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Comparison of acute skin toxicity with ultra-hypofractionated whole breast radiation therapy vs hypofractionated radiation dosing after lumpectomy for breast cancer: a single institutional experience

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INTRODUCTION:

Randomized control trials have shown that adjuvant radiation therapy (RT) after breast conserving surgery reduces the local recurrence of breast cancer. A common side effect of RT is radiation dermatitis, seen in up to 90% of patients. Hypofractionated radiotherapy (HF-RT) over 3 weeks with or without a boost dose is currently the standard of care in the United States, as multiple trials have shown equivalent or improved outcomes compared to a 5-week course of conventional radiotherapy. HF-RT has not been associated with worsening skin toxicity rates.[1] In an effort to improve treatment compliance and overall costs, the FAST-FORWARD trial revealed that an ultra-hypofractionated course of radiotherapy (UHF-RT) over 5 days with or without a boost dose was equally efficacious compared with a 3-week course of HF-RT with or without a boost.[2]

In this study, we retrospectively reviewed the acute skin toxicity in a cohort of patients receiving HF-RT (4256 cGy in 16 fractions with or without a boost dose of 1000 cGy in 4 fractions) compared to a similar cohort receiving UHF-RT (2600 cGy in 5 fractions with or without a boost dose of 520 cGy in a single fraction).

METHODS:

A retrospective chart review was conducted at the Cancer Institute at Catholic Health after IRB approval. Radiation plans typically were delivered as field-in-field tangential plans using 6 MV photons with a dose homogeneity within 105%. We analyzed a cohort of 42 female patients that received UHF-RT between April 2023 and March 2025. All 42 patients received 2600 cGy to the whole breast in 5 fractions with 10 patients receiving an additional boost dose of 520 cGy in a single fraction. Of the 42 patients, 2 were lost to follow-up at the secondary follow-up appointment. We assessed skin toxicity at both the primary follow-up and secondary follow-up**.**

We then conducted a retrospective chart review of a cohort of 79 female patients who underwent HF-RT between June 2022 and February 2025. All 79 patients received 4256 cGy in 16 fractions with 32 patients receiving an additional boost dose of 1000 cGy in 4 fractions. Of the 79 patients, 2 were lost to follow-up at the secondary follow-up appointment. We also assessed skin toxicity in this cohort at both the primary follow-up and secondary follow-up.

For both cohorts, we graded skin findings according to NCI-CTCAE criteria with Grade 0 indicating no skin changes, Grade 1 indicating minimal or mild skin changes, Grade 2 indicating moderate skin changes and Grades 3-5 indicating more severe skin changes requiring immediate medical attention.

RESULTS:

HF-RT Cohort Demographics	
Mean Age (years)	62.8 ± 10.5
Average Primary Follow-up Time (days)	34.7 ± 16.1
Average Secondary Follow-up Time (days)	143.2 ± 59.3
Ki-67% Range (n = 23)	2% - 90%
% Positive Genetic Mutation (n = 38)	10.5%
Oncotype Score Range (n = 31)	1 - 48
% HER2+ (n = 67)	9.0%
% Received Chemotherapy Pre-RT (n = 76)	12.0%
% Received Endocrine Therapy Post-RT (n = 76)	90.8%

UHF-RT Cohort Demographics	
Mean Age (years)	71.1 ± 7.0
Average Primary Follow-up Time (days)	29.0 ± 12.9
Average Secondary Follow-up Time (days)	142.1 ± 68.3
Ki-67% Range (n = 14)	5% - 70%
% Positive Genetic Mutation (n = 16)	12.5%
Oncotype Score Range (n = 15)	3 - 46
% HER2+ (n = 37)	2.7%
% Received Chemotherapy Pre-RT (n = 36)	8.3%
% Received Endocrine Therapy Post-RT (n = 42)	83.3%

