Advances in Localized Breast Cancer

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Advances in Surgery for Breast Cancer

Melissa Camp, MD
Historical Perspective

- Dr. William Stewart Halsted performed the first radical mastectomy for breast cancer in 1882
- Entailed removal of the breast, skin, chest wall muscles, and axillary lymph nodes
- Standard of care until 1970s
Moving forward in time…

- Modified radical mastectomy
- Lumpectomy with radiation
- Sentinel lymph node biopsy instead of a full axillary dissection
- Plethora of reconstruction options
Lumpectomy

- Wide excision of the area containing DCIS or invasive cancer
- Survival is the same for lumpectomy plus radiation vs. mastectomy
  - Slightly higher risk of local recurrence with lumpectomy
- Need to achieve negative margins
  - 20% of the time need re-excision
Lumpectomy margins

• Xray of the tissue in the OR to “look” at the margins
• Additional shave margins to sample the 6 faces of the lumpectomy cavity after lumpectomy tissue is removed
  – Shave margins reduce rate of positive margins and need for re-excision by about 50%
• Evolving technologies aim to more accurately assess margins intraoperatively


Lumpectomy with oncoplastic reduction/rearrangement

• Ideal candidates
  – Patients who prefer lumpectomy but would require removal of a large amount of tissue
  – Women with larger breasts who desire breast reduction

• Procedure involves close collaboration with the plastic surgeon
  – Tissue in the affected breast is rearranged at the time of lumpectomy
  – Simultaneous reduction of the contralateral breast for symmetry
Mastectomy

• Goal is to remove all of the breast tissue
  – Lymph nodes are typically sampled
  – Chest wall muscle is left in place
• Mastectomy be performed in different ways
  – Without reconstruction
  – Skin sparing
  – Nipple sparing
• Type of mastectomy performed depends on
  – Location of the cancer
  – Other types of treatments that may be necessary
  – Patient preference
Nipple sparing mastectomy

• Good candidates
  – Tumor located 2 cm or greater distance from the nipple
  – No involvement of nipple or areola on physical exam or imaging
  – Women with smaller breasts
  – Non smokers

• Caution with
  – Extensive DCIS
  – Large or pendulous breasts

• Incisions
  – Inframammary (under the breast)
  – Under the breast and extending up the side

• Potential risks
  – Poor blood supply to the nipple (nipple necrosis)
  – Cancer cells found in the tissue directly under the nipple (positive subareolar margin)
    • Need to resect nipple areolar complex at a later date
Reconstruction options

- Tissue expander placed at time of mastectomy
  - Most common immediate reconstruction
  - Typically placed underneath the pectoralis muscle
  - Initially only partially filled at time of surgery, injected with saline over time to fully expand
  - Final reconstruction can be with implant or your own tissue
- Implant based reconstruction
  - Saline or silicone
  - Most often done in a staged fashion after tissue expander
  - Occasionally implant placed at time of mastectomy
Pre-pectoral expanders/implants

• Plastic surgeons are starting to place tissue expanders/implants above the pectoralis muscle in some patients
• Tissue expander/implant is covered in acellular dermal matrix
• Advantages
  – Less postoperative pain since not raising pectoralis muscle
  – Shorter recovery time
• Potential disadvantages
  – Tissue expander/implant is less protected from the outside world
  – Postoperative infection may lead to increased likelihood of needing to remove the tissue expander/implant
Reconstruction using your own tissue

- DIEP flap using skin and soft tissue from the abdomen most commonly performed here
- Typically not performed at the same time as mastectomy in setting of cancer
  - Radiation may be needed
- Other options include using tissue from the back, buttocks or inner thigh
Minimizing surgery in the axilla

• Axillary lymph node status is important for:
  – Staging
  – Prognosis
  – Making treatment decisions

• Removing lymph nodes leads to a risk of developing lymphedema
  – ~5% risk with a sentinel lymph node biopsy
  – 20% or higher with an axillary lymph node dissection

• How to get the information we need by removing as few lymph nodes as possible?
Sentinel lymph node biopsy

- The sentinel lymph nodes are the first lymph nodes to drain the breast tissue
  - If breast cancer has spread, it will go here first
  - If the sentinel nodes are negative, can presume that the rest of the axillary lymph nodes are also negative
- Sentinel nodes are identified using blue dye, radiotracer or both
- Can be performed with either lumpectomy or mastectomy
  - Often do not need separate axillary incision when performed with mastectomy
- If sentinel lymph nodes are positive, a full axillary lymph node dissection may or may not be indicated
Sentinel lymph node biopsy

• Performed when no suspicion for lymph node involvement on clinical exam or imaging prior to surgery

• If only 1 or 2 positive sentinel lymph nodes, removal of additional lymph nodes generally not performed
  – Radiation may be used to treat the remaining nodes

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Sentinel lymph node biopsy

- May also be appropriate in some patients who received chemotherapy prior to surgery and had lymph node involvement at diagnosis
  - Good response to treatment
  - Lymph nodes no longer palpable
  - Aim to remove 3 sentinel nodes and the “clipped” node targeted axillary dissection
  - If sentinel nodes and clipped node are negative, unlikely to benefit from full axillary dissection
Which patients still need an axillary dissection?

