Oncoplastic and Reconstructive Surgery

Diagnosis and Treatment of Patients with early and advanced Breast Cancer

© AGO e. V.
in der DGGG e.V.
sowie
in der DKG e.V.
Guidelines Breast
Version 2021.1E
Plastic-reconstructive aspects after mastectomy

- **Versions 2002–2020:**
  Audretsch / Bauerfeind / Blohmer / Brunnert / Dall / Ditsch / Fersis / Friedrich / Gerber / Hanf / Kühn / Kümmel / Lux / Nitz / Rezai / Rody / Scharl / Solbach / Thomssen

- **Version 2021:**
  Thill / Heil
Definition of oncoplastic surgical procedures

Use of plastic surgical techniques at the time of tumor removal to enable safe resection margins and to preserve aesthetic breast contour.

Focus on favorable scar placement, adequate soft tissue formation, choice of proper reconstruction procedure (including in the context of radiation) and reconstruction of the contralateral side to achieve symmetric results.
Classifications

1. By Hoffmann/Wallwiener:
Classification by reconstructive surgery complexity with respect to breast conservation and mastectomy: PubMed Central, Figure 1: BMC Cancer. 2009; 9: 108. Published online 2009 Apr 8. doi: 10.1186/1471-2407-9-108 (nih.gov)

2. By Clough:
Oncoplastic classification for breast conservation according to relative resection volume: Level 1: < 20% of breast volume resection („simple oncoplastic surgery“) and Level 2 > 20% of breast volume resection with quadrant per quadrant techniques of mastopexy.
Oncoplastic breast conserving surgery (OPS)

- OPS may replace mastectomy in selected patients 2b B +
- OPS and BCS are oncologically equivalent 2b B +
- Aesthetic outcome of OPS might be better in selected cases 2b B +
- Complication rates of OPS and BCS are similar 3b C +
Algorithm of Breast Reconstruction

Patient wishes to undergo breast reconstruction
N.B.: Habitus, breast volume, wishes, previous surgery

No postmastectomy radiotherapy

SSM/NSM and implantation
or
MRM + tissue expander → Implant
or
not suitable for alloplastic reconstruction or wish of patient → autologous reconstruction

Postmastectomy radiotherapy indicated

Mastectomy
à Radiotherapy
à Delayed autologous reconstruction

Not suitable for autologous reconstruction
E.g. too little subcutaneous fat, wishes of patient

Direct prosthesis reconstruction or two-staged implant-based reconstruction:
MRM → Tissue expander → Implant
+ Radiotherapy
N.B.: Increased complication rate, particularly capsular fibrosis

To be discussed in individual cases:
Immediate autologous reconstruction
N.B.: Increased fibrosis rate

Delayed prosthesis reconstruction
N.B.: Increased complication rate
Breast Reconstruction Principles

Good Clinical Practice

AGO: ++

- Planning of reconstructive procedure by interdisciplinary tumor board before mastectomy
- Counseling regarding all surgical techniques, including advantages and disadvantages
- Preference for autologous reconstruction after radiotherapy or if radiotherapy is planned
- Offer second opinion
- Discussion of neoadjuvant treatment if unfavorable tumor-breast-relation
- Consideration of contralateral breast;
  - discuss possible alignment / sequencing surgical procedures to produce symmetry;
    usually after at least 3-6 months (Caveat: need for post-resections, consider effects of radiotherapy for affected side)
- Preference for less stressful surgical technique with stable long-term aesthetic result (prefer BCS / OPS over mastectomy)
- Avoid delay of adjuvant therapy due to reconstruction
- Assessment of outcome (e.g. PROM)
- Ensure that oncologic safety is not impaired
Postmastectomy Reconstruction

- Use of silicone gel filled breast implants one step or two steps after expander
  - Safety comparable to saline implants
- Autologous tissue reconstruction
- Pedicled tissue reconstruction
- Free tissue reconstruction (including vascular anastomoses)
- Autologous tissue procedure plus implants

