Breast Imaging: Clinical Settings

• Screening
• Diagnostic
The use of diagnostic imaging in early detection of breast cancer in an asymptomatic patient.

- Mammography
- Ultrasound
- MRI
Mammography

- Mammography should always obtain as it is the only proven screening tool
Standard Mammography Views

- Two-view mammography (mediolateral oblique and craniocaudal projections of each breast) is required at each attendance.
- Additional view may be required depending on body habitus.
Screening Mammography

- Women over the age of 50 with no history of breast cancer or implants: OBSP
- Over 25% lifetime risk 30-69 (including personal history of cancer or implants): OBSP
- Women at the age of 30-50: Clinician referral
- Personal history of breast cancer: Clinician referral
- Patients with Implants: Clinician referral
- Over 25% lifetime risk 25-30: Clinician referral
Screening Mammography

- Screening mammography is not offered to:
  - Patients younger than 30
  - Pregnant
  - Lactating
  - Male
Screening Ultrasound

• Over 25% life time risk 30-69 who cannot tolerate an MRI: OBSP
• Disabled patients who cannot have standard mammographic views
• Screening ultrasound is not offered to patients who cannot tolerate a mammogram for any other reason
Screening MRI

• Over 25% life time risk 30-69 : OBSP
• For those who are not approved by the High Risk OBSP: requisitions should be signed by a surgeon, oncologist or radiation oncologist
Non- OBSP Screening MRI

- Patients under 70
- BRCA carriers under 30: Starts 10 years prior to age of the youngest family member being diagnosed
- Patients under 30, 8 years or more after exposure to chest wall radiation
- Previous breast cancer and over 50% breast density
- Biopsy proven ALH/LCIS and over 50% breast density
- Inherited disease associated with high risk (Li Fraumeni syndrome, Cowden’s disease etc.)
- Previous mastectomy (uni or bilateral) with positive/tight margins
The use of diagnostic imaging in the assessment of breast symptoms or breast abnormalities suspected on previous studies.

- Mammography
- Ultrasound
- MRI
Offered for an abnormality detected on routine mammographic views:

• Additional mammographic views
• Two view finding: Cone magnification/cone compression views, lateral view and any additional views that may be helpful to locate the lesion
Diagnostic Mammogram: Calcifications

- Magnification views
- Defined as benign, indeterminate or suspicious
Diagnostic Mammogram: Calcifications

- Benign calcifications: no further assessment
- Indeterminate/suspicious: stereotactic guided biopsy
- Several indeterminate clusters: biopsy of the most suspicious one. The additional cluster/s will be biopsied if results are malignant
- Several suspicious clusters: biopsy of more than one cluster, taking in consideration the impact on surgery
Diagnostic Mammogram: Calcifications

• At SJHC we tend to biopsy most calcifications unless typically benign
• May follow-up multiple clusters if only one is biopsied
• The radiologist may offer to follow-up calcifications if not all calcifications in a cluster appear to layer
Mammogram: Mass

• Additional cone compression/magnification views to assess borders and associated calcifications
• US
• If mass cannot be identified on US: stereotactic biopsy or MRI
Diagnostic Mammogram: Asymmetry/ focal asymmetry/ distortion

• Additional mammographic views
• US if abnormality persist or if remain indeterminate, especially if dense breast
• If there is persistent abnormality and US is negative, the radiologist may offer short term follow-up mammogram, stereotactic biopsy or MRI depends on level of concern
Diagnostic Ultrasound

- Breast symptoms
- Initial imaging evaluation breast symptoms in patient under 30 years and in lactating and pregnant women
- Evaluation of abnormalities detected on other imaging studies
- Evaluation of the axilla
- Guidance of breast interventional procedures
Diagnostic Ultrasound: Cysts

- Simple cysts: Benign, no follow-up. Aspiration if requested by patient
- Complicated cysts (internal debris, inflammatory changes, thin septations): Follow-up, unless multiple similar findings. The radiologist may offer follow-up for a specific complicated cyst if there is uncertainty
- Complex cysts: (thick septations, intra mural nodule, internal flow): Biopsy
Solid Masses

- If benign features (slightly hypoechoic, oval shaped, parallel to the skin, encapsulated and up to 4 macrolobulations): Follow-up
- If even one malignant feature (spiculations, microlobulation, distortion, shadowing etc.): Biopsy
- If indeterminate finding: Biopsy
Diagnostic MRI

