in vivo *37*: 794-800 (2023)
doi:10.21873/invivo.13143

Preferences Regarding Breast Surgery Omission Among Patients With Breast Cancer Who Receive Neoadjuvant Chemotherapy

KAHO NAKAMURA[1], MAKOTO ISHITOBI[1], CHIYA OSHIRO[2], HIROAKI SHIMA[3], ERIKO TAKAHASHI[4], TAKAHIRO NAKAYAMA[5], TADAHIKO SHIEN[6], KANAKO SAITO[7], TSUGUO IWATANI[6], YUKIKO SETO[5], KAORI TERATA[4], GORO KUTOMI[3], TOMOKO OGAWA[1] and HIDEO INAJI[2]

[1]Department of Breast Surgery, Mie University School of Medicine, Tsu, Japan;
[2]Department of Breast Surgery, Kaizuka City Hospital, Kaizuka, Japan;
[3]Department of Surgery, Surgical Oncology and Science, Sapporo Medical University, Chuo-ku, Japan;
[4]Department of Thoracic Surgery, Akita University Graduate School of Medicine, Akita, Japan;
[5]Department of Breast and Endocrine Surgery, Osaka International Cancer Institute, Chuo-ku, Japan;
[6]Department of Breast and Endocrine Surgery, Okayama University Hospital, Okayama, Japan;
[7]Department of Medical Oncology, Mie University School of Medicine, Tsu, Japan

Abstract. *Background/Aim: Currently, several ongoing prospective studies are investigating the safety of breast surgery omission in patients with breast cancer who are exceptional responders to neoadjuvant chemotherapy. However, there is little information about the preferences of these patients regarding omission of breast surgery. Patients and Methods: We conducted a questionnaire survey to assess preferences regarding omission of breast surgery among patients with breast cancer who had human epidermal growth factor receptor 2-positive or estrogen receptor-negative tumors and good clinical response after neoadjuvant chemotherapy. Patients' estimation of the risk of ipsilateral breast tumor recurrence (IBTR) after definitive surgery or breast surgery omission was also assessed. Results: Of 93 patients, only 22 (23.7%) said they would omit breast surgery. Under the scenario of omitting breast surgery, the 5-year IBTR rate estimated by patients who said they would omit breast surgery was significantly lower (median, 10%) than the rate estimated by patients who preferred undergoing definitive surgery (median, 30%) (p=0.017). Conclusion: The proportion of our surveyed patients who were willing to omit breast surgery was low. Patients who said they preferred to omit breast surgery overestimated the 5-year IBTR risk.*

Correspondence to: Makoto Ishitobi, MD, Ph.D., Department of Breast Surgery, Mie University School of Medicine, 2-174 Edobashi, Tsu, Mie, Japan. Tel: +81 592321111 ext. 7329, Fax: +81 592315584, e-mail: m-ishitobi@med.mie-u.ac.jp

Key Words: Breast cancer surgery, ipsilateral breast tumor recurrence, patient preference.

Neoadjuvant chemotherapy (NAC) for breast cancer has become the standard therapy not only for locally advanced cases but also for operable, early-stage breast cancer. Recently, owing to the advances in chemotherapy and targeted therapy, the rate of pathologic complete response (pCR) is reaching 60% among human epidermal growth factor receptor 2 (HER2)-positive and triple-negative breast cancer (1, 2). This finding has attracted physicians' interest in "breast surgery omission" in reference to the ultimate breast-conserving therapy (3). Several ongoing worldwide prospective studies are investigating the safety of breast surgery omission in patients with breast cancer who are exceptional responders to NAC (4, 5). To date, however, these prospective studies have not provided sufficient safety data on omission of breast surgery.

In addition of the lack of safety data about breast surgery omission, a remaining problem for the introduction of breast surgery omission into clinical practice is the lack of information about the preferences of patients with breast cancer. In their commentary to an article about research into breast surgery omission, Caballero *et al*. stated that an important aspect of de-escalation strategies such as breast surgery omission is to listen to the patient's perspective during the early stages of developing future clinical trials, and to

understand more about the level of risk the patient is willing to accept if a radical treatment such as surgery is not performed (6). However, to our knowledge, there are no studies investigating patients' preferences regarding omission of breast surgery when a pathologic response is achieved after NAC and patients' perception about the risk of local recurrence or overall survival when they do or do not receive breast surgery.

To help health care providers understand the preferences of patients with breast cancer regarding omission of breast surgery, and to help in conducting future large-scale prospective trials on the omission of breast surgery and its future introduction into clinical practice, we investigated the preferences of patients with breast cancer regarding omission of breast surgery when a pathologic response is achieved after NAC, as well as patients' perception about the risk of local recurrence or overall survival if they do or do not undergo breast surgery.

