Mammography: Positioning and Clinical Image Evaluation Tools

Accreditation and Evaluation of the Clinical Image

Place the percentage by each of the problems with clinical images in the accreditation review:

1. Exposure ______
2. Compression ______
3. Artifacts ______
4. Labeling ______
5. Noise ______
6. Positioning ______
7. Sharpness ______
8. Contrast ______

% Choices:

a. 8%
b. 15%
c. 13%
d. 13%
e. 14%
f. 5%
g. 20%
h. 11%
Exposure and the Clinical Image

1. What is the average OD in the fibroglandular tissue?___________

2. Should the glandular tissue be gray or white?__________________

3. The pectoral muscle OD should not be less than _____?

4. Do you have to be able to see the underlying tissue through the pectoral muscle?________

Match the following percentages to accreditation clinical images:

5. General underexposure    ________

6. Inadequate exposure in dense tissue  ________

7. General overexposure  ________

8. Overexposure of radiolucent tissues ________

% Choices:

a. 24%
b. 18%
c. 2%
d. 56%
Compression

Which of the following indicate poor compression? 3 answers apply

a. the breast is not compressed to 5 cm  
b. poor separation of fibroglandular tissue  
c. the breast is not compressed to 10 decanewtons  
d. there is motion on the image  
e. non-uniform exposure in glandular tissue

Which view is motion seen on most commonly due to inadequate compression?

a. CC  
b. MLO

Sharpness

1. Where is unsharpness most commonly found on the MLO view?

2 answers apply  
a. subareolar  
b. inferior 1/3 of the breast  
c. tail  
d. anterior edge of pectoral muscle

2. Where is unsharpness most commonly found on the CC view?

2 answers apply  
a. chest wall  
b. subareolar  
c. lateral aspect  
d. medial aspect

3. Geometric unsharpness can be caused by:
Contrast

1. Inadequate contrast represents __________% of images that fail accreditation for contrast reasons.
2. Excessive contrast represents __________% of images that fail accreditation for contrast reasons.

Choose from these % options:

a. 10%

b. 90%

c. 20%

d. 60%

Mammography

PROPER POSITIONING WITH THE USE OF NIPPLE MARKERS

Mammography is the most difficult radiographic procedure to perform. Studies have shown that more breast cancers were missed when a woman was not in the correct position during her mammogram. Proper positioning is the key element to ensure the fullest amount of breast tissue is captured on the clinical image. The nipple plays a key role in determining if the breast is positioned properly. During positioning the nipple can change direction at any point and may not always be able to be visualized by the technologist. As we use our hands to mobilize, capture and secure the tissue prior to compression, much of the time this specific hand maneuver obscures visualization of the nipple. Using a nipple maker makes positioning easier as the marker can be felt to determine if the nipple is centered or rotated while positioning. Because we use our hands in this manner it is important to use a quality nipple marker that stays in place and does not move or come off when positioning, otherwise later we find the nipple marker on the sleeve of our scrubs, the bucky or on our shoes.
A nipple marker immediately identifies the nipple location on the clinical image and is necessary on each and every patient during a mammogram. With consistent use, the marker will expedite image critique, interpretation, enhance exposures and avoid repeat films. Below references the 5 essential reasons nipple markers add value in positioning and image critique.

Hint: When applying a nipple marker to a protruding nipple, apply it around the protrusion of the nipple; do not flatten the nipple with the marker. If the nipple is flattened, the marker will pop off of one side when compression is applied.

6 reasons nipple markers add value in positioning and image critique:

1) Identifies if lateral or medial tissue is missing on the image.

Nipples are not always naturally in the perfect position. On the CC view if the nipple points laterally, this indicates lateral tissue is missing from the film. Following the same guidelines, if the nipple is pointing medial, the medial tissue is missing. An important rule in image critique is to reference the nipple. Without a nipple marker it is more difficult and will often be overlooked during image critique.

