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

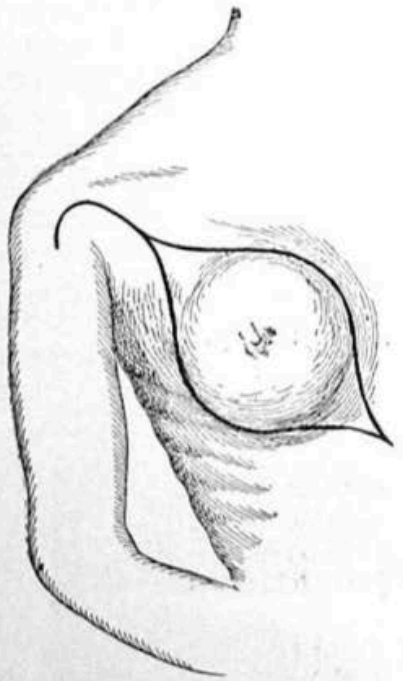


FIG. 1176.—The younger Senn's incision for amputation of the breast.

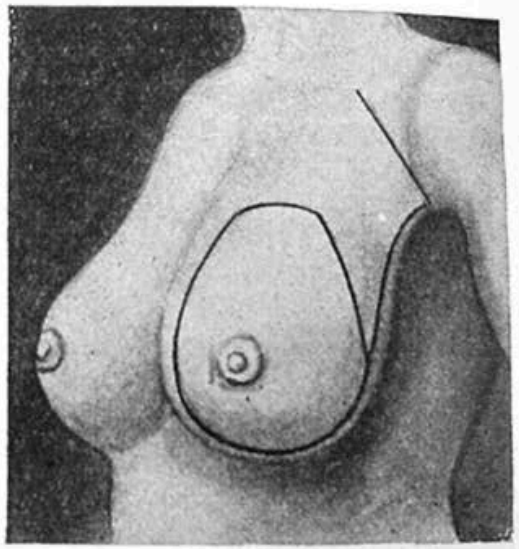


FIG. 1177.—Jabez N. Jackson's incision for removal of the mammary gland.

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*.[1] This incision gives a free exposure, opens the axilla from in front, enables the surgeon quick

Radical Mastectomy Incisions
Jackson, Warren 1905

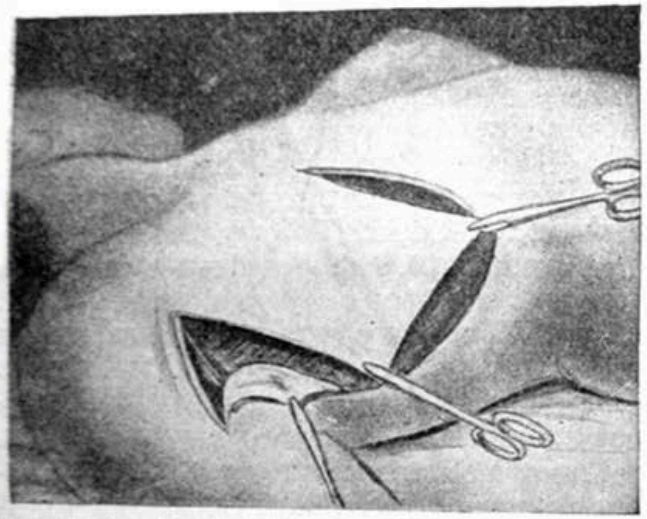


FIG. 1178.—Method of approximating flaps after Jackson's breast amputation.

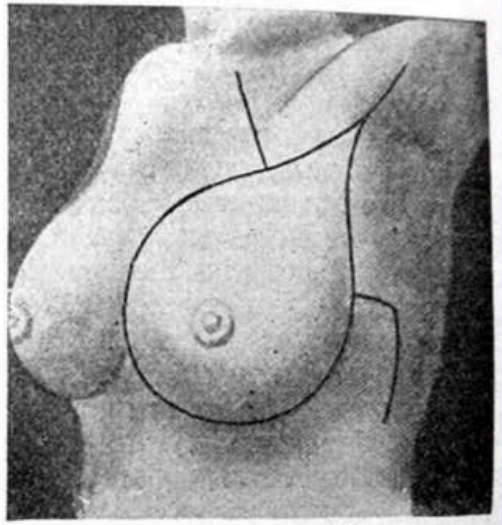


FIG. 1179.—Warren's incision for remo of the mammary gland.

Jackson's incision (Jabez N. Jackson, "Jour. Amer. Med. Assoc.," March 5, 19 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 wou (Fig. 1178).

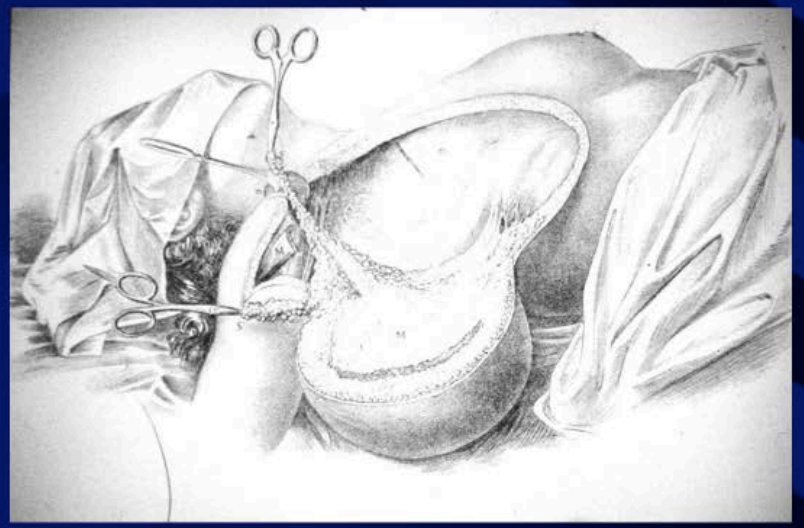
Warren's incision is shown in Fig. 1179. It enables the surgeon to close the woun

Willy Meyer's Operation ("Jour. Amer. Med. Assoc.," July 29, 1905).—For t

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

1981

The NEW ENGLAND JOURNAL of MEDICINE

COMPARING RADICAL MASTECTOMY WITH QUADRANTECTOMY, AXILLARY DISSECTION, AND RADIOTHERAPY IN PATIENTS WITH SMALL CANCERS OF THE BREAST

UMBERTO VERONESI, M.D., ROBERTO SACCOZZI, M.D., MARCELLA DEL VECCHIO, PH.D., ALBERTO BANFI, M.D.,

Landmark Study

5-Yr Survival Equal

Mastectomy Versus BCT

For 100 years mastectomy was the only option

The New York Times

Founded in 1851

ADOLPH S. OCHS, Publisher 1896-1935
ARTHUR HAYS SULZBERGER, Publisher 1935-1961
ORVIL E. DRYFOOS, Publisher 1961-1963

THE NEW YORK TIMES, THURSDAY, JULY 2, 1981

Study Supports Limited Surgery for Breast Cancer

By JANE E. BRODY

Surgery that spares most of the breast can be as effective as radical mastectomy in treating women with early breast cancer, according to a major study done in Italy and published yesterday in The New England Journal of Medicine.

The study, considered the best to date examining two such procedures, has thus far shown no difference in cancer recurrence or survival between women who had a partial mastectomy followed by radiation therapy and women who underwent the older, more disfiguring operation.

Although previous studies suggested this, the new study is the only large-scale, well-controlled study to show it. The researchers concluded that "radical mastectomy appears to involve unnecessary mutilation" in patients with early breast cancer.

The findings, which support the growing trend toward more conservative surgery for breast cancer, apply only to women whose cancers are very small at the time of diagnosis. Such women, though now seen more frequently than in the past as a result of educating patients, self-examination and the use of mammography, still represent only about 14 percent of breast cancer patients.

In another study in the same issue of the Journal, American researchers reported the first clear-cut evidence that older breast cancer patients whose disease has spread beyond the breast can benefit greatly from postoperative chemotherapy. Previous studies had shown such benefits primarily to patients under the age of 50.

Together, the two studies present further evidence that survival of breast cancer patients depends less on the local therapy chosen than on additional treatments given patients with more advanced disease. They also demonstrate that there is no one treatment for breast cancer; rather, therapy must be tailored to the individual, depending on the type of breast cancer, its size, extent and location, as well as the patient's physical and mental condition.

According to Dr. Bernard Fisher, a breast cancer specialist at the University of Pittsburgh and director of several major American studies on treating the disease, the Italian study "is very important."

"It's one of a series of studies which indicate the reasonableness of doing conservative surgery," he said, "and it points out the need for further large-scale trials" to evaluate more fully the various treatment approaches for different patients.

For nearly a century, nearly all breast cancer patients, regardless of how early they were diagnosed, were treated by removal of the entire breast, the chest-wall muscles beneath the breast and the lymph nodes under the arm — the so-called Halsted radical mastectomy. This disfiguring operation sometimes resulted in lasting difficulties in movement, limited choices of clothing and problems with breast reconstruction.

In recent years, however, scattered preliminary studies have suggested that less extensive surgery might be as effective as the radical operation for localized treatment of breast cancer, particularly when the tumor is small. The widely publicized findings prompted many women to request modified surgery and forced breast cancer surgeons to reconsider old dogma.

Today, in the United States, the Halsted radical has given way to a modified operation that spares the major chest muscle but still removes the entire breast and the lymph nodes. A minority of patients have just the lump removed, and usually have weeks of radiation treatments afterwards.

In the Italian study, begun in 1973 by Dr. Umberto Veronesi at the National Cancer Institute in Milan, 701 women whose cancers were smaller than two centimeters, or about three-fourths of an inch, in diameter and whose lymph nodes appeared to be free of cancer were randomly assigned to undergo either radical mastectomy or simply removal of the quarter of the breast that harbored the tumor, plus the lymph nodes in the armpit.

Those in the partial mastectomy group underwent up to six weeks of radiation treatments after surgery. All women in both groups treated since 1976 and found to have cancer spread to the nodes also received postoperative chemotherapy for one year.

Dr. Veronesi and his co-workers reported no difference between the groups in the percentage of patients who survived free of cancer recurrence for up to seven and a half years after treatment. "It appears unlikely that a longer follow-up time will introduce further changes," they said, although some surgeons believe a 10-year period is needed to determine the relative effectiveness of breast cancer treatments.

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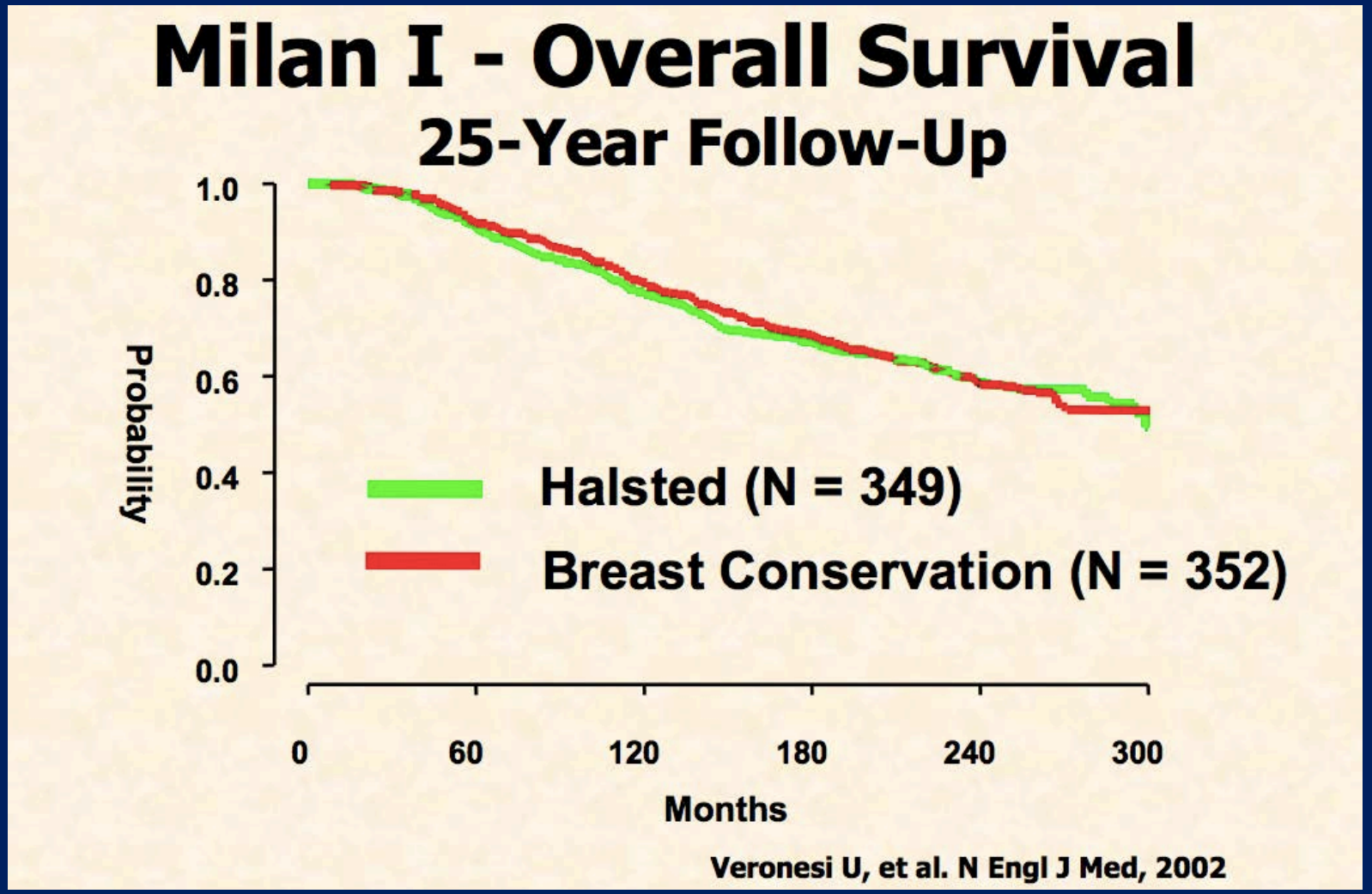
1981 Veronesi et al: Milan I Landmark Trial



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

were randomly assigned to total mastectomy, segmental mastectomy alone, or segmental mastectomy followed by breast irradiation. All patients had axillary dissections, and patients with positive nodes received chemotherapy.

compared with 72.1 per cent of those receiving no radiation ($P<0.001$). Among patients with positive nodes 97.9 per cent of women treated with radiation and 63.8 per cent of those receiving no radiation remained tumor-free

