AbstractID: 13522 Title: Clinical application of the eNAL set-up correction protocol to compensate for time trends in breast cancer treatments

Purpose: Clinical evaluation of the extended NAL (eNAL) set-up protocol (deBoer2007) for breast cancer patients treated with an integrated boost technique. **Method and materials:** For 80 breast cancer patients, two orthogonal planar kilovoltage images and one megavoltage image (for the medio-lateral beam) were acquired per fraction throughout the treatment course (14 fractions on average). Based on registration of surgical clips in the lumpectomy cavity (4.3 on average) set-up corrections were derived after the first three fractions and updated once a week thereafter using eNAL. The stability of the clips during the fractionated treatment was derived. Using a t-test the correlation between clip migration and either the method of surgery or the time elapsed from last surgery was quantified. The impact of the eNAL protocol on the set-up accuracy for both the tumor bed and the whole breast was evaluated. **Results:** During the fractionated treatment the mean distance between the clips and their center of mass (COM) reduced by 0.9 ± 1.2 mm (1 SD). The clip migration was not statistically different between patients treated within 100 days after surgery or afterwards (p=0.20). Compared to conventional breast surgery (closing the lumpectomy cavity superficially), clip migration after oncoplastic surgery (suturing the lumpectomy cavity) was slightly smaller, but not significantly different (p=0.13). Throughout the treatment course timetrends in the COM position of the clips >3mm were observed for 61% of the patients. Application of the eNAL protocol on clips resulted in residual systematic errors for the tumor bed of <1 mm in each direction, while the whole breast was treated within about 2 mm accuracy. **Conclusion:** Surgical clips can safely be used for position verification and correction. By compensating for time trends, the eNAL protocol resulted in better set-up accuracies for both the tumor bed and the whole breast than the NAL protocol.