Target volumes for Post mastectomy Radiotherapy in breast cancers

Punita Lal
Department of Radiotherapy, Sanjay Gandhi Postgraduate Institute of Medical Sciences, Lucknow
Road map

- Indications and Recommendations
- Post operative Anatomy
- Delineation of CTV chest wall & LN
Chest wall Radiotherapy in LN +ve or >T3 disease

1789 patients, 1982 – 1989, premenopausal, node + or Tumor > 5cm, M0
Total mastectomy, level I + II (partly) + CMF +/- 50Gy/25fx (electrons + photons)
Sx in 79 departments, RT in mainly 6 centers

Local rec. 32% vs. 9%
OS 40% vs. 54%

Overgaard et al. NEJM 1997 337:949
Ragaz et al. NEJM 1997 337:956
Overgaard et al. 1999, 353:1641
ASCO 2001 guidelines–PMRT

<table>
<thead>
<tr>
<th>Site</th>
<th>Indication</th>
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<tbody>
<tr>
<td>Chest wall</td>
<td>T3, ≥4 LN</td>
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<tr>
<td>Axilla</td>
<td>Incomplete dissection, ECE</td>
</tr>
<tr>
<td>IMC</td>
<td>??</td>
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<tr>
<td>SCF</td>
<td>+ve Axilla</td>
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</tbody>
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**Recommendations**

- ≥ 4 LN
- ≥T3
- Chest wall mandatory in PMRT
- SCF in ≥ 4 Axillary LN
- No axillary RT in complete dissection

**Insufficient evidence**

- T1/T2
- Dose Schedule
- SCF RT in 1-3 Ax LN
- IMC RT
- Sequencing of PMRT, Reconstruction & Systemic therapy
Increased cardiac mortality in left PMRT

• Innocent bystanders like Heart, Lung, LAD, Brachial plexus, ribs get irradiated
• Cardiac volume irradiated correlates with cardiac mortality (3.2 times).
• Lung volume irradiated correlates with functional lung damage (3%).

Gagliardi G, etal, IJROBP, 2000;46:373-381
Favourable and unfavourable effects on long-term survival of radiotherapy for early breast cancer: an overview of the randomised trials

Early Breast Cancer Trialists’ Collaborative Group*

Breast cancer deaths only

Non-breast-cancer deaths

Vascular deaths: Proportional excess ratio=1.3, absolute rates 3 fold greater
Anatomy
Simulator Film based planning

Radio-opaque wire 1.5cm below the opposite inframammary line

Below humoral head

Parasternal

Mid axillary line
Simulator based tangential photon beam planning

Lung

Heart
Need for delineation

- To spare the ipsilateral lung
- heart
- Left anterior descending artery
- Brachial plexus injury with axillary RT
How to Simulate?

• Patient supine (+ breast board); Flat (CT) couch; Arms overhead.
• Place radio-opaque wire on patients chest wall
• Medially – midline
• Laterally – midaxillary line
• Superior- Inferior aspect of clavicular head
• Inferior- 1cm below the c/l Inframammary fold

[CT scan data (+ Contrast) transferred to 3D TPS]
How to delineate?

• Contour both lungs
• Contour the heart (exclude great vessels)
• CTV delineation- Anteriorly – Skin surface
• Posteriorly- rib –soft tissue interface
• Medially- 1 cm lateral to the midline wire
• Laterally- 1 cm medial to the lateral wire

How and what to delineate?

CTV-
5mm from skin
5 mm from markers

PTV-
7mm from CTV
Except at skin
The issue of scar and bolus...

- Scar should be included
- Drain sites should be included
- Reasons – tumor cell entrapped in scar -hypoxic fibrotic region
- Bolus to the scar – Yes (unless lying in tangential beam)
- Bolus to entire chest wall - reason – heavy infestation of skin lymphatics
- Issue of junctions and self bolus effect exist
- Greater need in 4-6 MV beams than Telecobalt unit due to greater depth of Dmax
CTV delineation of SCF, IMC, Axillary Levels

SCF
Level III
Level II
Level I
IMC
Pectoralis minor
Conclusions

Delineation based planning in PMRT is to save the lung, heart, LAD especially in left sided lesions and brachial plexus injury in axillary irradiation.