An Introduction to Fine Needle Aspiration of the Breast

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BREAST- CLINICAL

- Clinically evident breast “mass” common cause of office visits
- ~1 million biopsies performed annually (U.S.A)
- ~85% of these biopsies are benign
- Workup of a breast mass has a heavy toll on patient
APPROACHES TO BIOPSY

• Exisional biopsy
  • Traumatic
  • Expensive
  • Scar tissue makes subsequent imaging difficult to interpret

• Core biopsy
  • Less traumatic but may miss lesion
  • If no lesion seen, may still need excision

APPROACHES (CONT.)

• Excision/core bx
  • Time consuming/expensive
  • Requires tissue processing
FNA OF BREAST
(ADVANTAGES)

- Cost effective
- Minimally invasive/traumatic
- No anesthesia/hospitalization
- Fast and accurate
- Pre-treatment planning
- Avoidance of surgical biopsy
- Therapeutic

FNA vs CORE BX

- Both operator dependent
- Only one chance to sample lesion by core bx
  - FNA- multiple movements redirecting needle with each pass, increasing sampling area
- Some lesions may be difficult to stabilize by core needle bx (benign lesions more mobile tends to push away from advancing needle)
- Cystic lesions better sampled by FNA
- Calcifications better sampled by core bx
FNA vs CBx

BREAST FNA (COMPLICATIONS)

- Bleeding/hematoma
- Infection
- Pneumothorax
- Vasovagal reaction
ADEQUACY CRITERIA

- Problematic
- No minimal cellular criteria required
- Nonproliferative lesions are paucicellular
  - Fibrocystic changes composed predominantly of fibroblasts
  - Physiological stromal thickening
  - Fibrotic fibroadenoma
  - Lipomas

ADEQUACY- BREAST FNA

- Applying criteria would make a good percentage of negative FNA’S unsatisfactory subjecting them to additional surgical procedures
- Based on opinion of pathologist and based on ability of operator to adequately stabilize and penetrate lesion
PATIENT MANAGEMENT PROTOCOL

• Triple Test:
  • Imaging (mammography, u/s)
  • Clinical
  • Cytology

CYTOLOGY OF NORMAL BREAST STRUCTURES

• Ductal cells
• Myoepithelial cells
• Acini
• Stroma
DUCTAL CELLS
- Flat sheets
- Discernable borders (honeycomb)
- Nuclei uniform

MYOEPITHELUM
- Small dark bipolar nuclei
- Scant cytoplasm
- Singly or within epithelium

MYOEPITHELUM
ACINI

• Form spherical, tight lobulated, dense structures
• Seen singly or in grapelike clusters
• Not seen in males
• Pronounced in pregnancy
• May see myoepithelium surrounding lobules
STROMA

- Adipose tissue
- Fibrous tissue
- Macrophages
## CYTO-ARCHITECTURAL FEATURES

<table>
<thead>
<tr>
<th>BENIGN</th>
<th>MALIGNANT</th>
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<tbody>
<tr>
<td>• Scant cellularity</td>
<td>• Cellular</td>
</tr>
<tr>
<td>• Cohesive</td>
<td>• Loosely cohesive/single cells</td>
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<tr>
<td>• 2-D honeycomb sheets</td>
<td>• Sycitia/crowded groups</td>
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<tr>
<td>• Tightly cohesive</td>
<td>• Loosely cohesive</td>
</tr>
<tr>
<td>• Minimal atypia</td>
<td>• Moderate/severe atypia</td>
</tr>
<tr>
<td>• Myoepithelium present</td>
<td>• No myoepithelium</td>
</tr>
<tr>
<td>• No mitosis</td>
<td>• Mitosis present</td>
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The images below illustrate the differences between benign and malignant tissue samples:
### DIAGNOSTIC ERROR

