Breast Reconstruction in Plastic Surgery:

Microsurgical vs. Traditional Methods and Developing a New Surgical Program

Dr. Laura Figura
Avera Plastic & Reconstructive Surgery
10/5/2024

History of Plastic Surgery

- *Plastikos* – To mold or give form
- 4000 BC – Facial fractures treated medically
- 2000 BC – Surgery
- 800 BC – Skin grafts
- 100 BC – Detailed anatomical drawings
- 50 BC"The Art of Medicine"
  Aulus Cornelius Celse
- 1827 – America's first plastic surgeon performs Cleft palate repair (Dr. John Mettauer)

History of Plastic Surgery

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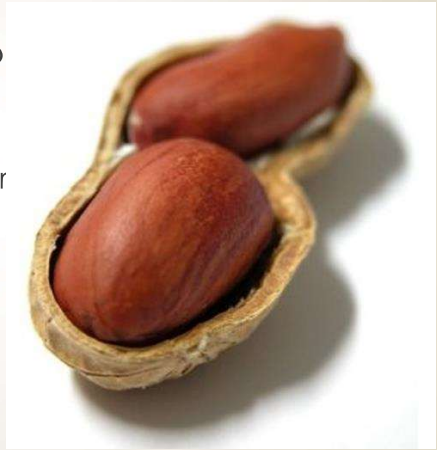
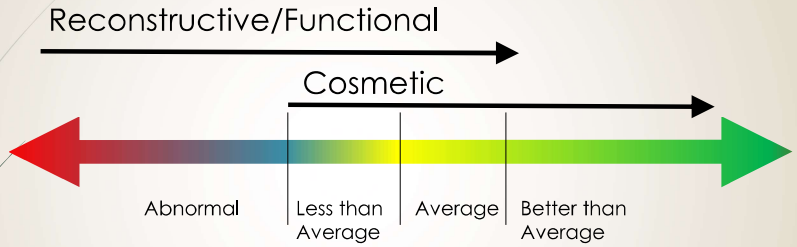
Plastic Surgery in a Nutshell

- Expert anatomists who move tissues around:
  - to solve a problem +/-
  - make things look better



Reconstructive vs. Cosmetic Surgery



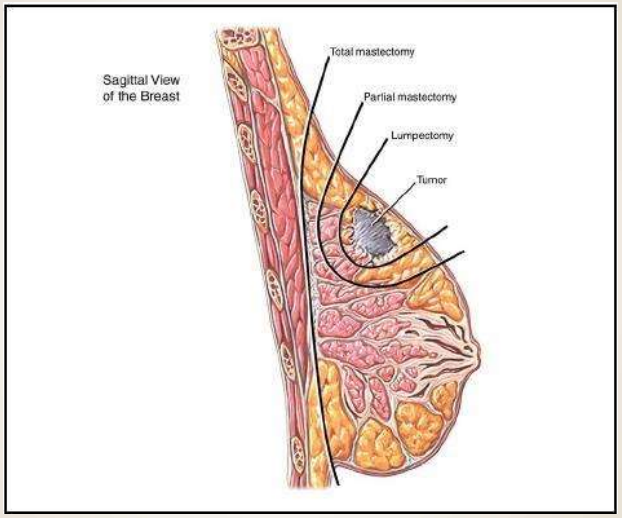
Goal: Move Patient in the **Right** Direction

CAUTION!

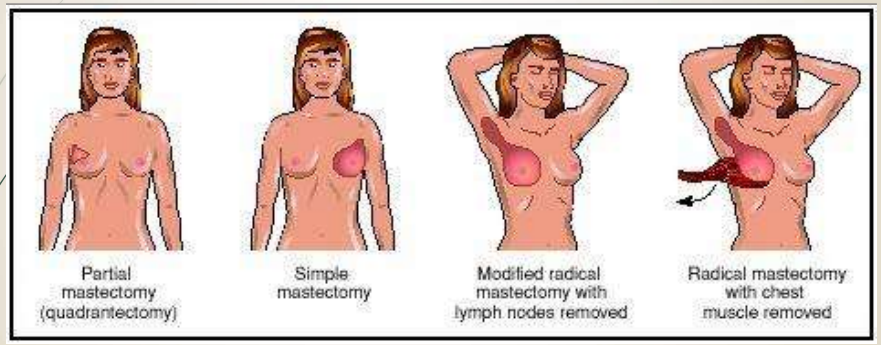
Some images are graphic

PG

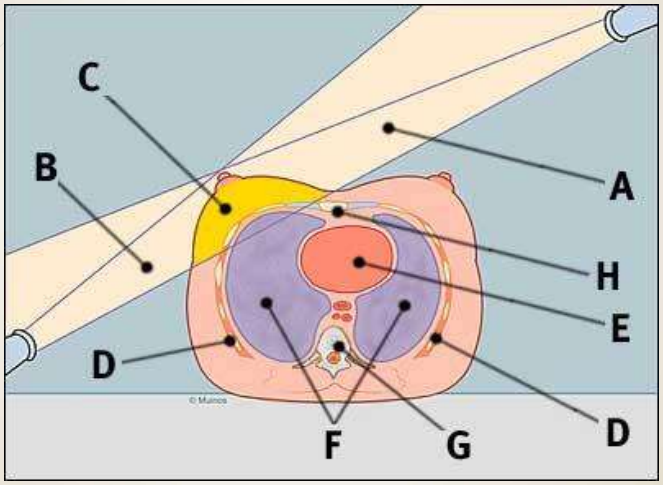
Breast Cancer



Variables: What Type Defect?



Radiation Fields



Definition: What is **Breast Reconstruction**?

- In the treatment of Breast Cancer, sometimes the entire breast is removed.
- **Breast reconstruction** is the replacement, rebuilding or reshaping of an absent (or partially absent) breast.
- **One or both** breasts can be absent due to:
  - cancer treatment
  - prevention of cancer
  - developmental or traumatic causes (less common)
- Breast reconstruction is optional.
  - can be **implant-based** or **tissue-based**.
- Extensive decision making is involved in determining the type and timing of breast reconstruction.

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Variables: What Incision? Keep Nipple?

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Options in Breast Reconstruction

- No reconstruction
  - Go Flat/Live Flat
  - Camoflage Flat
- Implant based reconstruction
- Tissue based reconstruction

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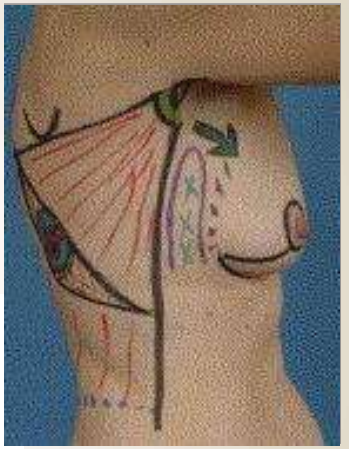

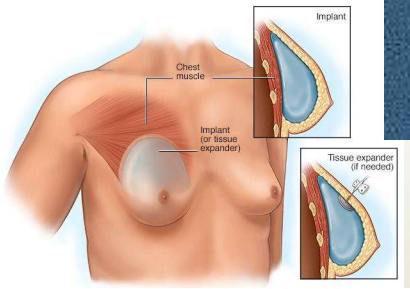

Agenda

- Introduction
- **No reconstruction**
- Implant based breast reconstruction
- Tissue based breast reconstruction
- Microvascular breast reconstruction
  - Patient Selection
  - Pre-Operative Preparations
  - Intraoperative Details
  - Inpatient Postoperative Course & Monitoring
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No Reconstruction

Going Flat/Living Flat vs Camoflage Flat

The New York Times

‘Going Flat’ After Breast Cancer

“It’s a tremendous amount to put your body through, and it’s not like we’re going to get our breasts back,” said Rebecca Pine, 40, who decided against reconstruction surgery after a mastectomy. Béatrice de Géa for The New York Times

By Roni Caryn Rabin

Oct. 31, 2018

BREASTCANCER.ORG

En Español

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Home > Research News > Most Women Satisfied With Choice to Go Flat After Mastectomy, but Choice Not Supported by

Most Women Satisfied With Choice to Go Flat After Mastectomy, but Choice Not Supported by Many Surgeons

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TOPIC: *Surgery and Reconstruction*

TAGS: *Planning/Considering Reconstruction, Planning/Considering Surgery, and Reconstruction*

Nearly 75% of women surveyed who opted for no breast reconstruction after mastectomy were satisfied with the results, but almost 25% said their decision to go flat was not supported by their surgeons, according to a study.

The research was published on Jan. 3, 2021, by the journal *Annals of Surgical Oncology*. Read the abstract of “Going Flat’ After Mastectomy: Patient-Reported Outcomes by Online Survey.”

What is going flat?
About the study
What this means for you

What is going flat?

While most women choose to have some type of breast reconstruction after mastectomy, a number of women decide to have no reconstruction.

There are a number of reasons why a woman might choose to have mastectomy without reconstruction. Some of the most common reasons are:

- not wanting a foreign object, such as a breast implant, in the body
- lower risk of surgery complications
- lower risk of other health problems

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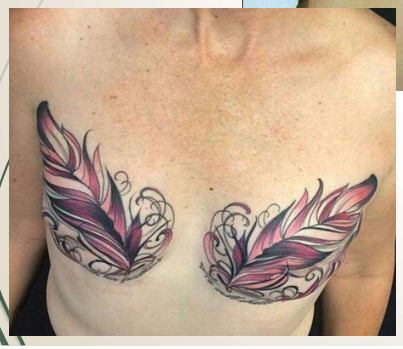
YOUR HEALTH

She Chose To 'Go Flat' And Wants Other Breast Cancer Survivors To Know They Can Too

November 2, 2018 · 12:50 PM ET

RACHEL O. COHEN

Catherine Guthrie decided not to get breast reconstruction after her double mastectomy in 2009. Not Putting on a Shirt is a grassroots advocacy organization that brings attention to the issue of surgeons disregarding breast cancer patients' wishes to go flat.



Justine Morrow; Tattoo by Shane Wallin

'Reclaiming Their Beauty': Tattoo Artist Inks Exquisite Flowers Over Mastectomy Scars

March 03, 2017 | By Richard Knox

This article is more than 4 years old.

The first time a woman approached tattoo artist David Allen and asked him to hide her mastectomy scars, he says he "politely declined."

He'd had surgery himself, and knew that scar tissue isn't the same — it's not as pliable or elastic, and may not heal as well. "I was hesitant to mess with the scarring," he says. But the woman kept asking, and after some research he agreed.

"It changed me. The gravity of the situation, watching her change," Allen says. "The way she carried herself, her posture. Her smile, her joy were infectious. I couldn't believe I was able to use my craft to have that kind of influence."

That was seven years ago. Since then, the Chicago tattooer (as the former painter prefers to be called) has applied his artistry to more than 70 women who've undergone mastectomy and breast reconstruction.

No Reconstruction

No Reconstruction

Why?

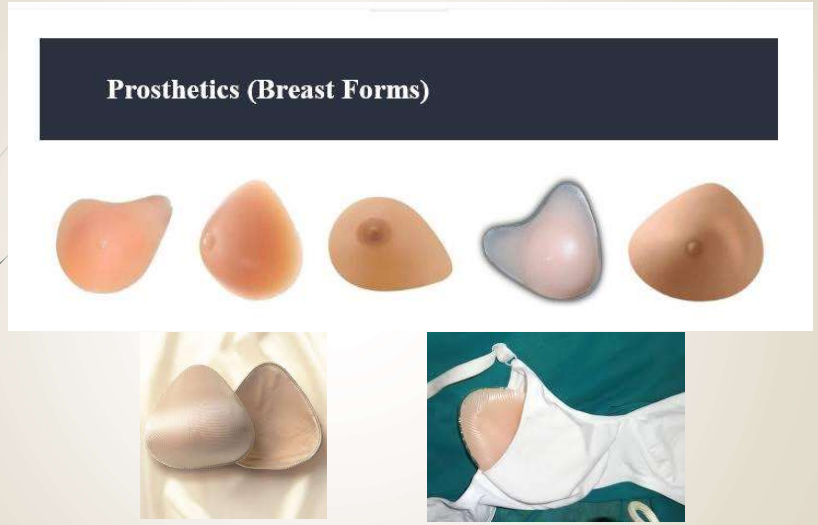
- Maintain sexual function on one side
- Simplest
- Lowest risk of complications
- No long term follow-up
- ? less expensive
- Often temporary plan
  - Wait til chemo over
  - Complete radiation therapy
  - Medical improvement
    - HgbA1c better
    - Liver enzymes better
    - WBC count has improved
    - Off anticoagulant
  - Stopped smoking
  - Better coping

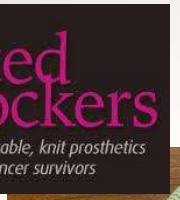
No Reconstruction

Options?

