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Original Article

# Completion mastectomy after breast conserving surgery

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**Abstract**

*Background:* Breast conserving surgery (BCS) is increasingly offered to suitable patients diagnosed with early stage breast cancer. Occasionally the pathological margins on specimens following BCS are positive. The objective of this study is to assess the proportion of patients within our unit who required completion mastectomy after BCS and to determine if predictive factors could be identified to assist the breast surgeon identifying those patients at risk of positive margins following BCS.

*Methods:* All patients diagnosed with breast cancer between 2001 and 2005 were reviewed. Patients undergoing BCS had their histopathological specimens examined for any evidence of residual tumour at the margins of the resected specimen. These patients then proceeded to completion mastectomy if these margins were positive for residual tumour. Multinominal logistic regression was then performed on clinico-pathological factors for each of these patients to determine if predictive factors existed for determination of residual disease in the mastectomy specimen following BCS.

*Results:* Logistic regression demonstrated that size of the initial tumour was the only significant predictor for the presence of completion mastectomy residual carcinoma (CMRC) ($p = 0.014$) and that tumours with an initial size $>2.5$ cm were 15 times more likely to have a CMRC than tumours $<1.5$ cm. This prediction model based on the initial tumour size had an 89.5% specificity and 52.2% sensitivity. The odds ratio for CMRC based on histological tumour type for each additional 1 cm increase in size of the initial tumour was 2.82 for ductal carcinoma in situ, 2.60 for infiltrating ductal carcinoma and 2.26 for other tumours.

*Conclusion:* This study demonstrates that residual disease in total mastectomy specimens following BCS increases significantly with increasing original tumour size. With current data, surgeons can inform patients of the risks of residual cancer associated with BCS with a view to increase the rate of primary mastectomies in those patients with presenting tumours greater than 2.5 cm.
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*Keywords:* Breast; Cancer; Conserving surgery; Completion mastectomy; Predictors of survival

## Introduction

Breast cancer is one of the most common cancers in Northern Ireland with an annual incidence of 1000 newly diagnosed cases and 300 deaths per year for all breast cancer patients in Northern Ireland from 1993 to 2003.[1] The Belfast City Hospital treats around 250 of these new patients every year. As part of the treatment protocol, suitable patients are offered breast conserving surgery (BCS) which, combined with post-operative radiotherapy, has been shown to be as effective as mastectomy with no significant difference in disease-free survival, distant disease-free survival and overall survival.[2–5]

BCS was offered to all women with early stage (I and II) invasive breast cancer following informed written consent regarding the necessity of post-operative radiotherapy and further surgery, if excisional margins were positive for residual tumour. Absolute contraindications for BCS include extensive malignant microcalcification on mammogram or if there was a contraindication to local radiotherapy such as previous irradiation to the site or severe cardiorespiratory disease.[6,7] Relative contraindications for BCS include the presence of multifocal or multicentric disease where it is our unit's policy to offer mastectomy rather than BCS and if the ratio of the size of the tumour to the size of the breast would not result in acceptable cosmesis. Patient choice was also a factor in a small

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number of patients who opted for mastectomy de novo. All therapeutic interventions are routinely discussed at our departmental multidisciplinary meeting.

The main objective of this study was to assess the proportion of patients within our unit who required completion mastectomy after BCS and to compare these results with the published literature. We also analysed the clinico-pathological data to determine if predictive factors were present to determine which patients would be at a higher risk of tumour involvement at the margins of the initial BCS resection.

## Patients and methods

Clinico-pathological data were reviewed for all patients diagnosed with breast cancer between April 2001 and March 2005. All patients who had BCS performed were included in this study. Data collection was completed by review of patient charts and histopathological records using a standardised performa.

Following BCS, each resected specimen was orientated by the surgeon according to a standard protocol of specimen suture ligation (long lateral, short superior and double deep). The specimens were weighed, measured in three dimensions, and inked by using the alcohol, India ink, and Bouin's fluid marking regimen.[8] The specimens were subsequently examined according to the UK Royal College of Pathologists Cancer Screening Programmes guidelines.[9] A detailed histopathological assessment of each specimen was performed to document the size and location of the tumour and the tumour-margin distance for all six margins (anterior, posterior, medial, lateral, superior, and inferior). A positive margin was defined as evidence of tumour foci at the inked edge of the specimen and a compromised margin as evidence of tumour foci within 5 mm of the margin of resection for infiltrating ductal carcinoma (IDC) and 10 mm for ductal carcinoma in situ (DCIS).[8,10,11]

Patients with positive or compromised margins proceeded to further excisional surgery of the margins or completion mastectomy. A patient was then classified with residual disease if an invasive component (IDC) or DCIS was identified in the re-excision or mastectomy specimen. Factors which are commonly used to predict the presence of residual cancer were also recorded (initial tumour grade, initial margin status, initial pathology, initial tumour size, age, hormonal markers, lymph node involvement, and lymphovascular invasion).

Statistical analysis was performed using the SPSS statistical software package (Version 14 SPSS® Inc., Chicago, US). The dependent variable for analysis was the presence of residual neoplastic disease in the completion mastectomy specimens which we have defined as completion mastectomy residual cancers (CMRC). Multinomial logistic regression was employed to investigate the extent (if any) to which the CMRCs frequencies varied according to categories of the independent predictive factors and variables. A further analysis dependant on each tumour type was performed to determine the odds ratio of CMRC for tumour type relative to a 1 cm increase in the size of the initial tumour. A $p$-value $< 0.05$ was considered statistically significant.

## Results

The total number of new patients having breast surgery between April 2001 and March 2005 was 951 with 395 (41%) of those patients having BCS. Of those patients undergoing BCS, 55 (55/395 = 14%) had positive or compromised margins following histopathological assessment (Table 1). Of the 55 patients who had positive margins following BCS, 3 patients proceeded to repeat excision of the margins in presence of a small focus of residual tumour in a single compromised margin. Unfortunately all three patients proceeded to completion mastectomy due to the presence of tumour in the re-excision specimens. The remaining 52 patients had completion mastectomy performed due to patient choice in the presence of multi-margin involvement. Overall, residual cancer was identified in 26 of the patients who had a completion mastectomy performed after the initial BCS (CMRC = 26/55, 47%). Pathology reports were not available for review for 4 of the 55 patients and all further analysis will be based on the complete results for 51 patients. Follow-up was complete for all other patients to October 2006.

Logistic regression analysis as shown in Table 2 demonstrates that the size of the initial tumour was the only significant predictor for the presence of CMRC ($p = 0.014$). The effect of initial tumour size was further assessed, as shown in Fig. 1, which demonstrates that as tumour size increases, there is an increasing incidence of CMRC ($p = 0.043$). Further odds ratio and binary logistic analyses for CMRC outcome, based for these three tumour size groups, demonstrated a significant difference between patients with an initial tumour size over 2.5 cm and those with an initial tumour size less than 1.5 cm, with a 15.0-fold

Table 1
Treatment course of 951 patients with breast cancer between 2001 and 2005

| | Year | | | |
|---|---|---|---|---|
| | 2001/2002 | 2002/2003 | 2003/2004 | 2004/2005 |
| Number of patients having surgery | 241 | 193 | 273 | 244 |
| Number having BCS (% of total patients having surgery) | 103 (42.7%) | 72 (37.3%) | 114 (41.8%) | 106 (43.4%) |
| Number having BCS + completion Mastectomy (% of total patients having surgery) | 24 (10.0%) | 11 (5.7%) | 12 (4.4%) | 8 (3.3%) |

BCS: breast conserving surgery.

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