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ADVERSE CARDIAC OUTCOMES IN BREAST CANCER PATIENTS TREATED WITH ACCELERATED PARTIAL BREAST IRRADIATION

Holden M. Lofaro[1], Nataniel H. Lester-Coll[2], Xiaocao Xu[3], Jinah Kim[3], Mikaela Mari[1], Puyao C. Li[2]

1-The Robert Larner, M.D. College of Medicine at the University of Vermont

2-Division of Radiation Oncology, University of Vermont Medical Center

3-Division of Hematology Oncology, University of Vermont Medical Center

Introduction

- Breast cancer accounts for approximately 30% of all new female cancer diagnoses in the United States.
- Nearly 380,000 women are diagnosed with breast cancer annually, with an estimated lifetime risk of 1 in 8 women.
- Cardiac disease is a leading cause of death for survivors of breast cancer.
- Previous studies have shown an increased risk of adverse cardiac events (ACE) in breast cancer survivors who were treated with conventionally-fractionated radiotherapy.
- The risk of ACE has been previously correlated with the amount of radiation reaching the heart.
- Accelerated partial breast irradiation (APBI) could provide a lower overall heart dose with a higher dose per treatment, but the risk of ACE is not well characterized.
- We evaluated the incidence of ACE in patients treated with APBI and investigated potential clinical and dosimetric risk factors associated with these outcomes.

Aim

- Quantify the rate of ACE in patients who received ABPI
- ACE included conduction abnormalities/arrythmias, valvular disease, ventricular dysfunction, myocardial infarction, and pericarditis
- Analyze the effects of mean heart dose (MHD) on incidence of ACE
- Evaluate effect of pre-treatment presence of coronary artery calcifications (CAC) on simulation CT
- Determine any correlation between other patient factors on the rate of ACE

Methods

- We conducted retrospective chart review of 73 patients enrolled in prospective trials VCC0601 and NRG-BR007 from 2006-2026.
- APBI doses were 40 Gy in 10 fractions (n = 66), 30 Gy in 5 fractions (n = 6), and 36 Gy in 9 fractions (n = 1).
- Presence of CAC was assessed on simulation CT with 130 HU threshold.
- Univariate analysis was performed by Cox proportional hazards model.
- Event free survival was calculated with Kaplan-Meier method.
- Statistical analyses were done with STATA.

Results

Patient and Treatment Characteristics

Characteristic	Median or Number of Patients	Range or %
Age	71	58 - 89
Laterality		
Right	39	53
Left	34	47
CAC on SIM CT		
Yes	48	69
No	22	31
History of Cardiac Disease		
Yes	19	26
No	54	74
Diabetes		
Yes	11	15
No	62	85
Smoking		
Current	3	4
Former	37	51
Never	33	45
Endocrine Therapy		
Yes	47	69
No	21	31

Incidence of Adverse Cardiac Events

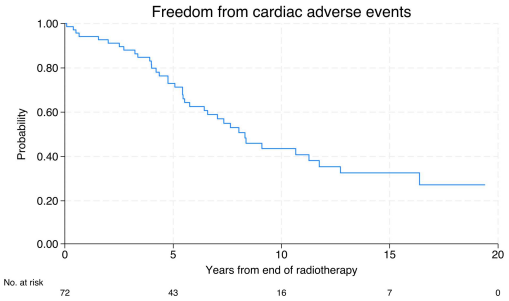


Figure 1. *Kaplan-Meier estimation of freedom from adverse cardiac events following radiation treatment.*

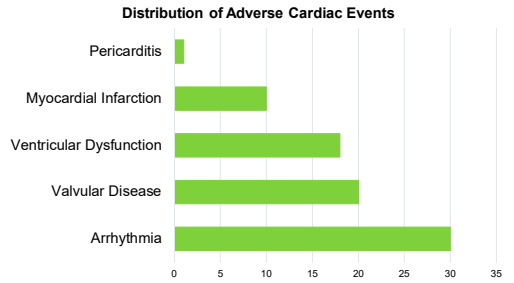


Figure 2. *Distribution of adverse cardiac events that occurred during follow-up.*

Results

Correlation with Adverse Cardiac Events

Variable	HR (95% CI)	p-value
Mean heart dose	0.72 (0.45-1.16)	0.181
Prior cardiac disease	3.81 (1.82-7.96)	<0.001
Age	1.07 (1.01-1.12)	0.015
Coronary artery calcification	1.92 (0.91-4.06)	0.089
Endocrine therapy	0.85 (0.43-1.67)	0.633

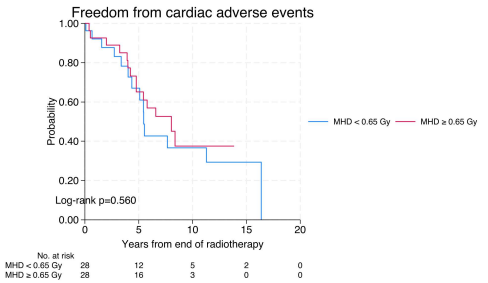


Figure 3. *Kaplan-Meier estimation of freedom from adverse cardiac events by mean heart dose following radiation treatment. No significant difference was found between groups.*

- A total of 37 ACE occurred across the cohort during follow-up.
- Median follow up time of 12.9 years.
- Median MHD was found to be 0.65 Gy.
- Univariate analysis showed older age at time of treatment (HR 1.07 per year, p=0.015) and preexisting cardiac disease (HR 3.8, 95% CI 1.8-8.0, p<0.001) to have a significant correlation with increased risk of ACE.
- CAC showed a nonsignificant trend (HR 1.92, p=0.089).
- MHD was not significantly correlated with risk of ACE in our cohort (HR 0.72 per Gy, 95% CI 0.45-1.16, p=0.18).

Discussion

History of cardiac disease prior to treatment and older age both had statistically significant correlation with ACE. CAC on simulation CT showed a trend toward increased risk but did not reach statistical significance. In our cohort MHD was not significantly associated with ACE which could be due to both the small sample size and the lower MHD with ABPI treatment of breast cancer. This could suggest that at lower MHD, baseline cardiovascular risk factors are more significant in determining risk of ACE post-treatment. Our study was limited by a small sample size and relatively few events reducing our statistical power.