Percutaneous image-guided core biopsy with either stereotactic or sonographic guidance has been shown to be an economical, accurate alternative to the surgical biopsy of suspicious breast lesions. In 1993 Parker et al. first described the use of ultrasound-guided core biopsy in a study of 181 lesions sampled with a 14-gauge automated needle. In the 49 lesions that underwent subsequent surgical excision, there was 100% histopathologic correlation with core biopsy results. In the remaining 132 lesions yielding benign results, no carcinomas were identified at follow-up (range 12–36 months). Although no subsequent study specifically addresses the false negative rate of ultrasound-guided core biopsy, clinical studies of stereotactic 14-gauge automated core needle biopsy demonstrate an average false negative rate of 2.8%, which is comparable to the 2.0% frequency of missed carcinoma at needle localization and surgical biopsy. Therefore, ultrasound-guided core biopsy can accurately diagnose benign lesions without surgery and facilitate preoperative planning for malignant lesions. In a study of 151 consecutive nonpalpable masses that underwent ultrasound-guided core biopsy, a surgical procedure was obviated in 85%, and the cost of diagnosis was estimated to decrease by 56% relative to surgical biopsy.

ADVANTAGES

Besides a lower cost of diagnosis, percutaneous image-guided biopsy has several advantages over surgical biopsy. It does not cause cosmetic deformity or scarring visible on mammography, can be performed the same day as the diagnostic mammogram, uses local anesthesia, and can provide estrogen/progesterone receptor status in patients with concurrent stage IV disease when therapeutic breast surgery is not indicated.

Ultrasound-guided core biopsy also has several advantages over stereotactic biopsy. The necessary equipment is widely available, is less expensive, and does not require additional radiation exposure to the breast. Procedure time is reportedly as low as 20 minutes. Patients who are unable to lie prone on a stereotactic table due to spinal arthritis or recent abdominal surgery can usually lie in the supine or supine-oblique position for an ultrasound-guided procedure. Because the patient is recumbent instead of seated as with some stereotactic units, vasovagal reactions rarely occur. Moreover, the breast is not compressed during ultrasound, which may increase patient comfort. Lesions that are not amenable to stereotactic biopsy because of their inability to be positioned in the stereotactic field of view because of their close proximity to the chest wall are easily biopsied with sonographically guided biopsy. Because the breast is not compressed during sonographically guided biopsy, the inability to perform a biopsy because the breast is too thin to accommodate the throw of the needle or the length of the tissue acquisition chamber is obviated in sonographically guided procedures. This also applies to situations where the lesion is in a thin area of the breast, such as behind the nipple.

Because of the limited volume of the axilla and the presence of the large, axillary vascular and neural structures, tissue sampling in the axilla is frequently done as fine-needle aspiration. However, if an axillary mass is large enough to accommodate the throw of the needle safely, ultrasound guided biopsy of the axilla can be performed. Because of the difficulty of positioning the ax-
illa in the stereotactic device, these biopsies usually cannot be done under stereotactic guidance. Ultrasound may also be helpful for percutaneous biopsy of mammographically subtle lesions that are better seen with sonography. Of course, it is the only appropriate method for biopsy of those lesions only seen with sonography.

DISADVANTAGES/COMPLICATIONS

The major limitation of ultrasound-guided core biopsy is that a small subset of solid masses are isoechoic with breast parenchyma and not sonographically evident. In addition, although biopsy of calcifications under ultrasound guidance has been reported, stereotactic biopsy is the preferred method, as calcifications are not reliably identified under sonography. Masses smaller than 5 mm are problematic, as biopsy can obscure or remove the lesion making subsequent localization difficult. The vacuum-assisted ultrasound-guided biopsy probe (Mammotome, Biopsys/Ethicon Endo-surgery, Cincinnati, OH) enables placement of a metallic localizing clip through the 11-gauge needle and may be an alternative in these cases. Radiologists are often reluctant to perform ultrasound-guided core biopsy in patients with breast implants because of concern about rupturing the implant and therefore prefer fine needle aspiration. The vacuum-assisted biopsy probe may be an alternative in these patients as it is not fired in the breast, thereby decreasing the probability of implant penetration. However, this method requires expensive dedicated equipment and may have a higher rate of bleeding complications than conventional 14-gauge automated biopsy.

Ultrasound-guided biopsy is not ideal for patients who cannot cooperate with positioning, as they are not immobilized by breast compression and must maintain their position for 20–30 minutes. Contraindications common to all percutaneous large-core needle procedures include allergy to local anesthetics and a history of a bleeding diathesis. We request that patients avoid aspirin-containing medications for 1 week and nonsteroidal antiinflammatory medications (NSAIDs) for 3–5 days before the procedure. Some authors have reported successful performance of ultrasound-guided biopsy while the patient is on warfarin. However, because these are not emergency procedures, if possible we request that the patient discontinue her warfarin for 1 week prior to biopsy. It has been suggested that in women in whom discontinuation is medically contraindicated, performance of the breast biopsy under sonographic rather than stereotactic guidance, when possible, is advantageous because of the greater ease in applying manual compression to the breast during sonographically guided procedures. The performance of core biopsy in lactating women has been reported to be complicated by subsequent formation of milk fistula in some cases.

Major complications are unusual, with infection or hematoma in approximately 0.2% of patients. Minor complications, occurring in up to 50% of patients, include bruising, breast tenderness, and psychological stress. In a study of 67 consecutive patients who underwent vacuum-assisted ultrasound-guided core breast biopsy, 5 (7%) had bleeding for longer than 10 minutes, suggesting a higher risk of bleeding complications. Pneumothorax is also a theoretical complication of ultrasound-guided core biopsy if the needle is fired into the chest wall during the procedure. In a large multiinstitutional study, Parker et al. found no cases of seeding of carcinoma along the needle tract.

EQUIPMENT REQUIREMENTS

All breast ultrasound procedures should be performed with a high frequency linear transducer of at least 7.5 MHz. The room should have adjustable lighting and the table or stretcher positioned to allow accessibility to all quadrants of the breast. A small portable table can serve as a flat surface for a sterile field (Figure 6.1). A needle disposal system should be maintained in the room for safe discard of sharps.

A wide variety of guns and needles are commercially available for performing ultrasound guided core biopsies (see Chapter 4). Ultrasound-guided core biopsy requires needles that are larger gauge than those used for aspiration to ensure that samples can be adequately analyzed histopathologically. Studies have shown that 14-gauge needles retrieve the most diagnostic specimens with no significant increase in complications or cost relative to 16- or 18-gauge needles.

The most common biopsy guns utilize a spring mech-