Overview of Breast Reconstruction in an Oncologic Setting

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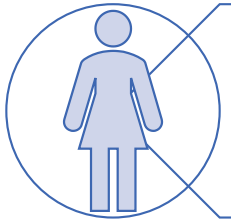
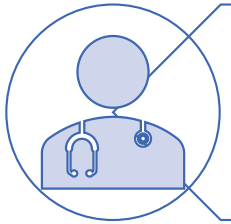
Objectives

At the end of this presentation, the learner will be able to:

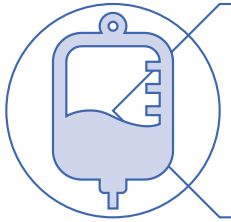
Recognize the differences between implant and autologous based breast reconstruction



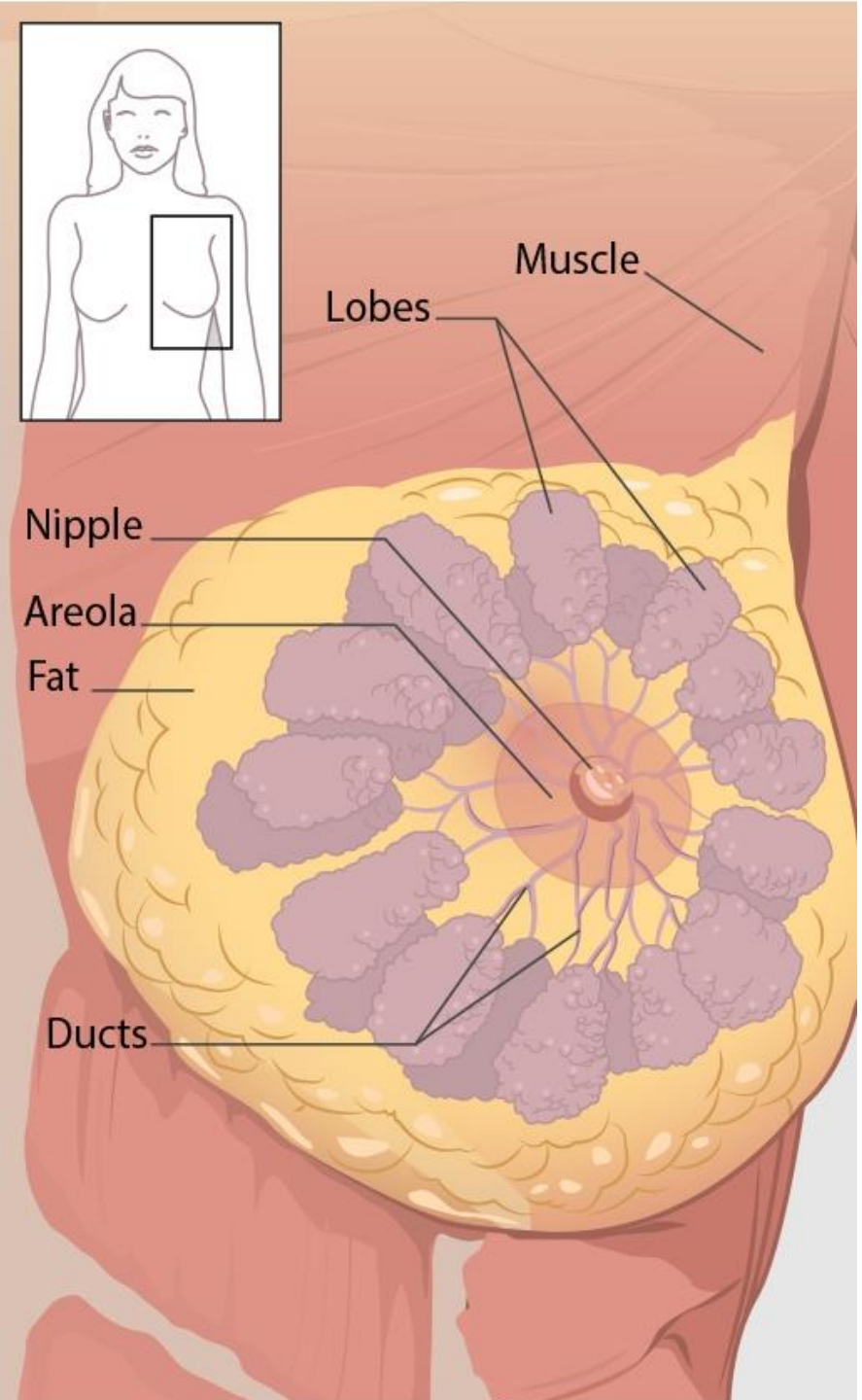
Identify ideal candidates for breast reconstruction and understand the timing around oncologic treatments.



Understand the surveillance for breast cancer in the setting of breast reconstruction



Recognize signs and symptoms of breast implant associated anaplastic large cell lymphoma

