Evolution of breast cancer surgery: Past, present and future effects on sexual, emotional, and physical well-being

Michelle Haslinger, MD
Breast surgical oncologist
Breast Surgery Timeline

• **Past:**
  - Senn/Jackson radical mastectomy (late 1800’s)
  - Halsted Mastectomy (early 1900’s)
  - Modified radical mastectomy (Patey 1948, Madden 1965)
  - Breast conserving surgery (lumpectomy)

• **Present:**
  - ONCOPLASTIC breast conserving surgery
  - nipple sparing mastectomy
  - skin sparing mastectomy
  - two stage nipple sparing mastectomy

• **Future:** Extreme oncoplasty

• **Goals:** achieve SYMMETRY and improved self-esteem
Radical Mastectomy Incisions
Senn, Jackson

The Younger Senn's Incision.—A very useful incision is that described by the younger Senn, and shown in Fig. 1176. The breast is circumscribed by two curvilinear incisions which meet above, at the border of the great pectoral muscle. The incision is continued a little internal to the outer border of the muscle to about 1 inch above the apex of the axilla, when it is curved outward in the deltoid region, and terminates

Fig. 1176.—The younger Senn's incision for amputation of the breast.

Fig. 1177.—Jabez N. Jackson's incision for removal of the mammary gland.

at the level of the apex of the axilla. The breast is removed from the wall of the chest and is then suspended by axillary glands and fat, which are removed en masse. The incision gives a free exposure, opens the axilla from in front, enables the surgeon quick
Radical Mastectomy Incisions
Jackson, Warren 1905

Fig. 1178.—Method of approximating flaps after Jackson’s breast amputation.

Fig. 1179.—Warren’s incision for removal of the mammary gland.

Jackson’s incision (Jabez N. Jackson, “Jour. Amer. Med. Assoc.,” March 5, 1905) is shown in Fig. 1177. It is very satisfactory. The axilla is entered from above, quadrilateral flap of skin is raised, and is subsequently pulled down to close the wound (Fig. 1178).

Warren’s incision is shown in Fig. 1179. It enables the surgeon to close the wound. Willy Meyer’s Operation (“Jour. Amer. Med. Assoc.” July 29, 1905).
Breast Cancer: 19th Century

Halsted Radical Mastectomy

Changing the Standard of Care 1905
Radical Mastectomy to Radical Conservation
Halsted surgery

Exclusively

Plus RTX
Pectoralis Preserving
“Modified”
Kinder, Gentler
First Step
Lymphedema as a major complication
Landmark Study
5-Yr Survival Equal
Mastectomy Versus BCT
For 100 years mastectomy was the only option
1981 Veronesi et al: Milan I Landmark Trial

Milan I - Overall Survival
25-Year Follow-Up

- Halsted (N = 349)
- Breast Conservation (N = 352)

1985 Fisher et al: B-06 Landmark Trial

The New England Journal of Medicine

Volume 312
MARCH 14, 1985

Number 11

FIVE-YEAR RESULTS OF A RANDOMIZED CLINICAL TRIAL COMPARING TOTAL MASTECTOMY AND SEGMENTAL MASTECTOMY WITH OR WITHOUT RADIATION

Total Mastectomy
Excision Plus RT
Excision Alone
1990 NIH consensus: Tumors <5 cm acceptable to undergo breast conservation

BCT Slowly Accepted in USA During 1990s

- Incision Over Tumor
- No Skin
- 15-30 Gram Excision
- Did Not Repair Breast
- Accept Deformity
- 20-40% Re-excision Rate
- RT to Clean Up Residual
- For Many - Unchanged
Issues with lumpectomy alone:
Asymmetry

QUADRANTECTOMY
Quadrantectomy (breast right cancer) Without Breast Right Reconstruction
Draining axillary region in the same incision without the SIMETRIZATION
Mastectomy with implant reconstruction
Satisfaction and Sexual Life Post Surgery

Type of surgery has significant role in post-op satisfaction and sexual life

Markopoulos, C et al, Jrnl
International Med Resrch, 2009
Breast-Specific Sensuality and Sexual Function in Cancer Survivorship: Does Surgical Modality Matter?

