Gemelli

Fondazione Policlinico Universitario Agostino Gemelli IRCCS
Università Cattolica del Sacro Cuore

MODERN BREAST CANCER SURGERY

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IMPROVED IMAGING
EARLY DIAGNOSIS

BETTER TREATMENTS

NEOADJUVANT
CHEMOTHERAPY

LESS AGGRESSIVE SURGERY
SURGICAL DE-ESCALATION
PRECISION SURGERY

PRECISION SURGERY

DEFINITION

- Personalized Surgery
- Surgical approach studied, planned and tailored to each patient
- It is based on tumor stage, biology but also age, comorbidity, body morphology and genetic risk

Updates Surg. 2023 Aug;75(5):1369-1371. doi: 10.1007/s13304-023-01569-6. Epub 2023 Jun 21.

Precision surgery for breast cancer: current trends and future perspectives

Gianluca Franceschini [1], Lorenzo Scardina [2], Riccardo Masetti [2]

Surgery. 2023 Jul;174(1):123-124. doi: 10.1016/j.surg.2023.04.026. Epub 2023 May 12.

De-escalation of breast cancer surgery

Sarah L Blair [1]

PRECISION SURGERY

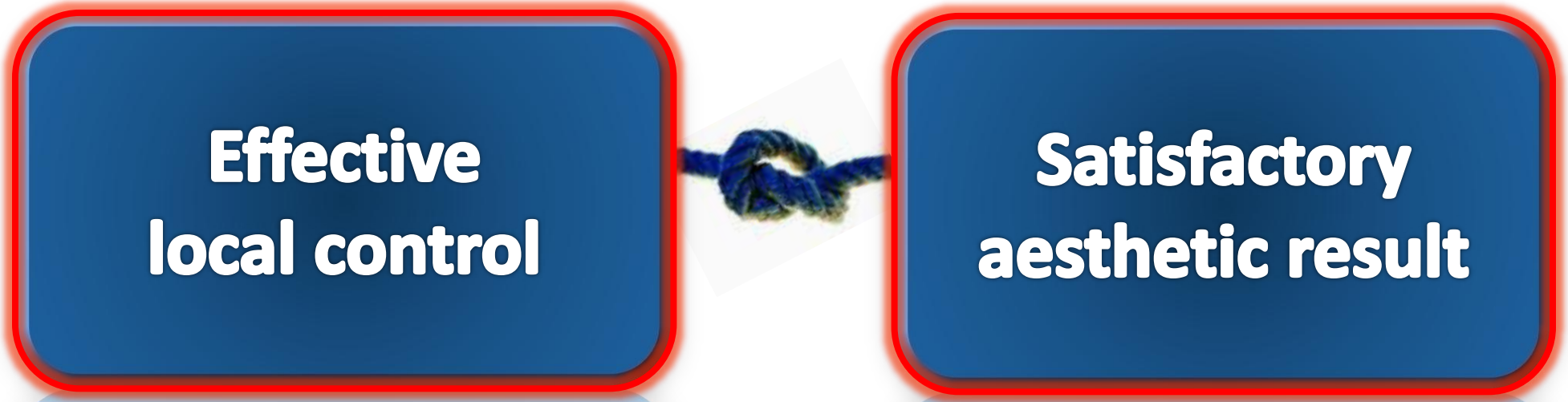
GOALS

- Ensure adequate loco-regional control
- Optimize aesthetic results
- Minimize morbidity
- Preserve quality of life

CONSERVATIVE SURGERY

INDICATION

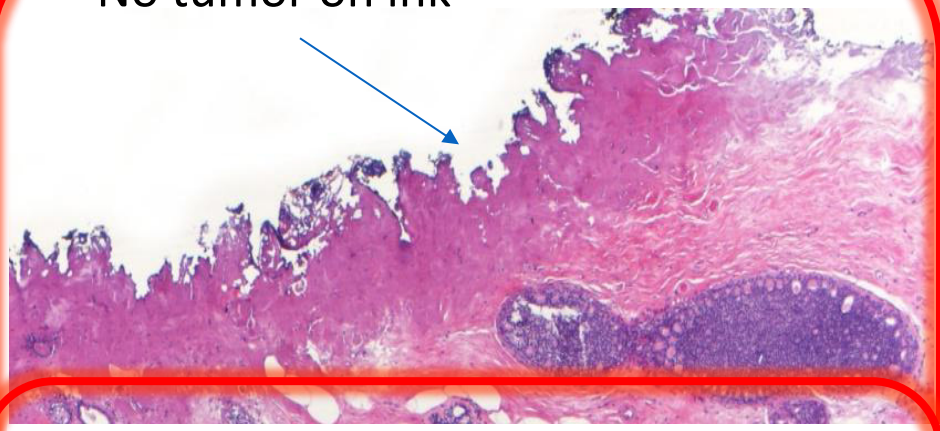
- We can treat all breast cancers, of any size, with conserving surgery but we must always obtain a dual objective:



ADEQUATE LOCAL CONTROL

It is necessary to have negative excision margins

- **No tumor on ink**



Eur J Surg Oncol. 2025 Feb;51(2):109505. doi: 10.1016/j.ejso.2024.109505. Epub 2024 Nov 29.

Are 1 mm margins necessary after breast-conserving surgery for invasive cancer? A critical look at the proposed change

Gianluca Franceschini [1], Riccardo Masetti [2]

We must avoid positive margins
Positive margins increase the risk of local recurrence by 2 to 3 times and this risk cannot be offset by radiotherapy or systemic treatments

GOOD AESTHETIC RESULT

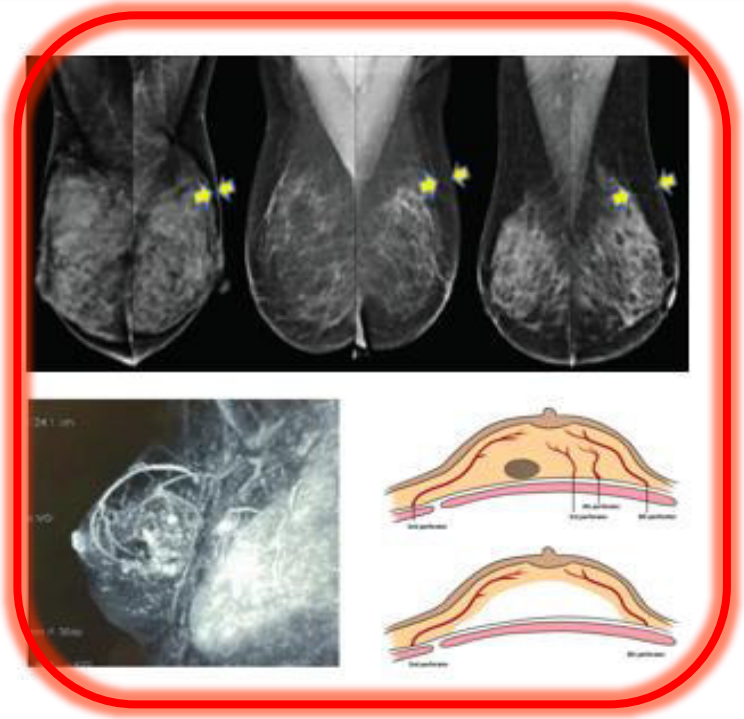
- The preserved breast must maintain an appropriate morphology, volume and symmetry with the contralateral breast
- We must avoid visible scarring and large tissue removal that could compromise patient's quality of life

