

Post Treatment Mastalgia is a Common Complaint But Not an Indication of Recurrence

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Abstract

Purpose: Post-treatment mastalgia is a common complaint in up to 68% of patients after treatment. This symptom is worrisome to patients as many believe it is a sign of recurrence. The current study was performed to evaluate if post-treatment mastalgia is associated with breast cancer recurrence.

Methods: Patients included were seen from January 1, 2000 to December 31, 2020. All patients who were treated for breast cancer and then presented with breast pain during follow up were considered to have post-treatment mastalgia. All patients who were diagnosed with a second breast cancer but did not experience post-treatment mastalgia were also evaluated.

Results: 1799 patients had a mean age 52.9 years. 36% of patients experienced post-treatment mastalgia. Of patients who complained of post-treatment mastalgia, 19 were diagnosed with a chest wall recurrence (CW), ipsilateral breast tumor recurrence (IBTR), or contralateral breast cancer (CBC). 17 of the 19 patients had breast pain after the second diagnosis and treatment were completed. The average duration between their second diagnosis and initial complaint of breast pain was 6.2 years. The two patients who complained of breast pain prior to their second diagnosis did not have mastalgia at the time of their second diagnosis.

Local recurrence or contralateral breast cancer were more common in patients without post treatment mastalgia (10.1% vs 0.3%, $p < 0.0001$) during follow up.

Conclusions: Post treatment mastalgia is not associated with recurrence. Interval or repeat imaging does not appear necessary and instead patient education and reassurance are important in its management.

Introduction

Breast pain or mastalgia is a very common complaint in outpatient offices and clinics. Approximately 70-80% of women will experience mastalgia (Joyce, et al. 2014; Ader, et al. 1997a, b). Numerous studies have demonstrated that mastalgia is not a sign or risk factor for breast cancer and instead is attributed to a response in breast tissue to normal physiologic hormones (Jameson, et al 2018; Lobo, et al 2017; Townsend, et al. 2017; Tintinalli, et al. 2020; Kliegman, et al, 2015; Altintas, et al, 2018; Holbrook, et al. 2020; Cho, et al. 2017; Owen, et al. 2019; Chetlen, et al. 2017; Duikm, et al. 1998; Leddy, et al. 2013; Mema, et al. 2019; Fonseca, et al. 2019; Noroozian, et al 2015; Masroor, et al. 2009; Howard, et al. 2012).

After the diagnosis and treatment of breast cancer, breast pain or post treatment mastalgia is similarly common. Several studies have demonstrated a risk of persistent pain after either breast conservation or mastectomy between 20-68% (Geving Anderson, et al. 2011; Bruce, et al 2012; Bruce, et al. 2014; Schreiber, et al. 2013). This persistent pain after breast cancer treatment is one of the reasons for the COMET (Comparison of Operative versus Monitoring and Endocrine Therapy) trial for low risk ductal carcinoma in situ (Hwang, et al. 2019). This prospective study compares standard of care including operation with radiation therapy as indicated versus endocrine therapy and monitoring with breast

imaging. Some of the factors associated with chronic or persistent post treatment breast pain include chronic preoperative pain (Bruce, et al 2012) and elevated levels of distress-related psychosocial factors such as anxiety, depression, catastrophizing, and somatization (Bruce, et al. 2014; Schreiber, et al. 2013). In addition, increased sensitivity to mechanical stimulation during quantitative sensory testing (QST) in nonsurgical body areas revealed increased likelihood for persistent post treatment pain (Schreiber, et al. 2013). Breast cancer treatment related factors which may increase risk for post treatment pain include axillary node dissection/clearance (Bruce, et al 2012; Bruce, et al. 2014) and radiation therapy (Geving Anderson, et al. 2011).

No study has yet demonstrated an association between post treatment mastalgia and breast cancer recurrence. Patients, however, fear that mastalgia during breast cancer follow up is a sign of breast cancer recurrence. Despite the lack of an association between mastalgia and breast cancer recurrence, when patients complain of breast pain during follow up visits, clinicians often order breast imaging. When patients have had a benign or stable mammogram within the last 12 months, clinicians will still often repeat another mammogram or order breast ultrasound or breast magnetic resonance imaging.