2) Indicates suboptimal anterior compression and rotation of the nipple on the MLO view.

On the MLO view we must image the pectoral muscle with a muscle pattern that is wide superiorly with a convex anterior border to the level of the nipple or further. This can be achieved on 80% of women. The pectoral muscle is the most difficult area to properly capture when positioning the MLO view. The larger or thicker the pectoral muscle, the more difficult it is to achieve adequate anterior compression. The nipple marker is an excellent reference during image critique and alerts us that anterior compression is compromised by the level of the nipple on the image. As a result the need for an anterior compression view is quickly identified. Just as on the CC view the sense of touch of the nipple marker on the MLO view as we use our hands to mobilize, capture and secure the tissue prior to compression is a valuable tool. A nipple that is rotated medially on the MLO view is a good indication that the patient was not fully turned into the unit. A nipple that is rotated laterally on the MLO view indicates that the lateral tissue was not fully mobilized anterior and medial during positioning.

Hint: Never send films in for accreditation that the nipples are not centered on the CC view or are rotated on the MLO view. There is a misconception that you should not send images in for accreditation with nipple or skin markers. This is just that, a misconception.
3) A landmark for the posterior nipple line measurement tool.

When measuring the posterior nipple line in the MLO and CC projections, the rule is that the CC view must measure within 1 cm of the MLO view (MLO drawn along the axis). A CC view that does not measure within 1 cm of the MLO view indicates that the entire breast is not imaged on the CC view. The measurement is made from the nipple skin junction. The nipple marker will not be the nipple skin junction on a protruding nipple and will assist with locating the junction for proper measurement criteria. The measurement tool is based on today’s very strict criteria and it sets a level of quality we want to achieve in order to optimize the technology. We need to consider how well we are using the technology available and what we can do to improve. We will not get the outcomes we want unless we optimize the technology available.

When critiquing the CC view, you must answer the following questions:
1) Is all the medial tissue imaged?
2) Is the nipple centered on the image?
3) Does the posterior nipple line measure to within 1 cm of the MLO view?

When critiquing the MLO view you must answer the following questions:
1) Is the pectoral muscle wide superiorly with a convex anterior border? A convex margin is preferable to a concave margin.
2) Does the pectoral muscle extend to or below the posterior nipple line? This can be achieved in more than 80% of women.
3) Are the deep and superficial tissues well separated?
4) Is the inframammary fold open?

Without a nipple marker it would be harder to determine the answer to these questions.

4) Helps to determine area for Spot Compression or Spot Compression Magnification Views.

When a patient is called back because of an area of concern in the breast, a spot or spot magnification view is typically performed to work-up the area of concern. Having a nipple marker on the screening mammogram will assist the technologist performing the diagnostic views. The nipple marker is also valuable on the spot or spot magnification films for repositioning and referencing the area of interest in a difficult case. The nipple marker makes taking the measurements for the spot views much easier, faster and accurate for the technologist.
5) Nipple markers help to determine motion.

Motion blur on a mammogram is more detrimental to breast cancer detection than poor contrast. Motion, even subtle can erase diagnostic information on the image. There are times it is questionable if the image has motion. We look for the double barrel effect and compare with the other images of the same breast. The nipple marker is a valuable indicator of motion blur. If you are questioning motion on your image look closely at your nipple markers, if they are blurry you have answered your question.

6) Nipple markers assist us with comparing positioning from year to year or facility to facility.

It is important that positioning is optimal and consistent from year to year in order for the physician to use the very important comparison of mammograms to assist in the detection of breast cancer.

Use the technology to improve your positioning and image critique skills. Be an expert at image critique.

We are in a position of trust and the patient has no control over the outcome. We must use our skills and the technology available to do the very best mammogram we can on each and every patient. Your patient depends on you. Be an expert at positioning and image critique.

Routine Nipple Marking-A valuable tool in positioning and image critique
A Universally Good Mammography Practice for Screen-film and Digital Examinations