Fundamentals of Plastic Surgery for the General Surgeon

October 5, 2009

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What do plastic surgeons do?

We restore, repair and make whole those parts...
Which nature has given but which fortune has taken away,
Not so much that they may delight the eye
But that they may buoy up the spirit and
Help the mind of the afflicted.

Gaspar Tagliacozzi, 1597

Burget G, Walton R. Plastic and Reconstructive Surgery 120(5); 1171, 2007

How do we do this?

- The Reconstructive Ladder:
- Organizing wound closure by level of complexity

Thought process

What is the easiest way to close?

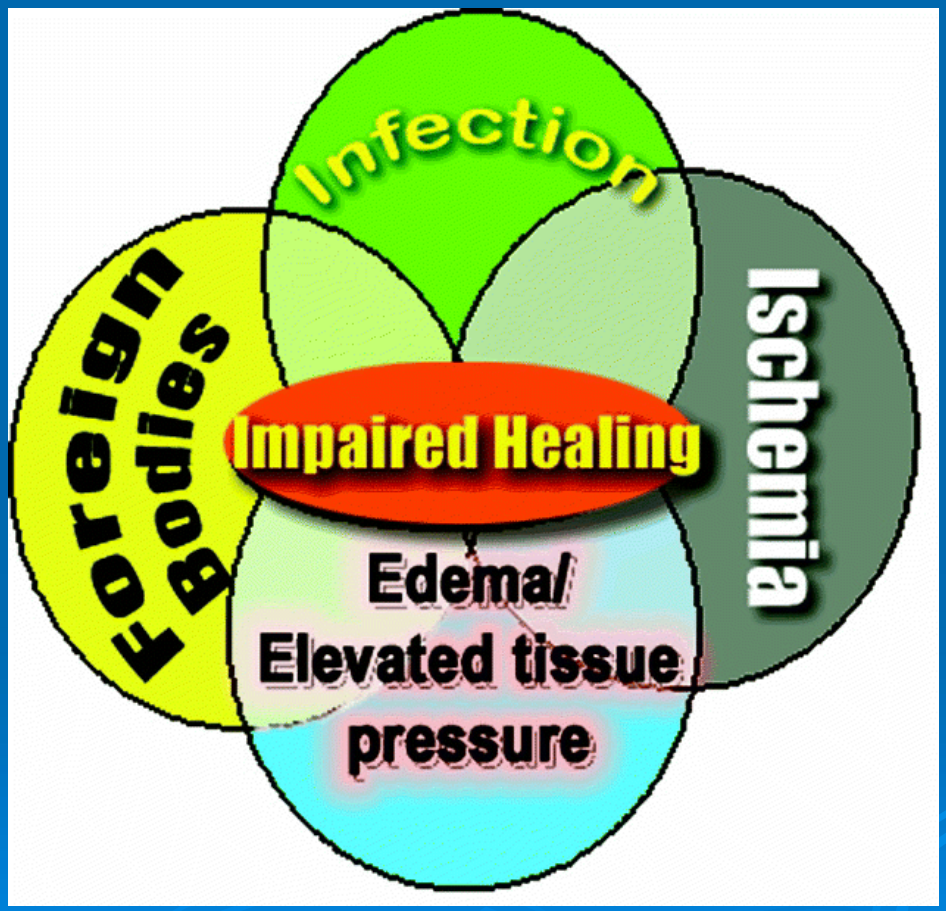
What is the best way to close?

What else must we take into consideration?

The choice of technique depends on many factors

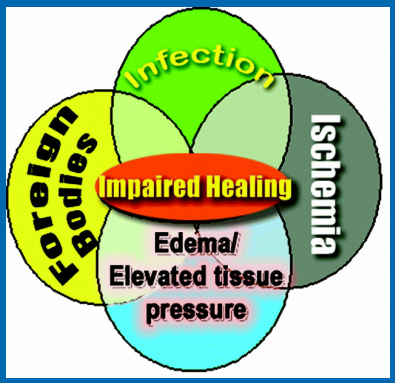
- Where is the defect located?
- How large is the defect?
- What is missing?
- What is the age and medical status of the patient?
- What is the nature of the disease?
- What donor sites are available or desirable?
- What are the patient's expectations?
- What is the surgeon's experience?

What prevents wound healing?



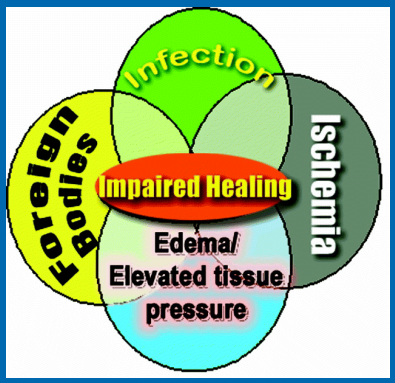
Broughton et al. Plastic and Reconstructive Surgery 117(7S): 1S, 2006.

