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ORIGINAL ARTICLE

Super-elderly patient-specific perioperative complications in breast cancer surgery

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Abstract

Purpose Geriatric surgery poses specific challenges due to patient vulnerability in relation to aging. We analyzed perioperative challenges concerning super-elderly patients with breast cancer.

Methods Between 2013 and 2018, 908 patients with breast cancer were treated surgically. Of these, two patient groups were compared: Group A (≥ 85 years old, $n = 34$, 3.7%) and Group B (75–84 years old, $n = 136$, 15%).

Results In Groups A and B, 26.4% and 36.8% of patients lived alone, respectively. Group A patients had higher rates of psychiatric and cardiovascular disease (32.4% and 41.2%) than Group B (8.8% and 16.2%) ($p = 0.0009$ and $p = 0.0031$, respectively). There was no marked difference in the type of surgery or length of hospital stay between groups, and most complications involved surgical site disorders. Postoperatively, Group A had a higher rate of delirium (29.4%) than Group B (3.7%) ($p < 0.0001$). The 30-day postoperative mortality rate was 0, and 76.5% of Group A and 45.6% of Group B patients received no adjuvant therapy ($p = 0.0024$).

Conclusions Age alone does not constitute a contraindication for appropriate surgery, although there are some challenges necessary to consider for super-elderly patients.

Keywords Breast · Elderly · Surgery · Complication · Delirium

Introduction

The Japanese population is living longer, with a natural life span of > 87 years in females. Women aged 85 years have a mean life expectancy of 8.4 years [1]; therefore, the numbers of super-elderly patients with breast cancer are likely to rise along with an increasing life expectancy. The national population database shows that breast cancer-specific mortality is notably increasing in the octogenarian population [2]. Since appropriate treatment for breast cancer is necessary, a risk–benefit evaluation must be carefully undertaken prior to decision-making when planning treatment in this population.

Previous studies have shown that elderly patients with breast cancer received less aggressive treatment and have a higher disease-specific mortality than younger patients [3–6]. Older patients may receive less than the standard therapy due to complications, such as adverse chemotherapy events, life-threatening comorbidities, patient preference, and the expected quality of life. While endocrine therapies are often preferred to surgery for super-elderly patients [6–8], an adequate surgical approach has been reported to be the cornerstone of breast cancer treatment [4, 7, 9]. Furthermore, recent studies have shown low morbidity and mortality rates in breast cancer surgery involving elderly patients [10–13].

Geriatric surgery has unique challenges due to patient vulnerability as a consequence of aging [14, 15]. To identify the specific challenges regarding breast cancer surgery for super-elderly patients, we analyzed the symptoms, lifestyle,

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comorbidities, type of surgery, complications, and mortality rates for patients ≥ 85 years of age.

Patients and methods

Between January 2013 and September 2018, 908 female patients with breast cancer were treated surgically in our hospital. We retrospectively analyzed the 34 of these patients ≥ 85 years of age. We obtained data from patient clinical records, and these data were compared to those of 136 patients between 75 and 84 years old. Patient characteristics, comorbidities, types of treatment, perioperative complications, and mortality rates were investigated. None of the patients had visceral metastasis or other active malignancy at the time of surgery, and all patients had undergone elective surgery.

According to the classifications of the American Society of Anesthesiologists (ASA), the majority of patients were classified as ASA II or III, with no patients classified as ASA V [16]. At our hospital, postoperative radiotherapy is usually performed for patients < 71 years old. Therefore, only three patients underwent whole-breast radiotherapy after breast-conserving surgery, and two patients received chest-wall irradiation postmastectomy.

Chief complaints were divided into subjective and objective symptoms or no symptoms reported at the time of the group checkup for health. The tumor status was analyzed according to the Union for International Cancer Control classifications [17]. In terms of comorbidities, dementia and impairment of willpower were categorized as psychiatric disorders. Cerebrovascular disease and Parkinson's disease were classified as central nervous system disorders. Hypertension was considered separately from cardiovascular disease. Perioperative complications were analyzed using the following terms: intraoperative, postoperative, and short-term post-discharge from hospital. Delirium was diagnosed when patients had a Delirium Observational Screening Scale score of > 3 [18]. Of these patients, active or mixed-type delirious patients with unrest were considered to have had a postoperative complication.

