T1-2N0M0 Triple-Negative Breast Cancer Treated With Breast-Conserving Therapy Has Better Survival Compared to Mastectomy: A SEER Population-Based Retrospective Analysis

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Abstract

We compared the survival outcomes of breast-conserving therapy (BCT) and mastectomy in patients with T1-2N0M0 triple-negative breast cancer (TNBC). An analysis of 14,910 patients demonstrated better overall survival and cause-specific survival in patients with BCT, suggesting that BCT could be an appropriate option for T1-2N0M0 TNBC. Further prospective studies are needed to confirm these conclusions.

Background: For early-stage breast cancer, the two current mainstay treatments are breast-conserving therapy (BCT; lumpectomy followed by radiotherapy [RT] and BCT) and mastectomy. Generally, triple-negative breast cancer (TNBC) is more aggressive compared to hormone receptor–positive breast cancer. We sought to investigate the effect of BCT compared to mastectomy on overall survival (OS) and breast cancer–specific survival (BCSS) in T1-2N0M0 TNBC. **Patients and Methods:** A population-based retrospective analysis was performed using the Surveillance, Epidemiology, and End Results (SEER) database. Patients included in the analysis were divided into 3 groups according to surgical modality and RT: BCT, mastectomy alone, and mastectomy with RT. The survival end points were OS and BCSS, and survival analysis was performed by the Kaplan-Meier method and the log-rank test among treatment types. **Results:** A total of 14,910 female subjects with T1-2N0M0 TNBC diagnosed between 2010 and 2014 were included. A total of 7381 patients had BCT; 6967 had mastectomy alone, and 562 had mastectomy with RT. Patients treated with BCT had better OS (log-rank $P < .05$) and BCSS (log-rank $P < .05$) than those receiving mastectomy with or without RT. The 5-year OS was 88.6% for BCT, 83.0% for mastectomy alone, and 79.6% for mastectomy with RT. The 5-year BCSS was 94.3% for BCT, 93.3% for mastectomy alone, and 83.7% for mastectomy with RT. **Conclusion:** In patients with T1-2N0M0 TNBC, BCT was associated with superior OS and BCSS compared to mastectomy with or without RT. After mastectomy, there was no evidence of survival benefit of RT.

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Introduction

Triple-negative breast cancer (TNBC) is a highly heterogeneous disease that is defined by a lack of expression of estrogen receptor, progesterone receptor, and HER2.[1] Accounting for 10% to 20% of all breast cancers, TNBC is characterized by younger age at diagnosis, higher invasiveness, higher risk of early recurrence, tendency to visceral and brain metastases, and significantly shorter median survival and disease-free survival than other breast cancer subtypes.[2,3] Because of its aggressive biologic characteristics, treatments for TNBC are always more radical. Currently, a lack of treatment guidelines for TNBC makes optimal management challenging.

The two main locoregional management of early-stage invasive breast cancer are breast-conserving therapy (BCT; lumpectomy followed by radiotherapy [RT] and BCT) and mastectomy.[4] Several

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prospective and retrospective randomized controlled trials have demonstrated that the long-term survival of early-stage breast cancer treated with BCT was at least equivalent to treatment with mastectomy.[5-8] However, considering the poor prognosis of patients with TNBC, whether a more aggressive locoregional approach would be needed remains unclear. What is more, failure to benefit from endocrine and HER2-targeted therapies emphasizes the urgent need to optimize locoregional management of TNBC patients and reduce the risk of local recurrence and distant metastasis.[9]

We therefore compared the survival outcomes between BCT and mastectomy with or without RT in T1-2N0M0 TNBC patients by utilizing data from Surveillance, Epidemiology and End Results (SEER), a large population-based database.

Patients and Methods

Patients

This retrospective study used data derived from the SEER database, which contains the available records from 18 population-based cancer registries. We used SEER*Stat 8.3.5 software to generate the case list according to the following criteria: female sex, age at diagnosis, year of diagnosis (2010-2014), race, marital status at diagnosis, insurance information, site recode (breast), histology, grade, American Joint Committee on Cancer (AJCC) stage, T1-2, N0, M0, breast subtype (TNBC), surgical treatment, RT, chemotherapy, cause of death, and survival time (months). The follow-up cutoff was December 31, 2015. The primary end points of our study were overall survival (OS) and breast cancer–specific survival (BCSS). OS was measured from date of diagnosis to date of death for any cause or last follow-up, and BCSS was defined as the time from date of diagnosis to date of death from breast cancer or last follow-up. All research and analysis were performed in compliance with China's laws.

Statistical Analysis

Statistical analysis was performed by SPSS 22.0 software (IBM, Armonk, NY). The following variables were analyzed: age, race, marital status, grade, AJCC stage, tumor size, treatment type (BCT, mastectomy alone, mastectomy with RT), and chemotherapy. The differences in demographics and tumor characteristics between the 3 groups were examined by the chi-square test. OS and BCSS were estimated by Kaplan-Meier survival curves, and survival differences were assessed by the log-rank test. The Cox proportional hazards regression model was conducted on univariable and multivariable analyses of OS and BCSS in the T1-2N0M0 TNBC population. Univariable Cox regression analysis was performed for each prognostic variable. Multivariable Cox regression analysis (stepwise backward likelihood ratio) adjusting for other prognostic factors including age, race, marital status, tumor grade, tumor size, and chemotherapy was performed to evaluate the effect of treatment type on OS and BCSS, and hazard ratio (HR) with 95% confidence interval (CI) for each variable was calculated. All reported P values were 2 sided, and differences were considered statistically significant at $P < .05$.

Results

Patient Demographic and Clinical Characteristics

We identified 18,694 female patients diagnosed with T1-2N0M0 TNBC from 2010 to 2014 in the SEER database. According to the type of surgery and receipt of RT, 14,910 patients were eventually included in the study and divided into 3 groups: BCT (n = 7381), mastectomy alone (n = 6967), and mastectomy with RT (n = 562). Table 1 outlines the demographic, tumor, and treatment characteristics of the study patients. Except insurance and marital status, significant differences were detected in the clinicopathologic variables in the 3 groups. Median age at diagnosis was 61, 59, and 53 years old in the BCT, mastectomy alone, and mastectomy with RT groups, respectively. Patients receiving mastectomy with RT had a higher proportion of younger women (< 50 years) and higher percentage of black subjects (Table 1). In addition, patients subjected to mastectomy with RT were prone to unfavorable prognostic factors, such as worse differentiation (grade III) and larger tumor size (T2) ($P < .001$ for 2 factors). Chemotherapy was provided to 5165 patients (70%) who received BCT, 4315 patients (61.9%) who received mastectomy alone, and 498 patients (88.6%) who received mastectomy with RT.

