The widespread use of improved mam-
mographic techniques has led to the de-
tection of many nonpalpable breast
masses and areas of calcification, which
are suspicious of carcinoma. As a result,
the number of breast biopsies performed
to evaluate these occult lesions has
markedly increased. Unfortunately,
specimen radiography has often failed to
show the lesion in the first biopsy speci-
men and subsequent extension of the
biopsy in these problem cases frequently
results in prolonged anesthesia time and
undesirable breast deformity.

To help find these lesions, we have
devised a preoperative needle localiza-
tion technique that provides a recog-
nizable dye marker at the lesion site and
also establishes a visible tract for the sur-
geon to follow. This procedure is used
for all patients with nonpalpable breast
masses and microcalcifications who un-
dergo breast biopsy. Our method has oc-
casionally been employed to locate
larger occult lesions more than two cm.
in diameter. These large, nonpalpable
masses were found in women with large
breasts, but they may also occur in
those with moderate-size breasts.

Several techniques for localizing oc-
cult breast lesions have been previously
described. Stevens and Jamplis sug-
gested the construction of breast orienta-
tion maps to coordinate information
taken from lateral and cranio-caudad
mammograms.1 Berger and associates
developed a system of localization
drawings to help pinpoint the suspicious
lesion.2 Recently, Frankl and Rosenfeld
modified the technique of placing metal
grids over the breast as roentgeno-
graphic guides; they advocated the taping
of plastic markers on the skin prior to
localizing xeromammography, after
which a skin marker is applied with
silver nitrate.3 Schwartz described a
method in which one or more needles are
placed in the suspicious area under radi-

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Fig. 1. Needles, syringe holder and dye used in localizing procedure.

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ographic control. The marker needle is then taped in position and used as a biopsy guide. Other investigators have inserted multiple needles, leaving only the one found closest to the lesion on monitoring mammograms. Simon and colleagues injected a mixture of dye and radiopaque iodized oil into the suspicious lesion.

Advantages

Since most nonpalpable breast lesions prove to be benign, an acceptable localizing procedure should permit small biopsies, with little or no breast deformity. The technique described on the following pages meets these essential criteria. Its specific advantages include:

- accuracy, so that an extended biopsy to remove additional tissue is only rarely necessary;
- an inherent guidance system that facilitates surgery, thus avoiding excessive tissue destruction and lengthy anesthesia time;
- versatility, allowing the use of either xeroradiography or conventional film mammography;
- a physiologically excreted dye that does not obscure subsequent mammographic findings;
- the ability to compress the breasts in both lateral and cranio-caudad views.

Most of the previously described techniques of localization do not permit adequate breast compression. This procedure, in our experience, is essential for imaging all nonpalpable lesions.

Technique

Preparation

The patient is brought to the mammography facility no more than three hours before the scheduled biopsy. Sedation is withheld to enable her to cooperate fully in a sitting position during the procedure. Local anesthesia is usually administered; however, it is not essential, as there is surprisingly little pain associated with needle insertion. Two patients with a history of adverse reactions to local anesthetics underwent the localization without anesthesia and described it as less painful than routine venipuncture.
Needle Insertion and Positioning

Utilizing aseptic technique, a #22 gauge or smaller localizing needle is inserted into the suspicious area to the estimated depth of the lesion. The needle is positioned horizontally at right angles to the coronal plane of the thorax. In this position, it will not be displaced by compression of the breast during mammography. Additional needles with slightly different positioning can be inserted, but multiple needles must have differentiating characteristics so that they can be individually identified on mammography. (Fig. 1.)

Needles are repositioned under mam-
mographic monitoring until the tip of the selected needle is "on target" at the lesion site. (Fig. 2.) If xeroradiography is used, the images are usually taken in the negative mode, as a positive mode produces a halo effect around the metal needles, which sometimes obscures microcalcifications. (The positive xeroradiographic mode can be used, however, if only the plastic portion of a sheathed needle is left in place during imaging.)

Injection of Dye
After the needle has been satisfactorily positioned, 0.10 ml. of one percent aqueous Methylene Blue dye is injected.
at the lesion site. More than this amount tends to diffuse through surrounding tissue. We originally mixed the dye with a water soluble radiographic contrast material (Renografin-76) so that the relationship of the dye and the lesion could be confirmed on monitoring mammograms. Its use was discontinued when it became clear that no change in needle position occurred between the injection of the dye and final confirmation films. The omission of contrast material eliminates the need for a final set of films and thus decreases the dosage of necessary radiation.

An additional 0.015-0.03 ml. of aqueous Methylene Blue is injected along the tract as the needle is withdrawn, establishing an easily visible blue route that the surgeon can follow to the main bolus of dye. (Fig. 3.) A specially designed micro-injector, which supports a disposable plastic tuberculin syringe, can precisely deposit a uniform amount of dye along the needle tract. (Available through Medical Instruments, Inc., 5315 S.W. Westdale Drive, Portland, Oregon.)

Biopsy
An incision is made at or near the needle puncture site, visible as a tiny blue spot on the skin of the breast. (Fig. 4.) The surgeon then follows the needle tract downward into the breast tissue (Fig. 5.) until the main bolus of the dye is recognized as a deeply stained area, usually about 2 cm. in greatest diameter. (Fig. 6.) This is entirely excised. (Fig. 7.)

Evaluation
The dye-stained material is immediately submitted for specimen radiography to confirm promptly that the suspicious area has been removed. (Fig. 8.) If the lesion is not identified in the specimen radiograph, the biopsy can then be extended.

At this institution, the biopsy incision is now closed, and the specimen prepared as permanent sections. Frozen sections are no longer routinely performed for nonpalpable breast lesions, as the suspicious area is often minute and difficult to interpret by this method. Furthermore, some critical tissue may be lost in preparing the frozen section.
Fig. 8. Specimen radiogram containing suspicious microcalcifications. Lesion was malignant.

block. The patient is usually discharged on the following day.

Summary
We have performed 160 localization procedures to date. All have been successful. In three cases an extended biopsy was necessary. Participating surgeons are enthusiastic about the procedure, especially the establishment of an easily visible tract to the clearly marked biopsy site.

Anesthesia time has been significantly reduced. Routine tissue preparation techniques have removed all traces of Methylene Blue dye and no alteration in breast architecture around the dye bolus has been noted.

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