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CHAPTER 7.10

Breast Surgery

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Breast Biopsy

Surgical Considerations

Description: Breast biopsy, or **lumpectomy**, is the surgical removal of breast tissue for histopathological examination. Many biopsies are done percutaneously as office procedures. Two approaches are used: **fine-needle aspiration cytology** and **core needle biopsy**. Ultrasound-guided biopsies, mammographically guided, stereotactic-core biopsies, and MRI-guided biopsies are used as preop diagnostic procedures. **Open breast biopsies** are performed primarily in the OR for palpable or nonpalpable abnormalities. **Palpable lesions** include masses, nodules, or areas of asymmetric breast thickening. Breast pathology can manifest as skin changes—specifically, edema, redness, brawny discoloration, or ulceration—mandating biopsy of the involved skin and underlying breast tissue. The term **excisional biopsy** usually is applied to benign entities and implies the complete removal of the lesion in question (e.g., excision of a fibroadenoma). The term **lumpectomy** is used to characterize cancerous lesions that are removed with a rim of normal breast tissue to achieve tumor-free margins.

Another common reason for excisional biopsy is the occurrence of bloody or pathological **nipple discharge**. The underlying cause of this abnormality is, in most instances, a benign intraductal papilloma or, infrequently, carcinoma. **Ductoscopy** may be used to explore breast ducts that produce abnormal discharge fluid. The ductoscope is a 0.9-mm fiber optic microendoscope. It is inserted into the duct(s) following progressive dilatation with lacrimal probes. After the intraductal lesion is visually identified, the surgeon injects methylene blue to further guide the duct excision and breast biopsy.

Nonpalpable lesions are usually discovered on routine screening mammography. Microcalcifications, masses, densities, and architectural distortion fall into the category of potentially malignant lesions. Similarly, ultrasound can identify complex cystic or solid masses and MRI areas of abnormal enhancement. In all these instances, the breast usually feels and looks normal. Typically, the radiologist places a percutaneous hook-wire in close proximity to the lesion, using local anesthesia. The surgeon uses this guide to identify the area of abnormality; therefore, these procedures are referred to as **wire localization**, **needle localization**, or **hook-wire localization** breast biopsies. In the OR, the surgeon removes the breast tissue surrounding the wire and confirms the removal of the wire and target lesion on specimen radiography and/or ultrasound.

Breast biopsies, or lumpectomies, are usually done under local anesthesia with iv sedation. In some cases, breast biopsies or lumpectomies are done under general anesthesia, either because of the size of the lesion, patient preference, or concerns of implant injury for patients who have subglandular implants. Alternatively, regional or paravertebral blocks may be used.

Usual preop diagnosis: Breast mass; nipple discharge; atypical hyperplasia; known in-situ cancer; mammographic, sonographic, or MRI abnormalities

Summary of Procedures

	Breast Biopsy/Lumpectomy	Wire Localization Breast Biopsy
Position	Supine with ipsilateral arm abducted. Table may be banked to center breast.	
Incision	Over the breast mass, circumareolar, along the inframammary fold or radial	Plus, incision may or may not incorporate skin entry site of wire.
Special instrumentation	Ductoscope; ultrasound	





Antibiotics	Cefazolin 1 gm iv (optional)	
Surgical time	0.5–1 h	1–1.5 h, depending on time needed to get results of specimen radiograph.
Closing considerations	Steri-Strips, gauze, or transparent bandage	Plus, specimen radiograph result must be obtained before completion of operation.
EBL	< 25 mL	
Postop care	PACU → home	
Mortality	Minimal	
Morbidity	Seroma: very common Ecchymosis or hematoma: < 10% Infection: 1–2%	Wire cut traverses or migrates into chest. Target lesion is missed (2° misplacement or dislodging of wire)
Pain score	2–5	2–5

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Patient Population Characteristics

Age range	18–90 yr	25–90 yr
Male:Female	Mainly female	
Incidence	Common	
Etiology	Unknown	

Anesthetic Considerations

See [Anesthetic Considerations for Breast Biopsy and Sentinel Lymph Node Biopsy, p. 649.](#)