- Reduction/Lift on natural side
- Wear a prosthetic
- Forget about it
- **?** Back/neck/shoulder pain

- Pursue autologous tissue
- Delayed reconstruction with 2 stage tissue expander to implant
- Prophylactic removal other side





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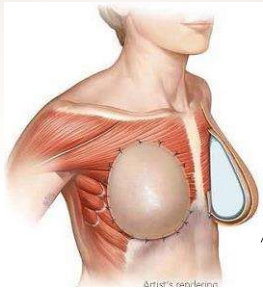
What is implant based breast reconstruction?

- Breast reconstruction that hinges on the insertion of a device – either a tissue expander (2 stages) or an implant (1 stage)
- Often utilizes Acellular Dermal Matrix (ADM) as in Alloderm.
- Modernly pre-pectoral, but can be retro-pectoral
- Often augmented with fat grafting

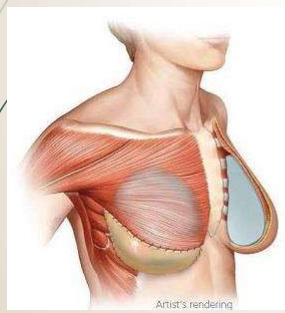
Breast Reconstruction



Pre-Pectoral technique

Acellular Dermal Matrix provides full anterior reinforcement of weak tissue

Artist's rendering



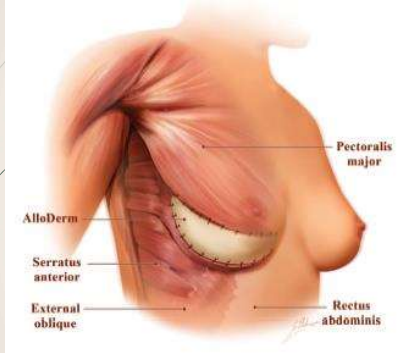
Sub-Pectoral technique

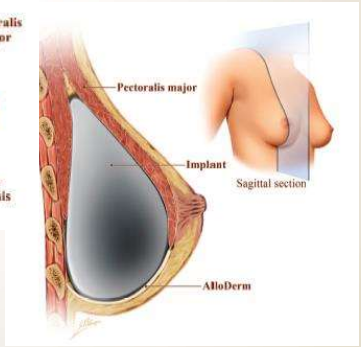
Acellular Dermal Matrix reinforces weak tissue in the lower pole only, with the pectoralis muscle reinforcing the upper pole

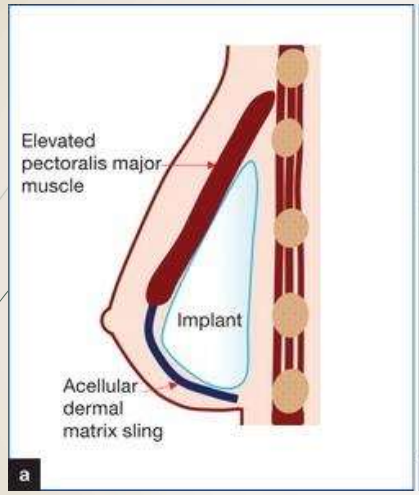
Artist's rendering

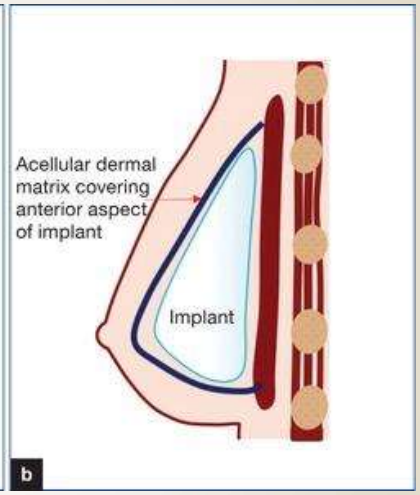
** Source: Allergan/Lifecell

Retro-pectoral Implant-Based Reconstruction (2006+)









British Journal of Hospital MedicineVol. 81, No. 3 Symposium
Direct to implant breast reconstruction with biological acellular dermal matrices
Victoria Teoh; Gerald Gui Published Online:4 Mar 2020https://doi.org/10.12968/hmed.2018.0428a

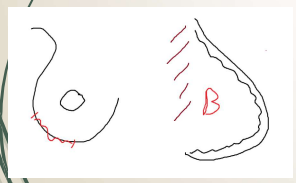
Retro-pectoral vs Pre-pectoral

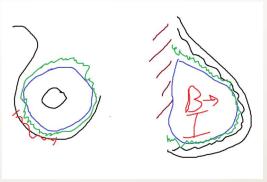
	Retro	Pre
Vintage	Old	New
Rippling in cleavage	Better	Worse
Animation deformity		
When moving	Worse	**Better**
When still	Better	Worse
Muscular dysfunction	Worse	**Better**
Projection	Worse	**Better**
Lateral displacement	Worse	**Better**
Pain	Worse	**Better**
Radiation effect	Worse	**Better**
Flattened apex	Worse	**Better**
Cosmesis	Worse	**Better**
Support	Better	Worse
Changes with time	Worse	**Better**

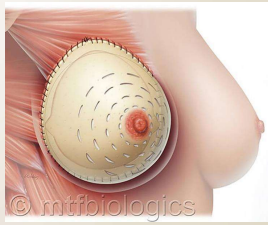
One Step (Direct to Implant)

"Permanent" Breast implant placed same time as mastectomy

- Single operation
- May need a revision
- Surgeon chooses size
- Risk mastectomy flap necrosis
- Smaller breasted best







Two Step (Tissue Expander → Implant)

Tissue Expander First Step

- Adjustable volume
- Can be light (if use air)
- Can sew to chest wall
- Patient gets to pick final size based on weight/projection
- Less mastectomy flap necrosis
- Better pocket control

Exchange to Implant Second Step

- Easy
- Often with fat grafting
- 2nd chance to make perfect
- 3-12 months later (diff deductible?)

Three Step (Reduction →TE → Implant)

Lumpectomy +Reduction or Lift First Step

- Way to get to Nipple sparing mastectomy for some
- Looks better
- Easy early surgery
- But 3 steps
- ?Coverage/copay considerations

1st - Breast Reduction +/- Lumpectomy
2nd – Mastectomy with Expander/ADM
3Rd – Exchange to implant +/- Fat Grafting

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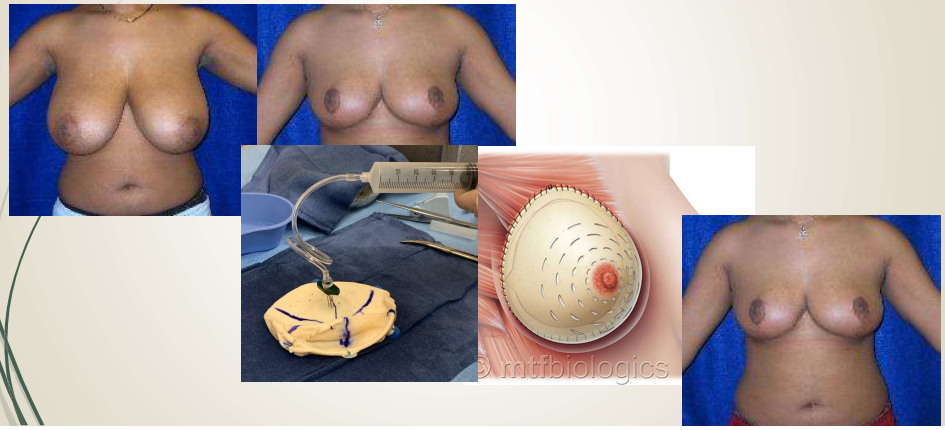

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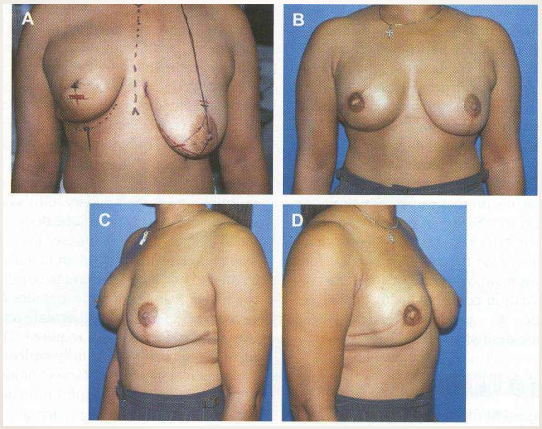
"I hope somebody here understands what she is saying"

Implant-Based Reconstruction with Balancing Procedure



Implant Reconstruction *

Pros

- Simple procedure
- Shorter operation & recovery time
- No additional major donor site morbidity
- Adjacent tissue skin matching
- Saves autologous tissue as salvage procedure

Cons (vs Autologous or Nothing)

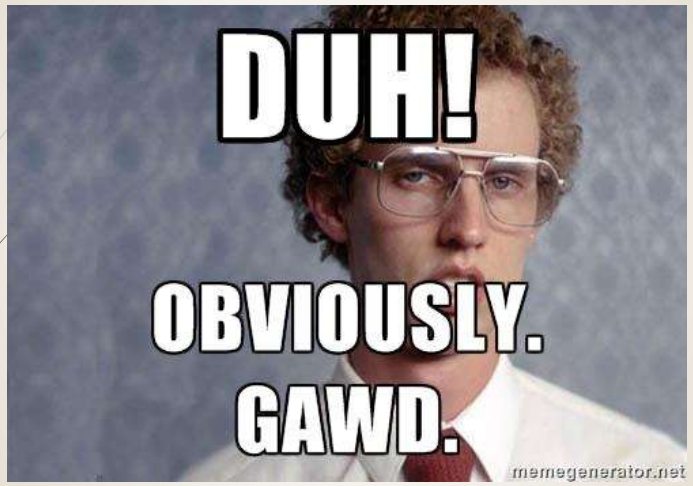
- Foreign body sensation (1st 2 years)
- Multiple stages usually
- Implant risks
  - Rupture
  - Displacement
  - Infection
  - Contracture
  - Breast implant illness
  - Anaplastic Large Cell Lymphoma of the Breast
- Not lifelong devices

* Spear S. PRS Jan 2001, 107(1): 177-187

Implants

Implants

ROUND IS BETTER ANyway



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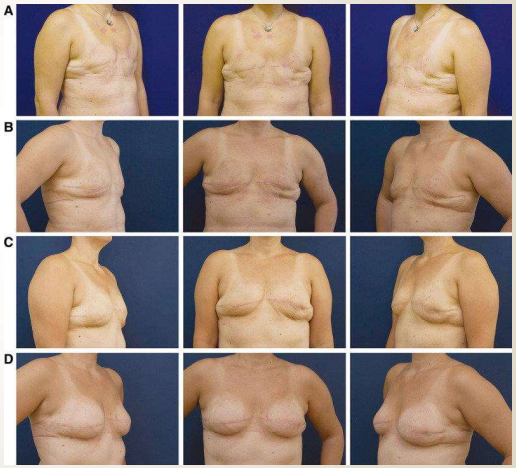
What is **tissue based** reconstruction?