Jennifer S. Gass, MD\textsuperscript{1,2}, Michaela Onstad, MD\textsuperscript{3}, Sarah Pesek, MD\textsuperscript{4}, Kristin Rojas, MD\textsuperscript{5}, Sara Fogarty, DO\textsuperscript{6}, Ashley Stuckey, MD\textsuperscript{1,7}, Christina Raker, ScD\textsuperscript{8}, and Don S. Dizon, MD\textsuperscript{9,10}

\textsuperscript{1}Breast Health Center, Women and Infants’ Hospital, Providence, RI; \textsuperscript{2}Department of Surgery, Brown University Warren Alpert Medical School, Providence, RI; \textsuperscript{3}Gynecologic Oncology, MD Anderson Cancer Center, Houston, TX; \textsuperscript{4}St. Peter’s Hospital, St. Peter’s Health Partners Medical Associates, Albany, NY; \textsuperscript{5}Obstetrics and Gynecology, Women and Infants’ Hospital, Providence, RI; \textsuperscript{6}Department of Surgery, Greater Baltimore Medical Center, Towson, MD; \textsuperscript{7}Gynecologic Oncology, Women and Infants Hospital, Providence, RI; \textsuperscript{8}Division of Research, Women and Infants’ Hospital of Rhode Island, Providence, RI; \textsuperscript{9}Gynecologic Oncology, Massachusetts General Hospital, Boston, MA; \textsuperscript{10}Harvard Medical School, Medicine, Boston, MA
Landmark trials have shown survival is equivalent regardless of surgical modality (lumpectomy vs. mastectomy).

Yet women across the US are increasingly choosing mastectomy for early stage breast cancer.

More extensive surgery has higher morbidity, especially when paired with reconstruction.
• Breast specific sensuality (BSS): the breast’s role in intimacy and pleasurable breast caress

• Sexual function was assessed using the Female Sexual Function Index (FSFI), a 19-item tool assessing 6 domains of sexuality, including desire, arousal, lubrication, orgasm, satisfaction, and pain.

• Score <26.55 indicated sexual dysfunction
### TABLE 2 Response to investigator-generated questions: “How important of a role did your chest play in intimacy and sex for you (before surgery)?” and “How important of a role does your chest play in intimacy and sex for you (now)”?

<table>
<thead>
<tr>
<th>Surgical procedure</th>
<th>(N)</th>
<th>Prior to surgery</th>
<th>After surgery</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lumpectomy</td>
<td>174</td>
<td>83</td>
<td>74</td>
<td>0.0006</td>
</tr>
<tr>
<td>Mastectomy alone</td>
<td>19</td>
<td>95</td>
<td>47</td>
<td>0.003</td>
</tr>
<tr>
<td>Mastectomy + reconstruction</td>
<td>60</td>
<td>93</td>
<td>77</td>
<td>0.002</td>
</tr>
</tbody>
</table>

### TABLE 3 Appearance satisfaction and appreciation of pleasurable breast caress by surgical procedure

<table>
<thead>
<tr>
<th>Surgical procedure</th>
<th>Favorable appearance satisfaction (%)</th>
<th>p value</th>
<th>Appreciation of pleasurable breast caress (%)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lumpectomy</td>
<td>79.6</td>
<td>0.02</td>
<td>51.2</td>
<td>0.01</td>
</tr>
<tr>
<td>Mastectomy + reconstruction</td>
<td>65.0</td>
<td></td>
<td>29.4</td>
<td></td>
</tr>
</tbody>
</table>

Favorable = very or moderately satisfied. Appreciation of pleasurable breast caress = very or moderately pleasurable.
FIG. 2 Median FSFI stratified by appearance satisfaction and BSS. Neutral response options were included in the “No” category. The black horizontal line at FSFI ≤ 26.55 indicates sexual dysfunction. **p < 0.001, *p < 0.05
Lumpectomy alone not always best solution

