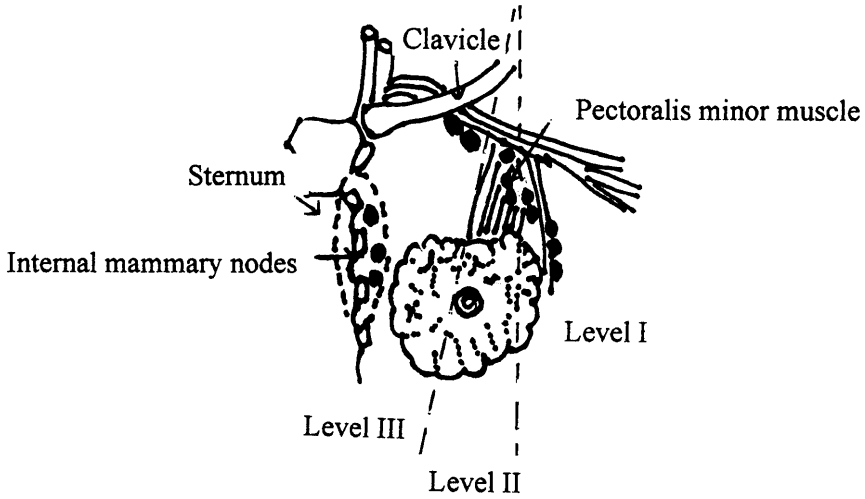

Fig. 1. Reginonal Lymph Nodes

Level I: regional lymph nodes in the low axilla.
Level II: regional lymph nodes in the mid axilla.
Level III: regional lymph nodes in the apical axilla.

sociated with the maximum diameter of the primary tumor[11-16]. These studies examined the incidence of i. m. n. metastases and its relationship to axillary node metastases, tumor size, and tumor location. It is possible that the incidence of i. m. n. involvement in patients without axillary metastases is much lower when the analysis is confined only to patients with tumors less than 2 cm in diameter. Patients with breast cancers of this size are thought to be candidates for sentinel lymph node mapping[11]. Prior studies which have identified the incidence of i. m. n. metastases in such patients with breast cancers 2 cm or less in diameter are limited[17]. Therefore, we have reviewed patients with carcinoma of the breast treated with Halsted mastectomy with i. m. n. dissection to evaluate the possibility that an i. m. n. could be the initial lymph node to receive malignant cells from a breast tumor.

PATIENTS AND METHODS

From 1965 to 1991, 499 patients with invasive breast cancer were treated at Niigata University Medical Hospital. One hundred and sixty-four patients had tumors classified as T1 (diameter = or < 2 cm)[5]. In the period studied, the indications for extended mastectomy were as follows: 1) from 1970 to 1980, most of the patients underwent this procedure regardless of location or tumor size; 2) from 1981, patients with primary tumors larger than 1 cm in diameter in the medial quadrants and those with lateral quadrant tumors greater than 5 cm in diameter or with clinically positive axillary lymph nodes underwent this procedure. Of the 164 patients with T1 breast cancer, 74 underwent extended radical mastectomy (i. e., Halsted mastectomy with i. m. n. dissection). The mean age was 48 years, with a range from 15 to 78. The site of the primary tumor was medial in 48 patients (64.8%), lateral in 23 (31.1%), and central in 3 (4.1%). The classic Halsted mastectomy with removal of the breast, pectoral muscles, and axillary contents en bloc was performed. The internal mammary dissection included the internal mammary vessels and lymph nodes from the second to the fourth intercostal space. The mean number of nodes removed and examined was 18.6 per patient. The mean number of nodes was 14.9 from the axilla, 1.4 from the apical axilla, and 1.4 from the i. m. n. chain. Pathologic specimens were examined by hematoxylin and eosin staining. The incidence of i. m. n. metastasis was examined retrospectively.

Statistics

A chi-square test was used to examine differences in proportions. Differences were considered significant when P values were <0.05. All statistical analyses

were carried out using StatView 4.1 for Windows.

RESULTS

Location of metastatic disease in patients with T1 breast cancer is shown in Table 1. The presence or the absence ofaxillary metastases is an important factor indicating the involvement of i. m. n. Of the 50 cases without level I+II, 1 (2%) showed i. m. n. involvement, while of 24 with axillary node metastases, 9 (12.2%) had i. m. n. metastases (p=0.0001) (Table 2). Axillary nodal status in levels I and II in patients with i. m. n. involvement is shown in Table 3. All but one patient with i. m. n. disease had metastatic involvement of the axillary lymph nodes. One patient with i. m. n. disease had supraclavicular node metastases. In five patients with T1 breast cancer, only one tumor-positive lymph node was identified. All of these 5 patients had positive nodes in the axillary region (Table 4).

