Tomosynthesis (DBT) Directed Biopsy

Jules H. Sumkin DO, FACR
Professor and Chair Radiology UPMC
UPMC Endowed Chair for Womens’ Imaging
What will we talk about today?

- Overview
- Advantages / Disadvantages of DBT biopsy Vs. Prone
- Overview of Equipment and Procedure
- Case demonstrations
- Video demonstration of a case
What is DBT biopsy?

- Image guided breast biopsy using tomo as guide
- Vacuum assisted biopsy the same as Prone
Why is it needed?

- Preferable to perform biopsy guided by modality that best shows the lesion
  - E.g. A requisite to offer breast MRI is the ability to perform MRI directed biopsy
- Tomosynthesis reveals lesions seen only by tomosynthesis (E.g. masses and arch distortions) therefore tomo biopsy is essential
- Prone stereotactaic biopsy has known limitations
Limitations of Prone Stereotaxic bx

- Difficult to sample chest wall/axillary tail lesions
- Body habitus
- Patients with limited mobility
- Procedure time can be 30-60 minutes
  - Hard to add on during the day
  - Patient tolerance
Posterior lesions: Arm through the hole lateral
Advantages of DBT biopsy

- The Procedure
  - Lesion visualization
  - Lesion access
  - Procedure time
    - Identification of target: FOV, Image conspicuity
    - Direct Z calculation
    - Biopsy, clip, and post biopsy MG same machine
  - Decreased exposures
  - Patient tolerance
Advantages of DBT biopsy

- The Machine
  - Can be added to existing equipment
  - Saves space
  - Less capital expense
Disadvantages of DBT biopsy

- **Operational considerations**
  - Limits use machine for screening or diagnostics
- **Strategies**
  - Batch tomo biopsies
  - Create tomo bx slots
  - Preview cases and triage
- **Inferior approach requires lateral decubitus**
- **Vasovagal is possible: patient sees needle**

- N = 205 patients: PS VAB 165 lesions, DBT VAB 51 lesions
- **Evaluated**
  - Technical Success: 100% DBT; 93% PS
    - Lesion non-visualization or inaccessible
  - Overall time: DBT=13 min; PS=29 minutes
  - Targeting time: DBT=4 min; PS=15 minutes
    - Larger FOV
    - No triangulation
  - Sample time: similar
  - Fewer exposures
  - Complications: No major, 1 vasovagal in each group

Comparison of Prone Stereotactic vs. Upright Tomosynthesis Guided Vacuum Assisted Core Breast Biopsies

- Prospective
- $N = 400$ breast biopsies: 200 prone and 200 upright DBT
- Evaluated:
  - Time ($\text{DBT} < \text{Prone}$)
  - Exposures ($\text{DBT} < \text{Prone}$)
  - Success Rate (equivalent)
  - Complications (equivalent)
  - Pain Score (No statistical difference)
  - Clip Migration (equivalent)

Presented RSNA 2014 Smith et. Al UPMC Magee-Womens Hospital
Comparison of Prone Stereotactic vs. Upright Tomosynthesis Guided Vacuum Assisted Core Breast Biopsies

- Total procedure time: Prone 30 minutes Vs 27 minutes (P-value = 0.03)

Smith et. al RSNA 2014
Comparison of Prone Stereotactic vs. Upright Tomosynthesis Guided Vacuum Assisted Core Breast Biopsies

- Decreased Exposures
  - Less number of attempts to position (FOV)
  - DBT localization view: 3 exposures Vs 1
  - Images #: Prone = 10.08; Upright = 7.45 (P <0.0001)

Smith et. al RSNA 2014
Attaching the Add on Biopsy Device
The Procedure

- Identify lesion and decide approach
- Tech locates lesion
- Tomosynthesis performed and target identified
- Coordinates sent
- Stage moved to appropriate position
- Skin prepped, lidocaine instilled, puncture performed, and needle placed in pre-fire position
- Angled views obtained needle confirmed
- Biopsy performed, specimen radiographed, clip placed
- Tomo clip
- Confirmatory MG
Acquisition Console
Target controls

- Creates sends coordinates
- Cancel target
- Create, compare, and send second target
- Shows target
- Deletes Target
- Z adjust
- Shows and Hides all targets
Biopsy Area

Distance from paddle to top of aperture
Distance target from center of aperture
Distance tip needle to platform

Safe to proceed
Warning near limit
Exceeds safety margin
To adjust a target
5 MM increments
New Features
When does tomosynthesis biopsy help?

- Lesions Visibility
- Special Calcifications
- Vascular structures
- Vessel identification
- Target Plane tunnel vision
- Challenging Lesion Location
- Localization
- Patient limitations
2 ways to view entire breast

- Projection Images
- Tomo Images
When does tomosynthesis biopsy help?

**Lesions Visibility**
- Lesions seen by tomosynthesis only
- Lesions visible on only one view
- Subtle masses and asymmetries

**Special Calcifications**

**Vascular structures**

**Vessel identification**

**Target Plane tunnel vision**

**Challenging Lesion Location**

**Localization**

**Patient limitations**
49 year old presents for screening
Inferior lesion so lateral approach
Pathology: ALH, ADH, Radial scar
When does tomosynthesis biopsy help?

- **Lesions Visibility**
  - Lesions seen by tomosynthesis only
  - Lesions visible on only one view
  - Subtle masses and asymmetries

- **Special Calcifications**
  - Vascular structures
  - Vessel identification

- **Target Plane tunnel vision**
- **Challenging Lesion Location**
- **Localization**
- **Patient limitations**
55 year presents for combo screen
BB placed on US lesion and 90 tan tomo done

US Bx: stromal fibrosis
Tomo biopsy performed from lateral approach

Pathology: Radial scar
When does tomosynthesis biopsy help?

- **Lesions Visibility**
  - Lesions seen by tomosynthesis only
  - Lesions visible on only one view
  - Subtle masses and asymmetries

- **Special Calcifications**
- **Vascular structures**
- **Vessel identification**

- **Target Plane tunnel vision**
- **Challenging Lesion Location**
- **Localization**
- **Patient limitations**