Patients and Methods

Participants were patients with early-stage breast cancer who visited one of six institutions in Japan as part of their regular postoperative follow-up between January 2022 and August 2022. Eligibility criteria were as follows: 1) patients with stage 1-3 breast cancer and HER2-positive or estrogen receptor (ER)-negative tumors; 2) patients who had clinical complete response (cCR) or clinical partial response (cPR) to NAC; cCR and cPR were defined using the Response Evaluation Criteria in Solid Tumors (7); 3) underwent definitive surgery after NAC between April 2012 and October 2021, and 4) patients with no evidence of recurrence at the time of participation. Patients who had known *BRCA1* or *BRCA2* mutation were excluded. This study was approved by each institutional review board. The study was conducted in accordance with the ethical principles laid down in the Declaration of Helsinki.

Consecutive patients who were eligible to participate in this study were directly approached by one of the investigators in an outpatient setting. If the patient showed an interest in the study, detailed information was provided; patients were then approached for enrollment. Respondents completed the questionnaire and posted it to Mie University Hospital or filled out a Google form. Respondents provided their consent *via* completion of the questionnaires.

Participants read a hypothetical clinical scenario, modified from those developed by Ishitobi *et al.* (8) (see https://docs.google.com/forms/d/1tu9z8kGhZroZwVz-04pHQnb77SnPS6NaDt8zshCGcrE/edit): "Imagine you were recently diagnosed with breast cancer and have received NAC. Your breast tumor has become markedly smaller after completion of NAC. You then see a specialist who recommends that you participate in a clinical trial regarding omission of breast surgery because the specialist determined that your breast cancer would be cured without breast surgery. If you participate in the trial, the morbidity of breast surgery can be avoided. However, there is a possibility that micro foci of breast cancer remain in your breast, which may lead to breast cancer recurrence. This could decrease the possibility of curing your breast cancer. Would you opt to omit breast surgery?" Each participant was to select their preference regarding breast surgery omission from among three response options: yes, no, or no preference. Each participant was then to circle all applicable reasons for their preference from among the following options: "To minimize breast deformity and surgical wounds", "To reduce the risk of breast cancer recurrence as much as possible", "To reduce the morbidity of treatment as much as possible", "To do everything I can by myself", "To reduce treatment costs as much as possible", "To increase the possibility of curing breast cancer as much as possible", "To avoid hospitalization for treatment", and "Other reasons". To assess participants' perception regarding the risk of disease recurrence, participants were asked, "What do you think the chance is that you will have a recurrence of breast cancer in your breast within 5 years if you undergo definitive surgery?" Responses to this question were from 0% to 100%. For this question, we provided a reference value from a previous report (9), which stated that a percent likelihood of breast cancer recurrence of approximately 3% was considered acceptable and approximately 12% was considered unacceptable. The same question was asked for the scenario in which breast surgery is omitted. Finally, participants were asked about their perception regarding their likelihood of survival for 5 years after each breast cancer treatment.

We collected clinicopathologic data on included patients from the participating institutions. The following data were collected: age at diagnosis, date of birth, menstrual status at diagnosis, clinical tumor (T) status, clinical node (N) status, ER and HER2 status before NAC, NAC regimen, clinical tumor response, date of definitive surgery, breast surgical procedure, breast reconstruction, pathologic T status, pathologic N status, pathological tumor response, adjuvant chemotherapy, endocrine therapy, anti-HER2 therapy, radiotherapy to the breast or chest wall, boost radiation, radiotherapy to sites other than the breast or chest wall, and date of last visit. ER status was considered positive if immunohistochemical staining showed that more than 1% of cells tested were positive for the receptor. HER2 status was determined using immunohistochemistry, fluorescent in situ hybridization, or both. We defined HER2 positivity as a receptor over-expression staining score of 3+ in immunohistochemistry or gene amplification with an HER2/CEP17 ratio >2.0 in a fluorescent in situ hybridization assay.

Statistical analysis. The χ^2 test was used to evaluate the correlation between patients' preferences and clinicopathologic factors and between patients' preferences and the reasons for their preferences. The Mann-Whitney *U*-test was used to evaluate the correlation between patient preference and perceived risk of ipsilateral breast tumor recurrence (IBTR) and overall survival. A p-value <0.05 indicated statistical significance. All statistical analyses were performed using IBM SPSS Statistics 28.0 (IBM Japan, Tokyo, Japan).