1990 NIH consenus: Tumors <5 cm acceptable to undergo breast conservation

BCT Slowly Accepted in USA During 1990s

Incision Over Tumor

No Skin

15-30 Gram Excision

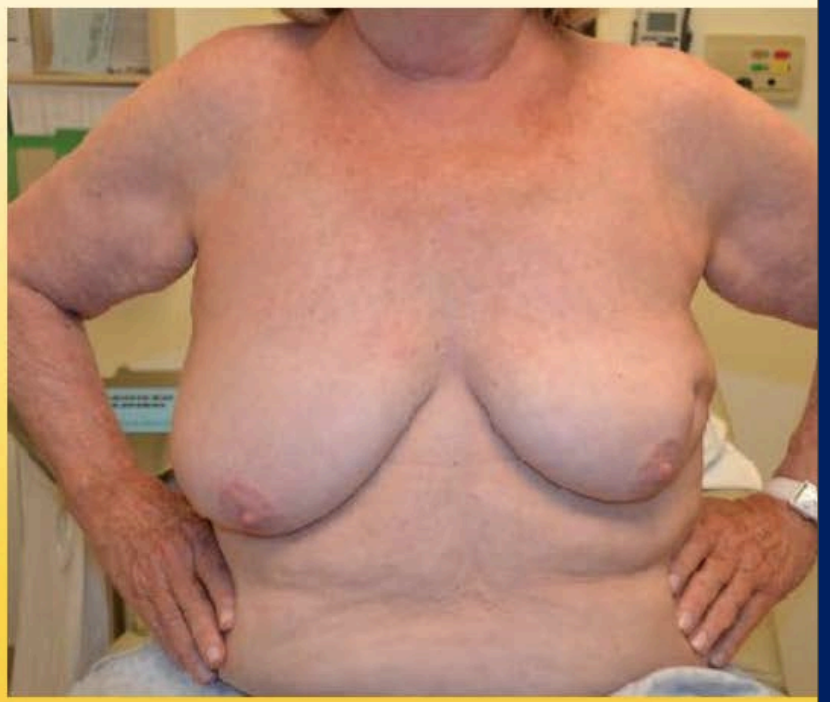
Did Not Repair Breast

Accept Deformity

20-40% Re-excision Rate

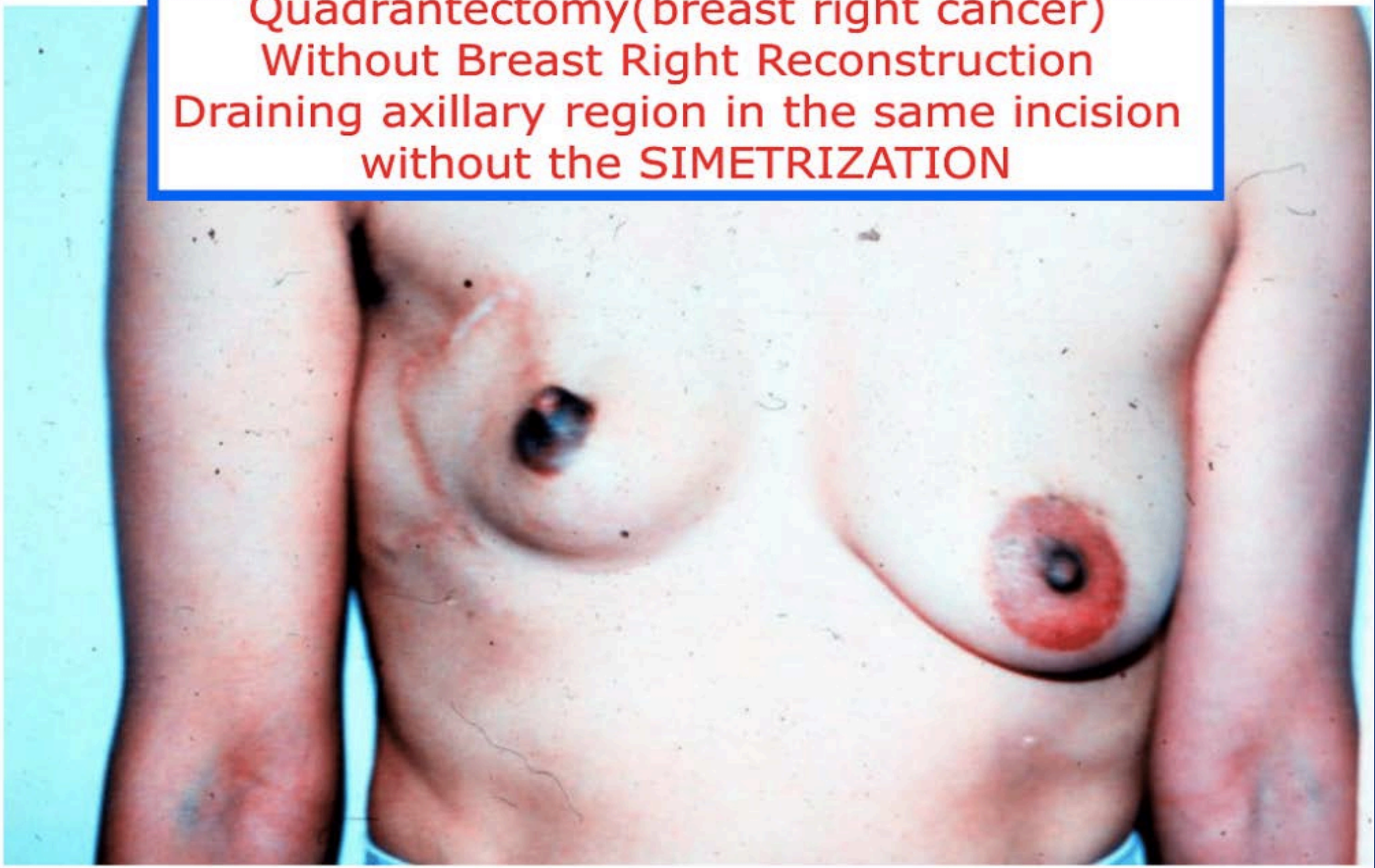
RT to Clean Up Residual

For Many - Unchanged



Issues with lumpectomy alone: Asymmetry

Quadrantectomy(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[1,2], Michaela Onstad, MD[3], Sarah Pesek, MD[4], Kristin Rojas, MD[5], Sara Fogarty, DO[6], Ashley Stuckey, MD[1,7], Christina Raker, ScD[8], and Don S. Dizon, MD[9,10]

[1]Breast Health Center, Women and Infants' Hospital, Providence, RI; [2]Department of Surgery, Brown University Warren Alpert Medical School, Providence, RI; [3]Gynecologic Oncology, MD Anderson Cancer Center, Houston, TX; [4]St. Peter's Hospital, St. Peter's Health Partners Medical Associates, Albany, NY; [5]Obstetrics and Gynecology, Women and Infants' Hospital, Providence, RI; [6]Department of Surgery, Greater Baltimore Medical Center, Towson, MD; [7]Gynecologic Oncology, Women and Infants Hospital, Providence, RI; [8]Division of Research, Women and Infants' Hospital of Rhode Island, Providence, RI; [9]Gynecologic Oncology, Massachusetts General Hospital, Boston, MA; [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)?"

Surgical procedure	(*N*)	My chest is important for intimacy and sex (%)		*p* value
		Prior to surgery	After surgery	
Lumpectomy	174	83	74	0.0006
Mastectomy alone	19	95	47	0.003
Mastectomy + reconstruction	60	93	77	0.002

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

Surgical procedure	Favorable appearance satisfaction (%)	*p* value	Appreciation of pleasurable breast caress (%)	*p* value
Lumpectomy	79.6	0.02	51.2	0.01
Mastectomy + reconstruction	65.0		29.4	

Favorable = very or moderately satisfied. Appreciation of pleasurable breast caress = very or moderately pleasurable

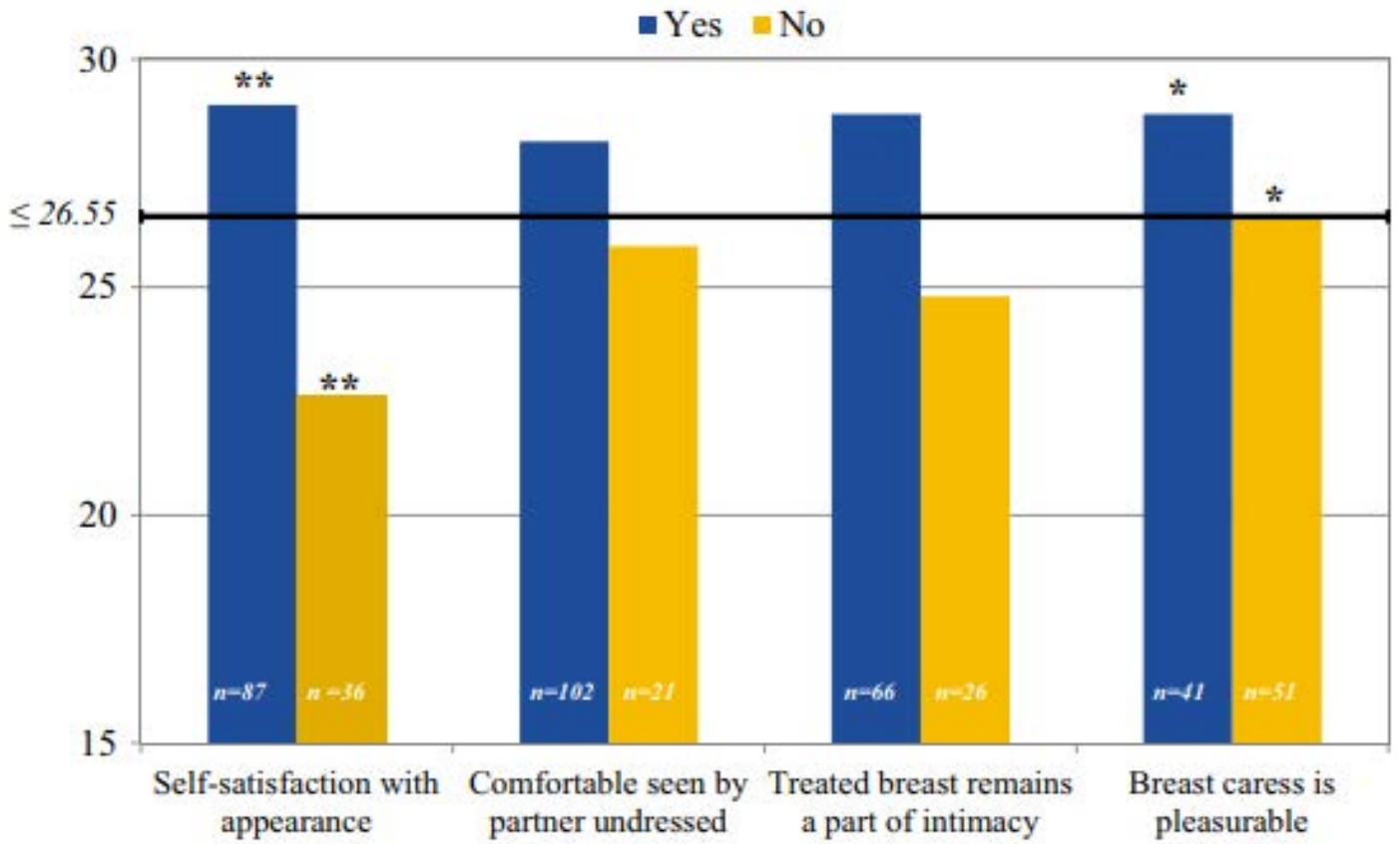
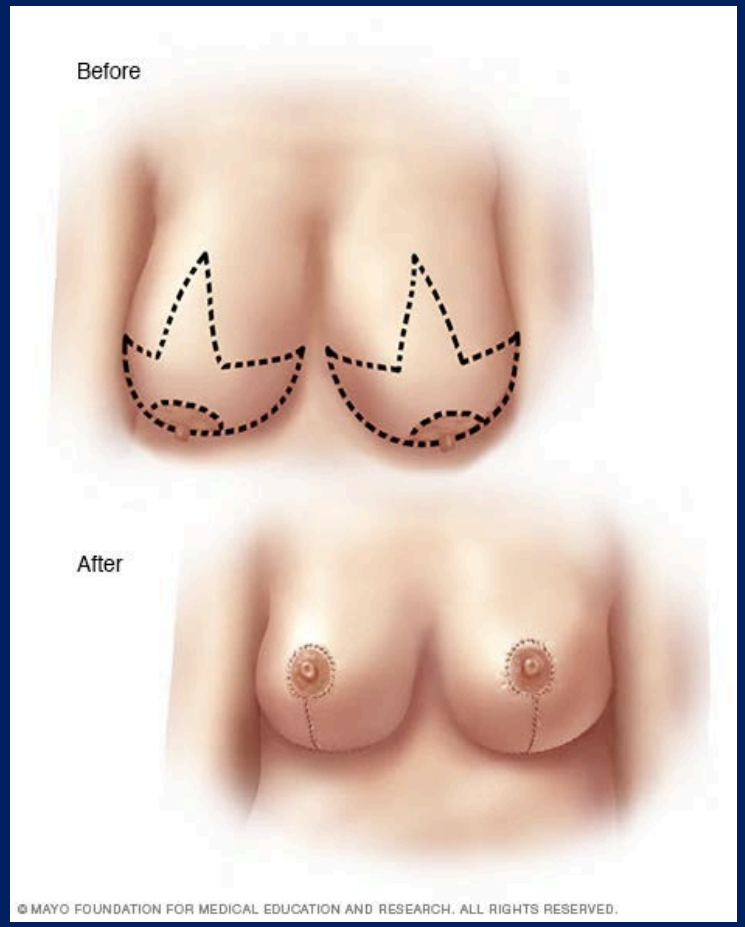


FIG. 2 Median FSFI stratified by appearance satisfaction and BSS. Neutral response options were included in the "No" category. The black horizontal line at FSFI $\leq$ 26.55 indicates sexual dysfunction. $^{**}p < 0.001$, $^{*}p < 0.05$

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**



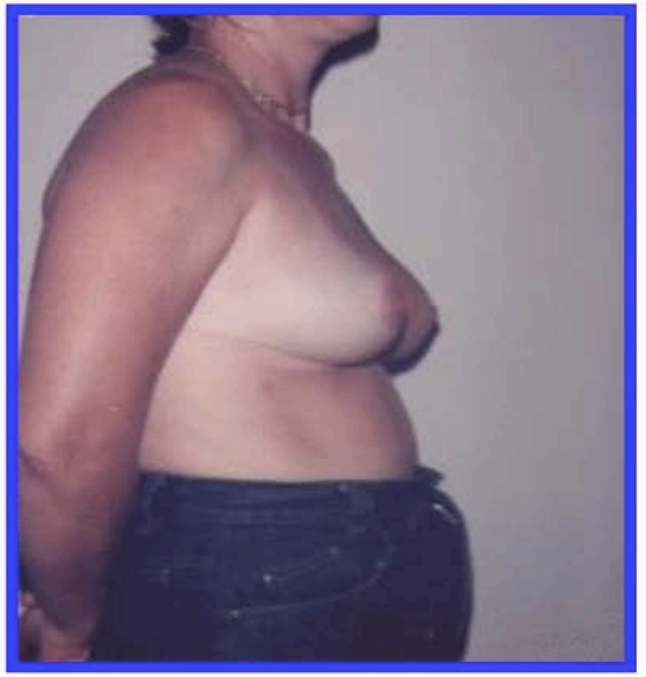
PRÉ

PÓS

BEFORE

AFTER

BEFORE



AFTER

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.

Procedure	Ellipses	Reduction
N	250	500
Mean Weight	65 Grams	134 Grams
Mean Extent	22 mm	22 mm
No Ink on Tumor	88%	97%
≥ 1 mm	79%	90%
Re-Excision	15%	3%
Mastectomy	2%	1%
Complications	2%	3%
Any Local Rec	2%	3%

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

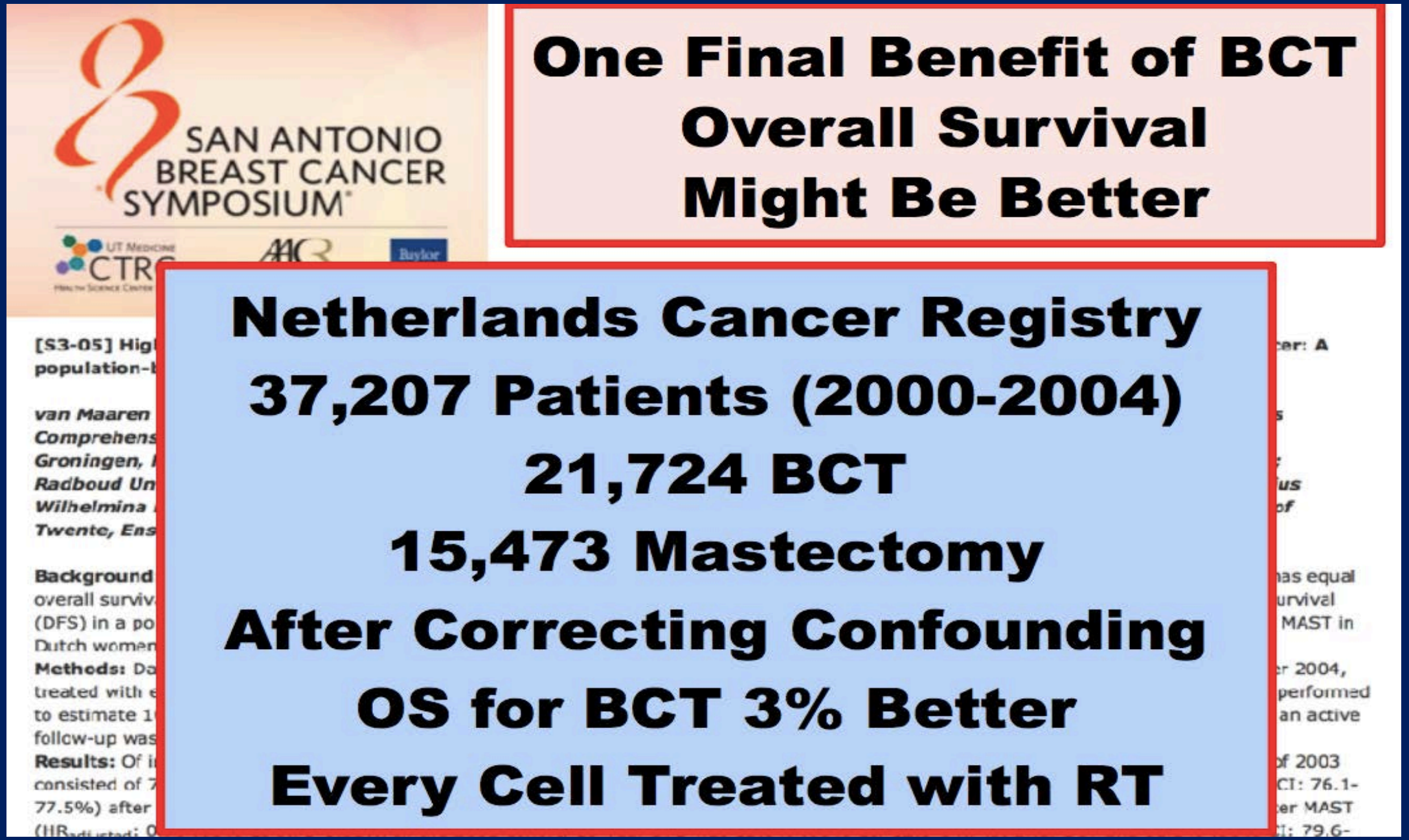
Looks Better (Now and Later)

Less Pain, Less Expense, Less Hospital

No Foreign Body, No Donor Site

More Functional, Sensate Breast

Better Body Image, All Tissue Treated


SAN ANTONIO BREAST CANCER SYMPOSIUM
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