Infection



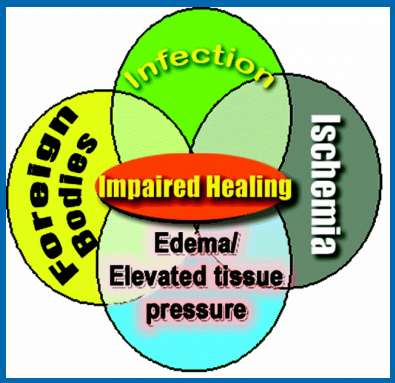
- If the bacterial count in the wound is greater than 10^5 organisms per gram or β-hemolytic streptococci are present- the wound will not heal by ***any*** means
- Bacteria cause prolonged inflammatory phase with phagocytosis and release of collagenase, causing breakdown of the wound and normal tissue

Ischemia



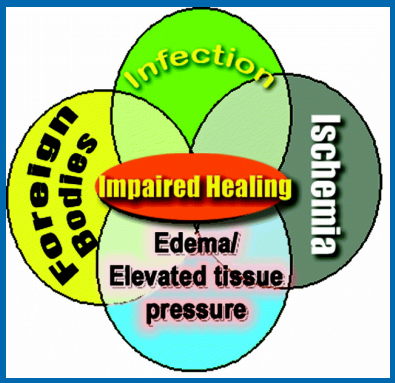
- Healing requires adequate supply of oxygen and glucose to create ATP
- Therefore, wound needs adequate vascular supply to heal
- Difficulty healing over non-vascularized surfaces- exposed bone without periosteum, tendon without paratenon

Foreign body



- Physical obstacle to healing
- Asylum for bacteria
- Necrotic tissue acts as a foreign body

Edema



- Elevated tissue pressures can decrease perfusion leading to increased ischemia
- Conditions associated with edema (leaky endothelium, low oncotic pressure, low peripheral pressure, histamine and cytokine release) contribute to poor wound healing

Other factors

- Malignancy (Marjolin's ulcer)
- Nutrition
- Smoking
- Radiation
- Diabetes
- Renal Failure
- Corticosteroids

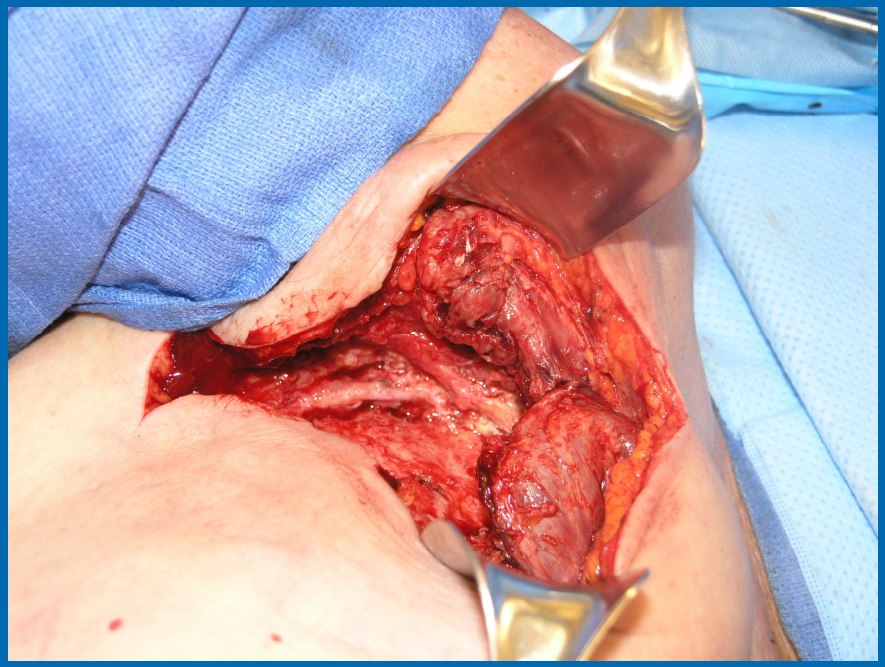
New Trends in Breast Reconstruction

- Why should you care?