For the statistical analysis, we used chi-square tests to evaluate the variables. A two-tailed p value of < 0.05 was considered statistically significant.

Results

Of the 908 surgically treated patients, 34 patients (3.7%) were ≥ 85 years old (Group A), and 136 patients (15%) were between 75 and 84 years old (Group B) (Table 1). The mean patient age in Group A was 88 years, and that in Group B was 78.9 years. The oldest patient was 94 years old. Three patients in Group A and 13 in Group B had bilateral breast cancer. One patient in Group A underwent surgery under local anesthesia due to severe heart failure (left ventricle dysfunction after myocardial infarction with frequent supraventricular extrasystole), and the rest underwent surgery under general anesthesia. Twelve patients in Group B had ductal carcinoma in situ (DCIS), whereas none in Group A were found to have DCIS.

Within the same period, between January 2013 and September 2018, 11 patients ≥ 85 years old who had been diagnosed with breast cancer did not receive surgery (Table 2). Of these, five patients or members of their family on their behalf declined surgery, and four did not undergo surgery due to severe comorbidities as follows: abdominal aortic aneurysm requiring emergency surgery, combined acute heart failure with pleural effusion and acute brain infarction, three coronary artery stenoses with hypertrophic cardiomyopathy, and brain dysfunction due to repeating brain infarction (in one each). In addition, 9 of 11 patients declined to receive other forms of therapy. Eighteen patients between 75 and 84 years of age did not undergo surgery. Of these, six patients did not undergo surgery due to priority treatments for another malignancy, and six other patients did not undergo surgery due to distant metastasis. At a median follow-up of 16 months, a total of 29 patients avoided surgery, nine died due to breast cancer, and five died from other diseases.

The characteristics of the surgically treated patients are shown in Table 1. In Groups A and B, 38.2% and 64.7% of the patients, respectively, either lived alone or with an elderly spouse, showing a decreased rate in Group A ($p = 0.0089$). While the rate of subjective symptoms was similarly high in both groups, the rate of T3 and T4 tumors was significantly higher in Group A than in Group B ($p = 0.0298$). There was no marked difference in the mean body mass index (BMI) between the two groups. The obesity rate (BMI > 30) was 11.8% in Group A and 5.9% in Group B. Many patients had one or more comorbidities. The rate of patients without comorbidities was 5.9% in Group A and 22.1% in Group B. In Group A, 32.4% of patients were categorized as having psychiatric disease, and 41.2% of patients had cardiovascular disease. These rates in Group A were significantly higher than those in Group B ($p < 0.0009$ and $p = 0.0031$, respectively). In addition, 41.2% of Group A patients and 27.2% of Group B patients had undergone anticoagulant therapy.

Table 3 shows the treatment type and length of hospital stay. The types of surgery did not differ markedly between the groups. None of the patients had undergone breast reconstruction. The mean lengths of hospital stay were 8.3 days (range 2–19 days) in Group A and 9.3 days (range 3–28 days) in Group B. In Groups A and B, 76.5% and 45.6% of patients, respectively, did not receive adjuvant