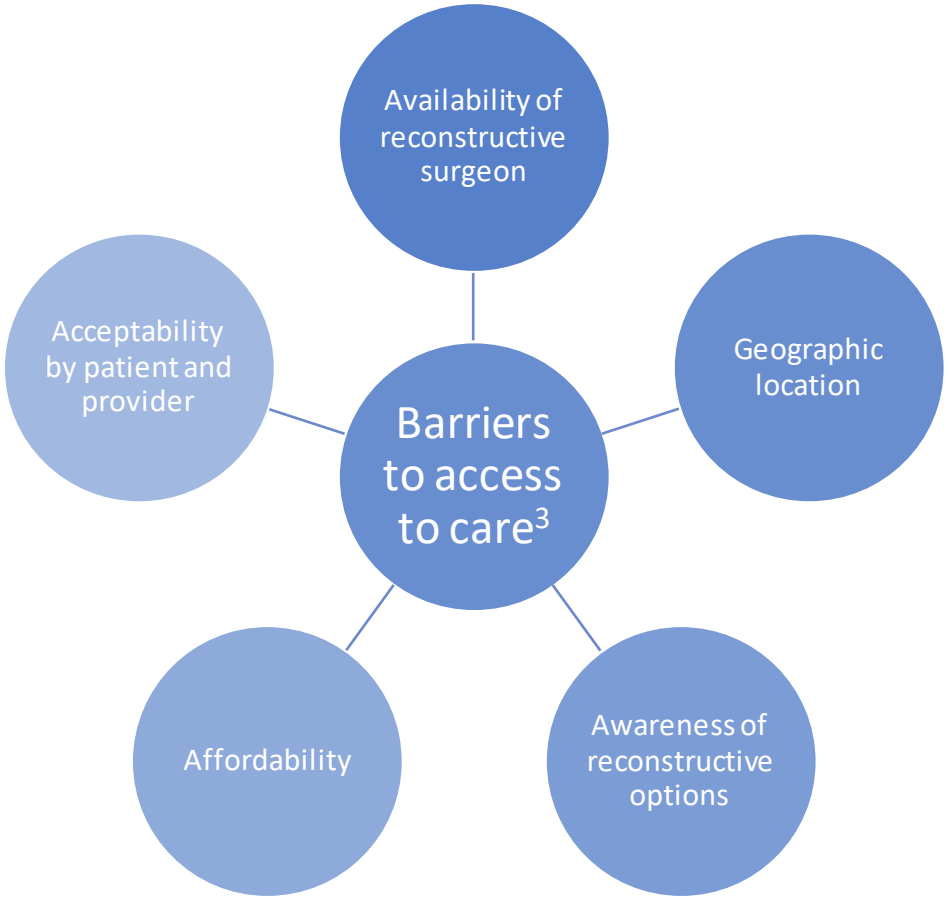


Breast Cancer

- Second most common cancer in women, after skin cancer
- In 2020, the American Cancer Society estimates
  - 276,480 new cases of invasive breast cancer
  - 48,530 new cases of carcinoma in situ
- Number of breast cancer survivors estimated at 3.5 million

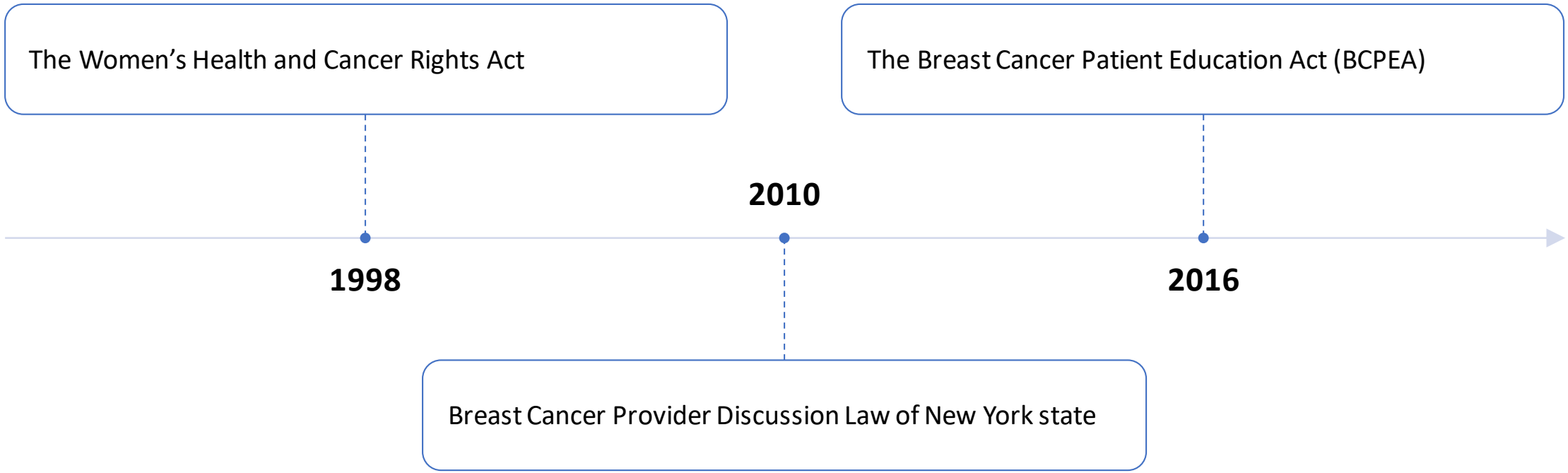
https://www.cdc.gov/cancer/breast/statistics/index.htm
https://www.cancer.org/cancer/breast-cancer/about/how-common-is-breast-cancer.html
Photo: https://www.cdc.gov/cancer/breast/images/breast2_566_838.jpg

Approximately 25-35% of patients having a mastectomy undergo reconstruction[2]



- Factors associated with not having immediate reconstruction[4]:
  - lower educational level
  - black and Hispanic race
  - increased age of patient
  - patients with a major comorbidity
  - patients requiring chemotherapy

Policies to improve access to breast reconstruction



In 2019, American Society of Plastic Surgeons (ASPS) reported 107,238 reconstructive breast procedures[5]

Is breast reconstruction safe?

- **Yes!** Breast reconstruction does not increase the risk of breast cancer recurrence
- Breast reconstruction does not delay recurrent breast cancer detection or have a negative impact on prognosis

Benefits of breast reconstruction – why do we do it?

