External Beam Accelerated Partial Breast Irradiation versus Whole Breast Irradiation for Invasive lobular Carcinoma : A Retrospective, Single-Institution Study

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Introduction

Accelerated partial breast irradiation (APBI) for invasive lobular carcinoma (ILC) is conditionally not recommended in the most recent (2024) ASTRO Clinical Practice Guidelines. This recommendation stems from the limited number of women with ILC, as opposed to ductal carcinoma, included in landmark APBI trials, and the lack of subtype-specific supporting data. This study aims to evaluate the use of APBI in patients with low-risk lobular breast cancers.

Methods and Materials

This is a retrospective, single-institution study. Eligible patients were females with pathologically confirmed breast cancer diagnosed between January 2015 and March 2025.

Inclusion criteria

- Treatment with breast-conserving surgery with or without lymph node sampling followed by adjuvant radiation
- Diagnosis of either pure invasive lobular carcinoma or a carcinoma with a lobular component with pT1-2 staging
- Clinically and/or pathologically negative lymph nodes

Exclusion criteria

- Had previously received breast irradiation
- Radiation treatment information was unavailable

Outcomes of interest include ipsilateral breast tumor recurrence (IBTR), disease-free survival (DFS), overall survival (OS), radiation toxicities (graded by CTCAE v5.0), and physician-reported (Harvard scale) cosmetic outcomes.

Results

Patients treated with APBI between January 2015 and March 2025 were included. **200 patients met eligibility criteria: 36 in the APBI group and 164 in the whole breast irradiation (WBI) group.**

Table 1 Patient Characteristics

Patient Characteristic	All	WBI	APBI	P-Value*
	N = (200)	N = (164)	N = (36)	
Age at Diagnosis (Years), Median (Q_1, Q_3)	66.00 (58.00, 71.00)	64.00 (56.50, 69.50)	69.00 (66.00, 76.00)	< 0.01
Race, n (%)				0.83
Asian	2 (1.0%)	2 (1.2%)	0 (0.0%)	
Black or African American	16 (8.0%)	14 (8.5%)	2 (5.6%)	
White	177 (88.5%)	144 (87.8%)	33 (91.7%)	
Unknown / Not Reported	5 (2.5%)	4 (2.4%)	1 (2.8%)	
Ethnicity, n (%)				0.56
Not Hispanic or Latino	193 (96.5%)	158 (96.3%)	35 (97.2%)	
Hispanic or Latino	4 (2.0%)	3 (1.8%)	1 (2.8%)	
Unknown / Not Reported	3 (1.5%)	3 (1.8%)	0 (0.0%)	
Breast Laterality, n (%)				0.50
Left	100 (50.0%)	80 (48.8%)	20 (55.6%)	
Right	96 (48.0%)	81 (49.4%)	15 (41.7%)	
Bilateral	4 (2.0%)	3 (1.8%)	1 (2.8%)	
Histology, n (%)				0.70
Invasive Lobular Carcinoma	179 (89.5%)	150 (91.5%)	29 (80.6%)	
Mixed Invasive Lobular and Ductal Carcinoma	21 (10.5%)	14 (8.5%)	7 (19.4%)	
T Stage, n (%)				0.03
1	155 (77.5%)	122 (74.4%)	33 (91.7%)	
2	45 (22.5%)	42 (25.6%)	3 (8.3%)	
N Stage, n (%)				N/A
0	192 (96.0%)	158 (96.3%)	34 (94.4%)	
Nx	8 (4.0%)	6 (3.7%)	2 (5.6%)	
Grade, n (%)				0.50
1	41 (20.5%)	35 (21.3%)	6 (16.7%)	
2	152 (76.0%)	122 (74.4%)	30 (83.3%)	
3	7 (3.5%)	7 (4.3%)	0 (0.0%)	
Focality, n (%)				0.13
Unifocal	178 (89.4%)	143 (87.7%)	35 (97.2%)	
Multifocal	21 (10.6%)	20 (12.3%)	1 (2.8%)	
Lymphovascular Space Invasion (LVSI), n (%)				0.45
No	197 (98.5%)	162 (98.8%)	35 (97.2%)	
Yes	3 (1.5%)	2 (1.2%)	1 (2.8%)	
ER, n (%)				N/A
Negative	4 (2.0%)	4 (2.4%)	0 (0.0%)	
Positive	196 (98.0%)	160 (97.6%)	36 (100.0%)	
% ER+, Median (Q_1, Q_3)	99 (95, 100)	99 (95, 100)	99 (95, 100)	0.43
PR, n (%)				0.08
Negative	32 (16.0%)	30 (18.3%)	2 (5.6%)	
Positive	168 (84.0%)	134 (81.7%)	34 (94.4%)	
% PR+, Median (Q_1, Q_3)	90 (50, 98)	90 (50, 96)	95 (80, 99)	0.17
HER2, n (%)				0.70
Negative	188 (94.0%)	153 (93.3%)	35 (97.2%)	
Positive	12 (6.0%)	11 (6.7%)	1 (2.8%)	
Oncotype Dx Score, n (%)				0.14
No	84 (42.0%)	73 (44.5%)	11 (30.6%)	
Yes	116 (58.0%)	91 (55.5%)	25 (69.4%)	
Oncotype Dx Score (n = 116), Median (Q_1, Q_3)	17.50 (12.50, 22.00)	19.00 (12.00, 22.00)	17.00 (13.00, 20.00)	0.42