Table 1 Characteristics of surgically treated patients

	Group A ≥ 85 years	Group B 75–84 years	*p* value
Patients	*n* = 34 [37 breasts]	*n* = 136 [149 breasts]	
Mean age	88.0 years	78.9 years	
BMI			
< 25	21 (61.7)	98 (72.0)	
25–30	9 (26.5)	30 (22.1)	
> 30	4 (11.8)	8 (5.9)	
Living style			
Living alone	9 (26.4)	50 (36.8)	
Living with elderly spouse	4 (11.8)	38 (27.9)	$p = 0.0089$
Living with younger family	17 (50.0)	42 (30.9)	
Living in an asylum	4 (11.8)	6 (4.4)	
Chief complaint			
Subjective symptoms	25 (73.6)	95 (69.9)	
Objective symptoms	6 (17.6)	35 (25.7)	
No symptoms reported	3 (8.8)	6 (4.4)	
Tumor stage			
T0–T2	30 (81.1)	140 (94.0)	$p = 0.0298$
T3, T4	7 (18.9)	9 (6.0)	
Comorbidity*			
Psychiatric	11 (32.4)	12 (8.8)	$p = 0.0009$
Central nerve	6 (17.6)	18 (13.2)	
Cardiovascular	14 (41.2)	22 (16.2)	$p = 0.0031$
Pulmonary	2 (5.9)	8 (5.9)	
Hypertension	17 (50.0)	72 (52.9)	
Diabetes mellitus	4 (11.8)	20 (14.7)	
Deep vein thrombosis	0 (0)	1 (0.7)	
None	2 (5.9)	32 (22.1)	$p = 0.0557$
Anticoagulant therapy	14 (41.2)	37 (27.2)	

*The patients often had multiple comorbidities; therefore, patient numbers overlap. The number inside the parentheses represents the percentage (%). Chi-square tests were used to determine *p* values

Table 2 Patients who avoided surgery

	≥ 85 years	75–84 years
Patients	11	18
Reason		
Patient or family wish	5 (45.4)	5 (27.8)
Other active malignancy	0	6 (33.3)
Severe comorbidity	4 (36.4)	1 (5.6)
With distant metastasis	2 (18.2)	6 (33.3)
Other treatment		
Endocrine therapy	2 (18.2)	6 (33.3)
Chemotherapy for other malignancy	0	6 (33.3)
None	9 (81.8)	6 (33.3)

The number inside the parentheses represents the percentage (%)

Chi-square tests were used to determine *p* values

therapy. The difference between the groups was statistically significant ($p = 0.0024$).

Intraoperative and postoperative complications are summarized in Table 4. The morbidity rate during hospital stay was 38.2% in Group A and 23.5% in Group B. There were no severe intraoperative complications, except for one patient in Group B who underwent re-intubation due to delayed anesthesia. The most frequent postoperative complication in Group A was delirium (29.4%) followed by the development of a surgical site hematoma (8.8%). The rate of delirium in Group B was 3.7%, which was significantly lower than that in Group A ($p < 0.0001$). Most Group B patient complications occurred at the surgical site, with 8.8% of patients found to have developed a hematoma, and 8.1% of Group B patients had skin necrosis. One of the Group B patients underwent further surgery for surgical site bleeding, and another suffered a cerebral infarction and cholangitis postoperatively, recovering at our hospital within 29 hospital days.

Table 3 Treatment and length of hospital stay

	Group A ≥ 85 years	Group B 75–84 years	
Patients	34 [$n=37$ breasts]	136 [$n=149$ breasts]	
Surgery			
Breast			
Breast-conserving	16 (43.2)	50 (33.6)	
Mastectomy	21 (56.8)	99 (66.4)	
Axillar			
Sentinel node biopsy	24 (64.9)	104 (69.8)	
Dissection	8 (21.6)	28 (18.8)	
None	5 (13.5)	17 (11.4)	
Mean hospital stay	8.3 days	9.3 days	
Adjuvant therapy			
Endocrine alone	6 (17.6)	58 (42.6)	$p=0.0024$
Others	2 (5.9)	16 (11.8)	
None	26 (76.5)	62 (45.6)	

The number inside the parentheses represents the percentage (%). Chi-square tests were used to determine *p* values