RECOMMENDATIONS FOR A GOOD PRECISION SURGERY

- Some specific technical strategies
- Well-defined guidelines shared by the multidisciplinary team

PREOPERATIVE MULTIDISCIPLINARY PLANNING

- Case discussion in a dedicated "Surgery Board"
- We assess clinical and radiological staging, photographic documentation and other critical parameters



SELECTION OF THE TYPE OF SURGERY

ROME MODEL

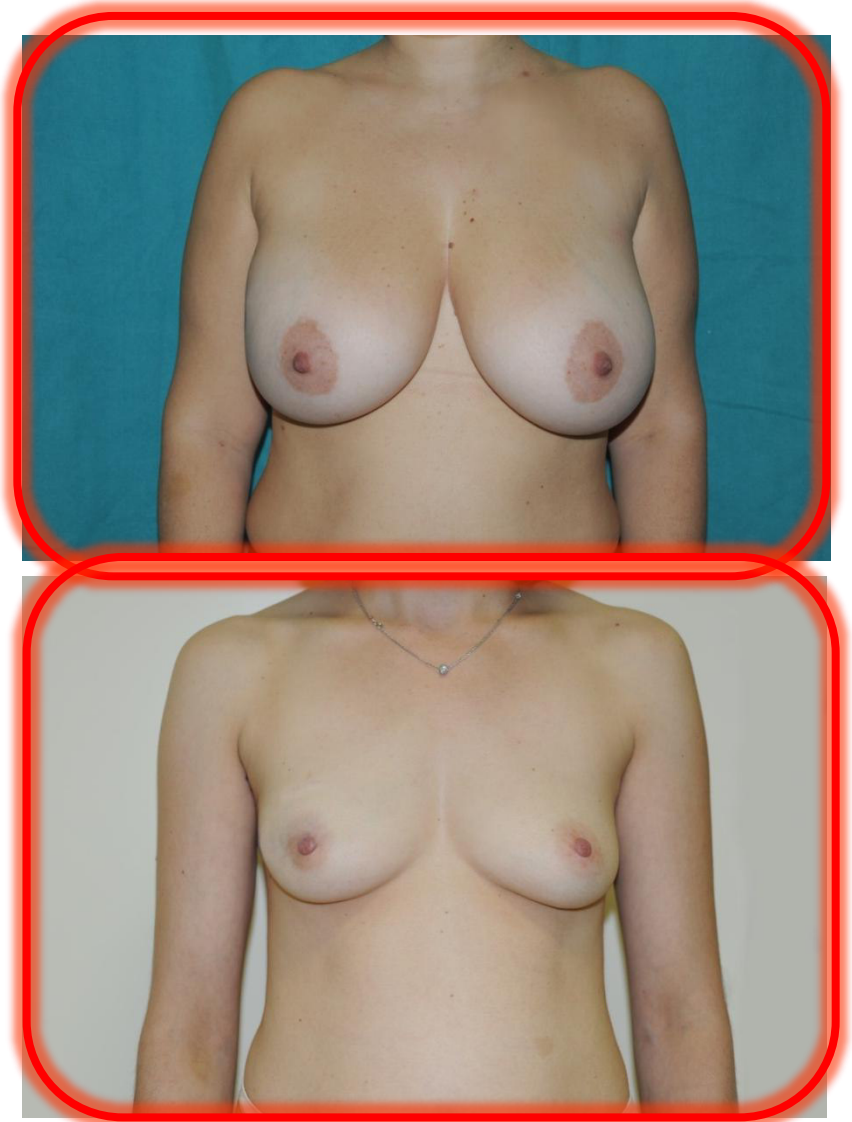
(Radiological and Oncoplastic Multidisciplinary Evaluation)

- A specific system that incorporates anthropometric, radiological and volumetric information about the tumor and the breast

SELECTION OF THE TYPE OF SURGERY

The choice of surgical technique is based on:

- how much tissue must be removed
- breast shape and volume
- degree of ptosis
- glandular density
- comorbidities
- patient's wishes and expectations



SELECTION OF THE TYPE OF SURGERY

post-NEoadjuvant Score System (pNESSy)

Journal of *Personalized Medicine*

MDPI

Article

An Innovative Scoring System to Select the Optimal Surgery in Breast Cancer after Neoadjuvant Chemotherapy

Antonio Franco [1,†], Alba Di Leone [1,†], Marco Conti [2], Alessandra Fabi [3,*], Luisa Carbognin [4], Andreina Daniela Terribile [1], Paolo Belli [2], Armando Orlandi [5], Martin Alejandro Sanchez [1], Francesca Moschella [1], Elena Jane Mason [1], Giovanni Cimino [2], Alessandra De Filippis [2], Fabio Marazzi [6], Ida Paris [4], Giuseppe Visconti [7], Liliana Barone Adesi [7], Lorenzo Scardina [1], Sabatino D'Archi [1], Marzia Salgarello [7], Diana Giannarelli [8], Riccardo Masetti [1] and Gianluca Franceschini [1]

In neoadjuvant setting, we use a specific scoring system called pNESSy – post-Neoadjuvant Score System

A new system that helps guide the most appropriate surgical choice based on pre- and post-treatment information

Table 3. Scoring system (pNESSy) for surgery after NACT.

BRCA 1 or 2 Genes	**No Pathogenetic Variant**		**Pathological Mutation**
	0		**2.867**
Ptosis	Grade 0	Grade 1	Grade 2 or 3
	1.389	0.511	1.352
Breast volume evaluated with MRI	<645.99 cm^3	646.00–1009.39 cm^3	>1009.4 cm^3
	1.375	0.900	1.526
Pre-NACT Focality	Unifocality	Multifocality	Multicentricity
	1.368	1.193	2.309
Pre-NACT MRI-PEBA	<3.52	3.53–9.99	>10.00
	1.251	1.391	1.860
Post-NACT Focality	Clinical complete response or unifocal	Multifocality	Multicentricity
	1.536	2.274	2.007
Post-NACT RX-PEBA	<0.041	0.042–4.61	>4.62
	1.505	2.020	1.589
SCORE	**6.896–8.724**	**8.725–9.375**	**9.376–14.245**
	$p < 0.0001$	$p < 0.0001$	$p < 0.0001$
TYPE OF SURGERY	**BCS**	**OPS**	**CMR**

PEBA = prediction of excised breast area. BCS: breast-conserving surgery; OPS: level II oncoplastic surgery; CMR: conservative mastectomy with reconstruction.

