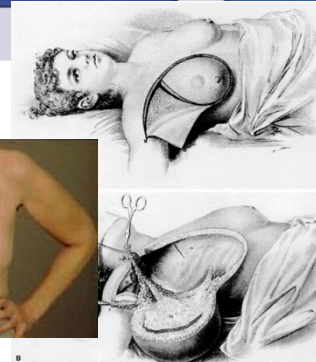
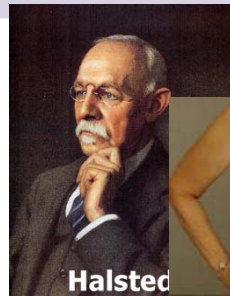
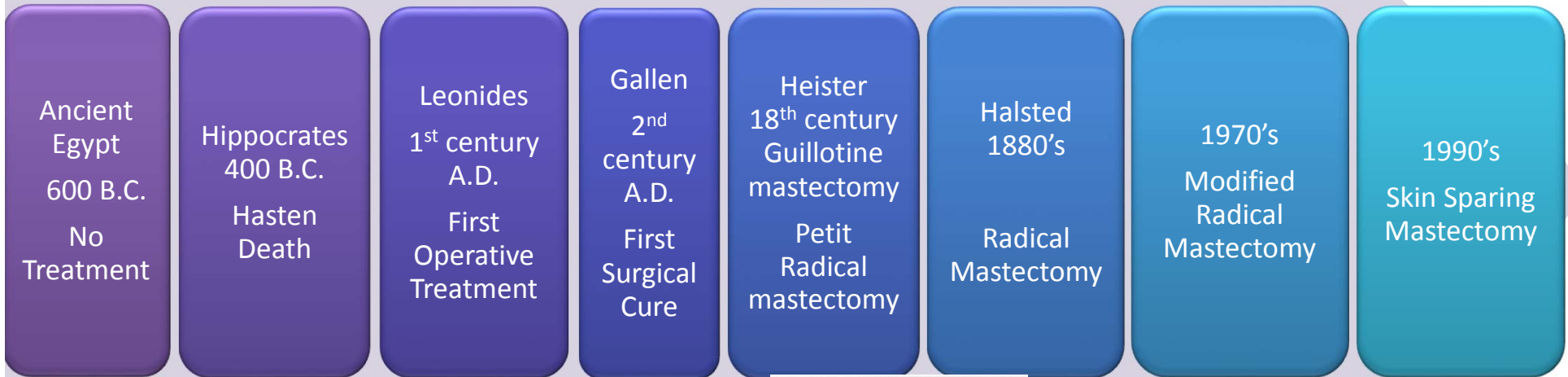
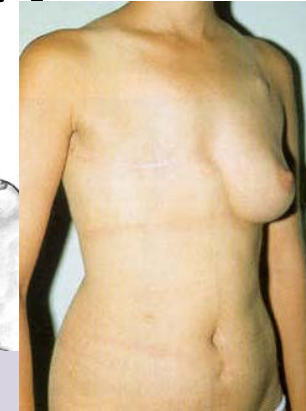
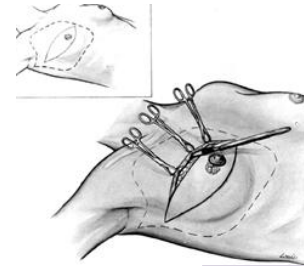


# Nipple Sparing Mastectomy: Lessons Learned

Kandace McGuire, MD  
University Of Pittsburgh



# Evolution of Mastectomy



# Question

- If all other skin can be maintained, why not the skin of the nipple/areola?



# Nipple Sparing Mastectomy

- Background
- Classic Inclusion Criteria
- Surgical Approach
- Special Situations
- The Magee Experience

# BACKGROUND



# Background

- Hartmann – Prophylactic Mastectomy
  - 575 “subcutaneous mastectomy”
  - 64 total mastectomy
  - 7 (1.2%) cancer occurrence, none in NAC
- Sacchini – 192 NSM
  - At 98.4 weeks, 4 LR, none in NAC

- Crowe – 149 NSM
  - 73% for DCIS/IDC
  - At 164 month f/u - 4 LR, 2 DR, none at NAC
  - 2.7% complication rate
- Petit – 1001 NSM
  - ELIOT with thicker tissue preserved behind NAC
  - 80 week f/u – 1.4% LR, none at NAC
  - NAC loss ~5%
- Benediktsson & Perbeck – Late 1980s
  - Inclusion criteria varied, outcome poor

# Occult Nipple Involvement

Study	Number of mastectomy specimens (N)	Nipple involvement (%)	Depth of nipple blocks (millimeters from skin)	Number of sections per block	Orientation of sections for pathological assessment
Wertheim and Ozzello (1980)	1,000	23.4	8	Up to 5	Coronal
Morimoto et al. (1985)	141	31	20	5-mm intervals	Coronal
Lüttges et al. (1987)	166	38	10	3	NR
Menon and van Geel (1989)	33	58	12	9	Coronal
Verma et al. (1997)	26	0	10	4	Coronal quarters
Vyas et al. (1998)	140	16	NR	6-8	Sagittal
Laronga et al. (1999)	286	5.6	3	>1	Sagittal
Simmons et al. (2002)	217	10.6	NR	3-mm intervals	Coronal nipple and sagittal retroareolar
Brachtel et al. (2009)	316	21	5	0.05-mm intervals	Coronal
Pirozzi et al. (2010)	50	24	3	0.05-mm intervals	Coronal

Murthy and Chamberlain Clin Path 2013

**Weighted Average = 21% occult nipple involvement**



# Recurrence

Reference	No. of Procedures	Follow-Up (mo)	Locoregional Recurrence *	Distant Metastasis
Garwood et al., 2009 <sup>44</sup>	106	Median, 13; range, 1-65	1	2
Denewer and Farouk, 2007 <sup>33</sup>	41	Median, 7.9; range, 4-11	0	1
Margulies et al., 2005 <sup>40</sup>	50	Mean, 7.9; range 0.2-20.2	0	—
Palmieri et al., 2005 <sup>46</sup>	25	Mean, 21; range, 6-52	0	—
Mustonen et al., 2004 <sup>47</sup>	34	Mean, 45.6; range, 28.8-69.6	4	0
Verheyden, 1998 <sup>51</sup>	30	Mean, 75.5; range, 3-126	0	0
Boneti et al., 2011 <sup>32</sup>	281	Mean, 25.3; range, 3-102	7	—
Wagner et al., 2012 <sup>49</sup>	54	Median, 15; range, 1-29	0	1
Warren Peled et al., 2012 <sup>41</sup>	657	Median, 28; range, 3-116	4	8
Kneubil et al., 2012 <sup>35</sup>	948	Median, 64; range, 18-113	10	—
Lohsiriwat et al., 2013 <sup>25</sup>	934	Median, 64; range, 18-113	0	—
Gerber et al., 2009 <sup>17</sup>	60	NR	7	14
Harness et al., 2011 <sup>18</sup>	60	Mean, 18.5; range, 6-62	1	—
Petit et al., 2009 <sup>19</sup>	1001	Median, 20; range, 1-69	14	36
Benediktsson and Perbeck, 2008 <sup>5</sup>	272	Median, 156; mean, 135.6; range, 2.4-210	52	44
Caruso et al., 2006 <sup>20</sup>	51	Mean, 66; range, 9-140	1	5
de Alcantara Filho et al., 2011 <sup>22</sup>	353	Median, 10.38; range, 0-109	0	1
Kim et al., 2010 <sup>23</sup>	152	Median, 60	3	13
Sookhan et al., 2008 <sup>27</sup>	20	Mean, 10.8	0	0
Regolo et al., 2008 <sup>25</sup>	102	Mean, 16	0	0
Voltura et al., 2008 <sup>29</sup>	51	Mean, 18; range, 2-68	2	—
Jensen et al., 2012 <sup>34</sup>	149	Median, 60.2; range, 12-144	3	1
Paepke et al., 2009 <sup>15</sup>	109	Median, 34; range, 20-54	1	2
Spear et al., 2011 <sup>4</sup>	162	Mean, 36.5; range, 5-243	0	1
Garcia-Etienne et al., 2009 <sup>14</sup>	42	Median, 10.5; range, 0.4-56.4	0	NR
Spear et al., 2012 <sup>52</sup>	24	Mean, 13	0	0
Mosahebi et al., 2007 <sup>9</sup>	61	Mean, 48; range, 8-109	0	6
Yang et al., 2012 <sup>8</sup>	92	Mean, 18.1; range, 5-34	0	—
<b>Total</b>	<b>6003</b>	<b>0.2-210</b>	<b>110 (1.8%)</b>	<b>135 (2.2%)</b>

Endara et al. Plast Recon Surg 2013

**110 (1.8%)**

**135 (2.2%)**

# **INCLUSION CRITERIA**

# Inclusion Criteria

## Oncologic

- Unifocal cancer that is:
  - DCIS
  - Invasive Ductal
  - Invasive Lobular
  - Sarcoma
- Tumor is  $\leq 3$ cm
- Tumor is  $\geq 2$ cm from the nipple-areola complex (NAC)
- Clinically node-negative (no palpable lymph node involvement)
- Prophylactic mastectomy

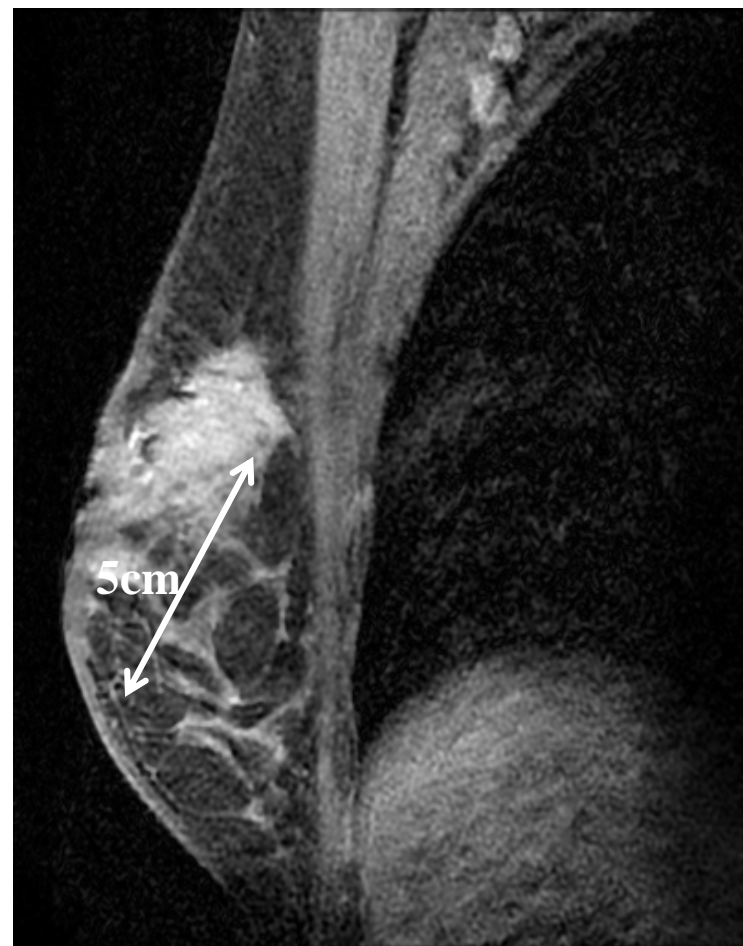
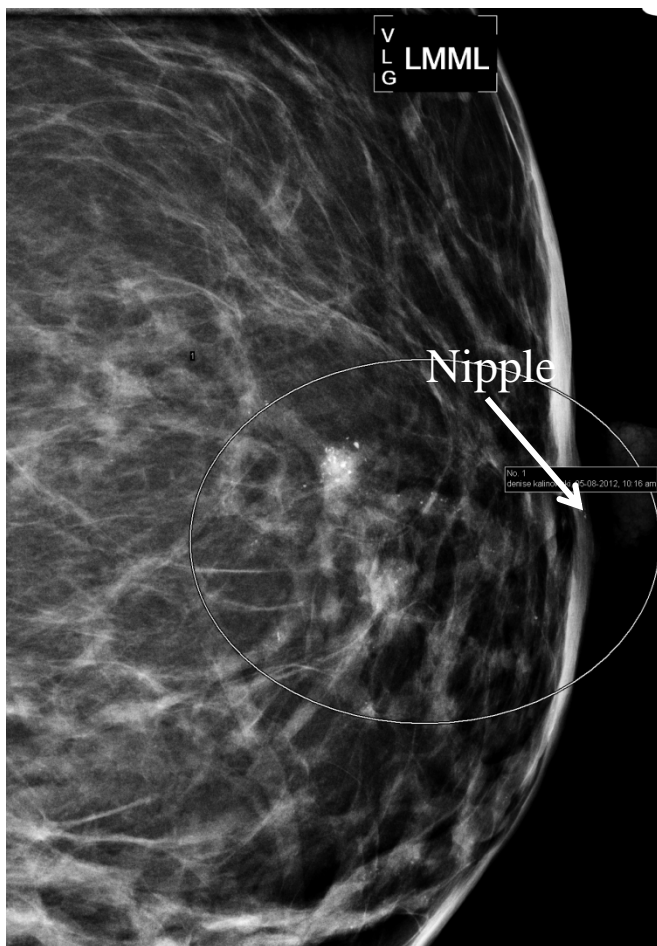
## Cosmetic

