



# Axillary management of breast cancer patients with isolated chest wall recurrence after mastectomy

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**Background:** National Comprehensive Cancer Network (NCCN) guidelines on the axillary management of breast cancer patients with isolated chest wall recurrence after mastectomy are unclear. Though sentinel lymph node biopsy (SLNB) is possible and may be considered, there is limited data on its usefulness. We aimed to determine if axillary restaging surgery was required in this cohort of patients who developed operable isolated chest wall recurrences after mastectomy.

**Methods:** Breast cancer patients treated at a tertiary institution from 1st September 2005 to 31st October 2017 and developed isolated chest wall invasive recurrences after mastectomy were retrospectively reviewed. We excluded patients with bilateral cancers, concurrent regional or distant metastases, patients without surgery for their chest wall recurrences and patients who were lost to follow-up. The demographics, pathological data and second recurrences were collected from a prospectively maintained database and compared between patients with axillary lymph node dissection (ALND), SLNB and no axillary operation.

**Results:** Of the 1,841 patients who underwent mastectomy, 26 (1.4%) patients developed isolated chest wall recurrences. Twenty two eligible patients were analysed. The mean age at diagnosis of the recurrence was 54.7 years (range, 37–84 years). 1, 2 and 19 patients had ALND, SLNB and no axillary operation respectively. On mean follow-up of 38.3 months, no axillary recurrences were noted.

**Conclusions:** In breast cancer patients with isolated chest wall recurrences after mastectomy, axillary restaging surgery can be safely omitted with no increased axillary recurrences on medium term follow-up. This finding could refine existing guidelines in the management of the axilla for patients with chest wall recurrences after mastectomy.

**Keywords:** Breast cancer; mastectomy; recurrence; axillary staging; sentinel lymph node biopsy

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## Introduction

Breast cancer is the most common cancer affecting women worldwide. Despite advances in medical treatment, isolated locoregional breast cancer recurrences can still occur at a rate of 10–35% (1).

In patients with treatable isolated local chest wall recurrence after mastectomy, the National Comprehensive Cancer Network (NCCN) guidelines on the axillary management of these patients are unclear (2). Historically, an axillary lymph node dissection (ALND) was usually performed for axillary restaging, concurrently with the

resection of the chest wall recurrence, if an ALND was not previously done (3). However, ALND is associated with several complications such as arm lymphedema etc. (4).

Hence, there was a paradigm shift from ALND to sentinel lymph node biopsy (SLNB) for patients with clinically negative axilla, with ALND reserved for patients with nodal recurrence (5). While there were technical difficulties in performing SLNB, particularly after mastectomy, a repeat SLNB could still be performed successfully (6,7) in patients with isolated chest wall recurrence. However, there is sparse data on its usefulness. We aimed to determine if axillary restaging surgery was required in this group of patients who developed operable isolated invasive chest wall recurrences after mastectomy. We present the following article in accordance with the STROBE reporting checklist (available at <https://atm.amegroups.com/article/view/10.21037/atm-22-3702/rc>).

## Methods

Stage 0-III breast cancer patients who received treatment at KK Women's and Children's Hospital, Republic of Singapore from 1st September 2005 to 31st October 2017 were included in this retrospective study. Of this group of patients, we identified the patients who developed pathologically proven isolated chest wall recurrence after mastectomy. We excluded patients with bilateral breast cancers, concurrent distant or/and regional recurrences, lost to follow up or did not receive surgery for their isolated chest wall recurrence or had non-invasive chest wall

recurrences. For the purpose of this study, local recurrence was defined as ipsilateral cancer with pathological features similar to the primary cancer. Metachronous *de novo* cancers with different pathological features from the primary cancer were excluded.

At our institution, breast cancer patients would undergo breast conserving surgery or mastectomy with or without reconstruction based on patients' tumor factors such as the tumor size, the presence of multiple foci of cancer etc. and patient's preferences. The patient would then undergo adjuvant therapy as recommended by a multidisciplinary tumor board. Following treatment, the patient would then be followed up at the recommended surveillance intervals.

During each follow-up visit, a history and physical examination would be performed. Imaging surveillance with mammogram was performed annually. In patients who had undergone mastectomy, mammogram would be performed only for the contralateral breast.

