A pictorial review of breast biopsy complications

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Learning objectives

- to describe and illustrate some complications of percutaneous breast biopsies
- to describe the management principles for the main complications of percutaneous breast biopsies.

Background

Percutaneous breast biopsy is a simple and minimally invasive procedure that is widely used as a diagnostic tool for pathologic evaluation of suspicious breast lesions.

Complications are not common, and the majority of these complications are minor, although some can have clinical consequences.

The procedure complication rate varies from 1.4 to 9% in the literature.

Findings and procedure details

VASCULAR COMPLICATIONS

HEMORRHAGE

Bleeding that continues after 5-10 minutes and is often associated with a large area of bruising of the breast.

The incidence of bruising is higher in patients undergoing anticoagulant therapy, but the incidence of post-biopsy hematoma is not affected by the coagulation status of the patient.

Treatment consists of manual compression, surgical hemostasis and vascular embolization.

HEMATOMA

One of the most common biopsy complications, hematomas usually occur immediately after the needle procedure, and can be observed at real-time sonography when the procedure is done with ultrasound guidance.
Ultrasound shows hypoechoic fluid collection or a complex (solid-cystic) heterogeneous mass.

Mammography features an ill-defined or circumscribed new mass at the biopsy site. Gas-fluid level may be present.

Treatment consists of manual compression and saline lavage. Hematomas rarely require surgical treatment, percutaneous drainage, or other invasive intervention.

**ARTERIOVENOUS FISTULA**

Arteriovenous fistula (AVF) is an abnormal communication between an artery and a vein, bypassing an interposed capillary system with shunting of blood.

Acquired AVFs generally demonstrate one large feeding artery and one large draining vein.

May be asymptomatic or present with pulsatile hematomas, palpable thrills or audible bruits.

Ultrasound is a good non-invasive imaging modality to initiate investigation.

Color Doppler and spectral waveform criteria are:

- Low resistance flow in the supplying artery;
- High-velocity arterialized waveform in the draining vein;
- Turbulent high-velocity flow spectrum at the junction of the artery and vein.

Computed tomography and MRI angiography show early contrast filling in the vein during the arterial phase, demonstrating an enhancing mass with rapid wash-in and rapid washout.

Angiography is the gold standard imaging diagnostic modality.

Treatment consists of occlusion with coils or surgery.

**PSEUDOANEURYSMS**

Pseudoaneurysms (PA) lack arterial wall, and are contained by perivascular tissue.

Occur most commonly after a traumatic injury, when a punctured arterial wall fails to seal completely.

The risk of a PA is higher in elderly, patients with atherosclerosis, and patients receiving anticoagulation therapy.
CT angiography, MRI (including MR angiography), and ultrasound combined with color Doppler study can be used for the diagnosis of pseudoaneurysm.

Color Doppler ultrasound demonstrates a pulsatile mass with arterial blood filling and draining from the cavity in phase with the cardiac cycle.

Although compression has been used as a first-line treatment, it is often unsuccessful.

Treatment techniques include percutaneous alcohol injection, thrombin injection, microcoil embolization, and surgical excision.

INFECTION COMPLICATIONS

MASTITIS

Clinical symptoms include pain, redness, and heat, while fever is infrequently encountered.

Differentiation between an abscess and mastitis is difficult.

Ultrasound features an ill-defined area with heterogeneous echotexture and hypoechoic areas, skin thickening, and inflammatory axillary lymph nodes may also be encountered.

Mammography can show skin thickening, an asymmetric density, a mass or architectural distortion.

The recommended treatment is antibiotics.

BREAST ABSCESS

Most abscesses result from secondary bacterial infection from skin contamination. *Staphylococcus aureus* is the most usual pathogen, although other microorganisms can be encountered.

Clinical features are similar to mastitis.

Ultrasound shows a hypoechoic collection, usually multiloculated and presenting with a thick echogenic periphery with increased vascularity.

Treatment consists of antibiotics and percutaneous drainage.

NECROTIZING INFECTION

Necrotizing infections of the breast are uncommon, and rarely linked to a percutaneous procedure.
Clinical features include edema, skin discoloration, blisters/bullae, tissue necrosis and crepitus.