PREOPERATIVE LOCALIZATION OF NON-PALPABLE TUMOR

We use the following techniques:

- **Ultrasound-guided tattooing**
- **MAGSEED**
- **R.O.L.L.**
  (Radioguided Occult Lesion Localization)
- **SAVI SCOUT**

Image-Guided **Localization** Techniques for Surgical Excision of Non-Palpable **Breast** Lesions: An Overview of Current Literature and Our Experience with Preoperative Skin Tattoo.

Franceschini G, Mason EJ, Grippo C, D'Archi S, D'Angelo A, Scardina L, Sanchez AM, Conti M, Trombadori C, Terribile DA, Di Leone A, Carnassale B, Belli P, Manfredi R, Masetti R.

J Pers Med. 2021 Feb 4;11(2):99. doi: 10.3390/jpm11020099.

It allows to calibrate the excision, remove the tumor conserving as much healthy tissue as possible

The techniques are selected according to tumor depth, location, breast volume and surgeon experience

TECHNIQUES OF ONCOPLASTIC SURGERY

ADVANTAGES

- Allow for wider resections
- Improved margins status
- Reduced recurrence
- Improved cosmetic outcomes

cancers MDPI

Article

Level II Oncoplastic Surgery as an Alternative Option to Mastectomy with Immediate Breast Reconstruction in the Neoadjuvant Setting: A Multidisciplinary Single Center Experience

Alba Di Leone [1], Antonio Franco [1,*], Daniela Andreina Terribile [1], Stefano Magno [1], Alessandra Fabi [2], Alejandro Martin Sanchez [1], Sabatino D'Archi [1], Lorenzo Scardina [1], Maria Natale [1], Elena Jane Mason [1], Federica Murando [1], Fabio Marazzi [3], Armando Orlandi [4], Ida Paris [5], Giuseppe Visconti [6], Antonella Palazzo [4], Valeria Masiello [3], Liliana Barone Adesi [6], Marzia Salgarello [6], Riccardo Masetti [1] and Gianluca Franceschini [1]

J Clin Med. 2024 Jun 23;13(13):3665. doi: 10.3390/jcm13133665.

Long-Term Safety of Level II Oncoplastic Surgery after Neoadjuvant Treatment for Locally Advanced Breast Cancer: A 20-Year Experience

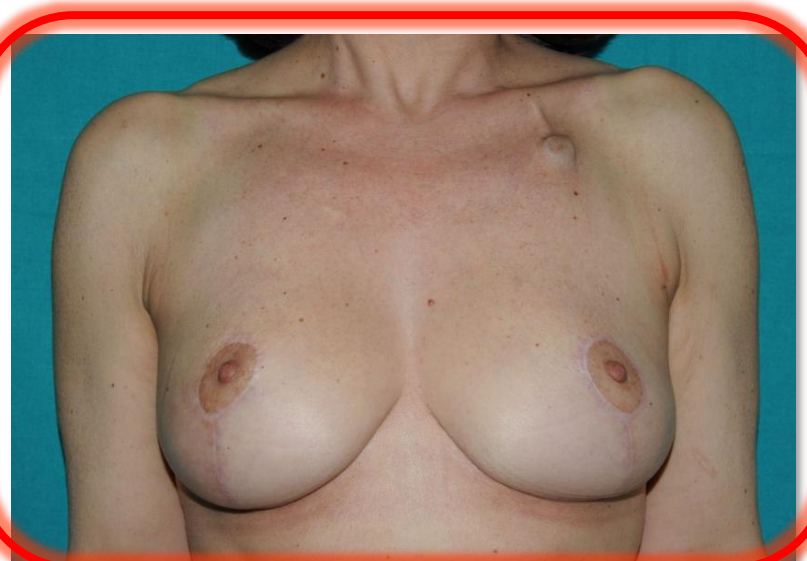
Alejandro M Sanchez [1], Flavia De Lauretis [1], Angela Bucaro [1], Niccolo Borghesan [1], Chiara V Pirrottina [1], Antonio Franco [1], Lorenzo Scardina [1], Diana Giannarelli [2], Jenny C Millochau [3], Marina L Parapini [3], Alba Di Leone [1], Fabio Marazzi [4], Armando Orlandi [5], Antonella Palazzo [5], Alessandra Fabi [6], Riccardo Masetti [1,7], Gianluca Franceschini [1,7]

TECHNIQUES OF ONCOPLASTIC SURGERY

We follow the classification by the American Society of Breast Surgeons and use:

- **Level I Volume displacement** techniques for resections under 20%

- **Level II Volume displacement** techniques for resections over 20% including contralateral symmetrization for better balance



