

Use of a Mammography Comfort Aid and Education to Improve Breast Positioning

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Introduction:

Breast positioning is key when detecting breast cancer with mammography. Researchers have evaluated several factors including positioning, breast compression, contrast, and exposure, and found that positioning most directly affects the overall image quality, and therefore the detection of breast cancer, on a mammogram. Physicians are significantly more likely to miss breast cancer on a mammogram image if the breast is improperly or poorly positioned during the exam. Good communication and cooperation between patients and mammography technologists help ensure a high-quality mammogram (Ref. 1).

Method/Materials:

Patients presenting for routine screening mammograms at two centers were evaluated to assess the use of a breast cushion (MammoPad[®] manufactured by BioLucent, Inc. Aliso Viejo, CA) on breast positioning, tissue inclusion, and patient satisfaction. 107 patients were imaged using standard techniques without the breast cushion as a control. Technologists then underwent a positioning workshop using the breast cushion prior to imaging 377 patients with the cushion. All films were assessed by the radiologist for quality of breast

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Figure 1. Radiologist Data Form

Patient ID: _____ Radiologist ID: _____

Breast Cushion Evaluation: St. John Radiologist's Section

CC VIEW:

CRITERIA	RCC		LCC	
	Current Year	Prior Year	Current Year	Prior Year
1. Posterior nipple line (PNL) on the CC view is within 5cm of its length on the MLO view.	<input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input type="checkbox"/> N
2. Presence of pectoralis muscle along the posterior nipple line.	<input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input type="checkbox"/> N
3. Posterior breast tissue inclusion.	<input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input type="checkbox"/> N
4. Nipple positioned in profile.	<input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input type="checkbox"/> N

MLO VIEW:

CRITERIA	R MLO		L MLO	
	Current Year	Prior Year	Current Year	Prior Year
5. Consistent amount of pectoralis muscle visualized.	<input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input type="checkbox"/> N
6. Inferior extent of the pectoralis muscle reaches down to the posterior nipple line (PNL).	<input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input type="checkbox"/> N
7. Retroglandular fat posterior to all fibroglandular tissue.	<input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input type="checkbox"/> N
8. Open inframammary fold (IMF).	<input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input type="checkbox"/> N
9. Breast not sagging.	<input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input type="checkbox"/> N

Patient ID: _____

Breast Cushion Evaluation: St. John Tissue Measurement

Measure the posterior nipple line (PNL). Using a ruler with centimeter gradations, measure the distance directly posterior from the nipple to the edge of the film.

VIEW	Current Year (cm)	Prior Year (cm)
RCC		
LCC		
R MLO		
L MLO		

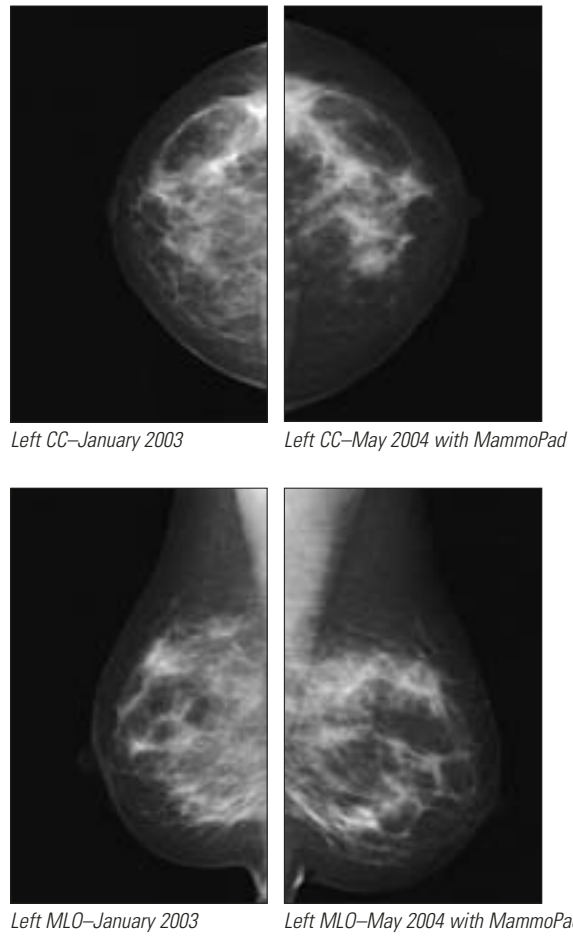
Figure 2. PNL Measurement Data Form

positioning for the current year films as compared to the prior year (Figure 1). The posterior nipple line (PNL) was measured on 167 sets of films randomly selected to assess tissue inclusion (Figure 2). After the mammogram, patients were given a survey to complete evaluating expected discomfort versus experienced discomfort. All films were evaluated against designated MQSA/ACR guidelines. Paired-sample T tests were performed comparing current year to prior year. A p-value less than 0.05 indicates a statistically significant difference and has been highlighted in green. Yes/No questions were scored as 1 = Yes and 0 = No. Therefore, the closer a value is to 1 the stronger the "Yes" response to the question.