In cases where a lesion at mastectomy site was presented, the patient would usually undergo an ultrasound, especially if they had undergone breast reconstruction, to further characterise the lesion. In such cases, an ipsilateral axillary ultrasound would usually be performed as well. In this study, an abnormal axillary node on ultrasound was defined as having one or more of the following criteria: cortical thickness more than 3 mm, eccentric cortical thickening of more than 2 mm, and fatty hilar effacement of more than 50%.

Histological confirmation of the lesion, either via corecut biopsy or excision biopsy would also be performed. If a recurrence was established histologically, the patient would then undergo staging with a CT thorax/abdomen/pelvis and bone scan. If the staging scan revealed no other areas of metastasis, a wide excision of the chest wall recurrence would be done. The axillary management in this group of patients with isolated chest wall recurrence following mastectomy was determined by their respective surgeon.

The patient would also be discussed at the multidisciplinary tumor board for adjuvant treatment on the recurrence. These patients were then followed up based on the surveillance protocol as for primary cancer.

Data such as the patients' demographics, pathological data and second recurrence, particularly axillary recurrence, if any, were retrieved from a prospectively maintained database. The data collected were then compared between patients with various axillary management for the chest wall recurrence, such as axillary lymph node dissection (ALND), SLNB and no axillary operation. These patients were then followed up, for the purpose of this study, from the date

### Highlight box

#### Key findings

- In breast cancer patients with isolated chest wall recurrences after mastectomy, axilla restaging surgery can be omitted with no increased axillary recurrences.

#### What is known and what is new?

- NCCN guidelines on the axillary management of breast cancer patients with isolated chest wall recurrence after mastectomy are unclear.
- This is one of the larger studies, to date, which examined the outcomes of omission of axilla restaging surgery in patients with isolated chest wall recurrences.

#### What is the implication, and what should change now?

- These findings may be applicable to a wider cohort and larger studies could be done to confirm our findings.

of histological confirmation of their local recurrence until another recurrence or death or last known follow-up date, whichever occurs first.

### Statistical analysis

A Fisher's exact test was used to compare the categorical variables between patients with axillary surgery and no axillary surgery, with  $P < 0.05$  defined as statistically significant. Graphpad statistical software (version 2022) was used for the analysis.

### Ethics and consent

The study was conducted in accordance with the Declaration of Helsinki (as revised in 2013). The study was approved by SingHealth Centralised Institutional Review Board (CIRB Ref: 2020/2147) and informed consents were waived by the ethics committee due to the retrospective nature of this study.

## Results

A total of 2,734 stage 0-III breast cancer patients were treated during this 12 years' time period. Excluding 131 patients with bilateral breast cancers, 2,603 patients were available for analysis. 1,841 (70.7%) underwent a mastectomy. 217 (11.8%) patients with mastectomy developed recurrences. Of these patients, 183, 8 and 26 had systemic, regional or local recurrence respectively. Of the 26/1841 (1.4%) patients who developed isolated invasive local recurrences, two patients did not undergo surgery or the local recurrence and 2 patients were lost to follow up. Excluding these 4 patients, 22 patients were eligible for analysis.

For the primary cancer, majority had invasive ductal cancer (77.3%), estrogen receptor (ER) (86.4%) and progesterone receptor (PR) (81.9%) positivity and Human epidermal growth factor receptor 2 (HER2) negativity (95.2%). Three (13.6%) patients received radiotherapy after mastectomy (Table 1). Sixteen (72.7%) patients had SLNB at primary surgery.

The mean age of the local recurrence was 54.7 years (range, 37–84 years) with a mean time to recurrence from primary cancer surgery at 45.6 months (range, 7–107 months). Average size of the chest wall recurrence was 21 mm (range, 5.3–90 mm). 91% of the patients had a normal ipsilateral axillary ultrasound prior to chest wall

recurrence resection. One, two and nineteen patients had ALND, SLNB and no axillary operation respectively (Table 2) when undergoing chest wall recurrence resection. For the 19 patients with no axillary surgery for recurrent cancer, 5 and 14 had ALND and SLNB at primary surgery respectively. For 3 patients with axillary surgery, there was no pathological lymph node involvement. Patients who underwent axillary surgery were younger compared to patients with no axillary surgery offered ( $P = 0.0227$ ).

63.6% patients received radiotherapy following recurrence with no statistical difference ( $P = 0.521$ ) noted between the groups with or without axillary surgery. Of all the patients who received radiotherapy for their recurrent cancer, none received radiotherapy to the supraclavicular region.