Results

A total of 142 patients were approached for the study, and 105 (73.9%) completed the questionnaire. Of these, nine patients were ineligible because their data could not be matched with their clinicopathologic data; one patient who was found to have *BRCA1* mutation and two patients whose breast cancer subtype did not meet the eligibility criteria were excluded. Finally, 93 patients were included in this analysis. Patient characteristics are shown in Table I. The median patient age was 54 (21-76) years. Six (6.5%) patients

Table I. *Patient characteristics*.

Characteristics	No. of patients (%)
Age median (range)	54 (21-76)
<50	40 (43.0)
≥50	53 (57.0)
Clinical T stage	
T1	10 (10.8)
T2	54 (58.1)
T3	17 (18.3)
T4	12 (12.9)
Clinical N stage	
N0	36 (38.7)
≥N1	57 (61.3)
Clinical stage	
I	6 (6.5)
II	52 (55.9)
III	35 (37.6)
Breast cancer subtype	
ER-positive/HER2-positive	38 (40.9)
ER-negative/HER2-positive	38 (40.9)
ER-negative/HER2-negative	17 (18.3)
Neoadjuvant chemotherapy regimen	
Anthracycline and taxane	16 (17.2)
Anthracycline and taxane and anti-HER2 drug	71 (76.3)
Anthracycline	2 (2.2)
Taxane	1 (1.1)
Taxane and anti-HER2 drug	3 (3.2)
Clinical tumor response	
Partial response	48 (51.6)
Complete response	45 (48.4)
Breast surgical procedure	
Breast-conserving surgery	34 (36.6)
Mastectomy	59 (63.4)
Breast surgical procedure	
Breast-conserving surgery alone	33 (35.5)
Breast-conserving surgery and breast reconstruction	1 (1.1)
Mastectomy alone	50 (53.8)
Mastectomy and breast reconstruction	9 (9.7)
Axillary surgical procedure	
SNB or sampling	42 (45.2)
Axillary dissection	51 (54.8)
Pathologic T and N stage	
ypT0 ypN0	41 (44.1)
Others	52 (55.9)
Postoperative chemotherapy	
Yes	27 (29.0)
No	66 (71.0)
Postoperative endocrine therapy	
Yes	34 (36.6)
No	59 (63.4)
Postoperative anti-HER2 therapy	
Yes	70 (75.3)
No	23 (24.7)
Postoperative radiotherapy to breast or chest wall	
Yes	62 (66.7)
No	31 (33.3)

ER: Estrogen receptor; SNB: sentinel lymph node biopsy; HER2: human epidermal growth factor receptor 2.

had cStage 1 disease, 52 (55.9%) had cStage 2 disease, and 35 (37.6%) had cStage 3 disease. Forty-five (48.4%) patients had cCR and 48 (51.6%) had cPR. Thirty-eight patients (40.9%) were ER-positive/HER2-positive, 38 (40.9%) were ER-negative/HER2-positive, and 17 patients (18.3%) were ER-negative/HER2-negative. Thirty-four (36.6%) patients underwent breast-conserving surgery, and 59 (63.4%) underwent mastectomy.

Patient preferences and reasons for preference. Of the 93 patients who completed the questionnaire, 22 (23.7%) said they preferred to omit breast surgery, 36 (38.7%) did not have this preference, 34 (36.6%) had no preference, and 1 (1.1%) patient did not respond to this question. The associations of patient preference for breast surgery omission with clinicopathologic factors are shown in Table II. Patient preferences were not associated with age, clinical stage, clinical or pathological tumor response, breast cancer subtype, or breast surgical procedure. The most frequently reported reason for breast surgery omission was "to minimize breast deformity and surgical wounds" (72.7%); the second most frequently reported reason was "to reduce the morbidity of treatment as much as possible" (68.2%) (both $p<0.001$) (Figure 1). Among patients who did not prefer to omit surgery, the most frequently reported reason for their preference was "to reduce the risk of breast cancer recurrence as much as possible", (83.3%, $p<0.001$); the second most frequently reported reason was "to increase the possibility of curing breast cancer as much as possible" (63.9%, $p=0.018$).

Patients' perception of IBTR and overall survival. Under the scenario of receiving definitive surgery, the 5-year IBTR rate estimated by patients who said they preferred to omit breast surgery was a median of 5% [interquartile range (IQR)=3-10)]; this was 7.5% (IQR=3-25) among patients who said they preferred definitive surgery (Figure 2A). There was no significant difference in the estimated 5-year IBTR rate between the two groups ($p=0.120$). However, under the scenario of omitting breast surgery, the 5-year IBTR rate estimated by patients who preferred to omit breast surgery was significantly lower [median, 10% (IQR=5-30)] than that among patients who preferred definitive surgery [30% (IQR=12.5-50), $p=0.017$] (Figure 2B). Regarding the estimated 5-year overall survival, there was no significant difference between the two groups for the scenario of receiving definitive surgery (90% in the group who preferred to omit surgery group *vs*. 80% in the group who preferred definitive surgery, $p=0.117$). Similarly, there was no significant difference between the groups for the scenario of omitting surgery (77.5% in the group who preferred to omit surgery group *vs*. 60% in the group who preferred definitive surgery, $p=0.153$).