This study was performed to determine if a complaint of breast pain during breast cancer follow up, or post treatment mastalgia, is a sign of breast cancer recurrence or a second primary breast cancer.

Methods

This study was conducted at Valleywise/Maricopa Medical Center (VMC) Breast Clinic in Phoenix, Arizona, and reviewed and approved by the institutional review board prior to data collection. All breast cancer patients seen in the Breast Clinic from January 1, 2000 to December 31, 2020, were included. Baseline data for every patient was compiled prospectively, supplemented by retrospective chart review. The data included presenting complaint, history and physical examination including sociodemographic information, medical history, surgical history, and family history, imaging studies, and diagnostic tests. Starting on May 1, 2011 all patients estimated their risk of breast cancer recurrence (Diefenbach, et al. 1993). All records were reviewed to identify diagnoses of breast cancer at the time of initial workup or in subsequent years of available follow up. Breast cancer treatment, follow up, and second cancer diagnoses and treatment were documented.

Determination of the necessity of adjuvant therapy is an individualized patient and physician decision. For purposes of this study, chemotherapy was deemed necessary for triple negative breast cancer and erbB2 (Her2neu) positive breast cancers. In addition, for Luminal breast cancer chemotherapy was deemed necessary for those with a Recurrence Score >31 or >25 (after 2018) or node positive cancers (Paik, et al. 2006; Sparano, et al. 2018). Radiation therapy was deemed necessary after breast conservation or after mastectomy if the cancer was greater than 5cm, T4, or node positive (Overgaard M, et al. 1997; Overgaard M, et al. 1999). Endocrine therapy was deemed necessary for any patient with hormone receptor positive breast cancer. Lastly, if there was a documented contraindication for a particular adjuvant therapy then the therapy was considered not necessary.

After completion of their operation, adjuvant chemotherapy, and radiation therapy for their initial breast cancer, patients who complained of breast pain in either breast were considered to have post treatment mastalgia. Due to the duration of adjuvant targeted (i.e. Herceptin, endocrine therapy, etc.) therapy, patients who had completed surgery, chemotherapy, and radiation therapy, but complained of breast pain while on the targeted therapy were included. For patients who complained of post treatment mastalgia and were diagnosed with a second local breast cancer (chest wall recurrence, ipsilateral breast tumor recurrence, or contralateral breast cancer), the findings on physical examination and breast imaging were documented. In addition, the location of second cancer and the location of the breast pain were documented. The diagnosis, treatment, and follow up for the patients were reviewed. During the same study period, there were 986 patients diagnosed with breast cancer who did not complain of post treatment mastalgia during follow up. Of these patients who were diagnosed with a second breast cancer, their records were reviewed a second time to ensure there was no indication of a complaint of breast pain during follow up.

Statistical Analysis

Age, education, body mass index, and monthly income were analyzed as continuous variables. Race/ethnicity, employment, insurance status, and screening mammography were analyzed as categorical variables. Health literacy was assessed using the Newest Vital Sign (NVS) (Weiss, et al. 2005; Komenaka, et al. 2014). Patients with NVS 4-6 were categorized as having “adequate health literacy.” Patients with NVS 0-3 were considered “low health literacy (Komenaka, et al. 2014).”

Continuous variables were summarized by mean with standard deviation and categorical variables were summarized by frequency and the associated percentage by post treatment mastalgia status. Wilcoxon rank-sum test was performed to compare continuous variables between the two groups. Chi-square test was performed to compare categorical variables between the two groups. Logistic regression was performed to identify variables associated with post treatment mastalgia. Then variables with an unadjusted p-value less than 0.05 were included in the adjusted analysis.

For variables associated with a diagnosis of second cancer, logistic regression was again performed to identify associated variables. The variables with an unadjusted p-value less than 0.05 were then included in the adjusted analysis. The adjusted model, however, was likely to be overfitted so the adjusted results were omitted. All statistical tests were two sided and significance levels were set at 0.05. The statistical methods of this study were performed and reviewed by a biomedical statistician (CHH).

