

Long-term effects of breast cancer treatments on scoliosis

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Introduction

Breast cancer is the second most common cancer in Korean women. The patients with breast cancer are in a risk condition of scoliosis due to a combination of asymmetrical body mass distribution by surgical procedure and increased risk of osteoporosis by systemic therapies such as chemotherapy or hormone therapy. Since most women are likely to be long-term survivors after breast cancer treatments, we have to attention to the association between breast cancer treatments and scoliosis. A few research has been carried out regarding the effect of breast cancer surgery on the postural changes using DEXA scan, chest radiographs or photogrammetry. The purpose of this paper is to identify the prevalence of scoliosis in breast cancer survivors and to investigate the long-term impact of breast cancer surgery on scoliosis with whole spine anteroposterior standing radiographic assessment to look at the alignment of the entire spine.

Methods

This retrospective study was carried out from April 2014 to July 2018. Inclusion criteria are as follows: 1) patients who diagnosed with breast cancer and treated with surgical procedure (Breast conserving surgery(BCS), mastectomy(MA) with or without immediate breast reconstruction(IBR)); 2) patients who underwent whole spine anteroposterior standing radiography within 60days after breast cancer surgery and repeated radiography at least 300days later. Exclusion criteria were 1) bilateral breast cancer operation; 2) spine operation in the past; 3) previous chemotherapy, hormone or radiation treatment for other cancer; 4) bone metastasis; 5) recurrent breast cancer; 6) delayed breast reconstruction surgery. The curvature of the spine was measured by using the Cobb method.

Result

Total 130 women met the criteria. The demographic characteristics in the three groups are shown in table 1. Women in MA with IBR group were younger than those in the BCS or MA without IBR group ($p=0.002$). The mean time between operation and the initial X-ray assessment was 21.81 ± 9.86 days and the total duration of X-ray follow up was 617.64 ± 253.97 days. At initial assessment, 13 out of our 130 women (10.77%) showed scoliosis. 3 more women had scoliosis during the whole follow-up and scoliosis was present in total 17 out of 130 women, at a prevalence rate of 13.08%. However, there were no significant differences among the three groups for the prevalence of scoliosis. The mean Cobb angle at initial and follow-up assessment was 4.84 ± 4.17 and 5.20 ± 4.15 . The difference over time was statistically significant by paired t-test ($p=0.041$) and change

in Cobb angle was 1.50 ± 1.36 . However, when comparing three groups, there was no significant time and time \times group interaction effect.

Conclusion

In the overall patients with breast cancer, the prevalence of scoliosis and Cobb angle showed a tendency to increase over time. Proceeding from this result, we have to observe the developing and progression of scoliosis in breast cancer survivors.

Table1. Demographic characteristics in the three groups (n=130)

	BCS (n=70)	Mastectomy without reconstruction (n=30)	Mastectomy with reconstruction (n=30)	p-value
Age (yr)	50.80 \pm 9.82	51.67 \pm 9.75	45.63 \pm 8.00	0.002
Time between initial and follow-up X-ray (days)	573.59 \pm 235.65	662.70 \pm 262.85	675.37 \pm 274.72	0.100
Scoliosis prevalence at initial assessment	9 (12.86%)	2 (6.67%)	3 (10.00%)	0.650
Scoliosis prevalence at follow-up assessment	10 (14.29%)	2 (6.67%)	5 (16.67%)	0.469
Initial Cobb Angle	4.87 \pm 4.17	4.66 \pm 4.86	4.96 \pm 3.49	0.960
Follow up Cobb Angle	5.43 \pm 4.21	4.85 \pm 4.17	5.02 \pm 4.06	0.789
Difference of Cobb angle	1.52 \pm 1.32	1.31 \pm 1.47	1.65 \pm 1.37	0.623
APEX				0.194
- Thoracic (T1-T11)	24	17	9	
- Thoracolumbar (T12-L1)	19	4	9	
- lumbar (L1-L5)	27	9	12	
Height (cm)	157.25 \pm 4.78	156.87 \pm 4.08	159.00 \pm 6.41	0.210
Weight (kg)	57.48 \pm 7.22	57.50 \pm 8.08	56.17 \pm 7.47	0.710
BMI	22.79 \pm 2.68	22.90 \pm 2.80	21.83 \pm 3.03	0.240
Osteoporosis (n)	29	11	7	0.204
Chemotherapy (n)	50	24	23	
Neoadjuvant chemotherapy (n)	5	10	10	
Radiation therapy (n)	62	13	11	
Hormone therapy (n)				
- Tamoxifen	44	16	22	
- AI	7	5	1	
- Mixed	3	0	1	

By one-way ANOVA for parametric data and Chi-square test for nominal data