Recent Advances in Breast Cancer Treatment

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Recent Advances in Breast Cancer Treatment

- To achieve adequate local tumor control
- To determine accurate nodal staging
- To minimize breast deformity
- To correct breast defect and asymmetry
Recent Advances in Breast Cancer Treatment

- To achieve adequate local tumor control
- Intra-operative radiation therapy
- To determine accurate nodal staging
- To minimize breast deformity
- To correct breast defect and asymmetry
External beam radiation therapy

Established treatment after BCS

WBRT    - 2 Gy/ fraction, 5 F/ week,
- Total 25 fractions/ 5 weeks

Boost    - 2 Gy/F, 5 F (1 week)
What is a problem of ERT after BCS?

- **Patterns of failure** - most (85-90%)— in the vicinity of tumor bed
- elsewhere - ? new primary

“Not prevent by whole breast RT”
What is a problem of ERT after BCS?

- **ERT issues** - fear of RT
  - length of treatment *(5-6 weeks conventional fraction)*
  - convenience *(distance, economics)*
  - elderly, working women
Accelerated Partial Breast Irradiation (APBI)

Interstitial brachytherapy

3 D conformal ERT

MammoSite

IORT
- **Intra Operative Radiation Therapy**

- One type of APBI

- Radiation treatment in the operating room
Types of IORT

- 50 kV applicators
- Electron Cone

Siriraj

Veronesi
Intraoperative radiotherapy during breast conserving surgery: a study on 1,822 cases treated with electrons

Umberto Veronesi · Roberto Orecchia · Alberto Luini · Viviana Galimberti · Stefano Zurrida · Mattia Intra · Paolo Veronesi · Paolo Arnone · Maria Cristina Leonardi · Mario Ciocca · Roberta Lazzari · Pietro Caldarella · Nicole Rotmensz · Claudia Sangalli · Daniele Sances · Patrick Maisonneuve

Electron IORT

Thoracic chest wall protection
Intraoperative radiotherapy versus external radiotherapy for early breast cancer (ELIOT): a randomised controlled equivalence trial

Umberto Veronesi, Roberto Orecchia, Patrick Maisonneuve, Giuseppe Viale, Nicole Rotmensz, Claudia Sangalli, Alberto Luini, Paolo Veronesi, Viviana Galimberti, Stefano Zurrida, Maria Cristina Leonardi, Roberta Lazzari, Federica Cattani, Oreste Gentilini, Mattia Intra, Pietro Caldarella, Bettina Ballardini

ELIOT RCT
Veronesi 2013

- 48-75 y-o (93% > 50 y-o)
- Suitable for BCS
- Up to 2.5 cm (87% < 2 cm)
- *Allow up to 3 + nodes* (74% node negative)
- 81% IDC, 90% ER +
- 40% Luminal A,
- 51% Luminal B

21 Gy at level of 90% isodose line

ERT
654 pts

IORT
651 pts

1305 pts
Intraoperative radiotherapy versus external radiotherapy for early breast cancer (ELIOT): a randomised controlled equivalence trial

5.8 years f/u

T > 2 cm       Node + > 4             ** grade 3       ER -       Triple neg

5 yr IBTR 11.3% ** vs 1.5%

P = 0.0001

Overall

HR 9.3

IORT 4.4%

ERT 0.4%

IORT 96.8%

ERT 96.9 %

P = 0.59

OS
ERT vs IORT

6 yrs post ERT

1.5 yrs post IORT
Innovations in Breast Cancer Surgery

- To achieve adequate local tumor control

- To determine accurate nodal staging
  - Molecular detection of nodal metastasis

- To minimize breast deformity
  - Minimal invasive ablative techniques

- To correct breast defect and asymmetry
  - Reconstructive/oncoplastic surgery
Sentinel Node Concept

- Metastasis to regional lymph nodes is an **orderly progression** of tumor cells within the lymphatic system.

- **Primary draining or sentinel node** is the first to contain metastases.

- Biopsy of this sentinel node **can accurately predict axillary involvement**.