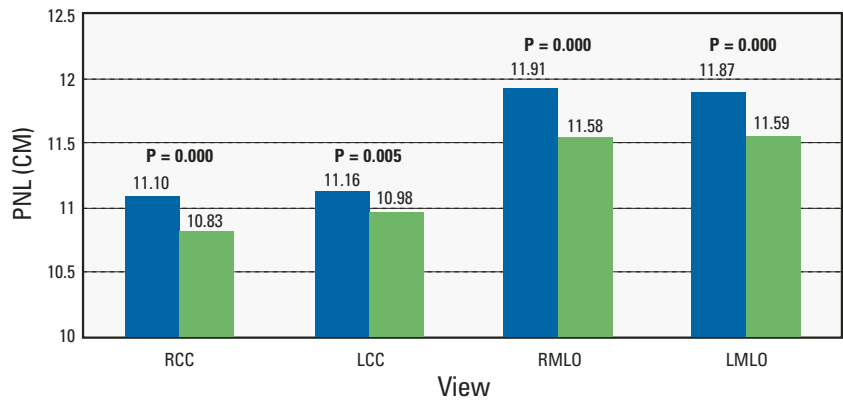
Results:

Positioning was improved with respect to length of the PNL, presence of pectoral muscle, and posterior tissue inclusion on the CC view ($P < .05$), and nipple profile was comparable, when using the breast cushion. CC images acquired without using the breast cushion showed no statistically significant improvement (Tables 1 & 2).

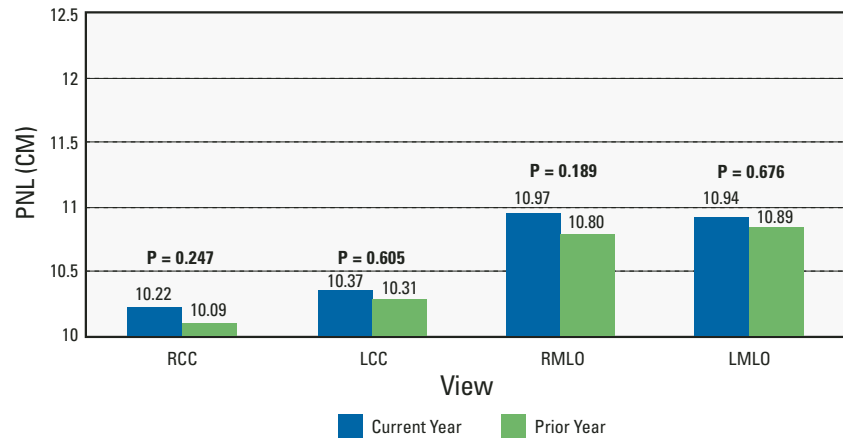
The breast cushion prevented the breast from sagging ($P = .000$) in the MLO views. Improvement was noted in the other criteria whether the breast cushion was used or not (Tables 3 & 4).



**Graph 1 – Tissue Inclusion with Breast Cushion
N=167**



**Graph 2 – Tissue Inclusion without Breast Cushion
N=61**



Tissue inclusion was increased by an average of 0.26 cm in all four views with the breast cushion ($P < .05$). Without the breast cushion, tissue inclusion remained the same (Graphs 1 & 2).

The comfort level experienced by patients with the breast cushion (2.10) was better than the level they expected (3.19).

Conclusions:

Use of a mammography breast cushion, combined with technologist training, will yield improvement in overall breast positioning and increased tissue acquisition. Women experienced less than anticipated discomfort and were likely to be more relaxed during the exam. The effect of relaxation, combined with the physical characteristics of the breast cushion contributed to the positive results achieved.



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Table 1 – CC View with Breast Cushion

Criteria	RCC			LCC		
	Current Year	Prior Year	P-Value	Current Year	Prior Year	P-Value
N = 365						
1. PNL on CC within 1cm on MLO	0.94	0.85	0.000	0.96	0.90	0.000
2. Pectoral Muscle along PNL	0.36	0.27	0.000	0.36	0.29	0.002
3. Posterior Tissue Inclusion	0.98	0.95	0.007	0.99	0.97	0.021
4. Nipple in Profile	0.94	0.98	0.169	0.96	0.96	1.000

Table 2 – CC View without Breast Cushion

Criteria	RCC			LCC		
	Current Year	Prior Year	P-Value	Current Year	Prior Year	P-Value
N = 103						
1. PNL on CC within 1cm on MLO	0.90	0.87	0.320	0.92	0.87	0.014
2. Pectoral Muscle along PNL	0.26	0.19	0.090	0.26	0.24	0.619
3. Posterior Tissue Inclusion	0.98	0.96	0.320	0.98	0.96	0.320
4. Nipple in Profile	0.91	0.91	1.000	0.90	0.90	1.000

Table 3 – MLO View with Breast Cushion

Criteria	RMLO			LMLO		
	Current Year	Prior Year	P-Value	Current Year	Prior Year	P-Value
N = 365						
5. Amount of Pectoral Muscle	0.72	0.68	0.232	0.70	0.65	0.018
6. Pectoral Muscle to PNL	0.86	0.77	0.000	0.90	0.85	0.334
7. Retroglandular Fat	0.98	0.99	0.633	0.98	0.98	0.180
8. Open IMF	0.64	0.53	0.000	0.61	0.51	0.000
9. Breast not Sagging	0.91	0.85	0.000	0.90	0.84	0.000

Table 4 – MLO View without Breast Cushion

Criteria	RMLO			LMLO		
	Current Year	Prior Year	P-Value	Current Year	Prior Year	P-Value
N = 103						
5. Amount of Pectoral Muscle	0.75	0.68	0.052	0.74	0.67	0.090
6. Pectoral Muscle to PNL	0.83	0.73	0.018	0.80	0.75	0.134
7. Retroglandular Fat	0.98	0.96	0.158	0.99	0.96	0.083
8. Open IMF	0.62	0.50	0.010	0.59	0.45	0.003
9. Breast not Sagging	0.93	0.88	0.096	0.93	0.90	0.181

References

1) Taplin SH., et al. *Clinical Image Quality and the Risk of Interval Breast Cancer.* AJR 2002; 178: 797–803.