Sentinel Lymph Node Biopsy

Surgical Considerations

Description: Sentinel lymph node biopsy is a technique applied to patients with small, invasive breast cancers who do not have clinically pathologic lymph nodes. The sentinel lymph node is the first node to drain afferent lymphatics from the particular region of the breast where the cancer is located. The sentinel node is commonly located in the axilla, but may be situated in the internal mammary chain or other extra-axillary sites. Because the sentinel lymph node is the first to drain the lymphatics from a breast cancer, it is the most likely lymph node to harbor metastatic tumor. Early studies suggest that absence of tumor metastasis on histological examination of sentinel nodes accurately predicts the histological status of nonsentinel nodes. The goal of this approach is to avoid conventional Level I and Level II axillary node dissection in node-negative patients. The technique has been validated in several large institutional and multicenter studies. Results from large, randomized trials show an overall accuracy of sentinel node resection of 97%. Failure to identify a sentinel node by the above-described techniques or palpation of axillary contents mandates proceeding to an axillary lymphadenectomy. **Completion axillary dissection** is currently recommended for patients outside clinical trials with tumor-positive sentinel nodes with a metastasis greater than 0.2 mm.

Two types of agents have been principally tested for lymphatic mapping and sentinel node identification procedures: **blue vital dyes** (1% isosulfan blue or methylene blue) and **99m-technetium-labeled sulfur colloid (TSC)** (unfiltered or filtered). Methylene blue can be used in lieu of isosulfan blue, a change precipitated by national shortages of the dye. Differences and controversy exist regarding ideal injection sites of these agents—peritumoral or around biopsy cavity, dermal, subareolar, or in combination. The first method instills 3–5 mL of isosulfan blue subareolar or at 3, 6, 9, and 12 o'clock surrounding the lesion. The breast is massaged and the axilla is incised 3–7 min later, inferior to the hair-bearing area a few cms inferior to the axillary skin fold, depending on the distance of the tumor to the axilla. Typically, blue afferent lymphatics and blue nodes are identified below the clavipectoral fascia.





The (*Print pagebreak 648*) surgeon should inform the anesthesiologist when injecting the dye, because a transient drop in the pulse oximeter reading of 2–5% is frequently seen. Patients may retain a bluish hue for a few hours or longer and will excrete blue-tinged urine, stool, or emesis. Allergic reactions, consisting of “blue hives” to full-blown, life-threatening anaphylactic shock, have been reported following the injection of isosulfan blue. Methylene blue has a lower incidence of allergic reactions, but can cause skin necrosis if injected undiluted intradermally.



Figure 7.10-1. 1. Arm may be draped into field and positioned on arm board at 90° or suspended over head, as shown. Incision site for lymph node biopsy is indicated by dotted line. (Reproduced with permission from Baker RJ, Fischer JE: *Mastery of Surgery*, 4th edition. Lippincott Williams & Wilkins, 2001.)

Sentinel nodes can also be identified using **TSC** (1 mCi). This agent can be injected in nuclear medicine the day of or the day before the operative procedure. The tracer has very low radioactivity and is safe to handle with no special protection required in handling specimens. Postinjection **lymphoscintigraphy** is considered optional. After induction of GA or regional anesthesia, the operative field (chest and lymph node-bearing areas) is surveyed with a hand-held gamma probe (a slim rod, similar to a Geiger counter). The “hot” spot(s), denoting accumulated tracer in lymph nodes, are identified and an incision is made in the overlying skin. It is customary to have a pathologist examine the sentinel node intraop using touch-prep cytology or frozen section. The purpose is to identify node-positive cases and proceed with standard axillary dissection during the course of the same operation.

Combination of blue dye and TSC yield the highest sentinel node identification rates. Whenever the sentinel node cannot be identified, a conventional axillary dissection should be performed.

