Brachytherapy for Breast Cancer

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Department of Radiation Oncology & Medical Physics, Tata Memorial Hospital, Mumbai
Brachytherapy for Breast Cancer

- Boost brachytherapy
- Radical brachytherapy
- Chest wall brachytherapy-recurrences
- Surface mould
Breast conserving therapy: Standard treatment for early breast cancer

Randomized trials comparing MRM vs BCT:
Comparable outcome
Better cosmetic outcome
Improved psychosocial impact
Critical Role of Radiation Therapy
Tumor Bed Boost

- Current practice
- Rationale for boost
- To boost or not to boost.
- Dose and fractionations.
- Techniques of boost delivery.
- Comparison of above techniques.
- Delineation of boost volume.
- TMH Experience
- Identification of High Risk groups
Rationale for boost..
Pathological basis ..

- N =441 pts (333 analysed) of Stage I & II Ca breast
- Aim – to define CTV for PBI
- All the pts underwent re-excision after lumpectomy.

- Results-
  - 35.2% had no residual
  - 20.1% had dis. 0-5 mm from tumour edge
  - 24.9% extended from 5-10 mm
  - 10.2% from 10-15 mm
  - 9% extended > 15 mm
- Conclusion: In ~ 90% of pts margin of 10 mm is adequate.

*Frank A. Vicini IJROBP. 60(3) :2004*
Clinical basis...

- Recurrence pattern in EORTC trial...

Boost Vs No Boost
Boost Vs No Boost

- Recommendations for post-lumpectomy radiotherapy prescription varied.

- This ranged from 50 Gy/25fr to whole breast without a boost to 45 Gy/25fr followed by a 16 Gy tumor bed boost.

- No level 1/2 evidence for standardisation of dose schedules.
No boost..

- Compared two short fractionation schedules for post-lumpectomy whole breast irradiation.
- RT schedules:
  - Arm A - Experimental arm (N = 622) - 42.5 Gy/ 16 fr
  - Arm B - Standard arm (N = 612) - 50 Gy/ 25 fr
- No difference in disease free or overall survival.

<table>
<thead>
<tr>
<th></th>
<th>Arm A</th>
<th>Arm B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local recurrence free survival (5 yr)</td>
<td>97.2 %</td>
<td>96.8 %</td>
</tr>
<tr>
<td>Cosmesis (excellent / good)</td>
<td>76.8 %</td>
<td>77.4 %</td>
</tr>
</tbody>
</table>

Boost Vs No Boost
RCT in Lyon, France (1986-92)

- Boost arm
  - N = 521
  - LR (5 yr) - 3.6%
  - Telangiectasia (Gr 1&2) - 12.4%

- No Boost
  - N = 503
  - 50 Gy/25 fr.
  - LR (5 yr) - 4.5% (P = 0.044)
  - 5.9%

Boost Vs No boost ..EORTC Trial

- Assessed the effect of boost to tumour bed on LR in post-lumpectomy pts (T1-2, N0-1, M0).
- Median f/u – 5.1 yrs
- WBRT to a dose of 50 Gy/25 fr, was followed by a boost of 16 Gy/8 fr. (e- beam)

<table>
<thead>
<tr>
<th></th>
<th>WBRT</th>
<th>WBRT + boost</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>N</strong></td>
<td>2657</td>
<td>2661</td>
</tr>
<tr>
<td><strong>LR (5 yrs)</strong></td>
<td>7.3 %</td>
<td>4.3 %</td>
</tr>
<tr>
<td><strong>Cosmesis</strong></td>
<td>86 %</td>
<td>71 %</td>
</tr>
</tbody>
</table>

Boost Vs No boost..EORTC Trial

Cumulative incidence of local recurrence

# Boost Vs No Boost

<table>
<thead>
<tr>
<th></th>
<th>WBRT</th>
<th>WBRT + Boost</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>HDR BT</td>
<td>Electrons</td>
</tr>
<tr>
<td>N</td>
<td>103</td>
<td>52</td>
</tr>
<tr>
<td>EBRT</td>
<td>50 Gy/ 25 fr</td>
<td>50 Gy/ 25 fr</td>
</tr>
<tr>
<td>Boost (median)</td>
<td>Nil</td>
<td>14.25 Gy/ 3 fr</td>
</tr>
<tr>
<td></td>
<td>5.3 yrs</td>
<td>5.3 yrs</td>
</tr>
</tbody>
</table>

