



Original Research

# Locoregional treatment and overall survival of men with T1a,b,cN0M0 breast cancer: A population-based study<sup>☆</sup>



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## KEYWORDS

Male breast cancer;  
Mastectomy;  
Breast conservation;  
Surgery;  
Overall survival

**Abstract Background:** Male breast cancer (MaBC) is an understudied disease; information about locoregional treatment and outcomes in patients with early stage is unknown. We aimed to analyse patient characteristics, locoregional treatment and overall survival (OS) of T1a,b,cN0M0 male breast cancer.

**Methods:** We evaluated men with T1a,b,cN0M0 breast cancer reported to Surveillance, Epidemiology, and End Results program from 1988 to 2012. Univariate and multivariate analyses were performed to determine the effect of each variable on OS.

**Results:** We included 1263 patients. Median age was 66 years (range 27–103). Median follow-up was 62 months (range 1–294). OS at 5 and 10 years were 85.1% and 66.5%, respectively. Distribution according to tumour sub-stage was: T1a 6.5%, T1b 20.7% and T1c 72.8%. Mastectomy was performed in >74% of patients of each tumour size group and overall 44.1% had >5 lymph nodes examined (LNE). Univariate analysis showed that patients with T1c, no surgery and 0 LNE had worse prognosis. In multivariate analysis, older age (hazard ratio [HR] 11.09), grade 3/4 tumours (HR 1.7), no surgery (HR 3.3), 0 LNE (HR 5.1) and unmarried patients (HR 1.7) had significantly shorter OS. There were no differences in OS between breast conservation versus mastectomy and 1–5 LNE versus > 5 LNE.

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**Conclusion:** Men with early breast cancer have a favourable OS. However, older age, higher grade, no breast surgery, no LNE and unmarried status emerged as poor prognostic characteristics. Efforts to decrease the high rates of mastectomy and extensive LNE should be taken given similar OS observed with breast conservation and 1–5 LNE, respectively.

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## 1. Introduction

Male breast cancer (MaBC) is a rather infrequent disease, representing less than 1% of all breast cancers in the United States [1]. Male patients have been inadequately represented in breast cancer clinical trials, leading to a lack of evidence to guide their management. In particular, no randomised studies have been conducted to evaluate the appropriate locoregional treatment in MaBC.

Breast conserving surgery is a standard treatment in appropriately selected female breast cancer patients, with similar overall survival (OS) compared with mastectomy [2,3]. Sentinel lymph node biopsy has replaced axillary dissection in node-negative women given similar outcomes and decreased morbidity [4]. The implementation of these two surgical techniques in men with breast cancer has been poor. A recent study from our group reported that only 12.8% of men underwent breast conserving surgery over the past ten years [5].

In T1a,b,cN0M0 MaBC—stage I tumours of up to 2 cm of maximum diameter—little information exists about locoregional treatment and outcomes, with most data coming from very small retrospective studies or population studies analysing all stages of disease [6–9]. Given the smaller breast volume in men and the importance of locoregional treatment for early breast cancer, an independent, large scale analysis of these approaches and their outcomes in T1a,b,cN0M0 MaBC would be extremely valuable to improve our treatment recommendations.

The aim of this population-based study was to analyse patient characteristics, locoregional treatment and OS of T1a,b,cN0M0 MaBC.

## 2. Materials and methods

### 2.1. Data source and study design

We obtained data from the National Cancer Institute's Surveillance, Epidemiology, and End Results (SEER) program, using the 18 registry (1973–2012) database [10]. SEER currently collects and publishes cancer incidence and survival data from population-based cancer registries covering approximately 28 percent of the US population. The SEER program registries routinely collect data on patient demographics, primary tumour site, tumour morphology and stage at diagnosis, first course of

treatment, and follow-up for vital status. Data on primary tumour size has been collected since 1988, because of this we used that year as the starting point for our study.

We extracted all cases of men with T1a,b,cN0M0 microscopically confirmed invasive breast cancer diagnosed between 1988 and 2012. Patients with another primary malignancy either before or after breast cancer were excluded.

Study variables included age at diagnosis, race, histology, tumour grade, tumour size, oestrogen receptor (ER), progesterone receptor (PR), type of surgery, radiation therapy, number of lymph nodes examined, marital status, survival months and vital status. Four tumour grades were collapsed into 3 grades; with grade 4 merged with grade 3 tumours. Histology codes were grouped according to frequency into six categories using the World Health Organization classification (ductal, lobular, mixed ductal and lobular, mucinous, papillary and other carcinoma). Tumour stage was registered according to the American Joint Committee on Cancer staging system sixth edition. Surgery to the primary site was classified as: no surgery, breast conserving surgery, mastectomy and unknown. We observed inconsistencies between the coding of the surgical procedure to the axilla and the reported number of lymph nodes examined. Therefore, we chose the number of lymph nodes examined as the prognostic variable for the analysis and categorised it as zero, one to five, or more than five lymph nodes examined.

The University of Iowa Institutional Review Board exempted this study from review because patients cannot be identified. This study was approved by Scientific and Ethical Committee of GOCS.

### 2.2. Statistical analysis

Descriptive statistics, including frequencies, medians and proportions, were used to evaluate characteristics of the patient population. Patient characteristics were compared between tumour sizes using chi-square or Fisher's exact tests, as appropriate.

Within each variable, patients with unknown data were excluded from all comparative analyses, including univariable and multivariable models. OS was the primary end-point chosen to assess prognosis and was defined as the interval from diagnosis of breast cancer until death from any cause or last follow-up for patients that were censored. Survival probabilities were

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