• May change the planned treatment
• Interpretation must correlated to mammogram and ultrasound findings
• Should not supplant careful problem-solving mammographic views or ultrasound and should not be used in lieu of biopsy of a suspicious finding
• MRI-guided intervention should be available
Diagnostic MRI

- Exclusion of multifocal/ multi-centric/bilateral disease
- Assessment of extensiveness of malignancy in patients with dense breast or patients with implants
- Mammographically occult malignancy
- Confirmation of locally advanced cancer
- Respond to neoadjuvant chemotherapy
- Recurrent disease/residual disease
- Metastatic axillary nodes of unknown origin
- Persistent bloody or clear nipple discharge
- Prior to prophylactic mastectomy
Diagnostic Mammography: Palpable Lump

- Symptomatic patients with no mammogram in the last year: Standard views with BB marker
- Symptomatic patients with previous mammogram less than a year, more than 6 months: ipsilateral standard mammographic views with BB marker
Palpable lump

- Mammogram is not offered for:
  - Symptomatic patients who had mammogram in the last 6 months
  - Female patients under 30, pregnant or lactating patient and male patients under 20
- Patient who refuses a mammogram should sign a consent form
- Targeted US is always offered
Palpable Lump

- If a malignancy is identified, the entire ipsilateral breast and axilla are scanned, and a mammogram is obtained regardless of age or condition.
- A negative mammogram and ultrasound in the setting of a palpable lump does not exclude malignancy, and clinical follow-up is required.
- An MRI can be obtained if a persistent palpable lump is suspected by the surgeon.
Breast Pain

- Mammogram only. US is not offered unless symptoms persist
- If the patient is younger than 30, pregnant or lactating: Targeted ultrasound
Spontaneous Nipple Discharge

- Six months trial: patient seen first by a surgeon.
- Mammogram for patient older than 30 and any other imaging requested by the surgeon.
Spontaneous Nipple Discharge

• Mammogram and ultrasound. The radiologist examine the breast. Galactography will be recommended if doable, even if an abnormality is detected by US, for the exclusion of multiple filling defects

• US guided biopsy for indeterminate lesions but only after a galactography

• MRI is recommended for persistent bloody nipple discharge if other imaging studies are negative
Patients with Implants

- Significant technical and interpretational difficulties
- Routine plus displacement techniques described by Eklund
- The risk of prosthesis rupture as a result of compression during mammography is extremely small
- In case that there is concern for rupture mammography is not performed in case the examination is blamed for producing an existing abnormality
If there is concern for silicon implant rupture, an MRI will be obtained with implant protocol (i.e. without i.v contrast).

Occasionally, the radiologist may recommend the use of contrast, especially if the patient is did not have mammogram for many years.

MRI is not offered for future screening.
Diagnostic Mammogram: Lymphadenopathy

• If associated with primary breast malignancy, US guided biopsy of clinically suspicious nodes ONLY (i.e., when there is concern for macroscopic involvement)
• MRI if metastatic adenocarcinoma and no breast origin is found on mammogram and/or US
• US of the contralateral axilla if no breast origin found, to exclude lymphoma
• Biopsy and flow cytometry when there is concern for lymphoma
When Do We Have to Recommend Biopsy?

- Indeterminate or suspicious breast imaging lesions
- New solid palpable over 30y
- New solid mass not seen on previous mammogram
- Growing solid or complicated cystic mass
- When there is even one concerning feature
- When not all benign features are present
- For a complex cystic lesion
The best results achieved under imaging guidance with 14-gauge needle mounted on a spring-loaded biopsy device.

Vacuum-assisted biopsy will yield greater diagnostic accuracy however it is expensive.

The imaging assessment and the histopathologic interpretations should be correlated for concordance by the physician performing the biopsy.
Imaging Guided Breast Biopsy

- One year follow-up mammogram is recommended for negative, concordant biopsy results.
- The radiologist may recommend short-term follow up for indeterminate findings.
- Surgical excision is recommended for any suspicious mass regardless the pathology results.
- Hormone receptors assessment is requested when neoadjuvant treatment is contemplated by the radiologist.
Tissue Marker

- Tissue marker is inserted whenever there is a risk that the abnormality will not be visualised after the
- Tissue marker is inserted prior to neoadjuvant chemotherapy, if lumpectomy is contemplated
- Tissue marker is always left after MRI guided biopsy
- Standard and true lateral mammographic views are obtain if a tissue marker is inserted
- Tissue marker migration should be treated with caution if will be used for pre operative localization
Pre-Operative Imaging Localization