- **Birth of ONCOPLASTY:**
- Resection of tumor in the setting of BILATERAL breast reduction (or variations of) with the goal of achieving SYMMETRY and enhanced self-esteem
PRÉ

PÓS
Reduction Excision Routinely Outperformed an Ellipse

1. Higher % Clear Margins
2. Less Re-Excisions
3. Better Cosmesis
4. Happier Patients
Bilateral remodeling with techniques of plastic surgery of the breast, in the Surgical Division Ricostruttiva plastic of the IEO of Milan, between **September 1994 and December 1999**

**NUMBER OF BREAST CANCER cases submitted to the ONCOPLASTIC bilateral breast on the EUROPEAN INSTITUTE of Milan Oncology 1994-1999**

1994 - 10
1995 - 28
1996 - 33
1997 - 30
1998 - 23
1999 - 20

Source: Division of Plastic Surgery Ricostruttiva, Istituto Europeo di Oncologia, Milan
In Great Britain, the reorganization of breast services led to the establishment of the Interface Training Group between breast and plastic surgeons in 2002. As a result of this collaboration, nine centrally funded Oncoplastic Breast Fellowship posts were created, with each fellow spending 12 months working in specialist oncoplastic breast units.

In the United States, the Society of Surgical Oncology (SSO) approved Breast Oncology fellowships in 2003 and began training its first class of fellows in July 2004.
<table>
<thead>
<tr>
<th>Procedure</th>
<th>Ellipses</th>
<th>Reduction</th>
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<tbody>
<tr>
<td>N</td>
<td>250</td>
<td>500</td>
</tr>
<tr>
<td>Mean Weight</td>
<td>65 Grams</td>
<td>134 Grams</td>
</tr>
<tr>
<td>Mean Extent</td>
<td>22 mm</td>
<td>22 mm</td>
</tr>
<tr>
<td>No Ink on Tumor</td>
<td>88%</td>
<td>97%</td>
</tr>
<tr>
<td>≥ 1 mm</td>
<td>79%</td>
<td>90%</td>
</tr>
<tr>
<td>Re-Excision</td>
<td>15%</td>
<td>3%</td>
</tr>
<tr>
<td>Mastectomy</td>
<td>2%</td>
<td>1%</td>
</tr>
<tr>
<td>Complications</td>
<td>2%</td>
<td>3%</td>
</tr>
<tr>
<td>Any Local Rec</td>
<td>2%</td>
<td>3%</td>
</tr>
</tbody>
</table>
Quality of Life
Mastectomy + Reconstruction + RT

1. Submuscular Expander: Pain, Drains, Foreign Body, Infection, Time to Expand
2. Final Reconstruction: Implant, Flap, Donor Site Morbidity
3. Multiple Operations: Adjust Breast & Nipple
4. Opposite Breast: Reduction or Mastectomy
5. Insensate Breast(s)
Quality of Life
Mastectomy + Reconstruction + RT

6. Wide Range of Cosmetic Results
   Significant Disappointment

7. Breast Tissue Left Behind

8. Radiation Therapy: Not Friendly to
   Reconstruction, Capsule, Inconvenient,
   Expensive, Morbidity, Timing vs Chemo
After Mastectomy/Reconstruction
If You Do NOT Give Radiation Therapy

5-10% of Breast Tissue Untreated, Including Dermal Lymphatics
PATIENT FORGETS SHE HAD BREAST CANCER

Compare QOL Oncoplastic BCT

One Operation, No Drains
Looks Better (Now and Later)
Less Pain, Less Expense, Less Hospital
No Foreign Body, No Donor Site
More Functional, Sensate Breast
Better Body Image, All Tissue Treated
One Final Benefit of BCT Overall Survival Might Be Better

Netherlands Cancer Registry
37,207 Patients (2000-2004)
21,724 BCT
15,473 Mastectomy

After Correcting Confounding
OS for BCT 3% Better
Every Cell Treated with RT
Improved localization of tumors