Prognostic Factors Associated With OS and BCSS

We next investigated the prognostic factors associated with OS and BCSS in T1-2N0M0 TNBC patients. Univariable Cox regression analysis revealed that age, race, marital status, grade, tumor size, treatment type, and receipt of chemotherapy were significantly associated with OS, while only race, marital status, grade, tumor size, and type of surgery were significantly associated with BCSS (Table 2). In univariable analysis, patients treated with BCT had superior OS and BCSS compared to women undergoing mastectomy alone (OS: HR = 0.617; 95% CI, 0.552-0.690; $P < .001$; BCSS: HR = 0.812; 95% CI, 0.685-0.963; $P = .016$). Patients undergoing mastectomy with RT had similar OS and decreased BCSS compared to mastectomy alone (OS: HR = 1.187; 95% CI, 0.937-1.505; $P = .156$; BCSS: HR = 2.418; 95% CI, 1.815-3.222; $P < .001$). After multivariable adjustment, patients who received BCT had improved OS (HR = 0.717; 95% CI, 0.639-0.803; $P < .001$) but similar BCSS (HR = 0.930; 95% CI, 0.781-1.108; $P = .418$) compared to mastectomy. Patients treated with mastectomy with RT had a higher mortality risk than women who underwent mastectomy alone (OS: HR = 1.391; 95% CI, 1.093-1.771; $P = .007$; BCSS: HR = 2.071; 95% CI, 1.546-2.776; $P < .001$) (Table 3).

Comparison of Survival Among Different Treatment Types

We investigated OS and BCSS in patients with T1-2N0M0 TNBC receiving BCT compared to those receiving mastectomy with or without RT. Patients with BCT had superior OS and BCSS than those treated with mastectomy alone (OS: log-rank $P < .001$; BCSS: log-rank $P = .016$) and mastectomy with RT (OS: log-rank $P < .001$; BCSS: log-rank $P < .001$). Additionally, patients receiving mastectomy with RT had similar OS (log-rank $P = .153$) and worse BCSS (log-rank $P < .001$) compared to mastectomy alone (Figure 1). The 5-year OS was 88.6% for BCT, 83.0% for mastectomy alone, and 79.6% for mastectomy with RT. The 5-year BCSS was 94.3% for BCT, 93.3% for mastectomy alone, and 83.7% for mastectomy with RT.

It seemed that BCT was the most suitable therapy for locoregional treatment of patients with T1-2N0M0 TNBC. Because

Table 1 Patient Characteristics

Characteristic	BCT (N = 7381)		Mastectomy Alone (N = 6967)		Mastectomy With Radiotherapy (N = 562)		*P*
	N	%	N	%	N	%	
Year of Diagnosis							.001
2010	1483	20.1	1370	19.7	120	21.4	
2011	1535	20.8	1399	20.1	117	20.8	
2012	1474	20.0	1432	20.6	113	20.1	
2013	1349	18.3	1436	20.6	124	22.1	
2014	1540	20.9	1330	19.1	88	15.7	
Age (y), median (range)	61 (22-99)		59 (22-98)		53 (21-87)		
Age at Diagnosis							<.001
<40 y	304	4.1	656	9.4	93	16.5	
40-49 y	1097	14.9	1271	18.2	128	22.8	
50-59 y	1968	26.7	1717	24.6	158	28.1	
≥60 y	4012	54.4	3323	47.7	183	32.6	
Race							<.001
White	5437	73.7	5260	75.5	374	66.5	
Black	1437	19.5	1093	15.7	143	25.4	
Other[a]	485	6.6	587	8.4	43	7.7	
Unknown	22	0.3	27	0.4	2	0.4	
Insurance							.161
Yes	7182	97.3	6761	97.0	539	95.9	
No	111	1.5	113	1.6	16	2.8	
Unknown	88	1.2	93	1.3	7	1.2	
Married							.251
Yes	4176	56.4	3880	55.7	324	57.7	
No[b]	2815	38.6	2715	39.0	218	218	
Unknown	354	4.8	372	5.3	20	3.6	
Histology							.002
IDC	6363	86.2	5901	84.7	463	82.4	
Lobular	60	0.8	92	1.3	5	0.9	
Other	958	13.0	974	14.0	94	16.7	
Grade							.002
I	240	3.3	192	2.8	9	1.7	
II	1493	20.2	1369	19.6	89	15.8	
III	5403	73.2	5123	73.5	433	77.0	
IV	43	0.6	63	0.9	6	1.1	
Unknown	202	2.7	220	3.2	25	4.4	
AJCC Stage							<.001
IA	4988	67.6	3846	55.2	176	31.3	
IIA	2393	32.4	3121	44.8	386	68.7	
Tumor Size							<.001
T1 (<2 cm)	4988	67.6	3846	55.2	176	31.3	
T2 (2-5 cm)	2393	32.4	3121	44.8	386	68.7	
Chemotherapy							<.001
Yes	5165	70.0	4315	61.9	498	88.6	
No/unknown	2216	30.0	2652	38.1	64	11.4	

Abbreviations: AJCC = American Joint Committee on Cancer; BCT = breast-conserving therapy; IDC = invasive ductal carcinoma.
[a]Includes American Indian, Alaskan native, Asian, and Pacific Islander.
[b]Includes divorced, separated, single (never married), unmarried or domestic partner, and widowed.

Table 2 Univariable Cox Proportional Hazard Regression Model of OS and BCSS

	OS		BCSS	
Variable	**HR (95% CI)**	***P***	**HR (95% CI)**	***P***
Age				
<40 y	Reference		Reference	
40-49 y	1.005 (0.745-1.354)	.976	0.896 (0.631-1.273)	.542
50-59 y	0.981 (0.738-1.305)	.896	0.768 (0.547-1.077)	.126
≥60 y	2.185 (1.083-2.837)	<.001	0.978 (0.715-1.337)	.888
Race				
White	Reference		Reference	
Black	1.165 (1.019-1.331)	.025	1.172 (0.957-1.435)	.125
Other[a]	0.802 (0.639-1.007)	.058	0.788 (0.556-1.117)	.181
Unknown	—	.832	—	.889
Insurance				
Yes	Reference		Reference	
No	0.938 (0.603-1.459)	.778	1.317 (0.744-2.333)	.345
Unknown	1.204 (0.766-1.894)	.421	1.637 (0.901-2.973)	.105
Married				
Yes	Reference		Reference	
No[b]	1.616 (1.448-1.803)	<.001	1.272 (1.077-1.503)	.005
Unknown	1.573 (1.251-1.978)	<.001	1.320 (0.926-1.882)	.125
Grade				
I	Reference		Reference	
II	1.810 (1.182-2.773)	.006	2.372 (1.038-5.425)	.041
III	1.932 (1.278-2.921)	.002	3.435 (1.536-7.686)	.003
IV	3.641 (2.015-6.579)	<.001	5.974 (2.126-16.783)	.001
Unknown	2.267 (1.374-3.739)	.001	3.231 (1.274-8.194)	.014
Histology				
IDC	Reference		Reference	
Lobular carcinoma	0.937 (0.553-1.588)	.810	0.449 (0.144-1.396)	.166
Other	1.121 (0.966-1.301)	.132	0.947 (0.745-1.203)	.653
Tumor Size				
T1 (<2 cm)	Reference		Reference	
T2 (2-5 cm)	1.918 (1.724-2.134)	<.001	2.870 (2.426-3.396)	<.001
Chemotherapy				
Yes	Reference		Reference	
No/unknown	2.236 (2.011-2.487)	<.001	0.956 (0.803-1.137)	.608
Treatment Type				
Mastectomy alone	Reference		Reference	
BCT	0.617 (0.552-0.690)	<.001	0.812 (0.685-0.963)	.016
Mastectomy with radiotherapy	1.187 (0.937-1.505)	.156	2.418 (1.815-3.222)	<.001