<table>
<thead>
<tr>
<th>Oxford</th>
<th>LoE</th>
<th>GR</th>
<th>AGO</th>
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<tbody>
<tr>
<td></td>
<td>2a</td>
<td>B</td>
<td>+</td>
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<td></td>
<td>2b</td>
<td>B</td>
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<td></td>
<td>3a</td>
<td>C</td>
<td>+/-</td>
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</table>

Caveat: BMI >30, smoking status, diabetes, radiotherapy, age, bilateral mastectomy
## Timing of Reconstruction

<table>
<thead>
<tr>
<th>Timing of Reconstruction</th>
<th>Oxford</th>
<th>LoE</th>
<th>GR</th>
<th>AGO</th>
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</thead>
<tbody>
<tr>
<td>Immediate breast reconstruction</td>
<td>3b</td>
<td>B</td>
<td>++</td>
<td></td>
</tr>
<tr>
<td>▪ Mandatory: SSM/NSM</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>▪ Avoidance of a postmastectomy syndrome</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Delayed breast reconstruction (2-step)</td>
<td>3b</td>
<td>B</td>
<td>++</td>
<td></td>
</tr>
<tr>
<td>▪ No interference with adjuvant procedures (CHT, RT)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>▪ Disadvantage: loss of skin envelope</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>„Delayed-immediate“ breast reconstruction (placeholder before definitive reconstruction)</td>
<td>3b</td>
<td>B</td>
<td>+</td>
<td></td>
</tr>
</tbody>
</table>
## Timing of implant Based Reconstruction and Radiotherapy

<table>
<thead>
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<th>Oxford</th>
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<tbody>
<tr>
<td>IR reconstruction (IR)</td>
<td>2a</td>
<td>B</td>
<td>+</td>
</tr>
<tr>
<td>IR without radiotherapy</td>
<td>2a</td>
<td>B</td>
<td>++</td>
</tr>
<tr>
<td>IR prior to radiotherapy</td>
<td>2a</td>
<td>B</td>
<td>+</td>
</tr>
<tr>
<td>IR following radiotherapy</td>
<td>2b</td>
<td>B</td>
<td>+/-</td>
</tr>
<tr>
<td>IR following secondary mastectomy (after BCS* with radiotherapy)</td>
<td>2a</td>
<td>B</td>
<td>+/-</td>
</tr>
<tr>
<td>Perioperative antibiotic prophylaxis (max. 24 hours)</td>
<td>2a</td>
<td>B</td>
<td>+</td>
</tr>
</tbody>
</table>

* BCS: Breast Conserving Surgery
Metaanalysis of Prophylactic Antibiotics >24h in Implant-based Immediate Breast Reconstruction (IBR)

- 11 studies (15,966 mastectomy procedures)
- Three studies comparing topical antibiotics with no topical antibiotics demonstrated statistical significance (RR= 0.26, 95% CI: 0.12–0.60, \( P = 0.001 \))
- 8 studies comparing extended systemic antibiotics with standard of care found no statistical significance (RR = 0.80, 95% CI: 0.60–1.08, \( P = 0.13 \)).

LoE 2a B

In the setting of immediate breast reconstruction (IBR) following mastectomy, there is insufficient evidence for the use of extended prophylactic antibiotics to reduce surgical site infection (SSI) rates. Well-designed randomized controlled trials in patients undergoing IBR should be conducted to determine the appropriate regimen and/or duration of prophylactic antibiotics on SSI outcomes.
Radiotherapy and 
Implant-based Reconstruction

Cave: High complication rate in combination with radiotherapy (capsular contracture, revision surgery, reconstruction failure, reduced cosmetic outcome and patient satisfaction)

Cave: Lower patient satisfaction with implant-based reconstruction plus radiotherapy compared to autologous reconstruction plus radiotherapy

LoE 2b B
Possible Associations between Implants and rare Diseases

- **US FDA Breast Implant Postapproval Studies (LPAS)**
  
  *Long-term Outcomes in 99,993 Patients*
  
  *(Primary Augmentation: N= 71,937 / Primary Reconstruction: N= 9942)*
  
  - 56% of implants were silicone implants

- Possible Associations:
  
  - Sjogren syndrome: (SIR* 8.14)
  - scleroderma: (SIR 7.00)
  - rheumatoid arthritis: (SIR 5.96)
  - stillbirth: (SIR 4.50)
  - melanoma: (SIR 3.71)

- At 7 years, reoperation rate is 11.7% for primary augmentation, and 25% for primary/revision reconstruction.

