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ORIGINAL ARTICLE

The Comparision of Breast Cancer in the Young and Elderly Patients

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OBJECTIVE

To compare the tumor characteristics, treatment approaches, recurrence patterns and survival results rates of young and elderly patients with breast cancer.

METHODS

In this study, Between between 2000-2013, a total of 779 patients were treated for breast cancer at nine radiation oncology departments were evaluated retrospectively. Three-hundred eight-four of these patients were young (≤35 years), and 395 of those the patients were elderly (≥70 years).

RESULTS

Young patients were more likely to present with aggressive tumor features. They were more often received comprehensive lymphatic irradiation, tumor bed boost and intense chemotherapy. No difference was found for 5 and 10-year loco-regional recurrence- free survival rates were (96% and 93% for young, 97% and 97% for elderly). The 5 and 10-year distant recurrence- free survival rates were lower in the young patients (77% and 67% for young, 85% and 85% for elderly, p<0.0001). No difference was found in 5 and 10-year breast cancer- specific survival (91% and 79% for young, 92% and 87% for elderly). The 5 and 10-year overall survival rates were higher in the young patients (92% and 78% for young, 78% and 63% for elderly, p<0.0001).

CONCLUSION

The reason for the similarity between the age groups in terms ofregarding loco-regional recurrence- free survival can be more comprehensive lymphatic irradiation and tumor bed boost, the young patients received. The distant recurrence- free survival rates rates were significantly lower in the young patients even though they received more intensive chemotherapy. Future studies aimed at more effective systemic regimens to decrease distant recurrence in young patients are warranted.

Keywords: Breast cancer; distant metastasis; elderly patients; loco-regional relapse; young age.

Introduction

Breast cancer (BC) is the most common malignancy in women worldwide. Despite a decrease in BC specific mortality, it is one of the leading causes of cancer death among women.[1] Age is a dominant risk factor in the development of BC. According to the SEER database, the median age at the time of BC diagnosis is 62 years.

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[2] Approximately less than 4% of women diagnosed with BC are younger than 35 years.[3] Definition of young age in BC has been controversial; in some studies, the cut-off points at different years have been identified according to the poor survival status compared to older counterparts. In many series, patients at 35 year or younger showed poor prognosis and increased risk of local-regional recurrence (LRR) and distant recurrence (DR).[4,5] This could partly be explained by BC at a young age is associated with more advanced stage and more biologically aggressive disease.[6-9] These aggressive biological features of BC in young patients include higher grade, higher proliferation rate, more lymphovascular invasion (LVI), more absence of hormone receptors, and higher prevalence of human epidermal factor receptor-2 (HER2) positive or triple negative disease.[5,7,8, 10-12] It is controversial whether these adverse prognostic factors mainly explain the poor outcome of young patients or the young age all by itself has an adverse prognostic significance.[13,14] On the other hand, since young age in BC is generally thought to be an adverse prognostic factor, these patients receive more aggressive treatments than elderly patients.[8,15]

One-third of all BCs occur in patients aged over 70 years.[16] BC in elderly patients has been reported relatively indolent in despite of the younger counterparts in several studies.[17] The biological characteristics of their tumors are more favorable. They represent higher estrogen receptor (ER) and progesterone receptor (PR) expression, less LVI, less HER2 expression, and lower proliferative rates.[18-21] Nonetheless, some studies suggest that older women generally have poor prognosis.[22,23] This is mostly explained by delayed diagnosis or lack of routine mammographic screening.[23] Moreover, the co-morbidities of elderly patients often limit therapeutic options and patients' compliance.[24] They receive less aggressive surgery and less frequent use of radiotherapy and chemotherapy even in patients with good performance status.[9,25,26]

Since two distinct age spectrum of women are underrepresented in the clinical trials, the exact reasons for poor outcomes remain unclear. Few studies have assessed whether very young or elderly patients have different patterns of LRR and DR. It is speculated that young patients receive more intensive therapy; therefore, they might have better survival after LRR or DM, despite a shorter disease-free survival.[27] This study aimed to evaluate the pathological characteristics, treatment approaches, recurrence patterns, and survival outcomes of very young and elderly patients.

