CT Simulation a Missed Opportunity: Coronary Artery Calcifications Predict Coronary Events in Older Breast Cancer Patients

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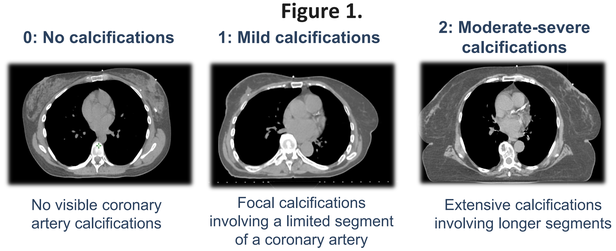
Background

- **Coronary artery calcifications (CAC)** are often visible on **CT simulation scans** performed for breast radiotherapy planning.
- Older breast cancer patients have elevated cardiovascular risk due to age, comorbidities, and cardiotoxic therapies.
- Despite this risk, **incidental CACs are rarely documented** or communicated to referring physicians.
- **CT simulation** is often the only imaging that visualizes the coronary arteries in this population, representing a **missed opportunity** to identify and manage high-risk patients before cardiac events occur.

Methods

- Retrospective cohort study included women aged **≥65 years** treated with breast radiotherapy at Tel Aviv Medical Center from 2017-2018.
- Patients were excluded with **metastatic disease** or **<3y of follow-up.**
- **CT simulation scans** were reviewed by radiotherapists for **CAC** using a **simplified visual scoring system:**

Figure 1.



- Clinical data (comorbidities, treatments, and cardiovascular outcomes) were collected from electronic medical records.
- The **primary endpoint** was the occurrence of a **coronary event** (myocardial infarction, revascularization, or cardiac death).

Results

- The study included **193 patients** included with a mean age 70.5 years, (range 65–84).
- Cardiovascular comorbidities were common: **hypertension 54%** (dyslipidemia 48% (n=93), **type II diabetes 21%** (n=41), n=105), **ischemic heart disease 7%** (n=13).
- **Coronary calcifications distribution** on CT simulation (Fig. 2):
  - Absent: 44% (n = 84)
  - Mild: 31% (n = 60)
  - Moderate-to-severe: 25% (n = 49)
- With a median follow-up of 7.5 years, 7 patients (4%) suffered a coronary event.
- **All events occurred in the moderate-to-severe calcification group** (7 of 49, 14%) versus none in the mild or no calcification groups **(P <. 0.001)** (Figure. 3).
- Event patients were typically older (mean 73.9 vs 70.5 years) and had multiple risk factors.
- **Breast laterality and radiotherapy boost were not associated** with coronary events (5 of 7 events after right-sided RT).

Figure 2.
Distribution of Coronary Artery Calcifications

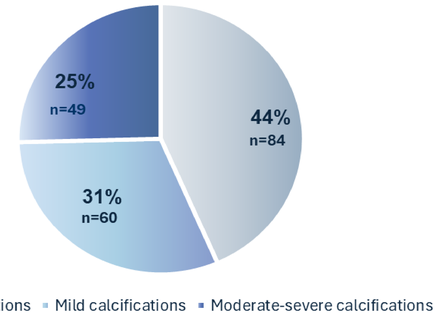


Table 1. Characteristics of The Study Population

Characteristic		No calcifications (n=84)	Mild calcifications (n=60)	Moderate-severe calcifications (n=49)	All (n=193)	P value
Age		68.2	70.9	73.9	70.5	p<0.001
T stage	Tis	9 (11%)	5 (8%)	4 (8%)	18 (9%)	p=0.4
	T1	55 (66%)	34 (57%)	27 (55%)	116 (60%)	
	T2	20 (24%)	20 (33%)	16 (33%)	56 (29%)	
	T3	0 (0%)	1 (2%)	2 (4%)	3 (2%)	
N stage	N0	60 (73%)	38 (66%)	28 (57%)	126 (67%)	p=0.2
	N+	22 (27%)	20 (35%)	20 (42%)	62 (33%)	
IHC Subtype	Hormone positive	73 (87%)	52 (87%)	38 (78%)	163 (84%)	p=0.3
	HER2 positive	10 (13%)	9 (16%)	12 (26%)	31 (18%)	p=0.2
	Triple negative	5 (7%)	6 (11%)	6 (13%)	17 (10%)	p=0.5
Pathological subtype	IDC	65 (77%)	53 (88%)	38 (78%)	156 (81%)	p=0.3
	ILC	10 (12%)	2 (3%)	7 (14%)	19 (10%)	
	DCIS	9 (11%)	5 (8%)	4 (8%)	18 (9%)	
Comorbidities	DM	11 (13%)	16 (27%)	14 (29%)	41 (21%)	p=0.05
	IHD	3 (4%)	2 (3%)	8 (16%)	13 (7%)	p=0.02
	HTN	36 (43%)	34 (57%)	35 (71%)	105 (54%)	p<0.006
	Dyslipidemia	33 (39%)	32 (53%)	28 (57%)	93 (48%)	p=0.08
Chemotherapy	Neoadjuvant	6 (7%)	11 (18%)	8 (16%)	25 (13%)	p=0.1
	Adjuvant	10 (12%)	14 (23%)	7 (14%)	31 (16%)	
Endocrine Treatment		66 (79%)	43 (72%)	37 (76%)	146 (76%)	p=0.6
RT boost		47 (56%)	30 (50%)	19 (39%)	96 (50%)	p=0.2

Figure 3.



All coronary events occurred in patients with moderate-severe calcifications (7/49, 14%), p<0.001

Discussion

- Moderate-to-severe CAC on CT simulation strongly predicts future coronary events.
- No events in mild/none CAC → **strong negative predictive value**
- Radiation oncology rarely incorporates CAC assessment despite growing awareness of cardiac risk in this population.
- CT simulation is a **cost-free opportunity** for risk detection that requires only structured reporting and communication.
- Potential to **guide preventive interventions** (statins, BP control, lifestyle modification)
- Limitations:
  - retrospective design
  - single center, small number of events
  - Moderate-to-severe: 25% (n = 49)

Conclusions

- **Incidental coronary artery calcifications** on CT simulation scans strongly predict future coronary events in older breast cancer patients.
- **CT simulation** represents an underused opportunity for **cardiovascular risk identification** within routine radiation oncology practice.
- **Systematic calcification assessment and reporting** could prompt timely preventive interventions.
- Collaboration between **radiation oncology, cardiology, and primary care** may improve long-term outcomes.
- A **larger, multicenter validation study** is planned to confirm these findings and establish practical recommendations.

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SABC, 9-12 December 2025, San Antonio, Texas

Disclosures: None