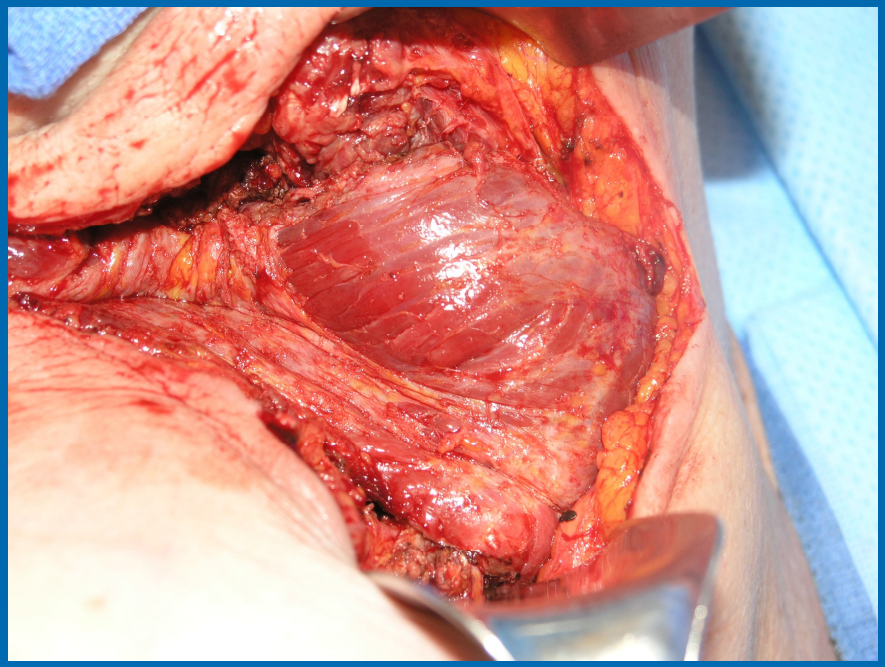
Healing by secondary intention

Chronic axillary wound in breast cancer patient due to radiation necrosis

Healing by secondary intention



After debridement, there is exposure of axillary vessels and periosteum of ribs



Coverage with vascularized pectoralis muscle flap allows healing of remaining wound by secondary intention (V.A.C.)

Healing by secondary intention

Mediastinitis after open heart surgery

After thorough debridement, V.A.C. can act as bridge to definitive muscle flap closure

V.A.C.
Vacuum-assisted closure

- What does it do?
  - Provides negative pressure therapy to wound under an occlusive dressing
  - Increases rate of angiogenesis and cell proliferation
  - Decreases frequency of dressing changes
  - Removes fluid from wound
  - Provides some mechanical stability

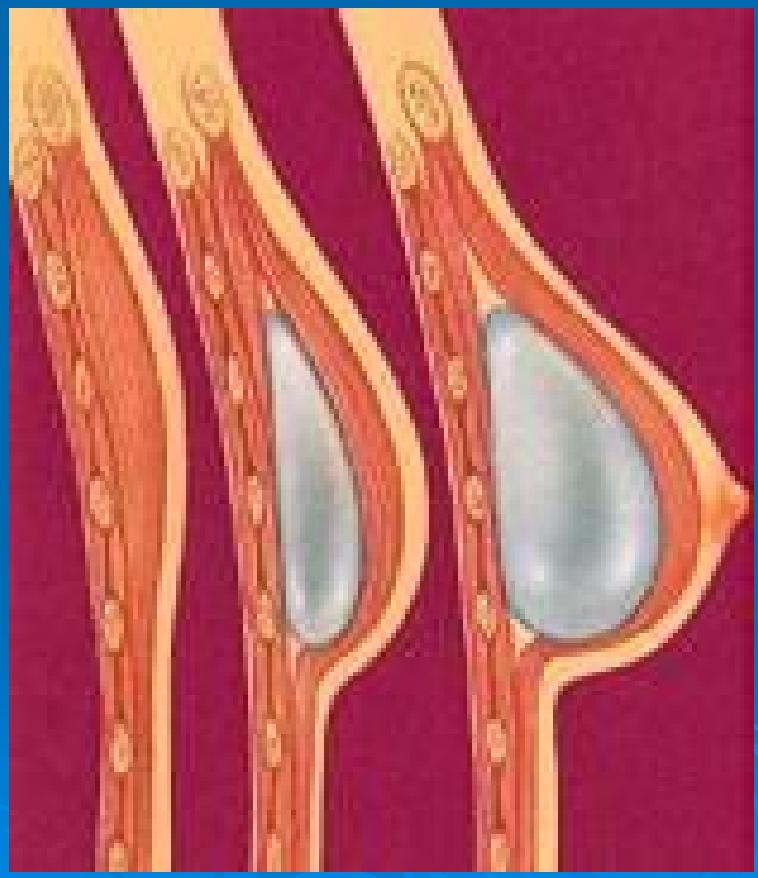
Scherer et al. Plastic and Reconstructive Surgery 122(3):786, 2008.

