Analysis of parameters to predict the effectiveness of scalp cooling to prevent chemotherapy-induced alopecia in breast cancer patients

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Background: Sensor-controlled scalp cooling (SCSC) has been found to be effective to prevent chemotherapy (Ctx)-induced alopecia (CIA). This retrospective study sought to obtain detailed information which clinical parameter is able to predict the success of SCSC in patients (pts) with primary (PBC) or recurrent/metastatic breast cancer (R/MBC) exposed to neoadjuvant (NACT), adjuvant (ACT), or palliative Ctx (PCT) using anthracyclines (A), taxanes (T), both given at different schedules (A + T/A→T, T→A) or none of them (non-A/non-T).

Methods: 109 pts who underwent SCSC were included: NACT, 47 (54.6%); ACT, 40 (45.4%); PCT 22; dose-dense (dd) Ctx, 38 (44.2%); non-dd Ctx 48 (55.8%); premenopausal, 48 (55.8%); postmenopausal, 38 (44.2%). Ctx regimens were: A + T/A→T, 41 (37.6%), T→A, 23 (26.7%), T, 34 (31.2%), non-A/non-T, 11 (10.1%), 3 wks after the last Ctx cycle, CIA was quantified according to the Deau score (DS). Data were analyzed in regard to the SCSC completion rate, and the quality of hair preservation (success: DS 0-2, failure: DS 3-4). The following parameters were investigated in regard to the success of SCSC: menopausal status, pretreatment, setting of Ctx, schedule, Ctx regimen.

Results: Success rate was 67.9% with 47 pts (43.1%) experiencing complete (DS 0), and 27 (24.8%) showing partial response (DS 1-2). 30 pts (27.5%) stopped SCSC prematurely due to CIA being the reason in 21 pts (19.3%). Effectiveness of SCSC did not differ for most analyzed subgroups. The relative risk (RR) to experience CIA was 1.18 (CI: 0.91-1.53, p = NS) for post-/premenopausal pts, 1.27 (CI: 0.99-1.64, p = NS) for dd Ctx-naive vs pretreated pts, 1.18 (CI: 0.89-1.56, p = NS) for dd Ctx vs non-dd Ctx, 1.42 (CI: 1.03-1.80, p = 0.03) for NACT/ACT vs PCT, and 1.42 (1.11-1.85, p = 0.012) for A-based Ctx vs non-A-based Ctx. Success rates for A + T/A→T, T→A, T, and non-A/non-T were 48.8%, 73.9%, 79.4%, and 90.9% (p = 0.015).

Conclusions: SCSC could effectively prevent CIA in a real-world population of pts with PBC or R/MBC with all subgroups of pts benefiting. NACT/ACT and A-based Ctx are associated with lower success rates of SCSC. However, the effectiveness of SCSC associated with A-based Ctx can be as high providing that Ctx does not start with an anthracycline.

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