Figure 1a

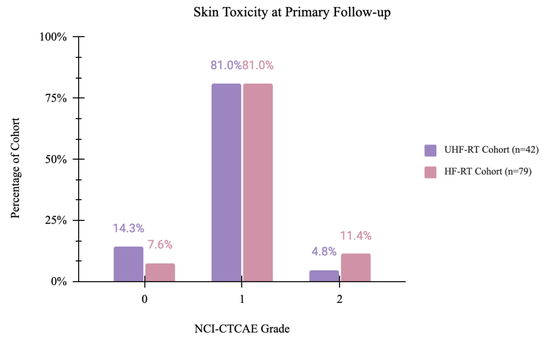


Figure 1b

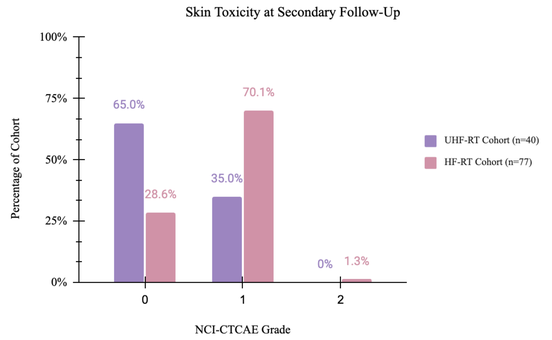


Figure 1a. Comparison of skin toxicity grades of UHF-RT cohort (n= 42) vs. HF-RT cohort (n=79) at the primary follow-up (average of 32.8 days after RT).

Figure 1b. Comparison of skin toxicity grades of UHF-RT cohort (n= 40) vs. HF-RT cohort (n=77) at the secondary follow-up (average of 142.8 days after RT).

Figure 2a

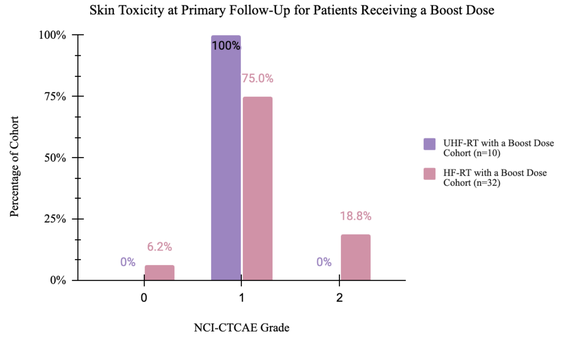


Figure 2b

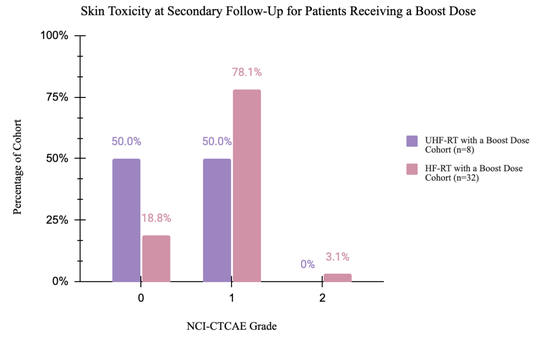


Figure 2a. Comparison of skin toxicity grades of UHF-RT with a boost dose cohort (n=10) vs. HF-RT with a boost dose cohort (n=32) at the primary follow-up.

Figure 2b. Comparison of skin toxicity grades of UHF-RT with a boost dose cohort (n=8) vs. HF-RT with a boost dose cohort (n=32) at the secondary follow-up.

CONCLUSIONS:

- Overall, at the primary follow-up, patients who received UHF-RT and HF-RT had similar risks of developing Grade 1 skin toxicity, but patients who received UHF-RT had a decreased risk of developing Grade 2 skin toxicity compared to patients who received HF-RT.
- However, patients who received a boost dose with UHF-RT had a slightly higher risk of developing Grade 1 skin toxicity, but still a lower risk of developing Grade 2 skin toxicity compared to patients who received a boost dose with HF-RT.
- Between the primary and secondary follow-up, more patients' skin toxicities resolved (changed from Grade 1 to Grade 0) in the UHF-RT cohort compared to the HF-RT cohort, with or without a boost dose.
- Overall, at both the primary and secondary follow-ups, more patients had no skin toxicity (Grade 0) in the UHF-RT cohort compared to the HF-RT cohort.
- While more research is needed to determine long-term differences between radiation treatments, this data supports UHF-RT being a step towards a more accessible form of adjuvant RT which can continue to prevent breast cancer recurrence, while also improving patient compliance and minimizing acute skin toxicity.

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