Table II. *Association of patient preference for breast surgery omission with various clinicopathological factors.*

	Prefer to omit breast surgery N (%)	Do not prefer to omit breast surgery N (%)	*p*-Value
Age median (range)	52.5 (21-69)	55.5 (34-73)	
<50	9 (39.1)	14 (60.9)	0.879
≥50	13 (37.1)	22 (62.9)	
Clinical T stage			
≤T2	12 (34.3)	23 (65.7)	0.480
>T2	10 (43.5)	13 (56.5)	
Clinical N stage			
N0	7 (30.4)	16 (69.6)	0.340
≥N1	15 (42.9)	20 (57.1)	
Clinical stage			
I or II	12 (37.5)	20 (62.5)	0.940
≥III	10 (38.5)	16 (61.5)	
Breast cancer subtype			
ER-positive/HER2-positive	6 (31.6)	13 (68.4)	0.424
ER-negative/HER2-positive	13 (46.4)	15 (53.6)	
ER-negative/HER2-negative	3 (27.3)	8 (72.7)	
Neoadjuvant chemotherapy regimen			
Anthracycline and taxane±anti-HER2 therapy	21 (37.5)	35 (62.5)	1.000
Others	1 (50.0)	1 (50.0)	
Clinical tumor response			
Partial response	12 (40.0)	18 (60.0)	0.737
Complete response	10 (35.7)	18 (64.3)	
Breast surgical procedure			
Breast-conserving mastectomy±breast reconstruction	9 (45.0)	11 (55.0)	0.421
Mastectomy±breast reconstruction	13 (34.2)	25 (65.8)	
Breast surgical procedure			
Mastectomy alone	11 (31.4)	24 (68.6)	0.208
Others	11 (47.8)	12 (52.2)	
Axillary surgical procedure			
SNB or sampling	9 (36.0)	16 (64.0)	0.792
Axillary dissection	13 (39.4)	20 (60.6)	
Pathologic T and N stage			
ypT0 ypN0	9 (37.5)	15 (62.5)	0.955
Others	13 (38.2)	21 (61.8)	
Postoperative chemotherapy			
Yes	5 (29.4)	12 (70.6)	0.389
No	17 (41.5)	24 (58.5)	
Postoperative endocrine therapy			
Yes	6 (35.3)	11 (64.7)	0.790
No	16 (39.0)	25 (61.0)	
Postoperative anti-HER2 therapy			
Yes	17 (39.5)	26 (60.5)	0.670
No	5 (33.3)	10 (66.7)	
Postoperative radiotherapy to breast or chest wall			
Yes	15 (40.5)	22 (59.5)	0.587
No	7 (33.3)	14 (66.7)	

ER: Estrogen receptor; SNB: sentinel lymph node biopsy; HER2: human epidermal growth factor receptor 2.

Discussion

To our knowledge, this was the first study to investigate patients' preferences for omitting breast surgery among patients with breast cancer who had a clinical response to NAC. In this study, the proportion of participants who preferred to omit breast surgery was 23.7%. This result is in contrast with a previous study, in which most physicians expressed interest in investigating the omission of surgery for their patients with breast cancer who have pCR after NAC (3). There have been several reports of discrepancies in perceptions regarding breast cancer treatment between

