Principles of Breast Surgery
Oncoplastic Surgery

Maria João Cardoso, MD, PhD
Head Breast Surgeon
Breast Unit, Champalimaud Foundation
Assistant Professor, Nova Medical School
Lisbon, Portugal
Conflict of Interest Disclosure

• No financial relationships to disclose
Surgery for early breast cancer

- Conservative (BCT) vs Mastectomy
- Oncoplastic Surgery
- Delayed Reconstruction vs Immediate Reconstruction
- Total mastectomy vs Skin Sparing Mastectomy
- Surgery after primary systemic treatment (PST)
- Sentinel Node vs Axillary dissection
- New options
Conservative (BCT) vs Mastectomy

MRM vs BCT
Randomized trials
Meta-analysis

Comparable local control, Overall survival

Better cosmetic outcome
Conservative (BCT) vs Mastectomy

Figure 1. Temporal Trends in Surgical Treatment of Early Breast Cancer

Figure 3. Temporal Trends in Type of Mastectomy for Early Breast Cancer

Kummerow K
JAMA Surg 2015
- Conservative (BCT) vs Mastectomy

Gu J.
Clin Med Insights Oncol. 2017
Conservative (BCT) vs Mastectomy

Original Investigation
Effect of Breast Conservation Therapy vs Mastectomy on Disease-Specific Survival for Early-Stage Breast Cancer

Shallesh Agarwal, MD; Lisa Pappas, MS; Leigh Neumayer, MD; Kristine Kokeny, MD; Jayant Agarwal, MD

<table>
<thead>
<tr>
<th></th>
<th>BCT</th>
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<td>5Y BCSSR</td>
<td>97%</td>
<td>94%</td>
<td>90%</td>
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<tr>
<td>10Y BCSSR</td>
<td>94%</td>
<td>90%</td>
<td>83%</td>
<td>&lt;.001</td>
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CONCLUSIONS AND RELEVANCE  Patients who underwent BCT have a higher breast cancer–specific survival rate compared with those treated with mastectomy alone or mastectomy with radiation for early-stage invasive ductal carcinoma. Further investigation is warranted to understand what may be contributing to this effect.

Breast conserving therapy and mastectomy revisited: Breast cancer-specific survival and the influence of prognostic factors in 129,692 patients

Mirelle Lagendijk, Marissa C. van Maaren, Sepideh Saadatmand, Luc J.A. Strobbe, Philip M.P. Poortmans, Linetta B. Koppert, Madeleine M.A. Tilanus-Linthorst and Sabine Siesling

Gentilini 2017, Breast
Van Maaren 2017 IJC
JAMA Surg. 2014

"Sometimes patients demand a mastectomy, driven by fear and the desire of getting rid of the disease while ignoring all this new information. It is important to inform them properly that, in most cases, breast cancer can be cured maybe even better without the need to be separated from their breasts."
Conservative (BCT) vs Mastectomy

Contra-indications for BCT

In aggregate, in the following clinical situations the increased risk of breast relapse should be extensively discussed with the patient and breast conservation should be executed with caution:

- very young woman (<35 years),
- the presence of extensive DCIS (heralded by extensive microcalcifications) mounting up to one quarter of the breast,
- more than focally incomplete resection of an invasive or in situ cancer,
- and in the case that radiotherapy cannot be given.

In all other clinical situations breast conservation is a safe option, provided complete resections are achieved and good cosmetic outcome is secured.


Who should not undergo breast conservation?
Nijenhuis MV1, Rutgers EJ.

Curr Treat Options Oncol. 2015 Apr;16(4):16.

Breast cancer under age 40: a different approach.
Ribnikar D1, Ribeiro JM, Pinto D, Sousa B, Pinto AC, Gomes E, Moser EC, Cardoso MJ, Cardoso F.

Maria João Cardoso
Conservative (BCT) vs Mastectomy

Margins

The association of surgical margins and local recurrence in women with early-stage invasive breast cancer treated with breast-conserving therapy: a meta-analysis.
Houssami N1, Macaskill P, Marinovich ML, Morrow M.