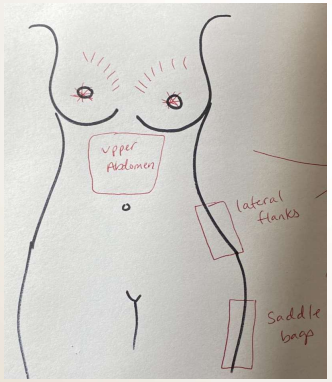
- Any reconstruction using the patient's own tissue to make or fill a breast mound without using an expander/implant.
- Total Autologous Fat Grafting
- Local Flap – as in Goldilocks – Autoderm/excess mastectomy flaps buried and shaped
- Pedicled Regional flaps
  - Latissimus Dorsi Myocutaneous flap or Muscle flap
  - Pedicled TRAM flap
- Distant or Microvascular or FREE flap

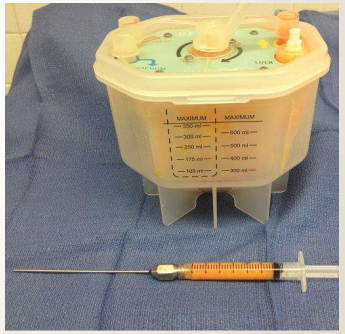
Total Autologous Fat Grafting Breast Reconstruction with BRAVA



Autologous Fat Grafting

- Rarely used successfully as a total reconstruction
- Used as an adjunct to another base technique most frequently



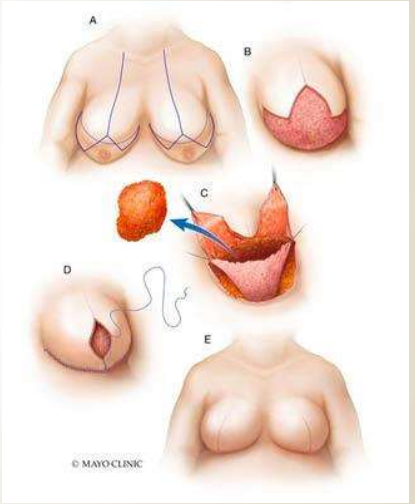


Definition: What is a **Flap**?

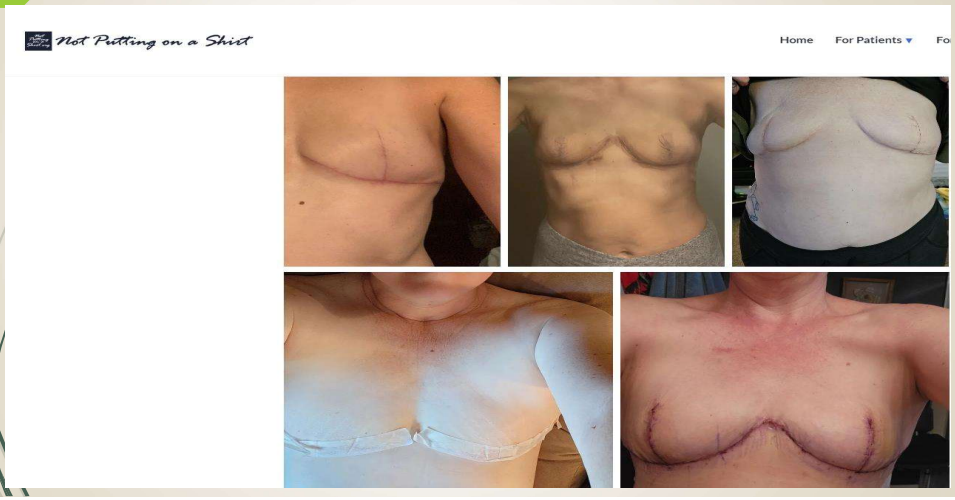
- A **Flap** is a portion of tissue that is elevated and moved from one area to another - to solve a problem, defect or wound - while maintaining its own blood supply.
- A **Pedicled Flap** is when this tissue remains connected to its original blood supply by a named artery and vein that have been isolated.
- A **Free Flap** is when the target tissue is completely disconnected from its original blood supply and reattached to a recipient blood supply.
  - This requires **microsurgical repair** of the artery and vein(s)
    - This means sewing the cut end of a donor vessel to a recipient vessel under the microscope.

Goldilocks – Autoderm or buried excess mastectomy flaps

- **Goldilocks is technically reconstructing the entire breast:**
  - Small breasted:
    - To avoid concavity
    - To hold a bra down
  - Large breasted:
    - To make a mound
- Often used as an adjunct tool in implant based reconstruction:
  - To reinforce the lower pole
  - Protect against implant exposure
  - Increase reconstructive volume without the heaviness of silicone
  - Improve shape



True Goldilocks Reconstructions:



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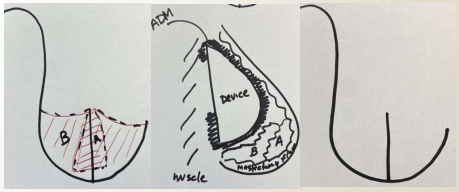

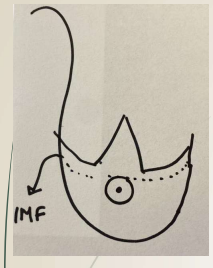

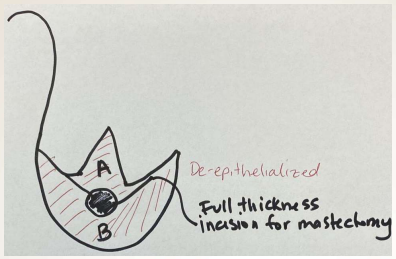

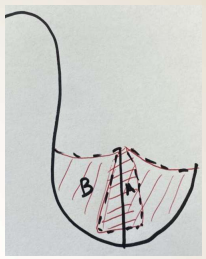

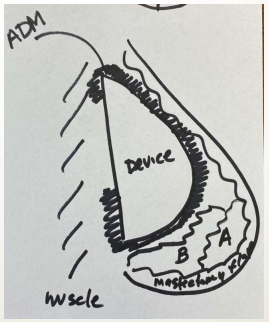

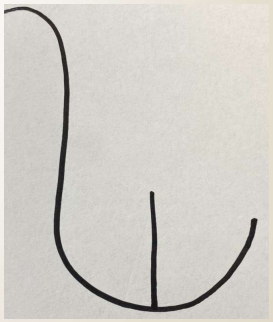

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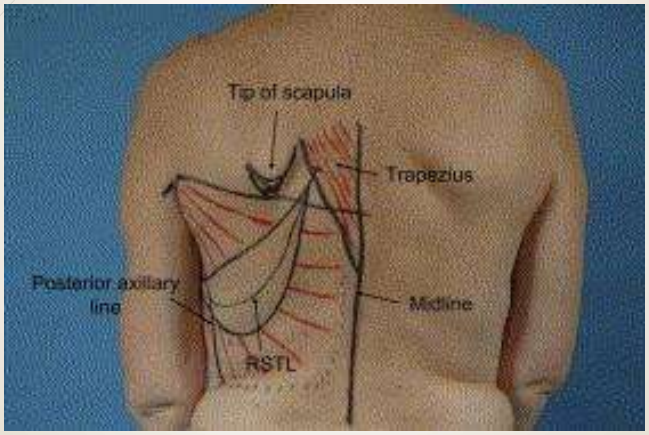
Autologous Tissue Reconstruction – **Pedicled** Latissimus Dorsi (LD) Flap



Credit: Dennis Hammond, MD

Autologous Tissue Reconstruction – **Pedicled** Latissimus Dorsi (LD) Flap

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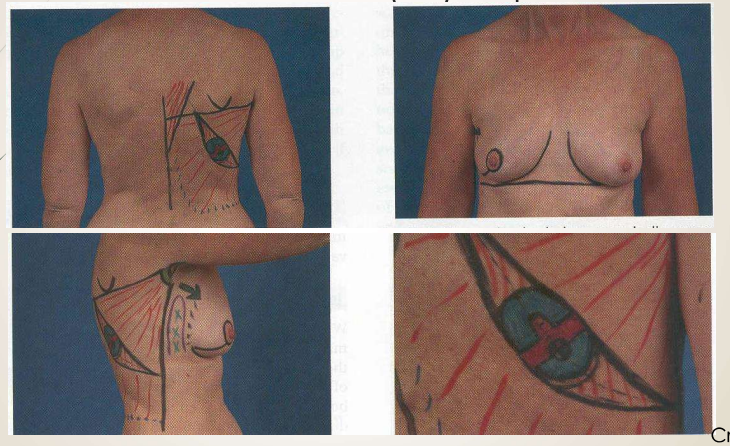
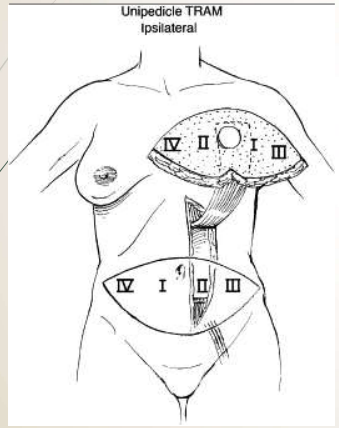
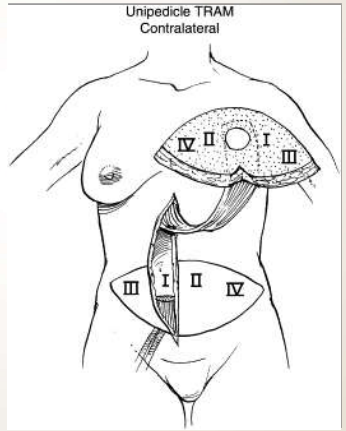


Credit: Dennis Hammond, MD

Pedicled TRAM Flap





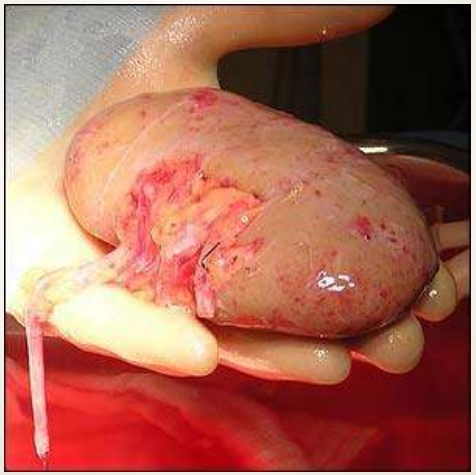
What is a **Flap**?

- A **Flap** is a portion of tissue that is elevated and moved from one area to another - to solve a problem, defect or wound - while maintaining its own blood supply.
- A **Pedicled Flap** is when this tissue remains connected to its original blood supply by a named artery and vein that have been isolated.
- A **Free Flap** is when the target tissue is completely disconnected from its original blood supply and reattached to a recipient blood supply.
  - This requires **microsurgical repair** of the artery and vein(s)
    - This means sewing the cut end of a donor vessel to a recipient vessel under the microscope.

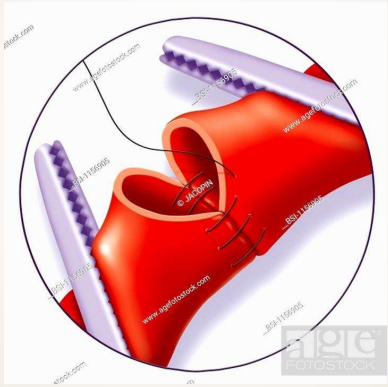
Agenda

- Introduction
- No reconstruction
- Implant based breast reconstruction
- Tissue based breast reconstruction
- **Microvascular breast reconstruction**
  - Patient Selection
  - Pre-Operative Preparations
  - Intraoperative Details
  - Inpatient Postoperative Course & Monitoring
  - Outpatient Postoperative Course & Monitoring
  - Complications & Take Backs
- Review
- Test

The First Free Flap – Kidney Transplant



Definition: Microvascular Repair – Minute vessels sewn together under magnification



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  - This requires **microsurgical repair** of the artery and vein(s)
    - This means sewing the cut end of a donor vessel to a recipient vessel under the microscope.
  - **Close monitoring during and after surgery is critical to monitor patency of the repaired vessels and success of the tissue transfer.**

Types of Microvascular Surgery:

- **Breast** Reconstruction (new)
- Oropharyngeal (ENT) Reconstruction
- Extremity Reconstruction
- Scalp Reconstruction
- Digit or other Replant
- Organ Transplant (Kidney/Liver)

New Program – **Microvascular Breast Reconstruction**

- This is a **NEW** program to bring microvascular TISSUE-BASED Breast reconstruction to our hospital
  - **Microvascular = Free Flap**
- Previously, patients were referred **out of state** to New Orleans, Mayo, Omaha (another newer program)
- Requires technical capabilities, **team approach**, significant preparation, commitment
- Started January 16, 2024
  - 13 Breast flaps, 1 loss at 12 days (7%)

Microsurgical **Breast** Reconstruction Team

- Dr. Jason Fowler, PhD

- Jillian Nedved, PA

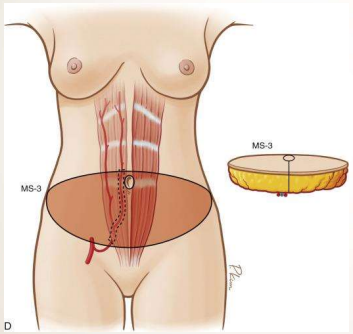
- Dr. Laura Figura

- Brooke Munk, NP

What are types of Microvascular **Breast** Reconstruction?