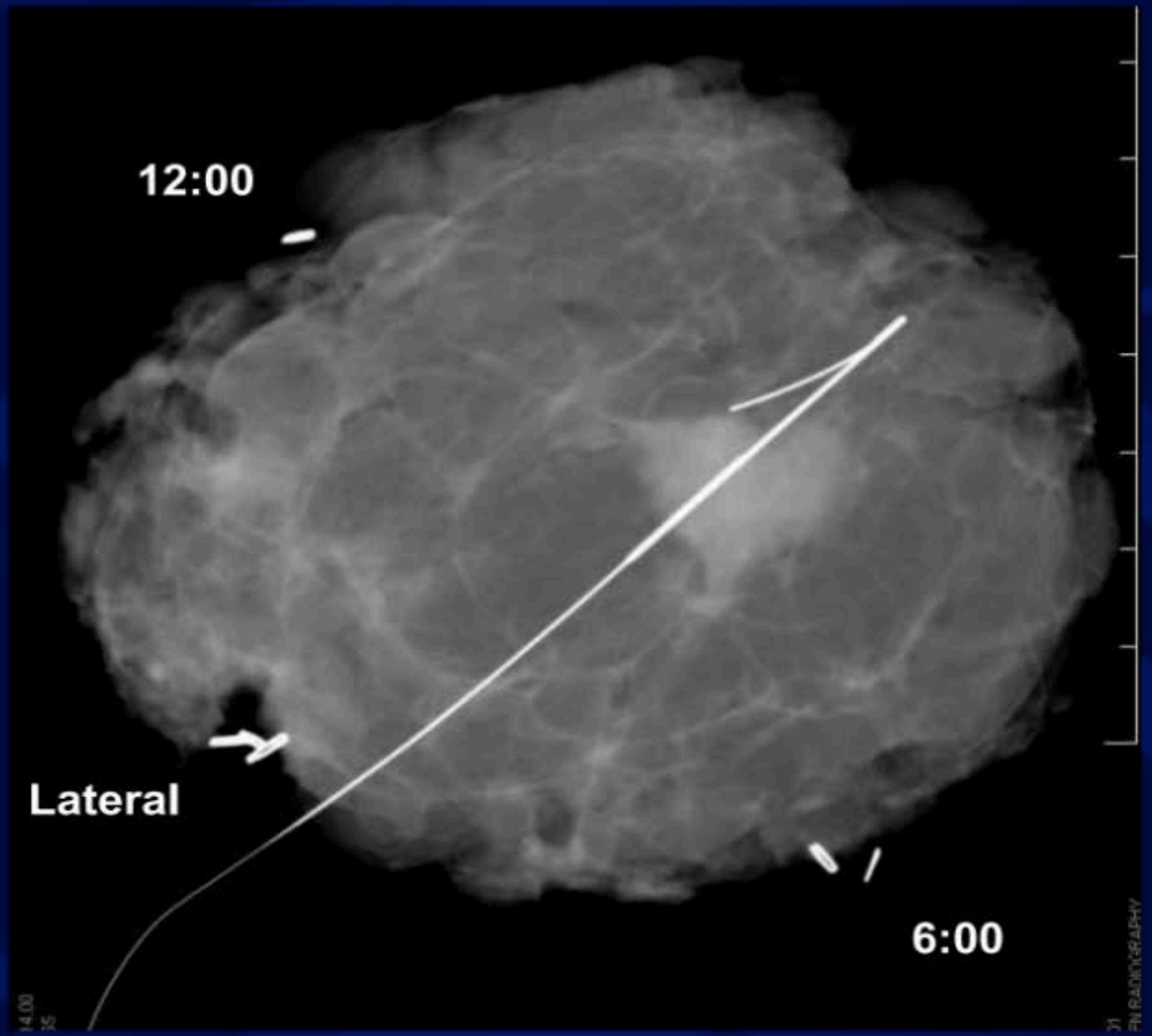
Specimen Examination - Ultrasound

Select an area to comment on

Anterior Surface Transverse and Sagittal

Lateral Surface Transverse and Sagittal

Intraoperative Specimen Mammogram

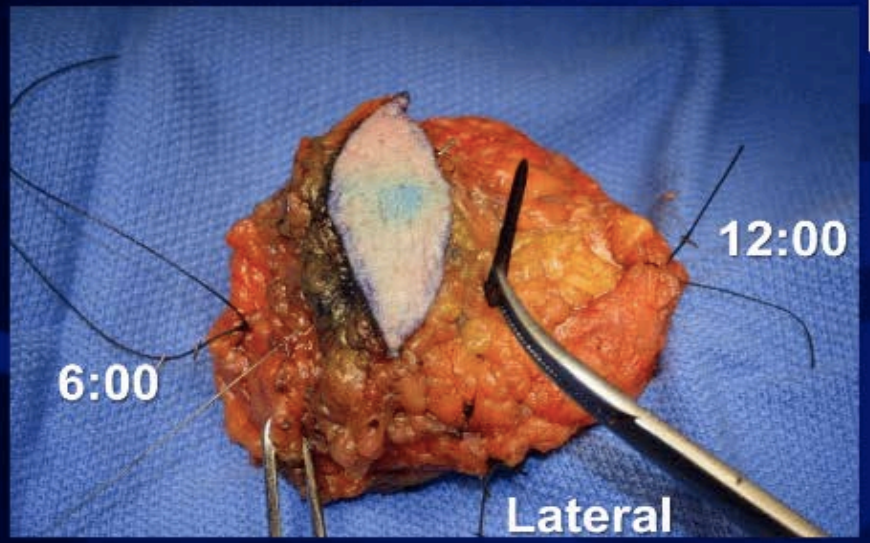


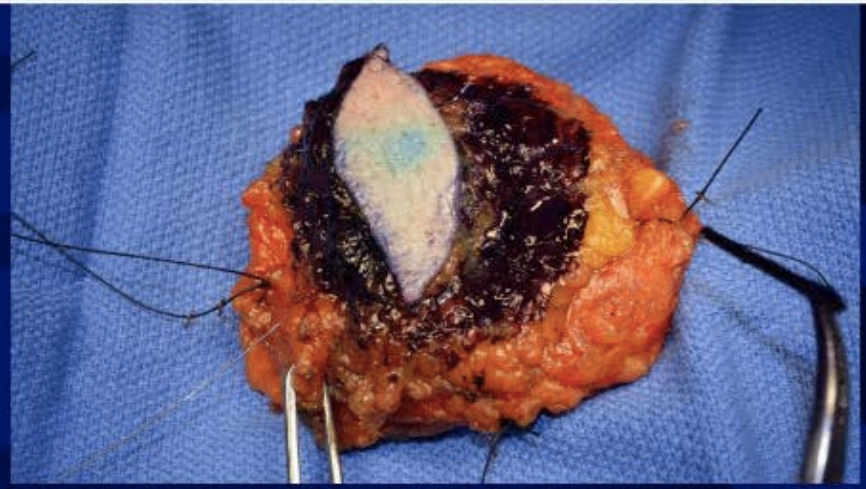
Kaufman CS, et al. Ann. Surg. Oncol. 2007; 14:1478-1485.

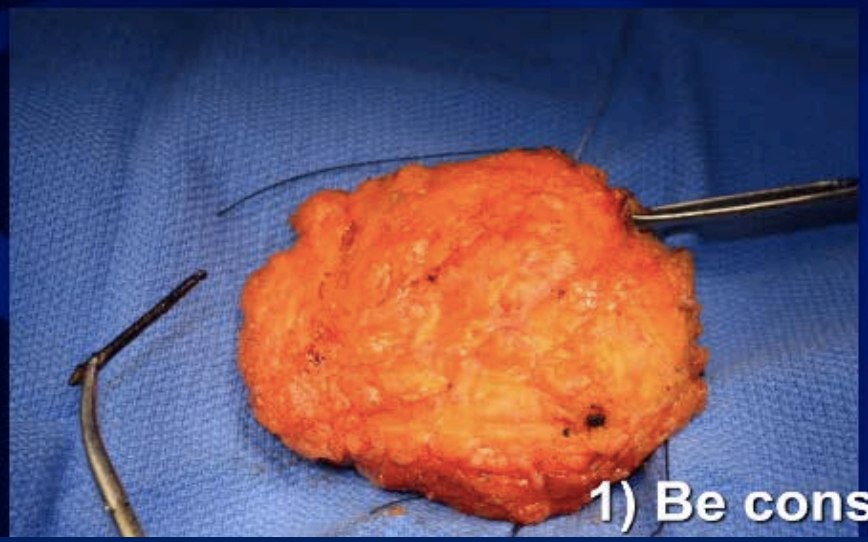
Specimen Orientation

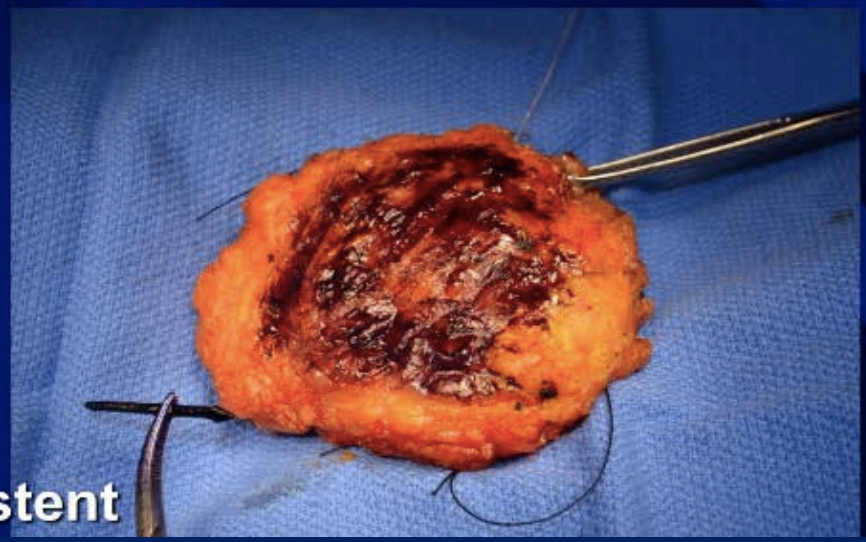
12:00	Double short	1 clip
6:00	Double long	2 clips
Lateral	Single long	3 clips

Purple Dye Anterior / Posterior









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

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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.

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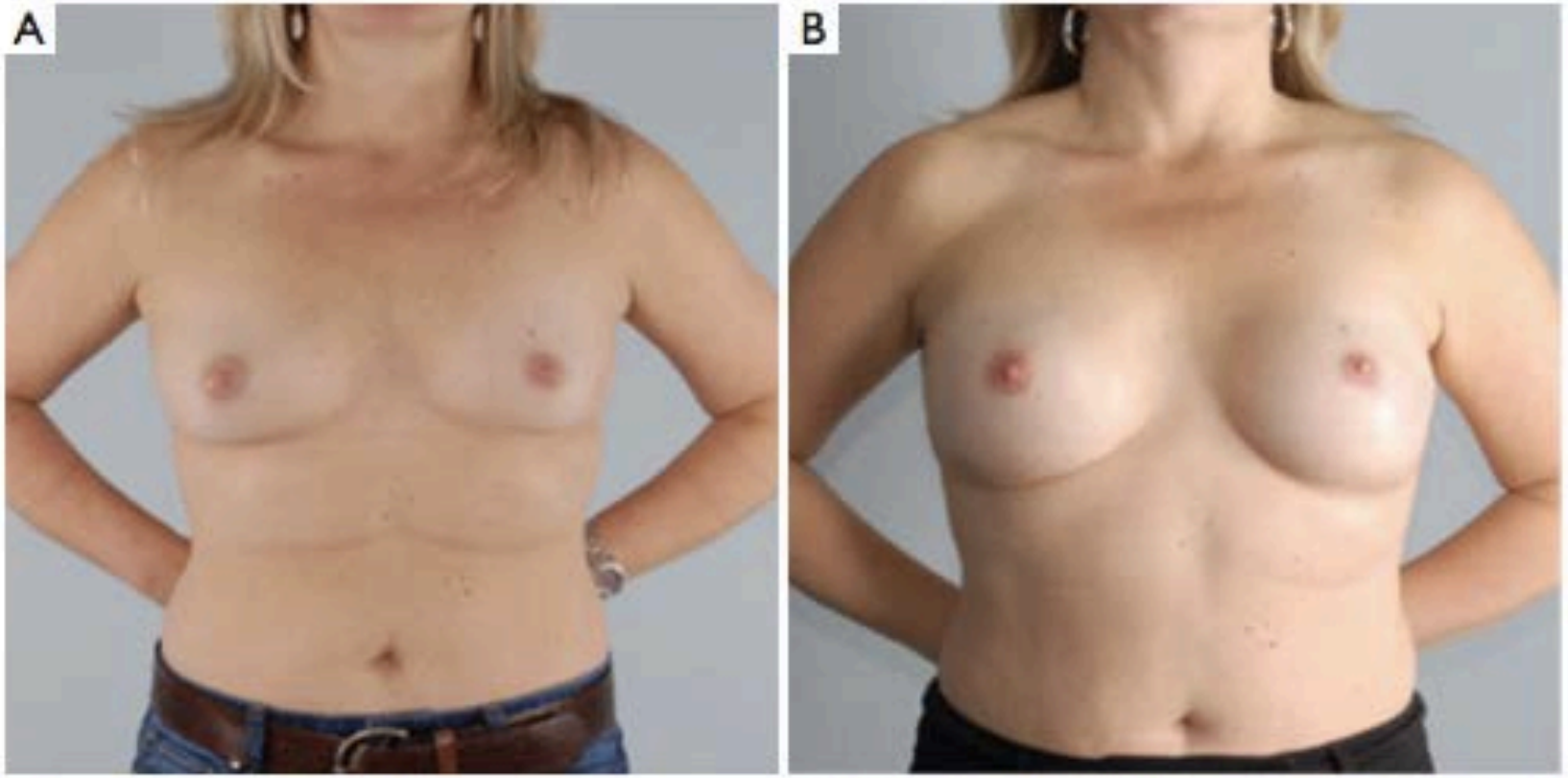

Figure 1 Ideal NSM candidate with small breasts and no ptosis. (A) Preoperative photo; (B) post bilateral NSM with direct to implant immediate prepectoral reconstruction. Photo courtesy Troy Pittman, MD. NSM, nipple sparing mastectomy.

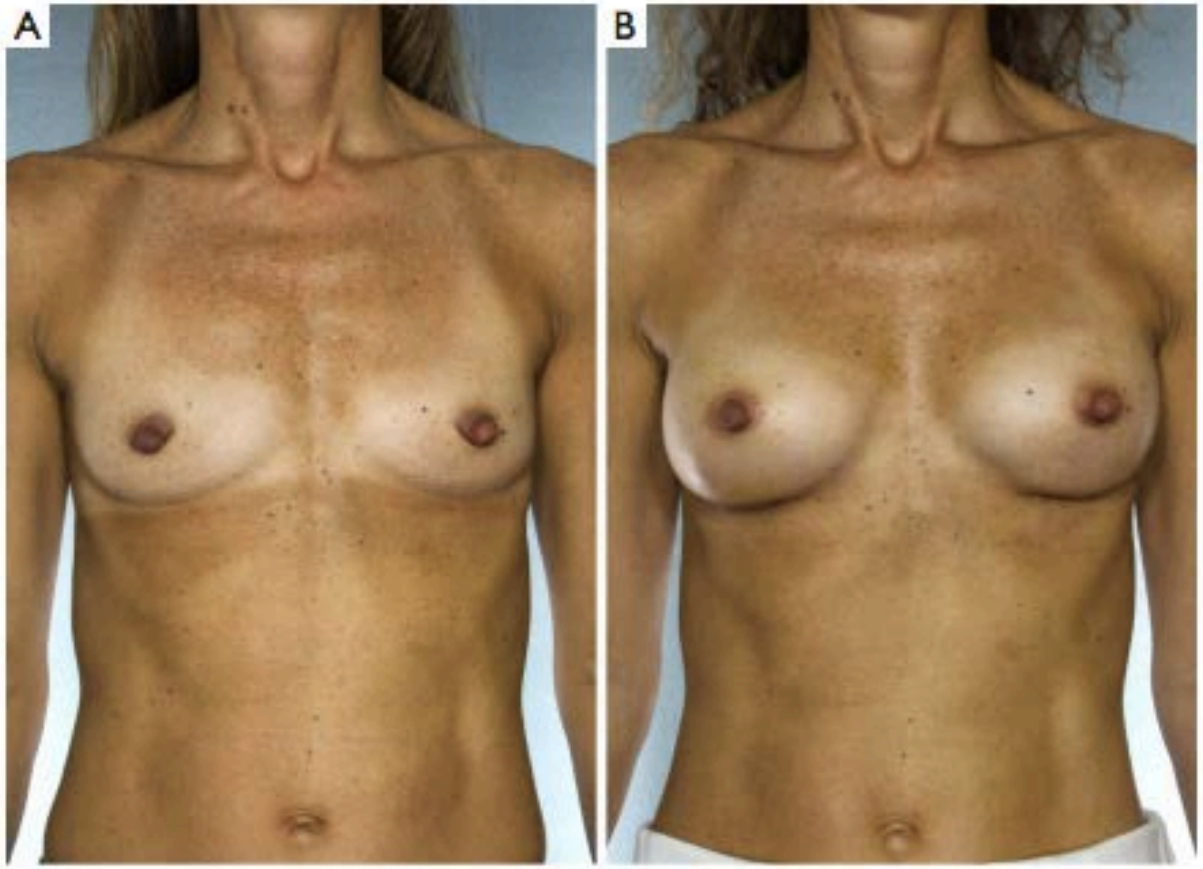

Figure 2 Patient with *BRCA* gene who underwent bilateral prophylactic mastectomies. (A) Preoperative photo; (B) 5 months postoperative photo after bilateral NSM with immediate reconstruction using 410 cc prepectoral implants. Photo courtesy John Sherman, MD. NSM, nipple sparing mastectomy.