Abbreviations: BCSS = breast cancer–specific survival; CI = confidence interval; HR = hazard ratio; IDC = invasive ductal carcinoma; OS = overall survival.
[a]Includes American Indian, Alaskan native, Asian, and Pacific Islander.
[b]Includes divorced, separated, single (never married), unmarried or domestic partner, and widowed.

patient age, tumor grade, and tumor size can affect the choice of treatment types, we further to stratified all patients according to age, tumor grade, tumor size and AJCC stage. There were no significant differences in OS ($P = .297$) and BCSS ($P = .202$) among the cohorts in patients aged < 40 years (Supplemental Figure 1A in the online version). When older than 60 years, patients who received BCT had the best OS ($P < .001$) and BCSS ($P < .001$), followed by mastectomy alone and mastectomy with RT (Supplemental Figure 1D in the online version). BCT was significantly associated with an OS advantage compared to mastectomy alone and mastectomy with RT in patients with tumor grades I, II, and III. However, there were no significant differences in BCSS among the 3 types in patients with tumor grades I, II, and IV. For patients with tumor grade II, BCT and mastectomy alone had similar BCSS

Table 3 Multivariable Cox Proportional Hazard Regression Model of OS and BCSS

Variable	OS		BCSS	
	HR (95% CI)	*P*	HR (95% CI)	*P*
Age				
<40 y	Reference		Reference	
40-49 y	1.119 (0.829-1.510)	.464	1.016 (0.714-1.445)	.930
50-59 y	1.137 (0.853-1.514)	.382	0.965 (0.685-1.359)	.838
≥60 y	2.221 (1.698-2.905)	<.001	1.341 (0.970-1.855)	.076
Race				
White	Reference		Reference	
Black	1.198 (1.045-1.373)	.009	1.111 (0.906-1.363)	.312
Other[a]	0.832 (0.662-1.045)	.113	0.758 (0.534-1.075)	.120
Unknown	—	.835	—	.891
Married				
Yes	Reference		Reference	
No[b]	1.308 (1.169-1.464)	<.001	1.63 (0.979-1.381)	.085
Unknown	1.349 (1.072-1.697)	.011	1.244 (0.872-1.776)	.229
Grade				
I	Reference		Reference	
II	1.989 (1.298-3.048)	.002	2.320 (1.014-5.311)	.046
III	2.368 (1.562-3.589)	<.001	2.909 (1.295-6.537)	.010
IV	3.799 (2.099-6.876)	<.001	4.662 (1.655-13.133)	.004
Unknown	2.779 (1.380-3.763)	.001	2.702 (1.063-6.865)	.037
Tumor Size				
T1 (<2 cm)	Reference		Reference	
T2 (2-5 cm)	2.184 (1.950-2.445)	<.001	2.797 (2.342-3.340)	<.001
Chemotherapy				
Yes	Reference		Reference	
No/unknown	2.154 (1.913-2.425)	<.001	1.209 (0.988-1.465)	.052
Treatment Type				
Mastectomy alone	Reference		Reference	
BCT	0.717 (0.639-0.803)	<.001	0.930 (0.781-1.108)	.418
Mastectomy with radiotherapy	1.391 (1.093-1.771)	.007	2.071 (1.546-2.776)	<.001

Abbreviations: BCSS = breast cancer–specific survival; CI = confidence interval; HR = hazard ratio; IDC = invasive ductal carcinoma; OS = overall survival.
[a]Includes American Indian, Alaskan native, Asian, and Pacific Islander.
[b]Includes divorced, separated, single (never married), unmarried or domestic partner, and widowed.

(Supplemental Figure 2 in the online version). Patients with BCT had better OS and BCSS regardless of tumor size (T1 or T2) (Supplemental Figure 3 in the online version) and same results were shown in patients with AJCC stage IA or IIA (Supplementary Figure 4 in the online version).

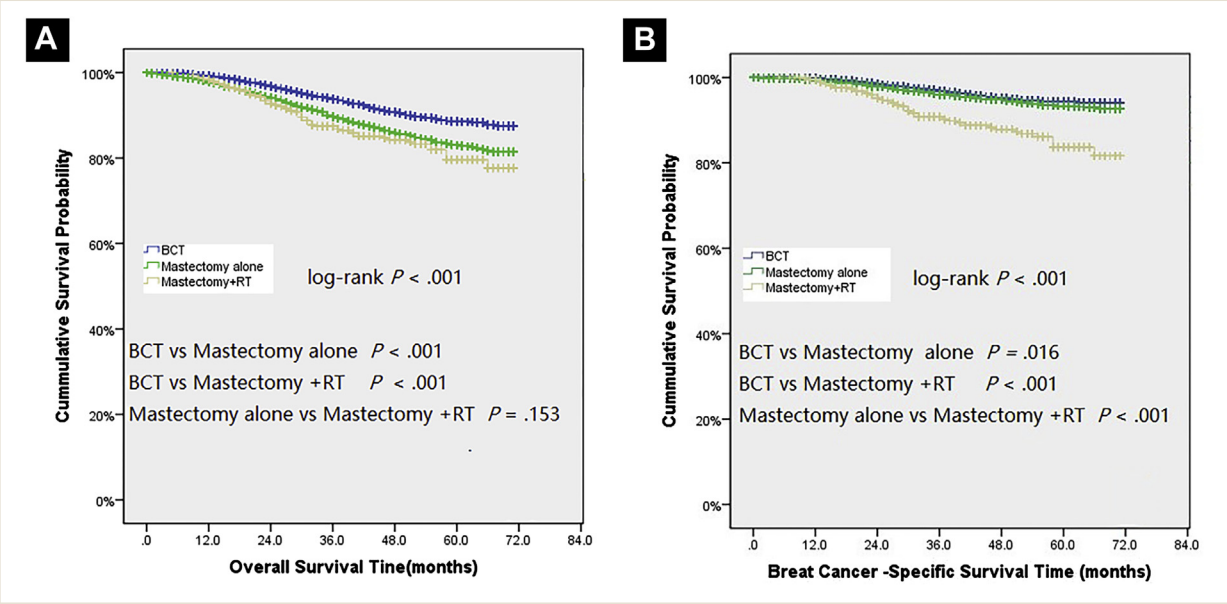
Discussion

For locoregional treatment of early-stage breast cancer, BCT and mastectomy are the two mainstay treatments.[4] Much evidence has demonstrated the equivalent long-term survival of early-stage breast cancers treated with BCT or mastectomy.[5-8] Given that TNBC is a rapidly growing and locally aggressive cancer, the question remains whether patients with TNBC should undergo more aggressive local treatment: either adjuvant RT or more radical surgery was being debated. Information comparing BCT versus mastectomy in early-stage TNBC was limited and was not helpful for identifying optimal local treatment for TNBC. Therefore, we wanted to clarify whether there were survival differences among T1-2N0M0 TNBC patients treated with BCT, mastectomy alone, or mastectomy with RT.