On mean follow-up of 38.3 months, there was no clinical or imaging evidence of axillary recurrences. However, there were 3 patients who had a second recurrence, manifesting as an isolated chest wall recurrence in 1 patient, systemic metastasis in another patient and ipsilateral supraclavicular lymph node metastasis in the last patient. All occurred in patients without axillary surgery, though there was no statistical difference of second recurrence between patients with or without axillary surgery (Table 2).

## Discussion

Our study showed that omitting axillary restaging was not associated with increased risk of axillary recurrence. To the best of our knowledge, this is one of the larger studies, to date, which examined the outcomes of omission of axillary restaging surgery in patients with isolated chest wall recurrences.

Limited data exists on the axillary management in patients with isolated chest wall recurrences after mastectomy since the incidence of isolated chest wall recurrences has become very low at 1–3% (8) with advances in treatment. Currently, there is more data on axillary restaging for patients with local breast recurrence following breast conservation than in patients with isolated chest wall recurrences after mastectomy (9,10). Based on data from predominantly patients with prior breast conservation, axillary restaging during local recurrence was proposed as it could potentially change management (9,11,12) and could be done using SLNB.

However, recurrences in patients with prior mastectomy or breast conservation have certain differences. Firstly, despite mastectomy and breast conservation therapy having

**Table 1** Characteristics of the primary cancer in patients with isolated invasive chest wall recurrences

Clinical features of primary cancer	N=22, n (%)
Age (years)	
<50	12 (54.5)
≥50	10 (45.5)
Reconstruction	
Yes	13 (59.1)
No	9 (40.9)
Axillary surgery	
Sentinel lymph node biopsy	16 (72.7)
Axillary lymph node dissection	6 (27.3)
Tumour histology	
Invasive ductal	17 (77.3)
Invasive lobular	2 (9.1)
Others <sup>1</sup>	3 (13.6)
Pathological features	
Invasive tumour size (mm) <sup>2</sup>	
≤20	6 (27.3)
>20 to ≤50	12 (54.6)
>50	2 (9.1)
Not available	1 (4.5)
Not applicable <sup>3</sup>	1 (4.5)
Grade of invasive cancer	
I	3 (13.7)
II	13 (59.1)
III	5 (22.7)
Not applicable <sup>3</sup>	1 (4.5)
ER of invasive cancer	
Positive	19 (86.4)
Negative	2 (9.1)
Not applicable <sup>3</sup>	1 (4.5)
PR of invasive cancer	
Positive	18 (81.9)
Negative	3 (13.6)
Not applicable <sup>3</sup>	1 (4.5)

**Table 1** (continued)**Table 1** (continued)

Clinical features of primary cancer	N=22, n (%)
HER2 <sup>4</sup>	
Positive	1 (4.8)
Negative	20 (95.2)
Stage	
pN0	16 (72.7)
pN1	5 (22.7)
pN2	1 (4.6)
Chemotherapy <sup>4</sup>	
Yes	8 (38.1)
No	13 (61.9)
Radiotherapy	
Yes	3 (13.6)
No	19 (86.4)
Hormonal therapy	
Yes	18 (81.8)
No	4 (18.2)
Targeted HER2 therapy <sup>4</sup>	
Yes	0 (0)
No	21 (100.0)

<sup>1</sup>, mucinous and DCIS subtype; <sup>2</sup>, if multifocal/centric disease was present, the size measurement will be based on the largest lesion; <sup>3</sup>, DCIS; <sup>4</sup>, invasive cancer only. ER, estrogen receptor; PR, progesterone receptor; DCIS, ductal carcinoma in situ; HER2, human epidermal growth factor receptor 2.

equivalent overall survival, it was reported that patients with prior breast conservation can have a higher risk of local and regional recurrences (13), though the locoregional recurrence rates had now become almost comparable between the mastectomy and breast conserving group in recent years (14). This could explain why there were more reported cases of axillary restaging in patients with prior breast conservation. Secondly, most of the breast conserving cases would have received radiotherapy. Thirdly, in patients with prior mastectomy, almost all these patients would have previous axillary surgery, resulting in a disrupted lymphatic drainage by scarring and fibrosis. This prior axillary surgery, coupled with the lack of breast tissue in patients who