V.A.C.
Vacuum-assisted closure

- What does it ***not*** do?
  - Heal infected wounds
  - Heal wounds that need to be debrided
  - Heal ischemic wounds
- V.A.C. can speed or aid healing of wounds, but one must still adhere to basic principles of wound healing

Tissue Expansion

A subcutaneous silicone expander is placed and gradually filled with saline which causes growth of new skin which shows histological differences from non-expanded skin

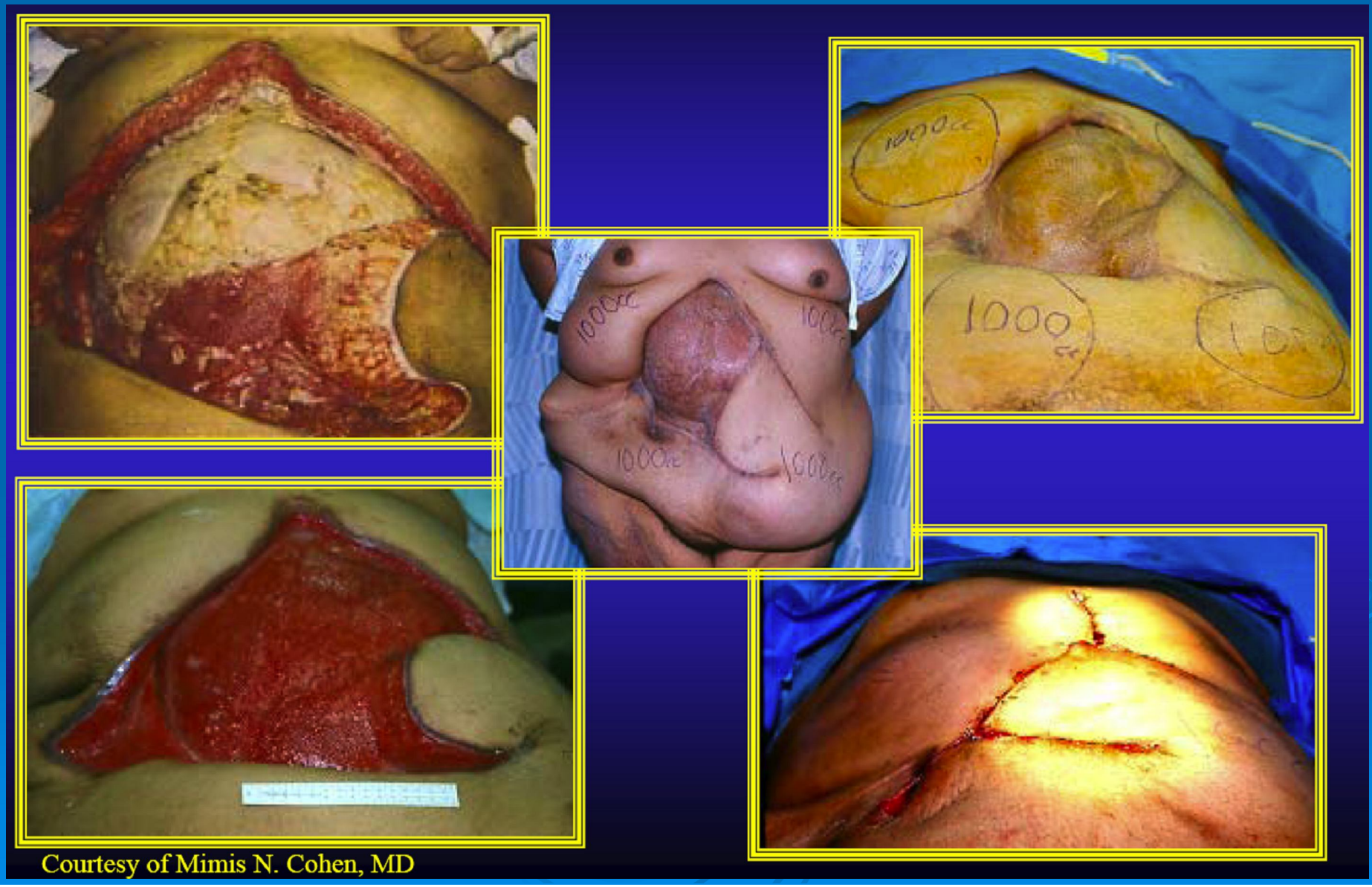


Tissue Expansion

