

Study Case :

Adaptive Radiotherapy for Post-Mastectomy Breast Cancer using AdaptBox



Key Figures

- 5 Radiation Oncologists
- 6 Medical Physicists
- 5 Dosimetrists
- 29 Radiation Therapists
- 5 linacs (3TB+2HCY)
- 1700 Patients treated annually

ANGELIQUE DUCTEIL, MD
Radiation Oncologist

The Challenge: From the first session: **Installation and positioning challenges (patient's age and weight) led to prolonged setup times, requiring nearly two CBCTs per fraction.** The team was concerned about dosimetric impacts from slight variations. During the 8th session, the medical team decided to use AdaptBox's synthetic CT for a dosimetric evaluation. Positioning challenges persisted, and **AdaptBox was used for dosimetric evaluation three times during treatment. For each synthetic CT, dosimetric coverage was precisely evaluated and confirmed to be within the initial CT's tolerances** (coverage of lymph node areas and chest wall, respect for organ-at-risk constraints). **Without AdaptBox, new planning CT scans, recontouring, and dosimetry adjustments would have been required at least three times,** creating significant logistical and organizational challenges.

Patient Profile

Age: 60-year-old **Gender:** Female

Medical History: Postmenopausal, no hormone replacement therapy, hypertension, active smoker, no family history of cancer.

Disease History:

February 2024: Self-detected mass in the upper quadrant of the left breast, retroareolar, estimated size > 5 cm, cT3 N0 Mx.

Initial biopsy: Grade II invasive ductal carcinoma, triple-negative, HER2-negative, Ki-67 at 1%, highly necrotic.

February 19, 2024: PET/CT scan showed no regional or distant metastases.

March 12, 2024: Total left mastectomy + sentinel lymph node biopsy. Findings: 4 cm invasive ductal carcinoma, quadruple-negative, presence of vascular and perineural invasion,

1 metastatic lymph node (5 mm, capsular rupture) out of 5 sampled, stage pT2N1a R0.

Adjuvant chemotherapy: Completed September 10, 2024

Radiotherapy protocole

Treatment Type: VMAT radiotherapy on Halcyon, planned with Eclipse TPS v16.1 Acuros XB.

Administered Dose:

29 fractions of 1.7 Gy to supraclavicular, infraclavicular, internal mammary, and axillary lymph nodes (total: 52.2 Gy).

29 fractions of 1.8 Gy to the chest wall (total: 52.2 Gy).

Start Date: September 26, 2024.

RESULTS & BENEFITS

- **Time and resources savings:** Reduced workload /delays for the team and improved service organization.
- **Precision et safety :** Maintained the prescribed dose with proper positioning, without compromising dosimetric constraints.
- **Optimized Patient Experience:** The patient received continuous treatment without stress from last minute adjustments and was exposed to less imaging dose by avoiding an additional CT scan.

CONCLUSION

This clinical case illustrates AdaptBox's ability to streamline clinical resources and provide a seamless care experience. With precise, automatically generated synthetic CTs and associated contours, dose verification was expedited at three points during treatment. **AdaptBox's simple integration into routine workflows and existing tools confirms its reliability for effective, stress-free adaptive radiotherapy.**

It enabled rapid dose validation using CBCT referred to as synthetic CT (synCT) - providing a precise evaluation of dosimetric coverage for lymph node areas and the chest wall while ensuring compliance with organ-at-risk (OAR) constraints. This was achieved without interrupting treatment continuity and avoided the need for additional dosimetry by the team or a new CT scan for the patient. This dosimetric evaluation using AdaptBox's synthetic CT was performed three times during the treatment course.