*Polgar C: Strahlenther Onkol. 2002 Nov;178(11)*
## Boost Vs No boost

<table>
<thead>
<tr>
<th></th>
<th>WBRT</th>
<th>WBRT + Boost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local rec.</td>
<td>15.5 %</td>
<td>6.7 %</td>
</tr>
<tr>
<td>LTC</td>
<td>84.9 %</td>
<td>92.7 %</td>
</tr>
<tr>
<td>RFS</td>
<td>66.2 %</td>
<td>76.6 %</td>
</tr>
<tr>
<td>S/E (Gr. 2-3)</td>
<td>7.8 %</td>
<td>17.3 %</td>
</tr>
<tr>
<td>Cosmesis (excellent /good)</td>
<td>91.3 %</td>
<td>85.6 % P - NS</td>
</tr>
</tbody>
</table>

*Polgar C: Strahlenther Onkol. 2002 Nov;178(11)*
RT boost .. Dose & Fractionation
## RT boost.. Dose & Fractionation

<table>
<thead>
<tr>
<th>Trial</th>
<th>N (pts)</th>
<th>EBRT (dose/fr)</th>
<th>Boost (dose/fr)</th>
<th>LR (%)</th>
<th>Med. f/u (yr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bartelink et al.</td>
<td>2657</td>
<td>46-50 Gy/25 fr 50 Gy/25 fr</td>
<td>- 16 Gy/8 fr</td>
<td>7.3</td>
<td>5.1</td>
</tr>
<tr>
<td></td>
<td>2661</td>
<td></td>
<td></td>
<td>4.3</td>
<td></td>
</tr>
<tr>
<td>Romestaing et al.</td>
<td>503</td>
<td>47-50 Gy/20 fr 50 Gy/20 fr</td>
<td>- 10 Gy/4 fr</td>
<td>4.5</td>
<td>3.3</td>
</tr>
<tr>
<td></td>
<td>521</td>
<td></td>
<td></td>
<td>3.6</td>
<td></td>
</tr>
<tr>
<td>Teissier et al.</td>
<td>327</td>
<td>48-50 Gy/25 fr 50 Gy/25 fr</td>
<td>- 10 Gy/5 fr</td>
<td>6.8</td>
<td>6.1</td>
</tr>
<tr>
<td></td>
<td>337</td>
<td></td>
<td></td>
<td>4.3</td>
<td></td>
</tr>
<tr>
<td>Polgar et al.</td>
<td>103</td>
<td>49-50 Gy/25 fr 50 Gy/25 fr</td>
<td>- 12-16 Gy/3-8 fr</td>
<td>15.5</td>
<td>5.3</td>
</tr>
<tr>
<td></td>
<td>104</td>
<td></td>
<td></td>
<td>6.7</td>
<td></td>
</tr>
</tbody>
</table>
# RT boost.. Dose & Fractionation

<table>
<thead>
<tr>
<th>Author</th>
<th>TBD (Gy)</th>
<th>LR (%)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clarke</td>
<td>&lt; 60</td>
<td>6.6 (5 yr)</td>
<td>0.003</td>
</tr>
<tr>
<td></td>
<td>&gt; 60</td>
<td>2.3 (5 yr)</td>
<td></td>
</tr>
<tr>
<td>Recht</td>
<td>&lt; 60</td>
<td>7 (5 yr)</td>
<td>0.06</td>
</tr>
<tr>
<td></td>
<td>60-70</td>
<td>4 (5 yr)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt;70</td>
<td>1 (5 yr)</td>
<td></td>
</tr>
<tr>
<td>Van limbergen</td>
<td>40-49</td>
<td>28</td>
<td>0.01</td>
</tr>
<tr>
<td></td>
<td>50-59</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td></td>
<td>60-69</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>70-79</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>80-89</td>
<td>2.5</td>
<td></td>
</tr>
</tbody>
</table>
Margin directed boost..

- N = 509; Stage I & II Ca breast.
- Post-lumpectomy, re-excision when margin < 2 mm.
- WBRT - 50 Gy, followed by e- boost.
- Median f/u – 121 mths.
- No boost when no residual on re-excision (LR-6%).