**Table 2** Characteristics of the chest wall recurrences

Clinical features, N=22	Patients with no axillary surgery, N=19, n (%)	Patients with sentinel lymph node biopsy, N=2, n (%)	Patients with axillary lymph node dissection, N=1, n (%)	P value <sup>#</sup>
Age (years) at recurrence				0.0227
<50	4 (21.1)	2 (100.0)	1 (100.0)	
≥50	15 (78.9)	0 (0)	0 (0)	
Axillary ultrasound imaging				0.260
Normal	18 (94.7)	2 (100.0)	0 (0)	
Abnormal	0 (0)	0 (0)	0 (0)	
Not done	1 (5.3)	0 (0)	1 (100.0)	
Pathological features of the recurrences				
Invasive tumour size (mm) <sup>1</sup>				0.364
≤20	11 (57.9)	1 (50.0)	0 (0)	
>20 to ≤50	4 (21.0)	1 (50.0)	1 (100.0)	
>50	1 (5.3)	0 (0)	0 (0)	
Not available	3 (15.8)	0 (0)	0 (0)	
Tumour histology				0.558
Invasive ductal	15 (79.0)	2 (100.0)	0 (0)	
Invasive lobular	2 (10.5)	0 (0)	0 (0)	
Others <sup>2</sup>	2 (10.5)	0 (0)	1 (100.0)	
Grade				1.000
I	3 (15.8)	0 (0)	0 (0)	
II	12 (63.1)	2 (100.0)	1 (100.0)	
III	3 (15.8)	0 (0)	0 (0)	
Not available	1 (5.3)	0 (0)	0 (0)	
ER				1.000
Positive	17 (89.5)	2 (100.0)	1 (100.0)	
Negative	2 (10.5)	0 (0)	0 (0)	
PR				1.000
Positive	14 (73.7)	2 (100.0)	1 (100.0)	
Negative	5 (26.3)	0 (0)	0 (0)	
HER2				1.000
Positive	1 (5.3)	0 (0)	0 (0)	
Negative	18 (94.7)	2 (100.0)	1 (100.0)	
Pathological nodal involvement <sup>3</sup>				NA
Yes	NA	0 (0)	0 (0)	
No	NA	2 (100.0)	1 (100.0)	

**Table 2** (continued)

Table 2 (continued)

Clinical features, N=22	Patients with no axillary surgery, N=19, n (%)	Patients with sentinel lymph node biopsy, N=2, n (%)	Patients with axillary lymph node dissection, N=1, n (%)	P value <sup>#</sup>
Chemotherapy				0.247
Yes	5 (26.3)	2 (100.0)	0 (0)	
No	13 (68.4)	0 (0)	1 (100.0)	
Not available	1 (5.3)	0 (0)	0 (0)	
Radiotherapy				0.521
Yes	11 (57.9)	2 (100.0)	1 (100.0)	
No	6 (31.6)	0 (0)	0 (0)	
Not available	2 (10.5)	0 (0)	0 (0)	
Hormonal therapy				1.000
Yes	14 (73.7)	2 (100.0)	1 (100.0)	
No	3 (15.8)	0 (0)	0 (0)	
Not available	2 (10.5)	0 (0)	0 (0)	
Targeted HER2 therapy				1.000
Yes	0 (0)	0 (0)	0 (0)	
No	19 (100.0)	2 (100.0)	1 (100.0)	
Axillary recurrence				1.000
Yes	0 (0)	0 (0)	0 (0)	
No	19 (100.0)	2 (100.0)	1 (100.0)	
Second recurrence				1.000
Yes	3 (15.8)	0 (0)	0(0)	
No	16 (84.2)	2(100.0)	1(100.0)	

<sup>1</sup>, based on the largest invasive tumour size if multiple lesions present; <sup>2</sup>, mucinous subtype; <sup>3</sup>, based on the patients who underwent axillary surgery. <sup>#</sup>, Fisher's exact test for patients with axillary surgery n=3 versus patients with no axillary surgery n=19. ER, estrogen receptor; PR, progesterone receptor; HER2, human epidermal growth factor receptor 2; NA, not accessed.

underwent mastectomy, could make SLNB identification during the recurrence operation technically more difficult. In a small study of 12 patients with chest wall recurrences, only 58.3% had a successful axillary node biopsy (15), compared to a success rate of 92.5% in patients with prior breast conservation (16). Overall, in a meta-analysis of all recurrent cases, there was a lower SLNB identification rate of 65.3% (11). In addition, there was a higher incidence of aberrant lymphatics drainage in recurrent cases, reported at 25.7–40% (11,17). Despite so, the false negative rate of SLNB in recurrent cases, involving predominantly breast conservation cases, had been reported to be low at 0.2% (11). There was also a low subsequent ipsilateral axillary

recurrence rate of 1.0% (18) in those patients with negative SLNB at their first recurrence, at a median follow-up of 4.7 years. These promising results were however not validated in chest wall recurrence patients whereby the aberrant drainage could be as high as 77% (11). Given the above reasons, it is unclear if the current data on axillary management in recurrence cases, based predominantly on patients with prior breast conservation, can be extrapolated to patients with prior mastectomy.