- Age  $< 65$
- No prior history of circumareolar incisions
- No history of smoking within 6 Months of intended surgery
- BMI  $< 30$
- Grade II or less ptosis (nipple at or above the inframammary fold)
- Breast size  $< 500$ grams (about a C cup)

## Relative Contraindications

- History of breast radiation (relative exclusion based on radiation damage to skin)
- Received neoadjuvant chemotherapy for locally advanced disease without a complete or near complete imaging response

# Poor Candidates Oncologic

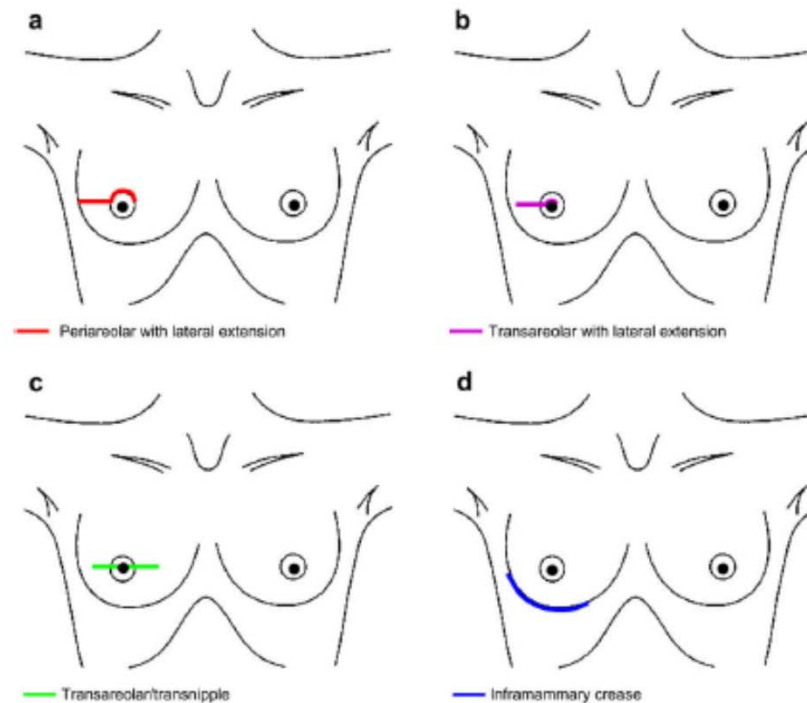


# Poor Candidates Cosmetic



# **SURGICAL APPROACH**

# Various Nipple Sparing Approaches



a. Nipple-sparing omega incision

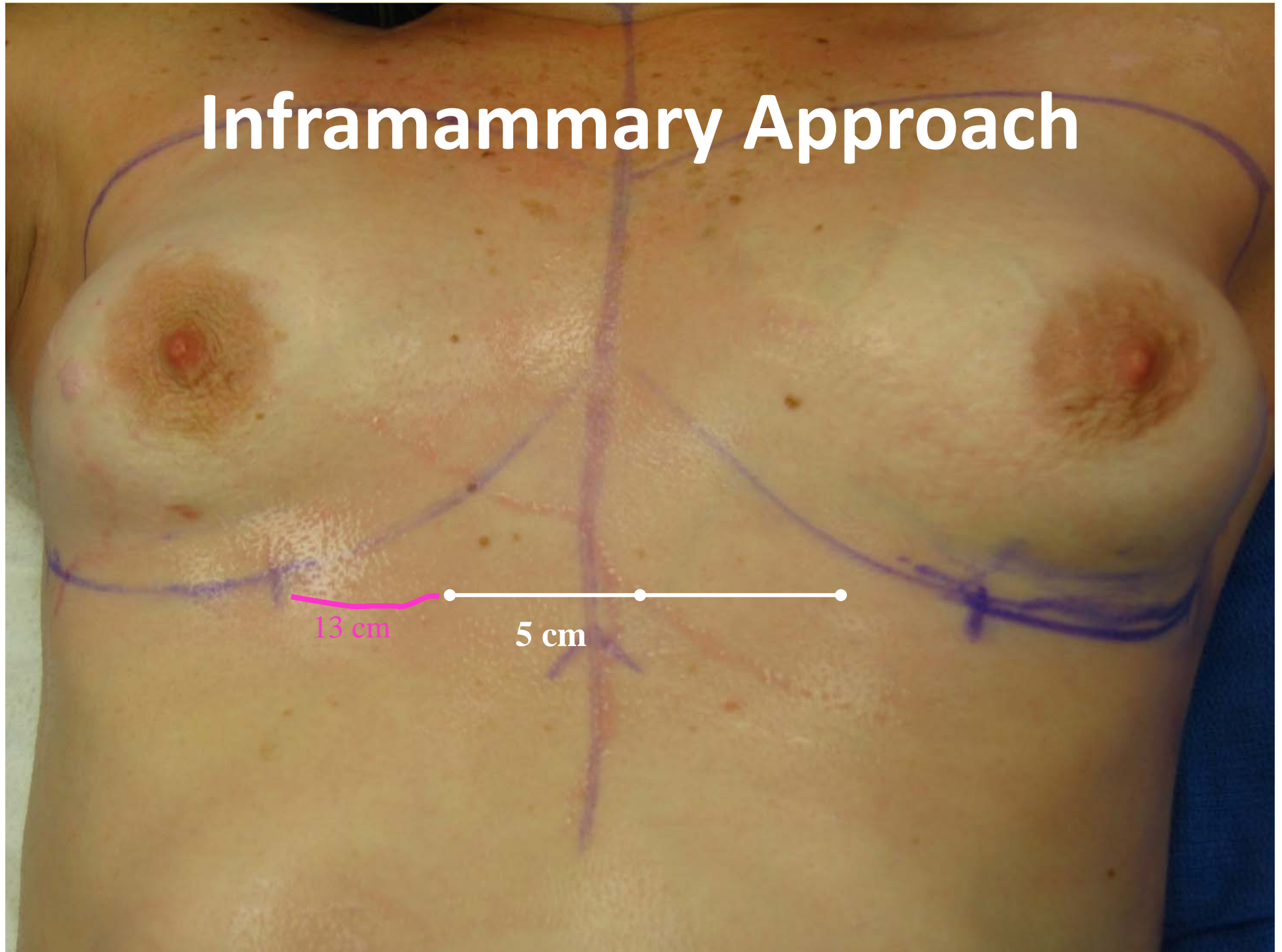
b. Transareolar, perinipple incision with lateral extension.

c. Transareolar, transnipple incision with medial and lateral extensions.

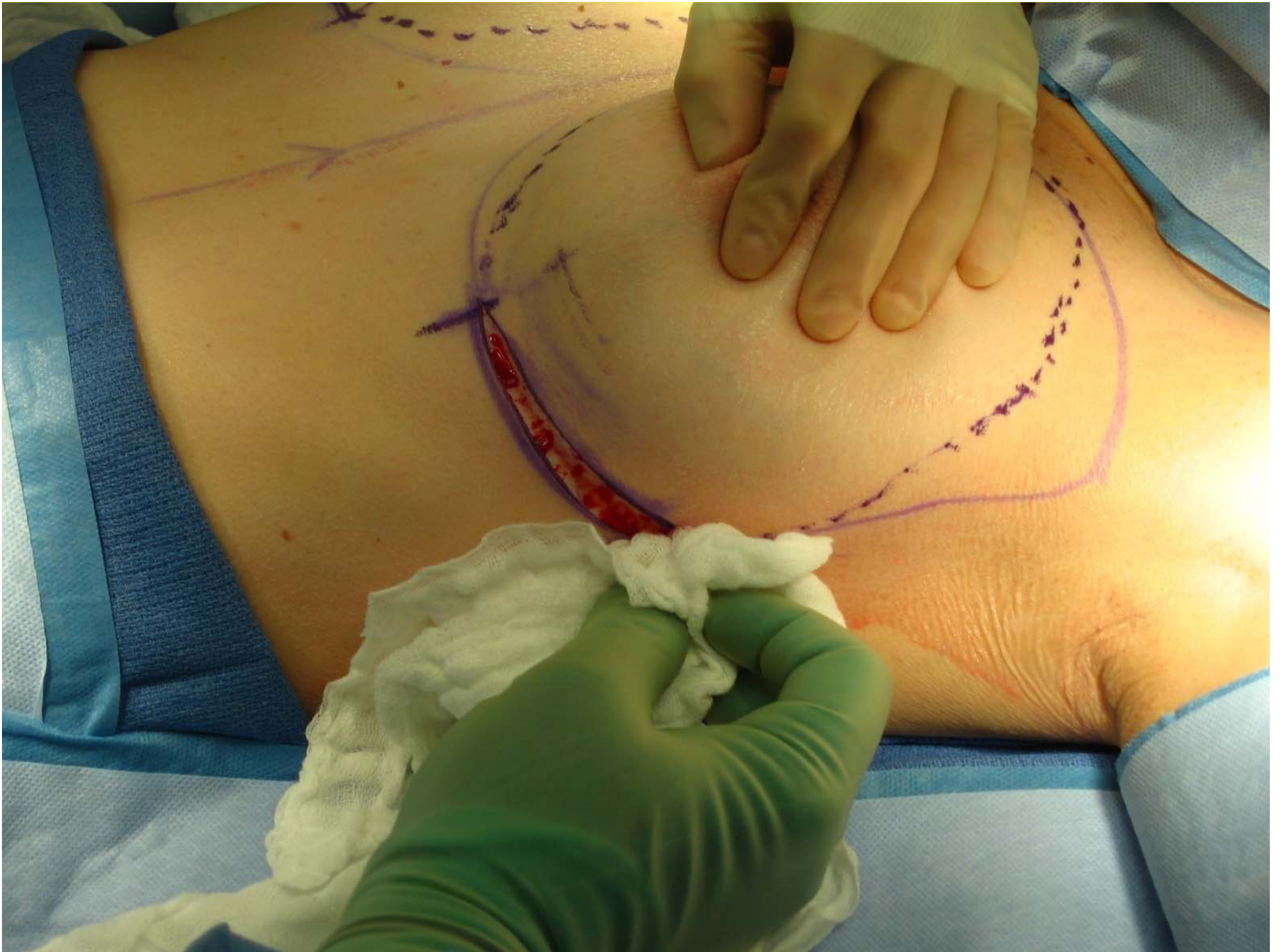
d. Inferior-lateral mammary crease incision.