- **Breast reconstructions provide substantial psychosocial benefits for patients undergoing mastectomy**
- Breast Q is one patient reported outcome tool developed by Dr. Andrea Pusic
  - Evaluates psychosocial impact, physical impact, appearance and outcome of breast reconstruction, and the process of care and recovery

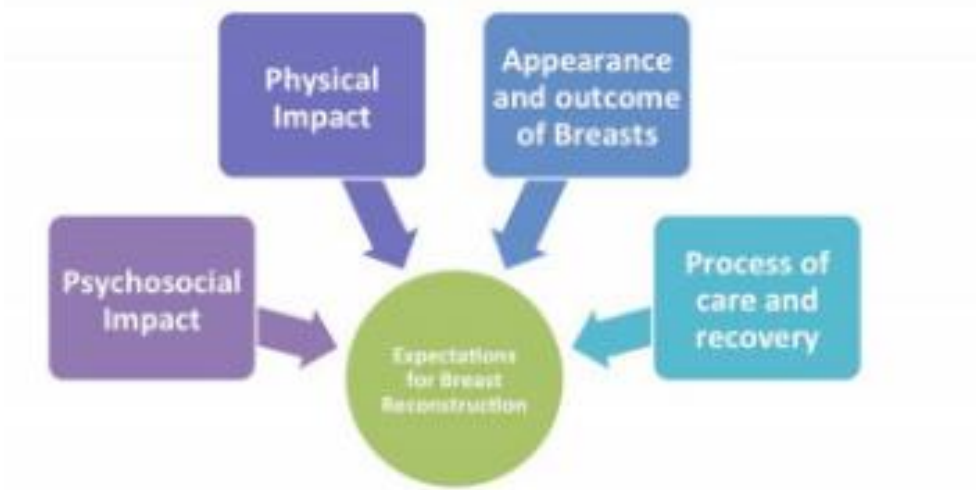
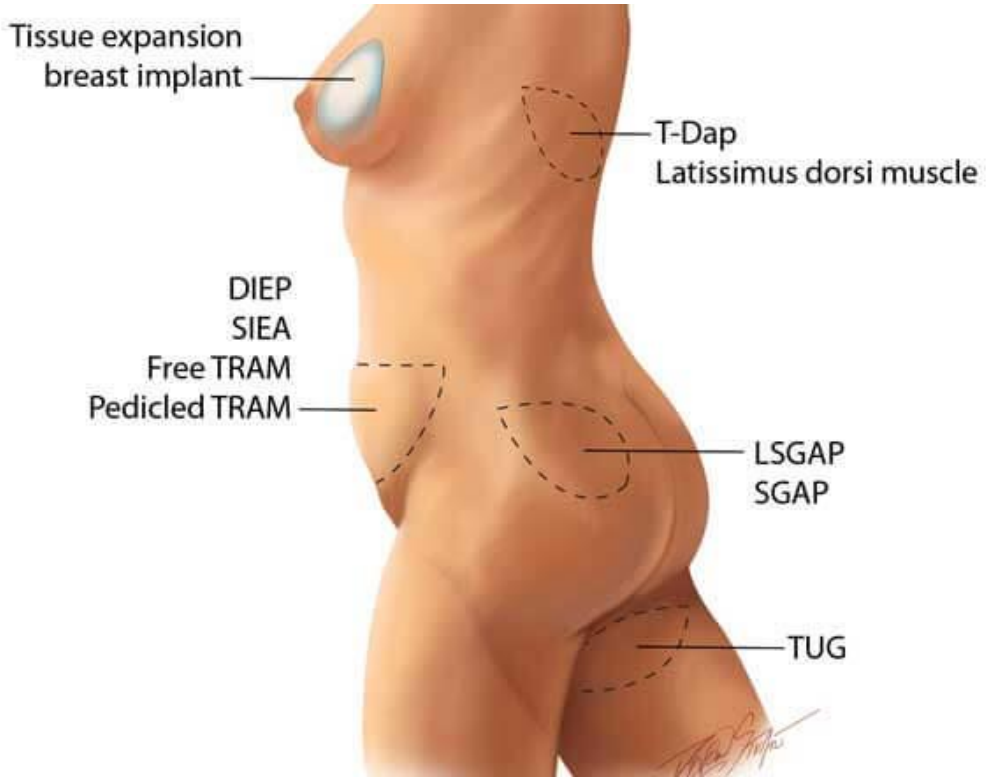


Photo: https://www.mskcc.org/clinical-updates/tool-measure-reconstruction-satisfaction

Two main ways to reconstruct the breast:

Implant (prosthetic) reconstruction

Autologous reconstruction



Also take into consideration timing of reconstruction:

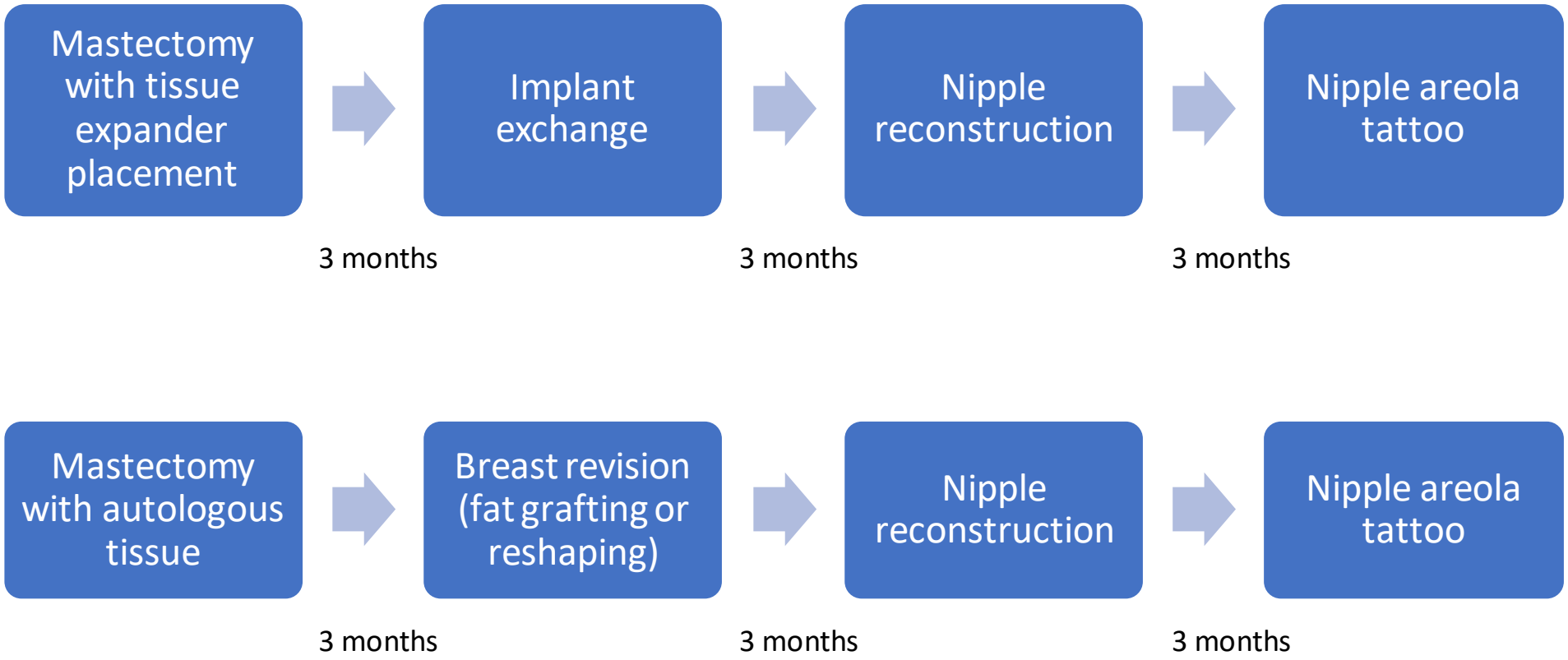
Immediate (at the time of mastectomy) vs. delayed

Photo:https://www.hopkinsmedicine.org/breast_center/treatments_services/reconstructive_breast_surgery/options.html

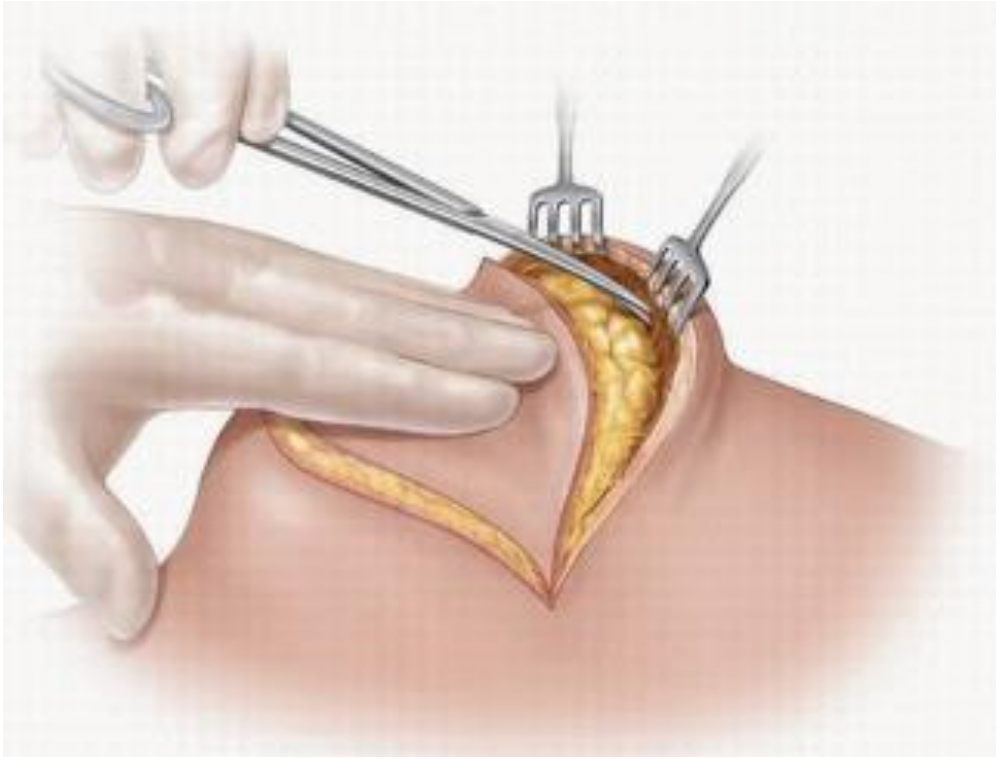
Choice of breast reconstruction depends on

- Patient preferences and expectations
- Patient's diagnosis and staging
- Radiation – past history of treatment or need for XRT after surgery
- Unilateral vs. bilateral mastectomy
- Timing
- Body habitus of patient (BMI, size of breast or desired size of breast, donor sites)

Breast Reconstruction is a Process



Mastectomy



Elevation of mastectomy skin flaps to maintain blood supply

- At the time of the mastectomy, the breast surgeon removes the breast gland through an incision discussed with the plastic surgeon.
  - Blood supply is compromised to the remaining skin
  - Sensation lost to the breast/chest
  - Patients can develop chronic post mastectomy pain syndrome
- Nipple sparing: preserves the entire breast skin envelope (best aesthetic result)
- Skin sparing: preserves inframammary fold and as much native skin as possible

Photo: https://oncohemakey.com/total-mastectomy/

Mastectomy

- Total mastectomy: removal of entire breast with preservation of pec muscle and axillary nodes
- Modified radical: complete removal of the breast with axillary lymph node dissection
- Partial mastectomy (lumpectomy)
  - Will typically need radiation as part of treatment