<table>
<thead>
<tr>
<th>Final margin status</th>
<th>+ve</th>
<th>0-2 mm</th>
<th>2-5 mm</th>
<th>&gt; 5 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boost dose</td>
<td>20 Gy</td>
<td>20 Gy</td>
<td>14 Gy</td>
<td>10 Gy</td>
</tr>
<tr>
<td>LR (12 yrs)</td>
<td>17%</td>
<td>9%</td>
<td>5%</td>
<td>0</td>
</tr>
</tbody>
</table>

Boost delivery..
Tumor Bed Boost: Techniques

- Photons
- Electrons
- Interstitial Brachytherapy
  - Intraoperative
  - Postoperative
- Mammosite
- Intraoperative Electrons
Comparison of Boost Techniques
Comparison of Boost Techniques.. EORTC Trial

• Assessed the role of RT boost.
• N= 2661; randomized in WBRT & WBRT+ boost
• Median f/u – 5 yrs
• WBRT- 50 Gy was delivered.
• Type of boost on investigator’s choice.
• Boost delineation was done clinically (scar & or surgical clips).

P. Poortmans et al. / Radiotherapy and Oncology 72 (2004) 25–33
## Comparison of Boost Techniques.. EORTC Trial..

<table>
<thead>
<tr>
<th>Boost tech.</th>
<th>Electrons</th>
<th>Photons</th>
<th>Interstitial</th>
<th>Unknown</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>N</strong></td>
<td>1653</td>
<td>753</td>
<td>225</td>
<td>48</td>
</tr>
<tr>
<td><strong>Dose (Gy)</strong></td>
<td>16</td>
<td>16</td>
<td>15</td>
<td>16</td>
</tr>
<tr>
<td><strong>T.V.(cm³)</strong></td>
<td>144</td>
<td>288</td>
<td>60</td>
<td>-</td>
</tr>
<tr>
<td><strong>Gap bet WBI &amp;boost (d)</strong></td>
<td>1</td>
<td>1</td>
<td>18</td>
<td>-</td>
</tr>
<tr>
<td><strong>Total Tt time</strong></td>
<td>48 days</td>
<td>48 days</td>
<td>54 days</td>
<td>-</td>
</tr>
<tr>
<td><strong>LR (%)</strong></td>
<td>4.7</td>
<td>4</td>
<td>2.5</td>
<td>2</td>
</tr>
<tr>
<td><strong>Fibrosis (mod –severe)</strong></td>
<td>22.4%</td>
<td>26.3%</td>
<td>27.1%</td>
<td>8.3%</td>
</tr>
</tbody>
</table>

*P. Poortmans et al. / Radiotherapy and Oncology 72 (2004) 25–33*
### Tumor bed boost: TMH data

<table>
<thead>
<tr>
<th></th>
<th>LDR</th>
<th>HDR</th>
<th>Electrons</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cosmesis: Good to excellent</strong></td>
<td>301 (79%)</td>
<td>121 (79%)</td>
<td>294 (64%)</td>
<td>LDR vs Electrons: p=0.000003</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>HDR vs Electrons: p=0.0005</td>
</tr>
<tr>
<td><strong>Worsening of the cosmesis</strong></td>
<td>35 (9%)</td>
<td>19 (12%)</td>
<td>45 (10%)</td>
<td>NS</td>
</tr>
<tr>
<td><strong>Moderate to late sequelae</strong></td>
<td>49 (13%)</td>
<td>39 (25%)</td>
<td>45 (10%)</td>
<td>LDR vs HDR: p=0.0003, LDR vs Electrons: p=NS</td>
</tr>
<tr>
<td><strong>5 yr local control</strong></td>
<td>90%</td>
<td>92%</td>
<td>93%</td>
<td>HDR vs Electrons: p=0.0000009</td>
</tr>
</tbody>
</table>

*Budrukkar et al. Clinical Oncology 2008*
Delineation of lumpectomy cavity..
Delineation of lumpectomy cavity.. Techniques..