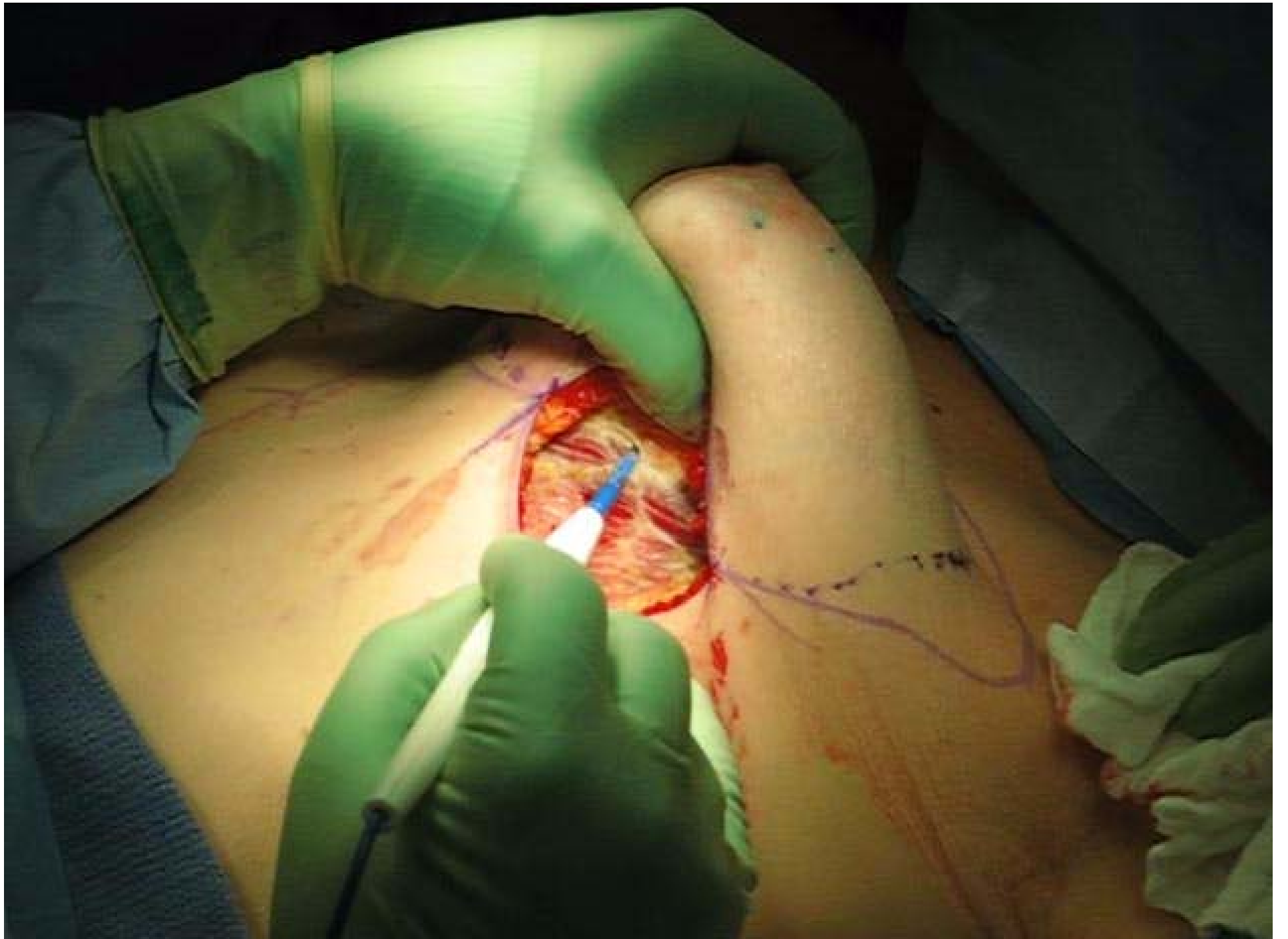
Chung & Sacchini: Surgical Oncolog(2008)

