BREAST

RADIOTHERAPY TREATMENT CLINICAL GUIDELINES

Please note: these Guidelines will apply unless the patient is taking part in clinical trial, in which case the trial protocol will supersede the Guidelines.

Contents:

1). SCOPE OF THE GUIDELINES

The management of patients with breast malignancies (invasive or pre-invasive) who are receiving radiotherapy to the breast, and/or nodal regions.

2). SELECTION CRITERIA / INDICATIONS FOR TREATMENT

All patients should be discussed in a multi-disciplinary meeting before the decision is made to offer radiotherapy. The exception may be very frail/elderly patients with locally advanced breast cancer in whom urgent palliation is required. The implications of the recommended treatment will be discussed with the patient before a final decision is made.

Most patients will have undergone radical surgery. There should be complete clearance of the primary tumour as judged by tumour-free excision margins in all but a very small minority.

Occasionally, a decision is made to give primary radical radiotherapy without surgery.

The indications for, and the timing of, systemic adjuvant therapies will depend on prognostic factors, tumour markers and on-going clinical trials. Radiotherapy should not be given whilst the patient is undergoing chemotherapy, unless in an emergency situation.

All surgical wounds should be well-healed and seroma formation controlled before starting radiotherapy.

Breast

Radiotherapy to the whole breast is indicated following breast conserving surgery (BCS) for invasive breast cancer or DCIS, apart from a subgroup of patients who are eligible for partial breast radiotherapy or whose risk of recurrence is so low that radiotherapy can be safely omitted. For example: patients ≥65 years with T1N0 ER/PR+ve, HER2-ve, grade 1-2 tumours who are willing to take adjuvant endocrine therapy for 5 years.

Partial Breast

Can be considered for patients ≥50 years, Grade 1-2, ≤3cm, ER+ve, HER2-ve, N0 with minimum 1mm radial excision margin for invasive disease.

Classical lobular cancer and/or lymphovascular space invasion should be excluded.

Tumour bed Boost

Tumour bed clips should be considered standard of care to improve the planning and delivery of the boost.

A boost to the tumour bed should be considered in all those under 50.

The benefits of a boost can be considered in those patients over 50 with high-risk features: grade 3, extensive LVI or DCIS.

Chest wall (post-mastectomy)

Radiotherapy to the chest wall is indicated in the following scenarios:

- T3, and T4 disease
- N2 disease
- Tumour extends to the excision margin

And can be considered for:

- N1 disease
- T2N0 and Grade 3 disease and/or LVI

Supraclavicular fossa (SCF) and Axilla

Radiotherapy to the SCF only is indicated:

- ≥4 positive lymph nodes after a level II axillary clearance and a minimum of 10 lymph nodes retrieved.
- after neo-adjuvant chemotherapy if considered high risk.

Radiotherapy to the SCF and Axilla is indicated:

- Node positive patients who have undergone sentinel node biopsy and axillary clearance is not undertaken
- Inoperable patients with node positive disease
- Positive margins of axillary clearance, or extensive extra-capsular spread.

Internal Mammary Lymph nodes

Radiotherapy to the internal mammary chain (IMC) should be considered in:

- Patients with T4 and/or N2-3 disease
- Patients with N1 disease, central/medial tumours and high-risk features

IMC radiotherapy should be given using a breath-hold technique and iv contrast can be given to aid delineation of nodal areas.

3). PRE-TREATMENT INFORMATION FOR RADICAL TREATMENT

- Pre-operative imaging
- Histology report

4). CONSENT (EBRT)

Patients should understand the rationale for the recommendation of radiotherapy and understand the potential side effects. Where possible it is recommended that the RCR Breast consent form is used: https://www.rcr.ac.uk/sites/default/files/radiotherapy-consent-form-for-breast-cancer.pdf

5). LOCALISATION

Cross-sectional imaging with CT is used in planning radiotherapy to breast, chest wall and nodal regions.

Patient should be positioned supine with arms supported and abducted to at least 90˚.

When treating tumours that are in the left breast, the left chest wall, or when including internal mammary nodes, a breath hold technique should be used to reduce dose to the heart.

6). VOLUME DEFINITION

For the majority of cases field placement will be undertaken using a virtual simulation programme.

The tumour characteristics, past medical history and individual anatomy will influence the setting of the field borders.

When treating nodal regions, consideration should be given to creating a CTV as per the ESTRO consensus guidelines: *Offerson et al. Radiotherapy and Oncology 114 (2015) 3-10*

Breast

- The clinical target volume (CTV) should include the breast tissue down to the deep fascia.
- The planning target volume (PTV): **as per local guidance**.

Chest wall

- CTV: Skin flaps down to deep fascia
- PTV: As a rough guide the 50% isodose should lie on the following anatomical margins, though inspection of the contra-lateral breast may lead to adjustments.

