Hypofractionated regimens for breast cancer irradiation

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Résumé

By using "hypofractionated, radiation therapy and breast cancer" as key-words in PubMed, the oldest citation came in 1990 from a famous French Professor in Radiation Oncology, François Baillet, with the results of a Phase III randomized trial comparing 45Gy / 25f / 33d versus 23Gy / 4f / 17d in 230 patients reporting no significant difference in terms of oncological outcome. Since this period, numerous new prospective phase II and III clinical trials aimed to provide more consistent proof level to consider hypofractionated regimen for breast cancer irradiation. The initial rational to shorter this adjuvant treatment was to improve the irradiation observance by reducing the burden of 25 to 30 fractions during 5 to 7 consecutive weeks and consequently better patient quality of life. New protocols were progressively validated using moderate (13 to 16 fractions) to extreme (4 to 5 days) hypofractionation regimens by reducing the treated volume from whole breast to partial breast respectively. In case of accelerated partial breast irradiation (APBI), patient selection with low-risk breast cancer remains crucial to achieve optimal oncological toxicity outcome.
Following the initial rational supporting the hypofractionated irradiation, it appears meaningful to think about a shorter irradiation (very accelerated partial breast irradiation – vAPBI) which can be performed in less than 3 days. Currently two different technical approaches are described: brachytherapy (with 4, 3 or 1 fraction - balloon based or multicatheter interstitial) and intra-operative radiation therapy (IORT – 1 fraction). However, because of these technical differences, it remains debatable to adequately compare the irradiated volume and the equivalent dose at 2 Gy assuming the fact that the LQ model is not applicable for dose/fraction higher than 8 Gy. While IORT was evaluated in phase III randomized trials and remains under debate due to unconvincing final results, brachytherapy based vAPBI was only evaluated in prospective phase II trials with encouraging results in terms of local control as well as toxicity profile.
The debate of hypofractionated regimen based on vAPBI will need to be discussed in regards to the evolution of breast cancer incidence in the next following decades. Elderly women will represent a high-interest sub-group of patients for whom the burden of a conventional irradiation is not acceptable while no adjuvant treatment lead to negatively impact the local control. In the meantime, it will be crucial to lower health care costs (patient transportations, medical human resources, technological investment ...) and preserve the organization of our radiation therapy departments.

Mots-Clés: Hypofractionation breast cancer radiation therapy brachytherapy

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