Management of Nonpalpable Breast Abnormalities

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From January 1982 to June 1986, 444 patients had localization of 500 nonpalpable mammographically suspicious lesions using the Kopans hook wire technique. Four hundred ninety-nine biopsies were performed in 443 patients. Cancer was identified in 12% of the biopsies performed for a suspicious mass or density and in 20% of biopsies performed for suspicious calcifications. Carcinoma was identified in a total of 72 biopsies (14%) performed in 65 patients; 82% of the malignant lesions were invasive. All lesions were small; 76% of the cancers were 1.0 cm or less in diameter. Sixty-two axillary dissections were performed of which seven (11%) had positive nodes. Advantages of preoperative needle localization include precise localization of the lesion, a small incision, and removal of a small amount of breast tissue with no cosmetic deformity. Outpatient biopsy of these lesions can be easily performed under local anesthesia. Identification and treatment of these small preclinical cancers should lead to improved survival from breast cancer.

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OTHER THAN LUNG CANCER, cancer of the breast accounts for more deaths of American women than any malignancy. It is estimated that about 120,000 cases of breast cancer will be diagnosed in 1986 and that approximately 40,000 women will die of the disease.[1] Because breast cancer will develop in 9% of women, every woman should be considered at risk. Identifying breast cancers before they become palpable should improve survival rates.[2]

Mammography provides the most effective method for early detection of nonpalpable breast cancer.[2] Several studies have shown improved patient survival rates from mass screening with serial mammography.[3] A biopsy must be performed on suspicious mammographic abnormalities to allow appropriate treatment if cancer is identified. These biopsies require either a large blind breast biopsy or some type of preoperative localization procedure. We describe our experience with breast biopsy after preoperative needle localization of nonpalpable mammographically identified breast abnormalities.

Methods and Materials

Records of patients at our hospital who had breast biopsy of nonpalpable suspicious mammographic abnormalities from January 1982 to June 1986 were retrospectively reviewed. There were 500 suspicious lesions localized in 444 patients. Suspicious mammographic findings were classified as: (1) a mass or density; (2) a suspicious clustering of calcifications; or (3) a mass that contained calcifications. Patients had preoperative localization by our radiologists using the Kopans hook wire localizing system that was performed under local anesthesia using a xeromammogram unit in an outpatient radiology suite.

Using a modification of the Kopans technique,[4] a needle was inserted perpendicular to the chest wall under mammographic control so that the tip of the needle was positioned adjacent to the suspicious lesion. A hooked wire was then advanced through the needle and the needle retracted. Completion craniocaudad and lateral mammograms were then obtained to confirm final placement of the hook wire. The lesion was considered appropriately localized when the tip of the wire was within 1 cm of the lesion on both views. Most lesions were localized with a single wire, but many patients had more than one lesion localized.

At this point the wire was bent at skin level, covered with a sterile dressing and the patient was transferred to

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TABLE 1. *Age of Patients*

Age (years)	Entire Group (444)* No. of Patients	%	Patients with Cancer (65)† No. of Patients	%	Per cent with Cancer by Age Group
30–39	19	4	0	0	—
40–49	66	15	2	3	2
50–59	142	32	22	34	15
60–69	143	32	25	39	17
70–79	68	15	14	22	21
80–89	6	1	2	3	33

* Age range: 32–82; mean: 60.
† Age range: 45–82; mean: 64.

the operating room with the final mammograms. The hook in the wire prevented its dislodgement during transportation of the patient and preparation for surgery. Biopsies were performed under general or local anesthesia, usually on an outpatient basis. The biopsy specimen included a segment of breast tissue containing the wire.

Specimen radiography was not used routinely but was used on the majority of patients with calcifications. Frozen-section diagnosis was used on all biopsies. Occasionally the frozen-section diagnosis was the basis for proceeding at the time of biopsy with definitive treatment of breast cancer. In addition, if carcinoma was identified on frozen section and the lesion was large enough, tissue was sent for estrogen and progesterone receptor assay.

Results

After 500 localization procedures, 499 biopsies for nonpalpable mammographic lesions were performed in 443 patients. An additional patient had a cyst drain spontaneously during the localization procedure. This mammographic abnormality disappeared completely, thus eliminating the need for biopsy. Preoperative localization was done for two lesions in 45 patients and for three lesions in six patients. A statistically significant change in the incidence of breast cancer was noted at age 50 (Table 1).