Table 2 Treatment Characteristics

Treatment Characteristic	All	WBI	APBI	P-Value*
	N = (200)	N = (164)	N = (36)	
Sugery Type, n (%)				0.74
Lumpectomy	15 (7.5%)	12 (7.3%)	3 (8.3%)	
Lumpectomy and SLNB	185 (92.5%)	152 (92.7%)	33 (91.7%)	
Surgical Reconstruction, n (%)				0.69
No	188 (94.5%)	154 (93.9%)	35 (97.2%)	
Yes	11 (5.5%)	10 (6.1%)	1 (2.8%)	
Type of Reconstruction†, n (%)				N/A
Immediate	11 (100.0%)	10 (100.0%)	1 (100.0%)	
Margins, n (%)				N/A
R0	196 (98.0%)	160 (97.6%)	36 (100.0%)	
R1	4 (2.0%)	4 (2.4%)	0 (0.0%)	
Endocrine Therapy, n (%)				0.05
No	17 (8.5%)	17 (10.4%)	0 (0.0%)	
Yes	183 (91.5%)	147 (89.6%)	36 (100.0%)	
Systemic Therapy, n (%)				0.01
No	175 (87.5%)	139 (84.8%)	36 (100.0%)	
Yes	25 (12.5%)	25 (15.2%)	0 (0.0%)	
Radiation Therapy Technique, n(%)				N/A
3D	200 (100.0%)	164 (100.0%)	36 (100.0%)	
IMRT/VMAT	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Treatment Position, n (%)				1.00
Supine	15 (7.5%)	13 (7.9%)	2 (5.6%)	
Prone	185 (92.5%)	151 (92.1%)	34 (94.4%)	
Treatment Duration (days), Median (Q1, Q3)	21.00 (18.00, 24.00)	21.00 (21.00, 27.00)	9.00 (6.00, 10.00)	< 0.01
Gross Tumor Volume‡ (cc), Median (Q1, Q3)			22.68 (13.1, 35.51)	
Clinical Target Volume‡ (cc), Median (Q1, Q3)			111.34 (78.23, 142.84)	
Planning Target Volume‡ (cc), Median (Q1, Q3)			177.29 (146.02, 257.79)	
Ipsilateral Breast Volume‡ (cc), Median (Q1, Q3)			1053.08 (852.33, 1817.62)	

*Wilcoxon Rank-Sum tests were used for continuous variables, and Fisher's exact tests were used for categorical variables.

†Among patients who received reconstruction (n = 11).

‡Among 37 lesions which reveived APBI.

The median follow-up was 4.7 years. The 5-year IBTR was 2.8% in the APBI group and 0.6% in the WBI group (p = 0.26). The 5-year DFS was 97.2% in the APBI group and 97.5% in the WBI group (p = 0.50), and the 5-year OS was 100.0% in the APBI group and 97.6% in the WBI group (p = 0.45) **(Figures 1,2)**