THERAPEUTIC REDUCTION MAMMAPLASTY

AESTHETIC RESULTS IN LARGE AND PTOTIC BREASTS

PREOPERATIVE PHOTO

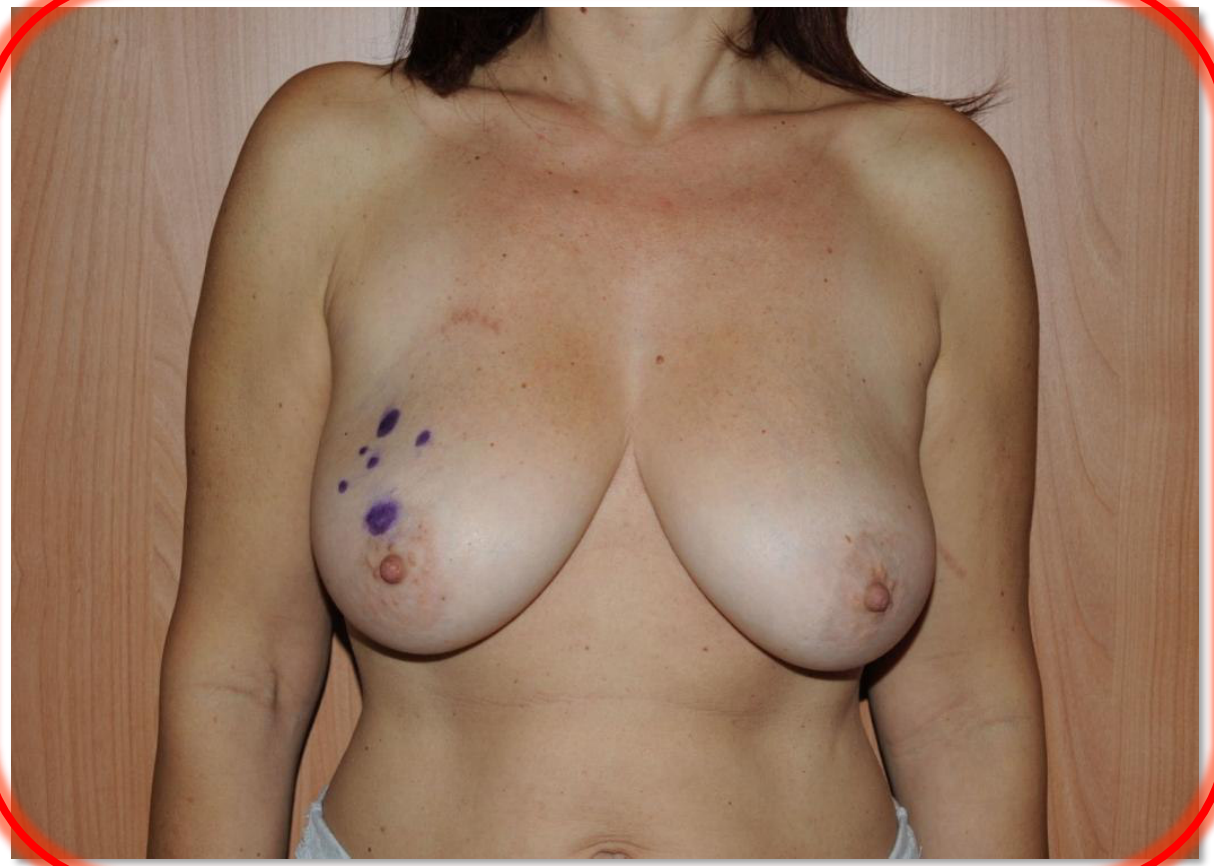
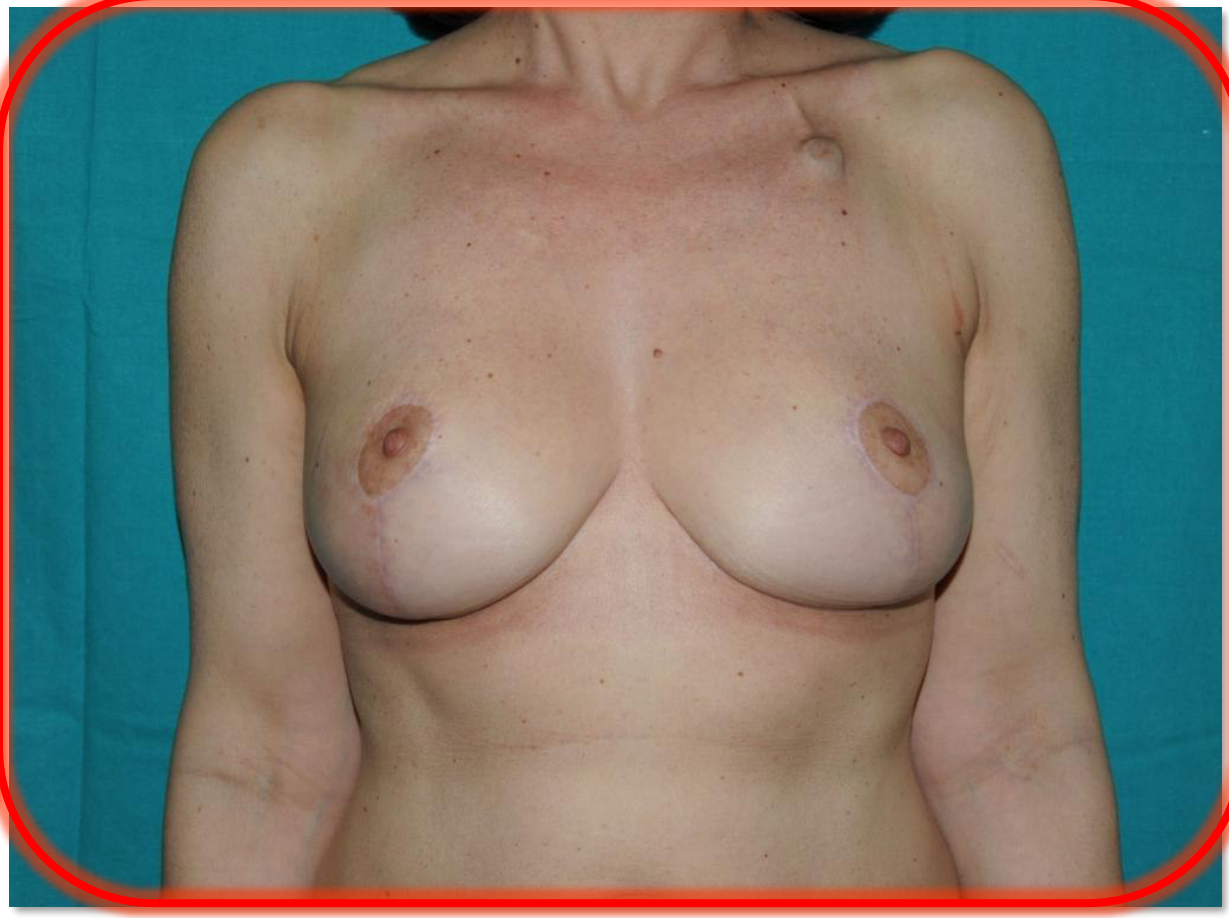