Materials and Methods

The patients treated for BC in nine Radiation Oncology Departments between 2000 and 2013 were retrospectively reviewed. The inclusion criteria were patients ≤35 years old and ≥70 years old and patients with invasive BC who received radiotherapy after breast-conserving surgery or mastectomy. The exclusion criteria were stage IV disease, bilateral BC, male gender, patients aged between 36 and 69 years, and patients with other malignancies except basal cell carcinoma of the skin and carcinoma in situ of cervix. The local ethics committee approved the study, and informed consent was obtained from the patients.

Patients' medical history, co-morbidities, family history, tumor features, staging, initial treatment, and clinical outcomes were obtained from hospital databases. Pathological assessment included the evaluation of primary tumor size, histological type, tumor grade, LVI, perineural invasion (PNI), surgical margin, lymph node status, extranodal extension, ER, PR, HER2 expression, and Ki-67 labeling index status. Tumor staging was performed according to 2002 American Joint Committee on Cancer guidelines.[27] The status of ER, PR, and HER2 were determined by immunohistochemistry. ER or PR positivity was determined if at least 1% of the tumor cells had positive nuclear staining. Hormone receptor positivity was defined as ER(+)/PR(+), ER(+)/PR(−) or ER(-)/PR(+). HER2 positivity was defined as an immunohistochemical score of 3+ or 2+ with positive gene amplification by using fluorescent in situ hybridization or chromogenic in situ hybridization.

The last date of follow-up and the date of first recurrences or death were recorded. End points were calculated as the interval between definitive surgery and event of the interest. We evaluated the recurrence patterns, the 5- and 10-year locoregional recurrence-free survival (LRFS), distant recurrence-free survival, breast cancer specific survival (BCSS), and overall survival (OS). LRR was defined as the first relapse in the ipsilateral breast, chest wall, or overlying skin and nodal regions. The contralateral BC was considered as new event. Any other site of recurrence was defined as DR. LRFS was defined as time from definitive surgery to any locoregional recurrence or last follow-up/death. DRFS was defined as time from definitive surgery to any DR or last follow-up/death. BCSS was defined as time from definitive surgery to death from BC or last follow-up/death. OS was defined as time from surgery to death from any causes or last follow-up/death.

Statistical Analysis

All analyses were performed using the SPSS software, version 20 (SPSS Inc, Chicago, IL). The patients were categorized by age into two groups. Descriptive statistics were generated for all variables and were summarized with frequencies and percentages. The significance of differences in categorical variables such as patient and tumor characteristics, treatment features, and recurrence patterns were compared across age groups using Pearson's chi-squared or Fischer exact test if necessary. Survival and recurrence data were analyzed using the Kaplan–Meier estimated method, and the survival/recurrence curves were compared using the log-rank test. Multivariate analyses were conducted using Cox's proportional hazard regression modeling. The value of $p \leq 0.05$ was considered as statistically significant.

Results

Patient Characteristics

A total of 779 patients who were treated in nine centers were evaluated. Among them, 49% of patients (n=384) were young and 51% of patients (n=395) were elder. The median age of young and elder patients was 30 (19–35) and 74 (70–87) years, respectively. The co-morbidities were higher in the elderly (10% vs. 62%, p<0.001). The number of patients who had family history of BC was higher in the young patients (21% vs. 12%, p=0.002).