Despite the feasibility and reported accuracy of SLNB in patients with recurrent cases, the question remained if axillary surgery for restaging should even be performed in this group of patients with chest wall recurrence and



clinically negative axilla. While some may argue that performing axillary staging could potentially change subsequent management, such as receipt of chemotherapy, radiation treatment field changes and doing ALND instead of SLNB etc., there is sparse data in this group of patients with local recurrence post mastectomy. Currently, data showed that the receipt of chemotherapy could be determined based on the tumour subtype (19), and/or genomic profiling. In addition, based on emerging data from the treatment of primary breast cancer with limited nodal disease, an omission of ALND would not affect survival outcomes (20). However, there are limited such data in recurrent setting. Finally, omission of supraclavicular region radiotherapy does not affect regional control in a negative axilla (15), hence supraclavicular region radiation could be reserved for patients with nodal metastasis. In our study, there was no axillary recurrence though a patient developed supraclavicular lymph node recurrence after her chest wall recurrence. This patient declined radiation for her primary and first recurrent cancer.

Given the known technical difficulties and limited data of SLNB in chest wall recurrence cases, an axillary ultrasound prior to chest wall recurrence resection could be considered. If there was no abnormal lymph node seen sonographically, an axillary restaging surgery could be safely omitted. Conversely, if there were abnormal lymph nodes sonographically, a percutaneous biopsy of the abnormal lymph node could be performed. Depending on the biopsy result, ALND could be performed, if needed.

The benefits of the axillary ultrasound were that a normal ultrasound could provide further confirmatory proof of a non-metastatic axilla and hence allow the omission of axillary restaging surgery. In addition, ultrasound has also been shown to be more sensitive than clinical examination in picking up subclinical nodal disease (21), hence guiding the management of the axilla.

In our study, axillary surgery for restaging was performed more frequently in younger patients ( $P=0.0227$ ). Being a retrospective study, this could be explained by the individual treating surgeon's concern that a younger age was a poor prognostic factor for recurrence (22), hence prompting the axillary restaging surgery. There were however no axillary recurrences noted in this study.

Strengths of the study included that it is one of the larger studies, to date, of patients with isolated chest wall recurrences and no axillary restaging surgery, adding further information to this sparse topic. The patients also had pre-operative imaging of the axilla, which was not routinely

performed in many centres.

Limitations of the study included that being a retrospective study, there may be selection bias regarding the treatment of the patients for their recurrences. However, the treatments of these patients were discussed in the multidisciplinary meeting and there was no statistical difference in the treatment regimens between the patients with or without axillary surgery. The sample size is small since isolated chest wall recurrences after mastectomy is a rare occurrence. However, this study is one of the larger such studies reported thus far.

## Conclusions

In breast cancer patients with isolated chest wall recurrences after mastectomy, we found that axillary restaging surgery can be safely omitted, especially if there was normal axillary imaging, with no increased axillary recurrences on medium term follow-up. These findings may be applicable to a wider cohort and larger studies could be done to confirm our findings.