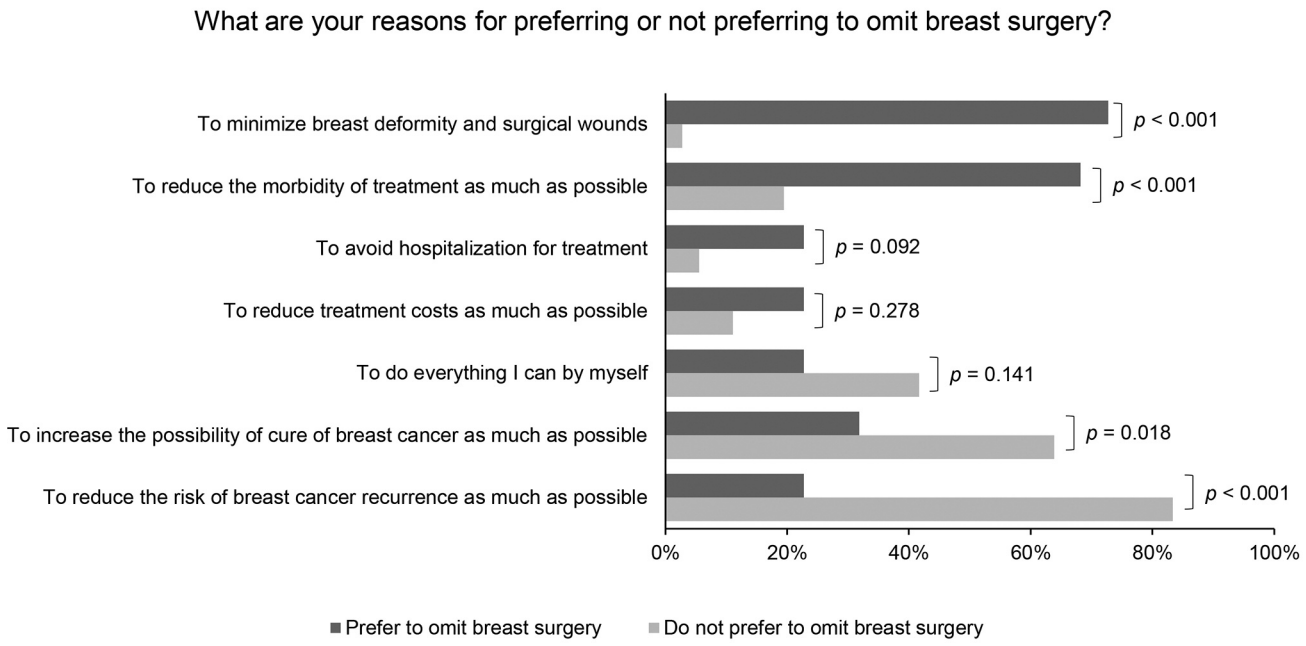

Figure 1. *Respondents' reported reasons for preferring or not preferring breast surgery omission.*

patients and their physicians. A typical example regarding these discrepancies is contralateral prophylactic mastectomy (CPM). The National Cancer Center Network and American Society of Breast Surgeons guidelines recommend CPM only for patients at high risk of contralateral breast cancer, such as *BRCA1/2* mutation carriers and patients with a strong family history (10, 11). However, a previous report using Surveillance, Epidemiology, and End Results registry data demonstrated that most patients (68.9%) who received CPM had no major genetic or familial risk factors for contralateral breast cancer (12). Thus, it is important to consider that a gap exists in the perception of breast cancer treatment and risk of recurrence between physicians and patients.

In this study, patient preference for breast surgery omission was not associated with age, stage, clinical or pathological response, or breast surgical procedure. Although there was no significant difference, patients who received mastectomy without breast reconstruction had less preference for omitting breast surgery (31.4%) than those who received oncoplastic breast surgery (*i.e.*, breast-conserving surgery with or without breast reconstruction, mastectomy with breast reconstruction) (47.8%). It is reasonable that patients who received oncoplastic breast surgery would prefer to omit breast surgery. However, because the lack of differences in this study might be explained by our small sample size, further studies are needed.

In this study, patient preference strongly depended on patients' perceptions regarding omission of breast surgery. Patients who preferred to omit breast surgery felt that less-invasive surgery (*i.e.,* less breast deformity and surgical morbidity) was important. However, patients who did not wish to omit breast surgery thought that minimizing the risk of recurrence was important. A study investigating perceptions regarding mastectomy among patients with breast cancer who had received unilateral or bilateral mastectomy reported that the most frequent reason for choosing mastectomy over breast-conserving surgery was minimizing the recurrence risk and was not associated with patient age; this finding is compatible with our study results (13).

In the present study, the estimated 5-year IBTR rate with omission of breast surgery was significantly lower among patients with a preference to omit breast surgery (median, 10%) than among those who did not have this preference (median, 30%). However, the median estimated 5-year IBTR rate of 10% among patients who wished to omit breast surgery was markedly higher than expected because we provided a reference value from a previous report on the questionnaire (9), in which a rate of approximately 3% was considered acceptable and approximately 12% was considered unacceptable. To date, there is only one prospective clinical trial investigating the safety of omitting surgery among patients who have an exceptional response to NAC (5). In that trial, there has been no IBTR among 31 patients with a median follow-up of 26.4 months. This result is quite promising; however, caution is needed owing to the small sample size and short follow-up period. Several studies have reported the IBTR or loco-regional recurrence rate among patients with triple-negative or HER2-positive tumors

