Stage Migration After Biopsy of Internal Mammary Chain Lymph Nodes in Breast Cancer Patients

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Background: Involvement of the internal mammary chain lymph nodes (IMNs) is associated with worsened prognosis in breast cancer. Use of lymphoscintigraphy to visualize sentinel nodes reveals that IMNs often receive lymph from the area containing the tumor.

Methods: We biopsied IMNs in 182 patients because there was radiouptake to the IMNs or because the tumor was located in the medial portion of the breast. After tumor removal, pectoralis major fibers were divided to expose intercostal muscle. A portion of intercostal muscle adjacent to the sternum was removed. Lymph nodes and surrounding fatty tissue in the intercostal space were freed, removed, and analyzed histologically. The pleural cavity was breached in four cases (2.2%), with spontaneous resolution.

Results: IMNs were found in 160 (88%) of 182 patients; 146 (94.4%) were negative and 14 (8.8%) were positive. The latter received internal mammary chain radiotherapy. The axilla was negative in 4 of 14 cases and positive in 10.

Conclusions: IMNs can be quickly and easily removed via the breast incision with insignificant risk and no increase in postoperative hospitalization. The patients with a positive IMN migrated from NO (4 cases) or N1 (10 cases) to N3, prompting modification of both local (radiotherapy to internal mammary chain) and systemic treatment; without IMN sampling, they would have been understaged.

Key Words: Breast cancer—Stage migration—Internal mammary chain—Sentinel node biopsy.

The last two decades have seen major advances in the treatment of breast cancer, thanks to greater understanding of breast cancer biology, advances in technology, earlier detection, and improved staging. It is now often possible to conserve the breast and spare the axillary nodes. The development of regional lymph node mapping has been fundamental in improving the staging of breast cancer. After initial reports in the mid 1990s, numerous series have demonstrated that sentinel node biopsy can reliably predict axillary node status, permitting avoidance of complete axillary dissection when the biopsied node is negative. However, use of this technique requires a more complete and careful pathologic examination of the sentinel node than is traditionally performed on lymph nodes, and this has led to the more frequent discovery of micrometastases, with improved staging accuracy as a consequence.

When radioactive tracer plus lymphoscintigraphy is used to localize the sentinel nodes before surgery, lymph nodes in the internal mammary chain are sometimes picked out. This lymphatic drainage pathway from the breast has been ignored in recent decades after randomized trials that showed that internal mammary chain dissection did not improve survival. Nevertheless, the long-term results of these trials did show that the metastatic status of the internal mammary chain is as important prognostically as the status of the axillary nodes.
nodes and, in particular, that the prognosis is very unfavorable if both axillary and internal mammary chain lymph nodes (IMNs) are involved.\textsuperscript{20,24,25} We decided to perform a pilot study to assess the feasibility of biopsying IMNs, to determine how often they are metastatic, and to assess the effect of their status on disease stage and consequent adjuvant therapy decisions.

**PATIENTS AND METHODS**

Between September 1998 and September 2001, we explored IMNs in 182 consecutive patients with breast cancer conforming to one of the following criteria: (1) radioactive uptake to the IMN region, as revealed by lymphoscintigraphy after peritumoral (131 cases) or superficial (16 cases) injection of radiotracer, or (2) tumor location in the medial portion of the breast, as defined in Fig. 1. The characteristics of these patients are listed in Table 1.

In 30 patients, surgical exploration of the opened intercostal space did not reveal macroscopically identifiable lymph nodes: these are in any event small and difficult to distinguish from adipose lobules. In these cases, we removed the adipose tissue and sent it to the pathologist; in 22 cases (12.0\% of total), no lymph nodes were found. These 22 patients are not considered further.

Of the remaining 160 patients, 154 received conservative breast surgery, and 71 of these underwent axillary dissection; the remaining 83 received axillary sentinel node biopsy as the only axillary treatment. Six patients received ablative surgery, one of whom was not given axillary dissection.

Radiotracer was injected before surgery in 147 patients, and radioactive take-up was observed in the IMN area in 95 of these. In the 52 patients in whom no take-up was observed in this area and in the 13 patients in whom no tracer was injected (65 cases in all), we sampled IMNs without the aid of a gamma-detecting probe. In these 65 patients, the tumor was always located medial to a vertical line drawn to touch the lateral margin of the areola (Fig. 1). Taking into account the anatomy of the lymphatic network of the breast, we decided to explore the second intercostal space if the tumor was located in the inner-upper quadrant and to explore the third intercostal space if it was in the lower quadrant. Post hoc analysis of scintigraphic data in 147 patients revealed that for tumors in the upper quadrant (101 cases), the radioactive node was in the first space in 6 cases, in the second space in 68 cases, and in the third space in 27 cases. For tumors in the lower quadrant (41 cases), the hot node was in the second space in 2 cases, in the third

**TABLE 1. Patient characteristics**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Data</th>
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<tbody>
<tr>
<td>No. of consecutive patients considered</td>
<td>182</td>
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<tr>
<td>No. of patients with internal mammary node sampled</td>
<td>160</td>
</tr>
<tr>
<td>Mean age of 160 patients (y)</td>
<td>52.0</td>
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<tr>
<td>Breast side</td>
<td></td>
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| Left | 72 (45.0\%)
| Right | 88 (55.0\%)
| Breast quadrant containing tumor | |
| Upper Outer | 8 (5.0\%)
| Upper Inner | 103 (64.4\%)
| Lower outer | 4 (2.5\%)
| Lower inner | 39 (24.4\%)
| Central | 6 (3.7\%)
| Lymphoscintigraphy | |
| Yes | 147 (91.9\%)
| No | 13 (8.1\%)
| Site of intercostal space biopsy | |
| I | 6 (3.8\%)
| II | 87 (54.4\%)
| III | 64 (40.0\%)
| IV | 2 (1.2\%)
| II + III | 1 (0.6\%)
| Surgery | |
| Quadrantectomy | 154 (96.3\%)
| Mastectomy | 6 (3.7\%)
| Mean diameter of primary tumor (mm) | 17.8

**FIG. 1.** Diagram illustrating the policy for internal mammary chain lymph node (IMN) biopsy in the absence of radio-uptake to the IMN region. II/III i.s., 2nd/3rd intercostal space.