Retrospective comparison of Digital Mammography versus Synthetic Mammography for the detection of calcifications and breast malignancy

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Introduction

Calcifications detected on mammography are associated with benign and malignant pathologies. Full field digital mammography (FFDM) has high contrast resolution allowing clear depiction of calcifications. Digital breast tomosynthesis (DBT) utilizes the synthetic composite view (C-view) in conjunction with tomosynthesis to evaluate calcifications. The addition of DBT/C-view to FFDM increases the radiation dose.

In an attempt to decrease radiation, many institutions now forgo FFDM. Appearance of mammographic microcalcifications may vary when comparing DBT/C-view images with FFDM. Experience at our institution has shown that faint/small round and amorphous calcifications may be harder to perceive on C-view images (Fig 1). Our study aims to evaluate the performance of DBT/C-view compared to FFDM in the detection of suspicious microcalcifications leading to stereotactic biopsy at our institution.

Methods

A retrospective analysis of stereotactic biopsies for suspicious calcifications was performed from 2013-2020. Pathology results were compared of biopsies performed in two-year increments for each modality: FFDM only (2013-2015), FFDM +DBT/C-view (2015-2017), and DBT/C-view only (2018-2020) (Fig 2). From 2017-18, our institution was gradually transitioning to DBT/C-view only. As such, some patients received both FFDM + DBT/C-view while others received DBT/C-view only. Data from this interim phase was excluded in order to maintain consistency. Stereotactic biopsies for calcifications which were detected at outside facilities during these time periods were also excluded. Pathology results were reviewed and recorded as benign, high risk, ductal carcinoma in situ (DCIS), or invasive cancer. High risk category included: intraductal papilloma, atypical ductal hyperplasia, atypical lobular hyperplasia, lobular carcinoma in situ and radial scar.

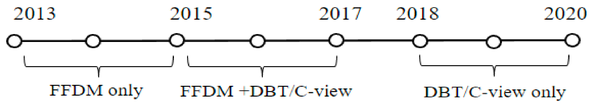

Figure 2. Timeline of modality used in two-year increments.

Results/Figures

Our data demonstrates during 2013-2015, a total of 260 microcalcifications requiring stereotactic biopsy were detected using FFDM; a total of 258 for FFDM+DBT/C-view; and a total of 190 for DBT/C-view only. Further subdivisions are listed in Table 1.

	FFDM (2013-2015)	FFDM + DBT/C-view (2015-2017)	DBT/C-view(2018-2020)
Benign	162	179	142
Benign/High Risk*	35	32	17
DCIS	46	43	28
Invasive Cancer	17	6	3
All Total	260	258	190
True Positive Total	63	49	31

*High risk includes LCIS, papilloma, ADH, ALH, radial scar.

Table 1. This table demonstrates the total of microcalcifications requiring stereotactic biopsy and their pathology results based on modality in two-year increments. True positive total is the summation of DCIS and Invasive cancer.

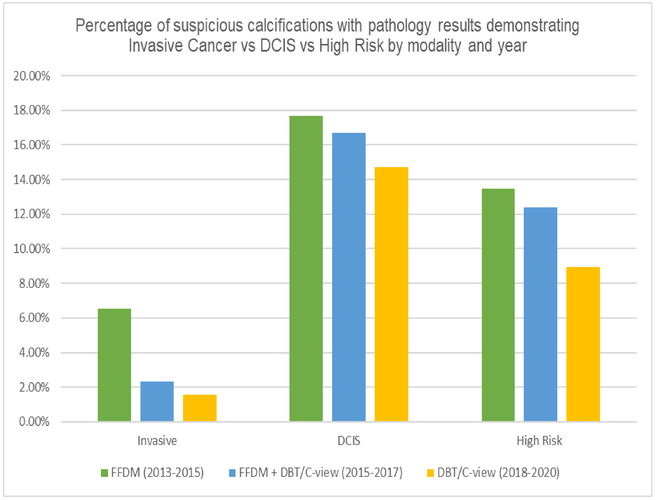

Figure 3. Percentage of cases demonstrating invasive cancer vs DCIS vs high risk based on modality and year.

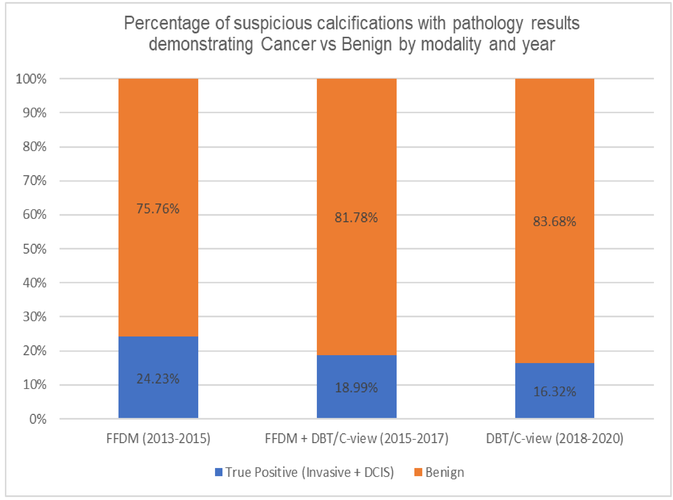

Figure 4. Percentage of cases demonstrating true positive cancer (invasive cancer and DCIS) versus benign pathology based on modality and year.

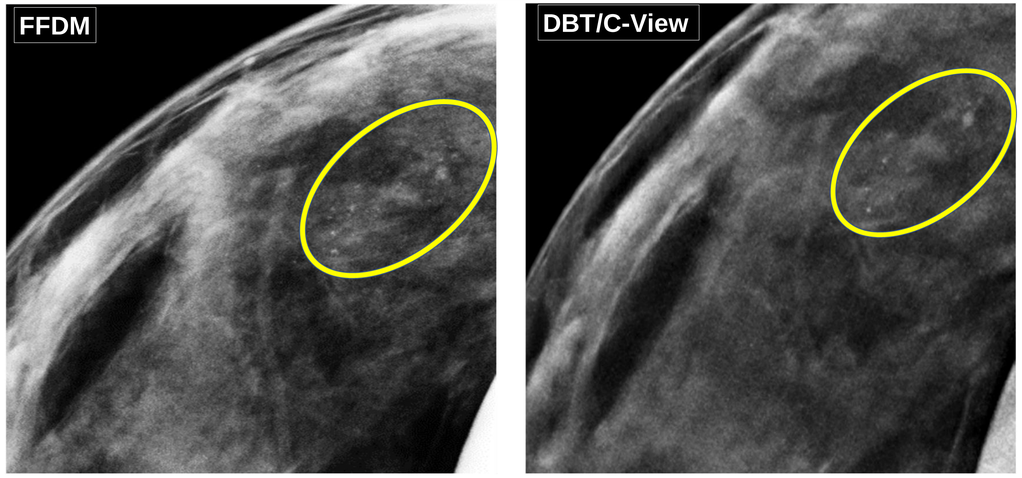

Figure 1. While both FFDM and DBT/C-view depict amorphous calcifications, the true extent is better evaluated on FFDM.

Conclusion

In this retrospective study, our data demonstrated that the DBT/C-view detected less microcalcifications compared to prior years. In addition, it detected less percentages of malignancies overall compared to FFDM only or FFDM + DBT/C-view combination mode.

Limitations/Next Steps

Limitations to this study include its retrospective nature and only demonstrates correlation. Although the cases detected at the same cancer center, other variables should also be considered and further analysis of the cohort data (age, past medical history, genetic factors, radiologists during each time period) can be evaluated.

References

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