- **Abdominal Donor Site** (**Most common and initial focus for new program**)
  - Free Tram (more muscle used)
  - Free Muscle Sparing Tram (minimal muscle used)
  - Free DIEP (no muscle used)
- Groin Donor Site (Inner thigh)
  - Free Gracilis
- Thigh Donor Site (Anterior thigh)
  - Free ALT
- Buttock Donor Site
  - Free SGAP or IGAP

Abdominal Free Flap in Breast Reconstruction



- Tissue is completely disconnected based on isolated blood supply from one artery and 1-2 veins.
- The transferred tissue is re-attached under the microscope to donor vessels in the chest or axilla
- DIEP (pronounced "DEEP") = Deep Inferior Epigastric Artery Perforator Flap
- **A DIEP is depicted. No muscle is utilized or transferred to the breast.**

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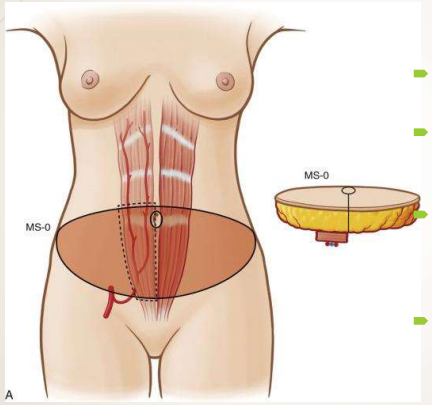
Abdominal Donor Site – Free TRAM



- Transverse Rectus Myocutaneous Flap (TRAM)
- **A Free TRAM is depicted. A portion of one rectus muscle is utilized/transferred to the breast**.
- More abdominal morbidity, but still tremendously less than a pedicled TRAM (which uses an entire rectus muscle)
- Occasionally necessary due to anatomic variations.

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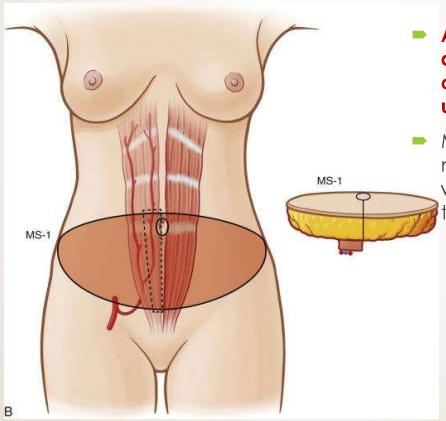
Abdominal Donor Site – Free Muscle Sparing TRAM (MS-1)



- **A muscle sparing TRAM is depicted. A strip of a portion of one rectus muscle is utilized/transferred to the breast**.
- Mild abdominal morbidity, often necessary due to the manner in which the target vessel traverses the muscle.

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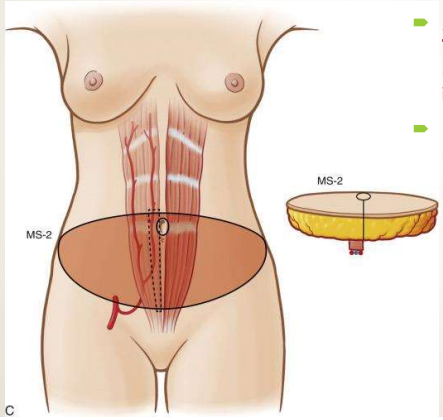
Abdominal Donor Site – Free Muscle Sparing TRAM (MS-2)



- **Another more muscle sparing TRAM is depicted. A narrow strip of a portion of one rectus muscle is utilized/transferred to the breast.**
- Minimal abdominal morbidity, often necessary due to the manner in which the target vessel traverses the muscle.

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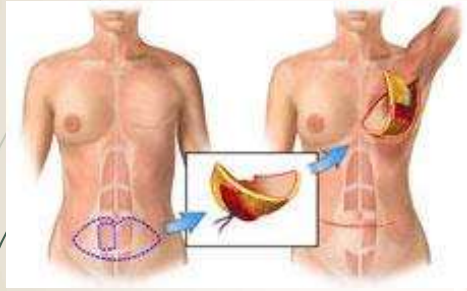
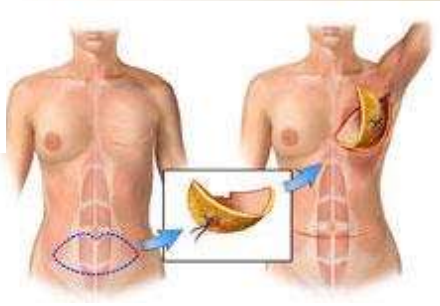
Autologous Reconstruction – Microvascular TRAM vs DIEP

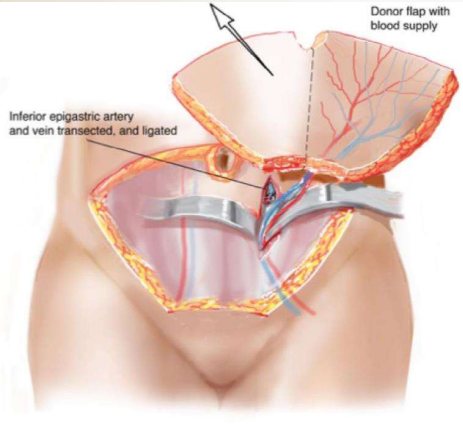


Below: Free DIEP to breast
Fascial opening repaired primarily.



Above: Free TRAM to breast
May require a small amount of mesh in the abdominal donor site, but usually not.

DIEP Flap Reconstruction



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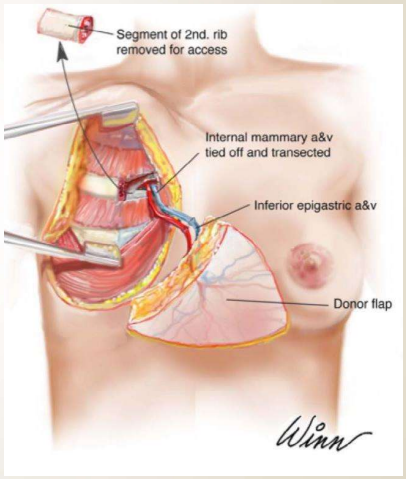
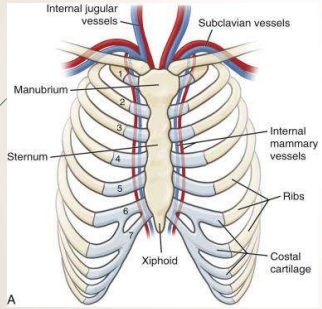
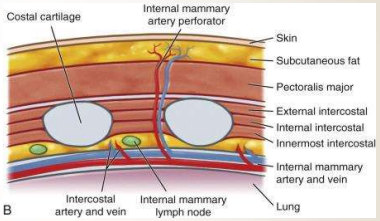


Internal Mammary Perforators – Most Common Breast Recipient Vessels





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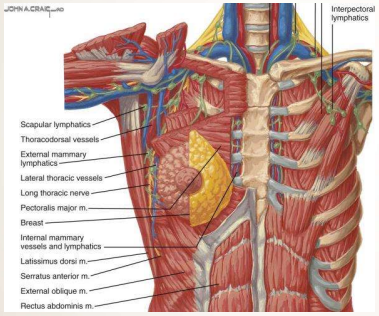
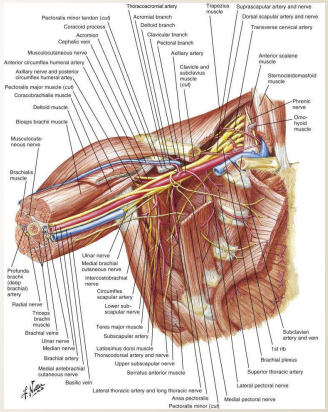
Thoracodorsal Artery & Veins – Secondary Recipient Vessels





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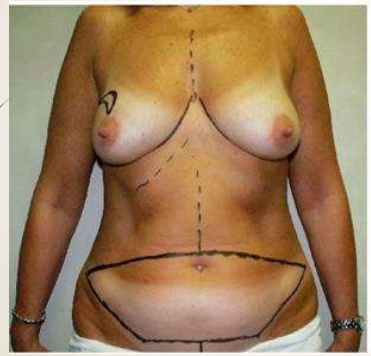
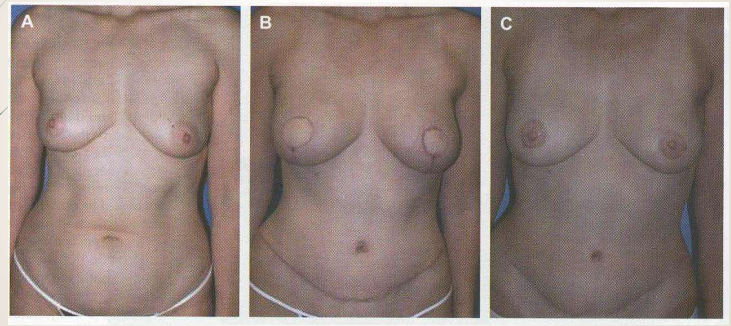
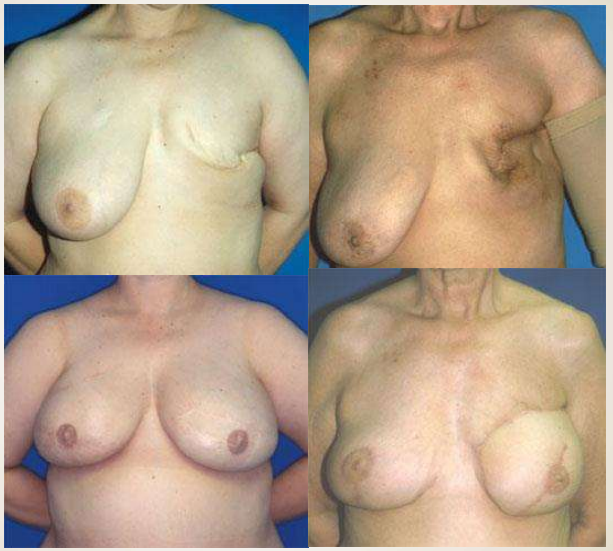
Examples: Autologous Tissue Reconstruction –TRAM Flap



Examples: Autologous Tissue Reconstruction – TRAM Flap





Patient Guidance & Selection

Procedure Overview, Protocol & Pre-operative Education/Instructions

Overview of Surgical Procedure:

- 6-8 Hours for one breast (one free flap)
- 12-18 Hours for two breasts (two free flaps)
- General anesthetic
- Two surgeons plus assistants
- Two surgical technicians
- 2-7 days inpatient (Avg 3-4 days)
- **First 48 hours critical**
- **Takebacks – 2-3 hours**
- **Risks: Bleeding, infection, flap loss, partial flap loss, DVT/PE, wound healing problems, need for further surgery (greatest in first 48 H)**, dissatisfaction, abdominal bulge, chronic pain, seroma, poor scars
- **All patients will need additional surgery** to refine the shape of the breast and for symmetry procedures