TABLE 3. *Mammographic Indications for Biopsy*

Finding	Entire Group (444) # Abnormalities	%	Patients with Cancer (65) # Cancers	%	Per cent Malignant
Mass	292	58	35	49	12
Calcifications	184	37	36	50	20
Mass with calcifications	24	5	1	1	4
Total	500		72		

Only two of 85 patients (2%) younger than 50 years were found to have breast cancer, but the incidence of cancer increased significantly at age 50.

In most patients, mammography was performed as routine screening (Table 2), and in the remaining patients the symptoms were judged not to be caused by the patients' mammographic abnormality. Although the mammographic indication for biopsy was more frequently a suspicious mass or density than suspicious calcifications, the distribution of the cancers was about equal (Table 3); more of the patients with suspicious calcifications had occult malignancy (20%). Benign breast tissue was identified in 86% of the biopsies (Table 4). The 72 cancers (14%) were identified in 65 patients, one of whom had bilateral invasive carcinomas. In fact, 83% of patients had invasive lesions (Table 5). In our series, 12 patients had false-negative pathology reports on frozen section and one had a false-positive frozen section; this patient, who was under general anesthesia, had an axillary dissection only. Most of the lesions were small (Table 6); about half of the lesions (51%) were 0.5 cm or smaller or were unmeasurable. Multicentricity, defined as a focus of invasive or noninvasive carcinoma away from the biopsy site, was present in 16 patients (24%). Two patients had bilateral breast cancer (3%). Most patients with cancer were treated by total mastectomy and axillary dissection (Table 7). Six of seven patients having biopsy and axillary dissection had radiation therapy. One of these patients had bilateral

TABLE 2. *Indication for Mammogram*

Indication	Entire Group (444) No. of Patients	%	Patients with Cancer (65) No. of Patients	%
Routine	399	90	56	86
Pain	12	3	3	5
Mass	23	5	4	6
Nipple discharge	4	1	1	1
Other	6	1	1	1

TABLE 4. *Pathologic Diagnoses of 499 Nonpalpable Breast Abnormalities**

Diagnosis	No. of Biopsies	%
Fibrocystic disease	326	65
Fibroadenoma	89	18
Lymph node	9	2
Lipoma	3	1
Cancer	72	14

* One additional patient did not have a biopsy; cyst drained spontaneously during localization.

TABLE 5. *Pathologic Diagnosis in 72 Nonpalpable Breast Cancers*

Diagnosis	Biopsies N	Biopsies %	Patients N	Patients %	Positive Nodes
Invasive: 59 (82%)					
Ductal	45	63	41	63	5
Lobular	1	1	1	2	1
Microinvasive ductal	13	18	12	18	1
In situ: 13 (18%)					
Ductal	12	17	10	15	—
Lobular	1	1	1	2	—
Total	72		65		

TABLE 6. *Size of Malignant Lesions*

Size*	N	%
≤1.0 cm	55	76
>1.0 cm	17	24

* Average size: 1.1 cm. Largest size: 2.2 cm.

breast cancers treated this way. Of the two patients who had biopsy only, one presented with metastatic disease to an axillary mass and to supraclavicular nodes and the other patient declined recommendations for further therapy.

Only seven patients (11%) with cancer had positive axillary lymph nodes (Table 8), including the above patient who presented with the axillary mass. This patient had only a 2-mm primary cancer. Eleven patients had noninvasive breast cancers; nine of these had axillary dissections and none had positive nodes.

Fifty-five patients had family histories of breast cancer; at biopsy 15 of these women (27%) were found to have carcinoma, compared with a 13% incidence of cancer in those with no family history of breast cancer ($p = 0.03$). Contralateral breast cancer had been previously resected in 18 patients; five of these women (28%) were found to have occult carcinoma in the remaining breast, compared with an incidence of 14% in those who had not had previous breast carcinoma, a difference that was not statistically significant.

General anesthesia was used in 283 patients (64%), whereas local anesthesia was used in 160 patients (36%).

TABLE 7. *Treatment of Breast Cancers in 65 Patients*

Treatment	No. of Patients	%
Total mastectomy and axillary dissection	53	82
Biopsy and axillary dissection	7	11
Single mastectomy	2	3
Subcutaneous mastectomy	1	2
Biopsy only	2	3

TABLE 8. *Nodal Status of 61 Patients with 62 Axillary Dissections*

Nodal status	No. of Patients	%
Negative nodes and no distant metastases	55	89
Axillary nodes: 7 (11%)		
1 positive	2	3
2 positive	2	3
>2 positive	2	3
Distant metastases and positive nodes	1	2

Some patients who had local anesthesia also had intravenous sedation. Average operating time for a single biopsy was 30 minutes with a range of 10–60 minutes.