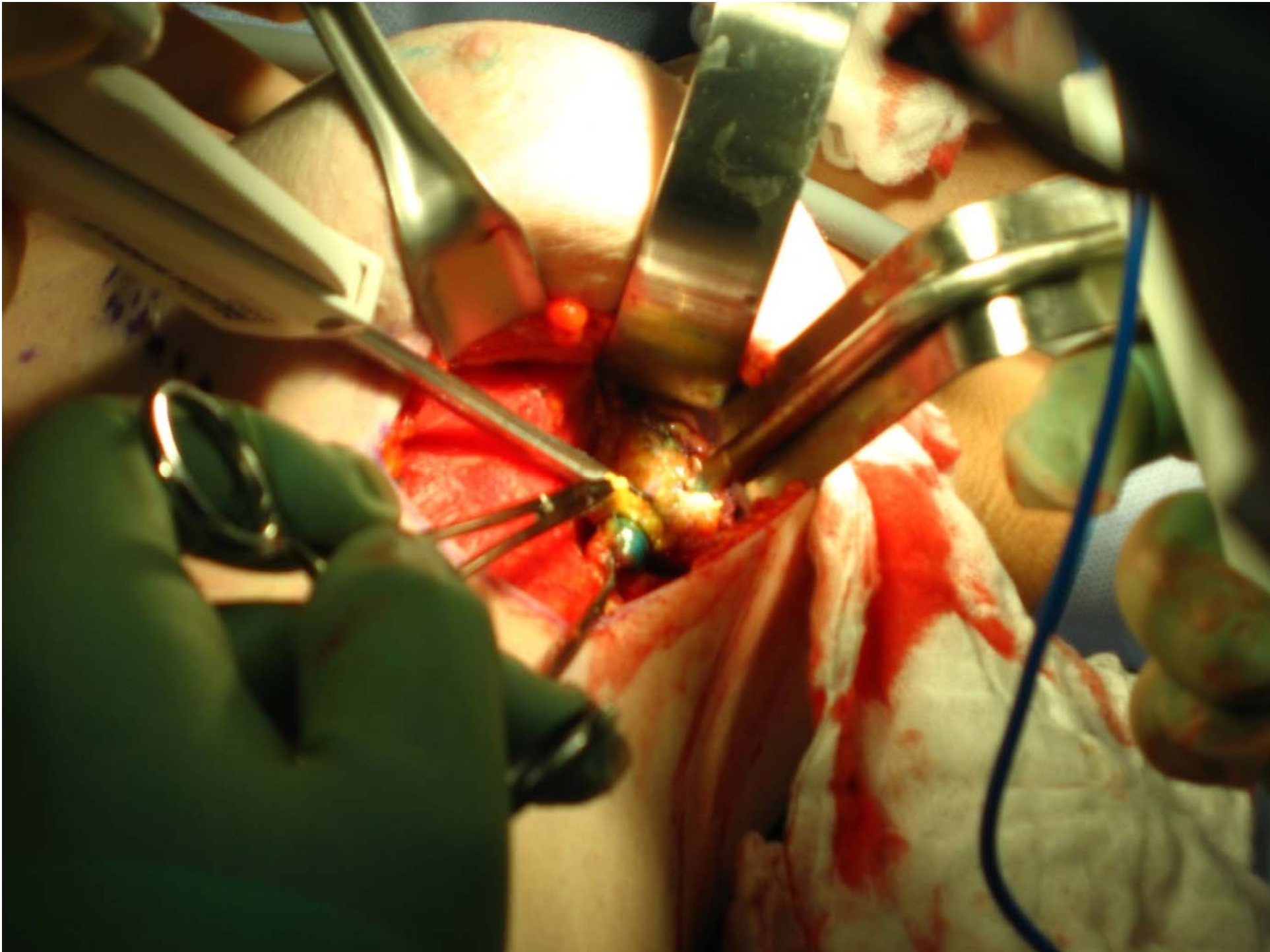
# Inframammary Approach



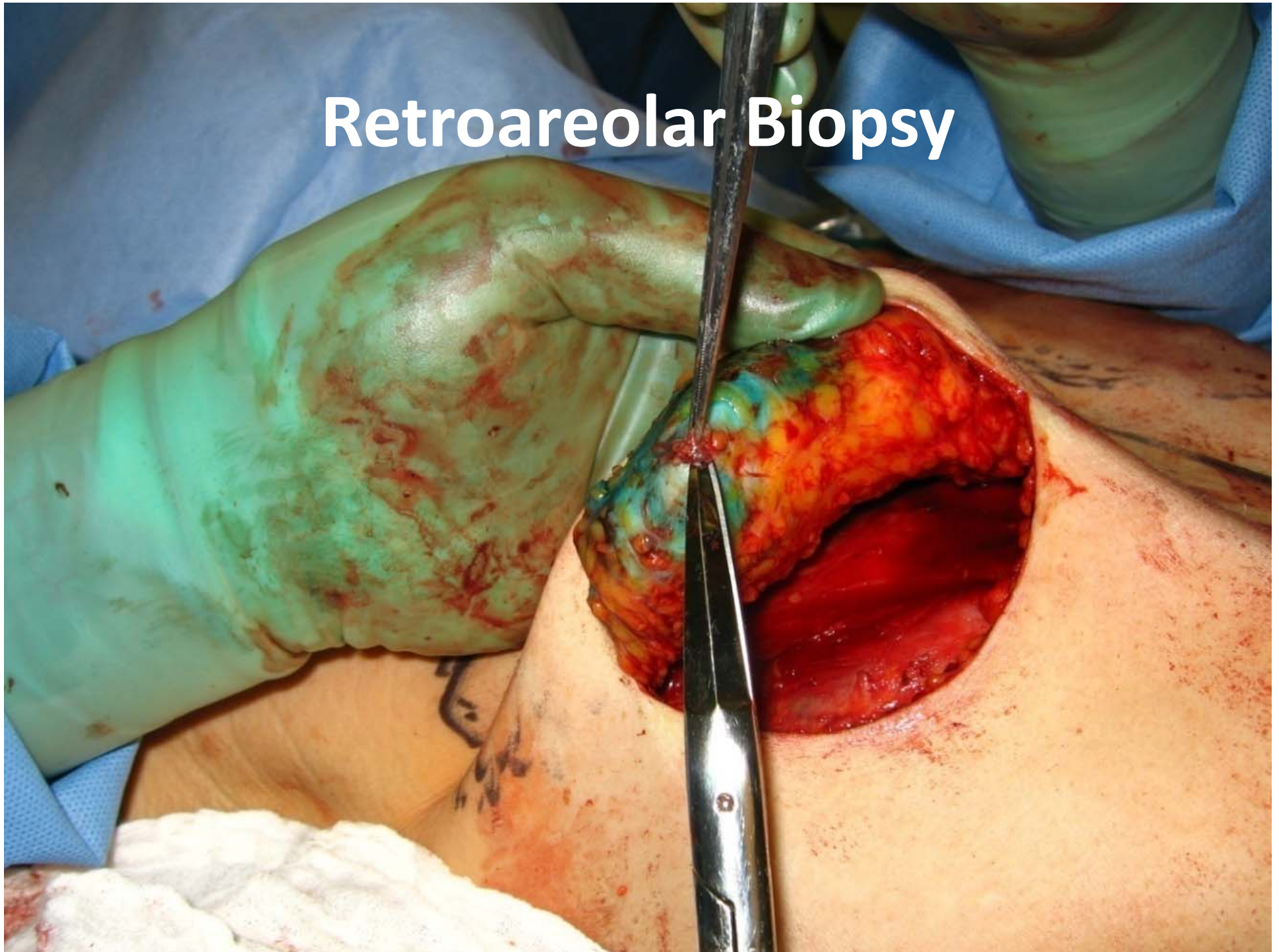








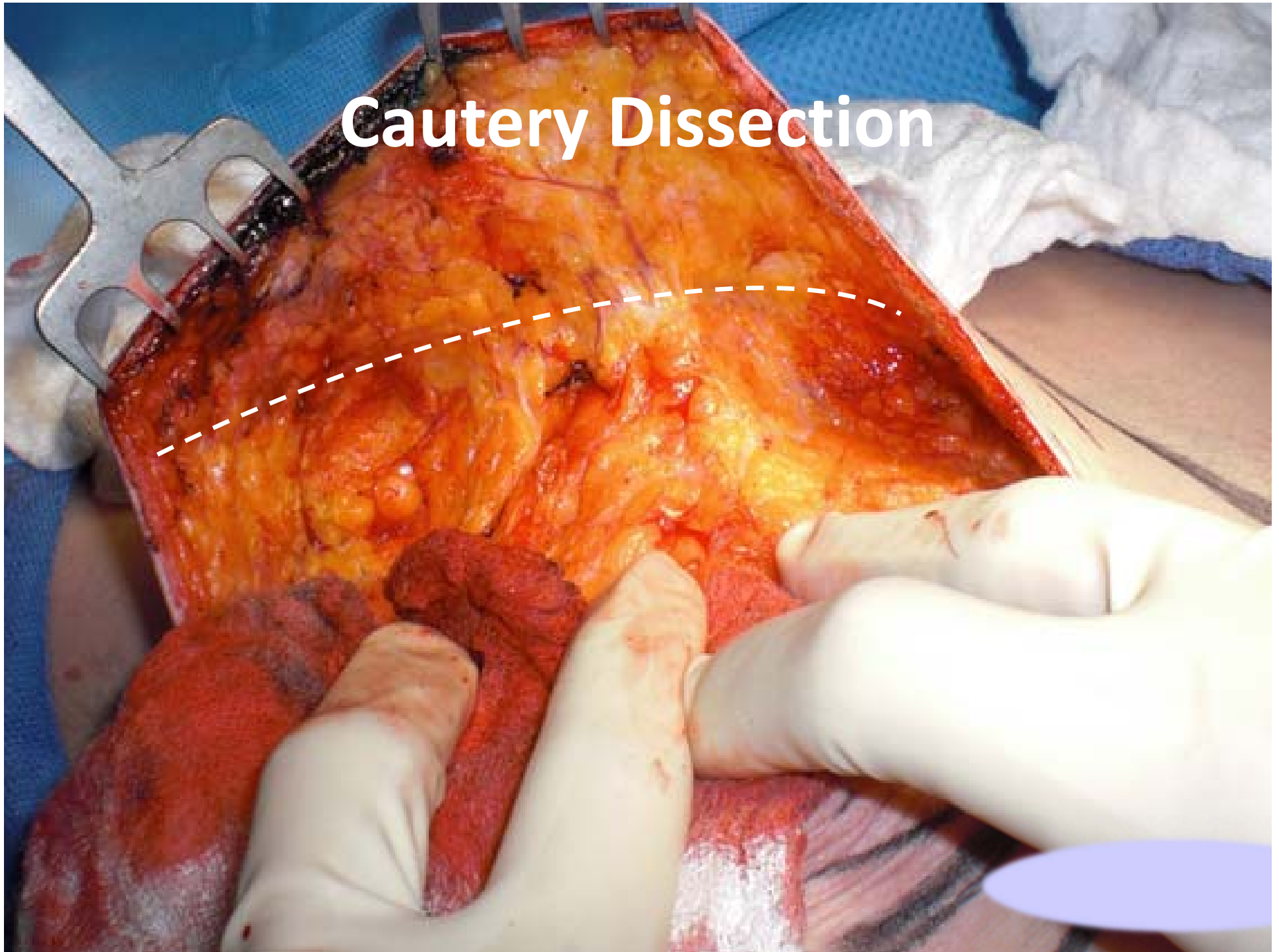
# Retroareolar Biopsy



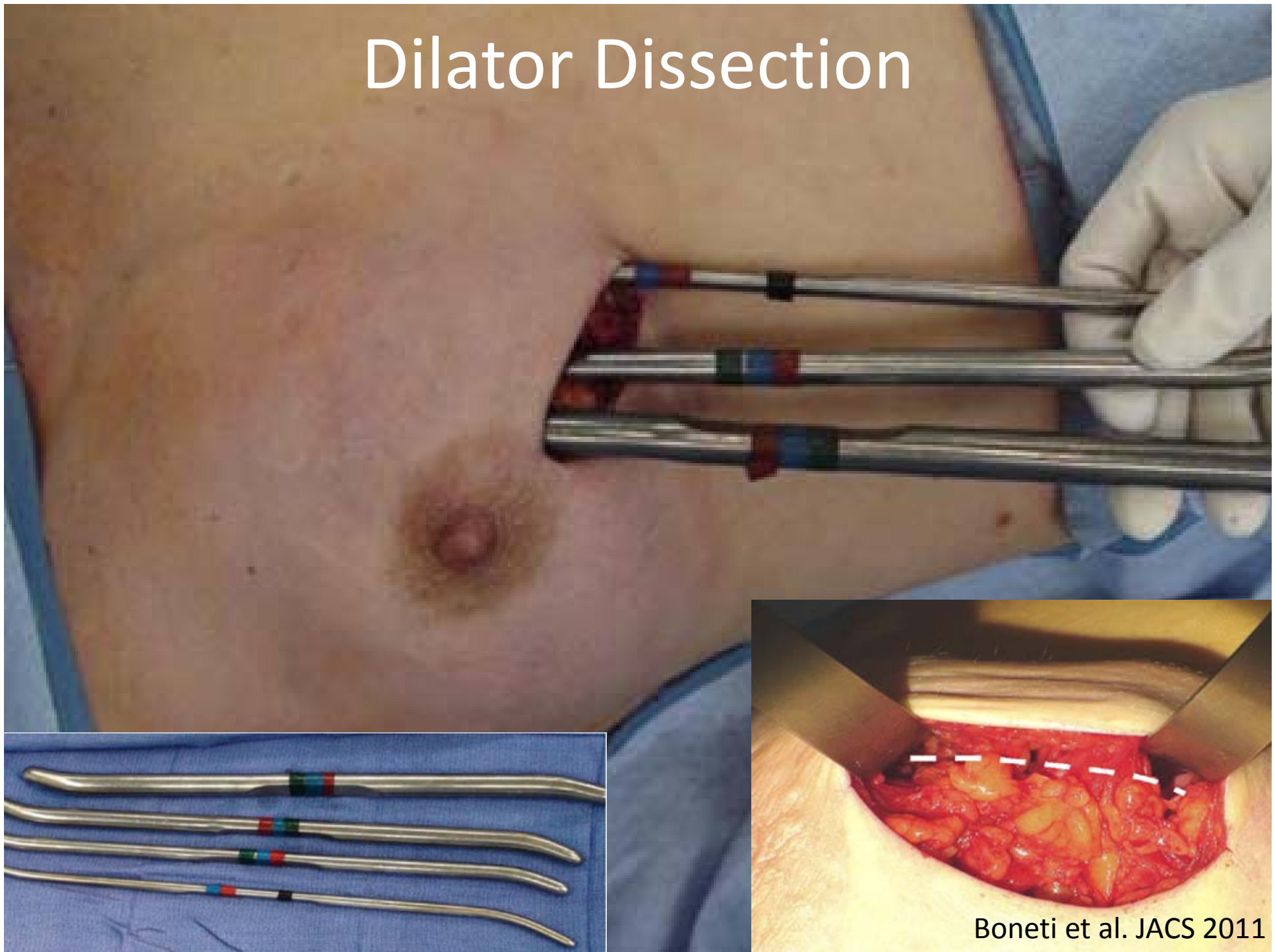
# Scissor Dissection



# Cautery Dissection



# Dilator Dissection



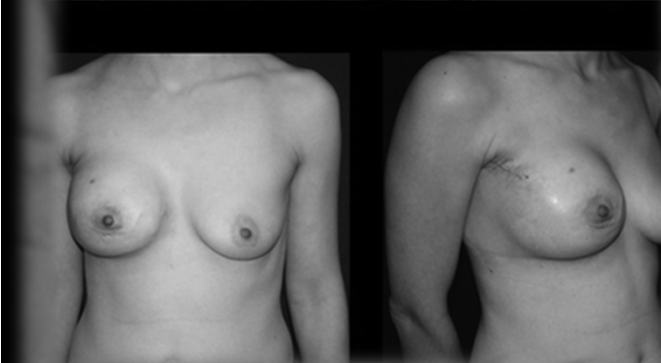
Boneti et al. JACS 2011

# Endoscopic "Window" Approach





# Video Endoscopic Approach



# **SPECIAL SITUATIONS**

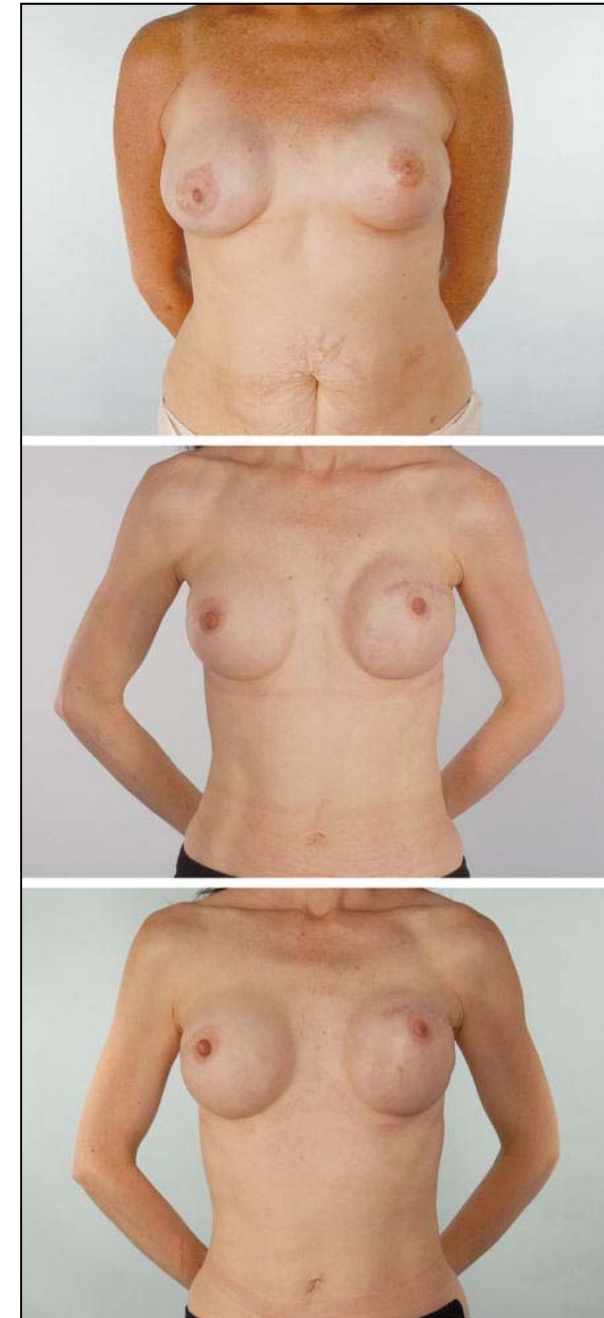
# Special Situations

## - Radiation

	PMRT (%)	BCT (%)	<i>p</i>
High-riding nipple			
0	1 (20.0)	5 (38.6)	0.82
1	2 (40.0)	3 (23.1)	
2	2 (40.0)	5 (38.5)	
High-riding nipple			
Low (grade 0, 1)	2 (40.0)	6 (46.2)	0.99
High (grade 2, 3)	3 (60.0)	7 (53.9)	
Capsular contracture			
No	3 (60.0)	12 (92.3)	0.17
Yes	2 (40.0)	1 (7.8)	
Malposition correction			
No	4 (80.0)	1 (69.2)	0.99
Yes	1 (20.0)	4 (30.8)	
Any complication			
No	1 (20.0)	6 (46.2)	0.6
Yes	4 (80.0)	7 (53.9)	

PMRT, postmastectomy radiation therapy; BCT, breast-conservation therapy.

Spear et al. Plast Recon Surg 2014



# Special Situations - Radiation

Authors	No. of patients	Type of surgery	XRT	Absolute LRR (%)	Nipple recurrence (%)	Median follow-up
Bishop et al. <sup>35</sup>	63	Total mastectomy with nipple preservation	Yes <sup>a</sup>	3	0	3.9 years
	24		No <sup>b</sup>	17	12	3.8 years
Cheung et al. <sup>40</sup>	134	Subcutaneous mastectomy	No	16	4	122 months
	535	Simple mastectomy	No	14	NA	93 months
Gerber et al. <sup>41</sup>	61	Skin-sparing mastectomy with NAC conservation	Some <sup>c</sup>	5.4	2	59 months
	51	Skin-sparing mastectomy without NAC conservation	Some <sup>d</sup>		NA	
Caruso et al. <sup>38</sup>	134	Modified radical mastectomy	Some <sup>e</sup>	8.2	NA	
	50	Nipple-sparing mastectomy	Some <sup>f</sup>	2	2	66 months
Petit et al. <sup>42</sup>	1,001	Nipple-sparing mastectomy	Yes	1.4	0	20 months