The main finding of this study was that both OS and BCSS were better in women with T1-2N0M0 TNBC undergoing BCT compared to mastectomy with or without RT. This was inconsistent with the fact that early-stage TNBC patients treated with BCT and mastectomy have similar long-term survival,[10-13] but it is in line with other research that indicates that TNBC patients treated with BCT have better survival than those who undergo mastectomy.[14]

The difference in efficacy between BCT and mastectomy in early-stage breast cancer has been studied since the 1980s. Large randomized controlled trials have shown similar survival for BCT and mastectomy in early-stage breast cancer.[5,6,8] Over more recent years, however, multiple observational studies showed superior survival for

Figure 1 Kaplan-Meier Curves for OS (A) and BCSS (B) by Treatment Type for All Patients. Treatment Included BCT Versus Mastectomy Alone Versus Mastectomy With RT



Abbreviations: BCSS = breast cancer–specific survival; BCT = breast-conserving therapy; OS = overall survival; RT = radiotherapy.

patients treated with BCT compared to mastectomy.[15-19] These results suggest that BCT may be a more appropriate approach for locoregional treatment of early-stage breast cancer. However, breast subtypes were not analyzed in these studies. It was not until 2011 that a study was conducted to compare BCT with mastectomy in TNBC; this study assessed 768 patients from a comprehensive cancer center in a single Canadian province.[10] The authors reported that there was no significant difference in OS between the BCT and mastectomy groups. Zumsteg et al[11] also found patients with BCT had similar OS compared to mastectomy (HR = 1.09; $P = .762$), although there was a low 5-year risk of locoregional recurrence in the BCT group of TNBC patients. A large multicenter cohort study in Asian women with TNBC found that there was no improved survival for different treatments; HR for BCT versus mastectomy alone was 1.22 (95% CI, 0.56-2.63), whereas HR for mastectomy with RT compared to mastectomy alone was 2.00 (95% CI, 0.88-4.55) in a cohort of 775 women with T1-2N0-1M0 TNBC.[12] Nonetheless, a recent population-based study showed far better BCSS for BCT compared to mastectomy in patients with T1-2N0-1 TNBC.[14]

In our series, we found that T1-2N0M0 TNBC patients undergoing BCT had better OS (log-rank $P < .001$) and BCSS (log-rank $P = .016$) than mastectomy alone. After correcting for potential imbalances in clinicopathologic characteristics by multivariable analysis, significantly improved OS was evident in patients undergoing BCT, with a similar BCSS compared to mastectomy. The discrepancy may be attributable to the small number of studies mentioned above, while the present study had the largest sample sizes of T1-2N0M0 TNBC patients to date. Our results further support the suggestion that patients with early-stage breast cancer can benefit more from BCT than mastectomy in terms of survival, regardless of disease subtype.

However, the underlying biological mechanisms of this phenomenon remain unclear. One possibility is that administration of adjuvant RT may reduce locoregional recurrence and improve survival. Onitilo et al[20] compared lumpectomy with or without RT versus mastectomy.[20] Although OS was similar for lumpectomy and mastectomy, BCT was better than mastectomy alone. The authors concluded that the survival benefit was not only related to the surgical approach itself, but that the addition of adjuvant RT resulted in a prognostic advantage of BCT over mastectomy. Several other studies reported that adjuvant RT, although associated with a significantly lower risk of locoregional recurrence, had no significance in OS.[10-13] Zumsteg et al[11] thought that once tumor burden was reduced to subclinical disease after adequate surgical treatment, tumor biology and the quality of systemic therapy were the main determinants of prognosis in TNBC.

We also compared OS and BCSS between mastectomy alone and mastectomy with RT. There was no evidence of survival benefit of RT after mastectomy, with worse BCSS (log-rank $P < .001$) and similar OS (log-rank $P = .153$). Multivariable analysis also showed that patients treated with mastectomy with RT had a higher mortality risk than women who underwent mastectomy. For patients with small lesions or negative lymph nodes, National Comprehensive Cancer Network guidelines recommend that it is unnecessary to perform postoperative RT.[21] It is an uncertain problem whether TNBC, a more malignant breast cancer subtype, needs RT after mastectomy. Abdulkarim et al[10] reported that the local recurrence rate of mastectomy with postoperative RT for 5 years (11.7%) was significantly lower than that of the group that received no RT

(25.4%). Nevertheless, in this study, the patients treated with mastectomy alone had better OS than mastectomy with RT. Prospective randomized trials performed by Wang et al[22] found 5-year OS significantly improved in the group with mastectomy with RT compared to the group with mastectomy alone. These inconsistent results prompted further research to help make decisions regarding whether early-stage TNBC needs RT after mastectomy. In addition, the acceptable benefit−toxicity ratio varies between patients and physicians. Therefore, the decision to recommend postmastectomy RT requires good clinical judgment.

We further explored the possible factors affecting the survival of the 3 treatment types by stratifying all patients according to age, tumor grade, and tumor size. Age-stratified analysis showed that BCT, mastectomy alone, and mastectomy with RT had similar OS and BCSS in very young women (< 40 years), which was supported by other observational studies that reported no significant survival differences between BCT and mastectomy in patients aged < 40 years.[23,24] Improved OS and BCSS were observed in the BCT group in patients aged > 40 years. Additionally, there was a trend toward similar OS and BCSS in the BCT group compared to the mastectomy-alone group in patients aged 40 to 60 years. These results confirmed that BCT was safe, and possibly the preferred option even in older patients. In patients with grade II moderate-grade disease, we found a difference in OS between the BCT and mastectomy groups; however, we did not observe increased BCSS in patients who underwent BCT compared to mastectomy. Stratified analysis of tumor size showed that BCT had better OS regardless of tumor size (T1 or T2). It is possible that classic tumor size−prognosis relationships are not relevant to node-negative TNBC.[11] Besides, the target population in our study was T1-2N0M0 TNBC, thus tumor size was the only factor affecting AJCC TNM stage in this study. The stratified analysis results of AJCC stage were consistent with those of tumor size.