The young patients presented with higher incidence of clinical stage II and III (79% vs. 70%, p=0.011), grade 3 tumors (48% vs. 30%, p<0.0001), positive lymphovascular space invasion (LVI) (64% vs. 51%, p<0.001), ≥15% Ki-67 status (86% vs. 51.5%, p<0.002), negative hormone receptor (ER/PR) (27% vs. 15%, p<0.0001), positive c-erb-B2 (34% vs. 26%, p=0.015), and triple negative subtype (18% vs. 8%, p<0.001). No difference was found between the groups regarding pathologic tumor stage, pathologic PNI, histopathological subtypes, and surgical margins. The clinical and pathological characterizations of the patients are summarized in Table 1.

Young patients had more breast-conserving surgeries (42% vs. 34%, p=0.02) and axillary dissection after positive sentinel lymph node biopsy (20% vs. 7%, p=0.0001). The percentage of young patients who receive chemotherapy was also higher (96% vs. 66%, p=0.0001). Although young patients were more likely to be treated with neoadjuvant chemotherapy (22% vs. 13 %), elderly patients were more likely to be treated with adjuvant chemotherapy (78% vs. 87%, p=0.0001). Young patients were more likely to receive doxorubicin, taxane, and doxorubicin + taxane chemotherapy regimens (p<0.0001). The number of patients who receive hormone-therapy was higher in elderly (p=0.012), while no difference was found between two groups in terms of anti-HER2 treatment. All patients in this retrospective study received adjuvant radiotherapy after mastectomy or breast-conserving surgery. The rate of application only tangential fields to breast or chest wall alone was found similar between the groups (30% vs. 30%). The comprehensive lymphatic irradiation (included axilla, supraclavicular fossa, internal mammary lymph nodes) ratio was found higher in young patients (29% vs. 15%; p=0.0001). In addition, young patients had more likely received boost (49% vs. 28%, p=0.0001). No difference was found in terms of median RT dose to the breast or chest wall and boost dose across the two patient groups (p=0.0001). The treatment features of the patients are shown in Table 2.

Survival Analysis

The median follow-up time for young and elderly patients was 67.5 (5–193) months and 54 (5–188) months, respectively. The 5- and 10-year LRFS rates were 96% and 93% for young patients and 97% and 97% for elderly patients (p=0.211) (Figure 1a). The 5- and 10-year DRFS rates were 77% and 67% for young patients and 85% and 85% for elderly patients (p<0.0001) (Figure 1b). The 5- and 10-year BCSS rates were 91% and 79% for young patients, and 92% and 87% for elderly. Although the difference in 10-year BCSS rate was 8% between the groups, it did not reach a statistical significance (p=0.243) (Figure 1c). The 5- and 10-year OS rates were 92% and 78% for young patients and 78% and 63% for elderly (p=0.0001) (Figure 1d).

Based on multivariate survival analysis, age was the significant prognostic factor for DRFS and OS. In addition to younger age, higher pathologic tumor stage and positive pathologic lymph node were negatively related to DRFS. Higher pathologic tumor stage and tumor grade and presence of lymphovascular space invasion were negatively related to LRFS. Higher clinical and pathological tumor stage, positive pathological lymph node, and higher tumor grade were found as significant negative prognostic factors on BCSS. Elder age, higher clinical stage, and tumor grade were negative prognostic factors on OS. The multivariate survival analysis results are shown in Table 3.

Recurrence Patterns

At the last follow-up, 98 (26%) patients in young patients had recurrences. Most common recurrence pattern was DM (86%). Fourteen of the young patients (5%) developed contralateral BC. At the last follow-up, 55 (15%) patients died from BC, and 4 (1%) patients died from other causes not related to BC. In the elderly,

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Table 1 The clinical and pathological characterizations of the patients