Usual preop diagnosis: Invasive breast cancer

Summary of Procedures

Position	Supine
Incision	Small transverse incision
Special instrumentation	Hand-held gamma-detection probe
Unique considerations	Radiation exposure negligible. Avoid BP cuff or iv in ipsilateral arm. Possible need to avoid muscle relaxants. Isosulfan blue vital dye → allergic reaction (1–2/100).
Antibiotics	Cefazolin 1 gm iv (optional)
Surgical time	10–30 min, up to 1.5 h for axillary lymph node dissections
EBL	Minimal
Postop care	PACU → home





Mortality

Rare

Discoloration of urine and stool up to 48 h

Permanent tattooing of skin with blue dye

Transient blue staining of skin

Morbidity

Allergic dye or radioisotope reaction: 1–2%

Anaphylaxis 1/2,000

Large intravascular doses associated with idiopathic encephalitis; may be related to concurrent SSRI use.

Pain score

2–5

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Patient Population Characteristics

Age range

25–85 yr

Incidence

1/8 American women will develop breast cancer.

Etiology

Unknown in most cases; familial history may be related to genetic mutation (BRCA 1 & 2).

Anesthetic Considerations for Breast Biopsy and Sentinel Lymph Node Biopsy

Preoperative

Breast masses may vary in size and depth, which will, in part, determine what type of anesthetic is most suitable for the procedure in these generally healthy patients. Typically, excisional biopsies can be accomplished with iv sedation and local anesthesia; however, patient wishes must be considered in the anesthetic plan. The suitability of local versus GA may be best addressed by preoperative discussion with the surgical team.

Psychosocial

Patients are likely to be very anxious concerning the possibility of breast malignancy, and should be counseled and premedicated appropriately.

Laboratory

CBC; other tests as indicated from H&P.

Premedication

Consider midazolam 1–2 mg iv

Intraoperative

Anesthetic technique: GA or local anesthesia + iv sedation are both appropriate techniques. Choice of anesthetic technique depends on the size and depth of lesion and the wishes of the patient. Surgery is typically done on an outpatient basis.

MAC

Propofol infusion (25–100 mcg/kg/min), combination of analgesics (e.g., fentanyl/remifentanyl) and anxiolytics (e.g., midazolam), titrated to effect, are most commonly used. The surgeon may choose to add Na bicarbonate to 1% lidocaine (1:10) to reduce injection pain. The anesthesiologist may give remifentanyl 0.5–1 mcg/kg 90 sec before initial injection of local anesthetic into the skin.

Induction

Standard induction (see [p. B-2](#)). Mask or LMA anesthetic may be appropriate.

Maintenance

Standard maintenance (see [p. B-3](#)). Muscle relaxants are not necessary for surgical procedure.

Emergence

No special considerations

Blood and fluid requirements

Minimal blood loss

IV: 18–20 ga × 1

NS/LR @ 3–5 mL/kg/h

Monitoring

Standard monitors (see [p. B-1](#)).

Maintain verbal contact with patient if

Other monitors as clinically indicated.

Isosulfan blue vital dye → artifactual ↓ O₂





Positioning	MAC.	sat as low as 92–94%.
	and pad pressure points eyes	
Complications	Inadequate analgesia	May have to supplement surgical field block with local anesthetic or convert to GA.
	Isosulfan dye reaction	Pruritus, localized swelling, blue hives. Rx: diphenhydramine (10–50 mg iv). ↓ BP may require epinephrine.

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Postoperative

Complications	No specific complications anticipated.	Inform patients that urine, emesis, or stool may be blue for 24–48 h.
Pain management	PO analgesics (see p. C-2)	
Tests	As clinically indicated.	

Suggested Readings

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Breast-Conserving Surgery and Mastectomy ± Reconstruction

Surgical Considerations

Description: The treatment of invasive breast cancer has evolved greatly in the last 30 years. The **radical mastectomy**, which removes the breast, the underlying pectoral muscles, and the axillary lymph nodes, has been replaced by the **modified radical mastectomy** or **lumpectomy (partial mastectomy)** with lymphatic mapping/sentinel node biopsy and/or **axillary dissection**. Modified radical mastectomy entails removal of the breast and axillary lymph nodes. Lumpectomy or re-excision lumpectomy and axillary nodal staging are normally done through separate incisions. Postop adjuvant radiation therapy is routinely recommended in breast-conserving surgery and is administered following the completion of adjuvant chemotherapy.