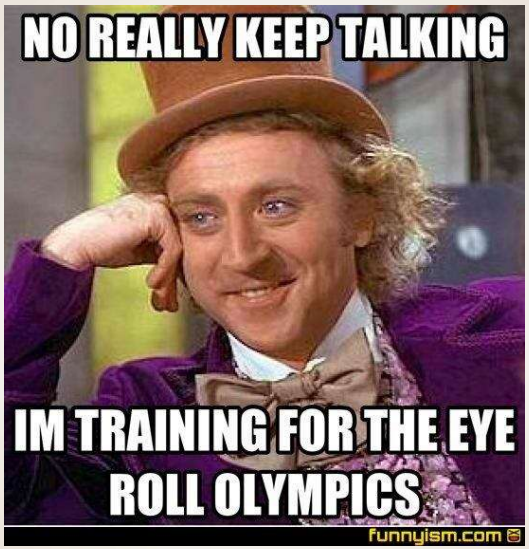
PLASTICS (FOWLER/FIGURA) FREE FLAP PROTOCOL (rev 1/19/2024)

Anesthesia/Pre-op/Intra-op
1. Decadron 10mg IV (1 dose only)
2. Ancef 2-3g preferred, Clindamycin 600-900mg if allergic, re-dose q3-4h intraop
3. Heparin 5,000 U SQ in thigh immediately pre-op
4. Ensure patient positioned on bed to allow "sit up" to 45 degrees
5. Temp > 37.5 C; Bair hugger lower body pre-op and intra-op, Aqua K on bed); Room temp 72
6. 2 Peripheral IVs
7. BP Cuff on both arms (can alternate use); IV on either arm
8. Foley with Urometer & Temp Probe
9. Muscle relaxants ok
10. Prefer no pressors – discuss w/ surgeon if deemed necessary (Hydralazine ok)
11. Immediately (3-5 mins) prior to harvest, IV heparin 5000 units, once
12. During harvest, SBP 100-120; after anastomosis SBP 110-140
13. Transfuse for hct < 24 or clinical (low bp, poor flap perfusion, etc.)
14. Prefer no A-line; if placed, out at end of case
15. Wake up deep, maintain Semi-Fowler position.

General Medications
1. Aspirin 325mg rectal suppository immediately postop
2. Abx 2 IV doses post-op
3. Heparin 5000 U SQ bid in thigh while in house
4. Aspirin 325 mg orally qday beginning POD1 x 4 weeks
5. Tylenol PO sched, Fentanyl IV immediate post op; Dilaudid IV; oxycodone PO PRN, Baclofen for muscle spasms
6. Start clear fluids POD#1, advance as tolerated

General Nursing Rules:
- **call surgical team immediately for any FLAP concerns: LAURA FIGURA MD (814) 464-6255 / JAY FOWLER MD PHD (218) 428-9987**
  - **APPs: Brooke Munk, CNP (VOALTE)/Jillian Nedved, PA (VOALTE)**
  - **Hospitalist for general medical concerns like BP, BS, sleeping issues, home meds, etc.**
- VS q15min x 4, q30min x 2, q1hr x 2, then q4hr; strict I&O measurements q8hr, STRIP & record each JP bulb q8 & prn (note color, volume, clots, transparent vs thick)
- NOTHING around, on, or against breast – like a bra, necklace drain bag (use drain belt instead)
- Elevate HOB at least 30°or semi-fowler position.
- Vasoconstrictors require discussion with surgeon; support BP with volume first
  - hypotension is worse than hypertension: 100 ≤ SBP ≤ 160 ; MAP > 60
- room at normal room temp, not cooled
- SCDs on & active while in bed
- Bedrest x 24H; out of bed to chair at 24 hours
- diet advance as tolerated
- Foley out on POD1 at 24 hours
- Flap checks incl hand held Doppler eval of the flap at (or within 1.5 cm) of the blue suture + color + temperature eval
- Hand offs occur at bedside, confirm flap exam visually, listen to Doppler together

POD#	Flap Check (Nursing)	Flap Check (MD)	Meds/Other	Abdomen
0	q1h	Daily	Before/during case: Foley, abx, heparin End of case: rectal aspirin, A-line out	Single panel binder at end of case – do not compress/abut breast
1	q1h	Daily	aspirin 325 qday, Heparin 5000 un sq bid in thigh At 24H: Foley out; OOB to chair; PT/OT, D/C planning (case mgr)	
2	q2h	Daily	At 48H: transfer to Floor if excellent	
3	q4h-qshift	Daily	Consider discharge	



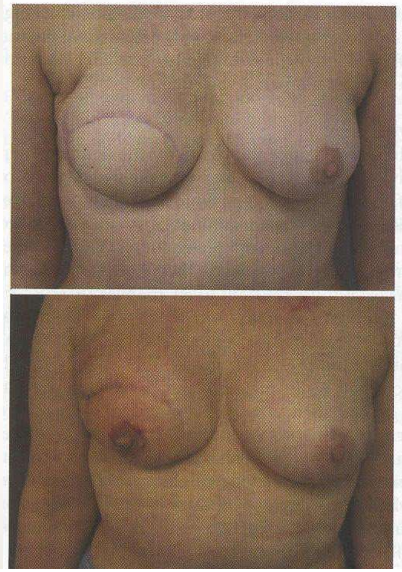
Patient Selection:

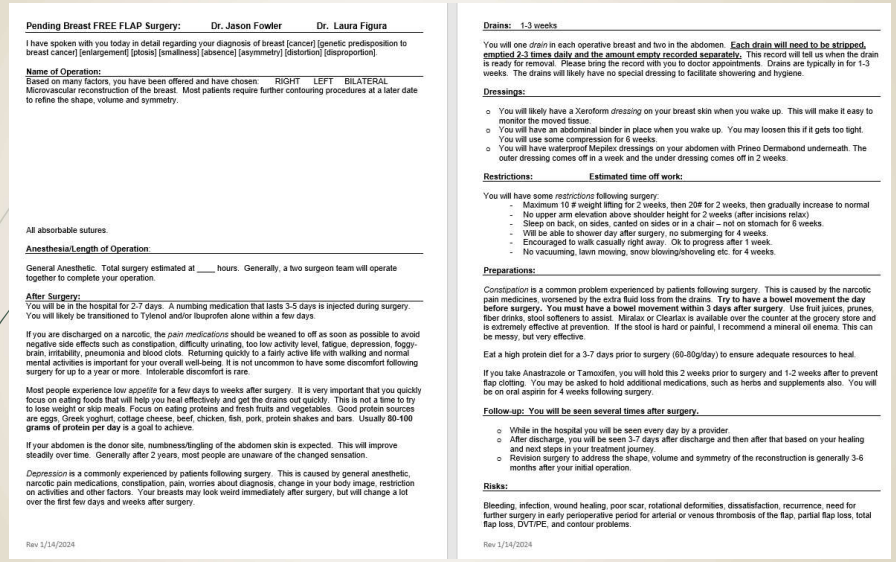
In general, patients undergoing microvascular tissue-based **Breast** reconstruction will be:

- Women
- Healthy
- An entire breast is absent (not partial breast defects)
- Finished with cancer treatments (if indicated)
  - Last radiation at least 6-12 months prior
  - Last chemo at least 3 months prior
- Delayed (not at same time as the mastectomy)
- Have other factors disfavoring implant based reconstruction
  - Prior failure or dissatisfaction
  - Aversion to implant based
  - Younger age

Autologous Tissue → Post operative Radiation Therapy Effect

This is why all patients will have completed their radiation treatments at least 6-12 months prior to microvascular reconstruction





Pending Breast FREE FLAP Surgery: **Dr. Jason Fowler** **Dr. Laura Figura**

I have spoken with you today in detail regarding your diagnosis of breast [cancer] [genetic predisposition to breast cancer] [enlargement] [ptosis] [smallness] [absence] [asymmetry] [distortion] [disproportion].

Name of Operation:
Based on many factors, you have been offered and have chosen: RIGHT LEFT BILATERAL
Microvascular reconstruction of the breast. Most patients require further contouring procedures at a later date to refine the shape, volume and symmetry.

All absorbable sutures.

Anesthesia/Length of Operation:

General Anesthetic. Total surgery estimated at ____ hours. Generally, a two surgeon team will operate together to complete your operation.

After Surgery:
You will be in the hospital for 2-7 days. A numbing medication that lasts 3-5 days is injected during surgery. You will likely be transitioned to Tylenol and/or Ibuprofen alone within a few days.

If you are discharged on a narcotic, the *pain medications* should be weaned to off as soon as possible to avoid negative side effects such as constipation, difficulty urinating, too low activity level, fatigue, depression, foggy-brain, irritability, pneumonia and blood clots. Returning quickly to a fairly active life with walking and normal mental activities is important for your overall well-being. It is not uncommon to have some discomfort following surgery for up to a year or more. Intolerable discomfort is rare.

Most people experience low *appetite* for a few days to weeks after surgery. It is very important that you quickly focus on eating foods that will help you heal effectively and get the drains out quickly. This is not a time to try to lose weight or skip meals. Focus on eating proteins and fresh fruits and vegetables. Good protein sources are eggs, Greek yoghurt, cottage cheese, beef, chicken, fish, pork, protein shakes and bars. Usually **80-100 grams of protein per day** is a goal to achieve.

If your abdomen is the donor site, numbness/tingling of the abdomen skin is expected. This will improve steadily over time. Generally after 2 years, most people are unaware of the changed sensation.

Depression is a commonly experienced by patients following surgery. This is caused by general anesthetic, narcotic pain medications, constipation, pain, worries about diagnosis, change in your body image, restriction on activities and other factors. Your breasts may look weird immediately after surgery, but will change a lot over the first few days and weeks after surgery.

Rev 1/14/2024

Drains: 1-3 weeks

You will one *drain* in each operative breast and two in the abdomen. **Each drain will need to be stripped, emptied 2-3 times daily and the amount empty recorded separately.** This record will tell us when the drain is ready for removal. Please bring the record with you to doctor appointments. Drains are typically in for 1-3 weeks. The drains will likely have no special dressing to facilitate showering and hygiene.

Dressings:

- You will likely have a Xeroform *dressing* on your breast skin when you wake up. This will make it easy to monitor the moved tissue.
- You will have an abdominal binder in place when you wake up. You may loosen this if it gets too tight. You will use some compression for 6 weeks.
- You will have waterproof Mepilex dressings on your abdomen with Prineo Dermabond underneath. The outer dressing comes off in a week and the under dressing comes off in 2 weeks.

Restrictions: **Estimated time off work:**

You will have some *restrictions* following surgery:
- Maximum 10 # weight lifting for 2 weeks, then 20# for 2 weeks, then gradually increase to normal
- No upper arm elevation above shoulder height for 2 weeks (after incisions relax)
- Sleep on back, on sides, canted on sides or in a chair – not on stomach for 6 weeks.
- Will be able to shower day after surgery, no submerging for 4 weeks.
- Encouraged to walk casually right away. Ok to progress after 1 week.
- No vacuuming, lawn mowing, snow blowing/shoveling etc. for 4 weeks.

Preparations:

Constipation is a common problem experienced by patients following surgery. This is caused by the narcotic pain medicines, worsened by the extra fluid loss from the drains. **Try to have a bowel movement the day before surgery. You must have a bowel movement within 3 days after surgery**. Use fruit juices, prunes, fiber drinks, stool softeners to assist. Miralax or Clearlax is available over the counter at the grocery store and is extremely effective at prevention. If the stool is hard or painful, I recommend a mineral oil enema. This can be messy, but very effective.

Eat a high protein diet for a 3-7 days prior to surgery (60-80g/day) to ensure adequate resources to heal.

If you take Anastrazole or Tamoxifen, you will hold this 2 weeks prior to surgery and 1-2 weeks after to prevent flap clotting. You may be asked to hold additional medications, such as herbs and supplements also. You will be on oral aspirin for 4 weeks following surgery.

Follow-up: You will be seen several times after surgery.

- While in the hospital you will be seen every day by a provider.
- After discharge, you will be seen 3-7 days after discharge and then after that based on your healing and next steps in your treatment journey.
- Revision surgery to address the shape, volume and symmetry of the reconstruction is generally 3-6 months after your initial operation.

