Intraoperative Imaging by Breast Surgeons

Cary S. Kaufman MD, FACS Associate Clinical Professor of Surgery University of Washington Medical Director, Bellingham Regional Breast Center Intraoperative Imaging by Breast Surgeons Easy and Accurate for the Patient

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#### **Options of Image-guided Localization**

- Mammographic localization in radiology suite
- Ultrasound localization in the radiology suite
- Ultrasound localization in the O.R.
- ROLL radioisotope technique in the O.R. (Radioisotope-guided Occult Lesion Localization)

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Mammographic Localization in Radiology Suite . . .

**Patient Issues** Pain Anxiety Near syncopal episodes **Physician Issues** Scheduling at 7:30 AM Later delays in O.R. schedule **Technical Issues** Wire migration or dislodgment Entry site remote from lesion or incision Mammographic Localization in Operating Room . . .

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### Information Necessary for Localization

- Communication between the imager and the surgeon regarding targets:
  - Number
  - Size
  - Location
  - Optimal imaging method for each target
- Images are present in the O.R.
- Specimen imaging is available
- Place ULTRASOUND VISIBLE clip at biopsy

## **Necessary Equipment**

Ultrasound machine / gel Hook Guidewire Marking pen Blue Dye

#### **Yesterday's Study**



## Visualize clip





## Place needle





# **Confirm location**







# **Deploy Wire**





## Scan over wire "Pull" wire





# Inject blue dye







#### Intraoperative Ultrasound Localization Low Re-excision Rate

Author	#pts	#CA	#misses	%re-ex
Rahusen	27	20	0	10%
Harlow	62	62	0	5%
Smith	81	25	0	8%
Kaufman*	69	69	0	6%
Moore	27	27	0	4%
Kaufman+	100	101	0	9%
Bennett	103	43	0	7%
Ramos	225	225	1	4%
TOTAL	694	572	1	6% avg

Kaufman CS, et al. <u>Ann Surg Oncol</u>, 2002; 9:988-993.
 Kaufman CS, et al. <u>Am J Surg</u>, 2003; 186:378-382.

## Intraoperative Ultrasound Localization is Cost-effective

	Ultrasound Loc	Mammo Loc		
Patients	96	59		
Positive margin	10.4%	11.9%		
Cost of imaging	\$933	\$1,858		
Sav	vings per case =	\$925 (US)		

James TA, et al, Annals Surgical Oncology, 16: 1164-9, (2009)

#### Intraoperative ultrasound is easier. . .

#### On the patient

- Less pain / anxiety
- Less time
- On the surgeon
  - Easier scheduling
  - Patient in "surgery position"
- On the radiologist
  - More time efficient

#### On the operating room

- Less delays
- More predictability
- On the cancer
  - Less re-excisions
  - Less tissue excised
- On the insurer
  - Less cost

# But wait, there's more. . .

Localization is Incomplete without Confirmation of Target Excision

#### Options

- Digital mammographic specimen imaging in radiology suite
- 2) Digital mammographic specimen imaging in the O.R.
- 3) Ultrasound specimen imaging in the radiology suite
- 4) Ultrasound specimen imaging in the O.R.

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- 3) Ultrasound specimen imaging in the radiology suite
  - **4)** Ultrasound specimen imaging in the O.R.

# Intraoperative Digita

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# Specimen lammograms







File	Edit	View	Image	Layers	ruelles	-		C	alaster Marin
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1 III		CON E	s case	90 min was	hel 1				









#### Intraoperative Digital Specimen Mammograms 100 breast cancer patients Average 19 minutes saved per case



Clip



Calcifications

Nodule

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

## Intraoperative Specimen Imaging

- Send the image, not the specimen
- Intraoperative specimen imaging saves average of 19 minutes\* on each case.
- OR nurses handle imaging capture.
- No radiation exposure / self contained

Kaufman CS, et al. "Intraoperative digital specimen mammography: Rapid Accurate Results Expedite Surgery," <u>Annals of Surgical Oncology</u> 2007; 14:1478-1485. Kaufman CS, et al. "Intraoperative digital specimen mammography: Prompt Image Review Speed Surgery," <u>American Journal of Surgery</u>, 2006; 192:513-515.

# Specimen Orientation



12:00Double short1 clip6:00Double long2 clipsLateralSingle long3 clipsPurple Dye Anterior / Posterior



1) Be consistent 2) Communicate with your pathologist Summary: Universal Goals of Localization

Interventional Radiologist or Imaging Surgeon

Accurately identify the imaged abnormality.

 Make the process as painless and easy as possible for the patient

Confirm imaged target has been excised

Document everything (images + reports)

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