One of the strengths of our study is the large number of TNBC patients in the SEER database, which ensures the strength and objectivity of our conclusions. However, we acknowledge that there are several shortcomings to our study. The major limitation was that our study was a retrospective study; the different baseline characteristics between cohorts could variously affect results, although we attempted to correct for imbalances among the 3 cohorts by conducting multivariable analysis. Information about breast cancer subtypes has only been available since 2010, so information on HER2-positive disease in the SEER database cannot be obtained until 2010. Therefore, we had only relatively short-term survival results after the initial diagnosis. Inadequate follow-up duration may result in biased results. We were unable to obtain information about the disease recurrence, although it has been previously reported that TNBC exhibits a unique pattern of early recurrence, peaking at 2 to 3 years, most of which occurs within the first 5 years.[3] Therefore, we could not evaluate the locoregional recurrence-free survival benefit in the study groups. Moreover, the SEER database did not permit us to assess the patient's intrinsic *BRCA* expression. The predisposition to *BRCA* mutations in TNBC patients, rendering the tumor defective in DNA damage repair, has been argued to be a mechanism for increased radiosensitivity.[25] Finally, although data about chemotherapy were obtained, the exact chemotherapy regimens could not be obtained in SEER database.

Conclusion

On the basis of this population-based retrospective analysis, we found that patients with T1-2N0M0 TNBC treated with BCT had better survival than patients with mastectomy with or without RT. There was no evidence of survival benefit of RT after mastectomy. We therefore think that BCT is the most suitable locoregional treatment for patients with T1-2N0M0 TNBC. However, treatment decisions may be influenced by many factors, including an assessment from the doctor regarding whether the patient's physical condition can withstand the adverse effects of RT, and including the patient's own factors, such as socioeconomic status and personal willingness to undergo therapy.

Clinical Practice Points

- BCT and mastectomy are two mainstay treatments for early-stage breast cancer. BCT has been shown be equivalent to mastectomy.
- Our study demonstrated that BCT for patients with T1-2N0M0 TNBC results in better survival than mastectomy, regardless of patient age, tumor grade, or tumor size.
- Patients with T1-2N0M0 TNBC should be considered for BCT. However, additional follow-up data and prospective studies are needed.

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Disclosure

The authors have stated that they have no conflict of interest.

Supplemental Data

Supplemental figures accompanying this article can be found in the online version at https://doi.org/10.1016/j.clbc.2019.05.011.

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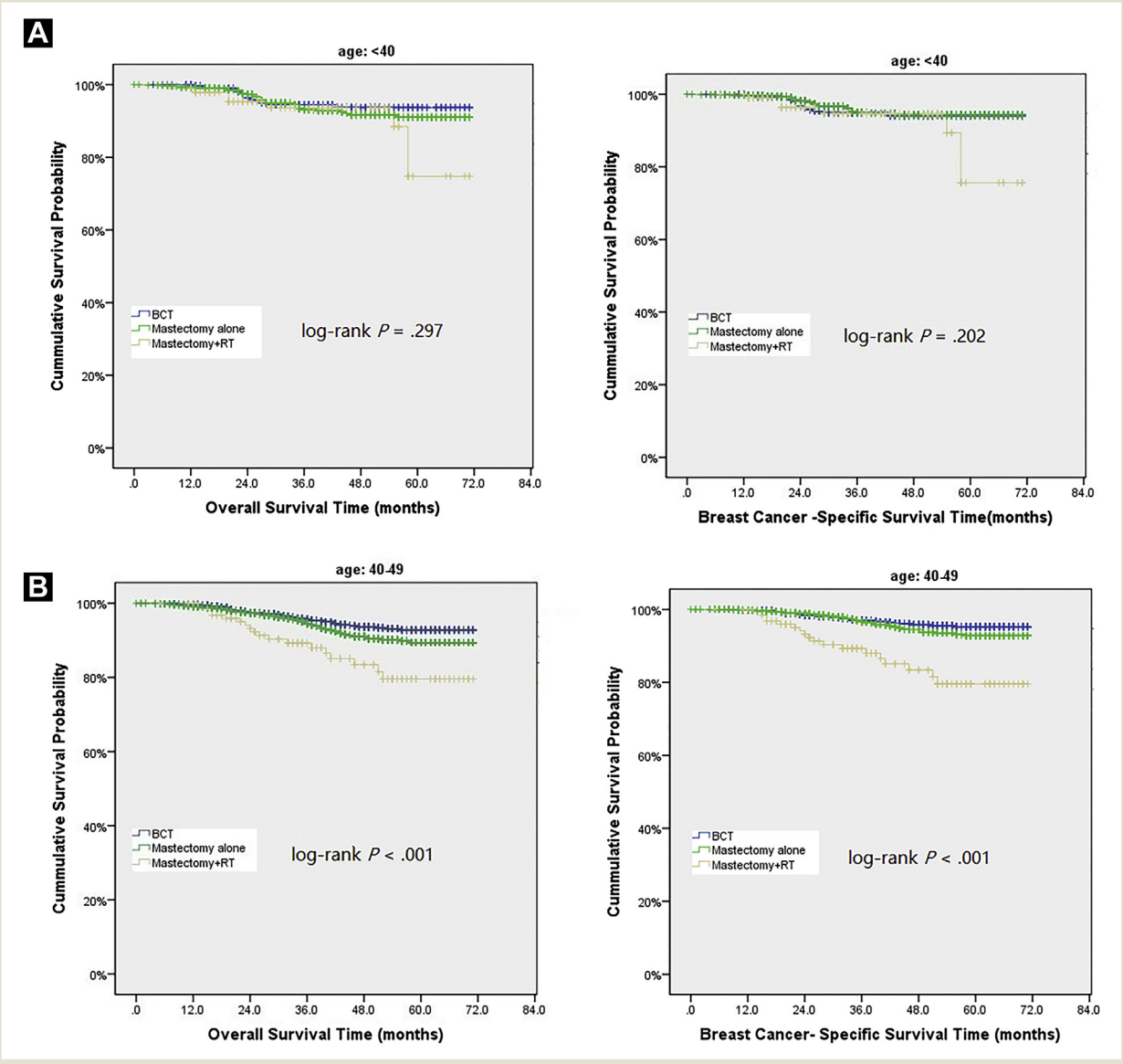
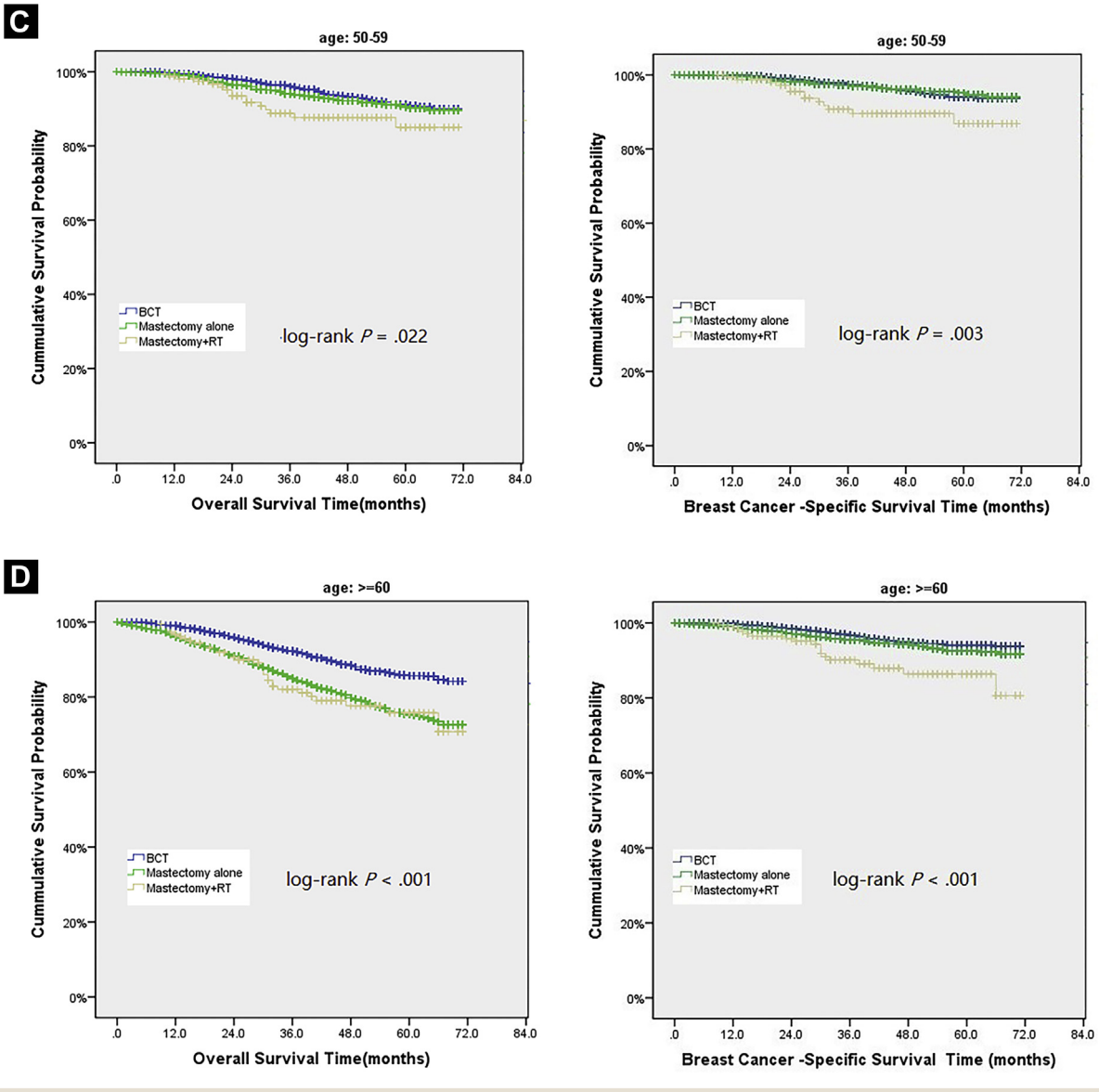
Supplemental Figure 1 Kaplan-Meier Curves of OS and BCSS by Treatment Type for All Patients, Stratified by Age at Diagnosis. Treatment Included BCT Versus Mastectomy Alone Versus Mastectomy With RT. Patients Were Aged < 40 Years (A), 40 to 49 Years (B), 50 to 59 Years (C), and > 60 Years (D)