Risks:

Bleeding, infection, wound healing, poor scar, rotational deformities, dissatisfaction, recurrence, need for further surgery in early perioperative period for arterial or venous thrombosis of the flap, partial flap loss, total flap loss, DVT/PE, and contour problems.

Rev 1/14/2024

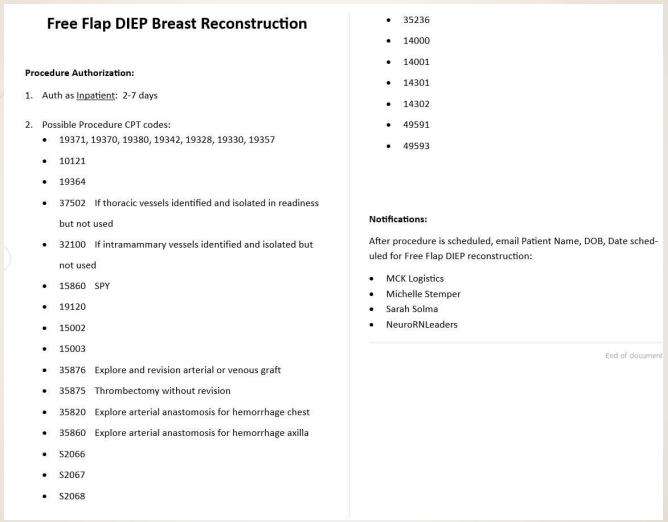
After Decision for Surgery

Initial Steps, Preparations, Meds & Morning of Surgery

Pre-Operative Course: 1st Steps

After Decision:

- Preauthorization
- CT Angiogram (for some)
  - Evaluate donor vessels
  - @ McKennan
  - **DIEP Protocol**
- Surgery Scheduling
  - Notify Logistics
- History & Physical for most patients with PCP
- Hold Anastrazole/Tamoxifen for 2 weeks prior (& 1-2 weeks after) to lower risk of flap clotting
- Hold/continue other medications per standard perioperative policy



Free Flap DIEP Breast Reconstruction

Procedure Authorization:

1. Auth as Inpatient: 2-7 days
2. Possible Procedure CPT codes:
   - 19371, 19370, 19380, 19342, 19328, 19330, 19357
   - 10121
   - 19364
   - 37502 If thoracic vessels identified and isolated in readiness but not used
   - 32100 If intramammary vessels identified and isolated but not used
   - 15860 SPY
   - 19120
   - 15002
   - 15003
   - 35876 Explore and revision arterial or venous graft
   - 35875 Thrombectomy without revision
   - 35820 Explore arterial anastomosis for hemorrhage chest
   - 35860 Explore arterial anastomosis for hemorrhage axilla
   - S2066
   - S2067
   - S2068
   - 35236
   - 14000
   - 14001
   - 14301
   - 14302
   - 49591
   - 49593

Notifications:

After procedure is scheduled, email Patient Name, DOB, Date scheduled for Free Flap DIEP reconstruction:

- MCK Logistics
- Michelle Stemper
- Sarah Solma
- NeuroRNLeaders

End of document

DAYS BEFORE: Calls/confirmations:

2-3 DAYS BEFORE:

- **Heather Jensen (Plastics Lead) – VOALTE**
  - Make sure she is aware of the case and scheduled to work

DAY BEFORE:

- **Main OR Charge Nurse–**
  - Start time/cut time. Make sure calendars correct.
  - In-room time 45 mins earlier than cut time
  - If ENT had case that trays will be fast tracked, alert that if there is a take back overnight, it also needs fast tracked to cleaning.
  - Confirm OR staff – reach out directly if any new staff
  - Make sure NOT in room 5 or 6
  - Confirm in OR 30-45 mins prior to cut time
  - Make sure no other pics are pulled – just the FIGURA FREE FLAP PIC
- **Logistics on Voalte –**
  - Notify Bed request in Neuro ICU and approximate time (4p for 1 flap, 8 pm for 2 flaps)
- **Hospitalist Triage on Voalte-**
  - Notify with patient name/dob and anything special so you can give abbreviated check out after the case.

Pre-Operative Course: Morning of Surgery

Morning of surgery **in Pre-Op**:

- CBC and Type & Screen
  - don't need results before going to sleep
- Heparin 5000 units SQ in the thigh
  - ***BEFORE induction***
- Warming blanket (lower body) **ASAP**
- Marking by surgeons
- IV Ancef or Clindamycin
- Nursing consent
- Timely huddle
- At least one IV (either arm)
- In room by **45 minutes before CUT**

Intra-Operative Portion

Set-up, Prep, Order of Operation, Dressings

Intra-Operative Details: Anesthesia & Room Set Up

- Warm room to 72 degrees
  - If pt temp >37.5, can turn down ambient temp
- Aqua K warming pad on bed
- Position: Supine, Arms out
  - secured with warm blanket and Kerlix roll
  - Rotate arms, legs, head Q 30 mins
  - Position on bed allows "sit up" to 45 degrees
- SCD's on
- Lower body Bair Hugger
- Foley w/ Urometer/Temp Probe
- Microscope opposite operative side

- 5,000 units SQ heparin in thigh **in pre-op**
- Peripheral IV x 2 (either or both arms ok)
- Decadron 10mg IV at beginning
- Muscle relaxants ok
- Support pressure with fluid, albumin first
- Pressors ok, ***please discuss with surgeon if considered***
- Redose Abx q 3-4 hours (Ancef or Clinda)
- Wake up patient in semi-fowler position like a tummy tuck
  - Avoid coughing or HTN at wake up

Intra-Operative Details: Set-Up & Prep

One Main Set up:

- See Case Card "Figura Plastic Free Flap" & "Fowler Abdomen Harvest" **(Don't need any other PICKS)**
- Trays to open:
  - Plastics & ENT combined Micro Tray
  - Plastics Tray

Two Mayo Stands:

- Two surgeon teams working simultaneously
  - One at breast, one at abdomen
- White towels on the mayos

Two Bovie Machines:

- Label each Bovie & Unit – Tiger print for Fowler.
- Start 40/40 blend on both, bipolar 12

Prep/Drape:

- Use Trimmers to shave mons to anterior vulvar commissure
- Chloroprep (Chin to mid thigh to sides of bed, axillas last)
  - If the patients abdomen is loose, you may need to lift the pannus while prepping
- Betadine to prepubic area
- Stickies
- Universal Drapes
- Will place white surgicount towels around micro field before anastomosis

Intra-Operative Details: Meds

On the Surgical Field:

- **Exparel** 20 mg, Bupivicaine 0.25% plain and 100cc of saline (mix/open after micro complete)
  - Inject with 10cc syringes x 2 and 22 gauge needles x 2
- **Heparin saline** (5000 units in 500cc of injectable saline) **in fluid warmer**
- Saline (in fluid warmer)
- Bone wax in wrapper

In the Room/Available:

- **Aspirin** 300mg rectal suppository (end of case)
- **ICG** (Indocyanine Green 25mg/10ml) for SPY
  - Dosed 1 ml at a time on Surgeon directive
- CathFlo Activase (**Alteplase**) (for thrombosis)
  - Now stocked in Main OR Pyxis
  - 2.2 mg vial, reconstitute with 2.2 ml sterile water → 1mg/ml solution
- **Papaverine** 60mg/2ml (for vasospasm)

Alteplase (tPA)

Each vial of Cathflo Activase contains 2.2 mg of Alteplase (which includes a 10% overfill), 77 mg of L-arginine, 0.2 mg of polysorbate 80, and phosphoric acid for pH adjustment. Each reconstituted vial will deliver 2 mg of Cathflo Activase, at a pH of approximately 7.3.

Reconstitute Cathflo Activase to a final concentration of 1 mg/mL:

1. Aseptically withdraw 2.2 mL of Sterile Water for Injection, USP (diluent is not provided). Do not use Bacteriostatic Water for Injection.
2. Inject the 2.2 mL of Sterile Water for Injection, USP, into the Cathflo Activase vial, directing the diluent stream into the powder. Slight foaming is not unusual; let the vial stand undisturbed to allow large bubbles to dissipate.
3. Mix by gently swirling until the contents are completely dissolved. Complete dissolution should occur within 3 minutes. **DO NOT SHAKE.** The reconstituted preparation results in a colorless to pale yellow transparent solution containing 1 mg/mL Cathflo Activase at a pH of approximately 7.3.

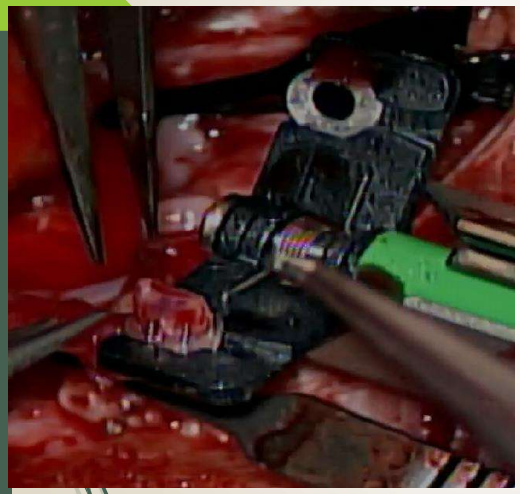
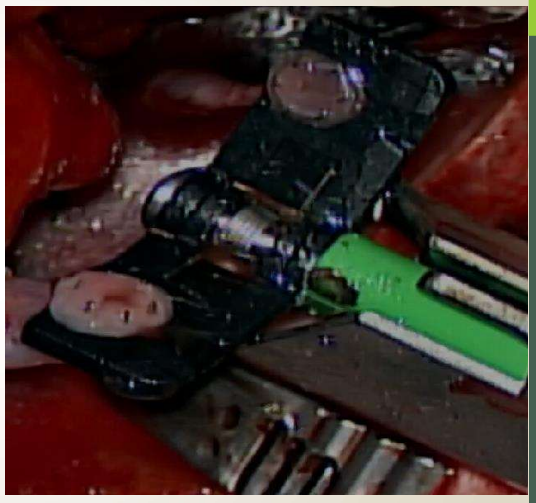
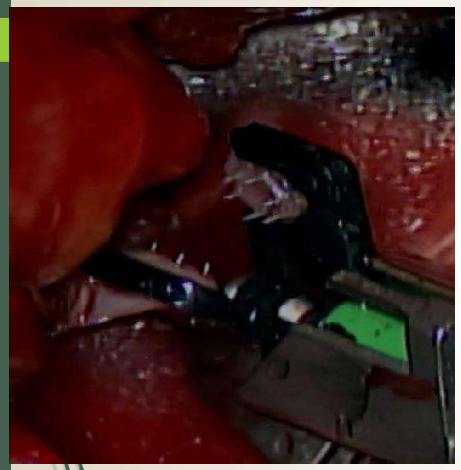
Final reconstitution is 2.2mg in 2.2cc of solution (1mg/ml)

