A Prospective Study of Seeding of the Skin after Core Biopsy of the Breast

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BACKGROUND: The number of core biopsies done for breast abnormalities is increasing. The risk of skin seeding resulting from core biopsy is unknown.

METHODS: Consecutive patients diagnosed with breast cancer were studied. The skin and subcutaneous fat surrounding the site of core needle penetration were excised and studied by routine histologic staining. Findings were correlated with other clinical variables.

RESULTS: Eighty-nine consecutive patients were studied. Thirty-one had stereotactic core biopsies, 23 had vacuum-assisted biopsy, 8 had multiple-puncture biopsy, and 58 had ultrasound-guided core biopsy. Two patients who were biopsied using multiple-puncture biopsy were found to have nests of cancer cells in the dermis. One of these patients had recurrence in the skin biopsy site at 34 months.

CONCLUSION: Skin seeding may be important in light of increasing use of image-directed biopsy, and particularly for cases in which the biopsy puncture site is outside the index quadrant and in which no radiation is anticipated. *Am J Surg.* 2000;180:104–107. © 2000 by Excerpta Medica, Inc.

Image-guided breast biopsy techniques are slowly replacing open procedures for the diagnosis of nonpalpable breast lesions. With the development of both stereotactic and sonographic guidance technologies, core needle biopsies of nonpalpable breast lesions have become an important method for the diagnosis of breast cancer. The number of core biopsies for these types of lesions is increasing and in some centers far exceeds open surgical biopsy.[1–4]

A potential problem for any percutaneous biopsy technique for malignancy is that of tract seeding. The seeding of cancer cells along the needle tract has been reported, but the available literature consists predominantly of anecdotal cases. Recurrent cancer along the needle tract has been reported for many tumor types, including breast, pancreas, prostate, liver and lung.[5–9] However, the true incidence of needle tract seeding after image-guided biopsy of the breast is unknown. The purpose of this study was to prospectively examine the incidence of skin seeding after image-directed core biopsy of the breast. Additionally, the impact of biopsy technique on seeding as well as on tumor factors was examined.

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METHODS

Eighty-nine consecutive patients who had undergone an image-directed core biopsy of the breast with a malignant diagnosis (invasive cancer or ductal carcinoma is situ) between February 1996 and December 1998 were entered into this study. All patients underwent core biopsy utilizing either stereotactic or ultrasound guidance. Stereotactic biopsy was performed using either multiple puncture or vacuum-assisted technique at the surgeons' preference. A 14-gauge needle was used for the multiple-puncture patients, whereas an 11-gauge or 14-gauge needle was used for patients undergoing vacuum-assisted biopsy. All ultrasound-guided core biopsies were performed using a 14-gauge spring loaded needle inserted through a 13-gauge coaxial sheath.

At the time of definitive surgery, the puncture site was identified on the breast and excised. In general, the excision consisted of an ellipse of skin and subcutaneous tissue measuring approximately 0.5 × 1.0 cm. The biopsy site was closed in a linear fashion with subcuticular absorbable sutures. The specimen was then submitted to the pathology department as a separate specimen and the definitive breast procedure performed. The skin specimens were examined using routine staining with hematoxylin and eosin.

RESULTS

Patients ranged in age from 36 to 89 years with an average age of 60.7. Two patients (2.2%) were noted to have tumor cells in the skin biopsy site (**Figures 1** and **2**). The relationship of skin seeding to various patient characteristics is noted in **Table I**. The cancers were invasive in 75 patients (84.3%) and noninvasive in 14 (15.7%). Among the 75 invasive lesions, 58 were ductal, 3 lobular, 1 mucinous, 2 tubular, and 1 squamous cell carcinoma. All noninvasive cancers were ductal carcinoma in situ. Sixty-seven patients (76.1%) had T1 lesions. The average tumor size in patients with invasive cancer was 1.7 cm.