<table>
<thead>
<tr>
<th>FALSE POSITIVE</th>
<th>FALSE NEGATIVE</th>
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<tbody>
<tr>
<td>• Subareolar abscess</td>
<td>• Small cancer arising from fibrocytic change</td>
</tr>
<tr>
<td>• Fat necrosis</td>
<td>• Well differentiated cancer</td>
</tr>
<tr>
<td>• Silicone granuloma</td>
<td>• Extensively necrotic tumor</td>
</tr>
<tr>
<td>• Granuloma</td>
<td>• Interpretive error</td>
</tr>
<tr>
<td>• Mucocoele like lesion</td>
<td></td>
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<tr>
<td>• Lactational change</td>
<td></td>
</tr>
<tr>
<td>• Gynecomastia</td>
<td></td>
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<tr>
<td>• Fibrocystic change</td>
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### SUBAREOLAR ABSCESS-CLINICAL

- Occurs at any age
- Related to duct ectasia
- Can mimick breast ca (mass, nipple inversion)
- Local inflammation beneath the nipple > squamous metaplasia > keratin plugging > rupture of the lactiferous duct
SUBAREOLAR ABSCESS - MORPHOLOGY

- Cellular smears (usually no duct epithelium seen)
- Mixed inflammatory exudate
- Granulation tissue (arborizing vessels with inflammatory cells sloughing off)
- Squamous material considered the hallmark of this disease (anuleated squamous, mature or metaplastic squamous epithelium, parakeratotic squamous epithelium)
SUBAREOLAR ABSCESS
SUBAREOLAR ABSCESS

• CAUTION
  • Be careful making a diagnosis of malignancy in the presence of abundant acute inflammation
FAT NECROSIS - CLINICAL

- History of trauma
- Firm, irregular, fixed, painful masses
- May contain calcifications
- Mimic breast cancer clinically and radiographically

FAT NECROSIS - CYTOMORPHOLOGY

- Variably cellular
- Degenerated fat vacuoles
- Multinucleated giant cells
- Epithelioid histiocytes, macrophages
- Myospherulosis
GRANULOMA

- Loose aggregates of epithelioid histiocytes
  - Elongated to polygonal cells
  - Indistinct cell borders
  - Elongated “boomerang” shaped nuclei
  - Associated with lymphocytes, plasma cells and Langhans type giant cells

GRANULOMAS IN THE BREAST

- Tuberculosis- can mimic breast ca (firm breast mass with axillary enlarged lymph nodes
- Sarcoidosis
- Idiopathic granulomatous mastitis- self limiting, young women- unknown etiology
  - Non-caseating granulomas, microabscesses surrounding lobules
  - Can mimic cancer
- Granulomatous reaction to malignant cells
GRANULOMA

GRANULOMA
GRANULOMA

CARCINOMA
SPINDLE CELL CARCINOMA

SPINDLE CELL CARCINOMA
SILICONE GRANULOMA

• Can be clinically suspicious, hard mass, single or multiple nodules
• Can resemble fat necrosis
• Look for refractile (silicone) material
• Aggregates of distended macrophages/histiocytes containing refractile cytoplasmic globules can be confused for adenoca
SILICONE GRANULOMA

SILICONE GRANULOMA
SILICONE GRANULOMA

LACTATIONAL CHANGES-
MORPHOLOGY

- Hypercellular smears
- Lobular fragments seen
- Numerous round, naked nuclei in background (epithelial)
- Large cells, prominent nucleoli, foamy cytoplasm
- Background- proteinaceous frothy cytoplasm
MUCOCELE-LIKE LESION-
CLINICAL

• Lesions often quite small
• Associated with fibrocystic change
• Originates from ruptured mucinous cyst into stroma

MUCOCELE-LIKE LESION-
CYTOMORPHOLGY

• Scant cellularity
• Small epithelial fragments, monomorphic, lack of atypia
• Abundant background mucin
• Muciphages
MUCOCELE LIKE LESION

- Can see mucin in background of
  - Fibrocytic change
  - Fibroepithelial lesions (fibroadenoma, phyllodes tumor)
  - Papilloma

