False Positive Detection Rate of R2-CAD in Evaluation of Breast Lesions at Full-Field-Digital Mammogram (FFDM)

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Introduction
Mammogram interpretation is challenging and the performance level varies between radiologists. Double reviewing increases cancer detection, however was not feasible in many centres due to lack of radiologist and cost.

CAD (computer aided diagnostic) system was developed to improve radiologist performance by simulating double reviewing. It identifies suspicious regions on mammograms (microcalcifications and focal densities), to draw the reader’s attention to these areas for evaluation of possible abnormalities. Reported series have shown that the sensitivity of CAD ranges from 76% to 94%.

R2-CAD is one of the soft ware available in clinical use, and has been on the market for several years with FDA approval. It is currently being used in our centre.

Aim
The objective of our study is to evaluate the detection rate of breast lesions by R2-CAD, with FFDM (full-field digital mammogram) in diagnostic and screening mammography.

Method
- This is a retrospective study
- Mammography cases done between January 2008 until May 2008 were reviewed on the BARCO monitor with CAD applied.
- A total of 191 cases in which R2-CAD prompted possible masses or calcifications were included in this study.
- The images were reviewed by 2 radiologist blinded to the final diagnosis.
- Each CAD lesion was documented and correlation was made with supplementary imaging and sampling by FNAC or biopsy whenever applicable.
- Final diagnosis with conclusion of CAD detected lesion whether it was malignant, benign or normal breast tissue were made.

Results
1. Demographic data:
2. Screening versus diagnostic mammogram

3. Evaluation of CAD-prompt calcification

4. Evaluation of CAD-prompt mass

5. Evaluation of CAD-prompt calcification and mass

6. Conclusion of CAD-prompt lesion

Example of cases

Case 1: A 44 year-old lady presented with right breast lump. Mammogram showed hard-density mass in the right breast and on US this is a solid mass, CAD did not mark the lesion. Another CAD marker on the contra-lateral side with no definite mass was. Biopsy of right breast showed stage IIB carcinoma.

Case 2: A 35 years old lady, who came for screening mammogram. She was at family history of breast cancer. CAD marked multiple calcifications with threshold for abnormal detection for the benefits of replacing radiologist in mammographic interpretation.

Case 3: A 47-year old lady came for screening mammogram which showed large calcifications in both breasts. CAD marked this calcification as lump on the right side and didn’t mark the similar calcification on the left side.

Case 4: A 70 years old lady came for screening mammogram which showed breast lesions. CAD marked both masses with calcification and mass on the right side and didn’t mark on the left side.

Case 5: A 64 year-old lady presented with a right breast lump. Mammogram showed hard-density mass in the right breast and on US this is a solid mass, CAD did not mark the lesion. Another CAD marker on the contra-lateral side with no definite mass was. Biopsy of right breast showed stage IIB carcinoma.

Case 6: A 59 year-old lady, who came for cancer screening. CAD marked multiple calcifications in both breasts. CAD did not mark this lesion on the left side and marked it on the right side.

Case 7: A 50-year old lady, who came for screening mammogram which showed abnormal densities in both breasts. CAD marked a normal breast tissue which was confirmed carcinoma.

Case 8: A 50 year-old lady, who came for screening mammogram which showed abnormal densities in both breasts. CAD marked this lesion on CC view). US showed a 6 mm density spot which was confirmed cancer.

Conclusion
R2-CAD has a high false positive prompt rate and low detection rate for malignant lesions.

In our CAD program, after a preliminary study that showed this system missing about one third of malignant lesions, we deliberately set a relatively low threshold for abnormal detection for the benefits of non-subspecialist trainee radiologist interpreting mammograms in our centre.

As such, it is only used for a diagnostic aid and not to replace radiologist in mammographic interpretation. Sorting meaningful marks from unhelpful marks will therefore remains the crux of effectively using CAD.

References

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