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## Footnote

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## References

- Gabriel L, Schmidt M, Juhasz-Böss S, et al. Therapy of isolated locoregional recurrent carcinoma of the breast. *Arch Gynecol Obstet* 2019;300:365-76.
- NCCN Guidelines version 2.2022 Invasive Breast cancer, Treatment of local and regional recurrence, accessed 17march 2022. Available online: [https://www.nccn.org/professionals/physician\\_gls/pdf/breast.pdf](https://www.nccn.org/professionals/physician_gls/pdf/breast.pdf)
- Ugras S, Matsen C, Eaton A, et al. Reoperative Sentinel Lymph Node Biopsy is Feasible for Locally Recurrent Breast Cancer, But is it Worthwhile? *Ann Surg Oncol* 2016;23:744-8.
- Lim GH, Teo SY, Gudi M, et al. Initial results of a novel technique of clipped node localization in breast cancer patients postneoadjuvant chemotherapy: Skin Mark clipped Axillary nodes Removal Technique (SMART trial). *Cancer Med* 2020;9:1978-85.
- Vugts G, Maaskant-Braat AJ, Voogd AC, et al. Repeat sentinel node biopsy should be considered in patients with locally recurrent breast cancer. *Breast Cancer Res Treat* 2015;153:549-56.
- Vugts G, Maaskant-Braat AJ, Voogd AC, et al. Improving the Success Rate of Repeat Sentinel Node Biopsy in Recurrent Breast Cancer. *Ann Surg Oncol* 2015;22 Suppl 3:S529-35.
- Wapnir IL, Khan A. Current Strategies for the Management of Locoregional Breast Cancer Recurrence. *Oncology (Williston Park)* 2019;33:19-25.
- Chang JH, Shin KH, Ahn SD, et al. Chest wall recurrence in pT1-2N0-1 breast cancer patients after mastectomy without radiotherapy. *Breast Cancer Res Treat* 2018;169:507-12.
- Maaskant-Braat AJ, Roumen RM, Voogd AC, et al. Sentinel Node and Recurrent Breast Cancer (SNARB): results of a nationwide registration study. *Ann Surg Oncol* 2013;20:620-6.
- Poodt IGM, Vugts G, Schipper RJ, et al. Repeat Sentinel Lymph Node Biopsy for Ipsilateral Breast Tumor Recurrence: A Systematic Review of the Results and Impact on Prognosis. *Ann Surg Oncol* 2018;25:1329-39.
- Maaskant-Braat AJ, Voogd AC, Roumen RM, et al. Repeat sentinel node biopsy in patients with locally recurrent breast cancer: a systematic review and meta-analysis of the literature. *Breast Cancer Res Treat* 2013;138:13-20.
- Derkx F, Maaskant-Braat AJ, van der Sangen MJ, et al. Staging and management of axillary lymph nodes in patients with local recurrence in the breast or chest wall after a previous negative sentinel node procedure. *Eur J Surg Oncol* 2010;36:646-51.
- Ursaru M, Jari I, Popescu R, et al. Multifactorial analysis of local and lymph node recurrences after conservative or radical surgery for stage 0-II breast cancer. *Rev Med Chir Soc Med Nat Iasi* 2014;118:1062-7.
- Riedel F, Hennigs A, Hug S, et al. Is Mastectomy Oncologically Safer than Breast-Conserving Treatment in Early Breast Cancer? *Breast Care (Basel)* 2017;12:385-90.
- Johnson J, Esserman L, Ewing C et al. Sentinel Lymph Node Mapping in Post-Mastectomy Chest Wall Recurrences: Influence on Radiation Treatment Fields and Outcome. *Ann Surg Oncol* 2016;23:715-21.
- Intra M, Viale G, Vila J, et al. Second Axillary Sentinel Lymph Node Biopsy for Breast Tumor Recurrence: Experience of the European Institute of Oncology. *Ann Surg Oncol* 2015;22:2372-7.
- Ahmed M, Baker R, Rubio IT. Meta-analysis of aberrant lymphatic drainage in recurrent breast cancer. *Br J Surg* 2016;103:1579-88.
- Poodt IGM, Vugts G, Maaskant-Braat AJG, et al. Risk of Regional Recurrence After Negative Repeat Sentinel Lymph Node Biopsy in Patients with Ipsilateral Breast Tumor Recurrence. *Ann Surg Oncol* 2018;25:1312-21.
- Wapnir IL, Price KN, Anderson SJ, et al. Efficacy of Chemotherapy for ER-Negative and ER-Positive Isolated Locoregional Recurrence of Breast Cancer: Final Analysis of the CALOR Trial. *J Clin Oncol* 2018;36:1073-9.
- Lim GH, Teo SY, Allen JC Jr, et al. Determining Whether High Nodal Burden in Early Breast Cancer Patients Can Be Predicted Preoperatively to Avoid Sentinel Lymph



- Node Biopsy. *J Breast Cancer* 2019;22:67-76.
21. Upadhyaya VS, Lim GH, Chan EYK, et al. Evaluating the preoperative breast cancer characteristics affecting the accuracy of axillary ultrasound staging. *Breast J* 2020;26:162-7.
  22. Montero A, Ciérvide R, García-Aranda M, et al. Postmastectomy radiation therapy in early breast cancer: Utility or futility? *Crit Rev Oncol Hematol* 2020;147:102887.

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