Table 1. Lymph node involvement in patients undergoing Halsted mastectomy with i. m. n. dissection with T1 breast cancer

Lymph nodes	No.	%
Total	25/74	(33.8%)
Level I+II	24/74	(32.4%)
i. m. n.	9/74	(12.2%)

i. m. n, internal mammary lymph nodes;
Level I+II, regional lymph nodes in the low axilla and the mid axilla.

Table 2. Frequency of metastases to internal mammary lymph nodes according to the presence of axillary node involvement

Level I+II	No. of patients	i. m. n.$^+$	%
Negative	50	1	2.0
Positive	24	8	33.3
Total	74	9	12.2

Level I+II, regional lymph nodes in the low and the mid axilla;
i. m. n.$^+$, internal mammary lymph nodes positive.

Table 3. Nodal status in Levels I+II of patients with internal Mammary lymph node involvement

Patient number	Age	Location	Tumor diameter (cm)	Total lymph nodes	i. m. n.	LevelI+II
1	61	medial	2.0	2/18	1/1	1/17
2	57	medial	2.0	3/ 7	1/1	2/ 5
3	30	medial	2.0	4/14	1/1	3/13
4	65	medial	2.0	9/36	1/2	0/ 6
5	35	medial	2.0	10/23	1/2	9/19
6	44	medial	2.0	19/31	1/2	17/26
7	39	medial	2.0	38/44	1/2	30/32
8	38	medial	1.2	12/36	2/6	10/29
9	43	medial	1.0	14/34	3/4	10/28

i. m. n, internal mammary lymph nodes;
Level I+II, regional lymph nodes in the low axilla and the the mid axilla.

Table 4. Nodal status in internal mammary lymph nodes of patients with only one positive node

Patient number	Age	Location	Tumor diameter (cm)	Total nodes dissected	LevelI+II	i. m. n.
10	62	medial	2.0	17	1/14	0/3
11	43	lateral	2.0	10	1/ 6	0/2
12	56	lateral	1.0	15	1/14	0/1
13	57	medial	1.0	10	1/ 9	0/1
14	46	medial	1.0	23	1/17	0/2

i. m. n, internal mammary lymph nodes;
Level I+II, regional lymph nodes in the low axilla and the mid axilla.

DISCUSSION

Our results show that lymph node metastasis to i. m. n. is not a frequent finding in patients undergoing Halsted mastectomy plus i. m. n. dissection for T1 breast cancer.

Anatomic concerns related to lymphatic mapping may influence the successful localization of a sentinel lymph node. However, Cox and his colleagues have shown that the incidence of skip metastasis, defined as negative sentinel lymph nodes with positive nodes higher in the chain, is very low (0.21%)[6]. Our data suggest that failure to identify the sentinel lymph node because of direct drainage to i. m. n. is unlikely in patients with T1 breast cancer, especially those with negative axillary nodes.

We studied patients with T1 breast cancer to examine the incidence of i. m. n. metastasis. Sentinel lymph node mapping is thought to have a significant impact on staging morbidity[18]. A greater incidence of positive sentinel lymph nodes has been reported in patients with larger invasive tumors. In addition, the accuracy of sentinel lymph node biopsy appeared to diminish with increasing tumor size because of alternate lymphatic drainage pathways[8].

There are some limitations to our study. First, the number of patients studied was small. Second, patients were not randomized prospectively with regard to the operation performed. One problem we faced was potential bias in the evaluation of our results because of an unbalanced distribution of tumor diameters and quadrants of origin of breast cancer. The number of tumors in the medial quadrants was greater than that in the lateral quadrants. Cancers in the medial quadrants typically are smaller than lateral tumors due to treatment algorithms used during the study period. It has been reported that the incidence of positive i. m. n. is higher in patients with medial lesions than those with lateral lesions[12]. All five patients with only one tumor-positive lymph node had nodal disease in the axillary region, despite a high incidence of cancers located in the medial part of the breast. This result is compatible with the findings by Valagussa and colleagues that only one of 52 patients with cancers less than 2 cm in diameter had positive i. m. n. and negative axillary nodes[17]. Therefore, we believe that our conclusion that it is highly unlikely that a single i. m. n. initially receives malignant cells from a T1 breast cancer remains valid.

It is well known that the incidence of i. m. n. nodal disease increases in patients with axillary lymph node involvement. In fact, all but one patient with i. m. n. disease had metastatic involvement of the axillary lymph nodes in the present study. It is not necessary to remove i. m. n. surgically, although patients with positive sentinel lymph nodes require complete axillary node clearance. It has been established that there are no beneficial effects from i. m. n. dissection on lengths of either disease-free survival or overall survival in patients undergoing breast cancer surgery[19].

Our results suggest that it is highly unlikely that a single i. m. n. initially receives malignant cells from a T1 breast cancer. Further studies are needed to determine lymph drainage to the internal mammary, supraclavicular, or infraclavicular nodes in larger patient populations in which scintigraphic results can be correlated with surgical findings.

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