Society of Surgical Oncology-American Society for Radiation Oncology consensus guideline on margins for breast-conserving surgery with whole-breast irradiation in stages I and II invasive breast cancer.
Ann Surg Oncol. 2014 Mar;21(3):704-16
J Clin Oncol. 2014 Feb 10
- **Conservative (BCT) vs Mastectomy**

1. **Positive margins**

   A positive margin, defined as ink on invasive cancer or ductal carcinoma in situ (DCIS), is associated with at least a 2-fold increase in IBTR. This increased risk in IBTR is not nullified by:

   a) Delivery of a boost dose of radiation

   b) Delivery of systemic therapy (endocrine therapy, chemotherapy, or biologic therapy), or

   c) Favorable biology

2. **Negative margin widths**

3. **Systemic therapy**

4. **Biologic subtypes**

5. **Radiation therapy delivery**

6. **Invasive lobular carcinoma and lobular carcinoma in situ**

7. **Young age**

   Young age (≤40 years) is associated with both increased IBTR after BCT as well as increased local relapse on the chest wall after mastectomy, and is also more frequently
**Conservative (BCT) vs Mastectomy**

The margin status of invasive carcinoma did not influence IBTR, DM rate, or OS. Between 1980 and 2008, locoregional control after BCT remained stable with low IBTR rates, even in young patients.


*Very low local recurrence rates after breast-conserving therapy: analysis of 8485 patients treated over a 28-year period.*

- Conservative (BCT) vs Mastectomy

Still 30% of fair/poor results

Can we improve those results
Conservative (BCT) vs Mastectomy

http://medicalresearch.inescporto.pt/breastresearch

Towards an intelligent medical system for the aesthetic evaluation of breast cancer conservative treatment.
Cardoso JS1, Cardoso MJ.
Oncoplastic Surgery

When a resection of more than 20% of breast volume is planned oncoplastic techniques are recommended and can prevent major deformities.

Current approaches to managing partial breast defects: the role of conservative breast surgery reconstruction.
Munhoz AM1, Montag E, Filassi JR, Gemperli R.
· Oncoplastic Surgery

Objective decision making between conventional and oncoplastic breast-conserving surgery or mastectomy: An aesthetic and functional prospective cohort study.

Figure 3. The algorithm used to determine the appropriate surgical strategy, considering the maximal volume of breast volume loss.
Oncoplastic Surgery

- Oncoplastic surgery is **tumor specific immediate breast reconstruction**.

- It represents the **integration of plastic surgery techniques into breast cancer surgery** in order to preserve aesthetical outcomes and quality of life of the patients, without compromising local control of disease.

- It is based on three surgical principles: **ideal breast cancer surgery with free tumour margins, immediate breast reconstruction, and immediate symmetry with the other breast.**
Oncoplastic Surgery

Although oncoplastic surgery is considered to be a major technical improvement it is associated with larger scars, increased complications and an increasing need for contralateral breast surgery.
Oncoplastic Surgery

Pros
- Wider excisions - Better margins
- Equal/ Less recurrences
- Overall better cosmetic outcomes ????

Cons
- Trained teams
- Higher cost
- Higher complication rate
- Possible delay of adjuvant treatments ???
- Planning of radiotherapy more difficult

Which technique to use for each case?
- **Oncoplastic Surgery**
  - **Breast cancer conservative treatment**
    - Simple
    - With local flaps
    - Therapeutic mammaplasty
    - LD miniflap
    - Perforator flaps
    - FAT injection
  - **Mastectomy**
    - Implants
    - Implants with ADM
    - LD with implant
    - LD autologous
    - TRAM
    - DIEAP, SGAP....
    - FAT injection
    - CL breast

*Fashionable surgery*
Oncoplastic Surgery

### TABLE 2. Articles Reporting Local-Regional and Distant Recurrence Rates

<table>
<thead>
<tr>
<th>Reference</th>
<th>Patients/Cases</th>
<th>Mean/Median Follow-up, mo</th>
<th>Stages Included</th>
<th>Local-Regional Recurrence Rate</th>
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<tr>
<td>Caruso et al22 (2011)*</td>
<td>50/52</td>
<td>72.6</td>
<td>0 to IIIB</td>
<td>1 (1.9%)</td>
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<td>Chang et al10 (2004)</td>
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<td>Chang et al6 (2012)</td>
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<td>2 (2.3%)</td>
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<tr>
<td>Clough et al*</td>
<td>175/175</td>
<td>49</td>
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<td>3 (1.7%)</td>
<td>11 (6.3%)</td>
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<td>Currie et al23</td>
<td>20/20</td>
<td>36</td>
<td>I and II</td>
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<tr>
<td>Denewer et al24*</td>
<td>50/50</td>
<td>20</td>
<td>I and II</td>
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<tr>
<td>Eaton et al25</td>
<td>86/86</td>
<td>54</td>
<td>0 to III</td>
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<td>Grubnik et al17*</td>
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<td>47</td>
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<td>Santanelli et al19</td>
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*Studies that utilized intraoperative frozen section.
Oncoplastic Surgery