![Image of sentinel node biopsy](image)
Limitations of Histologic Evaluation

- Permanent Section H&E
  - 3 levels of 2-mm node piece = < 5% of node viewed
  - Will miss 10-15% of metastases > 0.2 mm
  - 1-3 day work

- Intra-operative Frozen Section/Imprint Cytology
  - Samples even less
  - Loss of tissue
  - More difficult to evaluate
  - Sensitivity limited (40%-85% vs permanent reported)
  - Non-standardized

- Experienced pathologist required
One Step Nucleic Acid Amplification (OSNA) Breast Cancer System

- A molecular assay to determine if there is metastasis in the lymph node
- Uses CK19 mRNA as a marker
- No prior purification of RNA required
- Uses Reverse-Transcription – Loop mediated isothermal amplification (RT-LAMP) for amplification
Processing of Lymph Node for OSNA Assay

- **Homogenization**: Lymph node
- **Centrifugation**: 3 min
- **Homogeneous Amplification & Detection**: 65°C, 16 min
Detection of Amplified Products

Sample measurement

Gene Amplification

Measure Turbidity (465nm)

Calculate Risetime (at turbidity = 0.1)

Calculate copy number

Judge: metastasis

By-Product (magnesium pyrophosphate: white)

Apply Standard curve
<table>
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<tr>
<th>Country</th>
<th>Sensitivity (%)</th>
<th>Specificity (%)</th>
<th>Accuracy (%)</th>
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<td>Spain</td>
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<td>Snook et al, BJS 2011</td>
<td>UK</td>
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<td>Feldman et al, Cancer 2011</td>
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<td>Siriraj Experience, 2012</td>
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<td><strong>85.7</strong></td>
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Innovations in Breast Cancer Surgery

- To achieve adequate local tumor control
  - Intra-operative margin assessment
- To determine accurate nodal staging
  - Molecular detection of nodal metastasis
- To minimize breast deformity
  - Lipofilling/dermal fat graft
- To correct breast defect and asymmetry
  - Reconstructive/oncoplastic surgery
Coleman Fat Grafting Technique
Coleman Fat Grafting Technique

- Fat tissue
- Blood, tumescent solution
Breast Lipofilling

- Lipo-aspirate contains stem cells
- Proangiogenic capabilities
- Treatment radiotherapy induced soft tissue damage

**How much volume?**
- Donor site availability
- Up to 380cc each breast
- Aim to over correct volume (~30%)
- Volume stable 3-4 months post op
Autologous Free Dermal Fat Graft
Mammogram at 24 months

BIRADDS 2
Free Dermal Fat Graft Siriraj Experience (N=96)

- Breast conservation therapy by using autologous FDFG for reconstruction is Efficient
  - Simple
  - Safe

  No interference with radiologic imaging reports

  Ensures oncologic safety
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New Techniques and Approaches

- Skin sparing and NAC sparing mastectomy
- Free muscle-sparing TRAM flap and DIEP flap
- Oncoplastic breast conservation
- Corrective surgery and symmetry surgery
Total Mastectomy
Skin-sparing Mastectomy with TRAM Flap
Nipple sparing mastectomy
Nipple sparing mastectomy
NAC-sparing Mastectomy + TRAM Flap Reconstruction
Free MS TRAM Flap and Free DIEP Flap
Prophylactic mastectomy for hereditary breast cancer with implant reconstruction
Advantages of Breast Conserving Oncoplastic Surgery

- May allow removal of larger amounts of breast tissue with safer margins without compromising the cosmetic outcome
- Less technically demanding and time consuming than major reconstructive operations
- Usually require limited training to be properly performed by surgeons experienced in routine breast surgery
- Procedures are usually performed in a single surgical access, and the patient leaves the operating room without major residual asymmetry or deformity.

LD Flap for Reconstruction of Upper Hemimastectomy Defect
Conclusions

- Recent development in breast cancer treatment has been demonstrated here.

- Several new techniques in breast cancer treatment are available that may improve patient outcome in terms of maximum tumor control with minimum morbidity to patients.

- The interdisciplinary cooperation of clinicians, diagnostic radiologist and pathologists are crucial in which all must speak the same “language”.
Thank you for your attention