- One case of BIA-ALCL

Associations need to be further analyzed with patient-level data to provide conclusive evidence!

*Standardized incidence ratio*
### Possible Associations between Implants and rare Diseases

#### Rare Systemic Harms Compared With the General Population:

<table>
<thead>
<tr>
<th>Rare Disease</th>
<th>Manufacturer</th>
<th>Study Events</th>
<th>Study Event Rate (Per 10,000 Person Yr)</th>
<th>General Population Event Rate (Per 10,000 Person Yr)</th>
<th>SIR</th>
<th>SIR 95% CI</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fibromyalgia</td>
<td>Allergan</td>
<td>9</td>
<td>1.8</td>
<td>112.8</td>
<td>0.02</td>
<td>0.01–0.03</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td></td>
<td>Mentor</td>
<td>807</td>
<td>28.4</td>
<td>112.8</td>
<td>0.25</td>
<td>0.22–0.28</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Rheumatoid arthritis</td>
<td>Allergan</td>
<td>4</td>
<td>0.8</td>
<td>5.4</td>
<td>0.15</td>
<td>0.04–0.38</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td></td>
<td>Mentor</td>
<td>349</td>
<td>32.2</td>
<td>5.4</td>
<td>5.96</td>
<td>5.35–6.62</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Scleroderma</td>
<td>Mentor</td>
<td>46</td>
<td>4.2</td>
<td>0.6</td>
<td>7.00</td>
<td>5.12–9.34</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Sjogren syndrome</td>
<td>Mentor</td>
<td>62</td>
<td>5.7</td>
<td>0.7</td>
<td>8.14</td>
<td>6.24–10.44</td>
<td>&lt;0.001</td>
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<tr>
<td>Systemic lupus erythematosus</td>
<td>Allergan</td>
<td>3</td>
<td>0.6</td>
<td>5.4</td>
<td>0.11</td>
<td>0.02–0.32</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td></td>
<td>Mentor</td>
<td>66</td>
<td>6.0</td>
<td>5.4</td>
<td>1.11</td>
<td>0.86–1.41</td>
<td>0.398</td>
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<tr>
<td>Cancer</td>
<td>Allergan</td>
<td>80</td>
<td>16.0</td>
<td>41.3</td>
<td>0.39</td>
<td>0.31–0.48</td>
<td>&lt;0.001</td>
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<tr>
<td></td>
<td>Mentor</td>
<td>532</td>
<td>63.8</td>
<td>41.3</td>
<td>1.54</td>
<td>1.42–1.68</td>
<td>&lt;0.001</td>
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<tr>
<td>Breast cancer</td>
<td>Mentor</td>
<td>116</td>
<td>13.9</td>
<td>12.5</td>
<td>1.11</td>
<td>0.92–1.33</td>
<td>0.26</td>
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<tr>
<td>Lung cancer</td>
<td>Mentor</td>
<td>5</td>
<td>0.6</td>
<td>5.2</td>
<td>0.12</td>
<td>0.04–0.27</td>
<td>&lt;0.001</td>
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<tr>
<td>Brain cancer</td>
<td>Mentor</td>
<td>9</td>
<td>0.4</td>
<td>0.6</td>
<td>0.67</td>
<td>0.14–1.95</td>
<td>0.839</td>
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<tr>
<td>Melanoma</td>
<td>Mentor</td>
<td>65</td>
<td>7.8</td>
<td>2.1</td>
<td>3.71</td>
<td>2.87–4.73</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Neurological disorder</td>
<td>Allergan</td>
<td>18</td>
<td>3.6</td>
<td>22.5</td>
<td>0.16</td>
<td>0.09–0.25</td>
<td>&lt;0.001</td>
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<tr>
<td></td>
<td>Mentor</td>
<td>394</td>
<td>35.8</td>
<td>22.5</td>
<td>1.59</td>
<td>1.44–1.76</td>
<td>&lt;0.001</td>
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<tr>
<td>Multiple sclerosis</td>
<td>Mentor</td>
<td>47</td>
<td>4.3</td>
<td>2.5</td>
<td>1.72</td>
<td>1.26–2.29</td>
<td>0.001</td>
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<tr>
<td>Myositis</td>
<td>Mentor</td>
<td>17</td>
<td>1.5</td>
<td>0.8</td>
<td>1.88</td>
<td>1.09–3.00</td>
<td>0.018</td>
</tr>
</tbody>
</table>