Sacchini et al. <sup>39</sup>	123	Nipple-sparing mastectomy	No	3 <sup>g</sup>	0	24.6 months
Benediktsson and Perbeck <sup>36</sup>	216	Nipple-sparing mastectomy	Overall	5-year: 16.2 10-year: 20.8	0	13 years
			Yes <sup>h</sup>	8.5	0	
Crowe et al. <sup>37</sup>	83	Nipple-sparing mastectomy	Unknown	3.4	0	41 months

Spear et al. Plast Recon Surg 2014

# Special Situations – Prior Reduction Mammoplasty

Patient Outcomes	Mean (Range)
Follow-up, mo	
Mean	10.5
Range	3–24
Reconstruction type	
Immediate tissue expander	10/13
Immediate abdominally based microvascular free flap	2/13
Immediate latissimus dorsi flap with implant	1/13
Incision type	13/13 used previous incision
Reconstructive complications	
Hematoma evacuation	1/13
Implant replacement for displacement	1/13
Nipple necrosis (partial or complete)	0/13
Mastectomy flap necrosis	0/13
Infection	0/13
Seroma	0/13
Oncologic complications	
Positive subareolar biopsies	0/13
Cancer recurrences	0/13



Alperovich et al. Plast Recon Surg 2013

# Special Situations – Prior Augmentation

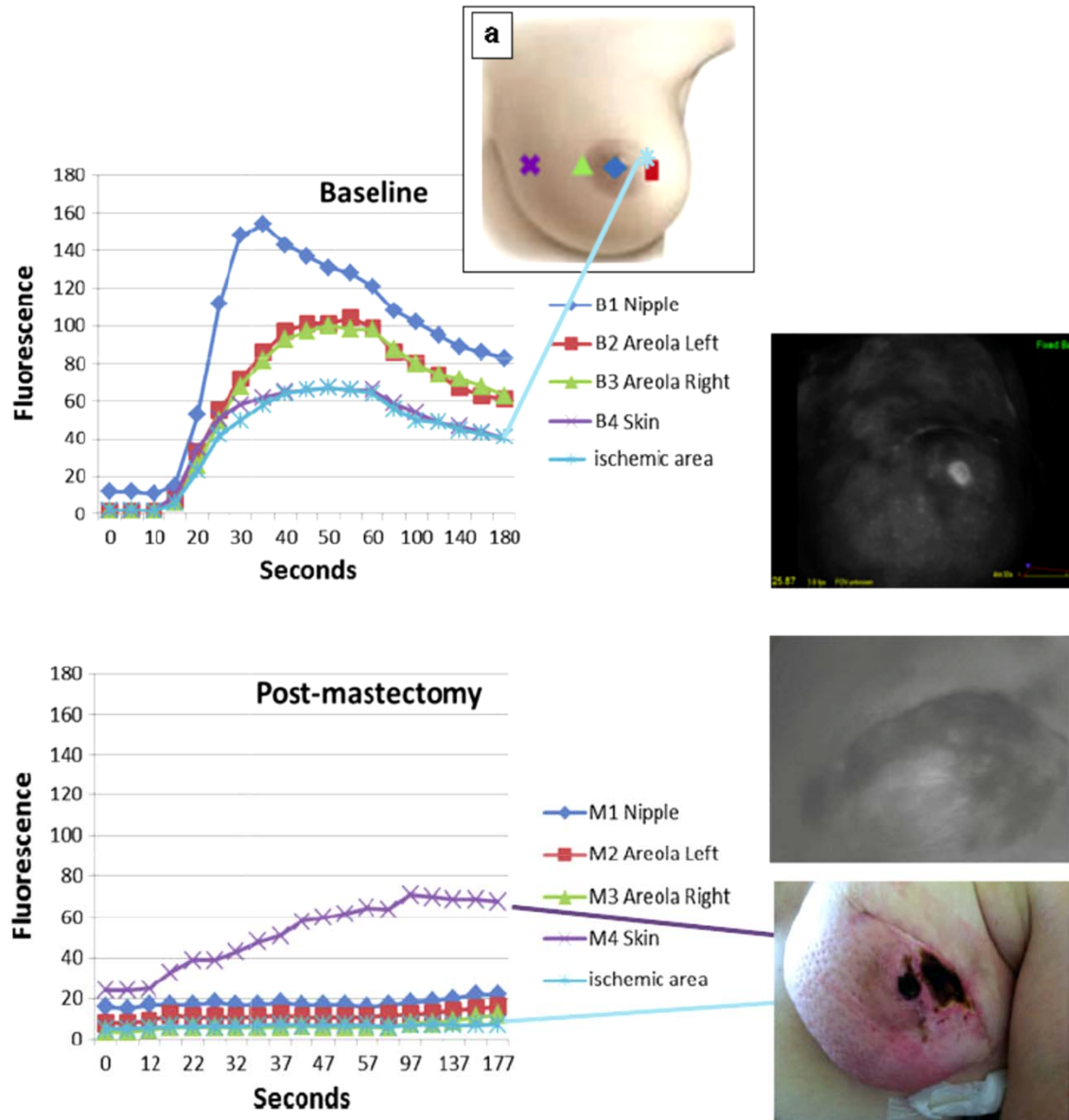
	No History of Prior Breast Implant	History of Prior Augmentation Mammoplasty	OR	95% CI	P-value
Hematoma	3 (3%)	1 (2%)	.76	0.01-9.75	1.0
Infection requiring oral antibiotics	13 (11%)	6 (12%)	2.99	0.71-12.94	0.091
Infection requiring IV antibiotics	10 (9%)	5 (10%)	1.16	0.29-3.99	0.775
Infection requiring unplanned procedure	6 (5%)	1 (2%)	.37	0.01-3.19	0.677
Wound breakdown	8 (7%)	2 (4%)	0.56	0.06-2.94	0.725
Superficial nipple necrosis	5 (4%)	0 (0%)	0	0-1.73	0.324
Partial nipple/areolar necrosis	2 (2%)	1 (2%)	1.94	0.05-73.8	0.360
Complete nipple/areolar necrosis	5 (4%)	0 (0%)	0	0-1.73	0.324
Minor skin flap necrosis	3 (3%)	0 (0%)	0	0-2.94	0.554
Major skin flap necrosis	6 (5%)	2 (4%)	0.76	0.07-4.42	1.0
Expander/Implant exposure	6 (5%)	1 (2%)	0.37	0.01-3.19	0.677
Expander/Implant loss	7 (6%)	5 (10%)	1.71	0.40-6.60	0.515