Although 13 patients had wound infections (Table 9), six had mild erythema that responded to oral antibiotics. The remaining patients had the incisions opened for drainage. Hospitalization was not required to treat any patients with complications. One woman had a vasovagal reaction during the localization procedure; she recovered rapidly after lying down and had biopsy under local anesthesia without incident. The two patients with incomplete excision of suspicious calcifications identified by follow-up mammography, having declined further biopsy, are being followed closely.

Discussion

Preoperative localization of suspicious nonpalpable mammographic abnormalities is essential. These lesions are usually small and are often deep in the breast. Without either preoperative localization or extensive removal of breast tissue, they would be impossible to find. Blind breast biopsy without localization is inaccurate, is cosmetically deforming, and usually requires general anesthesia. We believe that a cosmetic defect is inappropriate, especially for the 86% with benign lesions.

Because we found localization techniques involving straight needles and dye injection unsatisfactory, in this series we used a Kopans hook wire localization technique and have found it to be superior. This needle localization procedure is well tolerated by the patient, allows precise localization of the lesion, and the wire has not migrated.

TABLE 9. *Complications of Needle Localization Biopsy*

Complication	No. of Patients	%
Infection	13	2.6
Hematoma	4	0.8
Incomplete excision	2	0.4
Vasovagal reaction	1	0.2
Total	20	4.0

Needle localization has additional advantages: a smaller incision is made because less tissue is removed and usually no cosmetic deformity results.

Although most patients in this series had general anesthesia for the biopsy, we have developed an increased preference for outpatient local anesthesia using this technique. As others have reported, we now use local anesthesia almost exclusively.[5–7] Local anesthesia is well tolerated, allows an immediate return to normal activity, and knowing that 86% of abnormalities will be benign, complete discussion of treatment options for breast cancer with all patients is unnecessary before operation.

Our standard now is to do a frozen section on all biopsies and postpone definitive surgery until the final pathology report is complete. However, the frozen-section diagnosis allows for preliminary discussion of the findings. If a cancer is diagnosed on the final pathology report, we then discuss treatment options in detail with the patient.

If the mammographic lesion has calcifications and a mass cannot be palpated at the time of biopsy, then specimen radiography should be performed. Although we did not do routine specimen radiography in this series, we used it on most patients who had suspicious calcifications. Based on our experience of having two patients with residual abnormalities and the experience of others,[5,8] we recommend specimen radiography for all lesions with calcifications. We have not found it helpful to perform specimen radiography for mass lesions not containing calcifications. Specimen radiography ensures that the lesion has been removed while the incision is still open, and allows frozen-section pathologic examination of the appropriate tissue. Whether or not specimen radiography is performed, to be certain that the abnormality has been removed and to serve as a baseline for future reference, we recommend follow-up mammography in about 2 months in all patients.

Current mammographic techniques do not reliably differentiate between benign and malignant lesions; therefore, most biopsies will be benign. In this series the incidence of cancer is a relatively low (14%), which corresponds closely to that of Bigelow et al.[5] (16%) and Poole et al.[9] (14%). However, these rates are lower than other recent series with a 21–30% malignancy rate.[4,7,10–12] The differences may be due to our patient selection process. Not only did more of our patients have biopsies for mass lesions (58%) than for suspicious calcifications (37%), but perhaps more lesions that were less suspicious mammographically had biopsies. Other investigators have noted an increased malignancy rate in patients with calcifications only.[5,7,13] In our series patients with mammographic microcalcifications had a 20% malignancy rate compared with a 12% rate in patients who had a suspicious mass or increased density. Interestingly, 10 of 13 biopsies with carcinoma *in situ* were performed for suspicious calcifications (77%). Our low malignancy rate in patients who had a mass with calcifications (4%) is unexpectedly low; this is in contrast to a 59% rate of carcinoma in such patients reported by Schwartz et al.[10]

Because we are finding small, frequently noninvasive cancers, we believe our aggressive approach of performing a biopsy on all suspicious mammographic lesions is appropriate. Of the 72 malignancies found in this study, 55 (76%) were 1 cm or less in diameter. In fact, the average diameter of measurable lesions was just over 1 cm, which compares favorably with series of women who have palpable breast cancers in whom the average size is 2.5–3 cm.[1,5] Patients with these small nonpalpable cancers should have a 10-year survival rate of 95%.[1] We believe that the rate of carcinoma (14%) is not too low. Other series of needle localization biopsies report rates of carcinoma ranging from 14–47% with a mean of about 24%.[9] If a significant number of minimal cancers are identified, even a rate as low as 10% could be appropriate.[14] Minimal breast cancer has been defined as being *in situ* lesions and invasive lesions $\leq$ 5 mm, but many definitions have been used.[13] Although the cancers in this series were discovered at an early (preclinical) stage, most (82%) were invasive. Calling these small, clinically occult lesions "minimal" may invite inadequate treatment and should be avoided. We agree with Schwartz et al.[10] that invasive cancers should not be called minimal just because they are discovered by mammography. The status of the axillary lymph nodes is more important than size.[15] In this series three patients with positive axillary lymph nodes had lesions smaller than 5 mm.

