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**DELAYED PRESENTATION OF BREAST CANCER PATIENTS
IN THE AFTERMATH OF THE GREAT EAST JAPAN
EARTHQUAKE AND THE SUBSEQUENT FUKUSHIMA
DAIICHI NUCLEAR POWER PLANT INCIDENT:
A RETROSPECTIVE CASE SERIES**

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Background In breast cancer patients, delay in first presentation and self-interruption of continuous treatment are associated with lower survival. Social factors as well as demographic factors are risk factors to delay presentation of these patients.

In Minamisoma City, located in the coast area of Fukushima, Japan, the change of social structure has rapidly progressed due to the mass evacuation of young and middle-aged generations for fear of potential irradiation and catastrophic damage on infrastructure after the Great East Japan Earthquake and the subsequent Fukushima Daiichi nuclear power plant incident.

Objectives This study assesses the impact of the disasters on behavior of breast cancer patients in Minamisoma City.

Methods Breast cancer patients, diagnosed from January 2008 through March 2015, in Watanabe Hospital and Minamisoma Municipal General Hospital, the two chief cancer centers in Minamisoma City, were enrolled. We retrospectively reviewed the data on age, stage, pathological findings, treatment, and the data and reason of first presentation. The main outcomes were the change of interval since the self-detection of symptom to first presentation before and after the disasters, and whether continuous follow-up was maintained in the patients diagnosed after the disasters.

Result Total of 102 and 97 patients were diagnosed with breast cancer before and after the disasters, respectively. Average age (61 years old vs. 61 years old, $p=1$: unpaired t-test), the ratio of cancer in advanced stage (stage 3/4) (18% vs. 17%, $p=0.81$: chi-square test) and invasive cancer (92% vs. 93%, $p=0.87$: chi-square test) were not significantly different before and after the disasters. Among them, 76 and 72 patients were symptomatic before and after the disasters, respectively (75% vs. 74%, $p=0.74$: chi-square test). The ratio of patients with more than one-year delay significantly increased after the disasters, compared with before the disasters (4 patients (5.4%) vs. 11 patients (15%), $p=0.050$: chi-square test). The ratio of cancer in advanced stage was significantly higher in the patients with more than one-year delay, compared with those with within one-year delay (82% vs. 14%, $p<0.001$: chi-square test). Continuous follow-up was maintained in all of the patients diagnosed after the disasters.

Conclusion Although the patient characteristics assessed in this study were not significantly different before and after the disasters, the ratio of patients with more than one-year delay significantly increased after the disasters. This suggests that the changed social structure might contribute to delay in first presentation. However, this hypothesis remains to be elucidated

until information on social factors of the patients enrolled is available. Further study is warranted to clarify the association between these factors and delayed presentation, so that it could lead to the establishment of the effective measures of disaster risk reduction concerning breast cancer patients.