

Clinical Investigation

Hyperthermia and Radiation Therapy in Locoregional Recurrent Breast Cancers: A Systematic Review and Meta-analysis



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Summary

A systematic review and meta-analysis was carried out to evaluate the treatment outcomes of locally recurrent breast cancers (LRBCs) with radiation therapy and hyperthermia. Results from 34 studies, totaling to 2110 patients, shows that radiation therapy and hyperthermia could provide a complete response in more than 60% of these patients. In those who were reirradiated, 66.6% achieved a complete response without any additional significant treatment morbidity. Thermoradiation therapy thus provides a safe and effective therapeutic option in LRBCs.

Purpose: To conduct a systematic review and meta-analysis to evaluate the outcome of hyperthermia (HT) and radiation therapy (RT) in locally recurrent breast cancers (LRBCs).

Methods and Materials: A total of 708 abstracts were screened from 8 databases according to the PRISMA guidelines. Single-arm and 2-arm studies, treating LRBCs with HT and RT but without surgery (for local recurrence) or concurrent chemotherapy were considered. The evaluated endpoint was complete response (CR).

Results: Thirty-one full text articles, pertaining to 34 studies, were shortlisted for the meta-analysis. Eight were 2-arm (randomized, $n=5$; nonrandomized, $n=3$), whereas 26 were single-arm studies. In all, 627 patients were enrolled in 2-arm and 1483 in single-arm studies. Patients were treated with a median of 7 HT sessions, and an average temperature of 42.5°C was attained. Mean RT dose was 38.2 Gy (range, 26–60 Gy). Hyperthermia was most frequently applied after RT. In the 2-arm studies, a CR of 60.2% was achieved with RT + HT versus 38.1% with RT alone (odds ratio 2.64, 95% confidence interval [CI] 1.66–4.18, $P<.0001$). Risk ratio and risk difference were 1.57 (95% CI 1.25–1.96, $P<.0001$) and 0.22 (95% CI 0.11–0.33, $P<.0001$), respectively. In 26 single-arm studies, RT + HT attained a CR of 63.4% (event rate 0.62, 95% CI 0.57–0.66). Moreover, 779 patients had been previously irradiated (696 from single-arm and 83 from 2-arm studies). A CR of 66.6% (event rate 0.64, 95% CI 0.58–0.70) was achieved with HT and reirradiation (mean \pm SD dose: 36.7 \pm 7.7 Gy). Mean acute and late grade 3/4 toxicities with RT + HT were 14.4% and 5.2%, respectively.

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