	Young women n, (%)	Elderly women n, (%)	p
Median age	30 (19-35)	74 (70-87)	-
Co-morbidity			
Negative	335 (90%)	139 (38%)	0.0001
Positive	36 (10%)	228 (62%)	
Family history			
Negative	290 (79%)	318 (88%)	0.002
Positive	76 (21%)	45 (12%)	
Clinical stage			
0-1	72 (21%)	92 (30%)	0.011
2-3	272 (79%)	219 (70%)	
Histopathology			
Invasive lobular carcinoma	36 (9.5%)	24 (6%)	0.214
Invasive ductal carcinoma	272 (71%)	302 (77%)	
Invasive lobular+ductal carcinoma	32 (8.5%)	29 (7%)	
Others	43 (11%)	39 (10%)	
Pathologic tumor stage			
0-2	301 (79%)	316 (80%)	0.531
3-4	82 (21%)	77 (20%)	
Pathologic node status			
N0	119 (31%)	122 (32%)	0.854
N1-3	265 (69%)	264 (68%)	
Tumor grade			
1	21 (6%)	53 (15%)	0.0001
2	173 (47%)	202 (56%)	
3	176 (48%)	109 (30%)	
Surgical margin			
Negative	347 (91%)	364 (93%)	0.332
Positive	14 (4%)	8 (2%)	
Close (≤2 mm)	21 (5%)	18 (5%)	
Lymphovascular invasion			
Negative	122 (36%)	151 (49%)	0.001
Positive	214 (64%)	155 (51%)	
Perineural invasion			
Negative	203 (75%)	174 (69%)	0.184
Positive	67 (25%)	77 (31%)	
Ki 67 proliferation (%)			
<15	6 (14%)	16 (48.5%)	0.001
≥15	36 (86%)	17 (51.5%)	
Hormone receptor status			
Negative	103 (27%)	58 (15%)	0.0001
Positive	274 (73%)	329 (85%)	
HER2 status			
Negative	240 (66%)	263 (74%)	0.01
Positive	125 (34%)	91 (26%)	
Triple negative tumor			
Negative	300 (82%)	324 (92%)	0.0001
Positive	64 (18%)	29 (8%)	
Tumor grade			
1	21 (6%)	53 (15%)	0.0001
2	173 (47%)	202 (56%)	
3	176 (48%)	109 (30%)	

SLNB: Sentinel lymph node biopsy

Table 2 The treatment features of the patients

	Young women n, (%)	Elderly women n, (%)	p
Surgery			
Breast conserving surgery	160 (42%)	134 (34%)	0.02
Mastectomy	224 (58%)	261 (66%)	
Axillary surgery			
None	2 (0.5%)	15 (4%)	0.0001
SLNB	46 (12%)	48 (12%)	
SLNB and axillary dissection	75 (20%)	27 (7%)	
Axillary dissection	260 (67.5%)	304 (77%)	
Chemotherapy			
No	14 (4%)	128 (34%)	0.0001
Yes	367 (96%)	250 (66%)	
Chemotherapy			
Neoadjuvant	80 (22%)	32 (13%)	0.0001
Adjuvant	287 (78%)	218 (87%)	
Type of initial chemotherapy			
Doxorubicin containing regimen	68 (21%)	42 (20%)	0.0001
Taxane containing regimen	59 (18%)	44 (21%)	
Doxorubicin+Taxane containing regimen	113 (35%)	42 (20%)	
Other regimens	83 (26%)	84 (39%)	
Hormonal therapy			
Negative	110 (33%)	65 (23%)	0.012
Positive	226 (67%)	214 (77%)	
Anti-HER2 therapy			
Negative	295 (82%)	265 (84%)	0.512
Positive	63 (18%)	49 (16%)	
Radiotherapy fields			
Tangential	114 (30%)	117 (30%)	0.0001
Tangential+axilla+supra	160 (42%)	217 (55%)	
Tangential+axilla+supra+MI	110 (29%)	61 (15%)	
Boost			
Negative	197 (51%)	285 (72%)	0.0001
Positive	187 (49%)	110 (28%)	
Radiotherapy dose (median)			
Breast/chestwall dose	50 Gy (45-50.4)	50 Gy (45-50.4)	0.834
Boost dose	10 Gy (8-20)	10 Gy (6-16)	0.128

SLNB: Sentinel lymph node biopsy; MI: Mammaria interna

46 (13%) patients had recurrences. Most recurrence pattern was DM (85%). Ten (4.5%) elderly patients had contralateral BC. At the last follow-up, 35 (8.5%) patients died from BC, and 60 (16.5%) patients died from other causes not related to BC. The recurrence patterns and survival status of the patients are shown in Table 4.

