

Salvage treatment for local or local-regional recurrence after initial breast conservation treatment with radiation for ductal carcinoma *in situ*

Lawrence J. Solin^{a,*}, Alain Fourquet^b, Frank A. Vicini^c, Marie Taylor^d, Bruce Haffty^e, Eric A. Strom^f, Elaine Wai^g, Lori J. Pierce^h, Lawrence B. Marksⁱ, Harry Bartelink^j, Francois Campana^b, Marsha D. McNeese^f, Anuja Jhingran^f, Ivo A. Olivetto^g, Nina Bijker^j, Wei-Ting Hwang^k

^a Department of Radiation Oncology, University of Pennsylvania School of Medicine, 3400 Spruce Street, Philadelphia, PA 19104, United States

^b Department of Radiation Oncology, Institut Curie, Paris, France

^c Department of Radiation Oncology, William Beaumont Hospital, Royal Oak, MI, United States

^d Department of Radiation Oncology, Mallinckrodt Institute of Radiology, Washington University School of Medicine, St. Louis, MO, United States

^e Department of Radiation Oncology, Yale University, New Haven, CT, United States

^f Department of Radiation Oncology, University of Texas M. D. Anderson Cancer Center, Houston, TX, United States

^g Radiation Therapy Program, British Columbia Cancer Agency, Victoria, Canada

^h Department of Radiation Oncology, University of Michigan, Ann Arbor, MI, United States

ⁱ Department of Radiation Oncology, Duke University Medical Center, Durham, NC, United States

^j Department of Radiation Oncology, Netherlands Cancer Institute, Amsterdam, The Netherlands

^k Center for Clinical Epidemiology and Biostatistics, University of Pennsylvania, Philadelphia, PA, United States

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Abstract

The present study evaluated the outcome of salvage treatment for women with local or local-regional recurrence after initial breast conservation treatment with radiation for mammographically detected ductal carcinoma *in situ* (DCIS; intraductal carcinoma) of the breast. The study cohort consisted of 90 women with local only first failure ($n = 85$) or local-regional only first failure ($n = 5$). The histology at the time of recurrence was invasive carcinoma for 53 patients (59%), non-invasive carcinoma for 34 patients (38%), angiosarcoma for one patient (1%), and unknown for two patients (2%). The median follow-up after salvage treatment was 5.5 years (mean = 5.8 years; range = 0.2–14.2 years). The 10-year rates of overall survival, cause-specific survival, and freedom from distant metastases after salvage treatment were 83%, 95%, and 91%, respectively. Adverse prognostic factors for the development of subsequent distant metastases after salvage treatment were invasive histology of the local recurrence and pathologically positive axillary lymph nodes. These results demonstrate that local and local-regional recurrences can be salvaged with high rates of survival and freedom from distant metastases. Close follow-up after initial breast conservation treatment with radiation is warranted for the early detection of potentially salvageable local and local-regional recurrences.

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1. Introduction

The increasing use of screening mammography has been associated with an increase in the detection of

* Corresponding author. Tel.: +1 215 662 7267; fax: +1 215 349 5445.

E-mail address: solin@xrt.upenn.edu (L.J. Solin).

smaller and earlier-staged breast cancers, including ductal carcinoma *in situ* (DCIS; intraductal carcinoma) [1–3]. Many reports have evaluated the outcome after initial treatment of DCIS using breast conserving surgery plus definitive breast irradiation. Such studies have evaluated the results of treatment in terms of survival and local control. Approximately half of all local recurrences after breast conserving surgery plus definitive breast irradiation are invasive carcinoma, and approximately half are ductal carcinoma *in situ* [4–15].

Although many studies have reported on the outcome after initial breast conservation treatment for DCIS of the breast, little information has been published on the outcome of salvage treatment after local recurrence. Initial management of DCIS using breast conservation places the patient at risk for local recurrence. As DCIS of the breast is highly curable at initial presentation, the outcome of salvage treatment for local recurrence is important for evaluating the results of the initial management of DCIS using breast conservation treatment. Successful salvage treatment is especially important for the patient with an invasive local recurrence, as this type of local recurrence, in contrast to DCIS local recurrence, places the patient at risk for subsequent distant metastases and death.