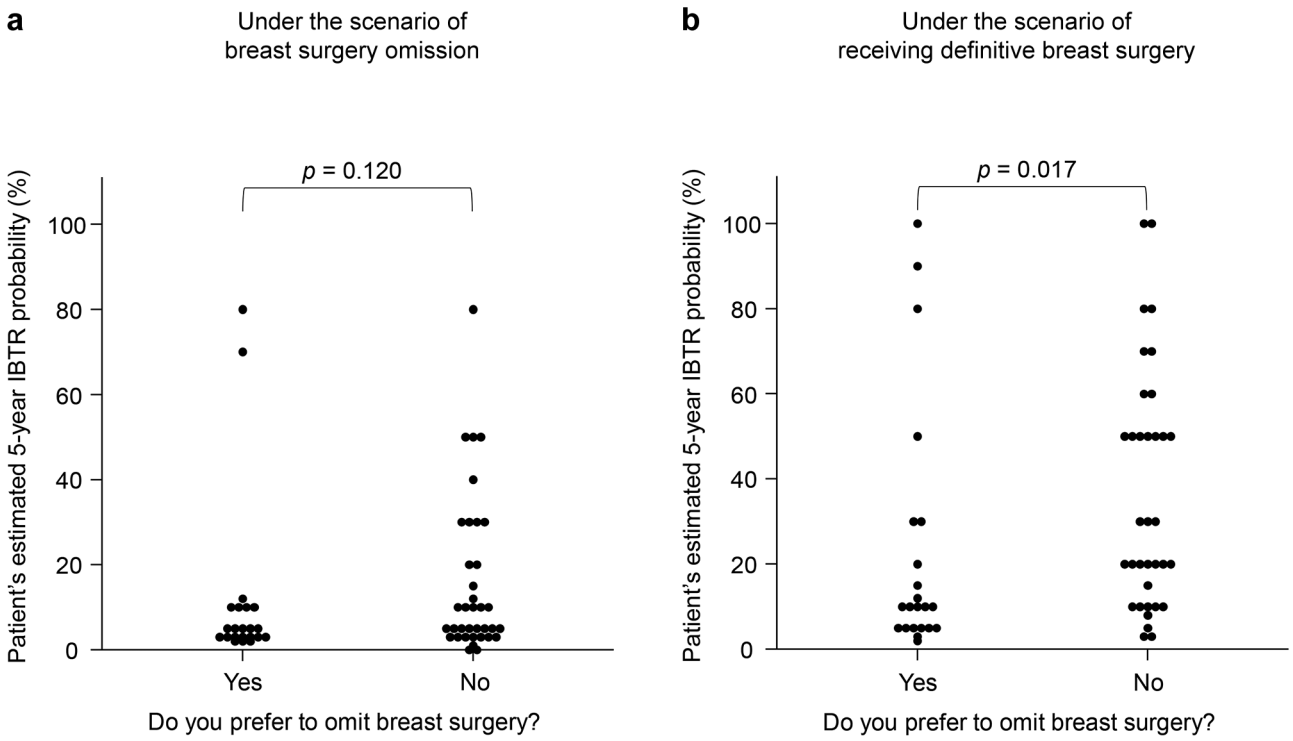

Figure 2. *Five-year ipsilateral breast tumor recurrence rate estimation according to patient preference for breast surgery omission A) under the scenario of breast surgery omission or B) under the scenario of receiving definitive breast surgery.*

who achieve a pCR after NAC and breast-conserving treatment (9, 14, 15). In these studies, the 5-year IBTR and loco-regional recurrence rate was 0% to 4.5% (9, 14) and 0% to 2.6% (15), respectively, which is also lower than 10%. It was surprising that patients who preferred to omit breast surgery would accept a high rate of 10%; this finding provides an important insight for future clinical trials investigating breast surgery omission. We cannot rule out that our patients' high survival estimates can be explained by the fact that these patients actually received surgery and did not omit breast surgery. Patient-reported outcomes from the ongoing prospective clinical trial investigating breast surgery omission are awaited (5).

The first limitation of this study is the small sample size. The second limitation is that to increase the number of patients enrolled, the study inclusion criteria were not limited to patients who had cCR or pCR and those who received breast-conserving surgery, although patients' preference for breast surgery omission was not associated with clinical or pathological response and breast surgical procedure. Third, because participants in this study provided their consent *via* completion of the questionnaire, we could not compare clinicopathologic data between participants and non-participants. Fourth, we did not collect data associated with patients' preference for breast surgical procedure, such as patient educational level, insurance type, marital status, or comorbidities (16). Finally, the lack of patient participation in the planning of this study is a limitation.