In an **axillary dissection**, Levels I and II lymph nodes are removed. These nodes lie behind and lateral to the edge of the pectoralis minor muscle. The Level III, or highest group of axillary lymph nodes, are medial to the pectoralis minor muscle. For prognostic and treatment purposes, no advantage can be shown in removing Level III lymph nodes. As part of the axillary dissection, the surgeon preserves the thoracodorsal nerve (innervates the latissimus dorsi muscle) and the long thoracic nerve (innervates the serratus anterior muscle), as well as the blood and nerve supply to the pectoral muscles. The intercostobrachial nerves (sensory to the upper arm) course through the axillary (*Print pagebreak 651*) contents. Preservation of some or all of these nerves usually can be accomplished, avoiding the occurrence of permanent dysesthesias.

A **total mastectomy** (also known as a **simple mastectomy**) removes only breast tissue. It is done mainly for treatment of extensive duct carcinoma in situ or for prophylaxis in high-risk patients.

Immediate breast reconstruction is an option for most women undergoing mastectomy. Postop chest radiation may be a relative, but not absolute, contraindication to immediate reconstruction. Two approaches are commonly used: (a) **prosthetic reconstruction** with a temporary tissue expander or a saline-filled implant placed behind the pectoral muscles and (b) **autologous myocutaneous flaps** (see [Breast Reconstruction, p. 1129](#)). Truly excellent cosmetic results are possible with mastectomy techniques that preserve much of the breast skin (skin-sparing, areolar-sparing, or nipple-sparing mastectomies). The latter are usually performed through smaller incisions therefore requiring more operative time.

Usual preop diagnosis: Invasive or in situ breast cancer, high-risk patients

Summary of Procedures

	Modified Radical Mastectomy	Total Mastectomy	Lumpectomy, Axillary Lymph Node Dissection
Position	Supine with ipsilateral arm abducted and prepped on field. May require repositioning (latissimus dorsi reconstruction).		
Incision	Elliptical oblique or elliptical transverse to include nipple/areola and previous biopsy; periareolar, or “tennis-racquet.”		Incision over breast mass or previous biopsy site. Separate transverse or oblique incision in axilla.
Unique considerations	Avoid iv and BP cuff on ipsilateral arm		
Antibiotics	Cefazolin 1 gm iv (optional)		





Surgical time	1.5–3 h (+ 1–7 h, if immediate breast reconstruction performed)	1–2 h (+ 1–7 h, if immediate breast reconstruction performed)	1–3 h
Closing considerations	Gauze bandage over incision		
EBL	150–500 mL, depending on whether scalpel or electrocautery is used.		25–100 mL
Postop care	PACU → 2 d hospitalization	PACU → 1–2 d hospitalization or occasionally → home	PACU → home
Mortality	Rare		
Morbidity	Lymphedema: 5–30% (depending on extent of axillary dissection) Seroma: 25% Infection: 2–10% Flap necrosis: < 5% Hematoma: < 5% Injury to axillary neurovascular structures: Rare Pneumothorax: Rare (may occur with attempts to obtain hemostasis of intercostal perforating vessels)		< 10%
Pain score	4–8	4–6	4–8

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Patient Population Characteristics

Age range	20–90 yr (generally > 40 yr)
Incidence	Over their lifetime, 1/8 of American women develop breast cancer. In 2007, according to American Cancer Society estimates, there were 178,480 invasive cancers and 60,000 carcinomas in situ.
Etiology	Unknown in most cases; familial Hx may be related to genetic mutation (BRCA 1 & 2).

Anesthetic Considerations

Preoperative

Patients often have no other underlying medical problems. Some consideration, however, should be given to the anesthetic implications of metastatic spread to bone, brain, liver, lung, etc.

Respiratory

Respiratory compromise can be present if patient has received XRT to the thorax as part of treatment.