- Excise all mucocele like lesions
COLLOID CARCINOMA-MORPHOLOGY

- Usually cellular
- Cohesive, minimally pleomorphic epithelial nests
- Occasional single cells
- Background- abundant mucin, arborizing capillary vessels

COLLOID CARCINOMA
CYSTS

- Usually see apocrine cell change
  - Larger than normal duct cells
  - Usually seen in sheets
  - Abundant granular cytoplasm
  - May see nucleoli
  - Occasionally prominent nucleoli or variability in size can cause overinterpretation
  - Can show architectural complexity that can lead to misinterpretation
APOCRINE METAPLASIA

CYST
APOCRINE CARCINOMA

APOCRINE CARCINOMA
GRANULAR CELL TUMOR

FIBROCYSTIC CHANGES

- Heterogenous cytological picture
  - Cellular vs paucicellular/acellular
- Architectural complexity
- Myoepithelial cells in epithelial groups
- Background myoepithelial cells
- Cell cohesion
- Monolayers with cell swirling
- Micronucleoli
FCC
GYNECOMASTIA

- Tender painful sub/periareolar lump
- Bimodal age distribution
- HIV, ETOH, drugs, liver disease
- Can be cellular
- Cohesive epithelium, can see papillary configurations
- Can see crowding, atypia, nuclear enlargement

GYNECOMASTIA

- Myoepithelium
- Stromal fragments
- Because of hypercellularity/atypia, have a higher threshold for cancer dx in a male breast
GYNECOMASTIA

GYNECOMASTIA
ATYPICAL DUCT EPITHELIUM

• Cells with micro-architectural pattern and cellular atypia which fall short of duct carcinoma in situ
• Atypical duct epithelium may not correlate with histologic diagnosis of atypical duct hyperplasia and should not imply the same lesion

FCC WITH ATYPIA

• Greater complexity
• Nuclear overlap
• Nuclear pleomorphism
• Hyperchromasia with chromatin clumping
• Macronucleoli

_Do not make a diagnosis of carcinoma when these features are seen accompanying benign cytologic features._
ATYPIA

ATYPIA
ATYPIA

- Crowded enlarged cells, nuclei hyperchromatic, lack myoepithelial cells
- Cribriform DCIS- Cohesive fragments with sharply punched out holes
- Micropapillary DCIS- slender well formed papillary structures with narrow stalks
- Comedo DCIS- cohesive sheets with high nuclear grade, accompanying necrotic debris

DUCTAL CARCINOMA IN SITU
<table>
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<td><strong>FCC</strong></td>
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CRIBRIFORM DCIS, MICROCALCIFICATIONS

DCIS- CELL BLOCK
DCIS

DCIS-MICROPAPILLARY
DCIS- COMEDO TYPE

FIBROADENOMA-
CLINICAL

• Most common benign tumor
• Usually solitary, firm, mobile, well circumscribed
• Most common in third and fourth decade
• Most common cause of false positive diagnosis
  • Absence of one or more of the triad of sheets of ductal cells, fibromyxoid stroma and myoepithelial cells
  • May see low cellularity, cellular dyshesion and prominent nucleoli (older patients)
FIBROADENOMA

- High cellularity, biphasic appearance
- Monolayered sheets, branching architecture ("staghorn")
- Fibrous stroma (metachromatic on diff-quik)
- Bland cellular morphology
- Background- naked oval myoepithelial nuclei
PHYLLODES TUMOR - CLINICAL

- Peak incidence in fifth to sixth decade
- Unilateral slowly enlarging mass
- Larger than fibroadenoma (~5 cm)

MALIGNANT PHYLLODES TUMOR

- Biphasic pattern
- Stroma with high cellularity, may contain significant atypia, mitotic figures may be seen
- Epithelial component benign
PHYLLODES TUMOR

FIBROEPITHELIAL LESIONS

<table>
<thead>
<tr>
<th>FIBROADENOMA</th>
<th>PHYLLODES</th>
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<td><img src="image1.png" alt="Fibroadenoma" /></td>
<td><img src="image2.png" alt="Phyllodes" /></td>
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PHYLLODES TUMOR