Preoperative Localization’s Goal: Identify the Target Site

Specimen Examination - Ultrasound

Anterior Surface Transverse and Sagittal

Lateral Surface Transverse and Sagittal
Specimen Orientation

<table>
<thead>
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<th>Type</th>
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<td>2 clips</td>
</tr>
<tr>
<td>Lateral</td>
<td>Single long</td>
<td>3 clips</td>
</tr>
<tr>
<td></td>
<td>Purple Dye Anterior / Posterior</td>
<td></td>
</tr>
</tbody>
</table>

1) Be consistent
Current advances in mastectomy: nipple sparing

• **Previous exclusion criteria for nipple sparing mastectomy:**
  • BMI >30
  • Smokers
  • Previous breast reduction
  • Tumor close proximity to nipple <2 cm
  • Neoadjuvant chemotherapy
  • Previously radiated
Overview of indications for nipple sparing mastectomy

Eleni Toumis, Michelle Haslinger

Department of Surgery. Medstar Georgetown University Hospital, Washington, DC, USA

Contributions: (I) Conception and design: None; (II) Administrative support: None; (III) Provision of study materials or patients: None; (IV) Collection and assembly of data: None; (V) Data analysis and interpretation: None; (VI) Manuscript writing: All authors; (VII) Final approval of manuscript: All authors.

Correspondence to: Eleni Toumis. Department of Surgery. Medstar Georgetown University Hospital, Washington, DC, USA. Email: toumis@gmail.com.
Figure 1 Ideal NSM candidate with small breasts and no ptosis. (A) Preoperative photo; (B) post bilateral NSM with direct to implant immediate prepectoral reconstruction. Photo courtesy Troy Pittman, MD. NSM, nipple sparing mastectomy.
Figure 2 Patient with *BRCA* gene who underwent bilateral prophylactic mastectomies. (A) Preoperative photo; (B) 5 months postoperative photo after bilateral NSM with immediate reconstruction using 410 cc prepectoral implants. Photo courtesy John Sherman, MD. NSM, nipple sparing mastectomy.
Figure 4 Patient who underwent bilateral NSM and immediate prepectoral implant reconstruction, followed by left breast postoperative radiation with an excellent cosmetic outcome. (A) Preoperative photo; (B) postoperative photo after bilateral NSM with immediate prepectoral implant reconstruction; (C) left breast after post-mastectomy radiation. Photo courtesy Troy Pittman, MD. NSM, nipple sparing mastectomy.
Figure 5 A 40 years old BRCA+ patient with grade 3 ptosis and large areola who underwent prophylactic surgery using a two-stage technique. (A) Preoperative photo; (B) post bilateral reduction-mastopexy with areolar reduction; (C) 8 weeks postop after 2nd stage bilateral NSM with immediate retropectoral tissue expander reconstruction; (D) one year postop with retropectoral final implants. Photo courtesy Troy Pittman, MD. NSM, nipple sparing mastectomy.
Figure 8 A 38 years old patient with left upper outer quadrant 4 cm invasive ductal cancer and positive node, status post NAC with good response. A left NSM was performed using a lateral upper outer quadrant incision over the tumor. Patient received left breast post-mastectomy radiation therapy. Figures show patient’s left breast in various standing positions one year post-radiation with mild fibrosis, asymmetry and a high riding nipple. The patient had high overall satisfaction. (A) Front view; (B) oblique view; (C) side view. Photo courtesy John Sherman, MD and Scott Spear, MD. NAC, nipple-areolar complex; NSM, nipple sparing mastectomy.
Figure 6 Patient with ptosis and enlarged areola who underwent bilateral NSM with DIEP free flap reconstruction using a two-stage technique. Figures show a patient with ptosis and enlarged areola who underwent DIEP free flap reconstruction from Medstar Georgetown University Hospital, also demonstrating a two-stage technique. The patient underwent initial reduction mastopexy followed by NSM with free flap reconstruction. (A) Preoperative photo; (B) post bilateral reduction-mastopexy and areolar reduction; (C) post bilateral NSM via IMF incision with DIEP free flap reconstruction. Photo courtesy Troy Pittman, MD. NSM, nipple sparing mastectomy; DIEP, deep inferior epigastric perforator.
Positive Nipple Margin After Nipple-Sparing Mastectomy: An Alternative and Oncologically Safe Approach to Preserving the Nipple-Areolar Complex