Results

A total of 1799 patients were seen during the time period. The mean age of the patients was age 52.9 years. Of the patients, 135 presented with or developed metastatic disease prior to their operation. Another 87 patients transferred their care to another facility or moved out of state, whereas 43 other patients either declined an operation or no showed for the procedure. Of the remaining 1534 patients,

approximately 36% of patients (548 of 1534) presented with a complaint of post treatment mastalgia at some point during their follow up after breast cancer treatment (Table 1). Many of these patients (57% = 310/548) presented more than once with post treatment mastalgia during follow up clinic visits and these patients consistently overestimated their risk of recurrence at 52%. Their estimation of risk was higher than that of patients who complained of post treatment mastalgia at only one visit and higher than those who did not complain of post treatment mastalgia (30% and 19%, respectively, $p < 0.01$).

Table 1
Patient sociodemographic information

	Patients with post treatment mastalgia (N = 548)	All other patients (N = 986)	p- value
Mean age, years (SD)	51.2 (10.5)	53.5 (12.1)	0.001
Race/ethnicity	106 (19%)	313 (32%)	<0.001
Non-Hispanic White	51 (9%)	86 (9%)	
African American	357 (65%)	522 (53%)	
Hispanic	34 (6%)	65 (7%)	
Other			
Language, English	231 (42%)	551 (56%)	<0.001
Education, years (SD)	10.5 (4.24)	10.6 (4.04)	0.56
6 or less	116 (22%)	172 (19%)	
7 – 11	128 (24%)	177 (19%)	
High school/equivalent	124 (23%)	203 (22%)	
Some college	91 (17%)	162 (18%)	
College degree	71 (13%)	199 (22%)	
Missing	18	73	
Adequate Health Literacy	16% (73/467)	18% (119/650)	0.24
Height (m)	1.59 (0.079)	1.59 (0.071)	0.99
Weight (kg)	75.7 (16.9)	75.5 (17.9)	
Body mass index in kg/m ² (SD)	29.8 (6.28)	29.8 (6.63)	
Marital status – married	229 (42%)	347 (35%)	0.028
Domestic partner	30 (5%)	66 (7%)	
Employment, employed	168 (31%)	295 (30%)	0.79

SD – Standard deviation

AHCCCS – Arizona Health Care Cost Containment System

	Patients with post treatment mastalgia (N = 548)	All other patients (N = 986)	p-value
Insurance status	22 (4%)	40 (4%)	<0.001
Commercial	29 (5%)	93 (9%)	
Medicare	145 (26%)	323 (33%)	
AHCCCS (Medicaid)	354 (65%)	530 (54%)	
None			
Monthly income \$ (SD)	1093.70 (1175.03)	1021.00 (1144.32)	0.075
Undergoing breast screening (40 yr+)	20% (92/459)	19% (161/852)	0.61
Age 40-49 years	16% (27/168)	16% (45/276)	
Age 50 years+	22% (65/291)	20% (116/576)	
SD – Standard deviation			
AHCCCS – Arizona Health Care Cost Containment System			

Patients who complained of post treatment mastalgia were more likely to be younger, Hispanic, non-English speaking, married or partnered, or uninsured. When surgical treatment was included in the analysis, patients who had bilateral mastectomy or axillary node dissection were more likely to have post treatment mastalgia (Table 2).