• Clinical (based on surgical scar )
• Surgical clips
• Ultrasound guided
• CT guided
• MRI
Surgical Scar

- Surgical scar at the centre of the tumor
- Simple and non invasive
- No additional costs

- Highly subjective
- Geographical miss
- Poor cosmetic outcome-Normal tissue irradiation
Surgical Clips

- Radio-opaque clips - 4 corners and centre
- Feasible – surgical cooperation
- Inexpensive
- Detection by fluoroscopy or CT
- Migration of clips
- Change in position over 3-4 months
Ultrasonographic Localization

• Intra-operative as well as postoperative
• Images compatible-RT planning systems
• Noninvasive
• Highly reproducible
• Less expensive

• Poor delineation 6-8 weeks postoperatively
• Underestimation of Tumor bed
CT Based delineation

- Accurate localization
- Planning in treatment position
- Excellent definition of breast tissue

- Difficult to distinguish glandular breast tissues from surrounding anatomy.
- Surgical clips necessary for delineation.
- Varies with window settings.
MRI

- Accurate delineation of target
- Accurate delineation of critical organs
- Expensive
- Difficulty in scanning in treatment position
- Image distortion during co registration of images for RT planning
TMH Experience ..
Tata Memorial Hospital
1022 patients
Tumor Bed Boost

Interstitial Brachytherapy (implant):

Low Dose Rate (LDR) $^{192}$Ir : 15-20 Gy

High Dose Rate (HDR) $^{192}$Ir: 10 Gy/1 #

Electron:

Appropriate energy (9 to 16 MeV) according to tumour bed depth (clinical data, mammo, CT) to a dose of 15 Gy/6 #
Tumor Bed Boost


No boost : n = 26
TMH Randomised trial

Stage I and II Breast Cancer
Treated with BCT
External RT: 45Gy in 25 fractions

HDR Implant — Electron Boost
10Gy single fraction — 15Gy in 6 fractions
LDR Brachytherapy

First BCT patient: 1980

HDR Brachytherapy
Identification of High Risk patients
Risk factors for Local Recurrence …

- Age was the only risk factor
- Max. benefit in reduction of LR was seen in young pts.
- Young pts were more radio-responsive.

<table>
<thead>
<tr>
<th>Age Group</th>
<th>LR (% at 5 yrs)</th>
<th>WBRT</th>
<th>WBRT+ boost</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;40 yrs</td>
<td>19.5</td>
<td>10.2</td>
<td></td>
</tr>
<tr>
<td>41-50 yrs</td>
<td>9.5</td>
<td>5.8</td>
<td></td>
</tr>
<tr>
<td>51-60 yrs</td>
<td>3.4</td>
<td>5.2</td>
<td></td>
</tr>
<tr>
<td>&gt;60 yrs</td>
<td>2.5</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

Risk factors for Local Recurrence ...

Risk factors for Local Recurrence..

- **Age** –
  - Young age pts had higher local failure rates.
  - They had greater reduction in LR %age.
- **Positive margin status** – Major risk factor for LR
  - No. of positive margins.
  - Width of clear surgical margin.
- **EIC** – EIC + ve pts had higher residual tumour outside reference tumour.
- **Tumour size, LVI, and histological grades** - controversial
- **Mitotic activity index** is investigational.

POLGÁR et al PATHOLOGY ONCOLOGY RESEARCH Vol 7, No 4, 2001
<table>
<thead>
<tr>
<th>Controversy</th>
<th>Suggested Guidelines</th>
<th>Level of Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>To boost or not to boost</td>
<td>To give boost to patients with higher risk of relapse.</td>
<td>I</td>
</tr>
<tr>
<td>Boost dose</td>
<td>15-20 Gy</td>
<td>I</td>
</tr>
<tr>
<td>Positive margins</td>
<td>Boost dose escalation.</td>
<td>III</td>
</tr>
<tr>
<td>Boost fractionation</td>
<td>Electrons: 2–2.5 Gy per fraction HDR Implant : 3-4 Gy per fraction</td>
<td>No definite evidence</td>
</tr>
<tr>
<td>Concomitant Boost</td>
<td></td>
<td>II</td>
</tr>
<tr>
<td>Technique of Boost delivery</td>
<td>Electrons or HDR Implant</td>
<td>I</td>
</tr>
<tr>
<td>Boost delineation</td>
<td>Electrons - CT with surgical clips HDR Implant – Ultrasound</td>
<td>III</td>
</tr>
<tr>
<td>Margins to tumour bed</td>
<td>Electrons - 2-3 cm HDR Implant – 1 cm</td>
<td>III</td>
</tr>
<tr>
<td>Ideal candidates for boost</td>
<td>Age&lt; 40yrs, EIC, LVI, Axillary nodes positive, Receptor negative</td>
<td>III</td>
</tr>
</tbody>
</table>

