Assessment of Axillary Lymph Node Status

G. C. DAVIES, F.R.C.S., ROSEMARY R. MILLIS, M.R.C.PATH., J. L. HAYWARD, F.R.C.S.

Three methods of assessing axillary lymph node status were compared: In 149 patients assessed clinically, positive nodes were not detected in 31 (45%) of 69 patients with pathologic Stage II disease. Histologic examination of selected axillary nodes biopsied from 54 patients immediately prior to mastectomy, failed to detect metastatic disease in 11 (42%) of 26 patients with pathologic Stage II disease. Examination of lymph nodes in the axillary tail of 95 mastectomy specimens failed to diagnose axillary involvement in six (14%) of 43 patients with pathologic Stage II disease. Thus, none of the techniques determined the extent of axillary node involvement.

From the Imperial Cancer Research Fund, Breast Cancer Unit, Guy's Hospital, London, England

THERE CONTINUES TO BE controversy on the best treatment for operable breast caner. There is divergence of opinion regarding the form of surgery to be performed and on the possible requirement of adjuvant therapy.

Simple mastectomy, with radical radiotherapy to the axilla, supraclavicular fossa and internal mammary chain, is probably equivalent to the radical operation in terms of distant recurrence and survival. More conservative surgery, in which the breast is retained, is less cosmetically damaging and therefore more desirable for many patients. Studies indicate that the results of such treatment in patients with clinically uninvolved axillary lymph nodes are not inferior to those obtained with radical or simple mastectomy in terms of survival and freedom from distant recurrence. However, there is a significantly higher incidence of local recurrence. This occurs most frequently in the axilla, probably arising in metastatic deposits in lymph nodes which were not detected by clinical staging and which were unaffected by adjuvant radiotherapy.[2,9]

In recent years there has been a growing awareness that systemic disease is already present in many patients presenting with involved axillary nodes. This concept has led to the increasing use of adjuvant chemotherapy or hormone therapy, particularly for patients with heavily involved axillae. Patients with four or more involved axillary nodes have a considerably worse prognosis than those in whom less than four nodes contain metastases.[4]

Thus, an accurate knowledge of axillary lymph node involvement is essential when planning treatment of apparently operable breast cancer, irrespective of what form of primary surgical treatment is undertaken and is the best available guide when attempting to evaluate prognosis. Clinical assessment alone of axillary lymph node status is known to be inaccurate. The error rate has been variously reported, but is usually at least 25% in patients with negative axillae and may be even greater when the nodes are involved.[2,12,16] At present, the only certain way of assessing axillary node status accurately is by total axillary clearance. Attempts to stage without total clearance have included pre- and intraoperative surgical and radiologic techniques, but, so far, none of the methods described completely eliminates the error and all suffer from inherent technical difficulties.

This paper reports an investigation into two further approaches to the problem of assessing axillary lymph node status without extensive axillary lymph node dissection. The first study was undertaken to see whether biopsy of one or two selected axillary nodes, as a separate procedure from definitive surgery, was a helpful adjunct to clinical staging. The second study was an attempt to investigate the report of Forrest, et al.[8] who found that examination of pectoral and axillary tail lymph nodes obtained during simple (total) mastectomy gave a reliable index of the total axillary status.

For descriptive purposes in this paper, patients with clinically uninvolved nodes ($N_{0 \text{ or } 1a}$) are referred to as clinical Stage I and those with clinically involved nodes (N_{1b}) as clinical Stage II. When the nodal status is determined histologically they are referred to as pathologic Stage I and II respectively.

Clinical Staging

One hundred forty-nine consecutive patients with operable breast cancer (T_{1-3} $N_{0,1a \text{ or } b}$ M_0) were included in the study. All underwent a radical mastectomy. In the first 54 patients axillary node biopsy was performed beforehand and in the subsequent 95 pa-

Reprint requests: J. L. Hayward, F.R.C.S., Imperial Cancer Research Fund, Breast Cancer Unit, Guy's Hospital, London, England.

