Reconstruction After Preoperative Therapy

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Breast Reconstruction

First report: 1906 Louis Ombredanne (France)

www.urofrance.org
Breast Reconstruction

William Halsted (1852-1922)
• Father of American Surgery
• Vigorously opposed breast reconstruction
Halsted Mastectomy

- Breast Skin
- *Pectoralis Major*
- Axillary contents
Initial Reports- 1980’s

  - 62 patients
  - 42% > 2yr F/U
  - Recon. (n=101) vs. non-recon (n=377) cohorts
  - Median F/U 36 months (92% > 1yr)
  - 185 patients
  - Mean F/U 26 months (range 2-82)

No adverse affect on disease outcomes
Breast Deformity

Incidence: 100%
Physical Deformity

\textit{Consequences:}
- Aesthetic
- Functional
- Emotional
- Social

\textbf{= Suffering}
NCI Challenge Goal Initiative

Year 2015

... eliminate suffering ... from cancer.

Andrew von Eschenbach, M.D.
Director, National Cancer Institute
Paradigm Shift

Eliminate Cancer

Suffering

Mission accomplished.
Paradigm Shift

Eliminate Cancer

Suffering

Mission accomplished?

At least one step closer…
Consequences

Therapeutic Goal: Restore Wholeness

Therefore:

• Multidisciplinary care team including reconstructive surgeons.
• More difficult to study.
• Quality of life outcome changes therapeutic risk/benefit calculation
Multidisciplinary Care

Not universally adopted…

- Low overall rate of reconstruction
- Extreme geographic variation
- Knowledge deficit
  - Limited awareness of contemporary methods
  - Skepticism of clinical value

Knowledge Deficit: Practitioners


<table>
<thead>
<tr>
<th>Survey Statement: Breast Reconstruction. . .</th>
<th>Physician Specialty (%)</th>
<th>Physician Gender</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Oncologists</td>
<td>General Surgeons</td>
<td>Primary Care Physicians</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Adversely delays detection of local cancer</td>
<td>36.7</td>
<td>31.1</td>
<td>39.8</td>
</tr>
<tr>
<td>recurrence</td>
<td>Adversely interferes with</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Should be offered only to long-term</td>
<td>38.9</td>
<td>48.9</td>
<td>22.7</td>
</tr>
<tr>
<td>cancer-free survivors</td>
<td>May have a positive effect</td>
<td></td>
<td></td>
</tr>
<tr>
<td>on quality of life</td>
<td>95.6</td>
<td>1.1</td>
<td>95.5</td>
</tr>
<tr>
<td>Is an appropriate use of healthcare</td>
<td>81.1</td>
<td>3.3</td>
<td>85.2</td>
</tr>
</tbody>
</table>

* In each case, the remainder of the respondents were “unsure” of their opinion regarding the statement.
Reconstruction Process

- Deformity
- Op #1
  (Immediate)
Reconstruction Process

- Deformity
- Op #1 (Immediate)
Reconstruction Process

Problem list:
1) Point of maximum projection (anterior)
2) Point of maximum projection (lateral)
3) Breast width
4) IMF position
5) Irregular left IMF

- Deformity
- Op #1 (Immediate)
Reconstruction Process

- Deformity
- Op #1 (Immediate)

Op. #2
Op. #3
Op. #4

Left IMF
Right IMF
Reconstruction Process

- Deformity
- Op #1 (Immediate)

Time

Op. #2  Op. #3  Op. #4

Left IMF
Right IMF

Reconstruction process with time intervals and surgical operations.
Reconstructive Techniques

Post-mastectomy reconstruction
- Tissue expander/breast implant
- Tissue flap/implant combination
- Autologous tissue flaps
  - Pedicled transfers
  - Free tissue transfers
- Skin-sparing
Reconstructive Techniques
Pre-operative

Post-operative

Implant reconstruction

Latissimus Dorsi flap + Implant reconstruction

Autologous tissue reconstruction
Perforator Flaps

DIEP flap

• Advantages
  – Spares Muscle
  – Minimizes Pain
  – Less functional morbidity

• Disadvantages
  – Technical challenge
  – Increased operative time
  – Variations in anatomy
  – Less blood supply
Skin-Sparing Mastectomy

Incisions for:

- Nipple and Areola
- Biopsy scars
- Access to the axilla
- Skin areas “at risk”
Skin-Sparing Mastectomy

The *ablative surgeon* begins the reconstruction!
Skin-Sparing Mastectomy
Skin-Sparing Mastectomy

Pre-operative appearance

Post-operative appearance
Nipple/Areolar Reconstruction

Nipple Reconstruction

Areolar Micropigmentation
Overview

• Background
  – Reconstruction and multidisciplinary care
  – Techniques

• Preoperative therapies
  – Chemotherapy
  – Radiotherapy
  – Recurrent disease

• Research opportunities
Pre-operative Chemotherapy

- 31 TRAM patients
- Increased minor complications
- No effect on resumption of therapy