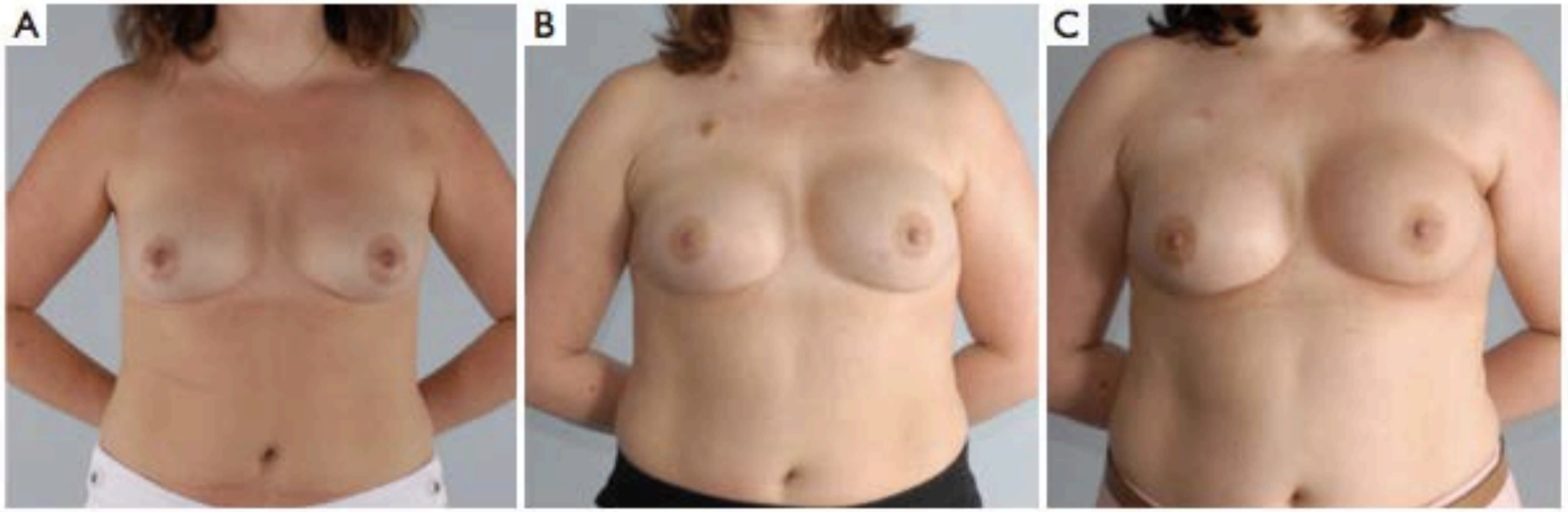

Figure 4 Patient who underwent bilateral NSM and immediate prepectoral implant reconstruction, followed by left breast postoperative radiation with an excellent cosmetic outcome. (A) Preoperative photo; (B) postoperative photo after bilateral NSM with immediate prepectoral implant reconstruction; (C) left breast after post-mastectomy radiation. Photo courtesy Troy Pittman, MD. NSM, nipple sparing mastectomy.

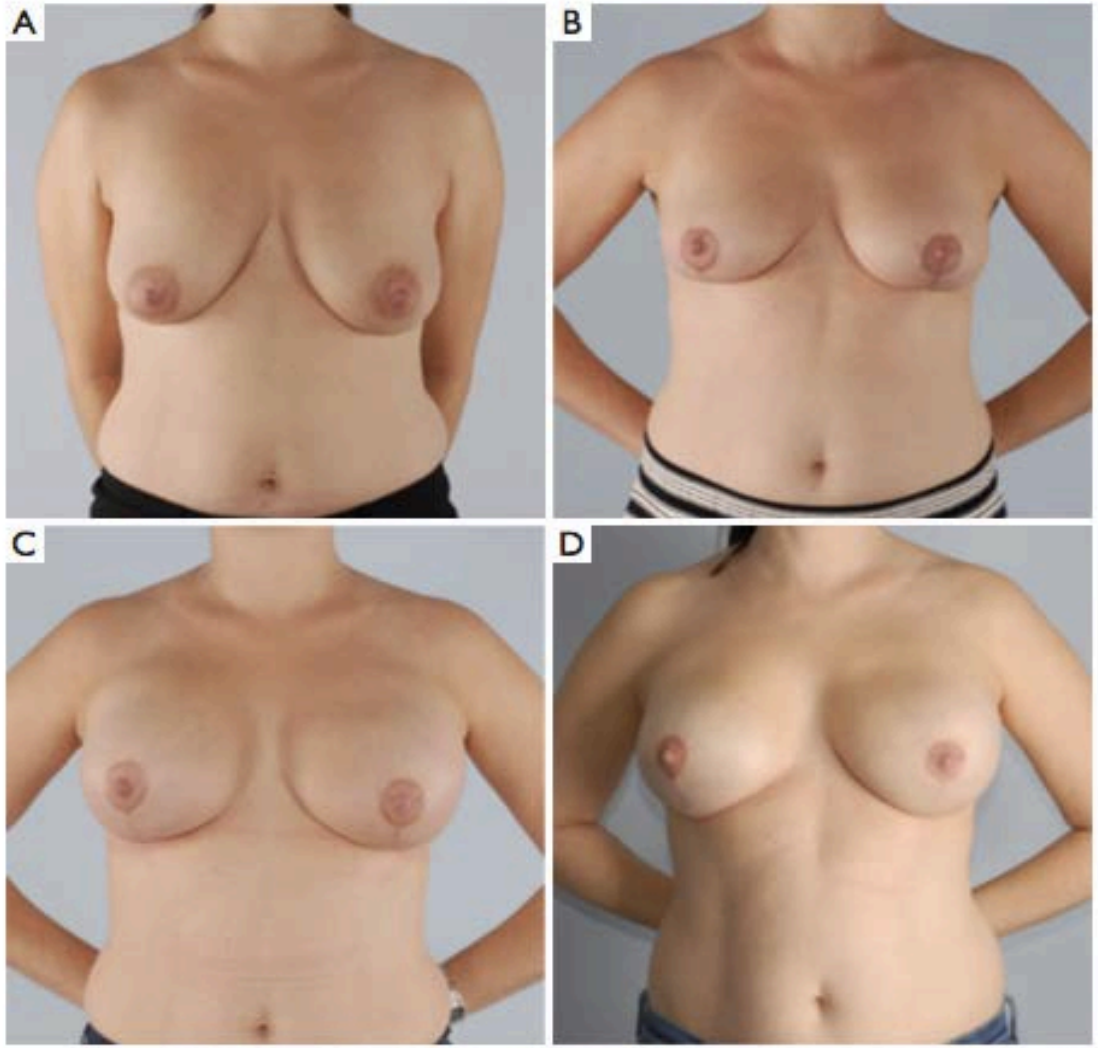

Figure 5 A 40 years old BRCA+ patient with grade 3 ptosis and large areola who underwent prophylactic surgery using a two-stage technique. (A) Preoperative photo; (B) post bilateral reduction-mastopexy with areolar reduction; (C) 8 weeks postop after 2nd stage bilateral NSM with immediate retropectoral tissue expander reconstruction; (D) one year postop with retropectoral final implants. Photo courtesy Troy Pittman, MD. NSM, nipple sparing mastectomy.

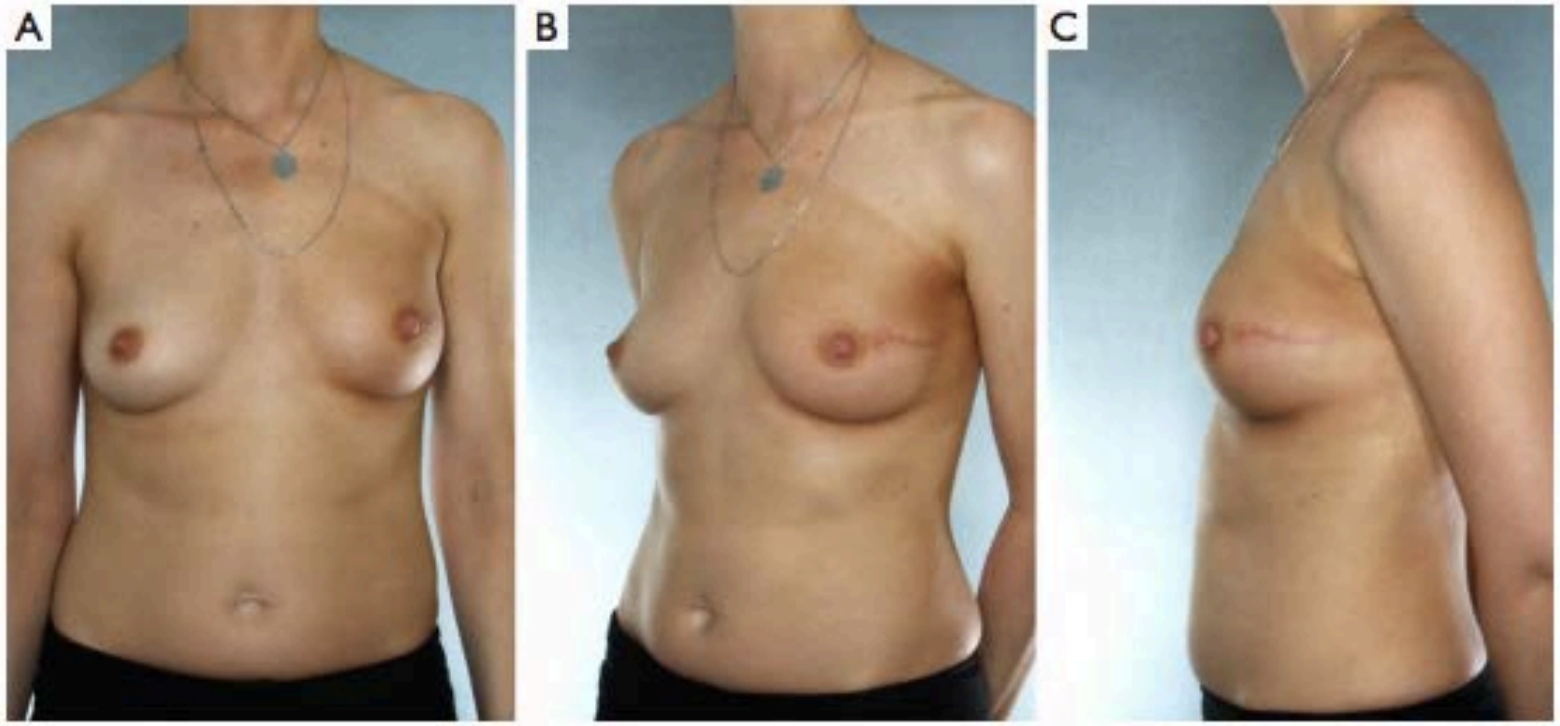

Figure 8 A 38 years old patient with left upper outer quadrant 4 cm invasive ductal cancer and positive node, status post NAC with good response. A left NSM was performed using a lateral upper outer quadrant incision over the tumor. Patient received left breast post-mastectomy radiation therapy. Figures 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.

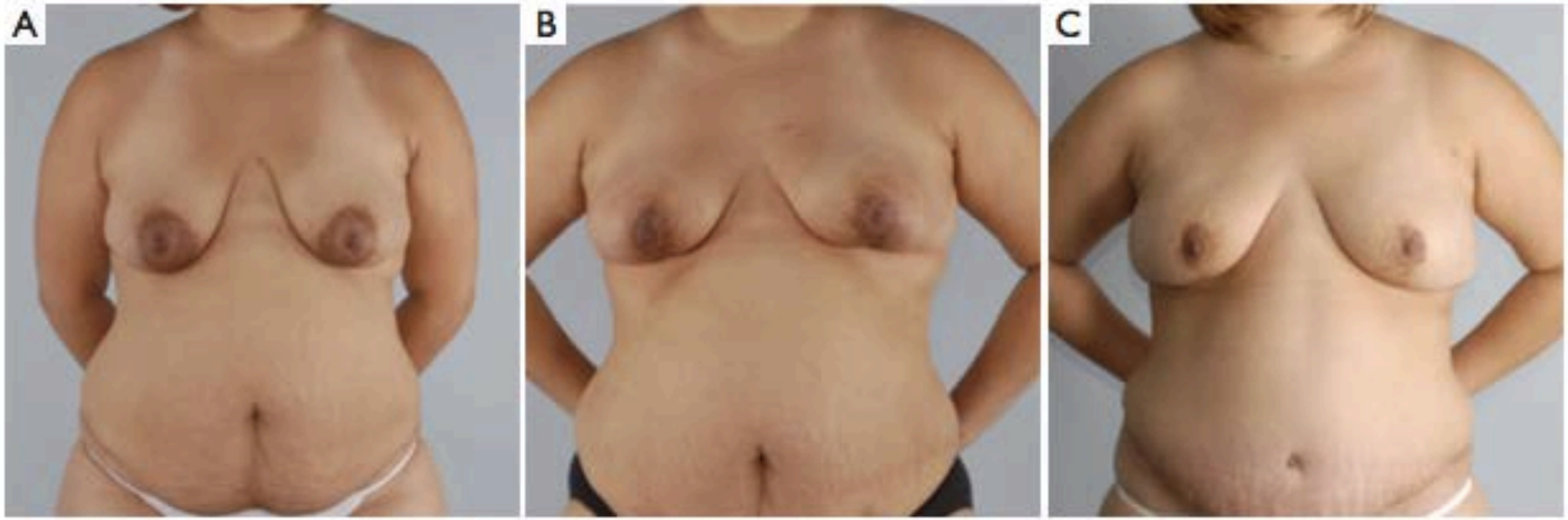

Figure 6 Patient with ptosis and enlarged areola who underwent bilateral NSM with DIEP free flap reconstruction using a two-stage technique. Figures show a patient with ptosis and enlarged areola who underwent DIEP free flap reconstruction from Medstar Georgetown University Hospital, also demonstrating 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.

SSO The Society of Surgical Oncology, inc.
THE AMERICAN SOCIETY OF Breast Surgeons
Annals of SURGICAL ONCOLOGY

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

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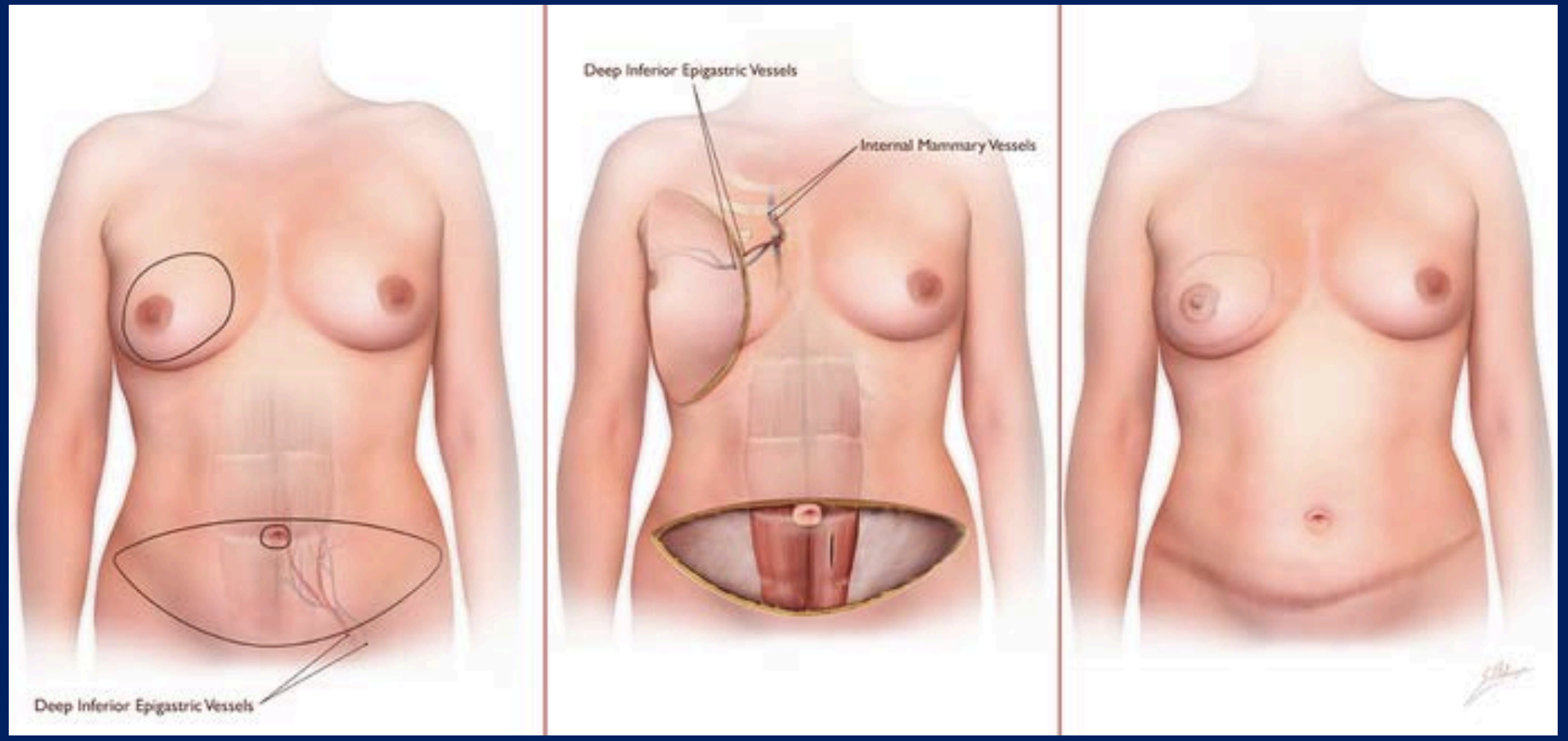
Reconstructive options