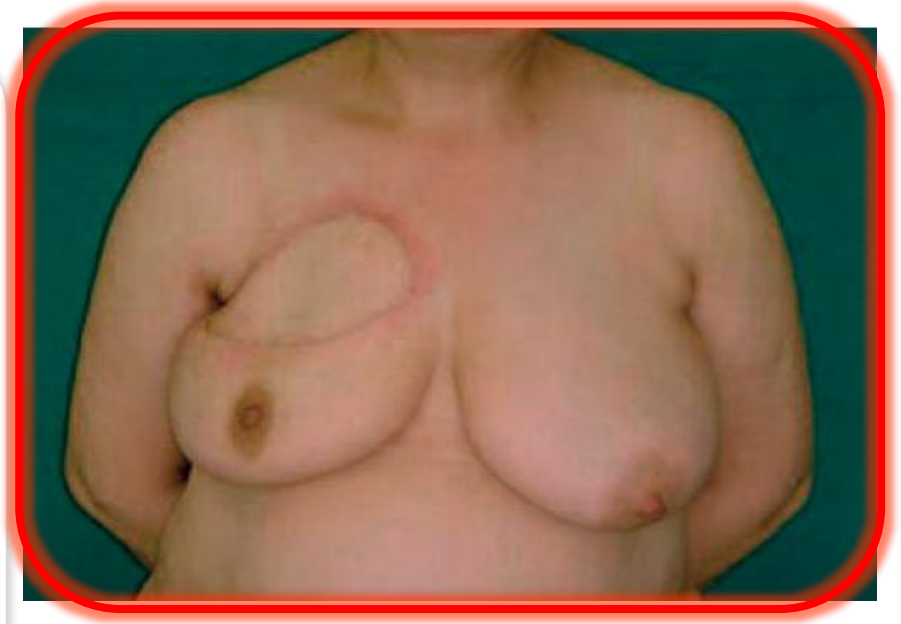
PHOTO AFTER 7 MONTHS

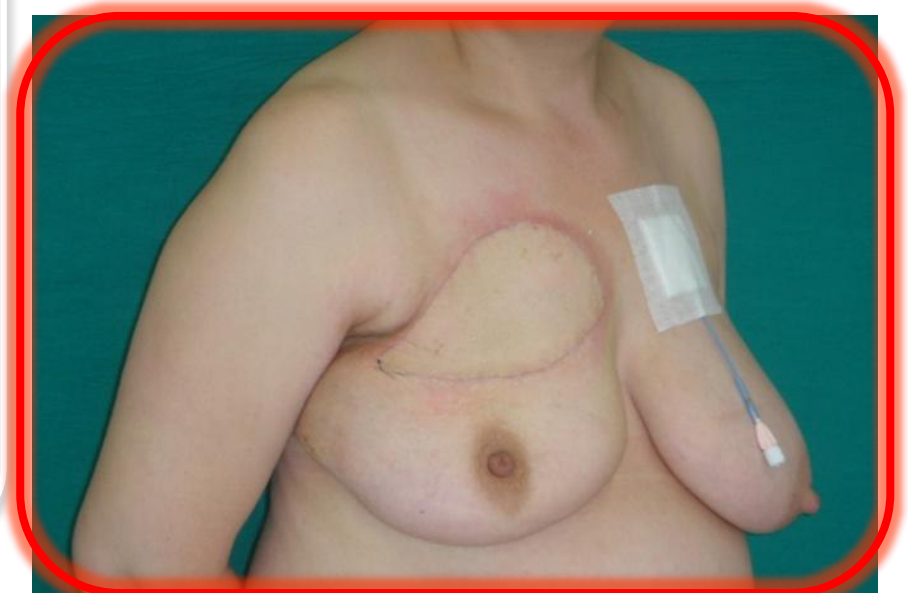


TECHNIQUES OF ONCOPLASTIC SURGERY

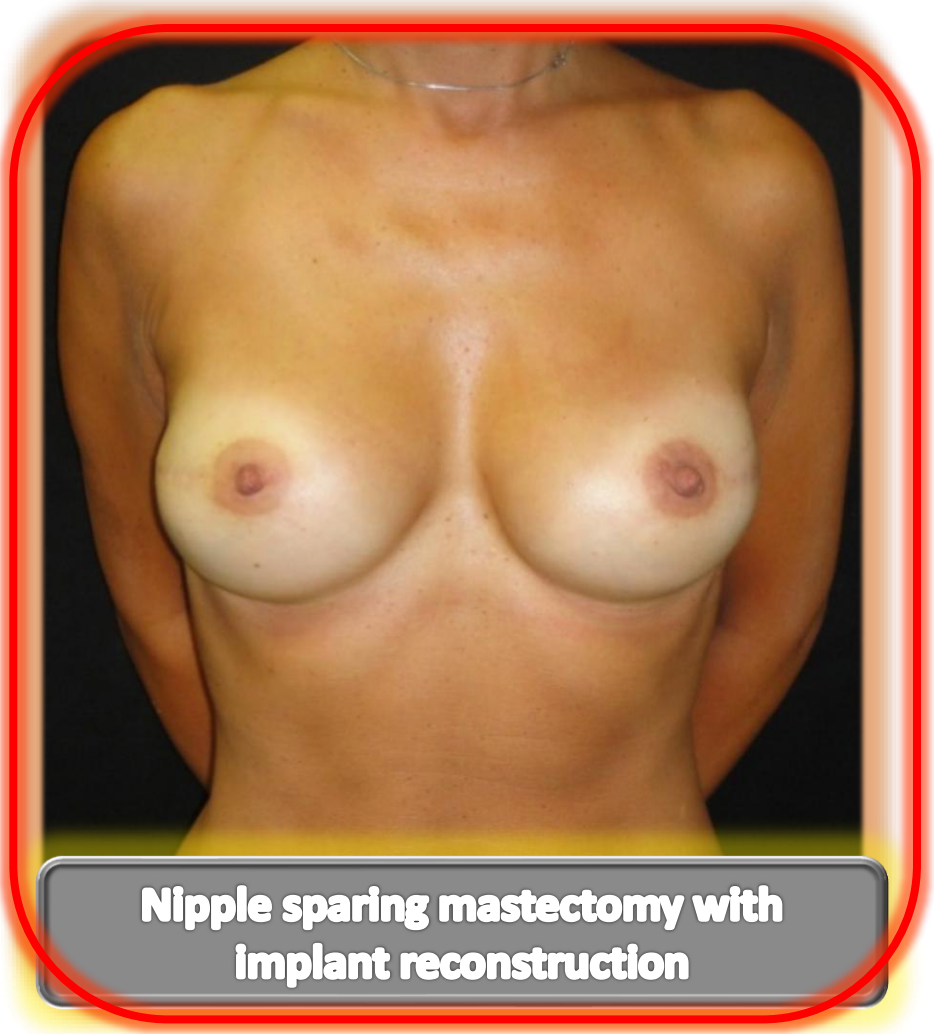
When we need to replace lost volume with flaps, especially if skin excision is necessary, we can use:

- **Volume replacement techniques**
  (Latissimus dorsi, TDAP, LICAP flaps)





CONSERVATIVE MASTECTOMY WITH IMMEDIATE RECONSTRUCTION



Nipple sparing mastectomy with implant reconstruction

Journal of Personalized Medicine
MDPI
Article

Prepectoral vs. Submuscular Immediate Breast Reconstruction in Patients Undergoing Mastectomy after Neoadjuvant Chemotherapy: Our Early Experience

Lorenzo Scardina [1,2,*], Alba Di Leone [1], Ersilia Biondi [1], Beatrice Carnassale [1], Alejandro Martin Sanchez [1], Sabatino D'Archi [1], Antonio Franco [1], Francesca Moschella [1], Stefano Magno [1], Daniela Terribile [1], Damiano Gentile [3], Alessandra Fabi [4], Anna D'Angelo [5], Liliana Barone Adesi [1], Giuseppe Visconti [1], Marzia Salgarello [1], Riccardo Masetti [1] and Gianluca Franceschini [1]

cancers
MDPI
Article

Oncological Safety of Prepectoral Implant-Based Breast Reconstruction After Conservative Mastectomy: Insights from 842 Consecutive Breast Cancer Patients

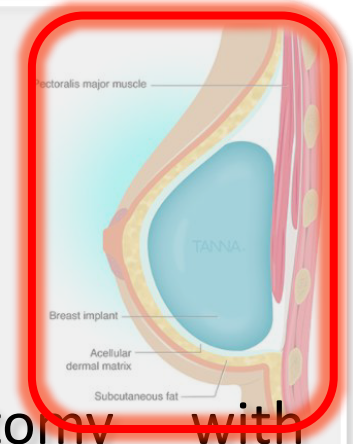
Lorenzo Scardina [1,*], Alba Di Leone [1], Alejandro Martin Sanchez [1], Cristina Accetta [1], Liliana Barone Adesi [2], Ersilia Biondi [1], Beatrice Carnassale [1], Sabatino D'Archi [1], Flavia De Lauretis [1], Enrico Di Guglielmo [1], Antonio Franco [1], Stefano Magno [1], Francesca Moschella [1], Maria Natale [1], Marzia Salgarello [2], Eleonora Savia [1], Marta Silenzi [1], Giuseppe Visconti [2], Riccardo Masetti [1] and Gianluca Franceschini [1]

Even when a mastectomy is required, we perform a surgical de-escalation with a nipple-sparing mastectomy with immediate reconstruction

Reconstruction is always co-planned with the plastic surgeon and personalized to the patient's anatomy and wishes