Accelerated Partial Breast Irradiation
Breast Conserving Therapy
Disadvantages

- Prolonged treatment for 5 weeks followed by boost poses problems for:
  - Working women
  - Elderly frail women
  - Patients who live at long distances

- Megavoltage Radiation not easily available at many places and is expensive

- Women with large breasts may have unacceptable toxicity with EBRT

- Around 10-14% of women undergoing BCT do not receive radiotherapy
Concept of Partial breast irradiation

- 70-90% recurrences after whole breast RT in the tumour bed and pattern for site of recurrence same whether RT given or not
- Small percentage of all BCT patients recur outside tumour bed
- Comparable to contralateral breast cancer recurrences
- Most of these outside recurrences are in fact New Breast Cancers
- Hence irradiation of tumor bed with margins
- Smaller volume of Radiation: Higher dose per fraction possible
- Acceleration of treatment over 1 week
- Accelerated Partial Breast Irradiation: APBI
## Selection Criteria for APBI

<table>
<thead>
<tr>
<th>Criteria</th>
<th>American Brachytherapy Society recommendation</th>
<th>TMH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>45 years or more</td>
<td>40 years</td>
</tr>
<tr>
<td><strong>Tumour size</strong></td>
<td>Up to 3cm</td>
<td>Up to 3 cm</td>
</tr>
<tr>
<td>Node</td>
<td>Negative</td>
<td>Negative</td>
</tr>
<tr>
<td><strong>Histology</strong></td>
<td>Infiltrating duct carcinoma (IDC)</td>
<td>IDC</td>
</tr>
<tr>
<td><strong>Margins</strong></td>
<td>Microscopically negative</td>
<td>Microscopically negative</td>
</tr>
<tr>
<td><strong>EIC</strong></td>
<td>-</td>
<td>Negative</td>
</tr>
</tbody>
</table>
### APBI studies in optimally selected patients

<table>
<thead>
<tr>
<th>Institution</th>
<th>Number of patients</th>
<th>Median Follow up (yrs)</th>
<th>Breast rec. (anywhere)</th>
<th>Outside the tumor bed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oshner Clinic</td>
<td>160</td>
<td>7</td>
<td>2.5%</td>
<td>1.2%</td>
</tr>
<tr>
<td>NIO Budapest</td>
<td>45</td>
<td>6.7</td>
<td>4.4 %</td>
<td>4.4 %</td>
</tr>
<tr>
<td>William Beaumont</td>
<td>199</td>
<td>5.4</td>
<td>1.2 %</td>
<td>0.6 %</td>
</tr>
<tr>
<td>Virginia Commonwealth</td>
<td>59</td>
<td>4.2</td>
<td>5.1 %</td>
<td>2.6 %</td>
</tr>
<tr>
<td>Orebro</td>
<td>49</td>
<td>4.6</td>
<td>4 %</td>
<td>2 %</td>
</tr>
<tr>
<td>RTOG 9517</td>
<td>99</td>
<td>3.7</td>
<td>3 %</td>
<td>NA</td>
</tr>
</tbody>
</table>

R Sarin, Nature Oncology 2005
# APBI in suboptimally selected patients

<table>
<thead>
<tr>
<th>Institution</th>
<th>APBI technique</th>
<th>No of patients (Median FU yrs)</th>
<th>Criticism</th>
<th>Breast Recurrence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Christie Hospital RCT</td>
<td>External Electrons, 40Gy/8#/10days</td>
<td>353 (8)</td>
<td>Lobular ca -15%, Margin NK or+ve 19%, Inadequate coverage</td>
<td>25%</td>
</tr>
<tr>
<td>Guys Hospital</td>
<td>LDR 55 Gy over 5 days</td>
<td>27 (6)</td>
<td>Positive margins 55%, EIC+VE 40%</td>
<td>37%</td>
</tr>
<tr>
<td>Uzsoki Hospital Budapest</td>
<td>LDR 50Gy in 10-22 hrs</td>
<td>70 (12)</td>
<td>Cut margin NK, single plane, unacceptable dose rate</td>
<td>24%</td>
</tr>
<tr>
<td>London Regional Cancer Centre Ontario</td>
<td></td>
<td>39 (7.5)</td>
<td>Av. Implant vol:30cc</td>
<td>16%</td>
</tr>
<tr>
<td>Tufts New England</td>
<td></td>
<td>33 (5)</td>
<td>55% EIC</td>
<td>6%</td>
</tr>
<tr>
<td>University of Kansas</td>
<td></td>
<td>25 (4)</td>
<td>Inadequate LDR dose</td>
<td>0%</td>
</tr>
</tbody>
</table>
Methods of APBI