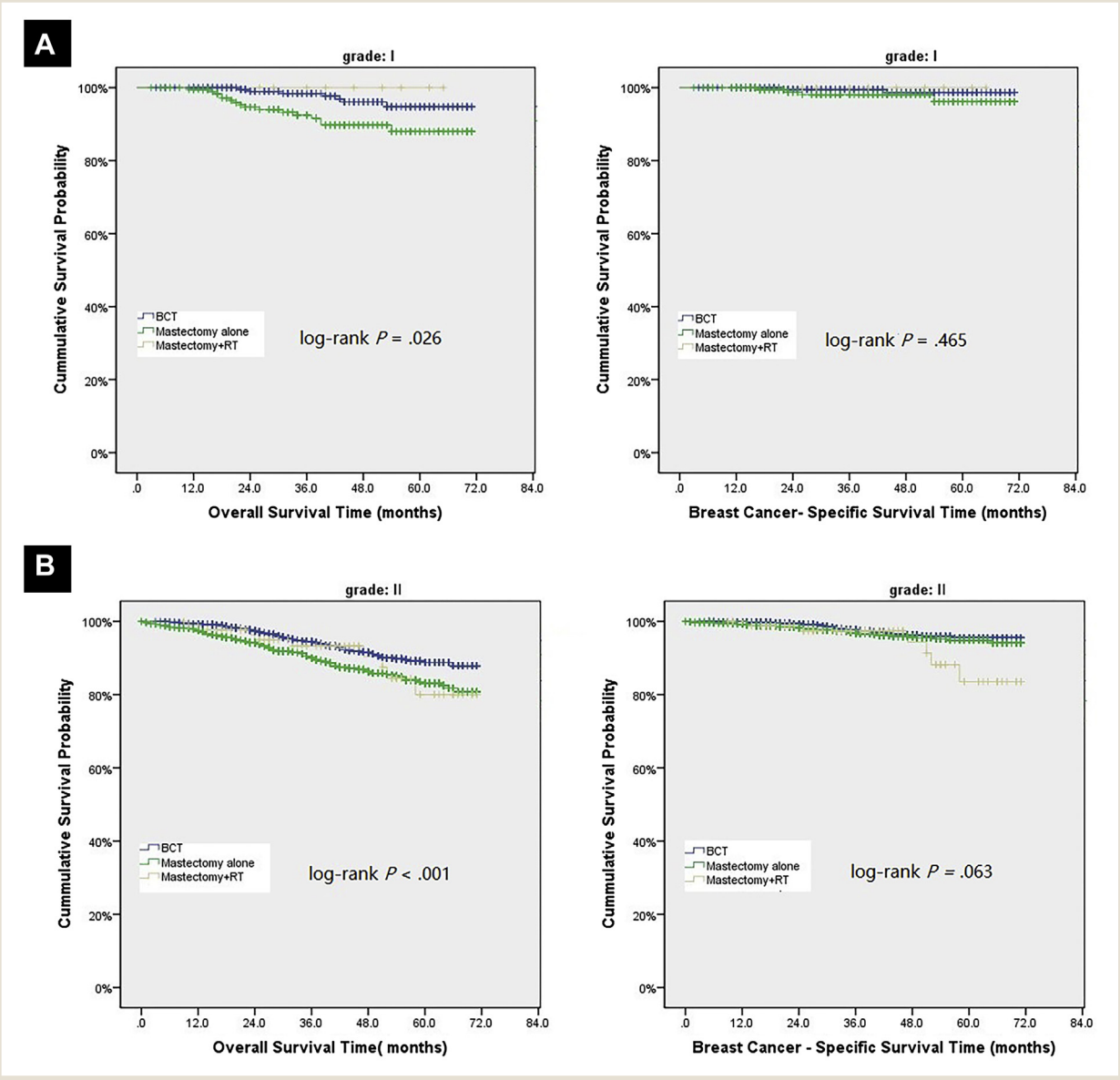


Abbreviations: BCSS = breast cancer–specific survival; BCT = breast-conserving therapy; OS = overall survival; RT = radiotherapy.