- US-guided localization when the lesion is identifiable
- Mammographic guidance for microcalcifications or lesions seen only on mammography or lesion marked with tissue marker and is not seen on US
- Bracketing technique for large area is recommended
- The tissue marker inserted following using MRI guidance can be localized under mammography. Wider excision is required as there is an expected larger clip mobility given the use of vacuum-assisted device
- Specimen radiography is required to confirm adequate sampling
- If there is doubt regarding adequate surgical excision, repeat imaging is required to be obtained in a month to ensure that the lesion had completely excised
MRI Guided Localization

- If there is concern for significant clip migration
- For lesion seen on MRI only and not amenable for biopsy by being located too deep
Pre-Operative Imaging Localization

• Following the imaging guidance localization standard and true lateral mammographic views are obtain

• The radiologist provides the surgeon the required landmarks: lesion location, size of wire inside the breast and location of the wire in relation to the lesion
Deep Lesions

- A wire may be inserted anterior to the lesion and not through the lesion
- Skin marking may be the only option for deep lesions, using mammogram, ultrasound or MRI guidance
- The radiologist provides as many as possible landmarks to direct the surgeon
- Specimen radiography is required
- Repeat Imaging will be required in a month to ensure that the lesion had completely excised
Suspicious One View Finding

• If a lesion is not amenable for biopsy surgical excision is required
• Attempt should be made to appreciate the location of the lesion with any other imaging modalities
• Deep axillary tail lesions and medial lesions which are located very high are difficult to be seen on two views
• The findings should be carefully reviewed with the surgeon. Surgery may be required to be obtain in several steps with interval specimen radiography
• Repeat mammography will be required in a month to ensure that the lesion had completely excised
Pre-Operative Galactography

- Galactography can be used to localize lesion prior to surgery by injecting blue dye mixed with iodine based contrast into the discharging orifice.
- Wire can be inserted into the filling defect if located far from the nipple.
- Standard and lateral mammographic views are obtain after the procedure.
- The radiologist provides the surgeons specific landmarks of the location of the lesion using o’clock face and distance from the nipple.
The breast Imaging Report

- The ACR BI-RADS lexicon provides a framework for reporting using specific descriptors. The report should establish levels of suspicion and provide recommendations.

- The location of breast abnormality can be indicated by using clock face, quadrant, depth and distance from the nipple.

- Recommendations for subsequent follow-up studies should be included in the report. Overall final assessment of findings is based on all imaging studies performed that day and common report may be issued.

- The conclusion must follow the categories defined in the ACR BI-RADS lexicon.
The breast Imaging Report

- BI-RADS 0: Incomplete assessment: Need additional imaging evaluation and/or prior mammograms for comparison
- BI-RADS 1: Negative for breast malignancy
- BI-RADS 2: Benign finding(s)
- BI-RADS 3: Probably benign finding – short-interval follow-up
- BI-RADS 4: 2-95% chances of malignancy – biopsy should be considered
- BI-RADS 5: Highly suggestive of malignancy – appropriate action should be taken
- BI-RADS 6: Biopsy – proven malignancy – appropriate action should be taken
The breast Imaging Report

• **Screening mammography can be only concluded as BIRADS 1, 2 or 0**

• **BI-RADS Category 0 assessments** are assigned to incomplete evaluations. Additional mammography views, ultrasound, or previous studies are necessary

• **A category 3, 4, or 5 assessment** is not recommended for a screening mammogram, although in some instances a highly suspicious abnormality may be identified that will warrant a recommendation for biopsy
BI-RADS 3 follow-up:

- Usually offered for a period of 2 years at 6 months, 12 months and 24 months using the modality where the abnormality is seen the best.
- Mammogram should always obtain every year unless the patient is younger than 30, pregnant or breast feeding.
- The report during the period of follow-up should always include information regarding the next suggested appointment by mentioning the month, year and the modality (ies) to use.
The breast Imaging Report

**BI-RADS category 4 or 5**

- An attempt to perform the biopsy same day or to arrange an urgent appointment and to deliver the patient with the information regarding the time and the date should be obtained if possible.
- The communication is documented in the mammogram report. If the date and time of the appointment is known, this should be mentioned in the report.