In the 62 axillary lymph node dissections in our series, seven (11%) had positive axillary lymph nodes. Again, this compares favorably with women with palpable breast cancers who have positive lymph nodes in about 50%.[1] Nine axillary dissections were performed in women who had noninvasive cancer, and none of these patients had positive axillary lymph nodes. Although it is possible that those with noninvasive (*in situ*) carcinoma may not need axillary lymph node dissection, one patient with *in situ* carcinoma was found on biopsy to have residual invasive carcinoma in the mastectomy specimen. One series reported no axillary metastases in 33 specimens with *in situ* or microinvasive lesions,[9] but one patient in our series with a microinvasive carcinoma had a positive axillary lymph node. The 11% rate of positive axillary lymph nodes includes those with *in situ* lesions. Of patients with invasive carcinomas, only 13% had positive axillary lymph nodes, which compares favorably with rates of 22–35% in recent reports.[10,11]

Multicentricity was demonstrated in 24% of patients, which is somewhat lower than the 40–47% rate of multicentricity reported by others.[13,16] If thin sectioning rather than routine pathologic examination had been performed, it is possible that our multicentricity rate might have been higher. When considering treatment options, multicen-

tricity could have serious implications if less than total mastectomy is performed.

Four per cent of patients had complications; wound infection occurred in 3% of patients, which corresponds to a 2% infection rate requiring hospitalization reported by Homer et al.[6] We believe that the slightly increased infection rate is due to the patient having to be transferred from radiology to surgery during which sterility can be disrupted. The four hematomas were due to the biopsy and not the localization procedure. The one patient with a vasovagal reaction was the only complication due directly to the localization procedure, which is a complication reported by others.[4]

In our series the main risk factors for breast cancer of increased age, a family history of breast cancer, and previous breast cancer history were associated with an increased incidence of breast cancer. Patients with these risk factors should be screened carefully. Mammographic screening of asymptomatic women is an important step in reducing mortality from breast cancer. It has been shown to have reduced mortality rates from breast cancer by 20–30% and to have decreased the percentage of patients with Stage II disease or higher by 60%.[3,14] Mammographic screening will reduce breast cancer mortality only if the abnormalities identified are managed aggressively. A biopsy should be performed on any nonpalpable suspicious lesion. If cancer is identified, then appropriate surgery should be performed, usually a total mastectomy with axillary dissection in this series.

Although mortality can be decreased by mammographic screening, three issues on breast screening of asymptomatic women remain: expense, labor, and compliance. The major cost component is the mammogram, which accounts for 90% of the cost; however, costs will also be increased by the number of biopsies generated by abnormal mammograms. The cost projection for the annual screening of 50 million women over the age of 50 by 1990 is overwhelming.[1] Obviously, some efforts to reduce this cost have to be made. A Swedish study showed improved survival rates from a single-view mammogram taken every 2–3 years,[1] an approach that has not been well accepted in the United States. Also, even if the American Cancer Society (ACS) guidelines were followed by all, there would not be enough radiologists to analyze the mammograms. Currently, compliance rates with the ACS guidelines among surgeons is about 11%.[1] As the use of screening mammography increases, it may become necessary to use paramedical personnel to screen the mammograms, which may also decrease the costs.

Patient compliance is also a problem. Many women do not understand the importance of breast cancer screening, how effectively early breast cancer can be detected, and the increased treatment options if cancer is discovered early. Because some women fear a mastectomy if cancer is found, they will not comply with screening. These components of noncompliance should be addressed by public education.

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Discussion

DR. RONALD COY JONES (Dallas, Texas): I believe Dr. Roberts and Symmonds have brought to our attention the importance of the liberal use of mammography for the early detection of breast cancer. Only 11% of their patients had positive nodes, which is much lower than the usual 40–50% that is quoted if the mass is first detected by the patient or by the physician. Therefore, these patients in their series should have a 5-year survival rate in excess of 90%.

I believe it is also important for the surgeon to remember that one of every four or five patients with cluster microcalcification will have carcinoma on biopsy.