# Special Situations – Prior Augmentation



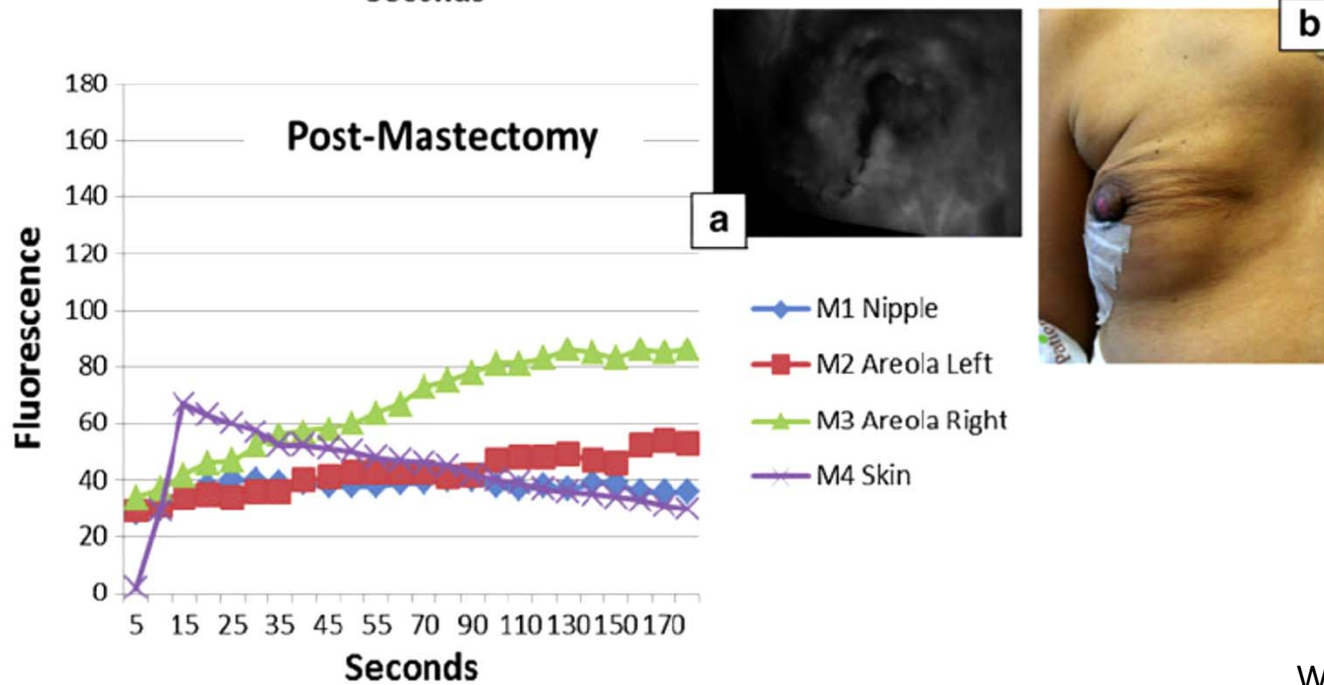
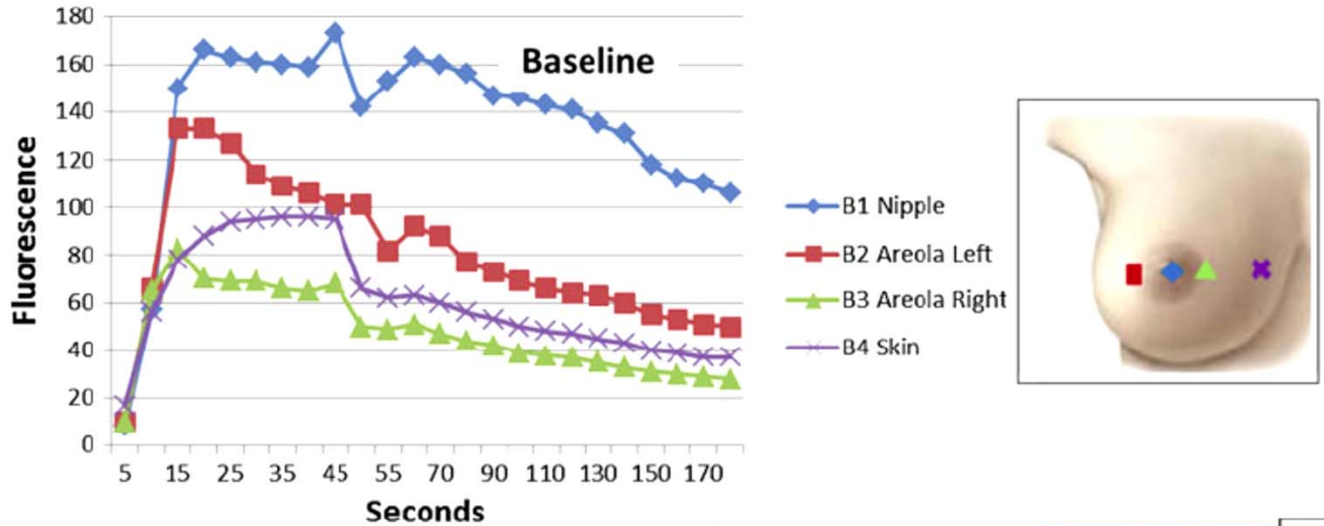
Courtesy of Scott Spear, MD

# Special Situations - SPY

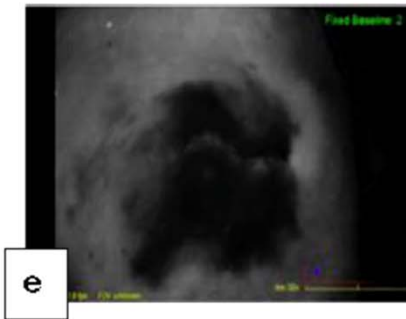
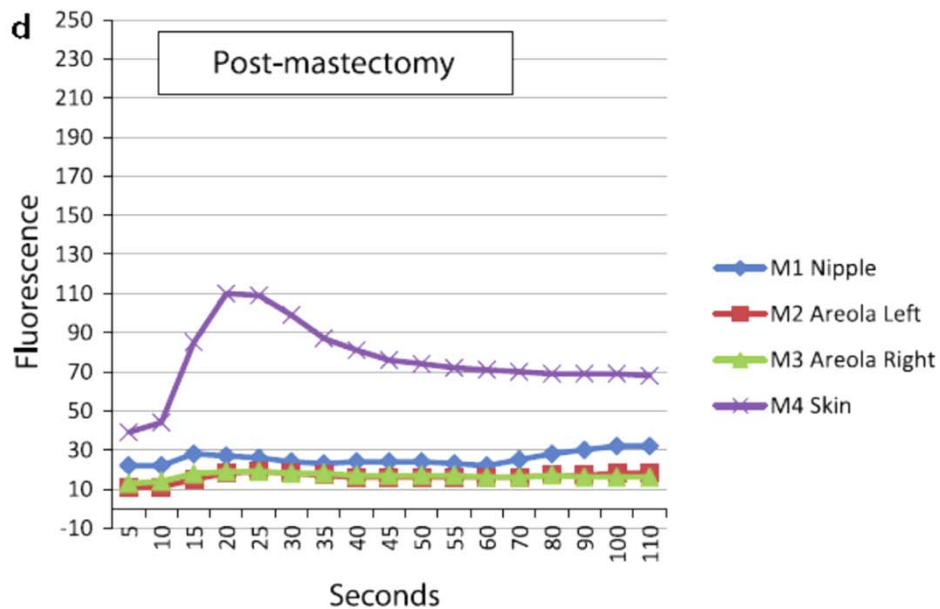
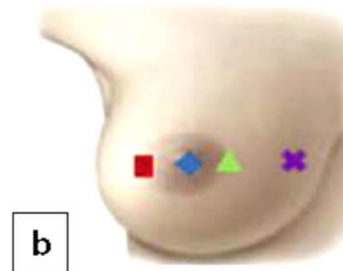
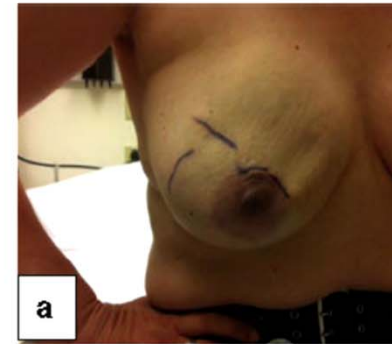
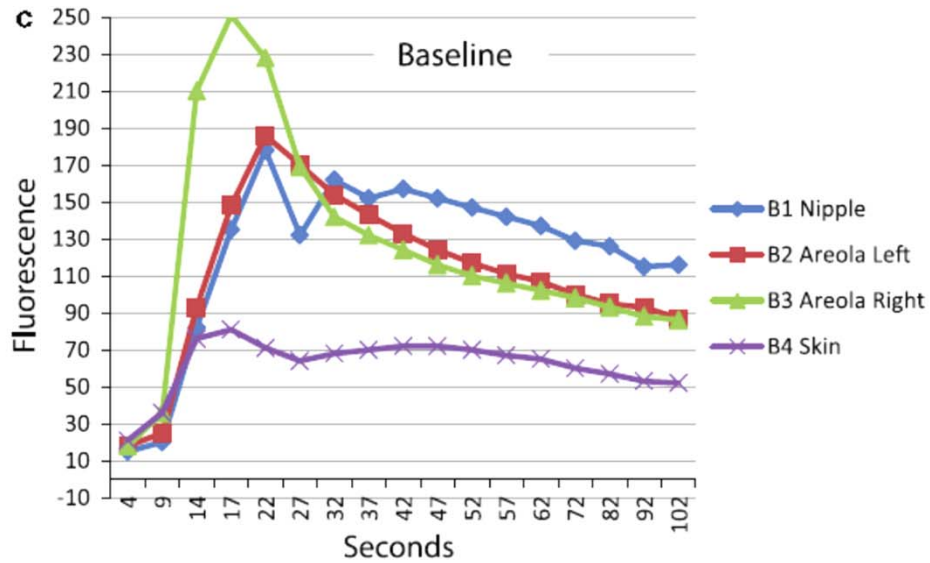




# Special Situations - SPY



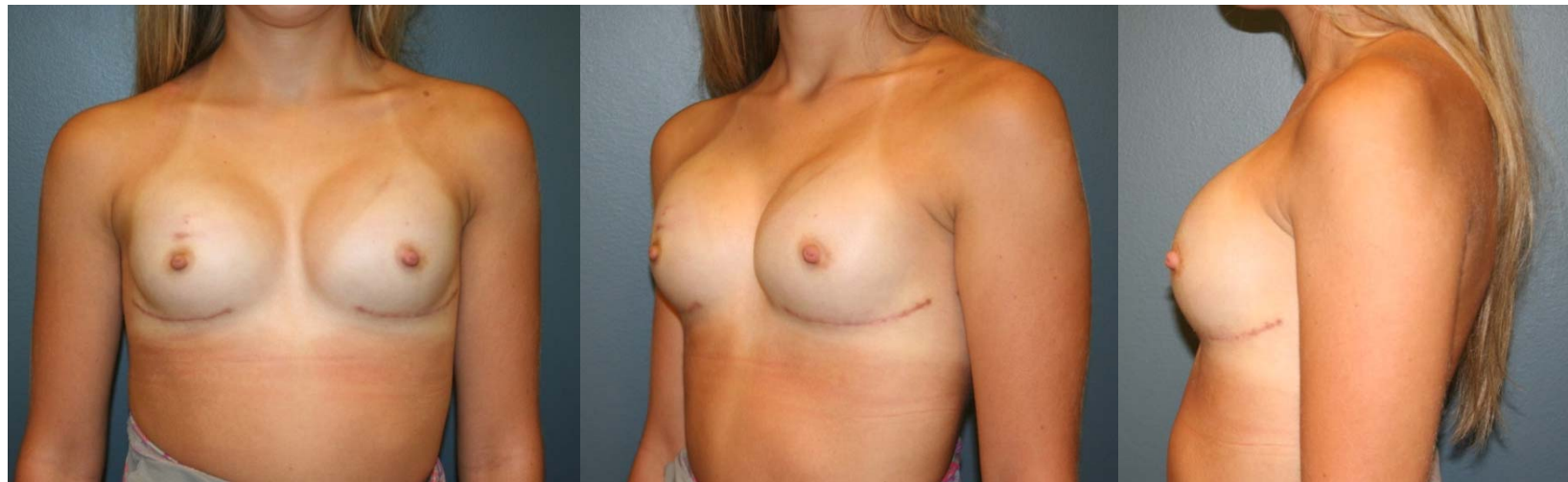
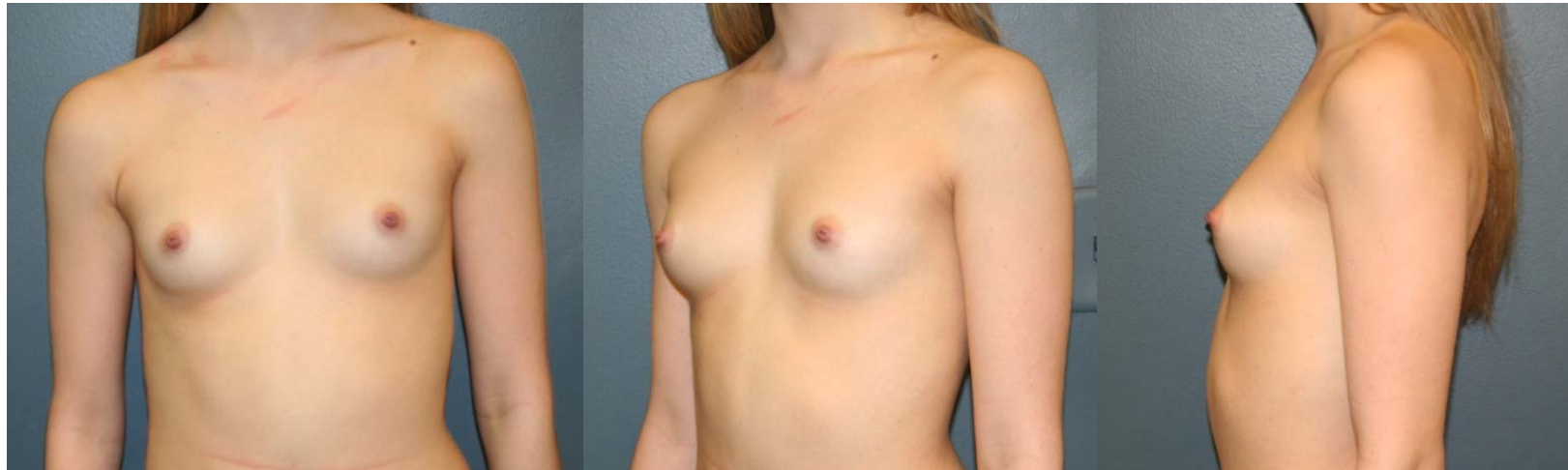
# Special Situations - SPY