Treatment comprises debridement, broad-spectrum antibiotics, clinical resuscitation and nutritional support.

OTHER COMPLICATIONS

MILK FISTULA

Milk fistula is a tract between the skin and a lactiferous duct that is acquired during lactation, usually associated with surgical intervention or percutaneous biopsy.

Milk fistulas can resolve spontaneously, although treatment is usually preferable.

Treatment consists of lactation suppression, and can be achieved by:

- Breast binding
- Dopamine agonists (bromocriptine) that decreases prolactin levels, inhibits lactation and suppresses milk production
- Ultrasound-guided percutaneous triamcinolone injection

TUMOR SEEDING

Tumor seeding is the condition where malignant cells are displaced from the tumor site and deposited along the tract of a biopsy needle.

As the biopsy needle go through the tumor site and is withdrawn, there is the potential for tumor migration into the adjacent soft tissue and skin.

Based on the findings of a literature review conducted by Loughran et al\textsuperscript{12}, the probability of tumor recurrence as a consequence of a biopsy procedure appears to be very low.

It is still uncertain if the type of lesion, the needle size, or the method of biopsy affects the potential for tumor seeding. However, there are some case reports with sarcomas, and this should be considered when planning a core biopsy procedure.

It has been recommended to consider surgical resection of the biopsy track at the time of definitive surgery.

Images for this section:
**Fig. 1:** A: 60 year-old female with a biopsy site fungal infection after a vacuum-assisted breast biopsy. The patient had a past history of tinea corporis. B: 53 year-old female with S. aureus biopsy site infection after a core needle biopsy. The patient had a past history of diabetes.

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**Fig. 2:** 50 year-old female patient presenting with new masses in the biopsy site, compatible with tumor seeding. A and B: axial T1-weighted non-enhanced and T1-weighted contrast-enhanced subtraction MRI show spiculated masses in a linear distribution (arrows) and the index mass (asterisk). C: sonography shows hypoechoic spiculated masses (arrow) along the biopsy site, and the index mass (asterisk) Before (D) and after biopsy (E) mammogram views show emergence of new spiculated masses (arrow) close to the index mass (asterisk).

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Fig. 3: 53 year-old female with right breast hematoma after MRI-guided vacuum-assisted breast biopsy. A, B and C: axial T1-weighted, T2-weighted and contrast enhanced subtration MRI show a circumscribed mass with high signal on T2 and no Gadolinium enhancement, measuring 5,0 cm. D and E: CC and MLO right mammogram views show a circumscribed hyperdense mass with a tissue marker clip inside.

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Fig. 4: 54 year-old female with hemorrhage and hematoma after core needle biopsy. A: sonography shows a hyperechoic and heterogeneous hematoma in the left breast B: Color and pulsed-wave Doppler shows active bleeding inside the hematoma. D: MLO mammogram view shows a circumscribed hyperdense mass (arrows).

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Fig. 5: 28 year-old female presenting with diffuse breast swelling and bruising after a core needle biopsy. Hemoglobin level dropped from 12.8 to 11.4 g/dL after the procedure. The imaging characteristics confirmed pseudoaneurysm. A: swelling and bruising of the right breast B and C: heterogeneous hematoma with the yin-yang sign on color Doppler D: to and fro flow on pulsed-wave Doppler E: sagital angio-CT showing a pseudoaneurysm of a branch from the lateral thoracic artery, with active bleeding.

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Conclusion

The most common complications are bleeding and hematomas, followed by infection.

Hematoma manifests at imaging methods as masses with solid or solid-cystic components or increased density areas in mammographies. The main management aspect consists of manual compression and saline lavage.

Infections are uncommon and usually present as cellulitis or abscess. It is important to assess if there is any fluid collection that may need an interventional procedure.

Rarer complications are reported in the literature, such as vascular complications, milky fistula and tumor seeding along the biopsy track.

The diagnostic flowchart when facing a possible complication of a percutaneous breast procedure starts with a new ultrasound study with Doppler assessment. The first objective is to exclude a life-threatening vascular complication. After that, a wide range of differential diagnosis can be considered and most of them can have an expectant management.

Personal information

References