- 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



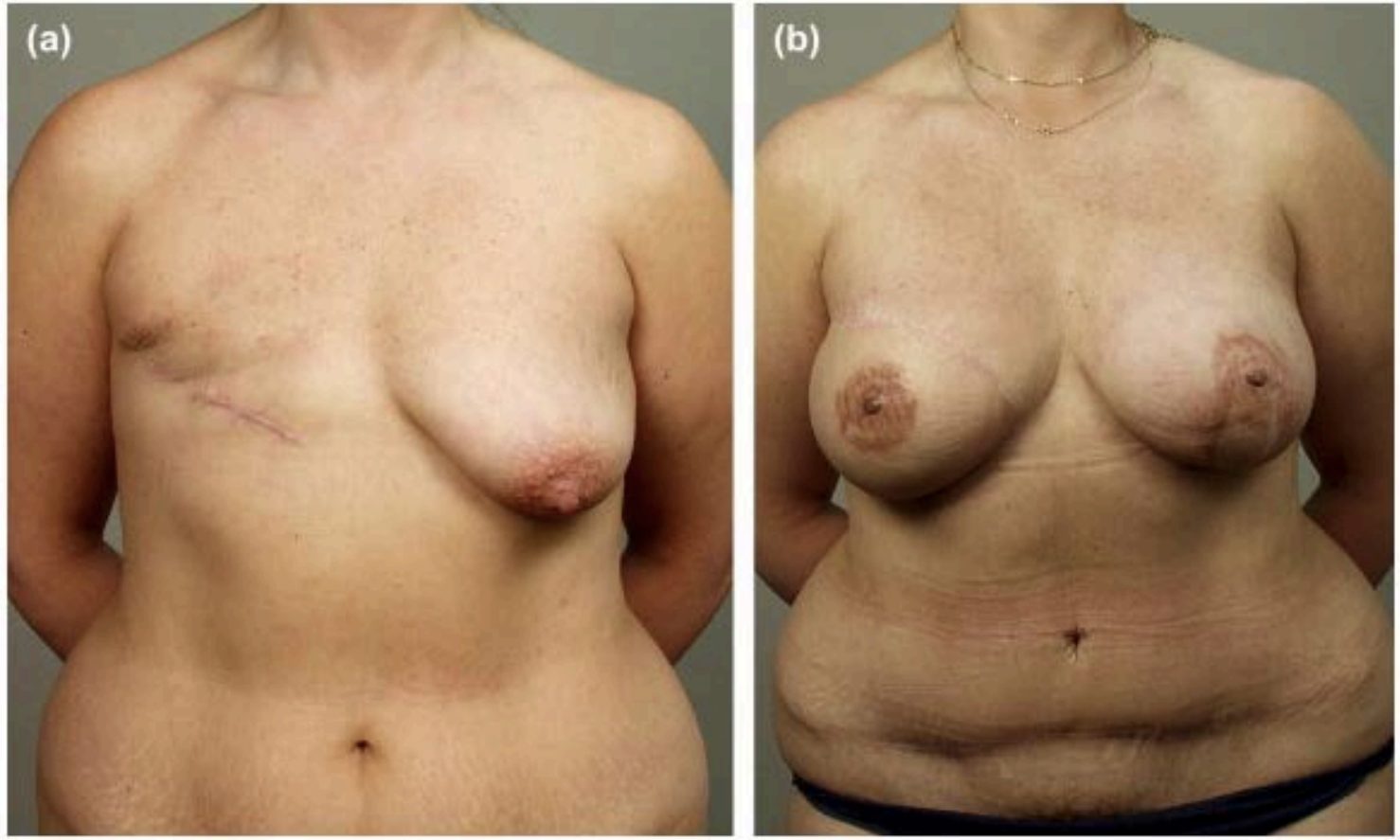


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Figure 1. (a, b) A 43-year-old patient after unilateral modified radical mastectomy for lobular carcinoma in situ, with mammographic and ultrasound suspicious results on her left breast. (a) Preoperative view. (b) Postoperative view after left skin-sparing mastectomy with mastopexy and bilateral reconstruction.

Non-buried skin paddle

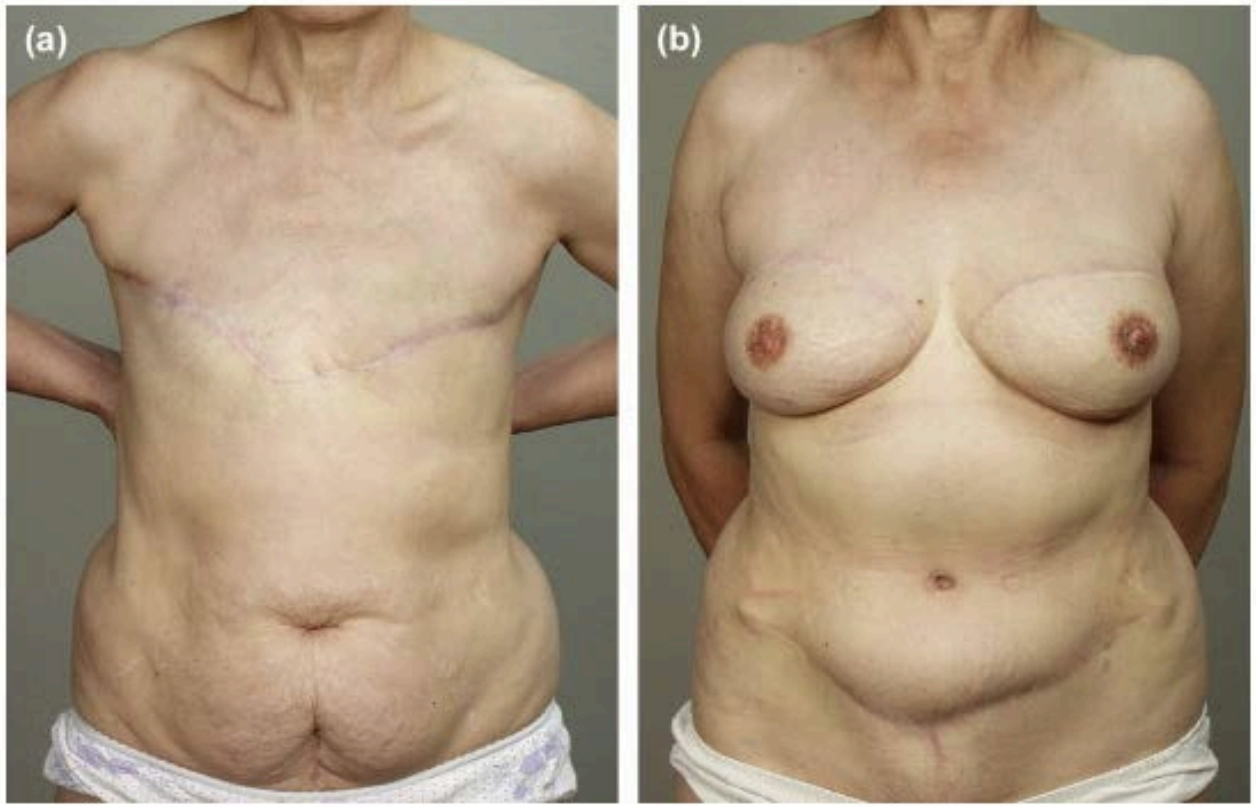

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Figure 2. (a, b) A 54-year-old patient after bilateral modified radical mastectomy. (a) Preoperative view. (b) Postoperative view two years after reconstruction.

Free flap reconstruction in mastectomy patients after radiation: non-buried skin paddle

Immediate tissue expander followed by PMRT to the left chest wall with subsequent bilateral free-flap autologous reconstruction

Buried tissue paddle, skin reduction

Autologous reconstruction

Select an area to comment on

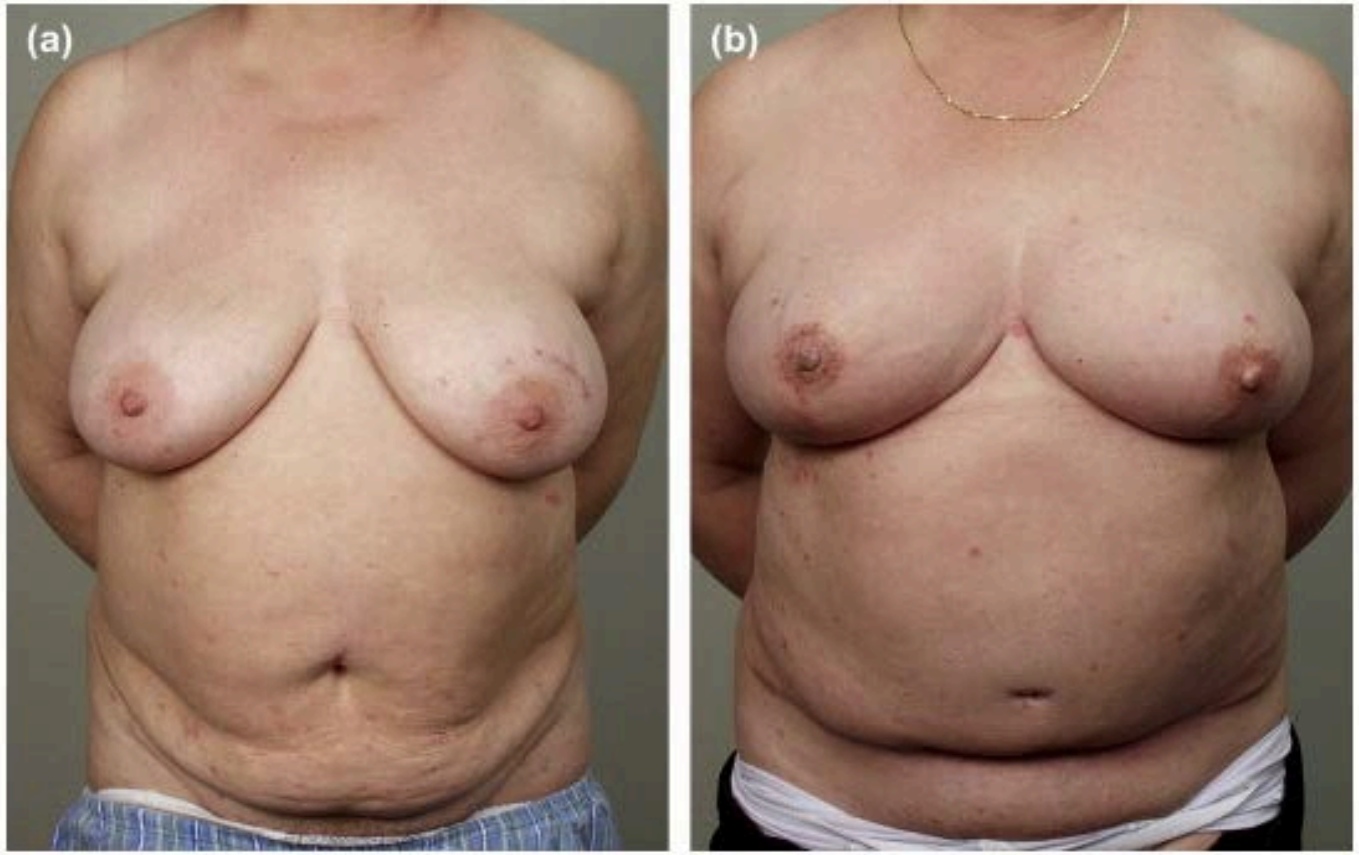

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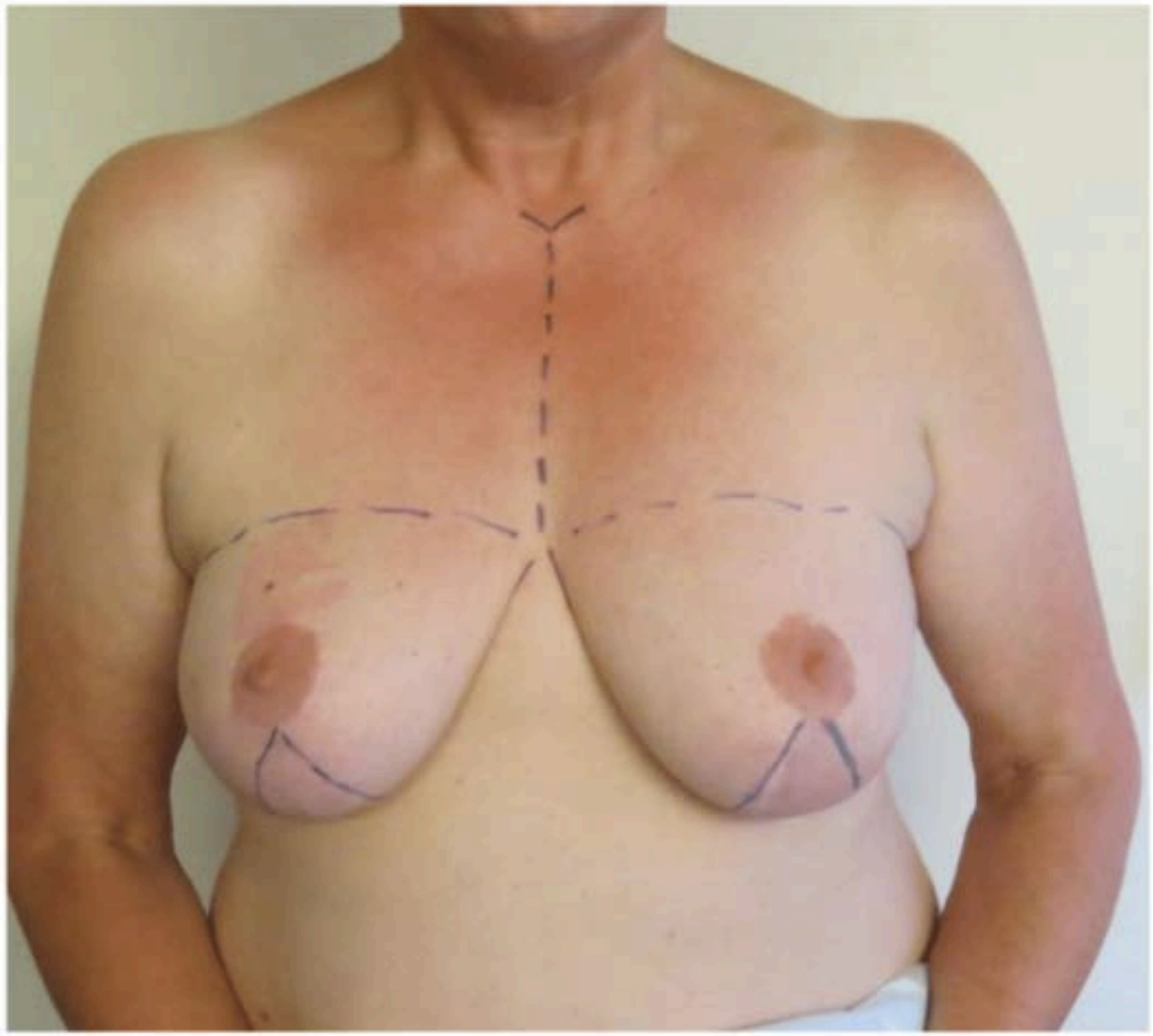
Figure 3. (a, b) A BRCA-positive 51-year-old patient with bilateral biopsy of ductal carcinoma in situ. (a) Preoperative view. (b) Postoperative view 2 years after bilateral prophylactic skin-sparing mastectomy with mastopexy and reconstruction. Note that in this patient we used the technique of keeping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