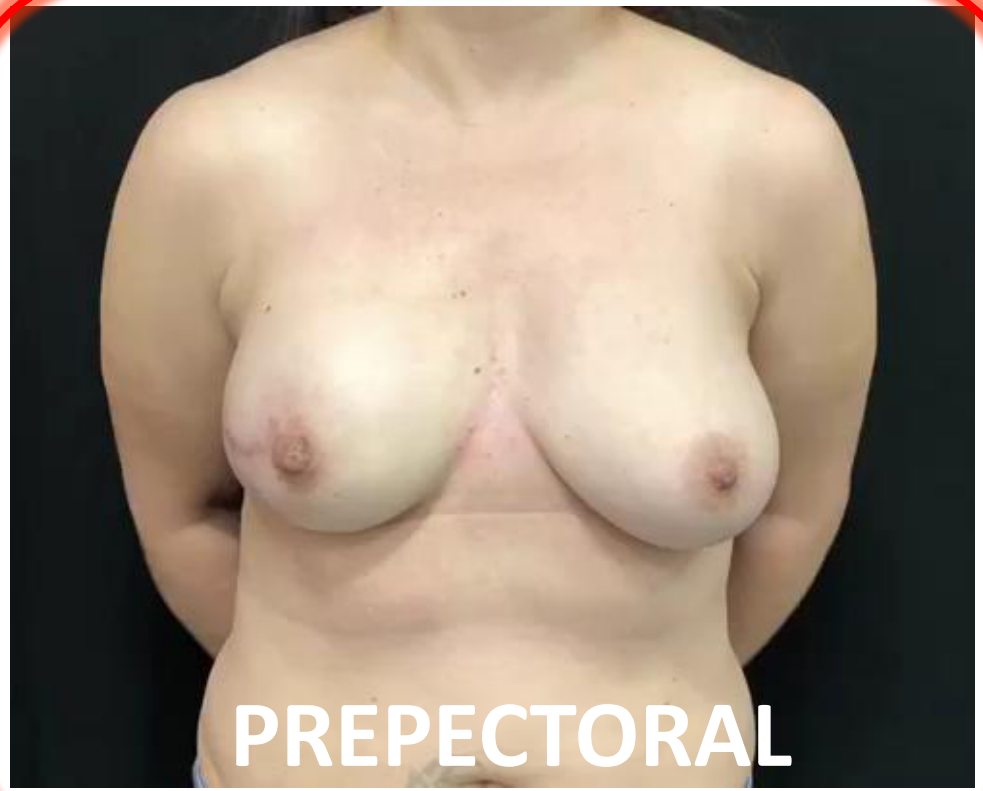
RECONSTRUCTION WITH PREPECTORAL IMPLANT

ADVANTAGES



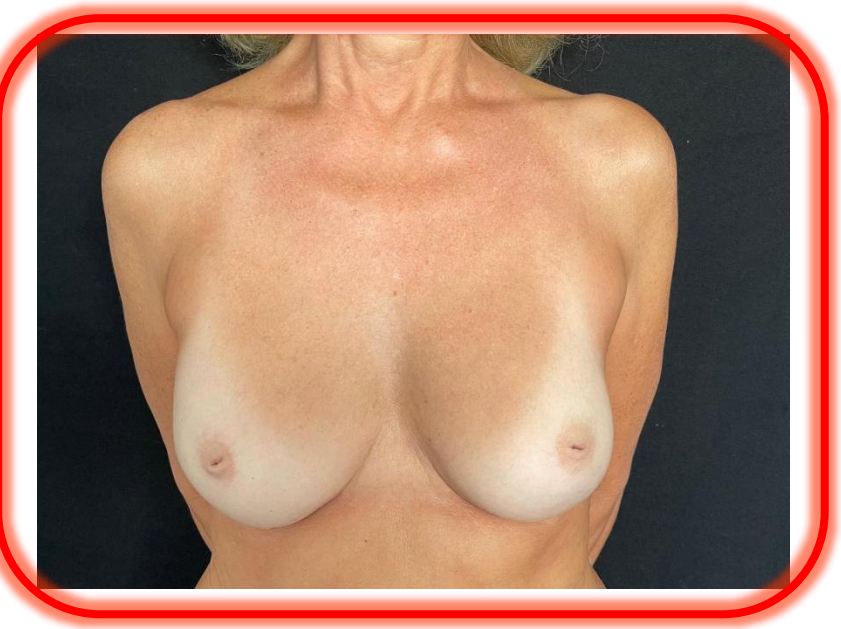
We prefer nipple-sparing mastectomy with prepectoral implant reconstruction

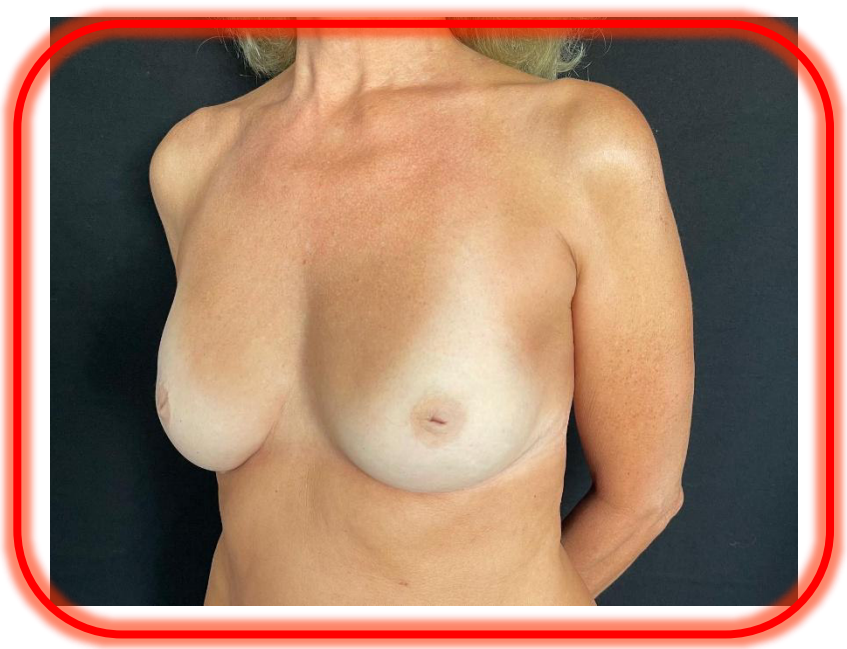
It allows for better aesthetic outcomes, fewer contralateral adjustments, faster functional recovery and improved quality of life.