Table 3 Adverse Events

Acute Toxicity								
	WBI				APBI			p-value
	Grade 0	Grade 1	Grade 2	Grade 3	Grade 0	Grade 1	Grade 2	
Dermatitis	21 (13.5%)	111 (71.2%)	24 (15.3%)	0 (0.0%)	23 (65.7%)	12 (34.3%)	0 (0.0%)	< 0.01
Fatigue	52 (33.8%)	97 (63.0%)	5 (3.2%)	0 (0.0%)	16 (47.1%)	18(52.9%)	0 (0.0%)	0.30
Breast Pain	85 (63.0%)	46 (34.1%)	4 (3.0%)	0 (0.0%)	31 (93.9%)	2 (6.1%)	0 (0.0%)	< 0.01
Breast Edema	46 (63.0%)	27 (37.0%)	0 (0.0%)	0 (0.0%)	23 (92.0%)	2 (8.0%)	0 (0.0%)	< 0.01
Pruritus	40 (58.8%)	28 (41.2%)	0 (0.0%)	0 (0.0%)	23 (95.8%)	1 (4.2%)	0 (0.0%)	< 0.01
Skin Hyperpigmentation	46 (68.7%)	20 (29.9%)	1 (1.5%)	0 (0.0%)	21 (87.5%)	3 (12.5%)	0 (0.0%)	0.19
Late Toxicity at 6-month								
	WBI				APBI			p-value
	Grade 0	Grade 1	Grade 2	Grade 3	Grade 0	Grade 1	Grade 2	
Fatigue	31 (56.4%)	19 (34.5%)	5 (9.1%)	0 (0.0%)	7 (36.8%)	12 (63.2%)	5 (9.1%)	0.08
Skin Hyperpigmentation	16 (20.0%)	63 (78.8%)	1 (1.3%)	0 (0.0%)	6 (40.0%)	9 (60.0%)	0 (0.0%)	0.25
Skin Hypopigmentation	36 (90.0%)	4 (10.0%)	0 (0.0%)	0 (0.0%)	8 (100.0%)	0 (0.0%)	0 (0.0%)	N/A
Fibrosis	24 (36.9%)	41 (63.1%)	0 (0.0%)	0 (0.0%)	4 (50.0%)	4 (50.0%)	0 (0.0%)	0.47
Breast Atrophy	26 (51.0%)	23 (45.1%)	2 (3.9%)	0 (0.0%)	5 (62.5%)	3 (37.5%)	0 (0.0%)	0.79
Lymphadema	97 (91.5%)	9 (8.5%)	0 (0.0%)	0 (0.0%)	18(100.0%)	0 (0.0%)	0 (0.0%)	0.35
Late Toxicity at 1-year								
	WBI				APBI			p-value
	Grade 0	Grade 1	Grade 2	Grade 3	Grade 0	Grade 1	Grade 2	
Fatigue	30 (69.8%)	12 (27.9%)	1 (2.3%)	0 (0.0%)	6 (35.3%)	11 (64.7%)	0 (0.0%)	0.02
Skin Hyperpigmentation	26 (38.2%)	42 (61.8%)	0 (0.0%)	0 (0.0%)	13 (65.0%)	7 (35.0%)	0 (0.0%)	0.04
Skin Hypopigmentation	38 (86.4%)	6 (13.6%)	0 (0.0%)	0 (0.0%)	14 (93.3%)	1 (6.7%)	0 (0.0%)	0.67
Fibrosis	15 (24.6%)	46 (75.4%)	0 (0.0%)	0 (0.0%)	8 (44.4%)	10 (55.6%)	0 (0.0%)	0.14
Breast Atrophy	22 (39.3%)	31 (55.4%)	2 (3.6%)	1 (1.8%)	11 (73.3%)	4 (26.7%)	0 (0.0%)	0.13
Lymphadema	92 (90.2%)	10 (9.8%)	0 (0.0%)	0 (0.0%)	26(100.0%)	0 (0.0%)	0 (0.0%)	0.21
Data are presented in n, %								

Table 4 Physician-Reported (Harvard) Cosmesis

Cosmetic Outcome at 1-year (p-value=0.67)			
	Total (n=138)	WBI (n=109)	APBI (n=29)
Excellent	96 (69.6%)	74 (67.9%)	22 (75.9%)
Good	33 (23.9%)	28 (25.7%)	5 (17.2%)
Fair	9 (6.5%)	7 (6.4%)	2 (6.9%)
Poor	0 (0%)	0 (0%)	0 (0%)
Cosmetic Outcome at 3-year (p-value=0.20)			
	Total (n=74)	WBI (n=64)	APBI (n=10)
Excellent	44 (59.5%)	38 (59.4%)	6 (60.0%)
Good	22 (29.7%)	19 (29.7%)	3 (30.0%)
Fair	7 (9.5%)	7 (10.9%)	0 (0.0%)
Poor	1 (1.4%)	0 (0%)	1 (10.0%)

Figure 1: 5-year Ipsilateral Breast Tumor Recurrence-free Survival

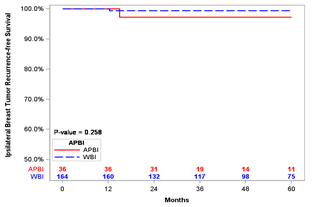
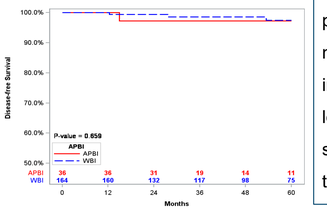


Figure 2: 5-year Disease-free Survival



Conclusions

In our experience, APBI appears to be a safe and effective treatment option for select patients with low-risk ILC who plan to undergo endocrine therapy. In addition, cosmetic outcomes appear equivalent based on one- and three- year follow up. Given the potential for late recurrences in hormone receptor–positive disease, longer follow-up is necessary. We plan to continue this investigation with additional data on local-regional recurrence and survival rates, as well as long-term toxicity and cosmesis.

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