Both patients with positive skin biopsies had invasive ductal carcinoma, measuring 1.8 and 1.7 cm. One patient underwent a modified radical mastectomy and the other a total mastectomy. In the patient undergoing modified radical mastectomy, the skin biopsy site was not included in the skin excision for the mastectomy and was excised with

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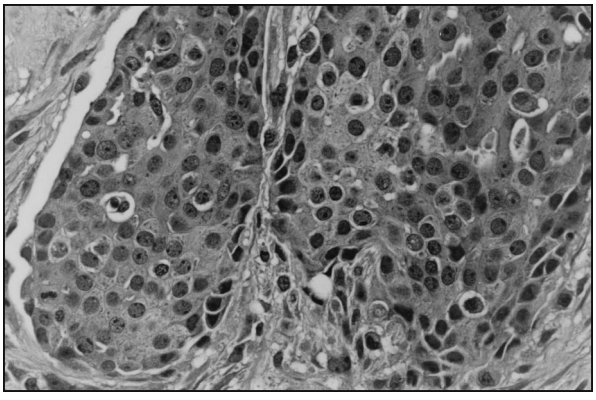

Figure 1. Photomicrograph (patient 1) of adenocarcinoma in the skin from a stereotactic biopsy site (hematoxylin and eosin, × 400).

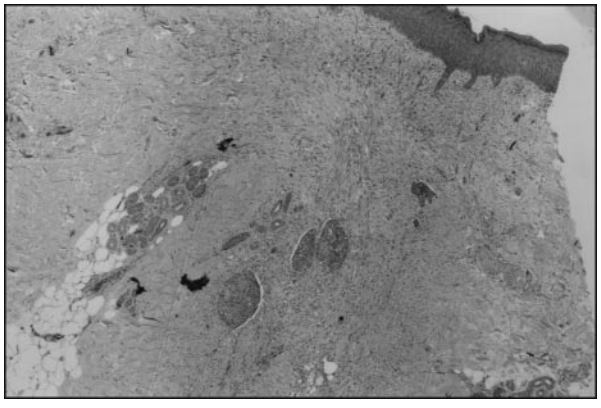

Figure 2. Photomicrograph (patient 2) of adenocarcinoma in the skin from the stereotactic biopsy site (hematoxylin and eosin, × 40).

a separate incision. The excision of the skin biopsy site was measured by pathology as 1.5 cm × 0.9 cm × 1.3 cm (depth). In the patient undergoing total mastectomy, the skin biopsy site was included in the original skin excision. Neither patient underwent radiation therapy. In the patient who had undergone modified radical mastectomy, a local recurrence at the skin biopsy site was noted 34 months after surgery (**Figure 3**). This patient was treated with wide excision and radiation therapy and is without evidence of further recurrence at 38 months.

Eighty patients were node negative or did not have nodes dissected or mapped, whereas 9 patients were node positive. One of the patients with a positive skin biopsy was node negative and the other underwent total mastectomy with no nodes removed. Lymphatic vessel invasion within the breast was noted in 9 patients (10.1%). However, both positive skin biopsies occurred in patients who did not show lymphatic invasion. The number of days between biopsy and definitive surgery the ranged from 2 to 20 days, with an average of 10.5 days. Patients with positive skin seeding had surgery performed 11 and 13 days after biopsy. Both patients with positive results underwent mastectomy, and all patients are free of recurrence.

Stereotactic core needle biopsy was utilized in 31 patients (34.8%). The chosen technique for stereotactic biopsy reflected only personal preference and was not based on the

TABLE I

Patient Characteristics

Patient Characteristics	Number (%)	Skin Biopsy Positive for Tumor Cells
Histology		
Invasive	75 (84.3)	2
Noninvasive	14 (15.7)	0
Tumor size		
Tis	14 (15.7)	0
T1	56 (62.9)	2
T2	15 (16.9)	0
T3	4 (4.5)	0
Surgical procedure		
Mastectomy	40 (44.9)	2
Partial mastectomy	49 (55.1)	0
Axillary nodes		
Negative†	62 (69.7)	2
Positive	27 (30.3)	0
Lymphatic permeation		
Present	9 (10.1)	0
Not present	80 (89.9)	2
Type of core biopsy		
Stereotactic	31 (34.8)	2
Multiple puncture	8*	2
Vacuum assisted	23	0
Ultrasound guided	58 (65.2)	0

** Difference between biopsy techniques significant by Fisher's exact test, P = 0.007.*

† Negative node patients also include clinically negative patients not having node dissections.