**Allergan follow-up 2 years**
**Mentor follow-up 7 years**

Oncoplastic and Reconstructive Surgery
Breast Implant Associated Anaplastic Large Cell Lymphoma (BIA-ALCL)

- Approximately 10,000,000 implant carriers
- Rare disease, 3% of Non-Hodgkin Lymphomas, 0.04-0.5% of all malignant breast diseases
- 1:3,000 – 30,000 in women with textured implants (caveat: underreporting!)
- Estimated incidence 0.6-1.2 / 100,000 women with implants (median age: 54 y)
- Mainly associated with textured implants
- Interval to diagnosis: 8 years (median)
- Clinical symptoms
  - Swelling and seroma. (60%)
  - Solid tumor (17%)
  - Seroma and solid tumor (20%)
- Histology: CD30+ / ALK-T-Cell Lymphoma
- Mandatory registration as SAE (§3 MPSV to BfArM)
The cause of BIA-ALCL is not established; however, it has been proposed that lymphomagenesis may be driven by a chronic inflammatory reaction induced by capsule contents or surface. The risk for BIA-ALCL has been shown to be significantly higher for implants with grade 3 and 4 surfaces.

<table>
<thead>
<tr>
<th>Process</th>
<th>Polyurethane foam</th>
<th>Salt Loss (Biocell/Eurosilicone)</th>
<th>Gas Diffusion</th>
<th>Salt Loss (Nagotex)</th>
<th>Imprinting</th>
<th>Smooth/Nano</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface Area</td>
<td>high</td>
<td>intermediate</td>
<td>intermediate</td>
<td>low</td>
<td>low</td>
<td>minimal</td>
</tr>
<tr>
<td>Roughness</td>
<td>high</td>
<td>intermediate</td>
<td>low</td>
<td>low</td>
<td>low</td>
<td>minimal</td>
</tr>
<tr>
<td>SURFACE TYPE</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
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</table>
### BIA-ALCL—Diagnosis

<table>
<thead>
<tr>
<th>Oxford</th>
<th>LoE</th>
<th>GR</th>
<th>AGO</th>
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<tbody>
<tr>
<td></td>
<td>3a</td>
<td>D</td>
<td>++</td>
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</tbody>
</table>

- **Breast US** (assessment of new seromas > 1 year after implant insert, solid lesion (sensitivity: 84%, specificity: 75%))

- **Breast-MRI** in confirmed cases

- **Staging** (Imaging, e.g. CT, PET-CT)

- **Cytology of late seromas**
  - > 50 ml
  - Complete assessment
  - Flow-cytology (T-cell clone)
  - BIA-ALCL specific cytologic diagnostic (CD 30+)

- **Core needle biopsy in solid lesions**

- **Lymphoma assessment of resected tissue and histologic staging**

- **Documentation of the implant** (manufacturer, size, volume, surface, Batch-number) and **entry in registry**
BIA-ALCL – Therapy

- Implant resection and complete capsulectomy including tumorectomy
  - LoE: 3a
  - GR: C
  - AGO: ++

- Resection of suspicious lymph nodes, no routine use of sentinel-node-biopsy, no axillary dissection
  - LoE: 4
  - GR: D
  - AGO: ++

- Polychemotherapy (e.g. CHOP) in cases of extra capsular extension
  - LoE: 4
  - GR: D
  - AGO: +