    - Superior – between sternal notch and sternal angle
    - Inferior – 1cm below contra-lateral infra-mammary fold
    - Medial – midline.
    - Lateral – mid-axillary line.
    - Posterior – to include the chest wall at the level of the tumour bed

Partial Breast

As per IMPORT LOW trial:

- CTV_Tumour bed is outlined based on clips +/- surrounding architectural distortion
- CTV_Partial Breast = CTV tumour bed + 15mm, bound by 5mm from the skin surface and should not extend beyond pectoral fascia posteriorly
- PTV Partial Breast = CTV partial breast + 10mm, bound by 5mm from skin surface but unmodified posteriorly

SCF

- CTV: Supra-clavicular and infra-clavicular lymph nodes
- PTV: nodes plus 0.5-1cm margin

    - Inferior – to match tangential fields
    - Superior – to ensure coverage of the SCF or at the level of C7-T1 space
    - Medial – abutting the lateral border of the ipsilateral vertebral body
    - Lateral – in line with the outer border of the first rib (roughly covering medial 2/3 of clavicle) for a level III dissection. Patients who had clips placed at the time of surgery, the lateral border should be in line with the most superior and medial clip. Otherwise the lateral border should extend to the coracoid process for a level II dissection

Axilla

- CTV: axillary chain, levels 1,2 and 3
- PTV: nodes plus 0.5-1cm margin

    - Inferior – to match tangential fields
    - Superior – to ensure coverage of the SCF or at the level of C7-T1 space
    - Medial – abutting the lateral border of the ipsilateral vertebral body
    - Lateral – to cover the head of humerus

Post-Axillary Boost

    - Superior – midway through head of humerus
    - Inferior – to match the inferior border of the anterior SCF field
    - Medial – lateral to the edge of the first rib
    - Lateral – to cover 2/3 of the head of humerus

Internal Mammary Nodes

    - Superior – matched to inferior limit of level 4 LN
    - Inferior – Cranial side of the 4th rib
    - Medial/Lateral – 1cm around the internal mammary vessels (clipped to lung)

Tumour bed

Use of clips at surgery to delineate the tumour bed is considered standard.

- CTV Boost: to include clips +/- surgical disturbance (clinical judgement)
- PTV Boost: CTV Boost plus 1cm (or 2cm if using electron field)

7). ORGANS AT RISK

The heart, lung, spinal cord and each lung should be outlined as organs at risk (OARs). Where a VMAT plan or wide tangents are employed the contra-lateral breast should also be outlined.
Cardiac sparing radiotherapy should be utilised for patients with left-sided breast cancer using a breath-hold technique.

8). DOSE AND FRACTIONATION

Breast and Chest wall

- 26Gy in 5# over 1 week, treating daily (5.2Gy per #)
- 36Gy in 6# over 6 weeks, treating weekly (6Gy per #)

The use of bolus for tumours involving the skin is recommended

Nodal regions (Axilla/SCF/IMC)

- 40.05Gy in 15# over 3 weeks, treating daily (2.67Gy per #)
- 24Gy in 4# over 4 weeks, treating weekly (6Gy per #)

Tumour Bed Boost

- 13.35Gy in 5# over 1 week, treating daily (2.67Gy per #)

or

- 10Gy in 5# over 1 week, treating daily (2Gy per #)

9). PLAN EVALUATION

Following the dose targets and constraints set out in the FAST FORWARD trial, the whole breast and chest wall plan should be optimised aiming to fulfil the criteria below:

Whole breast/Chest wall PTV

Mandatory	Optimal
V95% ≥ 90%	V95% ≥ 95%
V105% ≤ 7%	V105% ≤ 5%
V107% ≤ 2%	
Dmax ≤ 110%	

Axilla and SCF Lymph node irradiation

- LN PTV DVH coverage V90% ≥ 90%
- V107% ≤ 2% of LN PTV DVH.
- V107% ≤ 2 cm3 outside the nodal and breast/chest wall PTV volumes
- Maximum point dose should not exceed 110% of the prescribed dose.
- The maximum dose to 0.1 cm3 the brachial plexus should not exceed 105% of the prescribed dose.
- Ipsilateral Lung V30% ≤ 25%

Organs at risk

- 26Gy in 5#:
  - Ipsilateral Lung: V8 < 15%
  - Heart: V1.5 < 30% and V7 < 5%

- 40Gy in 15#:
  - Ipsilateral Lung: V12 < 15%
  - Heart: V2 < 30% and V10 < 5%

Internal Mammary lymph node irradiation

Where the IMC is included in the target volume, the following dose constraints are recommended:

- Heart V17 < 10%
- Ipsilateral Lung V17 < 35%
- Mean contralateral breast dose <3.5Gy
- Mean heart dose <6Gy

10). VERIFICATION

Please refer to Network Verification guidelines

11). ON-TREATMENT REVIEW

Most patients have few problems during their radiotherapy. Advice should be given regarding skin care and who to contact following treatment should they develop troubling side effects.

12). FOLLOW UP

This will vary according to stage, surgeon, referring hospital and patient preference. All patients should be seen as per the referring breast unit's protocol.

13). CHANGE/GOVERNANCE PROCESS FOR THE REGIONAL SW RT ODN GUIDELINES

To access all available SW RT ODN Clinical Guidelines, please click here (SWAG CA website).