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tients, the axillary tail nodes were examined in the mastectomy specimen separately from the other axillary nodes. The mastectomy specimens were dissected before fixation. The tissue was processed routinely and two levels of the paraffin block of each node were examined histologically. The mean number of nodes detected was 24 (range: 8–40). All the 149 patients were classified clinically according to axillary node status. Ninety-two (62%) were judged to have clinical Stage I tumors and 57 (38%) to have clinical Stage II tumors. Metastatic tumor was found on histologic examination of the axillary lymph nodes in 31 of the clinical Stage I tumors—an error rate of 34%. Nineteen of the clinical Stage II patients did not have involved axillary nodes. An error rate of 33% (Table 1).

Of the 149 patients studied, 69 were eventually found to have pathologic Stage II disease. Thirty-one of these were misdiagnosed on clinical examination (45%).

TABLE 1. *Clinical Staging*

Clinical Stage	Total	Pathologic Stage I	Pathologic Stage II	Error (Per Cent)
I	92	61	31	34
II	57	19	38	33

Axillary Lymph Node Biopsy

Materials and Methods

Fifty-four patients were included in this study. After histologic confirmation of the diagnosis of infiltrating carcinoma, an axillary lymph node biopsy was performed prior to radical mastectomy through an incision along the axillary aspect of the lateral border of the pectoralis major. The fat deep to this muscle was dissected until the pectoralis minor was reached. Fibro-fatty tissue at about the level of the third rib, adjacent to the lateral thoracic vessels, was then inspected and any obvious lymph node removed. This was termed the "pectoral node." The higher axillary contents were then palpated and if any other obvious node could be felt this was also removed. This was termed the "most prominent axillary node." The axillary incision was closed, the surgical field redraped and the patient then underwent a radical operation which encompassed both biopsy incisions.

The biopsied axillary nodes were examined by frozen section and then fixed and routinely processed for paraffin section.

Results

The results of the lymph node biopsies are shown in Table 2. Twenty-six of the 54 patients in this group proved to have pathologic Stage II carcinomas. Tumor was found in the biopsied node in 15 patients. Five of these patients were clinical Stage I and the use of node biopsy reduced the error in the clinical diagnosis of Stage I from 34 to 19%. All the nodal deposits were detected in both frozen and paraffin sections.

TABLE 2. *Staging by Axillary Lymph Node Biopsy*

Axillary Lymph Node Biopsy	Pathologic Stage I	Pathologic Stage II
Negative	28	11
Positive	—	15

Eleven patients with pathologic Stage II disease had negative node biopsies and positive nodes were detected only when the mastectomy specimen was dissected. Thus positive nodes were missed in 11 of 26 patients with pathologic Stage II disease, an error rate of 42%. In these 11 patients, however, axillary involvement was slight with less than four positive nodes in each case.

Axillary Tail Lymph Node Dissection

Materials and Methods

During routine dissection of radical mastectomy specimens the axillary nodes are categorized into three levels. This is facilitated by the surgeon who, while performing the mastectomy, marks the specimen with suitably placed sutures or clips. Low level nodes are deemed to lie below and lateral to the pectoralis minor muscle, middle level nodes lie behind the pectoralis minor and high level nodes are those found above the medial edge of the muscle. During this study a further stage was added to the dissection of the specimen. Nodes from the axillary tail of the breast such as would have been included in a simple mastectomy as described by Forrest et al.[8], were considered separately from the other low axillary nodes. Lymph nodes from the upper border of the axillary tail, which Forrest et al.[8] term the "pectoral nodes" were also included in this group.

Results

Ninety-five radical mastectomy specimens were examined as above. Lymph nodes were found in the axillary tail of the breast in 86 specimens and ranged from one to 25 in number with an average of six.