This study demonstrated that few patients with breast cancer who have a clinical response to NAC prefer to omit surgery, and that patients' estimates of IBTR risk significantly depend on their preference regarding breast surgery omission. These findings may provide important implications for future clinical trials investigating breast surgery omission and its future introduction into clinical practice. However, further studies are needed.

Conflicts of Interest

Makoto Ishitobi has received speaker honoraria from Chugai, AstraZeneca, Pfizer, Taiho, and Kyowa Kirin outside the submitted work. Takahiro Nakayama has received speaker honoraria from AstraZeneca, Chugai, Novartis, Eli Lilly, Pfizer, Takeda, Daiichi-Sankyo, and Taiho outside the submitted work. Tadahiko Shien has received speaker honoraria from Daiichi-Sankyo, Eizai, Chugai, Kyowa Kirin, AstraZeneca, Pfizer, and Lilly outside the submitted work. Kanako Saito has received speaker honoraria from Daiichi-Sankyo, Chugai, Kyowa Kirin, Lilly, Novartis, Eizai, and Pfizer outside the submitted work. Kaori Terata has received speaker honoraria from AstraZeneca, Daiichi-Sankyo, Chugai, Lilly, Novartis, and Pfizer outside the submitted work. The remaining Authors have no conflicts of interest in relation to this study.

Authors' Contributions

The study was designed by Makoto Ishitobi. Data were collected by all Authors. All data were analyzed by Kaho Nakamura and Makoto Ishitobi and interpreted by all Authors. Makoto Ishitobi contributed to funding acquisition and supervision. Kaho Nakamura and Makoto Ishitobi drafted the manuscript. All Authors critically reviewed and approved the manuscript before submission.

Acknowledgements

The Authors thank Analisa Avila, MPH, ELS, of Edanz (https://jp.edanz.com/ac) for editing a draft of this manuscript.

References

1 Loibl S, Jackisch C, Schneeweiss A, Schmatloch S, Aktas B, Denkert C, Wiebringhaus H, Kümmel S, Warm M, Paepke S, Just M, Hanusch C, Hackmann J, Blohmer JU, Clemens M, Dan Costa S, Gerber B, Engels K, Nekljudova V, von Minckwitz G, Untch M and investigators of the German Breast Group (GBG) and the Arbeitsgemeinschaft Gynäkologische Onkologie—Breast (AGO-B) study groups: Dual HER2-blockade with pertuzumab and trastuzumab in HER2-positive early breast cancer: a subanalysis of data from the randomized phase III GeparSepto trial. Ann Oncol *28(3)*: 497-504, 2017. PMID: 27831502. DOI: 10.1093/annonc/mdw610

2 Schmid P, Cortes J, Pusztai L, McArthur H, Kümmel S, Bergh J, Denkert C, Park YH, Hui R, Harbeck N, Takahashi M, Foukakis T, Fasching PA, Cardoso F, Untch M, Jia L, Karantza V, Zhao J, Aktan G, Dent R, O'Shaughnessy J and KEYNOTE-522 Investigators: Pembrolizumab for early triple-negative breast cancer. N Engl J Med *382(9)*: 810-821, 2020. PMID: 32101663. DOI: 10.1056/NEJMoa1910549

3 Gharzai LA, Szczygiel LA, Shumway DA, Bandos H, Julian TB, Mamounas EP, White J, De Los Santos JF, Basik M, Ganz PA and Jagsi R: A qualitative study to evaluate physician attitudes regarding omission of surgery among exceptional responders to neoadjuvant systemic therapy for breast cancer (NRG-CC006). Breast Cancer Res Treat *187(3)*: 777-784, 2021. PMID: 33740205. DOI: 10.1007/s10549-021-06172-0

4 Shigematsu H, Fujisawa T, Shien T and Iwata H: Omitting surgery for early breast cancer showing clinical complete response to primary systemic therapy. Jpn J Clin Oncol *50(6)*: 629-634, 2020. PMID: 32378709. DOI: 10.1093/jjco/hyaa055

5 Kuerer HM, Smith BD, Krishnamurthy S, Yang WT, Valero V, Shen Y, Lin H, Lucci A, Boughey JC, White RL, Diego EJ, Rauch GM and Exceptional Responders Clinical Trials Group: Eliminating breast surgery for invasive breast cancer in exceptional responders to neoadjuvant systemic therapy: a multicentre, single-arm, phase 2 trial. Lancet Oncol *23(12)*: 1517-1524, 2022. PMID: 36306810. DOI: 10.1016/S1470-2045(22)00613-1