Discussion

Several prognostic factors have been identified in the literature for recurrences or death from BC. The strongest prognostic factors are age at diagnosis, co-morbidity, tumor size, histological grade, and number of involved lymph nodes.[28,29] Some studies showed that the risk of BC recurrence is higher in the younger age. In five NSABP trials among 10,709 women, the 12-year incidence of ipsilateral breast tumor recurrences for women aged 49 years or younger, 50–59 years, and 60 years or older were 9.6%, 5.8%, and 5.6%, respectively.[28] Rudra et al examined the recurrence patterns in patients with BC. Women aged less than 40 years had higher rates of LRR (20% vs. 7, p=0.004) and DR (18% vs. 5%, p=0.003) compared to patients aged above 70 years.[30] Although young age at diagnosis was shown to be associated with an increased risk of recurrence and poorer survival [3,8,25], the exact reason for this poor prognosis

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Table 3 Multi-variant analyses of disease free survival, breast cancer specific survival and overall survival

Variable	Parameter	HR	95%CI	p
Locoregional recurrence-free survival				
Age	≤35 vs ≥70	1.12	0.30-4.14	0.868
Surgery	MRM vs BCS	0.13	0.04-0.46	0.002
Clinical stage	III+II vs I	2.41	0.71-8.14	0.155
Pathologic tumor stage	T3-4 vs T0-2	4.17	1.21-13.55	0.018
Pathologic node status	N1-3 vs N0	1.24	0.28-5.39	0.771
Grade	III vs I+II	3.67	1.13-11.4	0.030
LVSI	Positive vs negative	5.39	1.12-26.1	0.036
HR	Positive vs negative	0.47	0.18-12.31	0.653
HER2	Positive vs negative	0.94	0.21-4.28	0.940
Endocrine therapy	Yes vs No	2.28	0.087-59.6	0.620
Adjuvant chemotherapy	Yes vs No	0.64	0.062-6.81	0.718
Trastuzumab	Yes vs No	0.16	0.034-0.75	0.020
Distant recurrence-free survival				
Age	≤35 vs ≥70	1.73	1.04-2.89	0.034
Surgery	MRM vs BCS	0.96	0.59-1.55	0.863
Clinical stage	III+II vs I	1.41	0.88-2.23	0.156
Pathologic tumor stage	T3-4 vs T0-2	1.89	1.21-2.96	0.006
Pathologic node status	N1-3 vs N0	2.21	1.16-4.16	0.015
Grade	III vs I+II	1.36	0.88-2.09	0.164
LVSI	Positive vs negative	1.52	0.94-2.47	0.090
HR	Positive vs negative	0.57	0.18-1.86	0.357
HER2	Positive vs negative	0.65	0.35-1.22	0.179
Endocrine therapy	Yes vs No	1.47	0.46-4.69	0.515
Adjuvant chemotherapy	Yes vs No	1.06	0.42-2.67	0.892
Trastuzumab	Yes vs No	0.59	0.28-1.22	0.175
Breast cancer specific survival				
Age	≤35 vs ≥70	0.96	0.56-1.76	0.897
Surgery	MRM vs BCS	0.99	0.54-1.82	0.993
Clinical stage	III+II vs I	1.78	1.02-3.10	0.041
Pathologic tumor stage	T3-4 vs T0-2	1.76	1.02-3.05	0.042
Pathologic node status	N1-3 vs N0	2.49	1.08-5.75	0.032
Grade	III vs I+II	2.29	1.34-3.93	0.003
LVSI	Positive vs negative	1.11	0.62-1.98	0.714
HR	Positive vs negative	0.35	0.07-1.63	0.181
HER2	Positive vs negative	0.77	0.38-1.56	0.478
Endocrine therapy	Yes vs No	2.52	0.53-11.8	0.240
Adjuvant chemotherapy	Yes vs No	1.16	0.45-5.70	0.456
Trastuzumab	Yes vs No	0.89	0.37-2.14	0.798
Overall survival				
Age	≤35 vs ≥70	0.43	0.26-0.69	0.001
Surgery	MRM vs BCS	0.96	0.58-1.58	0.879
Clinical stage	III+II vs I	1.72	1.07-2.74	0.024
Pathologic tumor stage	T3-4 vs T0-2	1.56	0.99-2.45	0.053
Pathologic node status	N1-3 vs N0	1.67	0.91-3.05	0.094
Grade	III vs I+II	2.19	1.43-3.37	0.001
LVSI	Positive vs negative	1.13	0.71-1.79	0.597
HR	Positive vs negative	0.29	0.08-1.04	0.057
HER2	Positive vs negative	0.98	0.56-1.71	0.942
Endocrine therapy	Yes vs No	3.27	0.92-11.6	0.066
Adjuvant chemotherapy	Yes vs No	0.82	0.42-1.58	0.554
Trastuzumab	Yes vs No	1.39	0.64-3.07	0.403