# Special Situations – Straight to Implant Reconstruction

	Groups (incision)				<i>p</i> value
	Hemi-periareolar ( <i>n</i> = 39)	Double-circle ( <i>n</i> = 67)	Wise pattern/superior Pedicle ( <i>n</i> = 28)	Wise pattern/inferior Pedicle ( <i>n</i> = 24)	
Total complications— <i>n</i> (%)	8 (20.5)	5 (7.5)	6 (21.4)	3 (12.5)	0.144
Dehiscence— <i>n</i> (%)	5 (12.8)	3 (4.5)	3 (10.7)	2 (8.3)	0.405
Partial lost— <i>n</i> (%)	4 (10.3)	3 (4.5)	4 (14.3)	1 (4.2)	0.320
Infection— <i>n</i> (%)	2 (5.1)	1 (1.5)	0 (0)	1 (4.2)	0.441
Extrusion— <i>n</i> (%)	3 (7.7)	1 (1.5)	1 (3.6)	0 (0)	0.235
Hematoma— <i>n</i> (%)	0 (0)	1 (1.5)	0 (0)	0 (0)	>0.999

Factors	Univariate analysis <sup>a</sup>			Multivariate analysis <sup>b</sup>		
	OR	95 % CI	<i>p</i> value	OR	95 % CI	<i>p</i> value
Age (years)	1.011	0.961–1.063	0.678	–	–	–
Weight of specimen	1.007	1.003–1.010	<0.001*	1.000	0.995–1.006	0.871*
BMI	1.328	1.173–1.503	<0.001*	1.366	1.050–1.778	0.020*
HAS	7.867	2.753–22.479	<0.001*	1.854	0.420–8.184	0.415*
DM	0.600	0.073–4.934	0.635	–	–	–
Smoking history	2.178	0.801–5.918	0.127	–	–	–



Straight to Implant Reconstruction

# **THE MAGEE EXPERIENCE**

# The Magee Experience

- 2009 – Current
- 124 patients, 227 mastectomies (93 bilateral)
- 72% (90/124) prophylactic
- 40% (49/124) invasive ductal carcinoma
- 7% (8/124) invasive lobular carcinoma
- 20% (25/124) ductal carcinoma in situ (DCIS)

# The Magee Experience

- Mean follow up 23 months
- 30% (37/124) partial necrosis NAC
- 5% (6/124) full necrosis NAC
- 3% (4/124) nipple involvement
- 1.5% (2/124) recurrence/occurrence

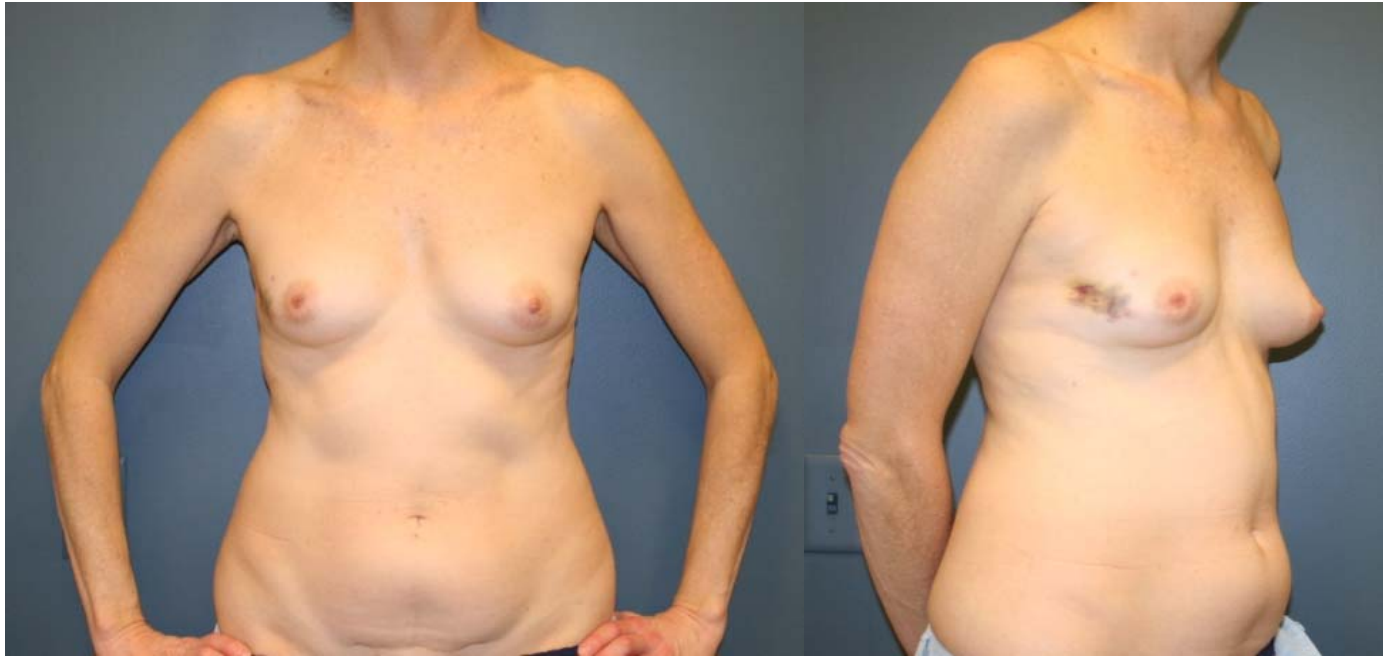


# The Magee Experience

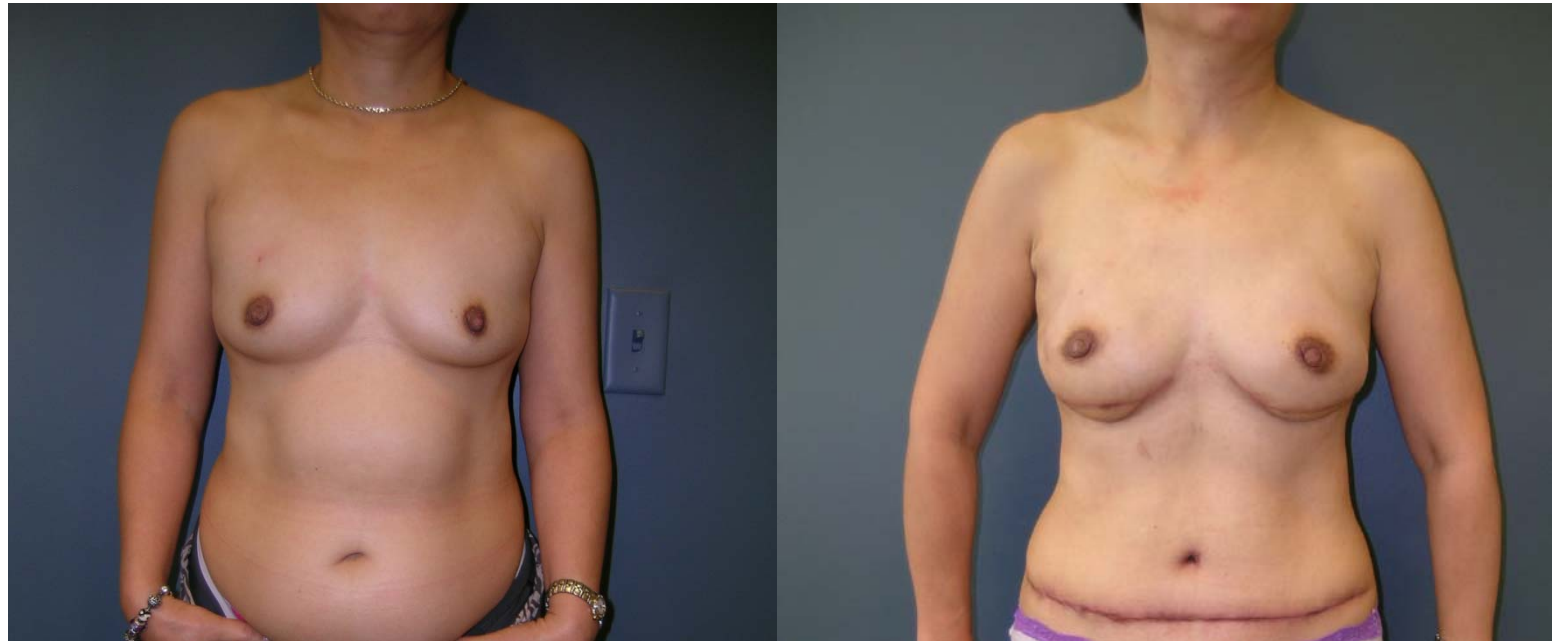
- 20% (24/124) s/p neoadjuvant chemotherapy
- 6% (7/124) radiation