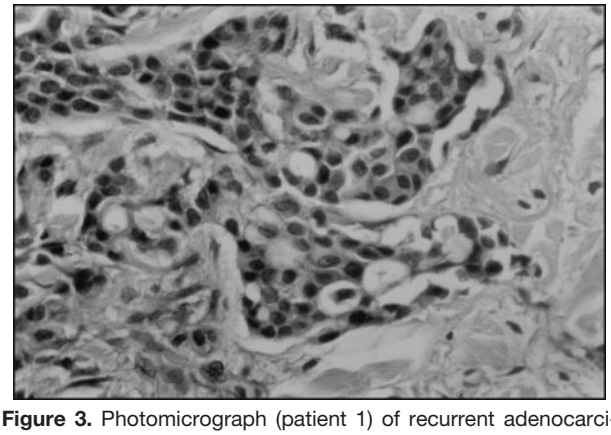

Figure 3. Photomicrograph (patient 1) of recurrent adenocarcinom in the subcutaneous tissue (hemotoxylin and eosin, × 400).

mammographic features of the tumor. Early in the series most biopsies were performed by multiple-puncture technique, using a 14-gauge needle. However, when vacuum-assisted technology became available, it was more commonly utilized. Only 8 patients had biopsies with multiple punctures whereas 23 biopsies were done using a single-puncture vacuum-assisted technique. Ultrasound-guided core biopsy was used in 58 patients (65.2%). Both patients noted to have positive skin seeding had stereotactic biopsy using the multiple-puncture technique. Therefore, the incidence of skin seeding in patients undergoing stereotactic biopsy using the multiple-puncture technique was 25%, with the other techniques having an incidence 0%. Pa-

tients undergoing the multiple-puncture biopsy were significantly more likely to have a positive biopsy as determined by Fisher's exact test, $P = 0.007$. The difference remains significant even if cases of DCIS are excluded from analysis.

COMMENTS

In this series, excision of the skin and subcutaneous tissue around the site of the core needle biopsy was used as a surrogate for complete needle tract excision. Complete tract excision would have been preferable, but impracticable. Certainly, one might expect a greater incidence of tract seeding had the entire tract been available for study. Tract seeding after core biopsy of the breast has been previously reported. Grabau et al[10] reported on 47 cases studied after core biopsy for palpable lesions. Needle tract contamination was demonstrated in 2 cases (4.2%). A single case of tumor seeding along the tract of a stereotactic biopsy has also been reported.[5]

The biological significance of finding tumor cells in the skin or along the needle tact after core biopsy of the breast is not known. The fact that 1 of the 2 patients with pathological skin seeding had recurrence in the skin biopsy site cannot be overlooked. However, because of the small numbers and relatively short follow-up times, it is difficult to draw sweeping conclusions. Aside from this single patient, no patient has suffered a local recurrence.

Berg and Robbins[11] studied 370 patients with breast cancer who had undergone fine needle aspiration biopsy. When compared with a matched control group, no difference in survival was noted. However, no reports were found in the literature demonstrating similar effects for core biopsy. Yet skin is a known area of recurrence after mastectomy and has been reported after partial mastectomy and radiation therapy. Fisher et al,[12] reporting the pathological findings from the NSABP B-06 protocol, noted that 5% of the ipsilateral breast recurrences were in the skin. Similarly, Gage et al,[13] reporting on more than 1,600 patients treated undergoing conservative surgery and radiation therapy, noted that 8% of all breast recurrences occurred in the skin. The number of patients who underwent core biopsy in these series or similar series reporting on local recurrence is not reported. Consequently, the actual incidence of recurrence secondary to needle tract seeding is not known.

The needle tracts after core and fine needle biopsy done for palpable lesions are generally just above the tumor, and can easily be excised during partial or complete mastectomy. However, in ultrasound-guided biopsies as well as stereotactic biopsies, the lesion must be approached from a position parallel to the chest wall. Consequently, the needle tract and skin puncture site is, in many instances, outside the quadrant containing the cancer. In the single patient with a local recurrence in the skin biopsy site, the biopsy site was indeed outside of the skin excision used for the mastectomy.