Table 2
Identification of variables associated with post treatment mastalgia

Variable	Unadj OR	Lower 95% CI	Upper 95% CI	p-value	Adj OR	Lower 95% CI	Upper 95% CI	p-value
Age	0.983	0.974	0.992	< 0.001	0.992	0.977	1.009	0.36
Hispanic ethnicity	1.669	1.345	2.070	< 0.001	0.975	0.557	1.706	0.93
English speaking	0.578	0.468	0.714	< 0.001	0.686	0.385	1.222	0.20
Education: 7-11 yrs	1.072	0.773	1.488	0.68				
Education: 12 yrs	0.906	0.655	1.253	0.55				
Education: Some College	0.833	0.588	1.180	0.3				
Education: Bachelor or higher	1.074	0.730	1.580	0.72				
Adequate health literacy	0.816	0.593	1.123	0.21				
Married/Partnered	1.273	1.031	1.572	0.025	1.003	0.689	1.461	0.99
Employed	1.039	0.828	1.303	0.74				
No insurance	1.549	1.252	1.918	< 0.001	1.238	0.817	1.876	0.31
Monthly income (\$1k)	1.054	0.963	1.153	0.25				
Bilateral mastectomy	2.022	1.352	3.025	< 0.001	1.967	1.277	3.030	0.002
Axillary node dissection	0.534	0.423	0.675	< 0.001	0.670	0.470	0.956	0.027
Logistic regression was performed to identify variables associated with pain, where variables with an unadjusted p-value less than 0.05 were included in the adjusted analysis								

Of the patients who complained of post treatment mastalgia, 19 were diagnosed with a second local breast cancer: chest wall recurrence (CW), ipsilateral breast tumor recurrence (IBTR), or contralateral breast cancer (CBC) during their follow up. Twelve patients presented with a palpable mass and seven patients presented with abnormal imaging. None of the patients, however, presented with breast pain at the time of their diagnosis of CW/IBTR/CBC (Table 3). Only two patients (2/548 = 0.3%) had post treatment mastalgia prior to a second diagnosis and both were contralateral breast cancers. The two patients, however, complained of breast pain 13 years and 3 years prior to their second diagnosis. Both

patients had normal physical examination, mammogram, and breast ultrasound at the time of their complaint of post treatment mastalgia. Both patients also did not complain of post treatment mastalgia at the time of their second diagnosis. The other 17 of the 19 patients who complained of post treatment mastalgia, complained of breast pain after the second diagnosis and treatment of their CW/IBTR/CBC was completed. The average duration between the diagnosis of their second breast cancer and the initial complaint of breast pain was 6.2 years (range 1 – 24 years).

Table 3
Second breast cancer in patients with post treatment mastalgia

Patient Age (years)	Type	Palpable Mass/Abnormal imaging	Date Diagnosis of CW/IBTR/CBC	Date Pain	Years after CW/IBTR/CBC diagnosis
58	CW	Mass	2019	2020	1
51	CW	Mass	2007	2014	7
48	CW	Mass	2005	2006	1
56	CW	Mass	1985	2007	22
75	CW	Mass	1990	2014	24
77	IBTR	Imaging	2011	2015	4
33	IBTR	Mass	2004	2016	12
59	IBTR	Mass	2019	2020	1
40	IBTR	Imaging	2018	2020	2
53	IBTR	Mass	2005	2010	5
55	IBTR	Mass	2004	2006	2
45	IBTR	Mass	2010	2019	9
53	IBTR	Imaging	2009	2010	1
43	IBTR	Imaging	2006	2013	7
44	CBC	Mass	2010	2010 after treatment	1
50	CBC	Imaging	2011	2017	6
58	CBC	Imaging	2019	2019 after treatment	1
Average 52.8					6.2 years
54	CBC	Imaging	2020	2007	13 years prior
47	CBC	Mass	2012	2009	3 years prior
CW – chest wall recurrence					
IBTR – ipsilateral breast tumor recurrence					
CBC – contralateral breast cancer					

Of the 986 who never had a complaint of post treatment mastalgia, 10% (100 of 986) were diagnosed with a second breast cancer (CW 31, IBTR 48, CBC 21). 64 patients presented with a painless breast mass and one patient presented with skin erythema and thickening without breast pain. The remaining 35 CW/IBTR/CBC were found on routine follow up imaging. Local recurrence or contralateral breast cancer were more common in patients without post treatment mastalgia (10.1% vs 0.3%, $p < 0.0001$) compared to those who had post treatment mastalgia during follow up.