Brachytherapy

- TARGIT

ELIOT

Mammosite

3DCRT

IMRT
# Ongoing Randomized trials

<table>
<thead>
<tr>
<th>Trial</th>
<th>Technique in APBI arm</th>
<th>Target accrual</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Institute of Oncology, Budapest, Hungary</td>
<td>HDR interstitial implant or electrons</td>
<td>257 patients: published results; comparable outcome</td>
</tr>
<tr>
<td><strong>ELIOT, Milan</strong></td>
<td>Intraoperative electrons</td>
<td>824 patients</td>
</tr>
<tr>
<td><strong>TARGIT, Multicentric trial</strong></td>
<td>Intraoperative 50 KV Xray</td>
<td>1700 Patients</td>
</tr>
<tr>
<td><strong>European Multicentre trial</strong></td>
<td>interstitial implant</td>
<td>Target accrual-1170 patients</td>
</tr>
<tr>
<td><strong>NSABP, USA</strong></td>
<td>Interstitial or MammoSite or 3D CRT</td>
<td>Target accrual-3000 patients Accrual closed for postmenopausal women</td>
</tr>
</tbody>
</table>
Procedure

• Intra-operative Brachytherapy
• Post operative brachytherapy
  – USG guided
  – CT scan guided
  – Fluoroscopy guided
  ❖ Template Guided
  ❖ Free Hand
APBI: Intraoperative Procedure
APBI: Post-operative Procedure
APBI: Intraoperative Template guided procedure
Brachytherapy Planning
Orthogonal X rays (2D brachytherapy)
Dose prescription and Treatment delivery

- Dose: 34Gy in 10 fraction two fractions per day, 6 hrs apart
- Dose per fraction: 340cGy
Intraoperative Brachytherapy

W/E+ Axillary dissection

Confirmation of basic histopathological features on Frozen section

If suitable: Intraoperative placement of catheters in 2-4 planes

Radiotherapy planning X rays and CT scans on day 2/3

Treatment starts: day 3/4

Confirmation of final HPR before 5th fraction

Favorable: continue brachy

Unfavorable: convert to boost

Ext RT to be followed
Immediate Post Treatment Pictures
Treatment of Regional Nodes
Internal Mammary Chain (IMC) Irradiation

- Involves external RT with mixed photon electron combination
- EORTC has conducted a randomized trial: IMC RT vs No IMC RT (results awaited)
- Disadvantages of external beam
  - Complex planning for photon /electron combinations
  - Use of Linear accelerators
  - Increased risk to heart and lungs due to photons
Potential advantages:

- Rapid fall off of the dose to the cardiac and other structures.
- IMC nodes lie around the vessels, which are anyway dispensable.
- Brachytherapy machine relatively more common and available (in developing countries).
Tumours more than 3 cms in central / inner quadrants with or without axillary nodes

High Dose Rate Ir-192 brachytherapy
34Gy in 10 fraction (BD) over 5 days starting on 3rd -5th post op day.
Dose prescribed at 1cm off axis.

Sarin R. IJROBP 2003 (abst) ;57:363
TATA MEMORIAL EXPERIENCE
IRIDIUM-192 HDR BRACHYTHERAPY FOR IMC
IN BREAST CANCER

Initiated in June 2001

>350 patients (June 2001- Dec06)

- Procedure failed in 3 initial patients (Learning curve)
- Vessel not identified (1), lumen too small to pass catheter (1), Catheter displaced (1)

Immediate complications

7 patients: minimal, asymptomatic, self limiting pleural collection

1 patient: mild self-limiting pneumothorax.

Small Learning Curve: All complications observed in the initial 10 patients

RECURRENCES:

1- Chest wall + Neck+ distant (Died); 2- Distant (alive)
SURFACE MOULD BRACHYTHERAPY FOR CHEST WALL

Brachytherapy for recurrent lesions: Surface mould