Tests: CXR (for pleural effusion and rib or vertebral lesions). If patient shows any signs of respiratory compromise, obtain room air ABG. Consider PFTs (FVC, FEV₁, MMEF_{25/75}) if CXR or ABG abnormal. This will help predict pulmonary reserve and patient tolerance to GA.

Chemotherapeutic agents (e.g., doxorubicin at doses > 550 mg/m²) may cause severe cardiomyopathies. If patient was exposed to





Cardiovascular

this type of drug, cardiac dysfunction may be present, and a cardiac consultation or cardiac imaging may be helpful to evaluate ventricular function.

Tests: Consider ECHO or MUGA scan; ECG.

Neurological

Breast cancer often metastasizes to the CNS and can present with focal neurologic deficits, ↑ ICP, or altered mental status. If patient has altered mental status, full workup should proceed without delay; postpone surgery until cause is found.

Tests: CT/MRI scan should be recommended, if indicated from H&P.

Hematologic

Patient may be anemic 2° chronic disease or chemotherapeutic agents.

Laboratory

Tests: CBC, with differential and Plt count

Premedication

Routine lab exam; other tests as indicated from H&P.

Consider midazolam 1–2 mg iv.

Intraoperative

Anesthetic technique: GETA or GA with LMA. Regional anesthesia (paravertebral block [PVB]) in breast surgery is associated with less PONV, less postop pain, earlier discharge from the hospital, and less chronic incisional pain.

General anesthesia:

Induction

Standard induction (see [p. B-2](#))

Maintenance

Standard maintenance (see [p. B-2](#)). The use of muscle relaxants during axillary dissection should be avoided to permit surgical identification of nerves by nerve stimulator or if electrocautery is used in the axilla.

Emergence

Pressure dressings may be applied with the patient anesthetized and “sitting up” at the end of the procedure. Discuss with surgeons whether they intend to apply this type of dressing, to enable appropriate timing of emergence. Consider PONV prophylaxis (see [p. B-6](#)).

Regional anesthesia: Unilateral multiple-level PVB provides satisfactory anesthesia for modified radical mastectomy and lumpectomy with axillary lymph node dissection. A block from T1-T6 is required. Suitable local anesthetics (*Print pagebreak 653*) (4–5 mL/level) are 0.5% bupivacaine or 0.5% ropivacaine with 1:400,000 epinephrine. Sedation is useful during block placement and is continued intraop. (See [Anesthetic Considerations for Breast Biopsy, p. 649.](#)) PVB is contraindicated for the following reasons: (a) patient refusal, (b) local anesthetic allergy, (c) pathology or previous surgery → anatomic distortion of paravertebral space, and/or (d) infection at sites of injection.

Blood and fluid requirements

Minimal-to-moderate blood loss

IV: 16–18 ga × 1 (avoid operative side)

NS/LR @ 3–5 mL/kg/h

Monitoring

Standard monitors (see [p. B-1](#)).

Others as indicated by patient status. BP cuff on arm opposite surgical site.

Positioning

and pad pressure points
eyes

Complications

Pneumothorax

Deep surgical exploration may cause inadvertent pneumothorax; monitor patient for Sx (e.g., ↑ PIP, ↓ PaCO₂ asymmetric breath sounds, hyperresonance to percussion over the affected side, hemodynamic instability). Dx: CXR. Rx: Chest tube and ↑ FiO₂

Inadequate block (10%)

Pleural puncture May result in pneumothorax.





Complications 2° PVB

Horner's syndrome
Inadvertent epidural spread of local anesthetic

Postoperative

Complications

Pneumothorax
Psychological trauma
PONV (see [p. B-6](#))

If index of suspicion for pneumothorax is high, maintain oxygenation (100% FiO₂) and ventilation; inform surgeons of the likelihood of the Dx. If patient is hemodynamically unstable (suggesting a tension pneumothorax), place a 14-ga iv catheter in the second intercostal space, while the surgeons set up for placement of a chest tube. If patient is hemodynamically stable and not hypoxemic, a portable CXR may aid in diagnosis.

Pain management

PCA (see [p. C-3](#)).
PO analgesics (see [p. C-2](#)).

Tests
Postop portable CXR, if pneumothorax is a consideration.

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