Patients diagnosed with a second breast cancer (CW/IBTR/CBC) were more likely to present with stage II or III breast cancer (75% vs 60%, $p = 0.002$) or with triple negative breast cancer (30% vs 20%, $p = 0.011$) compared to patients who were not diagnosed with a second breast cancer. In addition, patients diagnosed with a second breast cancer (CW/IBTR/CW) were more likely not to have undergone recommended adjuvant chemotherapy, radiation therapy, and endocrine therapy (Table 4). Logistic regression to identify variables associated with a second diagnosis of breast cancer showed that having undergone axillary node dissection and not having recommended Her2 targeted therapy, in addition to the previously mentioned factors, were associated with a diagnosis of a second breast cancer (Table 5).

Table 4
 Patients diagnosed with second cancer and those without second cancer

	CW/IBTR/CBC	No second cancer	p-value
Mean age, years (SD)	54.3 (13.9)	52.6 (11.1)	0.28
Race/ethnicity	39 (32%)	345 (27%)	0.32
Non-Hispanic White	9 (7%)	120 (9%)	
African American	64 (52%)	731 (57%)	
Hispanic	11 (9%)	84 (7%)	
Other			
Education, years (SD)	11.0 (4.65)	10.6 (4.04)	0.021
Adequate Health Literacy	19/89 (21%)	161/948 (17%)	0.36
Body mass index in kg/m ² (SD)	29.4 (6.21)	29.7 (6.58)	0.63
Marital status – married	45 (44%)	481 (43%)	0.89
Domestic partner	9	71	
Insurance status	61 (50%)	708 (55%)	0.26
None			
Undergoing breast screening (40 yr+)	19/102 (19%)	225/1107 (20%)	0.62
Preoperative Stage	11 (9%)	217 (17%)	0.002
0	20 (16%)	292 (23%)	
I	78 (63%)	619 (48%)	
II	14 (12%)	152 (12%)	
III			
Subtype	66 (60%)	674 (63%)	0.011
Luminal	14 (11%)	173 (16%)	
ErbB2 (Her2neu)	32 (30%)	216 (20%)	
Basal (Triple negative)			
SD – standard deviation			
CW – chest wall recurrence			
IBTR – ipsilateral breast tumor recurrence			
CBC – contralateral breast cancer			

	CW/IBTR/CBC	No second cancer	p-value
Operation	76 (62%)	804 (63%)	0.085
Breast conservation	41 (33%)	367 (28%)	0.005
Mastectomy	6 (5%)	109 (9%)	
Bilateral mastectomy	52 (42%)	377 (29%)	
Axillary node dissection			
Chemotherapy	62/90 (69%)	642/775 (83%)	0.005
Her2 targeted therapy	10 (83%)	145 (90%)	0.062
Radiation therapy	64/96 (67%)	824/965 (85%)	<0.001
Endocrine therapy	40/79 (51%)	748/912 (82%)	<0.001
SD – standard deviation			
CW – chest wall recurrence			
IBTR – ipsilateral breast tumor recurrence			
CBC – contralateral breast cancer			

Table 5
Identification of variables associated with a diagnosis of second breast cancer

Variable	Unadj OR	Lower 95% CI	Upper 95% CI	p-value
Age	1.013	0.997	1.029	0.12
Hispanic ethnicity	0.813	0.561	1.178	0.27
English speaking	1.217	0.839	1.767	0.3
Education: 7-11 yrs	0.524	0.270	1.017	0.056
Education: HS	0.712	0.388	1.304	0.27
Education: Some College	1.104	0.615	1.982	0.74
Education: Bachelor or higher	1.497	0.813	2.756	0.2
Adequate health literacy	1.337	0.783	2.282	0.29
Married/Partnered	1.045	0.718	1.521	0.82
Employed	1.019	0.683	1.521	0.93
No insurance	0.793	0.548	1.149	0.22
Monthly income (\$1k)	0.952	0.802	1.130	0.57
Underwent breast screening	0.853	0.512	1.419	0.54
Stage 2 or higher	1.967	1.290	3.000	0.002
Basal (Triple negative) subtype	1.779	1.157	2.737	0.009
Bilateral mastectomy	0.438	0.183	1.051	0.064
Axillary node dissection	1.750	1.200	2.553	0.004
No chemotherapy	2.045	1.265	3.307	0.004
No Her2 targeted therapy	4.456	1.151	17.255	0.031
No Radiation therapy	2.848	1.799	4.510	< 0.001
No Endocrine therapy	4.191	2.617	6.712	< 0.001
Logistic regression was performed to identify variables associated with diagnosis of second cancer, where variables with an unadjusted p-value less than 0.05 were included in the adjusted analysis. The adjusted model, however, was likely to be overfitted so the adjusted results were omitted.				