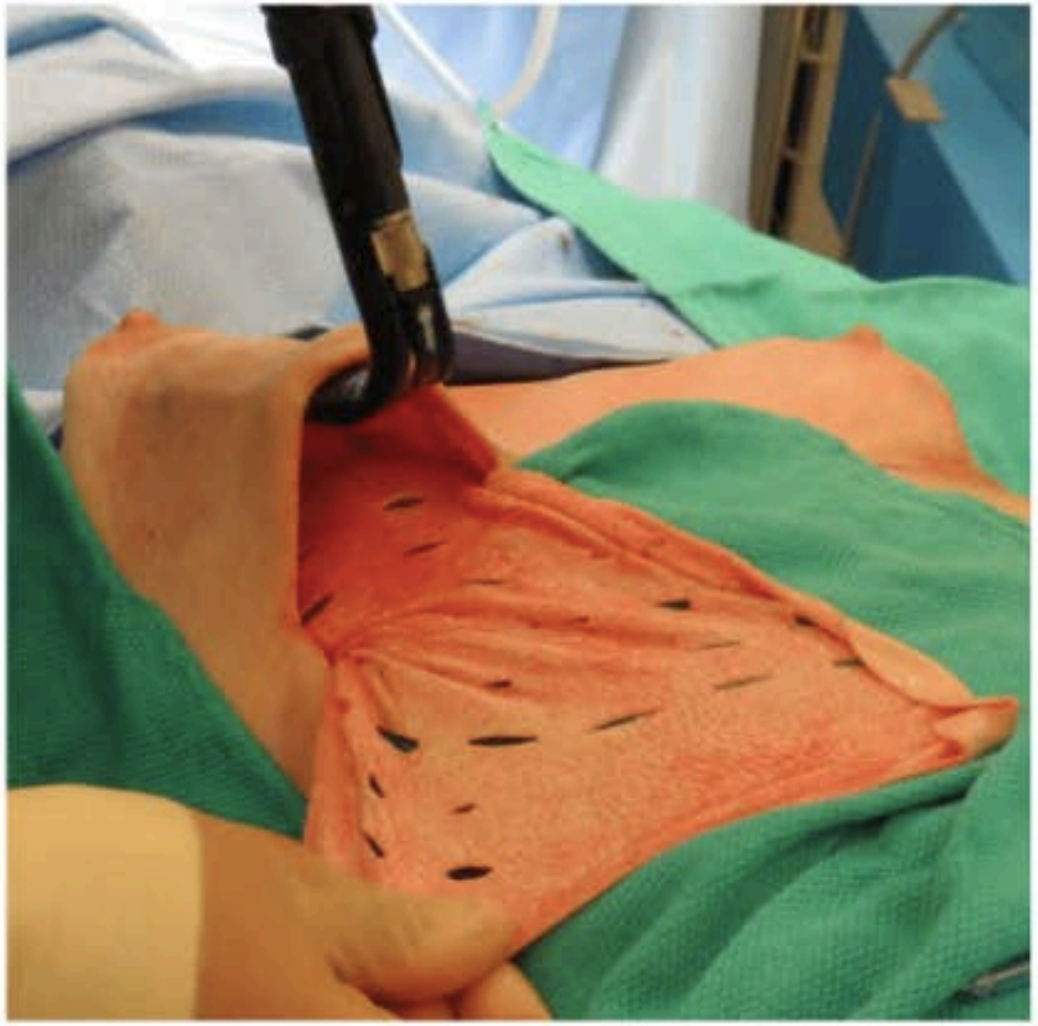
Pre-pectoral reconstruction

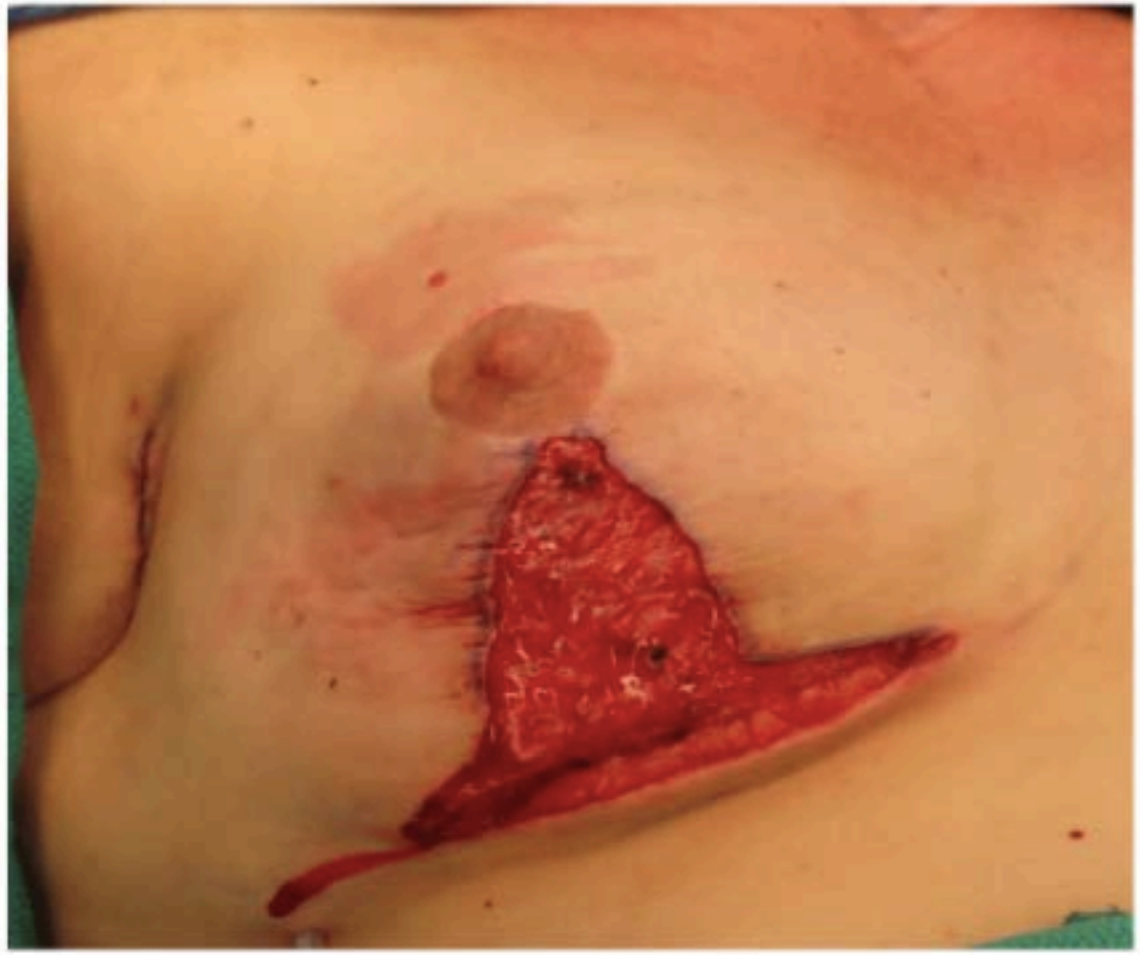
- Growing adoption
- Avoidance of hyperanimation deformity
- Decreased post-op pain
- Two-staged or DTI
- ADM-assisted
  - Increased cost
  - Long-term contracture rates?

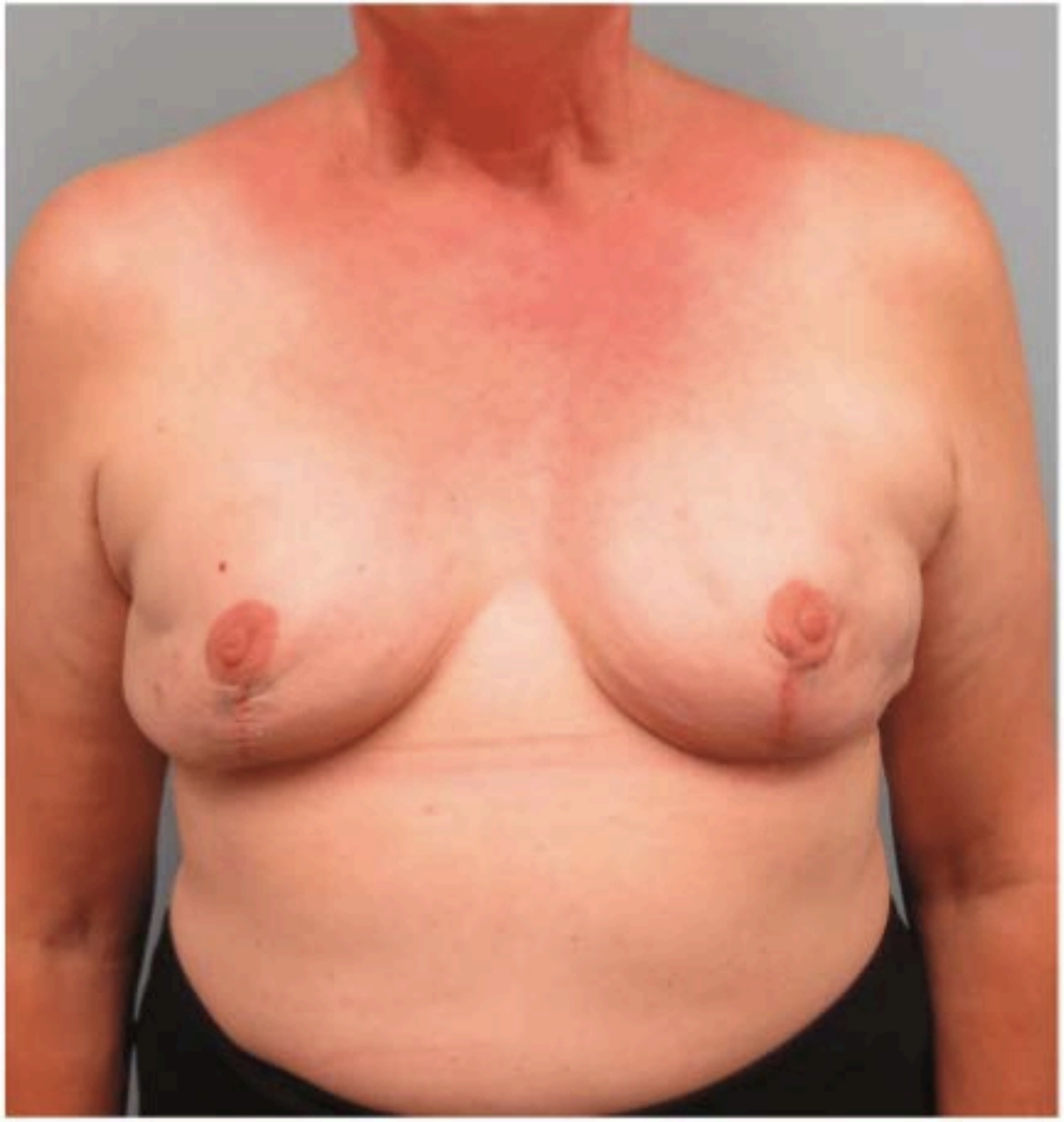
Pre-pectoral reconstruction

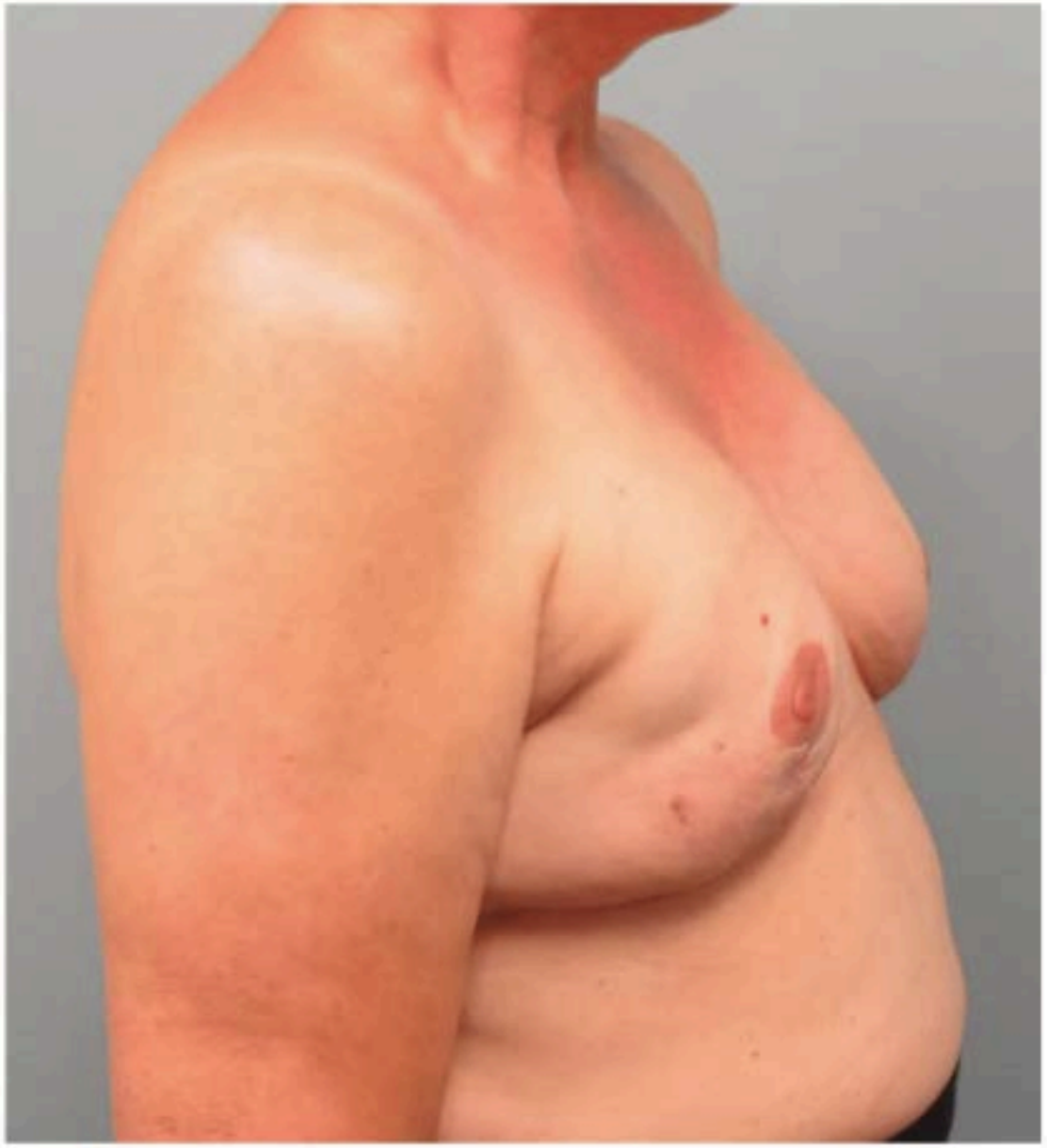
- Indications
  - Good skin flaps
  - Prophylactic/early stage disease
  - High likelihood of PMRT?
  - Patient preference
    - Potential increased implant palpability
    - Potential upper pole step-off