Michelle L. Haslinger MD, Michael Sosin MD, Alex J. Bartholomew MS, Andrew Crocker MS, Aiste Gulla MD, Shawna C. Willey MD, FACS, Troy A. Pittman MD, Eleni A. Tousimis MD, FACS

Breast Oncology

Volume 25, Issue 8 / August, 2018
Reconstructive options

• Implant-based
  ▫ Two-staged vs. direct-to-implant
  ▫ Subpectoral vs. pre-pectoral

• Autologous
  ▫ Immediate vs. two-staged (initial expander)
  ▫ Buried vs. skin paddle

• Fat grafting (lipofilling)
Alternative reconstruction options to implants: DIEP (Deep Inferior Epigastric Perforator) Free Flap Breast Reconstruction
Figure 1. (a, b) A 43-year-old patient after unilateral modified radical mastectomy for lobular carcinoma in situ, with mammographic and ultrasound suspicious results on her left breast. (a) Preoperative view. (b) Postoperative view after left skin-sparing mastectomy with mastopexy and bilateral reconstruction.
Figure 2. (a, b) A 54-year-old patient after bilateral modified radical mastectomy. (a) Preoperative view. (b) Postoperative view two years after reconstruction.
Free flap reconstruction in mastectomy patients after radiation: non-buried skin paddle
Buried tissue paddle, skin reduction

Autologous reconstruction

[Images of a person's chest before and after surgery, showing the procedure and results.]
Figure 3. (a, b) A BRCA-positive 51-year-old patient with bilateral biopsy of ductal carcinoma in situ. (a) Preoperative view. (b) Postoperative view 2 years after bilateral prophylactic skin-sparing mastectomy with mastopexy and reconstruction. Note that in this patient we used the technique of keeping extra skin during mastectomy for future nipple areola reconstruction. There is no scar around the reconstructed areola.
Prepectoral reconstruction

- Growing adoption
- Avoidance of hyperanimation deformity
- Decreased post-op pain
- Two-staged or DTI
- ADM-assisted
  - Increased cost
  - Long-term contracture rates?
Prepectoral reconstruction

- Indications
  - Good skin flaps
  - Prophylactic/early stage disease
  - High likelihood of PMRT?
  - Patient preference
    - Potential increased implant palpability
    - Potential upper pole step-off
Wise pattern skin-reducing NSM
Nipple reconstruction
Lipofilling/Fat grafting
...After Implant Based Reconstruction
Advances in lumpectomy alone: creation of Biozorb implantable device
Oncoplasty

- Biozorb
  - Fills in cavity for improved cosmesis
  - Marks cavity in 3 dimensions for radiation planning through titanium markers
  - Absorbable- PLA (polylactic acid): average of 1 year
  - Prevents seroma
Partial Breast Radiation: IORT (Intra-operative radiation therapy) and Brachytherapy
Savi Brachytherapy (Partial Breast Radiation)

- Option for patients with favorable biologic tumors (ER+, low grade, <3 cm), >age 50.
- Treatment given over 5 days (twice daily) instead of WBI for 5 weeks
SAVI: A New Approach to Breast Brachytherapy

Used in accelerated partial breast irradiation following lumpectomy, the SAVI applicator combines the tissue-sparing advantages of interstitial brachytherapy with the single-entry ease of intracavitary (“Balloon”) brachytherapy. This hybrid approach is designed to give more flexibility in treatment planning to the radiation oncologist and physicist.

1. **INSERT**
   The SAVI applicator is an expandable bundle of catheters. Prior to expansion, the applicator is placed by the physician into the lumpectomy cavity through a small incision.