In the single patient who had recurrence in the skin biopsy site, radiation therapy was not given until after recurrence. It is possible, that radiation therapy after breast- conserving surgery may be adequate to eradicate stray cancer cells. Currently, there is only circumstantial evidence to support this contention. Boutin et al[14] studied 40 patients with mesothelioma who underwent invasive diagnostic procedures (cytology, needle biopsy, thoracoscopy, chest tube placement). Of the 20 patients who did not receive radiation therapy, 8 patients developed metastases along the entry tract. Of the 20 patients who underwent radiation therapy, none developed entry tract metastases. How such data apply to breast carcinoma is unclear. Moreover, since most of the randomized data on breast-conserving surgery was gathered long before image-guided biopsy techniques were available, there is little that can be learned from comparisons with the large cooperative group trials of adjuvant radiation after lumpectomy.

It is interesting to note that all of the cases of seeding in this study occurred after stereotactic biopsy in which multiple punctures were used. In vacuum-assisted biopsy, only a single puncture is carried out and all specimens are withdrawn through a metal chamber shielding them from the skin. The only chance to displace cancer cells along the tract is when the needle is withdrawn. The multiple-puncture technique differs from the vacuum-assisted stereotactic biopsy in that the needle is withdrawn through the skin after each biopsy. In most instances 5 to 6 passes were made. During all cases of ultrasound-guided core biopsy, a coaxial needle guide was inserted prior to biopsy. In most instances the guide is advanced to a position just short of the tumor. The core biopsy needle is then advanced through the guide, where multiple biopsies are taken. In most instances, 5 to 6 core biopsies are taken. Again, the only chance for tract contamination is upon coaxial guide withdrawal. Therefore, stereotactic biopsy using multiple punctures theoretically offers more opportunity for tract contamination, which seems to be supported by our data.

Based upon these observations, two types of patients may be at risk for local recurrence secondary to tract seeding. The first group at risk are patients undergoing mastectomy in which the needle puncture site is outside of the planned skin excision. This was the circumstance in the patient who had local recurrence in the skin biopsy site. It is recommended for this group of patients that the skin puncture site be excised through the subcutaneous tissues and left attached to the mastectomy specimen. In doing so, the entire tract will be excised. Little effort is required and only a small surgical scar remains. The second group of patients at risk are those undergoing breast conservation in which radiation therapy is not planned, or patients having less than whole breast radiation (eg, brachytherapy). Excision of the skin puncture site is not recommended in this group since the entire tract cannot be excised, and the skin represents only a small portion of the needle tract. Moreover, our data would suggest that postoperative radiation therapy should be considered in those patients in whom the skin puncture site is outside the planned mastectomy incision, and in patients in whom cancer cells are noted in the skin biopsy excision.

The only patients who were noted to have skin seeding were those having a multiple-puncture stereotactic biopsy. Because this study was not designed to determine the merits of multiple- versus single-puncture techniques, and because there were so few patients (8), it is difficult to make a case for discarding multiple-puncture techniques.

Furthermore, there was no control group that allowed comparison of core biopsy to other biopsy techniques. Consequently we are unable to make a judgment as to the actual incidence of skin seeding during core biopsy. We do recommend however, that patients who have local recurrence and have been diagnosed by core biopsy should be studied carefully in an effort to determine whether needle tract seeding may have been the source of the recurrence. It is only by careful analysis of this group of patients that the true risk of core biopsy will be fully appreciated.

CONCLUSIONS

After image-directed core biopsy of the breast for cancer, needle tract seeding occurred only in 2 of 89 patients. Both patients underwent multiple-puncture stereotactic biopsy. No patient having a single-puncture core biopsy (vacuum-assisted biopsy and ultrasound-guided core biopsy) was noted to have skin seeding. One of the 2 patients had recurrence in the skin biopsy site at 34 months. Skin biopsy site excision should be considered for patients undergoing core biopsy in which the skin puncture is outside of the normal mastectomy incision. Radiation should be considered for these patients if skin seeding is demonstrated.

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