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<th>Reference</th>
<th>Year</th>
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<td>2009</td>
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<td>26.5</td>
<td>Yes</td>
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Outcomes Following Oncoplastic Reduction Mammoplasty: A Systematic Review.
Piper ML, Esserman LJ, Sbitany H, Peled AW.
Ann Plast Surg. 2016 May;76 Suppl 3:S222
- Delayed Reconstruction vs Immediate Reconstruction

Is immediate autologous breast reconstruction with postoperative radiotherapy good practice?: a systematic review of the literature.
Schaverien MV, Macmillan RD, McCulley SJ.
• Delayed Reconstruction vs Immediate Reconstruction
Delayed Reconstruction vs Immediate Reconstruction
- **Delayed Reconstruction vs Immediate Reconstruction**

- Reconstruction should be offered to all mastectomy patients and all techniques should be discussed even if not available locally.

- Immediate reconstruction can be performed in the majority of patients and does not reduce radiation efficacy.

- Patients who will probably need radiotherapy should be advised about the possibility of a poorer cosmetic outcome.
Total mastectomy vs Skin Sparing Mastectomy

Breast Reconstruction following Nipple-Sparing Mastectomy: Predictors of Complications, Reconstruction Outcomes, and 5-Year Trends.
Colwell AS, Tessler O, Lin AM et al.
Total mastectomy vs Skin Sparing Mastectomy
- Total mastectomy vs Skin Sparing Mastectomy
Surgery after primary systemic treatment (PST)

.....without ever forgetting the importance of each discipline
**Surgery after primary systemic treatment (PST)**

- Primary systemic treatment (PST) is responsible for a greater percentage of BCT.

- All patients proposed to PST should have their tumor marked before initiating treatment.

- Candidates to PST are those whose tumor breast size ratio doesn’t allow conservative treatment with a favorable cosmetic outcome and those with locally advanced breast cancer (LABC).

- Biologic subtypes - Her2 positive/triple negative -” if not stage I “ (benefit of PST upfront)
SELECTION CRITERIA FOR BEST CANDIDATES

Factors that can predict high likelihood for pCR
TNBC, high grade, high Ki67 in ER +, HER+, young age

Higher likelihood:
- Age: < 40 years
- Tumor size: < 2 cm
- Histology: ductal
- Grade: high (G3)
- Proliferation: high Ki67
- ER: negative
- Intrinsic subtype: Basal-like or HER2-enriched

Lower likelihood:
- Age: ≥ 60 years
- Tumor size: > 4 cm
- Histology: lobular
- Grade: low (G1)
- Proliferation: low Ki67
- ER: positive
- Intrinsic subtype: luminal A

• Surgery after primary systemic treatment (PST)
  • Initial work-up of locorregional disease
  • Monitoring response to treatment
  • Axillary approach
  • BCS after treatment
  • Reconstructive surgery
Surgery after primary systemic treatment (PST)

Pre-treatment work-up

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Meta-analysis of Magnetic Resonance Imaging in Detecting Residual Breast Cancer After Neoadjuvant Therapy.


- Surgery after primary systemic treatment (PST)

Tattooing
• Surgery after primary systemic treatment (PST)
- Surgery after primary systemic treatment (PST)
Impact of neoadjuvant chemotherapy and pathological complete response on eligibility for breast-conserving surgery in patients with early breast cancer: A meta-analysis

Carmen Criscitiello, Mehra Golshan, William T Barry, Giulia Viale, Stephanie Wong, Michele Santangelo, Giuseppe Curigliano

European Journal of Cancer 2018 May 4, 97: 1-6

- Meta-analysis of randomised trials evaluating pCR and surgical outcomes after neoad NST in patients EBC.
- The primary outcome was breast-conserving surgery (BCT) rate.
- Secondary outcomes were pCR rate and association to BCT.
- BCT rate ranged 5-76% across arms with an average BCT of 57% (95% CI 52-62%).
- In the subset of 14 multi-arm studies, no significant association was seen between the differences in pCR and BCT between treatment arms (p Z 0.27).
- pCR does not increase BCT in patients receiving NST for EBC.