Supplemental Figure 1 continued

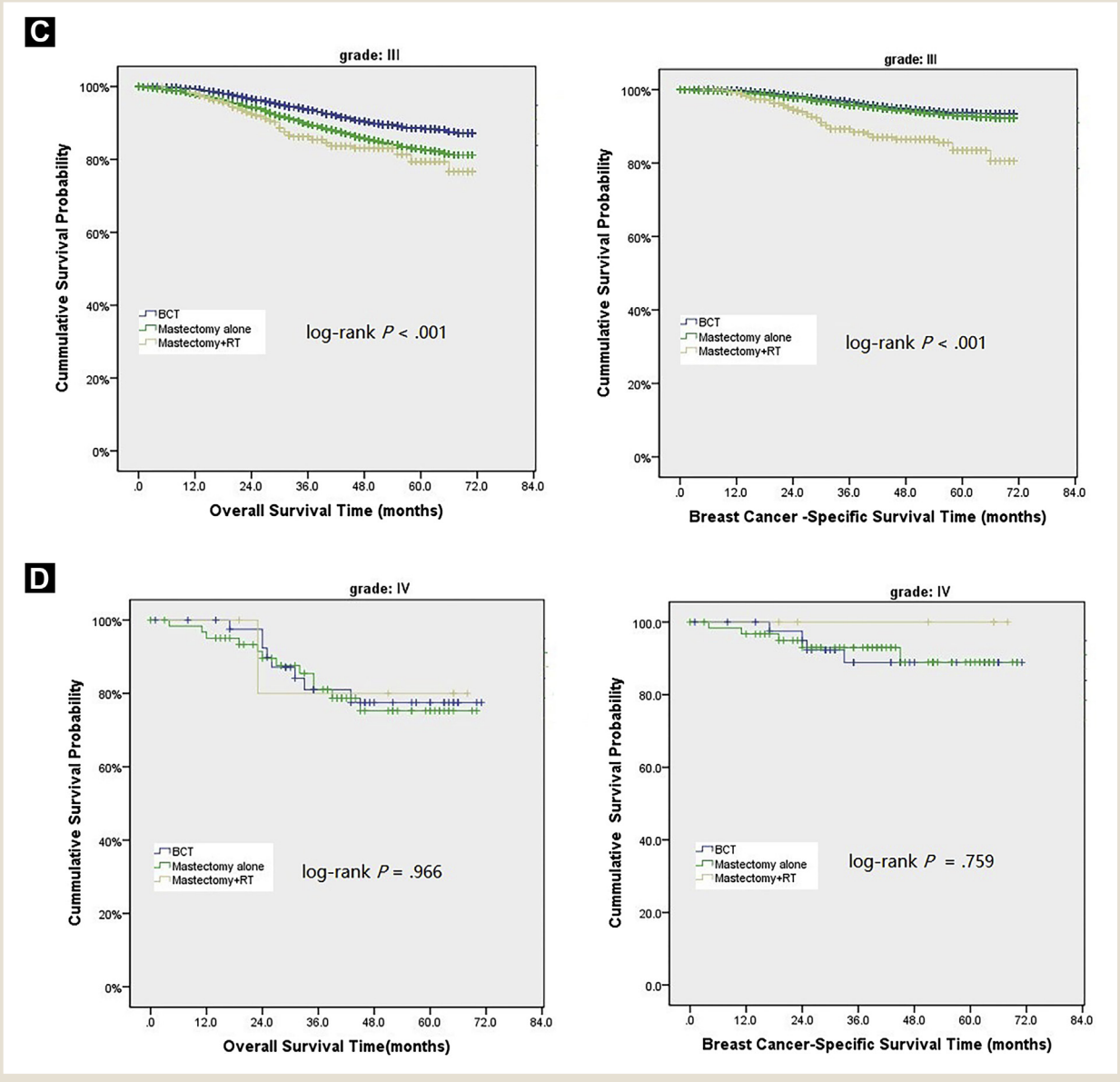


Supplemental Figure 2 Kaplan-Meier Curves of OS and BCSS by Treatment Type for All Patients, Stratified by Tumor Grade. Treatment Included BCT Versus Mastectomy Alone Versus Mastectomy With RT. Patients had Grade I (A), Grade II (B), Grade III (C), and Grade IV (D) Disease