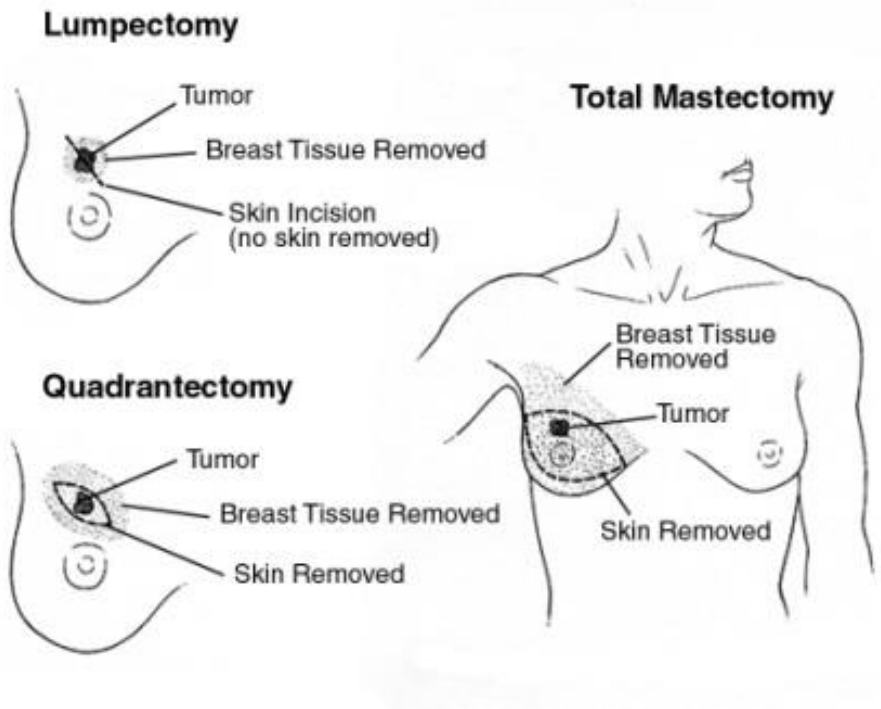
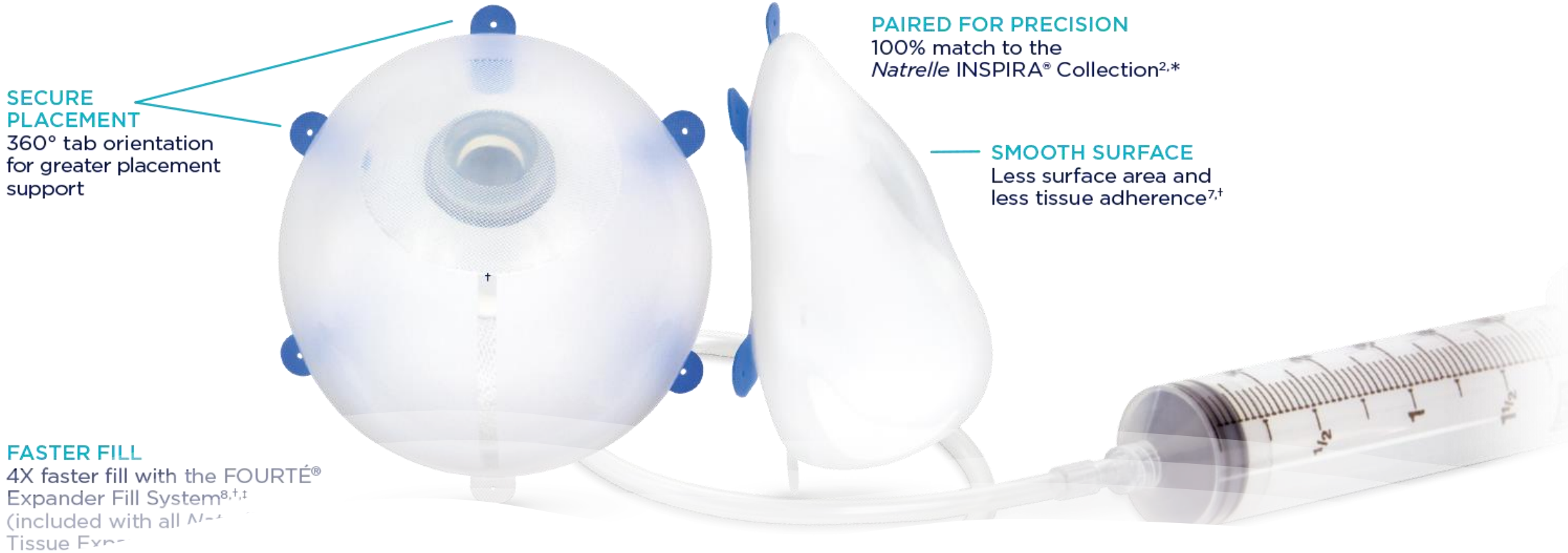


Photo: https://www.news-medical.net/health/What-is-a-Mastectomy.aspx

Implant Based Reconstruction



Implant based reconstruction

- Two stage approach with use of tissue expander vs. DTI (direct to implant)
- What is a tissue expander (TE) and why do we use them?