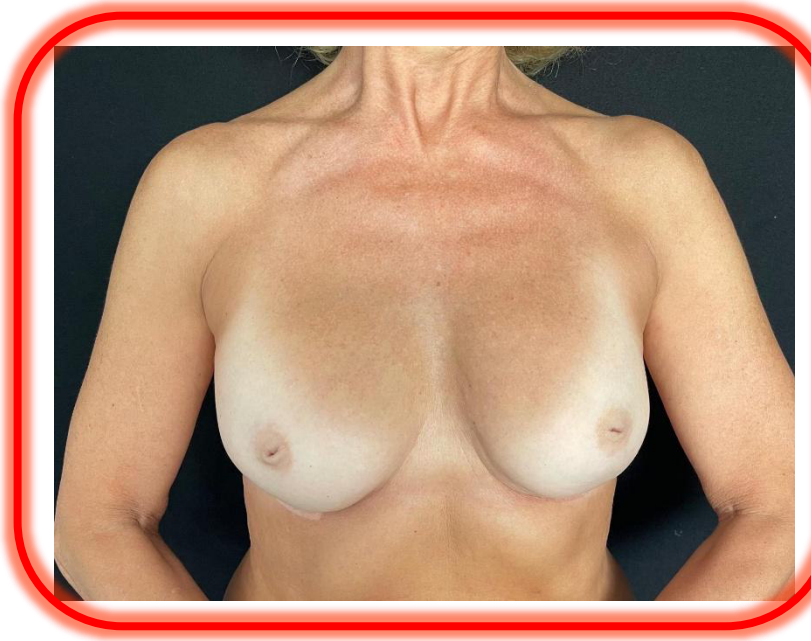


BILATERAL NIPPLE-SPARING MASTECTOMY WITH IMMEDIATE PREPECTORAL IMPLANT RECONSTRUCTION

AESTHETIC RESULTS WITH SKIN INCISION AT THE INFRAMAMMARY FOLD (FOR PTOTIC BREASTS)

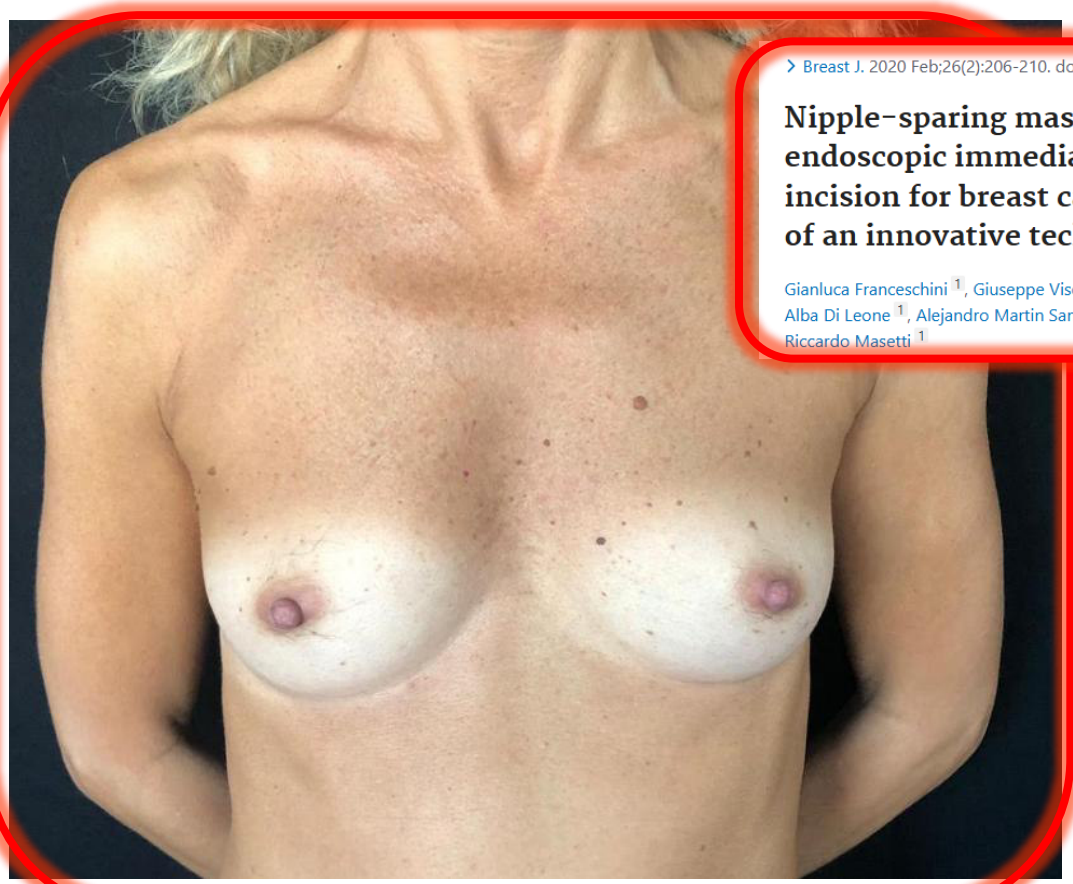






BILATERAL NIPPLE-SPARING MASTECTOMY WITH IMMEDIATE PREPECTORAL IMPLANT RECONSTRUCTION

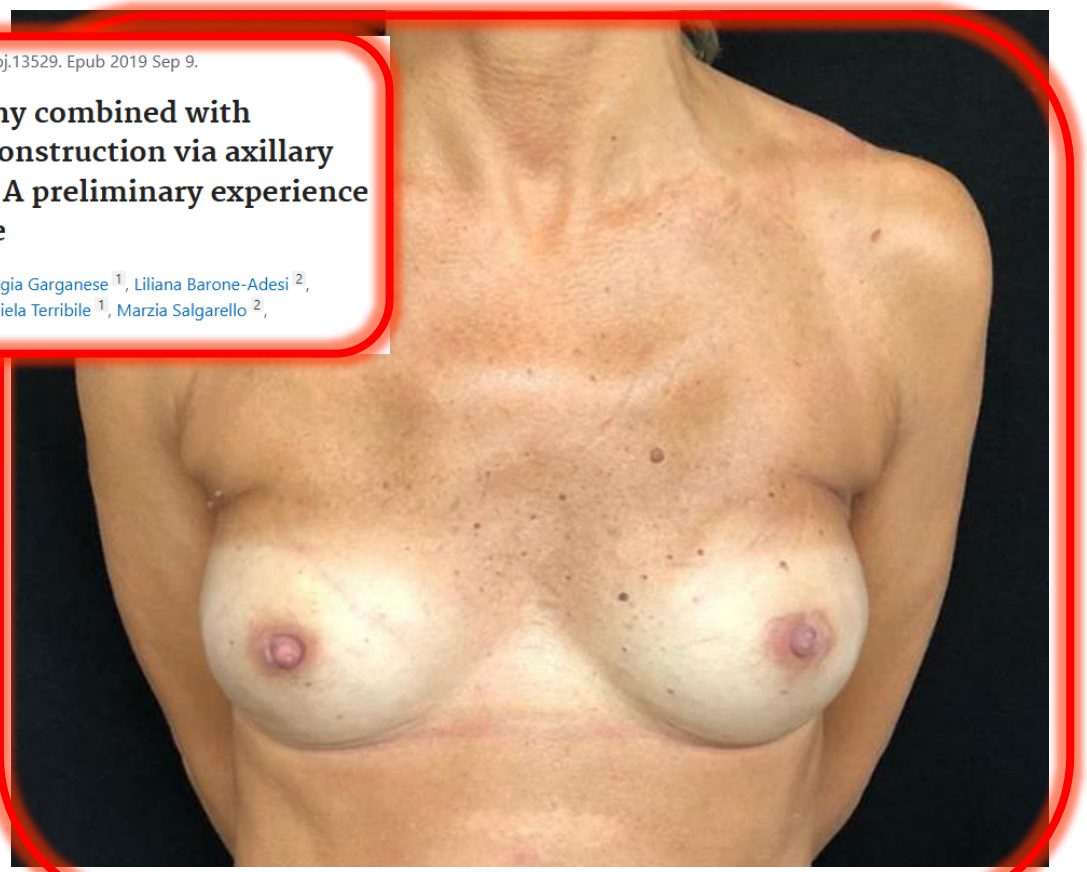
AESTHETIC RESULTS WITH SKIN INCISION IN THE AXILLARY REGION (FOR SMALL, NON-PTOTIC BREASTS)



Breast J. 2020 Feb;26(2):206-210. doi: 10.1111/tbj.13529. Epub 2019 Sep 9.