Bilateral Mastectomy Defects

Tissue Expansion

Abdominal Wall Defect



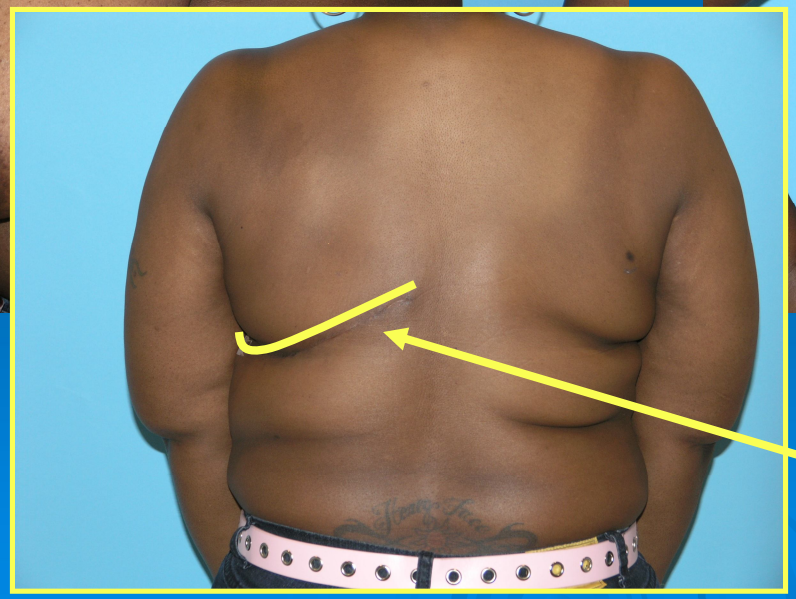
Courtesy of Mimis N. Cohen, MD

Latissimus Dorsi Flap

Based on thoracodorsal vessels

Latissimus Dorsi Flap

Left mastectomy with XRT



After latissimus flap with implant and contralateral reduction

Donor site

Latissimus Dorsi Flap

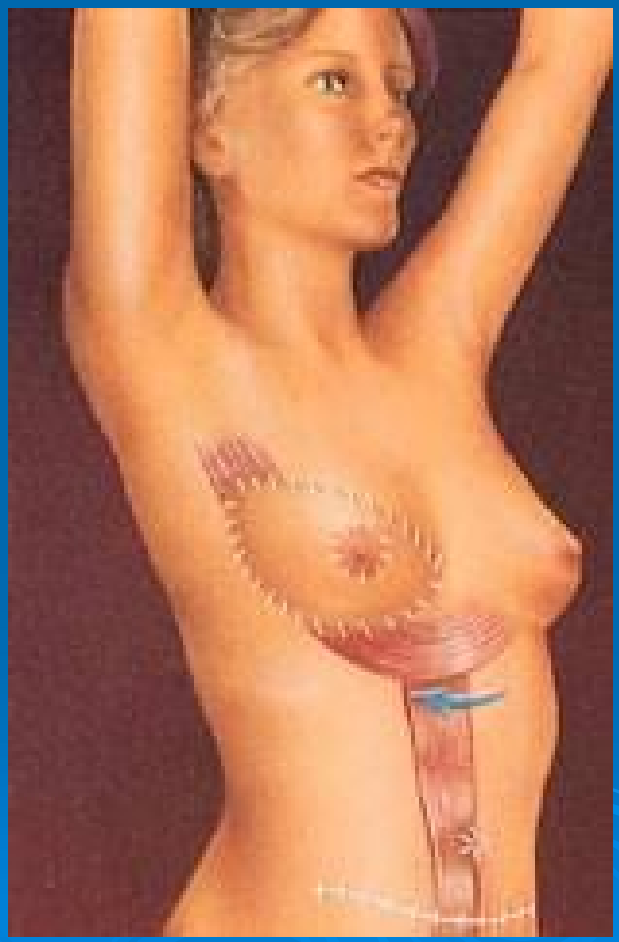
Bronchopleural fistula/ chronic empyema after lung resection in radiated field. Original thoracotomy used latissimus-sparing incision