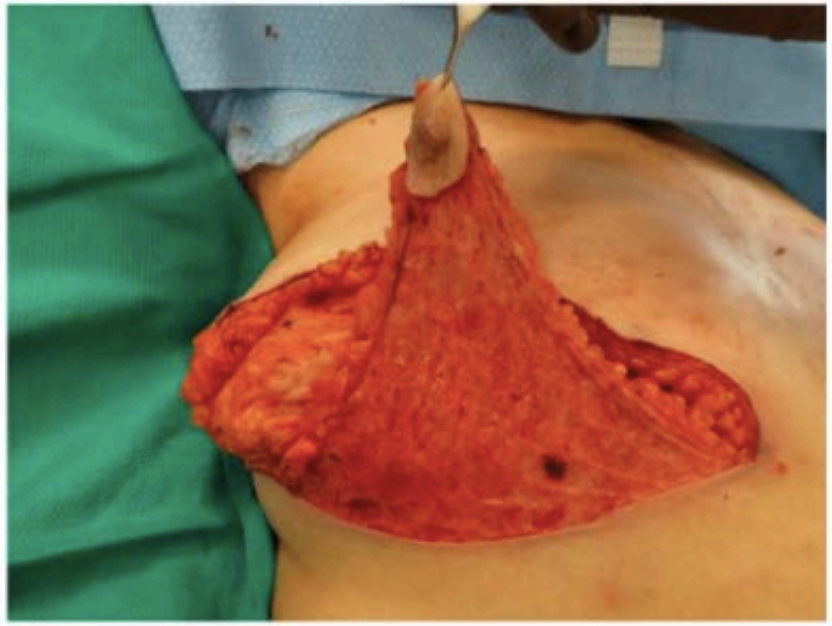


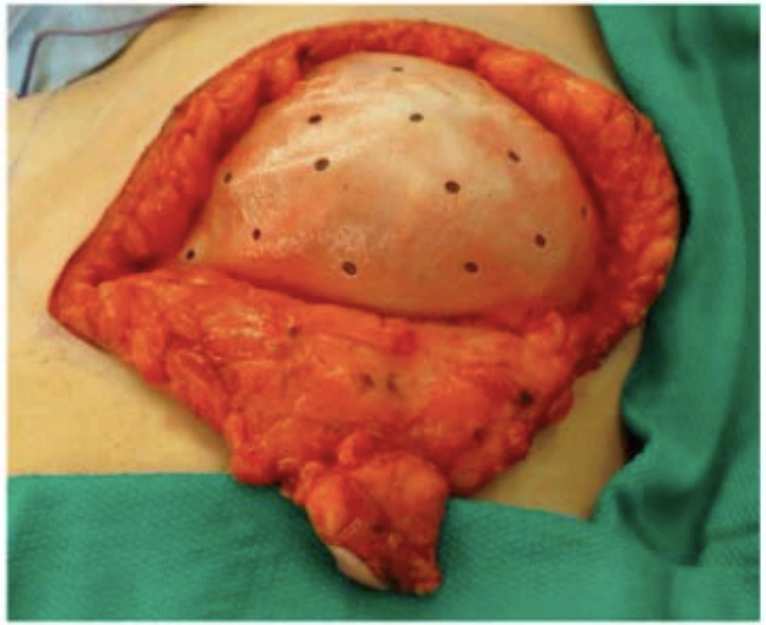


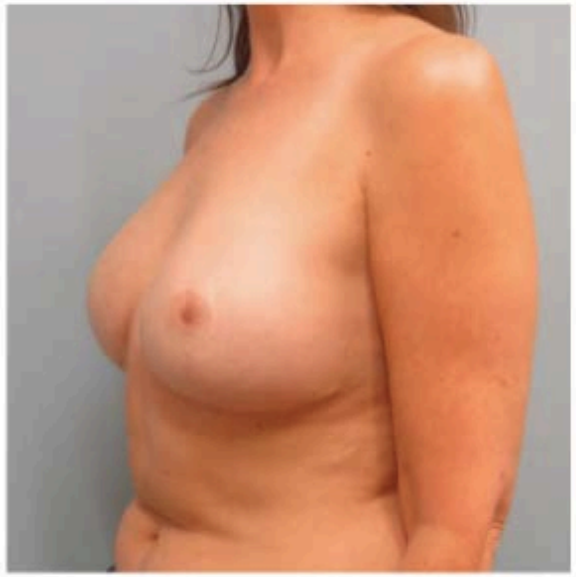




Wise pattern skin-reducing NSM

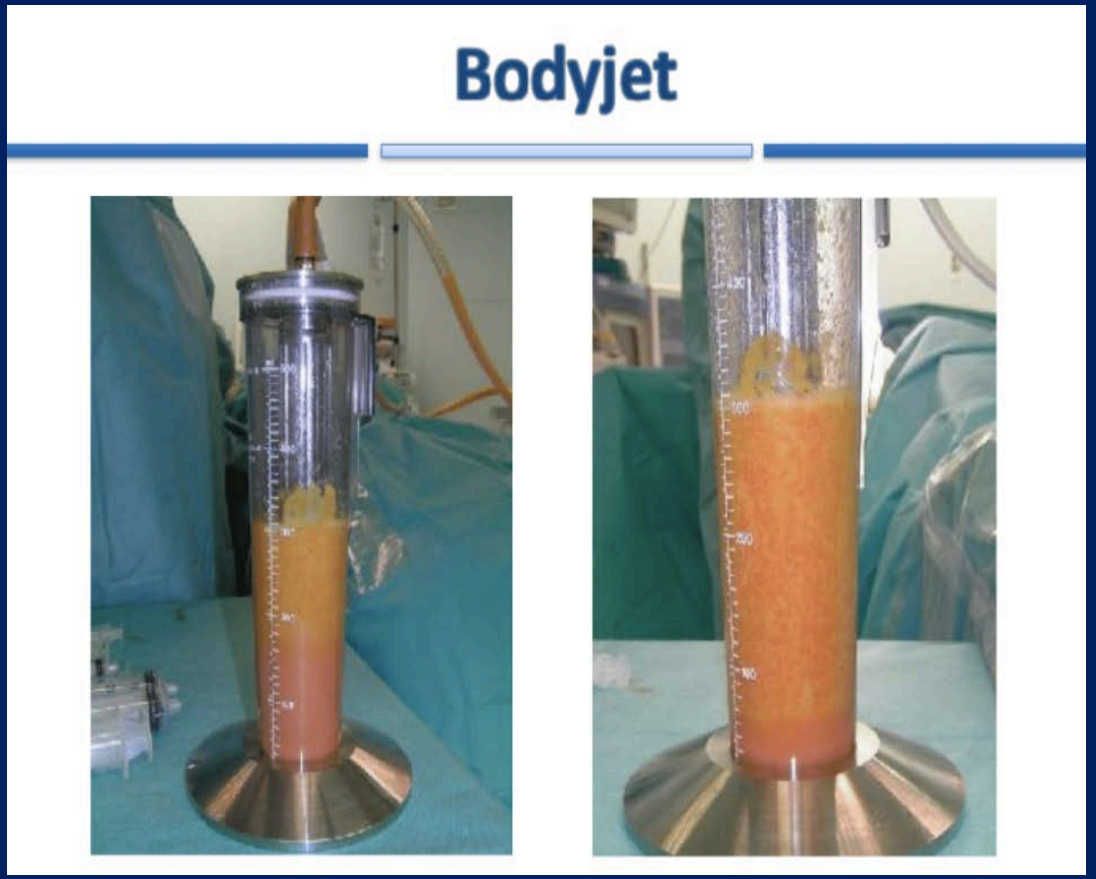






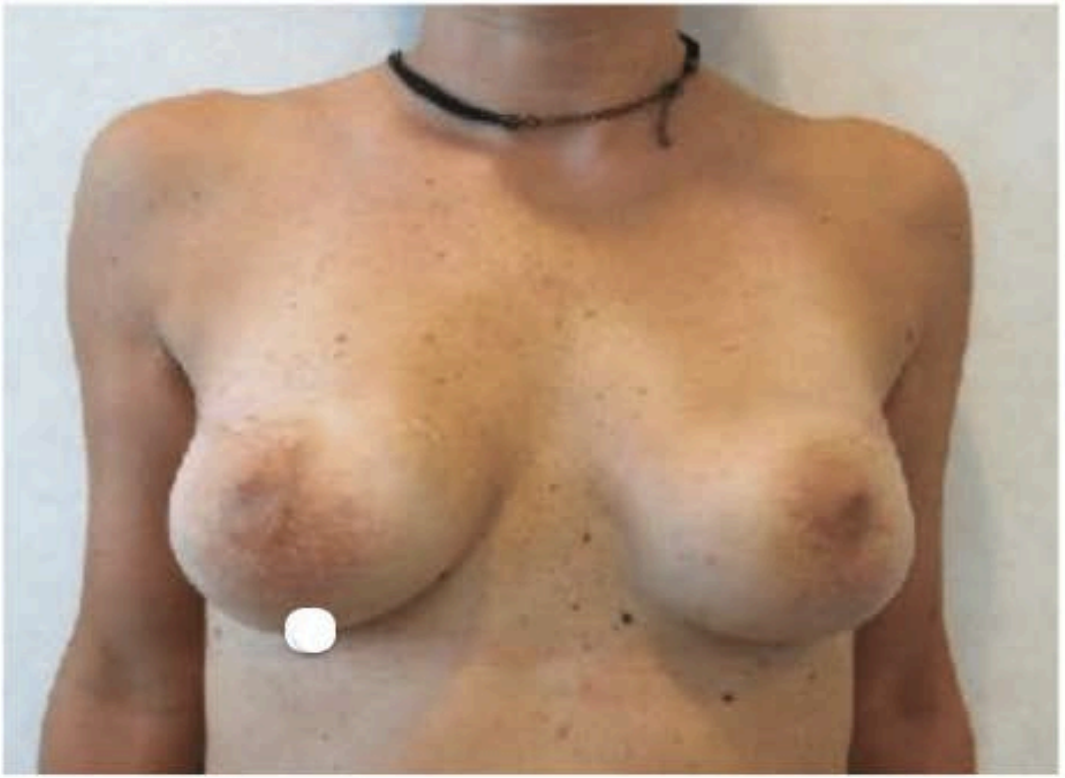
Nipple reconstruction

Lipofilling/Fat grafting



...After BCT

…After Implant Based Reconstruction

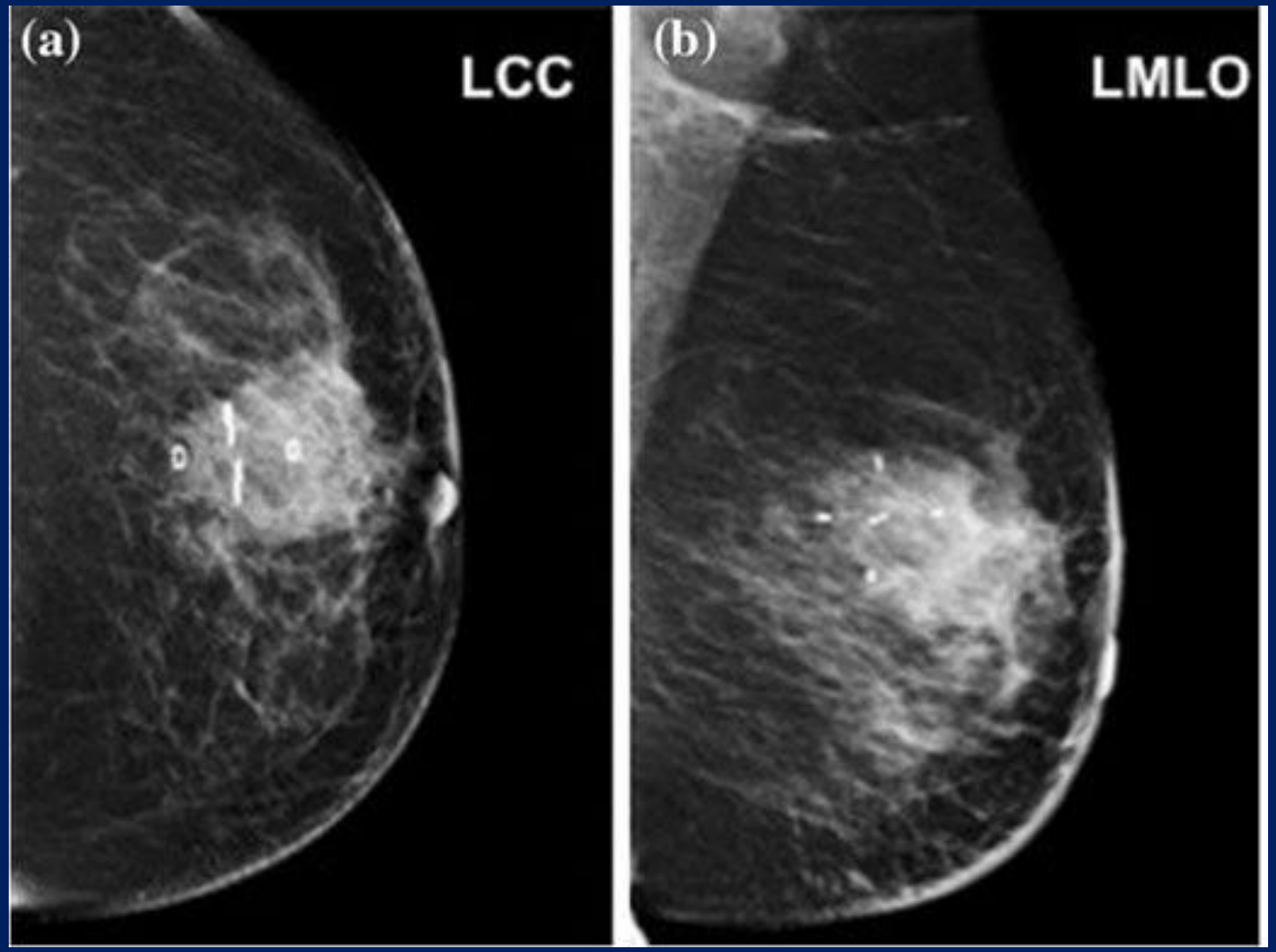


...After Implant Failure

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


(a)
LCC
(b)
LMLO


How Hernias Develop

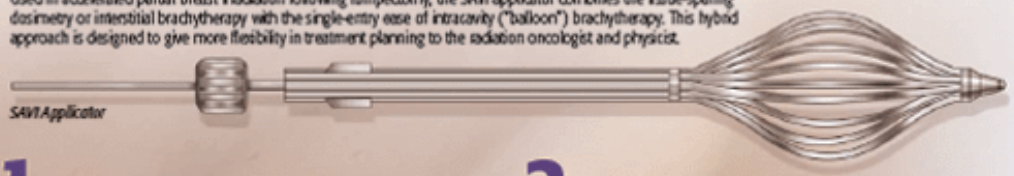
Partial Breast Radiation: IORT (Intra-operative radiation therapy) and Brachytherapy

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 dosimetry or interstitial brachytherapy with the single-entry ease of intracavity ("balloon") brachytherapy. This hybrid approach is designed to give more flexibility in treatment planning to the radiation oncologist and physicist.



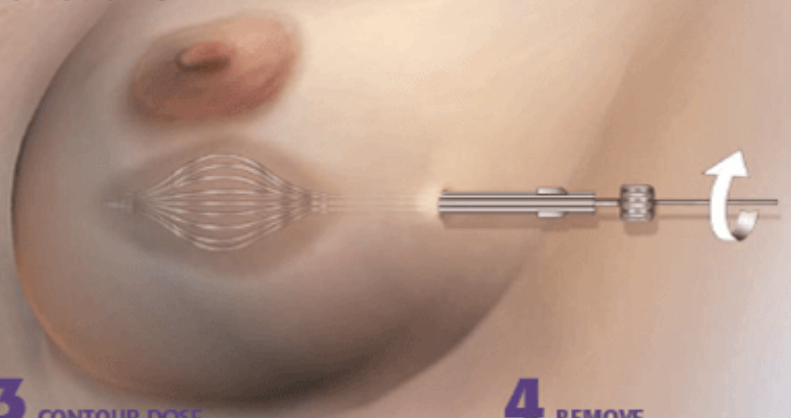
SAVI Applicator

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.

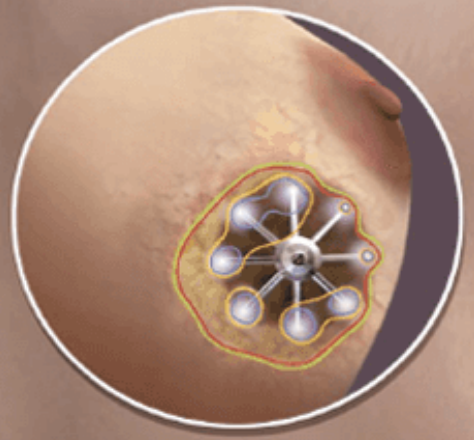


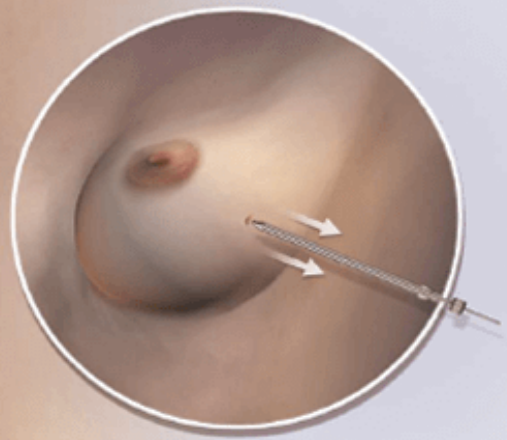
3 CONTOUR DOSE

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.





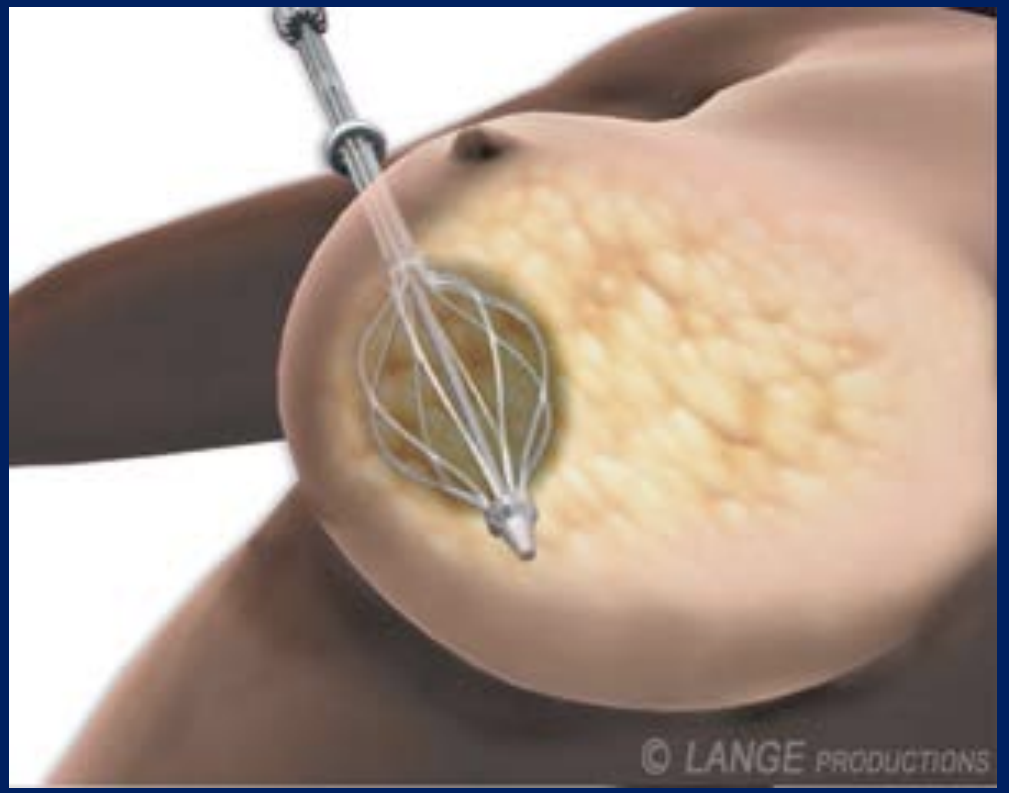
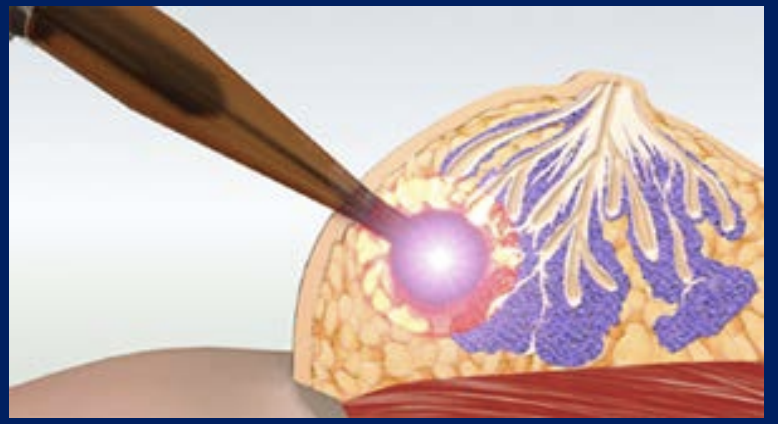


Foto: Carl Zeiss

IORT




ZEISS

Lymphedema Management

Stages of lymphedema

Stage	Clinical findings
0	Subclinical Impaired lymphatic transport Swelling not visible by gross evaluation
I	Visibly swollen Pitting edema
II	Non-pitting edema Tissue fibrosis
III	Elephantiasis Irreversible skin changes, fatty deposits, hyperpigmentation

Lymphedema Control (What We Know 2016)

- Factors **NOT** shown to increase the development of lymphedema following ALND or RLNR
- *C Ferguson, et al, J Clin Oncol 34:691-698, 2016*
  - 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

JA Petrek, et al, Cancer 92: 1368-1377, 2001
Y Shih, et al, J Clin. Oncol. 27:2007-2014, 2009

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.