Nipple–sparing mastectomy combined with endoscopic immediate reconstruction via axillary incision for breast cancer: A preliminary experience of an innovative technique

Gianluca Franceschini [1], Giuseppe Visconti [2], Giorgia Garganese [1], Liliana Barone-Adesi [2], Alba Di Leone [1], Alejandro Martin Sanchez [1], Daniela Terribile [1], Marzia Salgarello [2], Riccardo Masetti [1]



PROBLEMS RELATED TO SURGICAL TREATMENT

Even if less aggressive and invasive, precision surgery can have some complications that can affect the patient's quality of life:

- Post-operative pain
- Scars and aesthetic issues
- Risk of lymphedema and sensitivity disorders
- Psychological stress

PERSONALIZED SURGERY

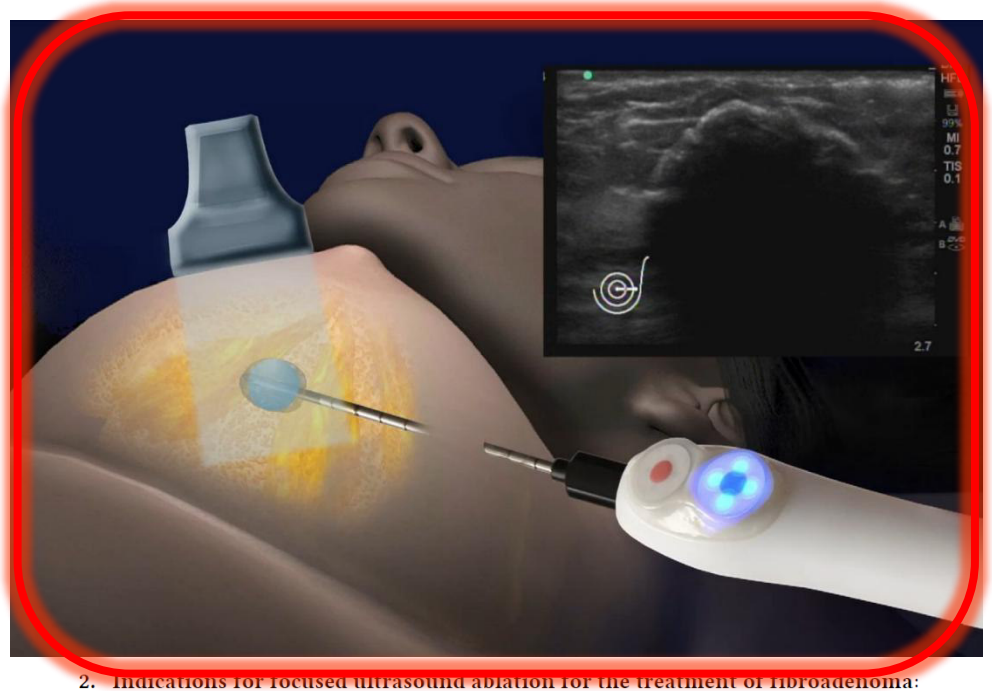
Based on stage, biological and molecular classification, we are assessing to perform a further de-escalation of local treatment by using non-surgical procedures or even with the omission of surgery

Non-surgical Procedures

Omission of surgery

CRYOABLATION

Cryoablation is being explored as a promising non-surgical option for early-stage ER-positive, HER2-negative breast cancer



2. **Indications for focused ultrasound ablation for the treatment of fibroadenoma:**

   Focused ultrasound ablation for the treatment of fibroadenoma is currently under investigation in the United States, and is not approved by the FDA for this indication. This technique is considered investigational and should not be performed outside the realm of a clinical trial. There is an ongoing FDA-approved clinical trial for "echotherapy" in the treatment of fibroadenomas.

3. **Indications for percutaneous and/or transcutaneous ablative treatments of malignant tumors of the breast:**

   Cryoablation is currently approved for treatment of benign and malignant soft tissue tumors by the FDA. Currently, there are no specific technologies that have FDA approval for breast tumors. Participation in registries and clinical trials evaluating the use of these technologies with and without surgical excision of a breast malignancy is advised as early data emerges on their efficacy.

CRYOABLATION

Ice3 TRIAL

ClinicalTrials.gov Identifier: NCT02200705

- Prospective multi-center studies like FROST and ICE3 report promising early results, with 3-year local recurrence rates under 2%, in early-stage ER-positive, HER2-negative breast cancer

Fine RE. Cryoablation Without Excision for Low-Risk Early-Stage Breast Cancer: 3-Year Interim Analysis of Ipsilateral Breast Tumor Recurrence in the ICE3 Trial. Ann Surg Oncol. 2021 Oct;28(10):5525-5534.

OMISSION OF SURGERY

ClinicalTrials.gov Identifier: NCT02945579

MD Anderson Cancer Center

- The omission of surgery is being considered in HER2-positive or triple-negative invasive breast cancers with a breast pathological complete response after neoadjuvant therapy
- In this setting, non-randomized multicenter studies — such as the MD Anderson trial — have shown encouraging preliminary results, with 5-year local recurrence rates below 1%

Kuerer HM. Exceptional Responders Clinical Trials Group. Eliminating breast surgery for invasive breast cancer in exceptional responders to neoadjuvant systemic therapy: a multicentre, single-arm, phase 2 trial. Lancet Oncol. 2022 Dec;23(12):1517-1524

OMISSION OF SURGERY

PROBLEMS

- Greater risk of loco-regional recurrence
- Lack of information on T and N for adjuvant therapy
- Risk of "understaging" and "undertreating"

Mauri G et al. Systemic effects of local ablation: Oncogenesis and antitumor induced imunity. Radiology. 2016.

CONCLUSIONS

PERSONALIZED SURGERY

ADEQUATE LOCAL CONTROL

GOOD QUALITY OF LIFE

CONCLUSIONS

We need new and more effective predictive models — integrating genomic profiling, radiomics and artificial intelligence — to better predict the risk of local recurrence before putting down the scalpel and declaring ‘game over’ in breast surgery

BREAST SURGERY

GAME OVER?