- Radiotherapy in unresectable tumors
  - LoE: 5
  - GR: D
  - AGO: +/-

- Case discussion in an interdisciplinary tumor board in the presence of a lymphoma specialist
  - LoE: 5
  - GR: D
  - AGO: ++
Late Seroma
>12 months since 1st implant

Capsule-related solid tumor mass

Pathological skin lesion

Pathological lymph nodes

Lymphomata
B-Symptoms

Ultrasound Breast + Axilla

+/- Mammogram (not useful if age < 40 yrs)

Skin biopsy

PET CT (r/o systemic disease)

MRI Breast (if diagnosis is indeterminate)

Effusion

FNA fluid (take > 50 ml)

Histology
Immunohistology

Cytology immune-cytology for CD30

Suspicion Imaging Findings Samples Assessment

Indeterminate?

Suspicious?

Flow-Cytometry Clonality studies (for T-cell rearrangements)

Oncoplastic and Reconstructive Surgery
BIA-ALCL Treatment Pathways

**Outcome**
- **BIA-ALCL confirmed**
- **Indeterminate**
- **Negative for BIA-ALCL**

**Workup**
- Referral to experienced breast cancer center
- PET-CT & breast MRI
- Routine bloods (+/- bone marrow bx)
- MTD Discussion

**Surgery**
- En-bloc capsulectomy and complete excision (mass)
- +/- other breast +/- axilla biopsy (SNB not recommended)
- Histological Staging (Clemens et al. 2016)
- Reports to BfArM, manufacturer, DGPRÄC, PROFILE database (FDA)
- Radiotherapy for positive margins / irresectable thoracic wall infiltration but N0/M0

**Adjuvant Therapy**
- Stage I: No further treatment
- Stage II - IV: Consider adjuvant treatment
- Chemo-immunotherapy

**Follow-up**
- Clinical follow-up (ultrasound /CT scan) 3–6 m for 2y, afterwards for 5y
- PET-CT if symptomatic
- Treatment as per systemic ALCL regimes

**Oncoplastic and Reconstructive Surgery**
## TNM Staging of BIA-ALCL

<table>
<thead>
<tr>
<th>Tumor extent (cT/pT)</th>
<th>T1</th>
<th>Confined to seroma or a layer on luminal side of capsule</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>T2</td>
<td>Early capsule infiltration</td>
</tr>
<tr>
<td></td>
<td>T3</td>
<td>Cell aggregates or sheets infiltrating the capsule</td>
</tr>
<tr>
<td></td>
<td>T4</td>
<td>Lymphoma infiltrates beyond the capsule</td>
</tr>
<tr>
<td>Regional lymph nodes (cN/pN)</td>
<td>N0</td>
<td>No lymph node involvement</td>
</tr>
<tr>
<td></td>
<td>N1</td>
<td>One regional lymph node positive</td>
</tr>
<tr>
<td></td>
<td>N2</td>
<td>Multiple regional lymph nodes positive</td>
</tr>
<tr>
<td>Metastasis (cM/pM)</td>
<td>M0</td>
<td>No distant spread</td>
</tr>
<tr>
<td></td>
<td>M1</td>
<td>Spread to other organs or distant sites</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stage</th>
<th>Definition</th>
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</thead>
<tbody>
<tr>
<td>IA</td>
<td>T1 N0 M0</td>
</tr>
<tr>
<td>TB</td>
<td>T2 N0 M0</td>
</tr>
<tr>
<td>TC</td>
<td>T3 N0 M0</td>
</tr>
<tr>
<td>IIA</td>
<td>T4 N0 M0</td>
</tr>
<tr>
<td>IIB</td>
<td>T1-3 N1 M0</td>
</tr>
<tr>
<td>III</td>
<td>T4 N1-2 M0</td>
</tr>
<tr>
<td>IV</td>
<td>T any N any M1</td>
</tr>
</tbody>
</table>
Despite an increase of BIA-ALCL in association with texture implants the use of textured implants is still permitted!