CI: Confidence interval; MRM: Modified radical mastectomy; BCS: Breast-conserving surgery; In: Lymph node; ECE: Extracapsular extension; LVSI: Lymphovascular space invasion; HR: Hormone receptor

Table 4 The recurrence patterns and survival status of the patients

	Young women n, (%)	Elderly women n, (%)	p
Recurrences			
Negative	277 (74%)	310 (87%)	0.0001
Positive	98 (26%)	46 (13%)	
Recurrence patterns			
Local-regional	6 (6%)	3 (6%)	0.98
Distant	84 (86%)	39 (85%)	
Local-regional+distant	8 (8%)	4 (9%)	
Survival status			
Alive	319 (84%)	272 (75%)	0.0001
Exitus from breast cancer	55 (15%)	31 (8.5%)	
Exitus from other causes	4 (1%)	60 (16.5)	

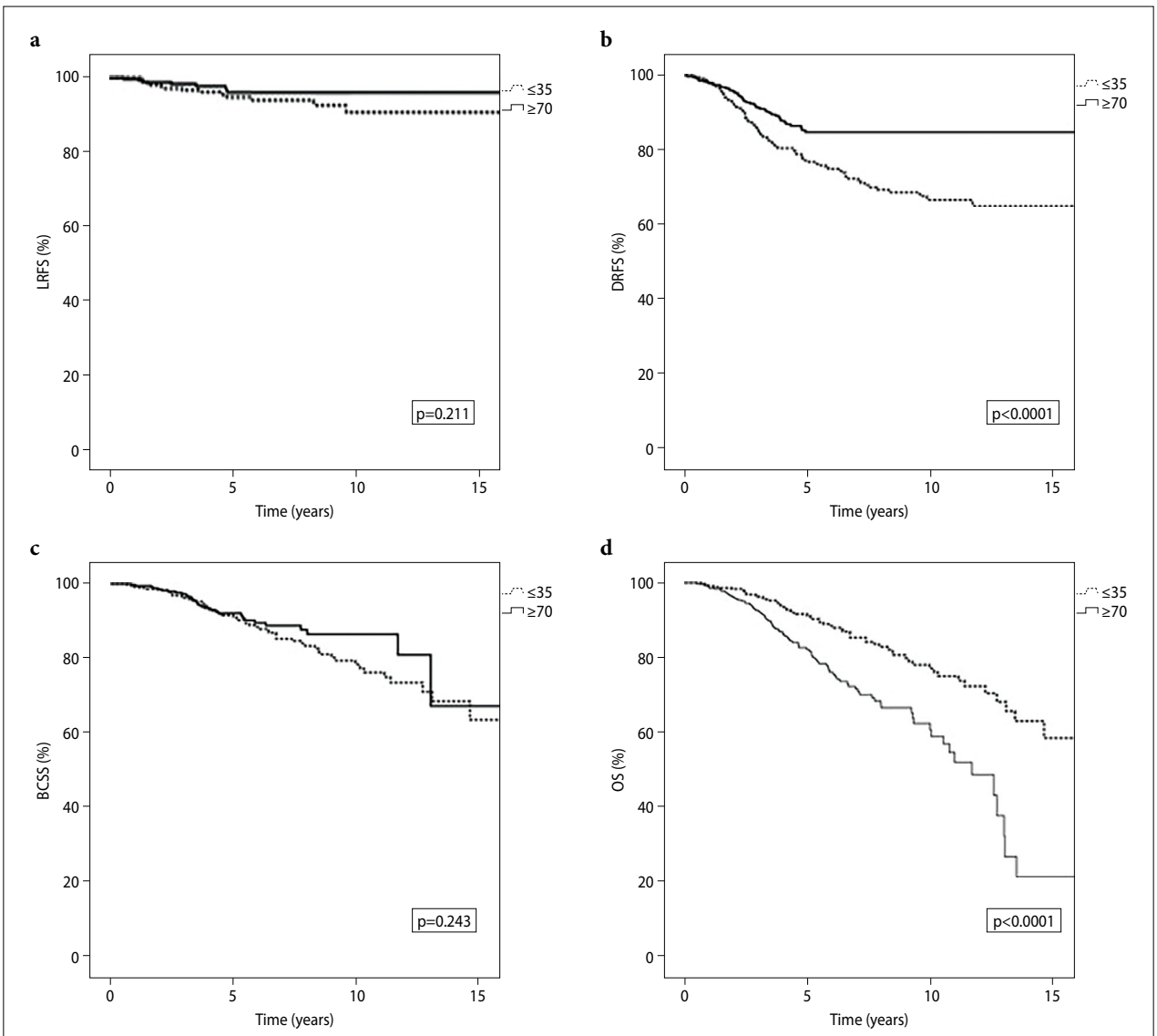

Fig. 1. The LRFS (a), DRFS (b), BCSS (c), and OS (d) of very young women and elderly women diagnosed with breast cancer.

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remains unclear. Numerous publications revealed that the adverse tumor features at young age are related to poor outcome. Similar to previous reports [5,7,8,10,12], our study showed that the BC in young patients younger than ≤35 years is characterized by a higher frequency of aggressive pathological features.

These unfavorable tumor characteristics and the disparity in treatment approaches might contribute to higher recurrence rates in younger patients. We found that the young patients were two times more likely to have recurrence rate than elderly. However, the recurrence patterns did not differ between the groups. The recurrences were mostly appeared in DR. The 5- and 10-year cumulative incidence of DR were significantly higher in the young patients, justifying more intensive chemotherapy following surgery in these age groups of patients. The St Gallen 1998 consensus identified diagnosis at 35 years or younger as a poor prognostic factor, and they recommended adjuvant chemotherapy regardless of tumor features.[31] However, this recommendation was not based on strong evidence. Now, the systemic chemotherapy decision is predominantly based on not only patient age but also patients' comorbidities and performance status and tumor stage and other clinical and molecular prognostic factors. In literature, it has been shown that elderly patients less likely received chemotherapy for their BC [32], and when they received chemotherapy, most of them were treated with non-cardiotoxic agents.[33] Similar to numerous reports [34-36], our study revealed that the number of young patients whom received chemotherapy was higher than elderly, and they mostly received neoadjuvant chemotherapy because of higher incidence of advanced clinical stage. Their chemotherapy regimens contained mainly anthracycline and taxane. The incidence of HER2 positivity in young patients was significantly higher compared to the elderly, but there was no significant difference in terms of anti-HER2 treatment in both groups. The reason for this may be the nature of the retrospective study with unbalanced data set or because most of our patients were treated before anti-HER2 treatment era. Therefore, no conclusion can be drawn for the contributing effect of this agent to improve distant metastasis control.