Few reports have specifically addressed the outcome after salvage treatment for local or local-regional recurrence for patients with DCIS initially managed with breast conservation treatment [7,13,14,16–18]. The present study was performed to evaluate in detail the outcome of salvage treatment for patients with local or local-regional recurrence after the initial treatment of ductal carcinoma *in situ* using breast conserving surgery followed by definitive breast irradiation.

2. Patients and methods

The present study reports the outcome for a cohort of 90 women with local failure ($n = 85$) or local-regional failure ($n = 5$) as the first and only site(s) of failure after initial treatment for mammographically detected DCIS of the breast. These 90 women were identified from a collaborative, multi-institutional database of women who had undergone initial treatment during 1973–1995 for DCIS of the breast with breast conserving surgery followed by definitive breast irradiation [4–6,16,17,19–24]. This database combines patient data from multiple institutions in North America and Europe. A detailed analysis of the outcome after initial treatment for 1003 patients presenting with newly diagnosed DCIS has recently been reported [4].

All women in the present study had American Joint Committee on Cancer (AJCC) stage Tis N0 M0 ductal carcinoma *in situ* of the breast at the time of initial presentation and treatment [25,26]. Institutions that con-

tributed patients to the present study were: (a) University of Pennsylvania, Philadelphia, Pennsylvania ($n = 5$ patients); (b) Institut Curie, Paris, France ($n = 20$ patients); (c) William Beaumont Hospital, Royal Oak, Michigan ($n = 14$ patients); (d) Mallinckrodt Institute of Radiology, St. Louis, Missouri ($n = 11$ patients); (e) Yale University, New Haven, Connecticut ($n = 10$ patients); (f) University of Texas M. D. Anderson Cancer Center, Houston, Texas ($n = 10$ patients); (g) British Columbia Cancer Agency, Victoria, Canada ($n = 9$ patients); (h) University of Michigan, Ann Arbor, Michigan ($n = 8$ patients); (i) Duke University, Durham, North Carolina ($n = 2$ patients); and (j) Netherlands Cancer Institute, Amsterdam, The Netherlands ($n = 1$ patient). Not included in the present study were patients ($n = 10$) with local or local-regional failure that occurred as an event other than isolated first failure after initial treatment.

In two prior reports of salvage treatment after local or local-regional recurrence, 5-year and 8-year outcomes, respectively, were reported for 42 patients [16,17]. The present study updates these two earlier studies by reporting 10-year outcomes with a substantially larger number of patients.

Actuarial curves were calculated using the Kaplan–Meier method [27]. The time period was calculated as beginning at the time of diagnosis of local or local-regional recurrence. The log-rank test was used for statistical comparisons between groups [28]. A multivariate Cox proportional hazards regression model was used to evaluate the independent prognostic significance of the variables [29].

For analysis of overall survival, a patient was scored as a failure at the time of death, regardless of the cause of death. For analysis of cause-specific survival, a patient was scored as a failure for a death that was from carcinoma of the breast. For analysis of freedom from distant metastases, a patient was scored as a failure at the time of first evidence of distant metastatic disease. For the determination of chest wall recurrence, only patients who had undergone salvage mastectomy were included. Location of the local recurrence was scored according to the method reported by Recht and colleagues [30].

For the study population of 90 patients, the median follow-up after salvage treatment was 5.5 years (mean = 5.8 years; range = 0.2–14.2 years). For surviving patients, the median follow-up after salvage treatment was 5.8 years (mean = 6.0 years; range = 0.2–14.2 years). The numbers of patients alive and evaluable at 5 and 10 years after salvage treatment were 47 and 13, respectively. The median interval from initial treatment to local or local-regional failure was 4.7 years (mean = 5.7 years; range = 0.6–15.0 years).

Of the 10 patients with local failure excluded from the present study (see above), seven patients developed a

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