„For the moment, textured implants can safely continue to be used with patient's fully informed consent, and that women that have these type of implants already in place don't need to remove or substitute them, which would undoubtedly cause harm to many tens of thousands of women, to prevent an exceptionally rare, largely curable and currently poorly understood disease."
# Tissue Replacement Techniques and Meshes
(Details of Implant Reconstruction)

- **The subcutaneous lodge is superior to the subpectoral lodge**

- **Acellular dermal matrix (ADM)**
  - subpectoral
  - subcutaneous

- **Synthetic meshes**
  - subpectoral
  - subcutaneous

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<td></td>
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<td>A</td>
<td>+/-#</td>
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<td>+#</td>
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<tr>
<td></td>
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<td>B</td>
<td>+#</td>
</tr>
</tbody>
</table>

# Participation in registry studies recommended
# Lipotransfer

<table>
<thead>
<tr>
<th>Oxford</th>
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<th>GR</th>
<th>AGO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lipotransfer following mastectomy and reconstruction</td>
<td>2a</td>
<td>B</td>
<td>+</td>
</tr>
<tr>
<td>Lipotransfer after BCS*</td>
<td>2a</td>
<td>B</td>
<td>+</td>
</tr>
<tr>
<td>Autologous adipose derived stem cells (ASCs)-enriched fat grafting vs. without stem cells</td>
<td>2a</td>
<td>B</td>
<td>-</td>
</tr>
</tbody>
</table>

*BCS: Breast Conserving Surgery*
Postmastectomy Pedicled Reconstruction

Breast reconstruction (BR) with autologous tissue

- TRAM, latissimus-dorsi-flap (both can be performed as a muscle-sparing technique) 2a C +
- Delayed TRAM in patients at high-risk 3a B +
- Ipsilateral pedicled TRAM 2a B +
- Radiotherapy:
  - BR following radiotherapy 2a B +
  - BR prior to radiotherapy 2a B +/-
- (higher rates of fibrosis, wound healing problems, liponecrosis and reduced aesthetic outcome)
Free flaps for reconstruction

Type of free flap

- DIEP
- Free TRAM
- SIEA
- Glutealis flaps (SGAP - IGAP, FCI)
- Free gracilis flap (TMG)
- Use of ICG* to assess flap perfusion

Advantages

- DIEP and free TRAM are potentially muscle-sparing procedures. DIEP has a lower rate of abdominal hernias, especially in obesity

Disadvantages

- Time- and personnel consuming microsurgical procedures
- Intensified postoperative monitoring
- Pre-reconstruction radiotherapy increases rate of vascular complications

Oxford

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*ICG: indocyanin green
Pedicled versus free tissue transfer

- Muscle-sparing techniques and accuracy of abdominal wall closure lead to low rates of late donor site complications independent of method used
- Autologous abdominal-based reconstructions have highest satisfaction rates (PROM)
- Donor site morbidity (e.g. impaired muscle function) has to be taken into consideration for all flap techniques

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### Skin-/nipple-sparing Mastectomy (SSM/NSM) and Reconstruction

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### Skin-/nipple-sparing Mastectomy (SSM/NSM)

- Safe (same recurrence rate as MX)
- Higher QoL for patients
- NAC can be preserved under special conditions
  - Feasible after mastopexy / reduction mammoplasty
- Use of ICG* to predict necrosis of the skin

### Skin incisions - different possibilities:

- Periareolar
- Hemi-periareolar with/without medial/ lateral extension
- Reduction pattern: „inverted-T“ or vertical
- Inferior lateral approach, inframammary fold
- Lowest incidence of complications

---

* ICG = Indocyanine Green
### Prevention and therapy of capsular contracture

#### Prevention

- **Textured implantats (Caveat: BIA-ALCL)**
  - **LoE**: 1a  
  - **GR**: A  
  - **AGO**: +

- **Acellular Dermal Matrix (ADM) vs. nil**
  - **LoE**: 2a  
  - **GR**: B  
  - **AGO**: +

- **Synthetic mesh vs. nil**
  - **LoE**: 3a  
  - **GR**: C  
  - **AGO**: +

- **Topical antibiotics/antiseptics**
  - **LoE**: 2a  
  - **GR**: B  
  - **AGO**: +