Latissimus Dorsi Flap

Muscle flap fills dead space with vascularized tissue, allows healing

Pedicled TRAM Flap

Transverse rectus abdominis muscle



Based on superior epigastric vessels

Pedicled TRAM Flap

Reconstruction of unilateral small volume breast

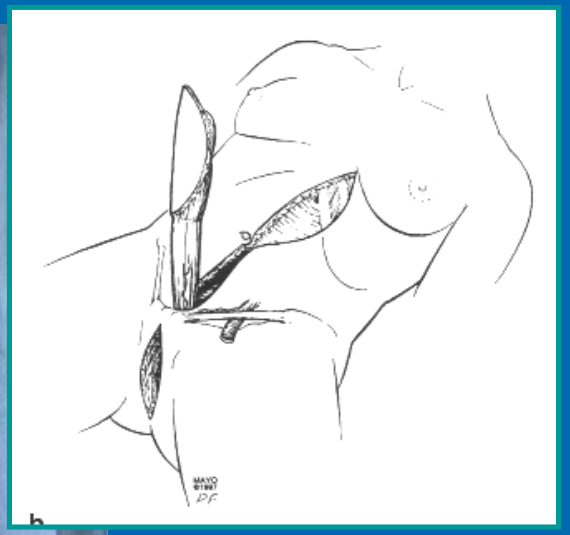
Pedicled VRAM Flap

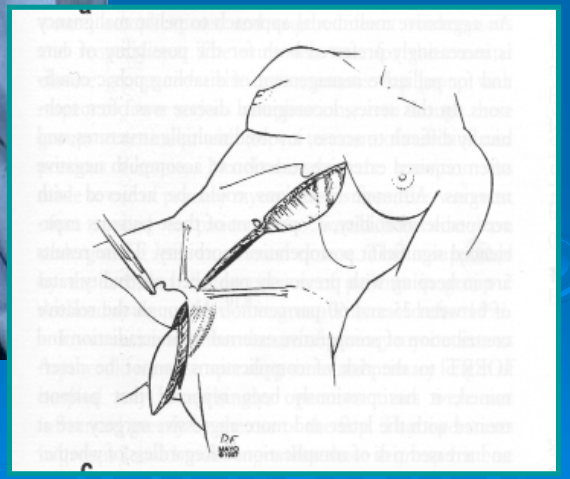