Thirty-seven patients had axillary tail lymph nodes involved by tumor. These included all but one of the patients with heavily involved axillae (four or more nodes). Included in these are two cases in which, although no nodes were found within the axillary tail,

TABLE 3. *Staging by Dissection of Axillary Tail Lymph Nodes*

	Number of Cases	Total Axillary Nodes Negative	Total Axillary Nodes Positive
Axillary tail nodes negative	49	46	3
Axillary tail nodes not found	9	6	3

other low axillary lymph nodes were obviously involved by tumor on gross examination. These nodes were included in the axillary tail dissection as the "pectoral nodes," even though they were located well above the upper border of the axillary tail, as they would certainly have been palpable and easily biopsied during a simple mastectomy.

In three of the 49 patients in whom axillary tail lymph nodes did not contain tumor, positive nodes were found higher in the axilla on subsequent dissection of the mastectomy specimen (Table 3), but in each patient axillary involvement was slight, with only 1 or 2 positive nodes.

In nine of the patients, no lymph nodes were found in the axillary tail. On subsequent dissection of the mastectomy specimen, involved nodes were found in three of these patients (Table 3). One of these three patients had more than four involved axillary lymph nodes.

Forty-three patients in this group had pathologic Stage II tumors. Six patients (14%) were not diagnosed by axillary lymph node dissection, although only three of these were in the 86 patients in whom axillary tail lymph nodes were found. None of these three patients had more than three positive nodes.

Discussion

These studies indicate that it is possible to improve on the determination of axillary nodal status without total dissection. However, in neither of the biopsy studies was the error eliminated.

In a recent report from Sweden, Adami et al.[1] also used axillary node biopsy to improve on clinical staging of early mammary carcinoma. In their study, imprints of biopsied axillary lymph nodes were examined perioperatively and total axillary node dissection only done if the imprint showed the presence of malignant cells. After five years of follow-up they found axillary recurrence in three of the 63 patients who had negative imprints and therefore had no further treatment to their axillae. This implies an error rate of at least 5% in patients who had been assessed as having Stage I disease by this technique.

In the second of the present biopsy studies, examination of axillary tail lymph nodes appeared to give a more accurate assessment of total axillary node status than clinical examination with or without axillary node biopsy. However no lymph nodes could be found in the axillary tail of nine patients. Forrest et al.[8] also failed to identify axillary tail lymph nodes in 13% (8 of 60 patients). This appears to be an inherent limitation of this method.

Furthermore, in three patients in whom negative lymph nodes were found in the axillary tail of the breast, nodes higher in the axilla were found to contain metastatic tumor. Previous studies have shown a similar incidence of metastases apparently bypassing an axillary level.[3,15] This may be due to true skipping of an axillary level, or due to failure to demonstrate small secondary deposits in the lower nodes. It has often been shown that routine methods of sectioning lymph nodes will miss up to 20 or 30% of small metastatic depositis.[7,13,14,17]

Both the biopsy techniques used in the current studies appear to detect the majority of heavily involved axillae, but they do not allow for quantitative assessment of the axilla nor do they allow for determination of the level to which the metastases have reached. In addition, if only small metastatic deposits are seen in the sampled lymph nodes, it is not possible to know whether or not large deposits, or even extranodal extension, are present elsewhere. The relevance of these factors is that knowledge of the number and extent of node involvement probably gives us more precise information on prognosis than any other feature of the tumor.[3,5,6,10,11,15] With current studies suggesting that adjuvant chemo- or endocrine-therapy may reduce recurrence and improve survival in high risk premenopausal women, an accurate assessment of prognosis is essential. Lymph node biopsy by the techniques described above does not provide all of this information, although it does improve to some extent on the information provided by clinical examination alone (Table 4). These studies suggest that, in terms of the axilla, nothing short of total clearance can achieve optimal assessment of axillary nodal status.

TABLE 4. *Error in Detection of Positive Axillary Lymph Nodes by the Three Methods*

	Clinical	Axillary Node Biopsy	Axillary Tail Node Dissection
Total patients in study	149	54	95
Pathologic Stage II	69	26	43
Positive axillary nodes missed	31 (45%)	11 (42%)	6 (14%)

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