- **PVP (Povidone-Iodine)**
  - **LoE**: 2a  
  - **GR**: B  
  - **AGO**: +/-

- **Leukotriene-antagonists**
  - **LoE**: 2a  
  - **GR**: B  
  - **AGO**: +/-

- **Breast massage**
  - **LoE**: 3a  
  - **GR**: C  
  - **AGO**: -

#### Surgical interventions

- **Capsulectomy**
  - **LoE**: 3b  
  - **GR**: C  
  - **AGO**: +

- **Capsulotomy (Caveat: exclusion of BIA-ALCL)**
  - **LoE**: 3b  
  - **GR**: C  
  - **AGO**: +
Seroma after implant-based reconstruction I

- Incidence: around 5-10% (2-50%)

Co-variates:

- History of radiation increases the risk (RR ca. 3)
- Obesity increases risk (e.g. BMI > 30 vs. < 30; RR ca. 3)
- ADM increases risk (RR ca. 3)
- Smooth expanders increase risk (RR ca. 5)
- History of neoadjuvant systemic chemotherapy does not increase the risk
- Epipectoral pocket does not increase the risk

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Seroma after implant-based reconstruction II

Prevention
- Drain with no, little and much suction 3b C +
- Drain removal at < 30ml per 24 hours 2b B +

Therapy
- Evacuation of serma by FNA or re-insertion of drain 4 C +
- Dressings 5 D +/-
- Revision surgery with capsulectomy (ultima ratio) 5 D +
- Revision surgery with implant removal (ultima ratio) 5 D +
Risk-reducing bilateral mastectomy for healthy women (RRBM)

- RRBM reduces breast cancer incidence
- RRBM in deleterious BRCA1/2 mutation
- RRBM in high-risk situation without BRCA 1/2 mutation (individual decision depending on personal-family history and mutational status – e.g. high and moderate-risk genes, Hodgkin lymphoma)
  - High risk and no BRCA counselling in specialized centre*
  - Non-directive counselling prior to RR-BM
  - RR-BM should be considered with other risk-reducing surgical options incl. bilateral salpingoophorectomy (BSO) and in the context of pre-existing diseases
  - Further need for education of physicians regarding possibilities and advantages of RRBM

* Counselling, risk prediction, and follow-up in specialized centers recommended

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### Surgical Prevention for Healthy Female BRCA1/2 Mutation Carriers

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<td>- Reduces OvCa incidence and mortality</td>
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<td>- Reduces BC mortality in BRCA1 mutation carriers***</td>
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*study participation recommended

** The RR-BSO is recommended from about 35 years for BRCA1 and from about 40 years for BRCA2 mutation carriers, taking into account the age of ovarian cancer diagnosis in the family and family planning status.

*** No reduction in mortality could be shown for BRCA2 mutation carriers. RRM counselling should be individualised.
## Risk-reducing Interventions for BRCA1/2 Female Mutation Carriers Affected by Breast Cancer

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### Risk-reducing bilateral salpingo-oophorectomy (RR-BSO)
- Reduces OvCa incidence and mortality
- Reduces overall mortality
  (contradictory results for reduction of cl BC incidence)

### Prophylactic contralateral mastectomy (RR-CM)
reduces BC incidence and mortality

### Tamoxifen (reduces contralateral BC incidence)

### Indication for RR-CM should consider age at onset of first breast cancer in affected gene

### RR-BM after ovarian cancer

* study participation recommended
** Depends on tumor stage (FIGO I/II), recurrence free interval (≥ 5y), age
Forms of risk-reducing (bilateral) mastectomy (RR-BM)

RR-BM reduces breast cancer incidence;** BC-specific mortality also likely reduced

- Simple mastectomy
- RR-BM by SSM*
- RR-BM by NSM* (NAC# sparing)
- Contralateral prophylactic mastectomy

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* SSM / NSM: Skin-/Nipple-Sparing Mastectomy
# NAC: nipple-areola complex
** depending on prior illnesses, e.g. pre-existing ovarian cancer 1-2% (stage III-IV)