Vertical rectus abdominis muscle

30 y.o. female with Crohn's disease

Requiring total proctocolectomy
and resection of perineal skin with fistulae

Pedicled VRAM Flap

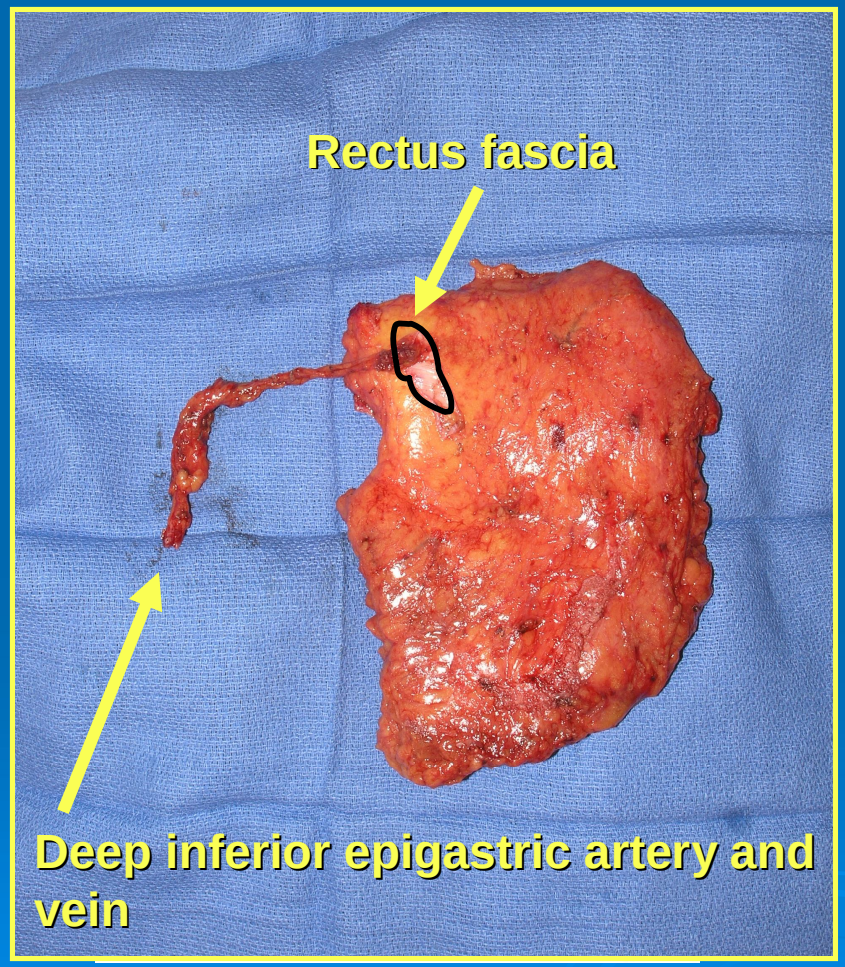


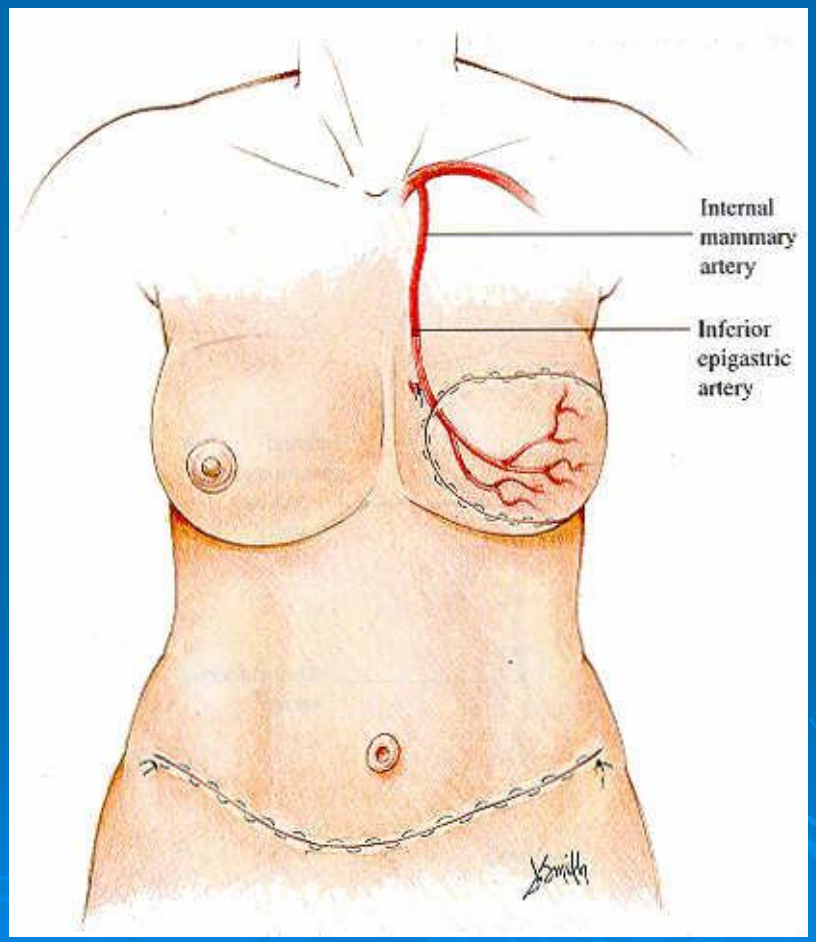


Wound closure with rectus abdominis myocutaneous flap
based on deep inferior epigastric vessels