6 Caballero C and Piccart M: Important considerations prior to elimination of breast cancer surgery after neoadjuvant systemic therapy: Listening to what our patients want. Ann Oncol *31(8)*: 1083-1084, 2020. PMID: 32344012. DOI: 10.1016/j.annonc.2020.04.009

7 Eisenhauer EA, Therasse P, Bogaerts J, Schwartz LH, Sargent D, Ford R, Dancey J, Arbuck S, Gwyther S, Mooney M, Rubinstein L, Shankar L, Dodd L, Kaplan R, Lacombe D and Verweij J: New response evaluation criteria in solid tumours: revised RECIST guideline (version 1.1). Eur J Cancer *45(2)*: 228-247, 2009. PMID: 19097774. DOI: 10.1016/j.ejca.2008.10.026

8 Ishitobi M, Shibuya K, Komoike Y, Koyama H and Inaji H: Preferences for oral *versus* intravenous adjuvant chemotherapy among early breast cancer patients. Patient Prefer Adherence *7*: 1201-1206, 2013. PMID: 24293991. DOI: 10.2147/PPA.S52687

9 Ishitobi M, Matsuda N, Tazo M, Nakayama S, Tokui R, Ogawa T, Yoshida A, Kojima Y, Kuwayama T, Nakayama T, Yamauchi H, Nakamura S, Tsugawa K and Hayashi N: Risk factors for ipsilateral breast tumor recurrence in triple-negative or HER2-positive breast cancer patients who achieve a pathologic complete response after neoadjuvant chemotherapy. Ann Surg Oncol *28(5)*: 2545-2552, 2021. PMID: 33021710. DOI: 10.1245/s10434-020-09176-0

10 Genetic/Familial High-Risk Assessment: Breast, Ovarian, and Pancreatic (Version 2.2023). National Comprehensive Cancer Network, 2023. Available at: http://www.nccn.org/professionals/physician_gls/pdf/genetics_bop.pdf [Last accessed on January 12, 2023]

11 Boughey JC, Attai DJ, Chen SL, Cody HS, Dietz JR, Feldman SM, Greenberg CC, Kass RB, Landercasper J, Lemaine V, MacNeill F, Song DH, Staley AC, Wilke LG, Willey SC, Yao KA and Margenthaler JA: Contralateral prophylactic mastectomy (CPM) consensus statement from the American Society of Breast Surgeons: Data on CPM outcomes and risks. Ann Surg Oncol *23(10)*: 3100-3105, 2016. PMID: 27469117. DOI: 10.1245/s10434-016-5443-5

12 Hawley ST, Jagsi R, Morrow M, Janz NK, Hamilton A, Graff JJ and Katz SJ: Social and clinical determinants of contralateral prophylactic mastectomy. JAMA Surg *149(6)*: 582-589, 2014. PMID: 24849045. DOI: 10.1001/jamasurg.2013.5689

13 Fisher CS, Martin-Dunlap T, Ruppel MB, Gao F, Atkins J and Margenthaler JA: Fear of recurrence and perceived survival benefit are primary motivators for choosing mastectomy over breast-conservation therapy regardless of age. Ann Surg Oncol *19(10)*: 3246-3250, 2012. PMID: 22833001. DOI: 10.1245/s10434-012-2525-x

14 Jwa E, Shin KH, Kim JY, Park YH, Jung SY, Lee ES, Park IH, Lee KS, Ro J, Kim YJ and Kim TH: Locoregional recurrence by tumor biology in breast cancer patients after preoperative chemotherapy and breast conservation treatment. Cancer Res Treat *48(4)*: 1363-1372, 2016. PMID: 26910473. DOI: 10.4143/crt.2015.456

15 Swisher SK, Vila J, Tucker SL, Bedrosian I, Shaitelman SF, Litton JK, Smith BD, Caudle AS, Kuerer HM and Mittendorf EA: Locoregional control according to breast cancer subtype and response to neoadjuvant chemotherapy in breast cancer patients undergoing breast-conserving therapy. Ann Surg Oncol *23(3)*: 749-756, 2016. PMID: 26511263. DOI: 10.1245/s10434-015-4921-5

16 Storm-Dickerson T, Das L, Gabriel A, Gitlin M, Farias J and Macarios D: What Drives patient choice: Preferences for approaches to surgical treatments for breast cancer beyond traditional clinical benchmarks. Plast Reconstr Surg Glob Open *6(4)*: e1746, 2018. PMID: 29876182. DOI: 10.1097/GOX.0000000000001746

Received January 14, 2023
Revised January 21, 2023
Accepted January 23, 2023