2. **EXPAND**
   By turning a mechanism from outside the breast, the physician expands the catheter bundle inside the cavity.

3. **CONTOUR DOSE**
   Delivery of radiation through the applicator’s individual catheters allows the doctor to better contour and control the radiation dose. More precise delivery of radiation may help avoid radiation damage to the skin and chest wall.

4. **REMOVE**
   After delivery of the prescribed radiation dose, the physician collapses the catheter bundle and retracts the SAVI applicator through the initial incision.

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Lymphedema Management
<table>
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<tr>
<th>Stage</th>
<th>Clinical findings</th>
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<tr>
<td>0</td>
<td>Subclinical</td>
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<tr>
<td></td>
<td>Impaired lymphatic transport</td>
</tr>
<tr>
<td></td>
<td>Swelling not visible by gross evaluation</td>
</tr>
<tr>
<td>I</td>
<td>Visibly swollen</td>
</tr>
<tr>
<td></td>
<td>Pitting edema</td>
</tr>
<tr>
<td>II</td>
<td>Non-pitting edema</td>
</tr>
<tr>
<td></td>
<td>Tissue fibrosis</td>
</tr>
<tr>
<td>III</td>
<td>Elephantiasis</td>
</tr>
<tr>
<td></td>
<td>Irreversible skin changes, fatty deposits, hyperpigmentation</td>
</tr>
</tbody>
</table>
Lymphedema Control (What We Know 2016)

- Factors **NOT** shown to increase the development of lymphedema following ALND or RLNR
    - Blood pressure readings
    - Blood draws
    - Injections
    - Air travel
Lymphedema

- Chronic, progressive, likely irreversible upper extremity swelling secondary to injury of axillary lymphatics

- Complication of breast cancer treatment where resection or radiation of axillary nodes is involved

- May develop years later (75% < 3yrs, 25% > 3yrs.)

- Effects 120,000 - 5 million Americans currently

- Adds ~$9000/yr in medical cost per individual

Cost savings associated with treatment of early BCRL

Annually $636 (proactive) vs $3124 (traditional model)

Stout N et al. Physical Therapy 2012
Mild LE is important.

TIME COURSE OF MILD ARM LYMPHEDEMA AFTER BREAST CONSERVATION TREATMENT FOR EARLY-STAGE BREAST CANCER

Vorhita Bar Ad, M.D.*, Andrea Cheville, M.D.*, Lawrence J. Solin, M.D.*, Pinaki Dutta, M.D.*, Stefan Both, Ph.D.**, and Eleanor E. R. Harris, M.D.*

- 266/1713 (16%) had LE

Progression of mild LE to more severe LE (n=109)

<table>
<thead>
<tr>
<th>Time</th>
<th>Percentage</th>
</tr>
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<tbody>
<tr>
<td>1yr</td>
<td>21%</td>
</tr>
<tr>
<td>3yrs</td>
<td>34%</td>
</tr>
<tr>
<td>5yrs</td>
<td>48%</td>
</tr>
</tbody>
</table>
Early swelling may be reversible.

Preoperative Assessment Enables the Early Diagnosis and Successful Treatment of Lymphedema

- Prospective cohort; N=196 with early stage BC
- LE as >3% volume change
- If LE then compression garment x 4wks
- Results after intervention
  - Mean arm volume decrease of 58%
  - Reduction maintained mean 4.8mos

Stout et al. Cancer 2008
Data on risk reducing behaviors

Lifestyle Risk Factors Associated with Arm Swelling Among Women with Breast Cancer
Shayna L. Showalter, MD, Justin C. Brown, MA, Andrea L. Chesville, MD, Carla S. Fisher, MD, Dahlia Sataloff, MD, and Kathryn H. Schmitz, PhD, MPH

- Prospective subanalysis of PAL trial
- Evaluated 30 lifestyle factors and incidence of LE
  - 27/295 (9%) LE
- Only sauna use was predictive
  - MVA: OR 6.67 (CI 1.36-32.56) p=0.01

