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Title: Investigation of the Relationship between Body Mass Index and Local Recurrence Following Breast Conservation Treatment for Early Breast Cancer in a New Zealand Cohort

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Sponsor: Breast Cancer Foundation New Zealand

Introduction

Breast cancer is the most common form of cancer diagnosis for women in New Zealand. Approximately 1 in 10 women will develop breast cancer in their lifetime. Every year approximately 3,000 are affected and 600 subsequently die from their cancer. Early breast cancer is cancer which has not spread beyond the nodes and is able to be removed by breast conservation surgery. This is where the cancer lump is removed from the breast but the breast is left in situ, as opposed to a mastectomy where the entire breast is surgically removed. In order to minimize the risk of recurrences in breast conservation, radiation treatment is routinely given after surgery.

Body Mass Index (BMI) is a simple measure of height and weight used to measure obesity in adults. The World Health Organization classifies a BMI greater than or equal to 25 as "overweight" and a BMI greater than or equal to 30 as "obese". Obesity effects approximately 30% of women in New Zealand and this number is thought to be increasing.

In the past, there has been a number of studies and systematic reviews that look at the relationship between obesity and breast cancer outcomes; indicating potentially poorer outcomes for patients with a higher BMI.

Despite this, the effect of obesity on risk of recurrence in the breast after breast conservation is not known. It is possible that due to differences in oestrogen metabolism, patients with a higher BMI may have an increased risk of cancer recurring in the breast.

Aim

The aim of this study is to investigate the relationship between obesity and local recurrence after breast conservation treatment for women with early breast cancer in New Zealand.

Impact

This research may potentially indicate that the risk of local recurrence is increased for women with higher BMI. If this was shown to be true this may allow clinicians to adjust treatments such as radiation according to the BMI. It may also lead to further support for studies looking at possible interventions, such as weight loss, exercise and dietary programs which may improve outcomes.

Method

This study used data from the NZ Breast Cancer Register (NZBCR) to identify women who underwent breast conservation treatment (both surgery and radiation) for early breast cancer in NZ between 2009 and 2014. The NZBCR collects data on patients diagnosed in Auckland, Waikato, Wellington and Canterbury regions. Types of data include demographics, BMI,

tumour characteristics, radiation treatment and local recurrence outcomes. The relationship between BMI and local recurrence was investigated with statistical methods.

The date of diagnosis was defined as the date breast cancer was detected by a biopsy or surgery. We defined overall survival as the time between the date of diagnosis and death, or time from diagnosis to the last follow up. Local recurrence rate was defined as the time between diagnosis and the first breast cancer recurrence in the treated breast.

We compared these outcomes for those with an elevated BMI (greater than or equal to 30) and those with a BMI less than 30.

My involvement in this summer studentship involved updating the data for patients on the Christchurch Breast Cancer Register, using electronic hospital records and databases. This data will then be combined with data from other registries in New Zealand.

Results
1. Patient demographics & Body Mass Index
We identified 560 patients in the Canterbury region and the table shows their characteristics. Forty percent of the patients were obese.

	Characteristic	**Number N=560 (%)**
Menopausal status	Premenopausal	165 (30%)
	Postmenopausal	386 (69%)
	Unknown	9 (1%)
BMI	<30	336 (60%)
	≥ 30	224 (40%)

2. Outcome data
We had a median follow up period of 4.6 years.
- Overall survival at 5 years was 94%
  - 17 of 560 patients (3%) had died of their breast cancer
  - The remaining (14) died from other causes

- Local recurrence free rate at 5 years was 98%
  - 14 of 560 patients (2%) had a recurrence in the treated breast

3. Relationship with Body Mass Index
There was no relationship between BMI and local recurrence.

Conclusion
There is a high proportion of Canterbury patients who have a BMI in the obese range. We have shown excellent breast cancer outcomes with a very low risk of local recurrence after radiation, which is reassuring for patients. The follow-up period for this study was short; ideally a minimum of 10 years to give the study more robust results. **As the local recurrence rate was very low, we could not adequately study the effect of BMI on local recurrence rates. An increased number of patients/recurrences would be required to provide reliable results.** In order to do this, we intend to combine the data we have gained from this project with data from the other centres in the NZ Breast Cancer Register. This will likely answer the question as to whether a relationship between BMI and local recurrence truly exists.