

To plan and deliver adjuvant breast radiotherapy over 1 week: 1-week breast workflow implementation

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Abstract

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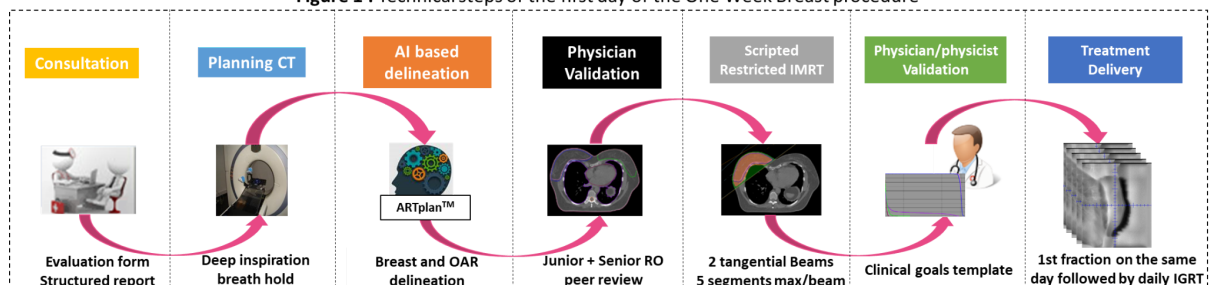
Purpose or Objective

To limit hospital visits and transportation of the patients with early breast cancer (BC) especially during the covid-19 pandemic, we aimed to implement a workflow of treatment to prepare and deliver adjuvant breast radiotherapy (RT) within 1 week.

Material and Methods

Based on the Fast Forward RT schedule of 5 fractions of 5.2 Gy over 5 days for adjuvant BC, we designed a workflow to perform BC RT over 1 week from the first RT consultation to the end of treatment (figure 1). Patients were seen in consultation on Monday morning. The planning CT was carried out immediately after the consultation. A deep inspiration breath-hold technique was systematically offered to all patients. Automatic delineation using an artificial Intelligence (AI) based model with ART-Plan™ software was first corrected by a junior radiation oncologist (RO) then, independently by a senior RO. As 3D conformal RT failed to achieve dose constraints of the fast forward trial in many cases (due to breast hotspots), we developed a restricted IMRT (rIMRT) technique based on 2 tangential beams (internal and external) using inverse planning restricted optimization parameters to improve the dose homogeneity. Treatment planning was semi-automated by scripting the creation and optimization steps of rIMRT plans. After validation of the reliability of rIMRT treatment delivery by patient-specific quality assurance (PSQA) with gamma index evaluation on 20 patients, we decided to abandon systematic PSQAs. *In-vivo* dosimetry was validated by end-to-end controls and performed for each patient during the first fraction on Monday afternoon. Daily repositioning was controlled by portal images of the largest segment of each beam. Structured baseline, end of treatment and follow up evaluation forms were used to prospectively collect toxicities and oncological outcomes at each consultation. Patient agreement for data collection and analysis was prospectively obtained.

Figure 1 : Technical steps of the first day of the One Week Breast procedure



Results

From February 2021 to March 2021, the 1-week breast procedure was proposed to up to 3 patients/week, ≥ 65 years, in complete resection after conservative surgery, with pT1-T3 N0 BC, without tumor bed boost or regional lymph nodes irradiation. Six out of seven patients (85.7%) accepted the 1-week breast procedure. All procedures were successfully conducted over 5 days with

complete patient and RT team satisfaction. A follow-up of acute toxicities by online consultation on day 10, structured evaluation forms and management decision trees has been implemented for these patients. No grade ≥ 2 acute toxicities (CTACE V4.0) have been reported so far.

Conclusion

The successful implementation of this comprehensive 1-week breast workflow with AI based delineation and semi-automated rIMRT without PSQA demonstrates the practical feasibility of the whole procedure over 5 days reducing drastically the coming-and-going to the hospital and the overall RT management time per patient. Our work opens the way for further development of comprehensive compact workflows in various settings.