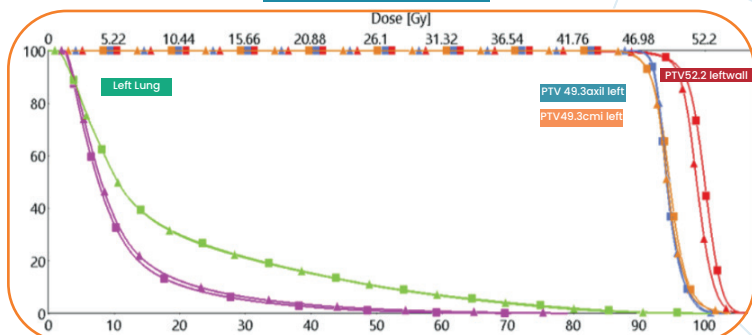
TIME SAVINGS WITH ADAPTBOX*

Medical staff: 45 minutes to 1 hour (eliminating an additional CT, eliminating an additional treatment plan: contouring, dose calculation, QA and data exchange with OIS system.)

Radiation Therapists: 20 minutes (patient handling and performing the scan).

Dosimetrists & Physicists: 2 hours to produce another treatment plan and perform QA.

HDV - OAR/PTV



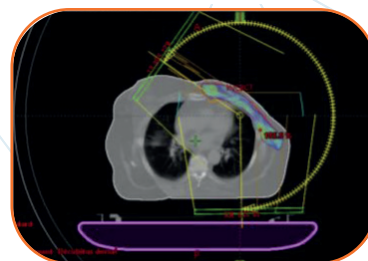
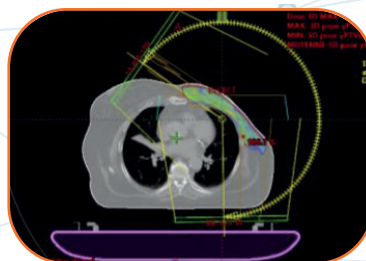
Dosimetry check

8TH SESSION: Used AdaptBox on Oct. 7

Satisfactory coverage, continue treatment

Dmax CTA 107.8%

Dmax CTs 108.1%

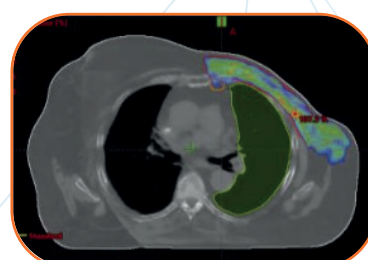
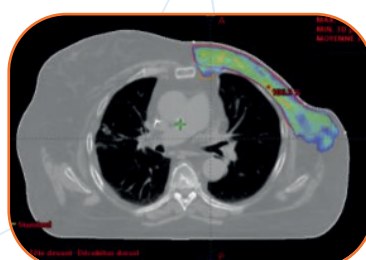


11TH SESSION: Used AdaptBox on Oct. 10

Satisfactory coverage

Dmax CTA 107.8%

CTs : Dmax 107.5%

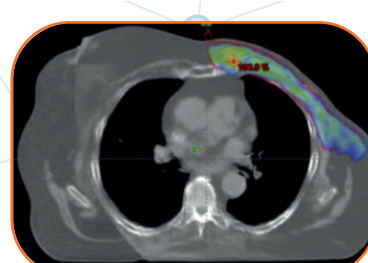
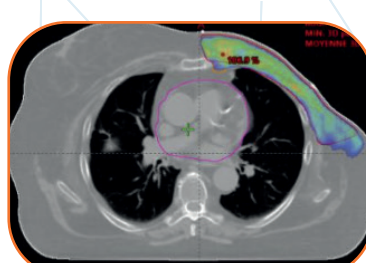


20TH SESSION: used AdaptBox on Oct. 23

Satisfactory coverage

Dmax CTA 107.8%

CTs : Dmax 106.9%



AFFECTED CLINICAL WORKFLOW	WITH ADAPTBOX	WITHOUT ADAPTBOX
Dosimetry Validation	Directly validated from the CBCT using the synthetic CBCT.	Required a new planning CT , associated recontouring and a new treatment plan .
Continuity of Care	Treatment continuity maintained without stress for the patient .	Three new planning CT scans necessary at sessions 8, 11, and 20, adding stress for teams and patient
Impact on Teams	Up to 9 hours saved!	Approximately 9 hours* of additional work for the team.
Patient Imaging Dose	Avoided 3 additional CT scan.	Increased radiation exposure due to a new CT scan.