The 5- and 10-year cumulative incidences of LRR were not found significantly different between the groups, though young patients had significantly more adverse tumor features and significantly higher clinical and pathological stage of the disease. The reason for the similarity between the age groups in terms of LRR might be that the young patients received more comprehensive lymphatic irradiation and tumor bed boost that has been shown to reduce LRR.[37] On the other hand, we found that the LRR in our series was quite lower compared to older series. Beadle et al reported a 10-year LRR rate of 16% after breast-conserving therapy and 12.5% after mastectomy in a cohort of 652 women aged 35 years or younger.[4] Voogd et al reported 10-year LRR rate of 35% after breast-conserving therapy in women aged 35 years or younger.[38] Patients with ≤35 years of age in our series showed 6% isolated locoregional recurrence and 8% LRR and DR with a median follow-up time of 67.5 months. In more recent series, the 5- and 10-year cumulative incidences of LRR were 1% and 4% after breast-conserving therapy; 3.5% and 8.7% after mastectomy in women aged 40 years or younger, which was quite similar to our results.[39]

Historically, young patients had worse survival than older counterparts. Cancello et al reported that for the patients aged <35 years, the risk of death rose by 5% for every 1-year reduction in age, whereas there was no significant change in death risk with age in patients aged 35–50 years.[16] It is speculated that younger age have a higher risk of death compared to older counterparts even if they are diagnosed early and receive more intensive treatment.[8] Prognosis in BC has dramatically improved over the past decades. According to 2017 data from the American Cancer Society, overall BC death rates increased by 0.4% per year from 1975 to 1989, but since then the death rates have decreased rapidly, for a total decline of 39% through 2015. This decrease after 1989 occurred in both younger and older women.[40] The differences related to age may be narrowing as the treatment of patients with BC improves. The better preoperative staging, margin assessment, new systemic agents, and modern radiotherapy techniques may contribute better local-regional control and survival.[39] In one of the recent studies, no significant difference in 5-year survival was found between the patients aged 35 years or younger and the patients aged 65 years or older in despite of lower 5-year RFS in patients with young age.[27] Similar to this study, we found no significant difference in terms of BCSS between the groups though the difference in 10-year BCSS rate was 8%. This can be explained by more intensive treatments that young patients have received because of better performance status and tolerability, which compensate the negative impact of young age on BCSS.

It is not surprising to find that the 5- and 10-year OS rates were significantly lower in the elderly. Since these women had more likely to have co-morbidities and many of them died because of other reasons than that of BC.

The strengths of our study can be summarized as having two distinct age groups, which were underrepresented populations and fall out of screening programs.

The patient data were reviewed in terms of pathological features and treatment approaches as well as recurrence patterns and survival. In contrast to most studies in literature, the treatment and recurrence patterns were represented in detail. However, several limitations should also be mentioned. First, the nature of the retrospective study made unbalanced data set, and some lost information of patients and treatment characteristics was inevitable. Second, there is a selection bias in terms of treatment, since all patients received radiotherapy, and we do not know the consequence of patients without RT.

Conclusion

In conclusion, similar to previous reports, we have demonstrated that the younger patients had more aggressive pathological features and advanced stage. The LRFS between two distinct age groups was found similar in spite of the presence of adverse tumor features. The reason of this can be explained by more comprehensive lymphatic irradiation and tumor bed boost that the young patients received, justifying more aggressive RT in this age groups of patients. The DRFS rates were significantly lower in the young patients even though they received more intensive chemotherapy. Future studies are needed for more effective systemic regimens to decrease DR in young patients.

Peer-review: Externally peer-reviewed.

Conflict of Interest: There is no conflict of interest.

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Turk J Oncol 2019;34(3):179–88
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