Discussion

Post treatment mastalgia is a common complaint after breast cancer treatment. The current study found that 36% of patients complained of post treatment mastalgia. Only two patients (0.3%) diagnosed with a

second breast cancer, however, had ever complained of post treatment mastalgia prior to their second diagnosis. In addition, neither patient had mastalgia at the time of their diagnosis.

Several studies have demonstrated that after treatment of breast cancer, the risk of breast pain or post treatment mastalgia is between 20-68% (Geving Anderson, et al. 2011; Bruce, et al 2012; Bruce, et al. 2014; Schreiber, et al. 2013). The pain is common and can occur after either breast conservation or mastectomy. The breast pain can persist for 12 years, become a chronic complaint, and sometimes may also be musculoskeletal pain (Bovbjerg, et al. 2019; Lundstedt, et al. 2012; Bell, et al. 2014; Forget, et al. 2020; Macdonald, et al 2005). Treatment related factors include radiation therapy, chemotherapy, younger age at diagnosis, axillary node dissection/clearance and lymphedema (Geving Anderson, et al. 2011; Bruce, et al. 2014; Lundstedt, et al. 2012; Bell, et al. 2014; Peuckmann, et al. 2009; Gärtner, et al. 2009). Bell, et al. reported that while breast cancer treatment contributes to breast pain, it is clear that there is no simple mechanical issue or single treatment factor as the cause (Bell, et al. 2014).

Patients fear that mastalgia is a sign of breast cancer recurrence. Thirteen studies in different populations from several countries have shown no association of mastalgia with an initial diagnosis of breast cancer. Of 13,183 patients only 106 (0.8%) were found to have breast cancer (Altintas, et al, 2018; Holbrook, et al. 2020; Cho, et al. 2017; Owen, et al. 2019; Chetlen, et al. 2017; Duikm, et al. 1998; Leddy, et al. 2013; Mema, et al. 2019; Fonseca, et al. 2019; Noroozian, et al 2015; Masroor, et al. 2009; Howard, et al. 2012). Interestingly, most patients who complained of post treatment mastalgia did not have pain prior to their diagnosis. Of the current patients who complained of post treatment mastalgia, only 2.6% (14/548) had breast pain prior to their initial diagnosis and only two patients had ipsilateral breast pain. Consistent with prior to an initial diagnosis of breast cancer, post treatment mastalgia was not associated with diagnosis of a second breast cancer (CW/IBTR/CBC). Factors that were associated with diagnosis of a second breast cancer included higher stage of cancer and triple negative breast cancer. In addition, as could be expected, not having undergone recommended adjuvant chemotherapy, radiation therapy, and endocrine or targeted therapy were also associated with a second breast cancer diagnosis (Table 4 and 5).

There has been recent substantial growth in neurobiological research on pain and emotion. There is a subcortical circuit that governs defensive responses, and this circuit involves the nonconscious processing of stimuli that underlie emotional states associated with persistent pain. Repeated fear experiences can elicit anticipatory anxiety, thereby contributing to persistent pain (Lumley, et al 2011). The belief that mastalgia indicates cancer recurrence could be considered a continued repeated fear experience.