CLINICAL INVESTIGATION **Breast**

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

Yoichita 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)

21%	1yr
34%	3yrs
48%	5yrs

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

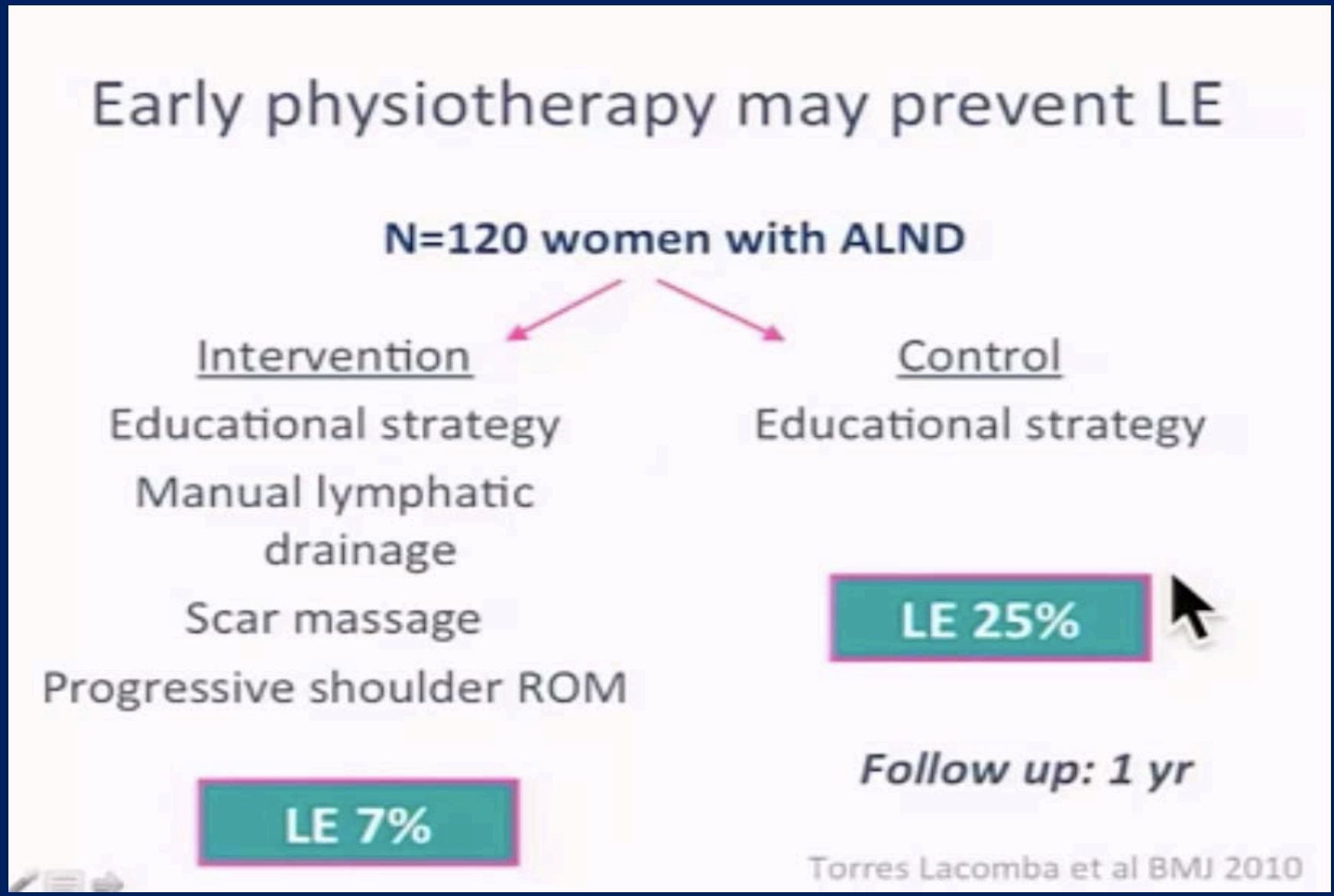
Lifestyle Risk Factors Associated with Arm Swelling Among Women with Breast Cancer

Shayna L. Showalter, MD[1], Justin C. Brown, MA[2], Andrea L. Cheville, MD[3], Carla S. Fisher, MD[4], Dahlia Sataloff, MD[4], and Kathryn H. Schmitz, PhD, MPH[2]

- 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



Summary of resistance exercise RCT and LE

	# RCT	N	f/u, mean (mos)	LE rate*	
				control	intervention
AT RISK	3	383	12	12%	12%
AFFECTED	1	141	12	12%	11%

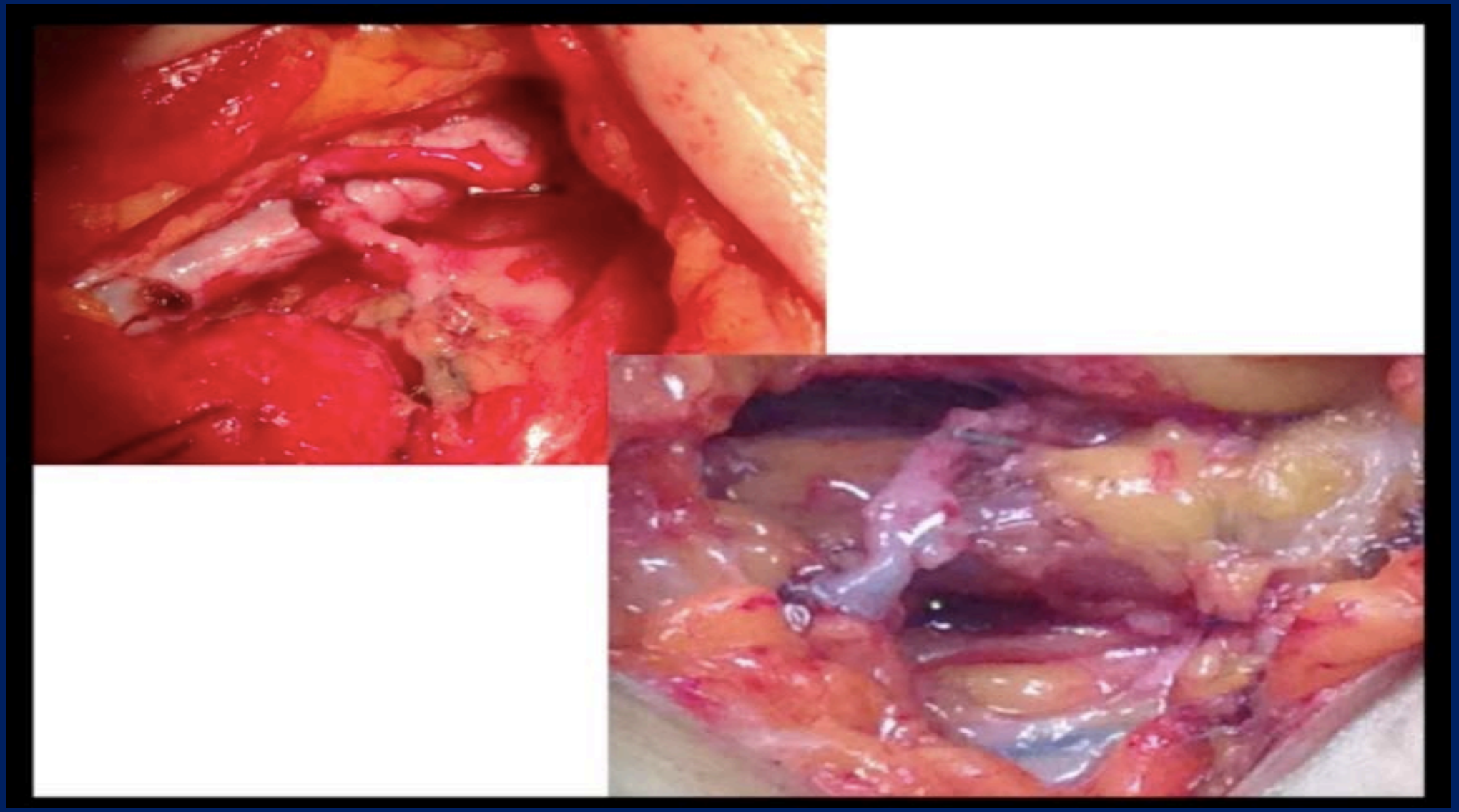
***Individual trial p-values not significant or favor intervention group**

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

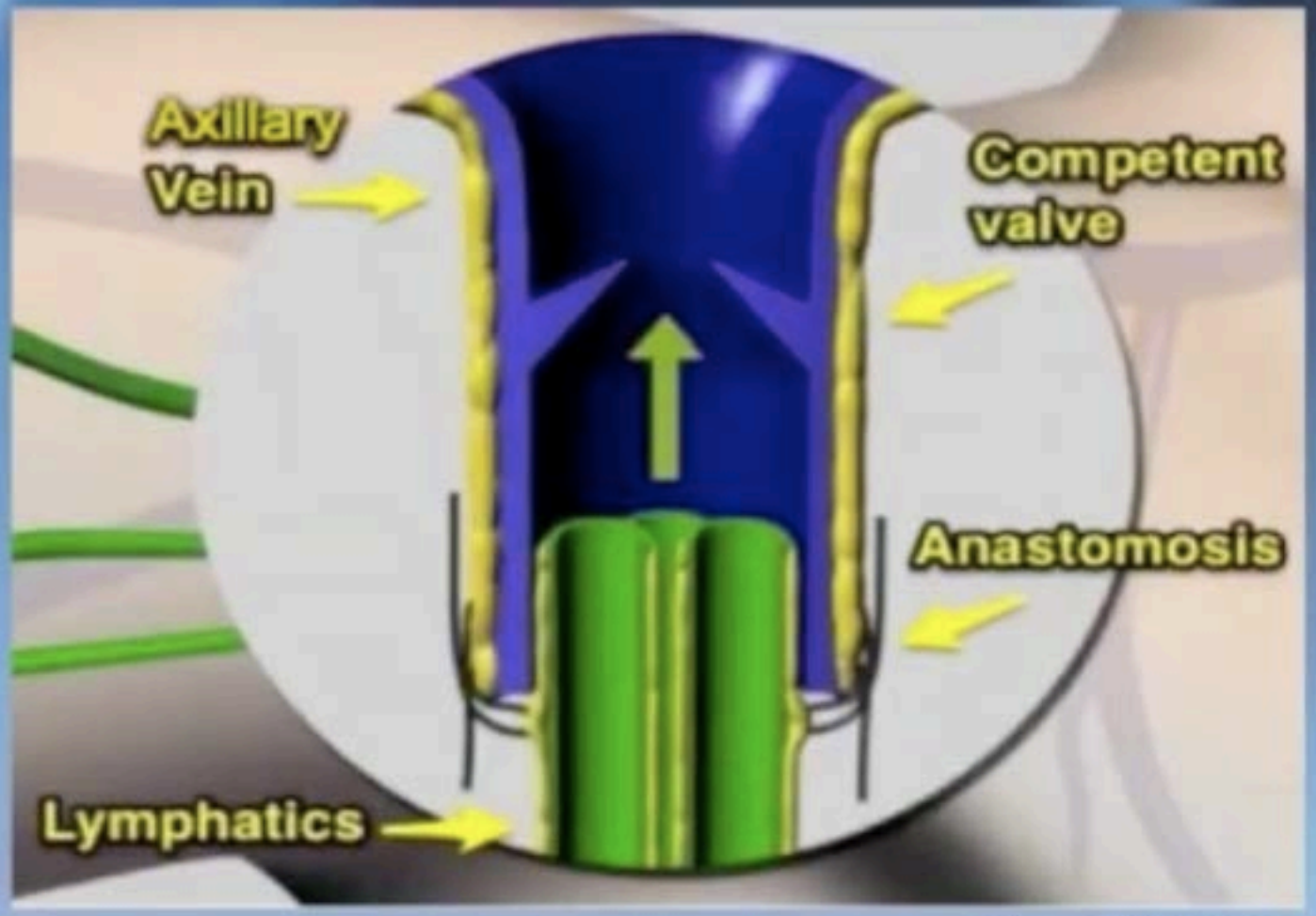
Study	N	f/u (yrs)	Lymphedema rate		comments
			LVA done	No LVA	
Boccardo, 2011	49	1.5	4%	30%	• Assessed at 1,3,6,12, 18 mos with volumetry • No compression garments

Not a RCT
Unclear indications

ASBS Poster: Dr. Ojo, Columbia U.

Boccardo FM et al. ASO 2011

LYMPHA PROCEDURE MICROSCOPE



Columbia University, Dept of Surgery, COACH

Delayed autologous reconstruction and lymph node transfer in affected

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

* 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

PRS Global Open
International Open Access Journal of the American Society of Plastic Surgeons

Plast Reconstr Surg Glob Open. 2018 Jun; 6(6): e1828.
Published online 2018 Jun 11. doi: 10.1097/GOX.0000000000001828
PMCID: PMC6157943
PMID: 30276055

Plast Reconstr S

Robotic Nipple-sparing Mastectomy and Immediate Breast Reconstruction with Gel Implant

Hung-Wen Lai, MD, PhD,[*†‡§¶#] Shih-Lung Lin, MD,[**] Shou-Tung Chen, MD,[*†‡] Shu-Ling Chen, MS,[*‡] Ya-Ling Lin, BS,[*] Dar-Ren Chen, MD,[*†‡] and Shou-Jen Kuo, MD[†‡]

Annals of Surgical Oncology
September 2018, Volume 25, Issue 9, pp 2579–2586 | Cite as

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

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Benjamin Sarfati, Samuel Struk, Nicolas Leymarie, Jean-François Honart, Heba Alkhashnam, Kim Tran de Fremicourt, Angelica Conversano, Françoise Rimareix, Marie Simon, Stefan Michiels, Frédéric Kolb

Plastic and Reconstructive Surgery. 142(5):816e–818e, NOV 2018
DOI: 10.1097/PRS.0000000000004908, PMID: 30119125
Issn Print: 0032-1052
Publication Date: 2018/11/01

Print

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 Narui;Mayu Muto;Takashi Ishikawa;Jiro Maegawa;

Thank you


St. Francis Outpatient Center
St. Francis Hospital
LANE
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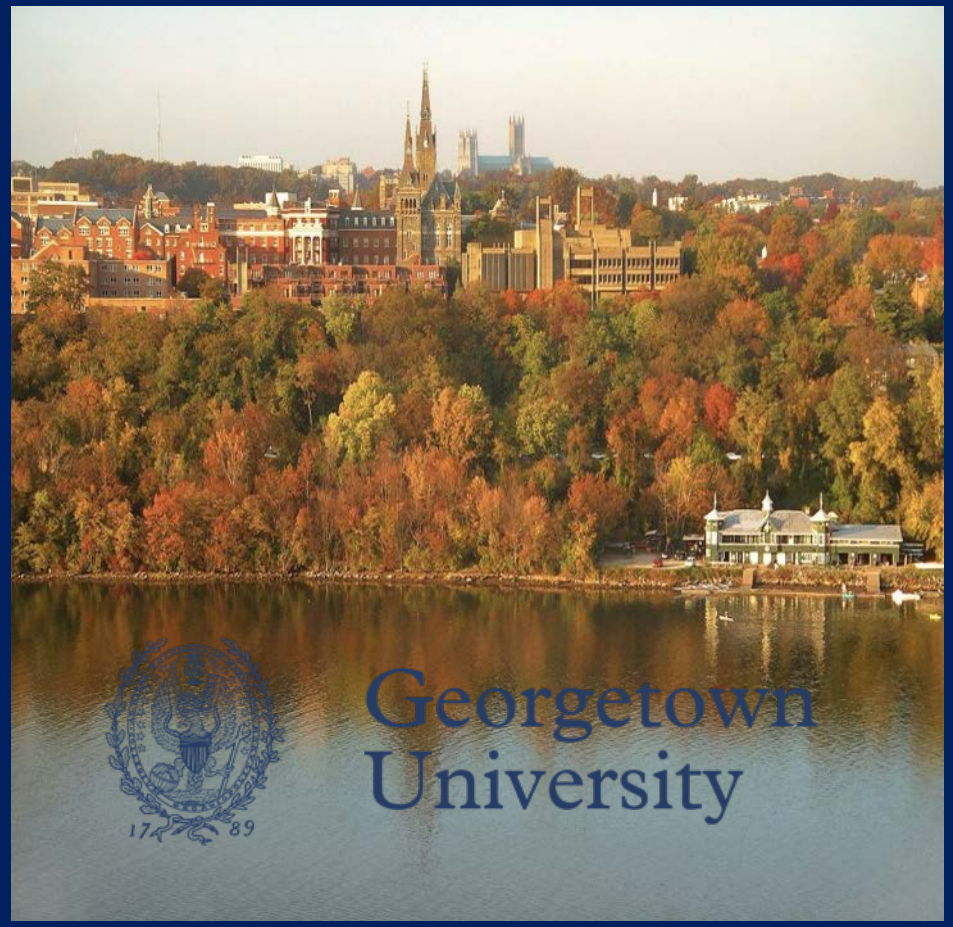
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