ABSTRACT SUBMISSION FORM

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PRESENTATION TITLE
Radiologic response on MRI and pathologic response after MR-guided single dose preoperative radiotherapy in breast cancer patients

AUTHOR(S)
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ABSTRACT

Purpose: Low-risk breast cancer can be treated with breast conserving surgery (BCS) followed by whole breast irradiation or accelerated partial breast irradiation. In both radiotherapy (RT) treatment options a large volume of the breast is irradiated, partly due to postoperative changes leading to a large clinical target volume (CTV). With the aim to reduce treatment-induced toxicity and to omit surgery following RT in future patients with a complete response, we initiated a study on MR-guided single dose preoperative RT in breast cancer patients, the ABLATIVE study (ClinicalTrials.gov reference number: NCT02316561). Primary outcome was pathologic complete response (pCR), secondary outcomes were radiologic response and toxicity.

Materials & Methods: Patients eligible for treatment according to study protocol were women ≥50 years, with a unifocal tumor (ER positive, HER2 negative) with maximum diameter of 2cm (3cm if ≥70 years), assessed by MRI, without regional or distant metastases, confirmed by sentinel node biopsy. Contrast-enhanced (CE) CT and functional and CE MRI scans were performed in supine RT position and co-registered for target delineation. Prescribed single dose to gross tumor volume (GTV) and CTV (GTV plus 20mm margin) was 20Gy and 15Gy, respectively, using VMAT. Position verification was performed using cone beam CT. Patients underwent BCS 6 months following RT. Pathologic response was evaluated according to EUSOMA criteria by breast pathologists. Radiologic response was monitored on MRI every two months and evaluated by dedicated breast radiologists using contrast enhancement kinetics. Treatment-induced toxicity was scored according to Common Terminology Criteria for Adverse Events v4.03.

Results: From June 2015 to February 2018, 34 patients were treated with MR-guided single dose preoperative radiotherapy. Fifteen patients had a follow-up of at least 12 months, allowing for pathologic, radiologic and toxicity evaluation. Median follow-up was 13 months (range 12-30 months), median tumor diameter 13mm (range 7-18mm). After pathologic evaluation, in five patients pCR, and in five patients near pCR with <10% residual disease was observed. Three patients had partial...
response (PR) with 10-50% residual disease and two patients stable disease (SD) with >50% residual disease. Radiologic complete response (rCR) 6 months following RT was reported in 8 patients, corresponding to 5 patients with pCR and 3 patients with near pCR (Figure 1). Time to rCR differed per patient, no radiologic or pathologic progression of disease was observed. Examples of patients with rCR and no rCR can be seen in figure 2. At 12 months following RT, 6 months following BCS, grade 1 treatment-induced toxicity consisted of local fibrosis (100%), fatigue (13%), hyperpigmentation (33%), breast pain (27%) and breast edema (27%); one patient developed postoperative wound infection. No grade 3-4 toxicity was observed.

**Figure 1.** Pathologic and radiologic response 6 months following RT.

**Figure 2.** A) diagnostic MRI in patient X; B) rCR in patient X; C) diagnostic MRI in patient Y; D) no rCR in patient Y.

**Conclusions:** Radiologic response evaluation using MRI showed this to be a promising imaging tool to identify patients with pCR after MR-guided single dose preoperative RT in low-risk breast cancer patients resulted in pathologic complete response in 5 out 15 patients. Treatment-induced toxicity was mild.