Table 4 Perioperative complications

	Group A ≥ 85 years	Group B 75–84 years	
Patients	34	136	
Intraoperative complication			
Re-intubation	0	1 (0.7)	
Others	0	0	
Postoperative complication*			
Cardiovascular disorder	0	0	
Thrombo-embolism	0	1 (0.7)	
Pneumonia	0	0	
Sepsis	0	0	
Cholangitis	0	1 (0.7)	
Delirium or unrest	10 (29.4)	5 (3.7)	$p<0.0001$
Postoperative hemorrhaging (requiring further surgery)	0	1 (0.7)	
Hematoma	3 (8.8)	11 (8.1)	
Skin necrosis	1 (2.9)	11 (8.1)	
Surgical site infection	0	2 (1.5)	
Seroma	2 (5.9)	6 (4.4)	
Morbidity rate during hospital stay	13 (38.2)	32 (23.5)	

*Some patients had multiple complications; therefore, patient numbers overlap. The number inside the parentheses represents the percentage (%). Chi-square tests were used to determine *p* values

Post-hospital discharge complications are shown in Table 5. One patient in Group A had an abscess that required drainage and antibiotic therapy, and one patient in Group B had bleeding at the surgical site that required drainage and compressive bandaging. Seromas were identified in one patient in Group A (2.9%) and in 41 patients in Group B (30.1%), with the rate of seroma formation being significantly higher in Group B ($p=0.0022$). In both groups, the 30-day postoperative mortality rate was 0. At a median follow-up of 20 months, one patient had died due to breast cancer, and four had died from other diseases in Group A. In Group B, four patients had died due to breast cancer, and two had died due to other diseases.

Table 5 Patient outcomes post-hospital discharge

	Group A ≥ 85 years	Group B 75–84 years	
Patients	$n=34$	$n=136$	
Post-discharge complications			
Seroma	1 (2.9)	41 (30.1)	$p=0.0022$
Bleeding	0	1 (0.7)	
Abscess	1 (2.9)	0	
30-Day postoperative mortality	0	0	
Median follow-up of 20 months			
Dead from breast cancer	1 (2.9)	4 (2.9)	
Dead from other disease	4 (11.8)	2 (1.5)	

The number inside the parentheses represents the percentage. Chi-square tests were used to determine the *p* value

Discussion

Studies involving large-scale database analyses have shown that breast cancer surgery is associated with a low perioperative morbidity and mortality [11–13]. Although these studies referenced major complications, limited data have been reported concerning the unique challenges facing super-elderly patients. This study highlighted super-elderly patient-specific perioperative complications.

Several factors affect treatment decisions concerning elderly patients. In this study, 136 younger elderly patients (75–84 years old) underwent surgery, while 18 did not receive surgery. Eleven super-elderly patients (≥ 85 years old) did not undergo surgery, whereas 34 patients proceeded to have surgery for breast cancer treatment. Five of 11 super-elderly patients opted to avoid surgical treatment, and 9 of 11 did not receive any other treatment at all. Compared to younger elderly patients, the rates for avoiding treatment were higher in super-elderly patients. While four patients with acute cardio- and/or cerebro-vascular disease avoided surgery, the contraindications for surgery based on comorbidities in super-elderly patients have not been established. Elderly patients and/or family members may prefer to undertreat or opt for no therapy based on assumptions that adverse events will be poorly tolerated or even fatal. Our study findings about low rates of severe morbidity may provide a more informed understanding to help address these concerns.

Help from family members or a support system is important in encouraging super-elderly patients to attend hospital appointments and receive treatment. Our study found that 38% of super-elderly patients lived alone or with an elderly spouse, and although this rate was lower in super-elderly patients than in younger elderly patients, it was still high. These patients require support at home postoperatively and in situations where it is difficult for them to visit the hospital independently. While patients in this study received standard surgery, most of super-elderly patients opted not to undergo adjuvant therapy. Patient and/or family preferences to avoid the burden of regular hospital visits may have influenced the decision not to opt for adjuvant therapy. To ensure appropriate treatment is delivered, we should consider social frailty in addition to physical frailty in super-elderly patients.