Fig. 3. (A) Scatterplot of the reported rate of patients who achieved pCR versus the rate who underwent breast-conserving therapy per study treatment arm. (B) Scatterplot of the absolute difference in pCR between arms and the log odds of BCT between arms in 18 pairwise contrasts of multi-arm trials. Point sizes are drawn proportional to number of patients in the paired arms. No statistically significant association was observed. pCR, pathological complete response.
Sentinel Node vs Axillary dissection

Sentinel node biopsy is actually considered standard of care in patients with clinically and ultrasound negative axillae

Sentinel Node vs Axillary dissection

Recommendations

- **Clinicians should not recommend** ALND for early-stage breast cancer without nodal metastases.
- **Clinicians should not recommend** ALND for women with early-stage breast cancer who have one or two sentinel lymph node metastases and will receive breast-conserving surgery (BCS) with conventionally fractionated whole-breast radiotherapy.
- **Clinicians may offer** ALND for women with early-stage breast cancer with nodal metastases found on SNB who will receive mastectomy – RT/no RT
- **Clinicians may offer** SNB for women who have operable breast cancer who have the following circumstances:
  - DCIS/mastectomy
  - Prior breast/axillary surgery
  - PST
- There are **insufficient data to change the 2005 recommendation** that clinicians should not perform SNB for women who have early-stage breast cancer and are in the following circumstances:
  - LABC N2/N3 / Inflammatory -ALND
  - DCIS in BCS - Nothing
Omission of axillary dissection cN-, SLN+

- ACOSOG Z0011

Axillary dissection
0.5% regional recurrence\(^1,2\)

No axillary dissection
0.9\(^1\)→1.1\(^2\) regional recurrence

## Sentinel Node vs Axillary Dissection

### Ongoing trials on axillary management

#### Z0011 validation

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<tr>
<th>Country/Name</th>
<th>Inclusion</th>
<th>Question</th>
<th>Endpoint</th>
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<tr>
<td>1 China, &quot;Z0011&quot;</td>
<td>T1-2 cN0 1-2SN+</td>
<td>ALND vs no ALND in SLN pos</td>
<td>DFS</td>
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<td>2 France, &quot;Z0011”, SERC/IPC 2012-001</td>
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<td>3 UK, Posnoc-Trial</td>
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<td>4 Netherlands, BOOG 2013–07</td>
<td>cT1-2 cN0</td>
<td>Ax. treatment vs no ax. treatment in SLN pos after mastectomy</td>
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<td>5 Sweden, SENOMAC</td>
<td>T1-3 cN0 T1-3 iN1 1-2 SN+</td>
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<td>6 USA, Alliance A011202</td>
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<td>ALND + RNI vs ART + RNI in SLN pos after NACT</td>
<td>IBC-RFI</td>
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<td>7 Germany, INSEMA</td>
<td>T1-2 cN0</td>
<td>no SLN vs. SLN; SLN pos → ALND vs no ALND (Z0011 validation) in all cases no RNI</td>
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Sentinel Node vs Axillary Dissection

Omission of ALND in cN+ patients
Sentinel after chemotherapy

- cN+ → cN0: SLN-> back up ALND

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<tr>
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<th>SENTINA</th>
<th>SN-FNAC</th>
<th>Swedish$^1$</th>
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<td>n</td>
<td>663</td>
<td>592</td>
<td>153</td>
<td>195</td>
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<tr>
<td>Identification</td>
<td>93%</td>
<td>80%</td>
<td>87.6%</td>
<td>77.9%</td>
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<tr>
<td>FNR overall</td>
<td>12.6%</td>
<td>14%</td>
<td>8.4%</td>
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<td>FNR with ≥ 3 SLN</td>
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<td>&lt;10%</td>
<td>4.9% (≥ 2 SLN)</td>
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Axilla – NEOTARGET

Axilla +

MDT - NAC

NAC SURGERY

T0 recruitment

T1-3; N1,M0 Invasive Breast Cancer

Axillary ultrasound + marking one metastatic proven node (carbon dye and clip)

Neoadjuvant chemotherapy

Axillary ultrasound reevaluation

3 weeks

Positiv

Negativ

SLN + tagged node biopsy

Positiv

Negativ

Axillary clearance
Sentinel Node vs Axillary Dissection

- For patients with operable BC who are candidates for PST, ultrasound of the axilla and FNA/CB of suspicious lymph nodes should be considered as part of the staging workup (quantify and mark).
- SNB before PST does not offer particular clinical advantages and reduces the number of patients who could benefit from the down-staging effect of PST in the axillary nodes.
- SNB after PST is feasible and accurate with similar performance to SNB before PST (bigger samples). Neo-adjuvant protocol.
- By performing SNB after PST, up to 40 percent of patients who present with minimal involvement of axillary nodes may be spared from axillary dissection.
- Caution in patients who present with involved nodes before PST (until further results of prospective trials are obtained).
## New options

### NO SURGERY AFTER COMPLETE RESPONSE

<table>
<thead>
<tr>
<th>TABLE 1 Completed, ongoing, and planned clinical feasibility trials utilizing percutaneous biopsy after neoadjuvant therapy to select patients for omission of breast cancer surgery</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Status</strong></td>
</tr>
<tr>
<td>Completed trials</td>
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</tbody>
</table>

Surgeons are resourceful human beings