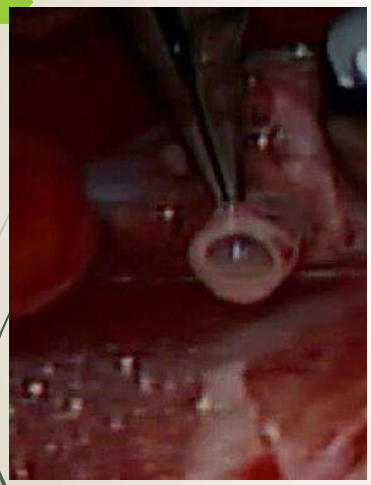
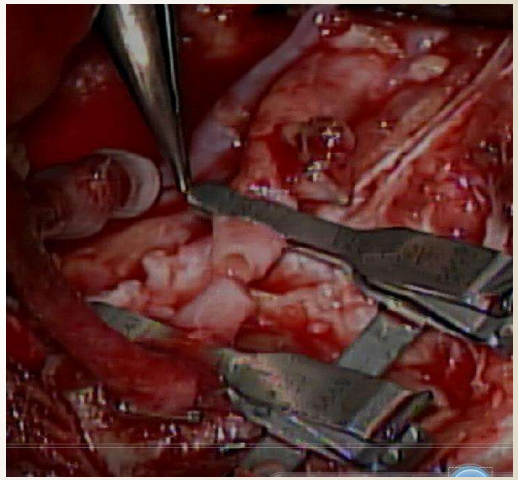
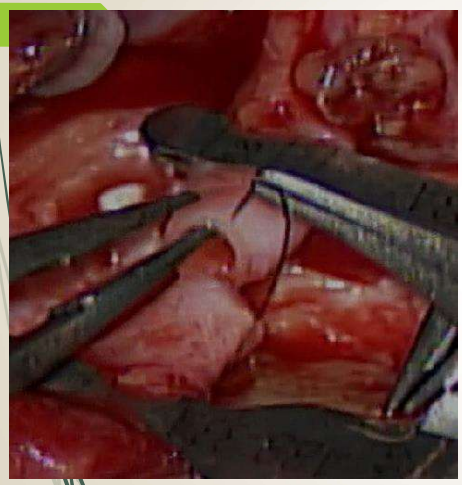
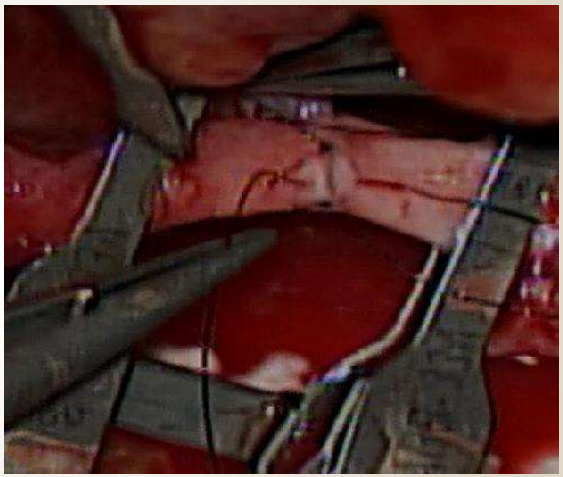
Inject or flush artery with:

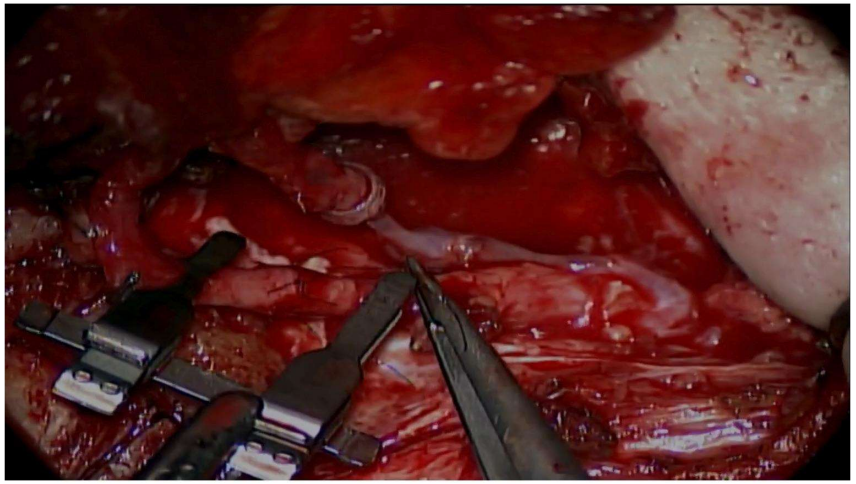
- 0.5cc (0.5mg) q 4 mins with vein open
- *or* 2cc (2mg) slowly over 1 min q30 mins x 2 (up to 40mg, 40cc) with vein open
- *or* Stroke dosing is 0.9mg/kg of flap weight
  - (need to weigh or estimate)
  - injected into pedicle artery, infused into A/V clamped flap for 3 minutes, then systemic circulation
- Use within 4 hours after reconstitution

Case Order: General

- Surgeon 1 – Develop donor site on the abdomen, select and isolate donor vessels on each side.
- Surgeon 2 – Prepare operative breast, remove medial third rib, expose and isolate recipient internal mammary vessels
- MICRO Time Out – Prepare to harvest donor flap
  - No one will count or enter/leave the field for next 45 minutes or so
- Dock the microscope, Inject 5000 units IV Heparin, Wait 3-5 minutes, Harvest flap
- Surgeon 1&2 – Microvascular anastomosis with white mayo stand/instruments
- Surgeon 2 – Inset flap
- *Repeat all steps (flipping sides)*
- Surgeon 2 – Inset flap
- Surgeon 1 – Close abdomen
- Apply dressings
- Insert 300mg rectal aspirin
- Emerge from anesthesia



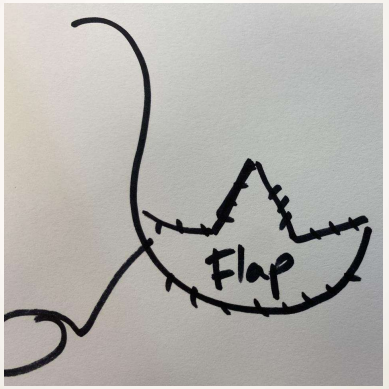
Post-Operative Monitoring

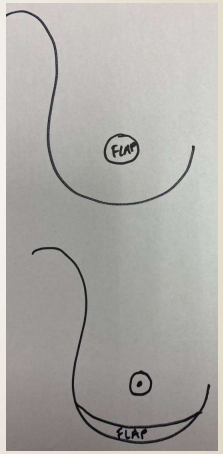
INPATIENT SETTING

Where Does Patient Go After Surgery?

- **Personal handoff** from surgeon to next person
- Patient goes to Neuro Critical Care directly
  - (if bed is available)
  - Patient waits in PACU if no bed available
- Later, patient may go to 1 west if necessary

Possible exposed skin paddles:





Plastic Surgery

Microsurgical **Breast** Reconstruction

Infographic

- Dr. Jason Fowler, PhD
- 1-218-428-9987 or Voalte

- Dr. Laura Figura
- 1-814-464-6255 or Voalte

Goals:
Comfortable patient
Hydrated
Normotensive

Hospitalist: for med mgmt

LOOK
- Assess Color of flap,
- Check drain color/volume

LISTEN
- Doppler signal within an inch of the blue stitch

FEEL
- Temperature
- Turgor – look for congestion, swelling, change in size of flap

DECIDE
- Is it the same as last check? → If not sure, CALL

PERSONAL HANDOFF
- Surgeon to nurse, then shift changes/lunch breaks, do assessment together at the bedside

Flap Monitoring

- **PERSONAL HANDOFF WITH PRIOR NURSE/DR**
- **Pencil Doppler Probe**
  - Sanitized handheld pencil Doppler dedicated to the patient at the bedside.
  - Every hour x first 24H
  - At the blue suture or within 1.5cm
  - Some DIEPS do not have a Doppler signal
- **Color Assessment**
  - Check the visible skin paddle and compare to the abdominal donor site skin.
  - Same color as donor site (good)
  - A little more red (hyperemic – good, but watch)
  - White or paler (**bad if different**)
  - Blue or purple tinged or darker (bad)
- **Temperature Assessment**
  - Same (good)
  - Cold (bad)

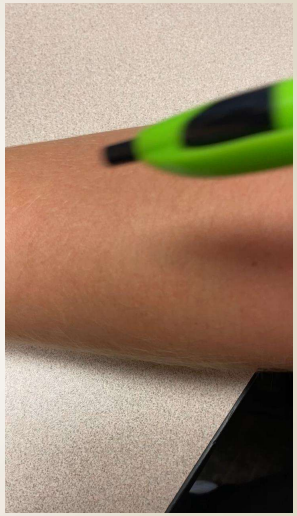
Nursing Goals

Global Assessment→ Objective Measurement → Flap Effects

- **Comfortable** → Pain 0-6 → Better perfusion
  - Pained → vasoconstricted → Worse perfusion/Flap problems
- **Hydrated** → NI urine output → Better perfusion
- **NI blood pressure** → Better perfusion
  - Low pressure (systolic <90, diastolic <40) → Poor perfusion/arterial thrombosis
  - High pressure (systolic >160, diastolic >100) → Bleeding events

Capillary Refill

- You *may* be asked to stroke the flap to check capillary refill if present
  - SOME DIEPS DO NOT HAVE CAP REFILL
  - Use a pen or narrow instrument
  - Stoke the skin paddle lightly and watch the pattern of blanching and refill
    - No blanching (bad)
    - Fills rapidly (bad)
    - Fills equal to surrounding skin (good)
    - Fills slowly (bad)



Visual Confirmation of Flap Status

- The **MOST** important aspect of flap monitoring is to pass off the flap to the next person **with a SHARED evaluation**
  - Visually inspect the flap *together*
    - Color, temp
  - Listen to the Doppler signal *together*
    - Where do you hear it best?
    - Does it have the same quality?
    - Triphasic sound? Monophasic?
  - Is it the same?
    - Changes are the most concerning
  - **If the flap is the same as when it was passed off to you (and the same as when it was passed off from the surgeons) then it is OK**

Post-Op Recovery

1st 24H

- Flap checks q1H
- Strict Ins and Outs
  - Foley
  - **Strip** & record drain output for each drain
    - Note color, turbidity, blood clots
    - Sudden increase in drain output that is dark/thick → suggests hematoma
- Aspirin
- Strict Bedrest
- Head of Bed elevated/Semi-Fowler Position
- Advance diet as tolerated
- Hospitalist for general care
  - (BP control, BS mgmt., etc.)

2nd 24H (if doing well)

- Foley out
- Up to chair, ambulating
- Flap Checks Q2H
- PT/OT/DC planning

3rd 24H (if doing well)

- Maybe home or Flap checks Q4-8H
- Ok to shower

Takebacks → Start Over

Venous changes to a flap (red → purple)

https://www.researchgate.net/publication/371520218/figure/fig4/AS:11431281177642653@1690552298081/Left-breast-DIEP-flap-venous-congestion-seen-on-post-operative-Please-change-to-left.jpg

I think something's wrong – (Quickly) Preparing for the Phone Call

- Check the **vitals**
  - Note the current HR (heart rate) and BP (blood pressure)
  - Is it different than when the flap was doing better?
- Check the **urine output**
  - When did patient urinate last and how much?
  - Does the patient feel the need to urinate now?
- Know your **assessment**
  - Flap: Pencil Doppler, Color, Temperature +/- Cap Refill
  - Patient: Comfortable/pained, Hydrated, Mentating,
- **ASAP** Call Dr. Laura Figura or Dr. Jason (Jay) Fowler – Cell or Voalte

Window of Greatest Risk

- Most free flaps that fail do so in the first 24H
- **Timely detection and intervention** are key to salvage
  - **Must restore blood flow ideally within 4H**
- Flap loss decreases exponentially over following 7-10 days

This is a venous congested, likely non-salvageable flap

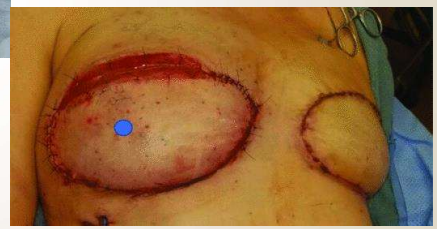
https://www.researchgate.net/profile/Richard-Baynosa/publication/312264167/figure/fig3/AS:644384995414017@1530644763450/Venous-congestion-of-a-trunk-musculocutaneous-flap-These-flaps-appear-blue-to-purple.png

TAKEBACKS

- Change in exam detected
- Surgeon contacted promptly
- Surgeon confirms, contacts OR
- **Emergent case booked – 2-3H most likely**
- Plastics Tray
- ENT micro Tray
- Microscope/SPY
- **Must restore flow to the flap within 4H from last GOOD check → ideal for salvage chances**

Acute Venous Changes → Takeback → Salvage

https://s3.amazonaws.com/HMP/hmp_ln/eplasty/article_images/eplasty19e22_fig2.gif



https://s3.amazonaws.com/HMP/hmp_ln/eplasty/article_images/eplasty19e22_fig3.gif

Avera

Avera McKennan Hospital

Breast Free Flap/Abdominal Donor Site Discharge Instructions

Dr. Jason Fowler & Dr. Laura Figura

Please call with any questions or problems- 605-322-4130. You may also send pictures, if desired, through AveraChart.