The majority of patients (57% = 310/548) complained of post treatment mastalgia at more than one follow up clinic visit. These patients substantially overestimated their risk of breast cancer recurrence at 52%. Unfortunately, the belief that mastalgia indicates cancer is common in breast cancer survivors with persistent breast pain. Bovbjerg, et al. found that survivors also had higher levels of general anxiety, pain catastrophizing, and worry (Bovbjerg, et al. 2019). One patient in the current study complained of breast

pain at seven consecutive follow up visits over a 3 year period including several Emergency Department visits. Despite undergoing standard follow up imaging and being reassured during each visit, the patient insisted that the post treatment mastalgia was a sign that she had breast cancer recurrence. The patient did not have a second breast cancer and was eventually seen by a psychiatrist and diagnosed with illness anxiety disorder for which she started cognitive behavioral therapy (Scarella, et al 2019). Bovbjerg, et al. similarly concluded that perceived risk of breast cancer and worry that pain may indicate cancer as important targets for intervention (Bovbjerg, et al 2019; Porter, et al. 2011). Augmentation of positive emotional states or relief of fear and anxiety generally have been found to reduce pain (Lumley, et al. 2011; Franklin 1998). A study by Bruce, et al. found that psychological robustness or dispositional optimism and positive affect may also have a favorable effect on post-operative breast pain severity (22). Pain is a subjective, complicated patient-reported phenomenon likely multifactorial and involving preoperative patient psychological factors (Bruce, et al. 2012; Schreiber, et al. 2013; Macdonald, et al. 2005; Törer, et al. 2010). Breast cancer patients experience anticipatory psychological distress prior to their diagnosis of breast cancer and prior to their cancer operation (Schnur, et al. 2008; Montgomery, et al 2010). Other studies have found that patients with greater preoperative emotional distress, depression and anxiety scores have significantly more clinically meaningful and chronic postoperative pain (Bruce, et al. 2014; Törer, et al. 2010; Katz, et al. 2005). Therefore it is possible that patients with more fear and worry about their prognosis may have more post treatment pain.

Schreiber, et al. found that patients with persistent postmastectomy pain were more likely to catastrophize in response to pain (Schreiber, et al. 2013). This study provides reassurance that post treatment mastalgia is not associated with breast cancer recurrence. Worry that breast pain indicates cancer is a common belief and source of distress for patients. Since post treatment mastalgia can become a chronic problem and a factor which lowers quality of life for patients (Macdonald, et al. 2005; Peuckmann, et al 2009), the current findings may help lessen worry about pain as a patient-reported outcome.

The findings of the current study that post treatment mastalgia is not a sign of breast cancer recurrence is also relevant because it makes interval mammography and other imaging unnecessary. It is particularly important to avoid unnecessary mammography in breast cancer survivors with persistent breast pain. A study by Shelby, et al found that breast pain and mammography related anxiety were associated with not returning for a mammogram (Shelby, et al 2012). Therefore post treatment mastalgia could inadvertently contribute to decreased compliance with recommended imaging during follow up.

One limitation of this study is that it is a retrospective review from one institution. The retrospective design of the current study, however, did allow review of patients diagnosed with a second breast cancer who presented with all other complaints to ensure that no patients who complained of post treatment mastalgia were missed.

Post treatment mastalgia is a common complaint after breast cancer treatment. Many patients fear that this symptom indicates cancer recurrence. This study demonstrated that post treatment mastalgia is not

a sign or risk factor for recurrent breast cancer. Since there is no evidence of increased risk for recurrent cancer, additional imaging can be avoided and prevent low-value care and instead preserve healthcare resources. Unnecessary breast imaging may also reinforce fearful behavior and exacerbate the belief in patients that “something should always be done (Kool, et al. 2020).” In addition, avoidance of unnecessary imaging can lessen anticipatory anxiety, thereby lowering the likelihood of persistent pain (Lumley, et al. 2011). Reassurance is critical to the management of breast pain, not the unnecessary use of healthcare resources.

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Author Contributions

All authors contributed to the study conception and design. Material preparation, data collection and analysis were performed by Ian Komenaka and Chiu-Hsieh Hsu. The first draft of the manuscript was written by Ian Komenaka and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

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