Implant based reconstruction: two stages

Stage 1: Mastectomy + Tissue Expander Placement → Expansions in office +/- Chemo +/- XRT → **Stage 2**: Exchange of TE to Permanent Implant

- 80% of prosthetic breast reconstruction is performed in 2 stages
  - Stage 1: Tissue expander placement at time of mastectomy
  - Stage 2: Exchange of tissue expander for saline or silicone implant
- Anatomical placement
  - Prepectoral vs. postpectoral

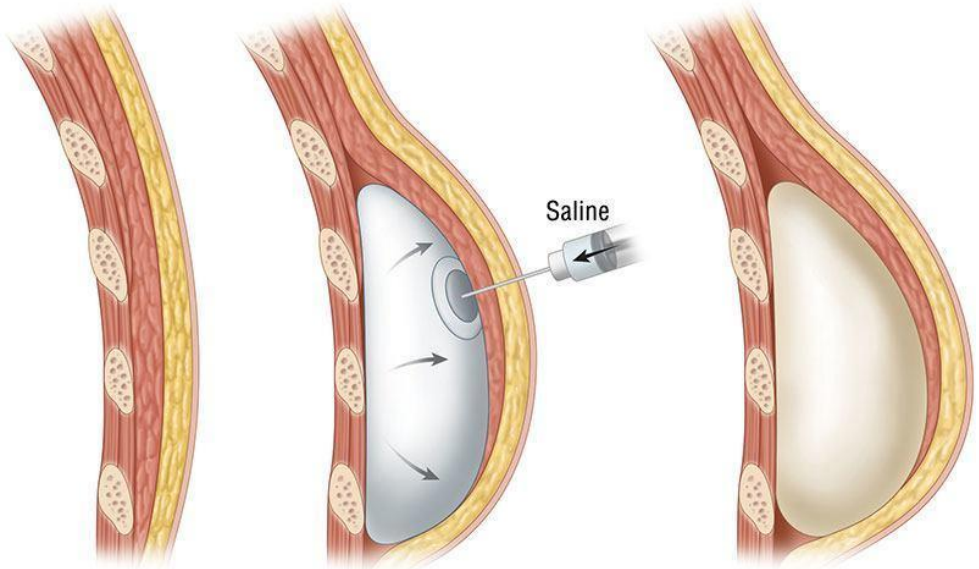


Photo: https://uihc.org/health-topics/breast-reconstruction-after-cancer-treatment

Breast Animation Deformity

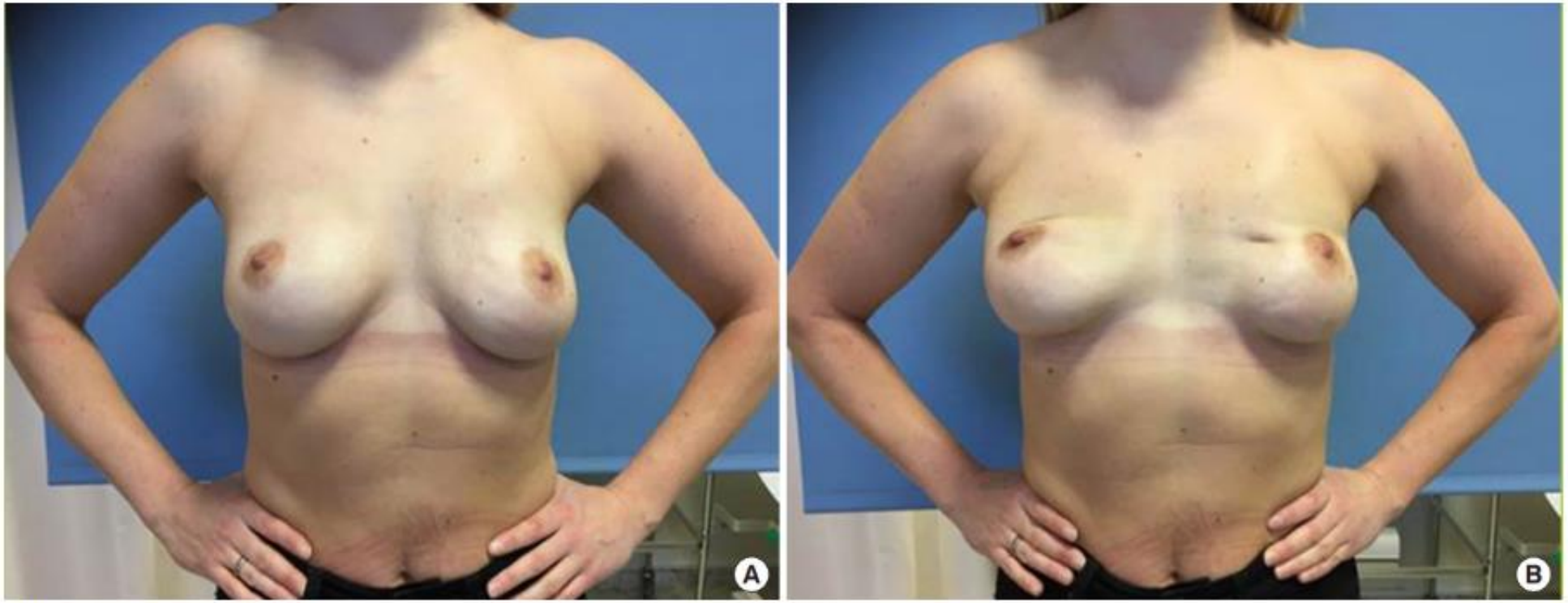


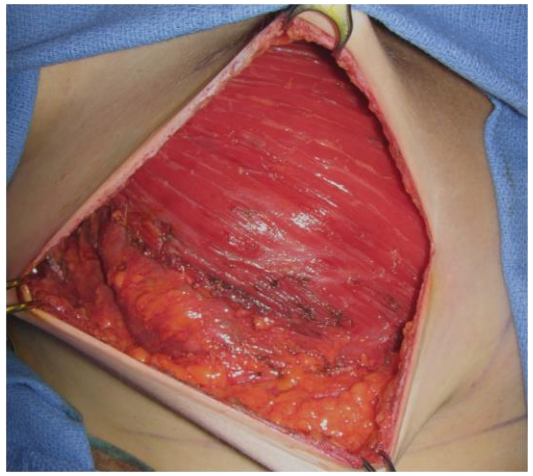
Fig. 3.