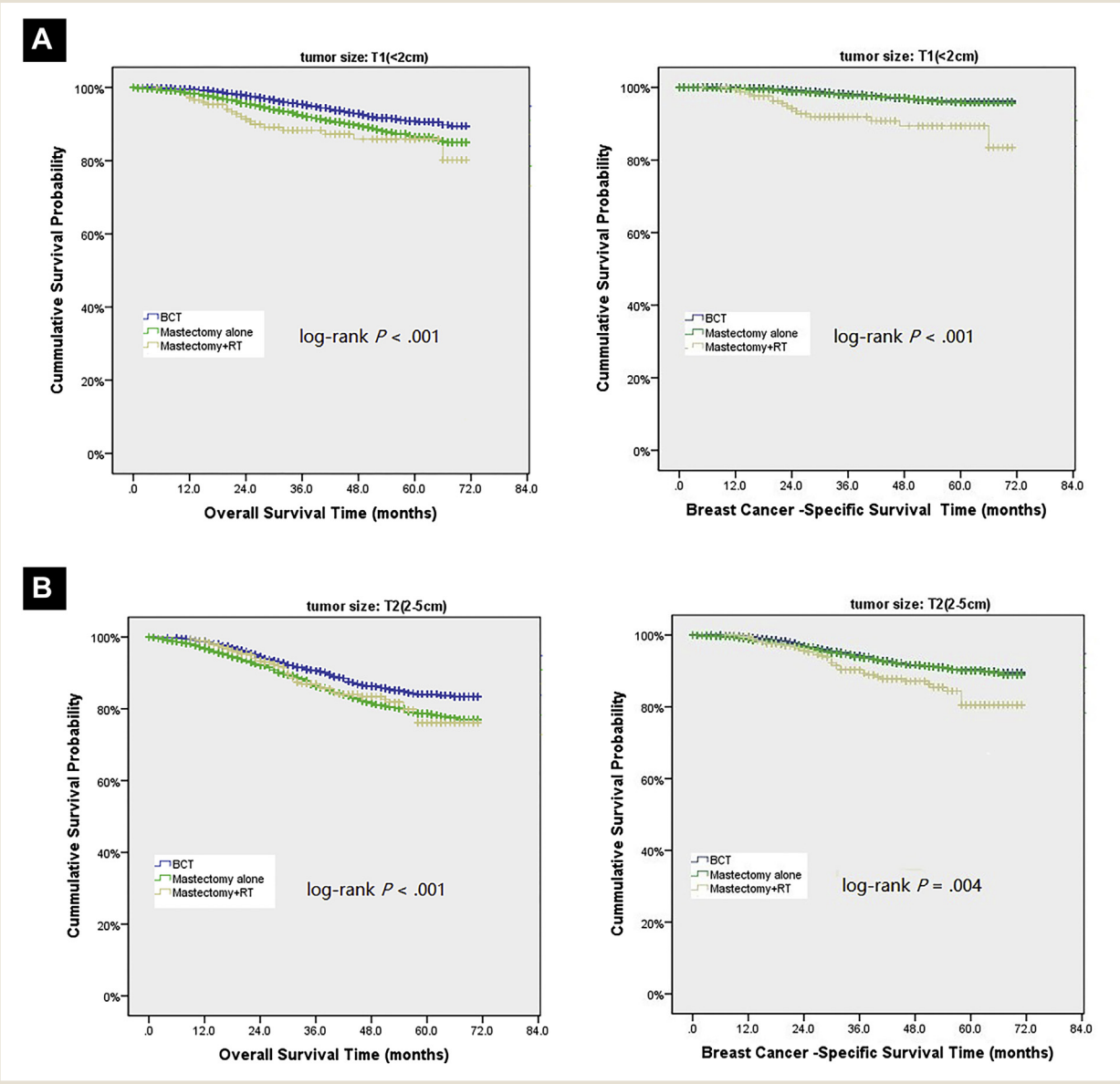


Abbreviations: BCSS = breast cancer–specific survival; BCT = breast-conserving therapy; OS = overall survival; RT = radiotherapy.

Supplemental Figure 2 continued

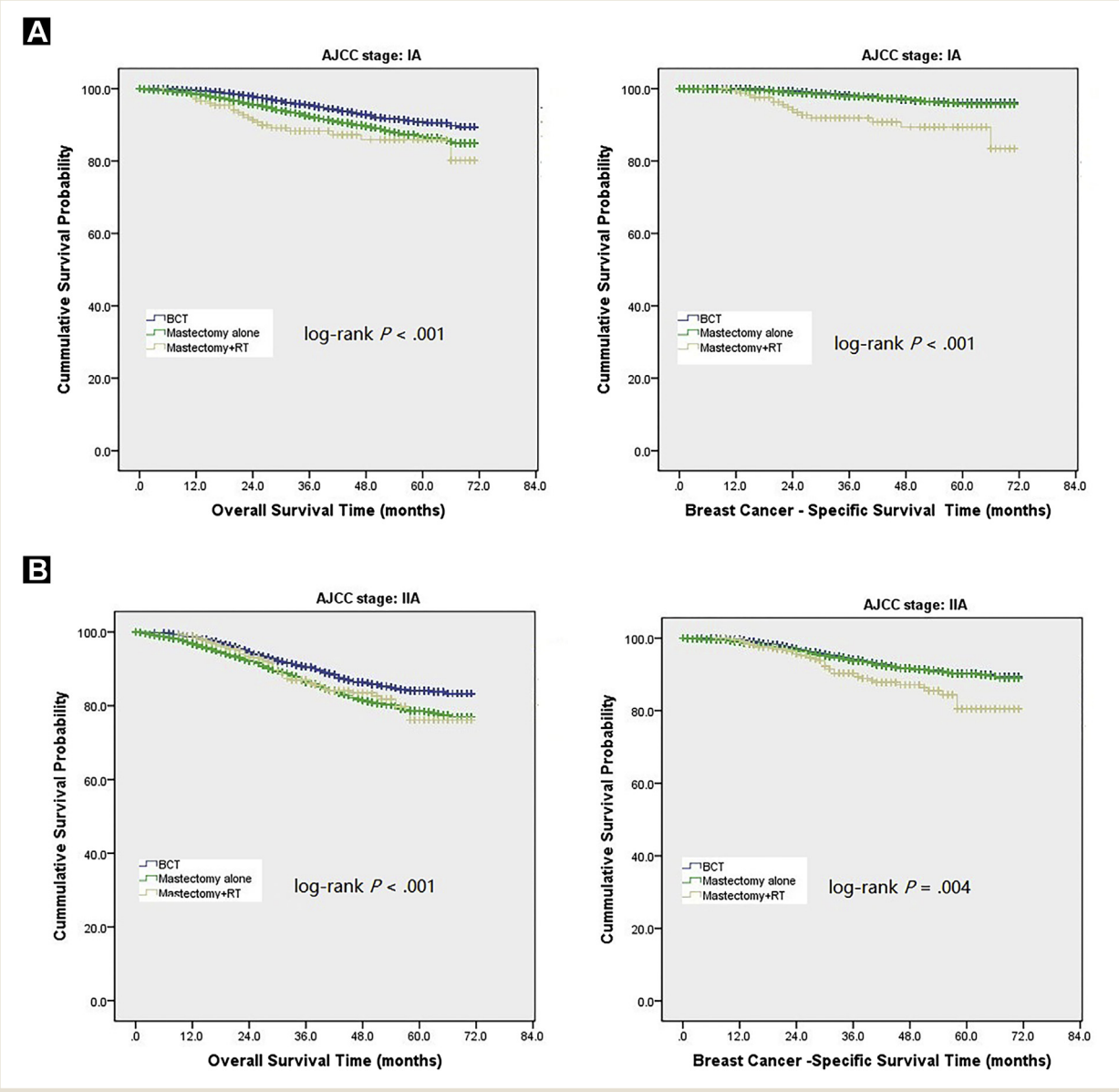


Supplemental Figure 3 Kaplan-Meier Curves of OS and BCSS by Treatment Type for All Patients, Stratified by Tumor Size. Treatment Included BCT Versus Mastectomy Alone Versus Mastectomy With RT. Patients had T1 (A) or T2 Tumor (B)



Abbreviations: BCSS = breast cancer–specific survival; BCT = breast-conserving therapy; OS = overall survival; RT = radiotherapy.

Supplemental Figure 4 Kaplan-Meier Curves of OS and BCSS by Treatment Type For All Patients, Stratified by AJCC Stage. Treatment included BCT Versus Mastectomy Alone Versus Mastectomy With RT. Patients Had Stage IA (A) or Stage IIA (B) Tumor



Abbreviations: AJCC= American Joint Committee on Cancer; BCSS = breast cancer–specific survival; BCT = breast-conserving therapy; OS = overall survival; RT = radiotherapy.