Showalter et al. ASO 2013
Exercise may reduce risk and help exacerbations

Early physiotherapy may prevent LE

N=120 women with ALND

Intervention
Educational strategy
Manual lymphatic drainage
Scar massage
Progressive shoulder ROM

Control
Educational strategy

LE 25%

Follow up: 1 yr

LE 7%

Torres Lacombe et al BMJ 2010
Summary of resistance exercise RCT and LE

<table>
<thead>
<tr>
<th></th>
<th># RCT</th>
<th>N</th>
<th>f/u, mean (mos)</th>
<th>LE rate*</th>
<th>LE rate*</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>control</td>
<td>intervention</td>
</tr>
<tr>
<td>AT RISK</td>
<td>3</td>
<td>383</td>
<td>12</td>
<td>12%</td>
<td>12%</td>
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<td>AFFECTED</td>
<td>1</td>
<td>141</td>
<td>12</td>
<td>12%</td>
<td>11%</td>
</tr>
</tbody>
</table>

*Individual trial p-values not significant or favor intervention group

- Exercise reduced number and severity of exacerbations
- 3 additional RCT (water, home exercise) in affected patients with similar findings

Kwan J Ca Surv 2011
Schmitz NEJM 2009
Lymphovenous bypass: a surgical treatment of LE
Prophylactic lymphatic-venous anastomosis (LVA)

Lymphatic Microsurgical Preventive Healing Approach: LYMPHA

<table>
<thead>
<tr>
<th>Study</th>
<th>N</th>
<th>f/u (yrs)</th>
<th>Lymphedema rate</th>
<th>comments</th>
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<tr>
<td></td>
<td></td>
<td></td>
<td>LVA done</td>
<td>No LVA</td>
</tr>
<tr>
<td>Boccardo, 2011</td>
<td>49</td>
<td>1.5</td>
<td>4%</td>
<td>30%</td>
</tr>
<tr>
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</table>

Not a RCT
Unclear indications

ASBS Poster: Dr. Ojo, Columbia U.

Boccardo FM et al. ASO 2011
Delayed autologous reconstruction and lymph node transfer in affected

<table>
<thead>
<tr>
<th>Study</th>
<th>Procedure</th>
<th>N</th>
<th>F/U (yrs)</th>
<th>Patients with improved swelling</th>
<th>Eliminated compression</th>
<th>Donor site morbidity</th>
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<td>Saaristo 2012</td>
<td>LNT with DIEP</td>
<td>9</td>
<td>0.8-2</td>
<td>Measured: 78%*</td>
<td>After 8-24 mos in 33%</td>
<td>0%</td>
</tr>
</tbody>
</table>

* Did not report % of volume reduction
Future of Breast Surgery

• Limited axillary surgery (Alliance 11202 trial, B-51 trial)
• Cryoablation of tumors
• Increased genetic testing: saved lives, saved health care costs
  • American Society of Breast Surgeons Consensus Statement February 2019: All breast cancer patients should be tested, as 16% of genetic mutations will be missed from those patients who did not meet NCCN testing criteria
• Extreme Oncoplasty (T3 tumors, multicentric tumors)
• Robotic Nipple sparing mastectomy
Robotic/Endoscopic NSM

Robotic Prophylactic Nipple-Sparing Mastectomy with Immediate Prosthetic Breast Reconstruction: A Prospective Study

Authors

Benjamin Sarfai, Samuel Strick, Nicolas Lemarie, Jean-Francois Honart, Hiba Alkhafeshaham, Kim Tran de Premicourt, Angélique Cerverino, Françoise Rimarpré, Marie Simon, Stefano Michiels, Frédéric Koll

Endoscopic Nipple-Sparing Mastectomy with Immediate Multistage Fat Grafting for Total Breast Reconstruction: A New Combination for Minimal Scar Breast Cancer Surgery

Toshihiko Satake, Kazutaka Naran, Mayu Kato, Takashi Ishikawa, Hiro Maegawa
Thank you