Pre-existing comorbidities or a limited physical function have been reported to be often related to mortality after breast cancer surgery [19, 20]. Chatzidaki et al. [10] reported that 89.3% of patients ≥ 80 years old had cardiovascular disease. de Glas et al. [11] found that approximately 75% of patients ≥ 65 years old had ≥ 1 comorbidity. In addition, our study revealed that most patients had ≥ 1 comorbidity, and the rate increased to 94.1% in super-elderly patients. Compared to younger elderly patients, super-elderly patients frequently had dementia and severe cardiovascular disease in our study. Other reports did not highlight dementia as a comorbidity [10–13]. While cardiovascular disease can be well controlled, dementia often leads to unexpected reactions and may sometimes be uncontrollable. The number of patients with dementia has increased twofold in the last 25 years globally [21]. Therefore, in addition to assessing the physical function, performing assessments and planning according to the psychiatric status of patients is likely to be important in elderly patients being considered for surgery.

Age is an independent risk factor for perioperative complications in general surgery [22]. Chatzidaki et al. [10] reported that the complication rate in their study was 20%, with a major complication rate of 5.7% in patients ≥ 80 years of age. de Glas et al. [11] reported that the postoperative complication rate in their study was 21.1% in patients between 75 and 84 years of age and 25.1% in patients ≥ 85 years of age. Most of the complications in these studies were wound-related. Our study showed similar complication rates in patients between 75 and 84 years of age, whereas the complication rate in patients ≥ 85 years of age was higher (38.2%). In younger elderly patients, most complications occurred at the surgical site. The main complication found in super-elderly patients was delirium or unrest (29.4%). Residual complications occurred at the surgical site.

Delirium is often a serious issue in hospitalized elderly patients. The occurrence of delirium has been shown to be related to an increase in complications, length of hospital stay, and mortality [23, 24]. Ratts et al. [24] reported that 31% of octogenarians in their study developed postoperative delirium following major surgery. They also revealed that a medical history of delirium, advanced age, and ASA score ≥3 were predictors of postoperative delirium [24]. Risk factors for delirium are congestive impairment, sleep deprivation, immobility, visual impairment, healing impairment, and dehydration [25]. Inouye et al. [25] reported on the efficacy of preventive nursing strategies regarding delirious risk factors in relation to elective surgery. In addition, decreasing the changes in patients' daily life patterns may be important for preventing delirium during hospitalization. To prevent worsening delirium and unrest in super-elderly patients, we suggest the following: surgery should be scheduled to occur in the morning followed by a meal and an early bed-side stand-up between 3 and 4 h after surgery, day-time sleeping should be avoided, and early removal of continuous venous infusion and urinary catheters should be scheduled to avoid restriction of movement. We also recommend family support through daily communication with the patient during hospitalization, when possible, and psychiatric liaison support as necessary.

Failure to recover from complications increases mortality in elderly patients after general surgery [22]. The perioperative mortality rate has been reported to be between 0 and 0.3% in elderly patients with breast cancer [10, 12, 13]. The mortality rate in our study was 0%. These rates were lower than those in elderly patients who had undergone general surgery (6.3%) [22]. Since most complications after breast cancer surgery were wound related, the mortality rate in breast cancer surgery might be low.

While breast cancer surgery is a low-mortality surgery, the number of complications increase as the patient age increases. To perform appropriate treatments, surgeons need additional consideration for super-elderly patient-specific challenges such as lifestyle, burden to visit hospital, uncontrollable dementia, and delirium during hospitalization.

Several limitations associated with the present study warrant mention. For example, this was a retrospective single-center data analysis. It was susceptible to selection bias, as patients were more likely to have a better outcome than the general population of a similar age range since most of the patients in this study had the ability to visit the hospital by themselves. A well-designed cohort study or a randomized trial is necessary to determine whether treatment with surgery or without surgery is better for improving the prognosis and quality of life in super-elderly patients.

However, data from this study are likely to be informative for elderly patients and their families who may be considering surgical treatment options. When considering the specific challenges facing super-elderly patients, age alone does not constitute a contraindication for adequate surgical treatment of breast cancer.

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Compliance with ethical standards

Conflict of interest The authors have no conflicts of interest to disclose.

Ethical approval This study was approved by the Ethics Committee of Osaka City General Hospital (December 2018; No.1812103).

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