Activity:

- Continue to use your arms for normal activity, however, do not raise your upper arms above shoulder height for 2-3 weeks – until tissues have relaxed. This may disrupt your internal healing and prolong drainage.
- Do not lift greater than 10 pounds for the first two weeks after surgery. Then, 20 pounds for 2 weeks and then you may gradually increase back to normal.
- Walking is good at any time.
- Avoid working out until cleared to do so by your surgeon.
- No vacuuming, lawn mowing, snow blowing/shoveling etc. for 4 weeks.
- Sleep on your back, in a chair, on your sides or canted/tilted (almost on your sides). After 6 weeks, you can sleep on your front if comfortable doing so.

Hygiene:

- You may shower. The first shower should be cool and brief. After that you may progress slowly to more normal showers.
- Do not spray water forcefully directly onto your incisions for 3-4 weeks after surgery. Its ok for incisions to get wet and soapy, just pat them dry, less rubbing.
- No submerging in a tub or pool for at least 4 weeks.

Dressings:

- You may adjust the abdominal binder as needed. **Avoid the edge of the binder abutting or compressing your breasts or bending into your abdominal incisions or your drains.**
- If you notice color changes in the skin, discontinue the binder and call Dr. Figura/Dr. Fowler immediately. You will wear your abdominal binder for several weeks around the clock, but can change to body compressive garments like Spanx or other when you feel you can change on/off without pulling on your incision. This is usually at about 3 weeks.

Rev. 1/13/2024

- Your abdominal wound has surgical superglue tape over your horizontal incision. This will be peeled off in 2 weeks. Do not apply any oily or petroleum based products or ointments. These will prematurely dissolve the glue.

Drains:

- **Strip and empty each drain <u>at least</u> 2-3 times daily.** Record the amount removed from each drain separately.
- You may shower with your drains in place. **Do not let the drains hang down in the shower.** You may use a lanyard or shoestring to suspend them around your neck.

Pain:

- Do not apply ice or heat to any of your surgical sites.
- You may use Tylenol (acetaminophen) and/or Ibuprofen according to the bottle instructions, unless contraindicated by your other health conditions. Do not use ibuprofen if you have had gastric surgery.
- Use the narcotic sparingly and wean to off as soon as possible as this is constipating, sedating, depressing and will take your appetite away.
- You should be having normal bowel movements within the first day or two after surgery. If not, use Miralax (over the counter) daily until you are having normal bowel movements and you are off narcotic pain medications.

Medications:

- You will be on oral aspirin for 4 weeks following surgery. This is to help prevent clotting of the flap.
- Hold your Anastrazole or Tamoxifen (if applicable) for 1-2 weeks as guided to help prevent clotting of the flap.

Diet:

- Eat regular meals with an emphasis on protein so you have adequate resources to heal and get your drains out quickly. Eat extra fruit and veggies to prevent constipation also.

Notifications/Precautions:

- Notify your primary surgeon immediately if you have a fever >101.4, vomiting, skin color changes, swelling or pain in an arm or leg.
- If you are planning to fly, please notify your surgery team in advance.

Thank you for choosing Avera McKennan Hospital and University Health Center for you health care provider. It is an honor caring for you.

Rev. 1/13/2024

Post-Operative Monitoring

OUTPATIENT SETTING

Outpatient Info:

- Patients will be in house for 2-7 days.
- They will have restrictions like abdominoplasty patients
  - Maximum 10 # weight lifting for 2 weeks, then 20# for 2 weeks, then gradually increase to normal
  - No upper arm elevation above shoulder height for 2 weeks (after incisions relax)
  - Sleep on back, on sides, canted on sides or in a chair – not on stomach for 6 weeks.
  - Will be able to shower POD#3, no submerging for 4 weeks.
  - Bedrest x 24H in hospital, then encouraged to walk casually right away. Ok to progress after 1 week.
  - **PO aspirin for 4 weeks**
  - No vacuuming, lawn mowing, snow blowing/shoveling etc. for 4 weeks.
  - Hold Tamoxifen or Anastrazole for 2 weeks prior and 1-2 weeks after.

Drains

- There will be one *drain* in each operative breast and two in the abdomen.
- **<u>Each drain will need to be stripped and emptied 2-3 times daily and the amount empty recorded separately.</u>**
- Likely in place for 1-3 weeks, using typical protocol for removal
  - Less than 30cc per day for 1-2 days in a row (per drain)

Outpatient Complaints:

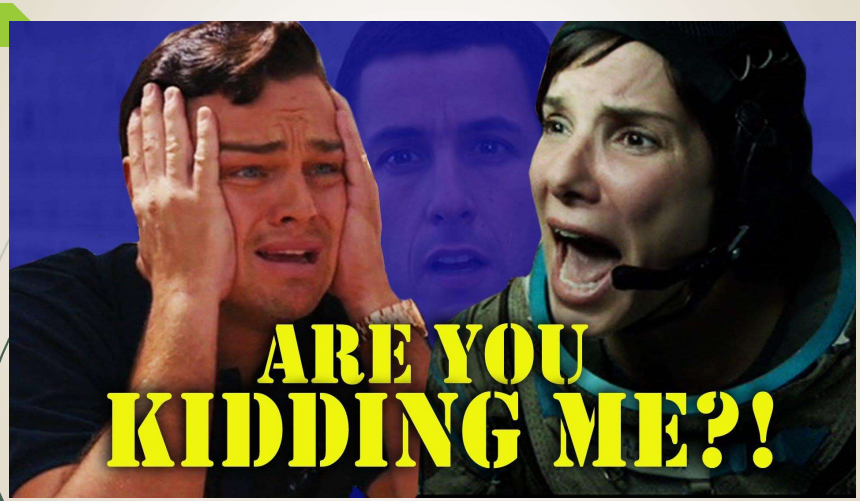
- **Flap has changed color**
- Increase in drain output or color or surgical site swelling suggestive of acute bleeding/new onset hematoma
  - Gather information from patient *by phone* **immediately**:
    - How far out from surgery?
    - When was problem noted?
    - What exactly do they see? Don't waste a lot of time waiting for pictures
    - Where is the patient geographically?
    - When did they eat last?
    - **Contact surgeon (Dr. Fowler or Dr. Figura) immediately by phone**
- Sudden shortness of breath, acute chest pain, leg or arm swelling → go to ED/Call 911 (R/o DVT/PE)
  - Keep in mind that the only area not treated with Exparel will be near the sternum on the operative side where a rib will be removed. This pain will not show up abruptly – it will be present since surgery and may gradually worsen as the Exparel wears off.
- Urinary symptoms (pain, burning, hesitancy, difficulty urinating) → consider UTI, contact PA/NP
- Other symptoms → contact PA/NP
- Patient isn't sure, something seems different → contact PA/NP, offer expedited appt

Agenda

- Introduction
- No reconstruction
- Implant based breast reconstruction
- Tissue based breast reconstruction
- Microvascular breast reconstruction
  - Patient Selection
  - Pre-Operative Preparations
  - Intraoperative Details
  - Inpatient Postoperative Course & Monitoring
  - Outpatient Postoperative Course & Monitoring
  - Complications & Take Backs
- **Review**
- Test

Symmetry Procedures

Surpise topic!



"Make 'em Match" (Twins vs. Sisters)

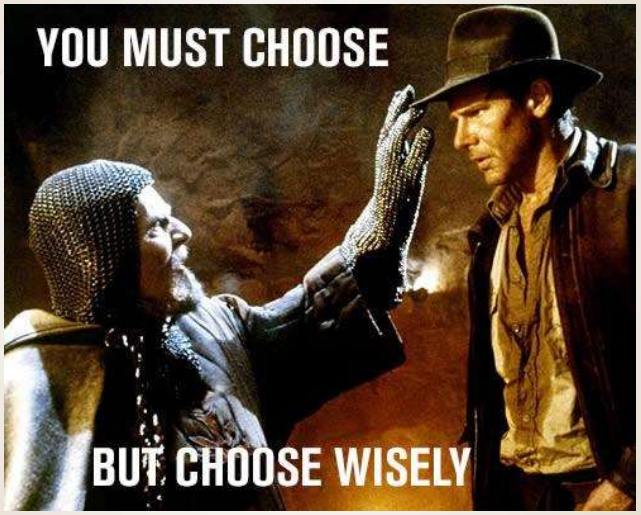
- Nipple reconstruction
- Fat grafting
- Lifts
  - Shape problem
- Reductions
  - Too big or big
- Augmentations
  - Too small
- Combo procedures
  - Augmentation mastopexy

Flood Lights vs. Head Lights

…we didn't discuss today:

- Aging
- Weight change
- Radiation effects
- Breast Implant Illness
- Complications
- Dissatisfaction
- Need for further surgery

…and THAT's why consultations take soooo long!



Review

Key Concepts

Key Concepts in Free Flaps: LOOK FOR **CHANGES**

- Flaps will be monitored **hourly for 24 hours**.
  - Q2H after 24-48H, then likely Qshift
- **Color** of the flap should be similar to abdominal donor site
  - Blue or purple is consistent with venous problem
  - Very pale is consistent with arterial problem
  - Slightly red is normal, but could be early sign of venous problem
- **Temperature** of the flap should be similar to surround skin
  - Cold is consistent with arterial problem
- **Pencil Doppler signal** should be audible at the blue suture on the skin paddle.
  - Or within 1.5 cm of the stitch due to positioning
- **Shift Change: Flaps must be handed off at the bedside with shared exam**
- **Call** Dr. Figura or Dr. Fowler **ASAP** with concerns
- **4H ideal window to restore perfusion!**

Parting Thoughts

- A team approach to breast reconstruction is very important
  - Every person plays a role
- The Decision Making Tree in breast reconstruction is highly individualized
- Diligent **post operative monitoring** and excellent **team communication** are **critical** for free flap survival.
- **Education, advance planning** and **problem solving** does *not completely* ensure a smooth endeavor, but it does make it **more likely**.

Test

You must answer 4 of 6 questions correctly to avoid personal humiliation.

1- How do you *usually* monitor a **free flap** *in the hospital*?

- A – Color of the flap
- B – Temperature of the flap
- C – Doppler signal at the blue stitch
- D – Evaluation for changes
- E – All of the above

2 - Which is **best** if you have a concern over **free flap** viability?

- A – Call the hospitalist
- B – Call the On-Call plastic surgery provider
- C – Call Dr. Figura or Dr. Fowler ASAP
- D – Observe

3 – A **free flap** will *usually* be monitored visually and with Doppler every hour for 24 hours.

- A – True
- B – False

4 – All breast reconstruction patients will have a history of cancer

- A – True
- B – False

5 – Inpatient handoff to the next nurse must include visually checking the free flap and listening to the Doppler signal (if initially present) together at the bedside.

- A – True
- B – False

6 – My work monitoring free flaps in the post operative period is critical and deeply appreciated by the patients and the surgeons.

- A – True
- B – False

BONUS – My work ***caring compassionately*** for patients in the post operative period is **important** and **deeply appreciated** by the patients and the surgeons.

- A – True
- B – False

If you just experienced personal humiliation by not passing the test…

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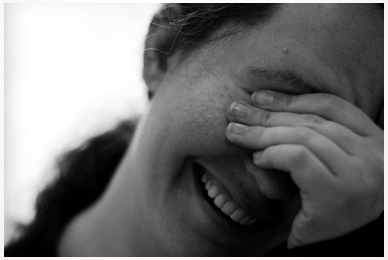

YOU NEED MORE CAFFEINE!!

"Whatever you do, do it all for the glory of God"

1 Corinthians 10:31

Thank you for your attention to the details of this learning exercise…

… and for your work ensuring the success of this program – for the patients, for the surgeons and for Avera.

Additional References:

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- Knoedler,et al. Postoperative free flap monitoring in reconstructive surgery – man or machine?. Front Surg, 2023:10: 1130566
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Questions?