- 3 or more positive sentinel lymph nodes
- Large palpable axillary lymph nodes that were biopsied and positive for cancer
- Positive lymph nodes that did not respond well to chemotherapy given prior to surgery
- Inflammatory breast cancer
Axillary lymph node dissection

- **Anatomy**
  - Level 1 = lateral to pectoralis minor
  - Level 2 = posterior to pectoralis minor
  - Level 3 = medial to pectoralis minor
- **Remove Levels 1 & 2**, which is the axillary fat pad located inferior to axillary vein and posterior and lateral to pectoralis minor
Trend towards LESS axillary surgery over time

• Fewer and fewer axillary dissections
  – Lower incidence of lymphedema
  – Less difficulty with postoperative range of motion of the arm

• No difference in outcomes
  – Long term survival is equivalent
  – Similar rates of cancer recurrence in the axilla

• Multidisciplinary treatment is key
  – Significant contribution from both radiation and systemic therapy
Summary

• Evolution of breast surgery from Halsted radical mastectomy to less invasive and more cosmetically appealing options
  – Lumpectomy
  – Nipple sparing mastectomy
  – Oncoplasics and reconstruction

• Minimizing surgery in the axilla
  – Decreased risk of lymphedema
  – Does not compromise outcomes
Advances in Radiation Oncology for Breast Cancer

Fariba Asrari, MD
Thinking about your options

• What kind of Breast surgery?
• What kind of axillary surgery?
• Upfront surgery or upfront Chemotherapy?
• How these decisions affect rest of my treatments?
• Personal choice, Avoid fear factor in decision making, Weigh pros & cons
is more better????

- Mastectomy vs lumpectomy
- Axillary dissection vs Sentinel Nodal Biopsy
- Whole breast vs Partial Breast radiation
- Post-mastectomy Radiation
- Post-lumpectomy radiation in elderly
Lumpectomy vs Mastectomy

Does mastectomy improve outcome?

- NO
- Same Survival
- Slightly higher risk of Intra-breast recurrence with lumpectomy & Radiation
Axillary dissection vs Sentinel Nodal Biopsy

Does Axillary dissection improve outcome?

• NO

• In appropriately selected patients, Sentinel Nodal Biopsy and nodal Radiation provides same outcome with less side effects
Post-lumpectomy Radiation options

- **Whole Breast Radiation**
  
  External Beam (Photon/Electron, Proton)

- **Partial Breast Radiation**
  
  External Beam
  Brachytherapy (Interstitial Catheters, Balloon)
  IntraOperative Radiation (Electronic Brachytherapy, Electron)
Whole Breast Radiation

- Lumpectomy and Radiation is as good as Mastectomy
- Short course (3-4 wks) is better than long course (5-6 wks), same outcome, less side effects
Early Stage Breast cancer in Women >70 yrs, ER+ 

- OPTION: Lumpectomy & Anti-Estrogen therapy. 
- Adding Breast radiation decrease 10-year intra-breast recurrence from 10% to 2% 
- Reduction in local recurrence with Radiation following breast conserving surgery ~75% 
- Same approach is currently under investigation for age 51-69
In properly selected patients, Nodal Radiation should replace axillary dissection:

- Same outcome
- Less side effects (Rate of arm lymphedema decreased by half)
- Node+ BC would get radiation even with Axillary dissection
Neoadjuvant (Preoperative) chemotherapy

- Similar survival for Upfront surgery vs Neoadj Chemo
- May provide the opportunity for less surgery or less Radiation
- Degree of Response to Neoadjuvant chemotherapy matters
- Initial clinical stage at Diagnosis matters
Impact of Radiation on coronary artery stenosis

- Goal is no Radiation exposure to heart whenever is possible
- Mean heart dose to be <400 cGy, ideally even <200 cGy
Supine Position
Prone position
Deep Inspiration Breath Hold
Whole vs Partial Breast Irradiation

Whole Breast

PBI
Brachytherapy Techniques
Partial Breast Irradiation (PBI)
Partial Breast Irradiation (PBI)

Multi-Catheter
Breast IntraOperative Radiation Therapy (IORT)

Single fraction at the time of lumpectomy
Breast IntraOperative Radiation Therapy (IORT)
Breast Electron IORT

- Single fraction at the time of lumpectomy
Ongoing investigational Trials

- A Phase II Study of Preoperative Single Fraction **Stereotactic** Radiation to the tumor in Intact Breast in Low Risk Early Stage Breast Cancer
Ongoing Proton investigational Trials

• Randomized Trial of Proton vs Photon Radiation for Stage II-III Breast Cancer

• Dose Constraints: Heart mean dose < 1500 cGy
Thank You