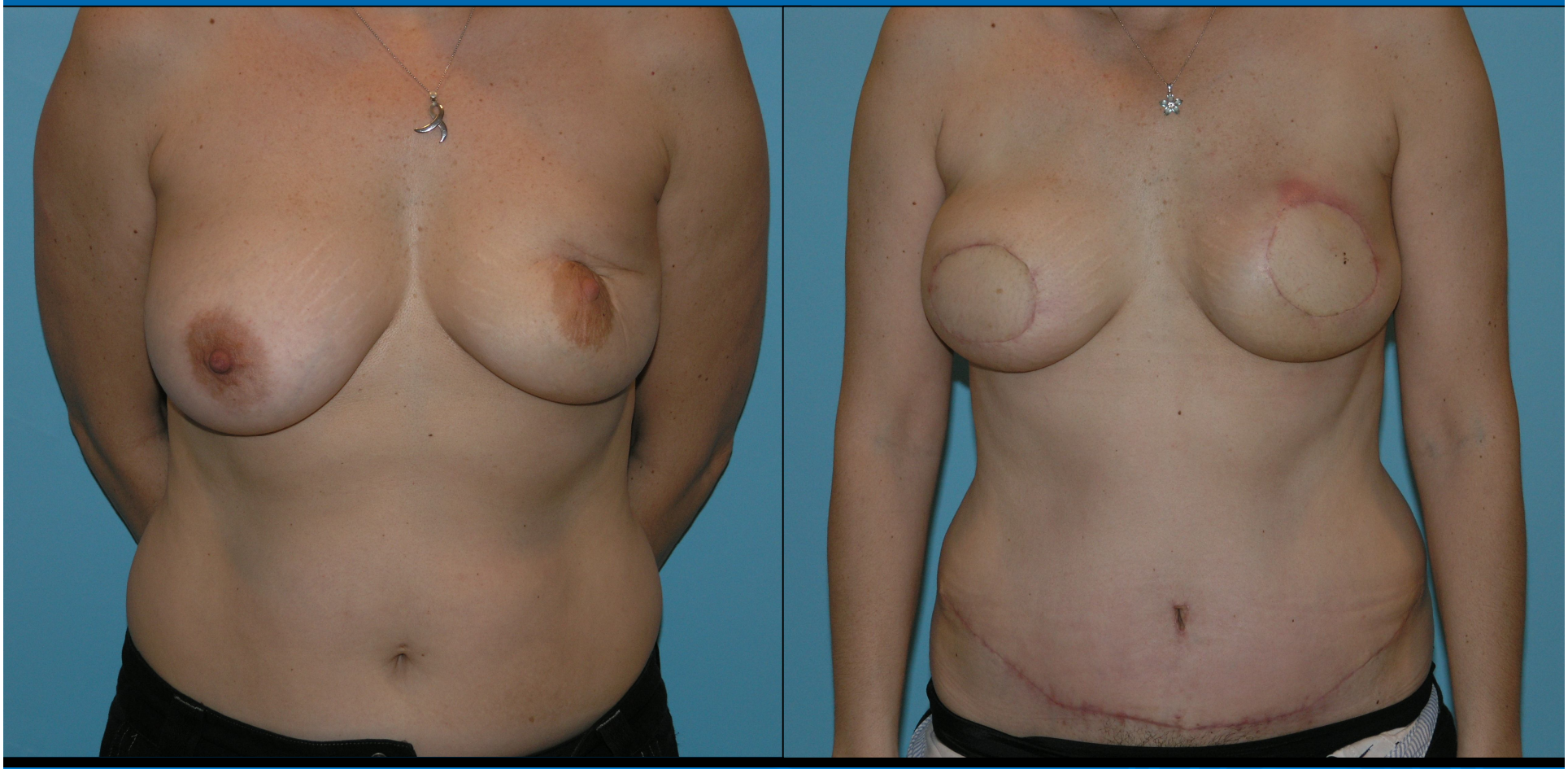
DIEP Flap

Deep inferior epigastric perforator





DIEP Flap

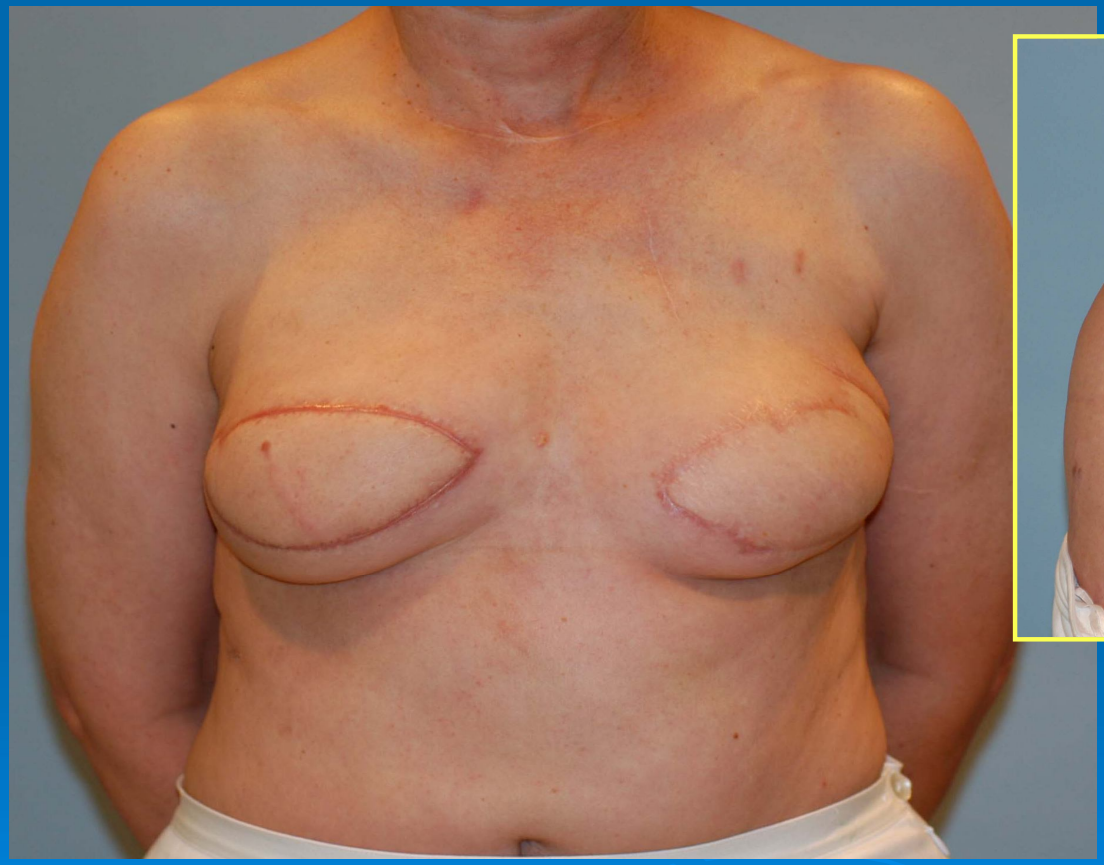


History of left breast cancer s/p lumpectomy and XRT with recurrence. Treated with bilateral mastectomy and immediate DIEP flaps.

Other perforator flaps

SGAP Flap

Superior gluteal artery perforator



Right breast reconstruction with SGAP flap, previous contralateral DIEP flap

SGAP Flap

Superior gluteal artery perforator

Defect after resection of sacral chordoma with exposed rectum

Fundamentals

- “I would like to see the day when somebody would be appointed surgeon somewhere who had no hands, for the operative part is the least part of the work.”
  - Dr. Harvey Cushing

Thank you

Lawrence Gottlieb, MD

David Song, MD

Mimis Cohen, MD

Mark Grevious, MD

Eric Odessey, MD