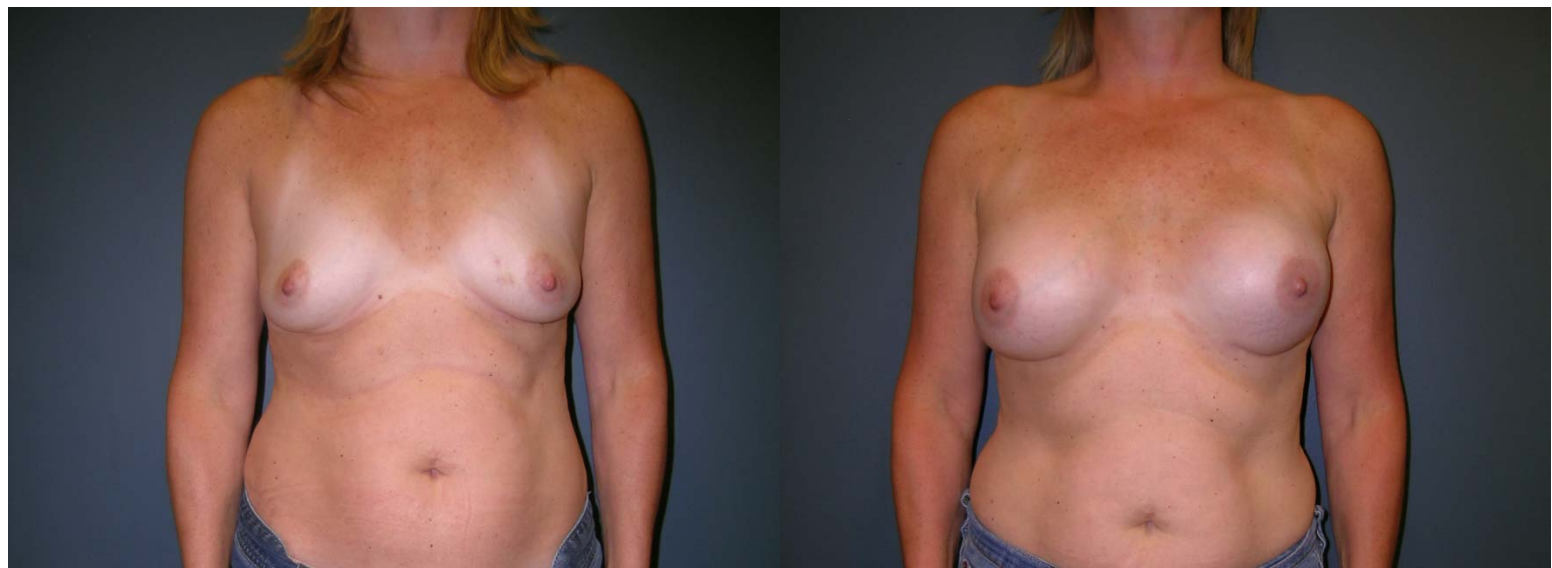


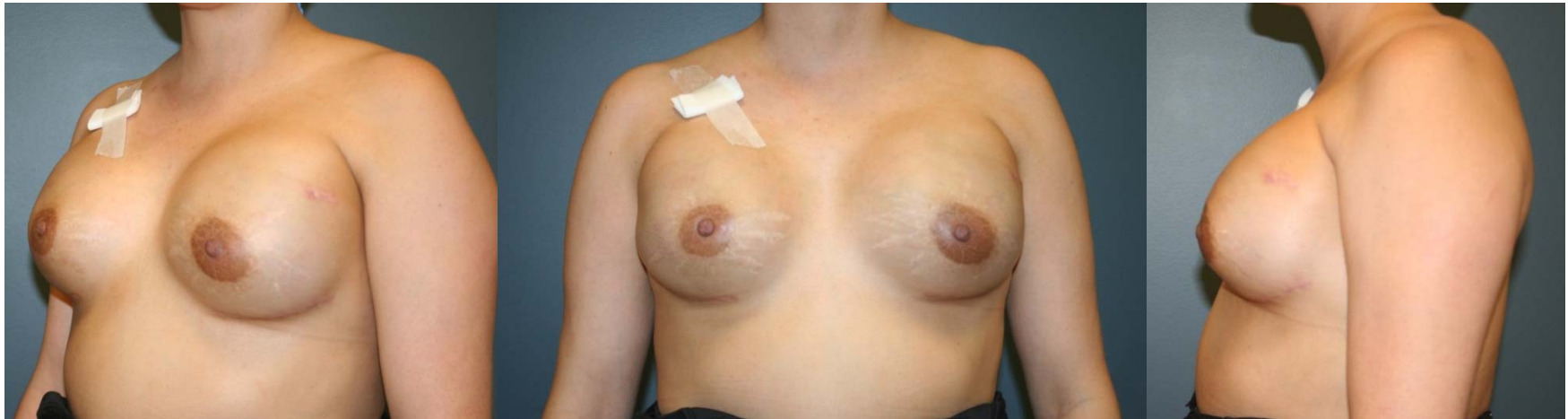
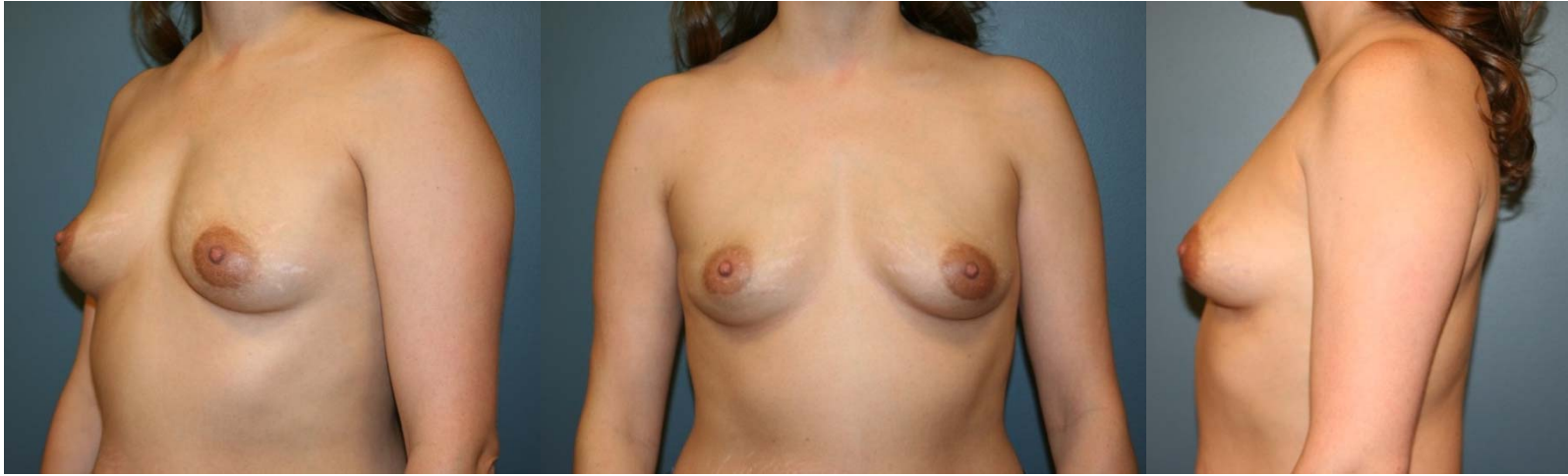


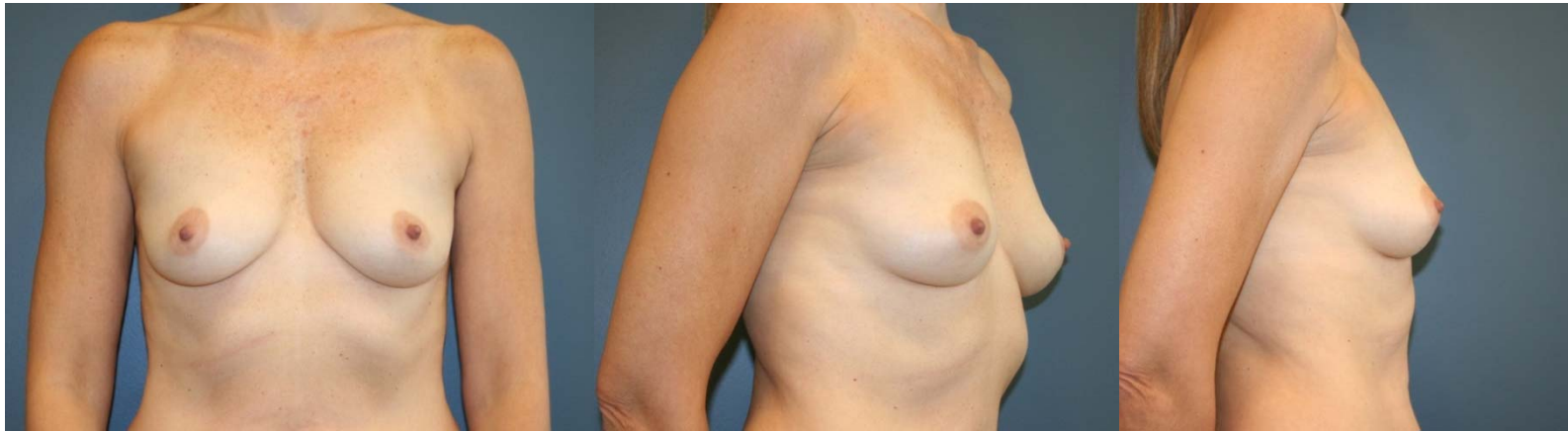
DIEP Flap



Implant





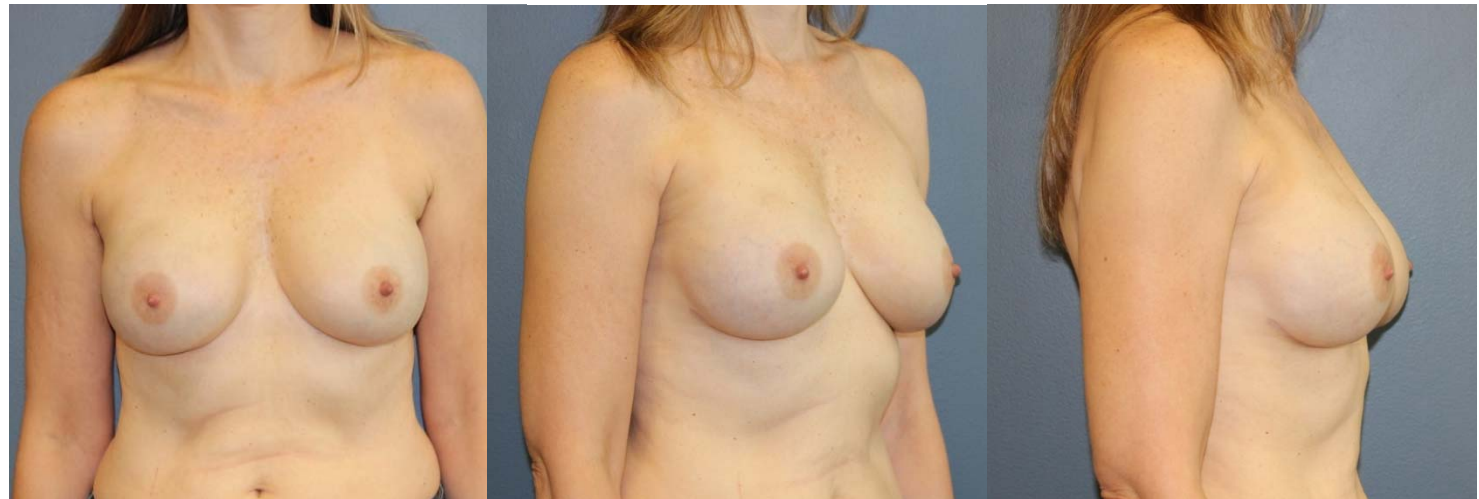


Tissue  
Expander



To

Implant  
Reconstruction





**Thank You!!!**