- 500 TRAM patients
- No effect on complications

- 1195 TRAM patients
- Increased risk minor complications
- No effect on resumption of therapy

- 1221 tissue expander/implant patients
- Safe to continue CTx during expansion
# Radiotherapy and Reconstruction

<table>
<thead>
<tr>
<th>Author</th>
<th>RTx Patients</th>
<th>Conclusions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1997 Williams</td>
<td>19</td>
<td>increased “fibrosis”</td>
</tr>
<tr>
<td>1998 Zimmerman</td>
<td>21</td>
<td>“cosmetically acceptable”</td>
</tr>
<tr>
<td>2000 Hanks</td>
<td>25</td>
<td>“well-tolerated”</td>
</tr>
<tr>
<td>2001 Lin</td>
<td>98</td>
<td>increases risk</td>
</tr>
<tr>
<td>2002 Proulx</td>
<td>15</td>
<td>“acceptable”</td>
</tr>
<tr>
<td>2002 Rogers</td>
<td>30 (matched pairs)</td>
<td>delay reconstruction</td>
</tr>
<tr>
<td>2005 McCarthy</td>
<td>12 (bilateral recon unilateral RTx)</td>
<td>▲ capsule, delay RTx</td>
</tr>
<tr>
<td>2005 Spear</td>
<td>80</td>
<td>▼ aesthetics, symmetry</td>
</tr>
<tr>
<td>2006 Behranwala</td>
<td>44</td>
<td>▲ capsule, ▲ pain, ▼ aesth.</td>
</tr>
<tr>
<td>2006 Cordiero</td>
<td>136</td>
<td>▲ complications</td>
</tr>
</tbody>
</table>
Radiation Effects on Irradiated versus Untreated Sides in 14 Bilateral TRAM Patients

<table>
<thead>
<tr>
<th></th>
<th>Untreated Side (n = 14)</th>
<th>Irradiated Side (n = 14)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>Flap loss</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Normal breast mound</td>
<td>13</td>
<td>93</td>
</tr>
<tr>
<td>Firm flap</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Hyperpigmentation</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Fat necrosis</td>
<td>2</td>
<td>14</td>
</tr>
<tr>
<td>Skin contracture</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Entire flap contracture†</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

* All except one patient received reconstruction with transverse rectus abdominis muscle flap (TRAM).
† Entire flap contracture would need an additional flap to create the breast mound.
Radiotherapy and Reconstruction

Oct. 2000

64 Gy
Jan. 2001

Jan. 2002
Radiotherapy and Reconstruction

Timing
- Immediate
- Delayed
- “Delayed Immediate”
Overview

• Background
  – Reconstruction and multidisciplinary care
  – Techniques

• Preoperative therapies
  – Chemotherapy
  – Radiotherapy
  – Recurrent disease

• Research opportunities
Research Opportunities

1. Characterize deformity-related morbidity.
   – Focused Quality of Life studies
Implant reconstruction

Latissimus Dorsi flap + Implant reconstruction

Autologous tissue reconstruction
Pre-operative

Post-operative

Latissimus Dorsi flap + implant reconstruction

Autologous tissue reconstruction
Quality of Life

- Results equivocal
- Selection bias
  - Patients generally successful self-selecting treatment options.
- Patients of interest are on the margins.
Research Opportunities

1. Characterize deformity-related morbidity.
   - Focused Quality of Life studies
   - Quantitative outcomes
     • Objective assessment of deformity
     • Individualized assessment of morbidity
Breast Shape Analysis

Conventional anthropomorphic measurements

Contours and cross sections
1. Characterize deformity-related morbidity.
   – Focused Quality of Life studies
   – Quantitative outcomes
     • Objective assessment of deformity
     • Individualized assessment of morbidity
   – Patient specific, predictive
Digital Breast Simulation

- **Surface Imaging**
- **Biomechanical**
- **Tissue Imaging**
  - MRI
  - CT
  - Ultrasound

Software Development

Virtual Reality Breast Simulator
Therapeutic Risk/Benefit

Undesirable outcomes

Cancer-free Survival + Freedom from Suffering
Patient Treatment Options
Short-term Opportunities

1. Characterize deformity-related morbidity.
   - Focused Quality of Life studies
   - Quantitative outcomes
     • Objective assessment of deformity
     • Individualized assessment of morbidity
   - Patient specific, predictive

2. Educational and decision-making aids

Research in these areas translates immediately into benefits for 100% of patients!
Long-term Opportunities

• Regenerative medicine
• Tissue Engineering
Thank you