Woman with subpectoral implant placement

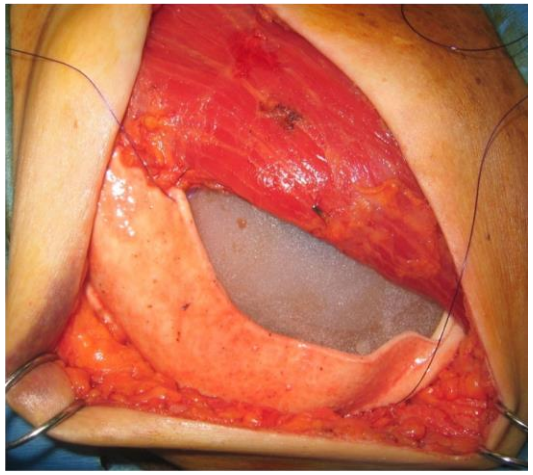
The two photographs demonstrate (A) no breast animation deformity at rest and (B) a visible deformity during muscle contraction.

Breast animation deformity. Arch Plast Surg. 2019;46(1):7-15. Published online January 15, 2019 DOI: https://doi.org/10.5999/aps.2018.00479

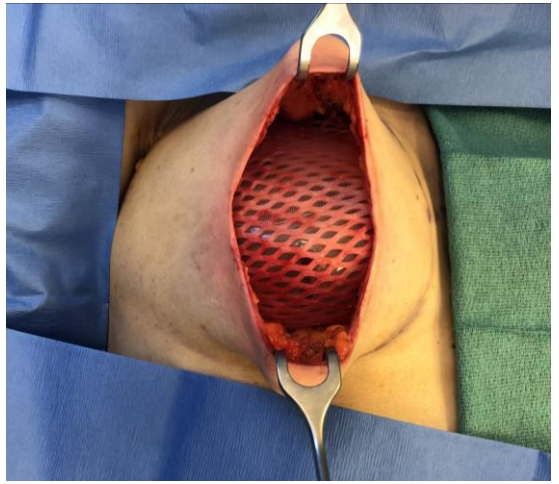
Intraop tissue expander placement



Total muscle coverage

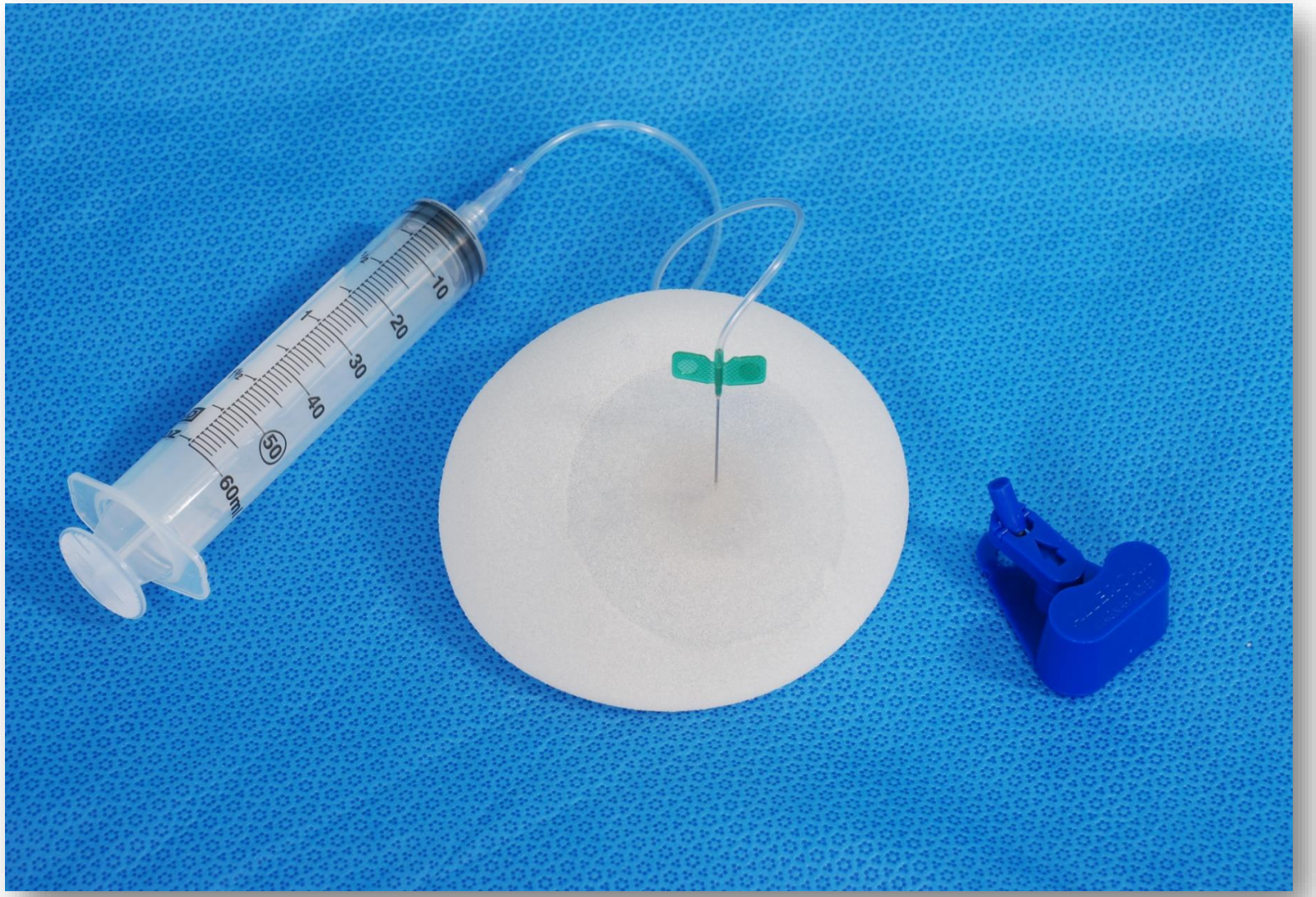


Partial coverage with ADM

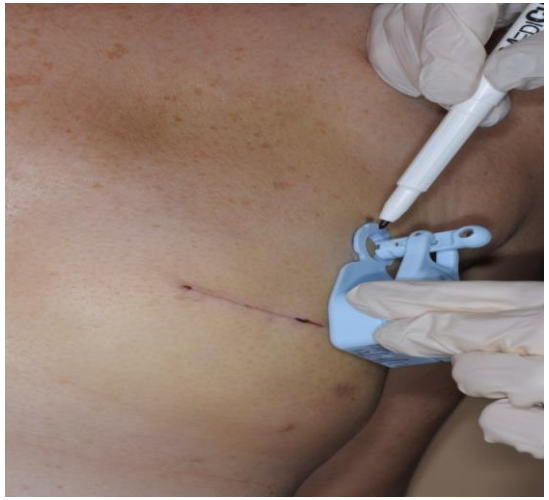


Pre-pectoral with ADM

Tissue expander



Tissue expansion in clinic



Stage 2: Implant exchange

- Exchange to permanent implant is performed about 3 months after mastectomy
  - If patient has chemo, we wait 4-6 weeks after treatment for exchange
  - If patient has radiation, we wait 6 months after completion of XRT
- Silicone, saline, textured implants

Photo: https://www.westlakedermatology.com/blog/breast-implants-comparison/

Saline

- Silicone outer shell
- Filled with saline fluid in the OR
- Rupture: easy to identify, will deflate over 5-7 days
- Shows more rippling

Silicone

- Silicone outer shell
- Filled with silicone
- Rupture: difficult to identify
- **Maintenance MRI to rule out rupture: 5 years after placed, then every 2 years**
- Looks more natural

Textured (Anatomic)

- Silicone outer shell
- Filled with saline or silicone
- **No longer on market due to link to ALCL**
- Originally designed to look the most natural (ptotic) breast

WARNING:

- **Breast implants are not considered lifetime devices. The longer people have them, the greater the chances are that they will develop complications, some of which will require more surgery.**
- **Breast implants have been associated with the development of a cancer of the immune system called breast implant-associated anaplastic large cell lymphoma (BIA-ALCL). This cancer occurs more commonly in patients with textured breast implants than smooth implants, although rates are not well defined. Some patients have died from BIA-ALCL.**
- **Patients receiving breast implants have reported a variety of systemic symptoms such as joint paint, muscle aches, confusion, chronic fatigue, autoimmune diseases and others. Individual patient risk for developing these symptoms has not been well established. Some patients report complete resolution of symptoms when the implants are removed without replacement.**

FDA recommendation for Black Box warning on implants

- Breast implant associated illness
- ALCL (anaplastic large cell lymphoma)

BIA-ALCL (Breast Implant Associated Anaplastic Large Cell Lymphoma)

- A rare subtype of T-cell non-Hodgkins lymphoma found in the capsule (scar) formed around **textured** implants
- Incidence estimations vary
  - Originally reported 1 case per 30,000 women
  - 1 case per 355 women reported May 2020
- Presents as late peri-implant effusion or swelling (fluid collection) in 66% patients or mass/capsule thickening in 8%
- On average, symptoms present 8-10 years from the time of placement of the implant

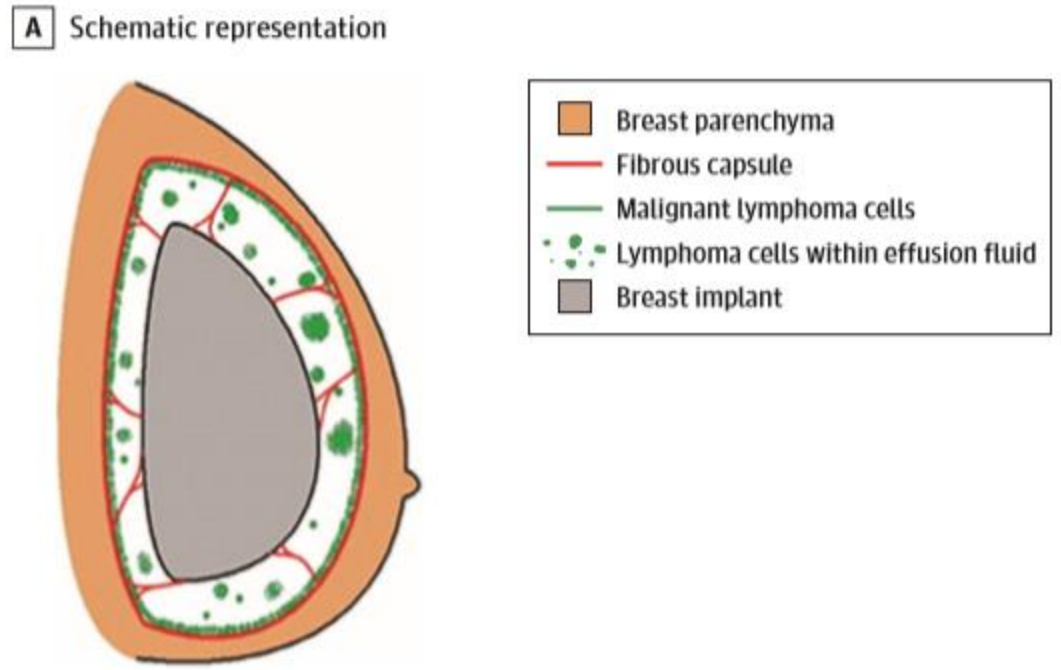
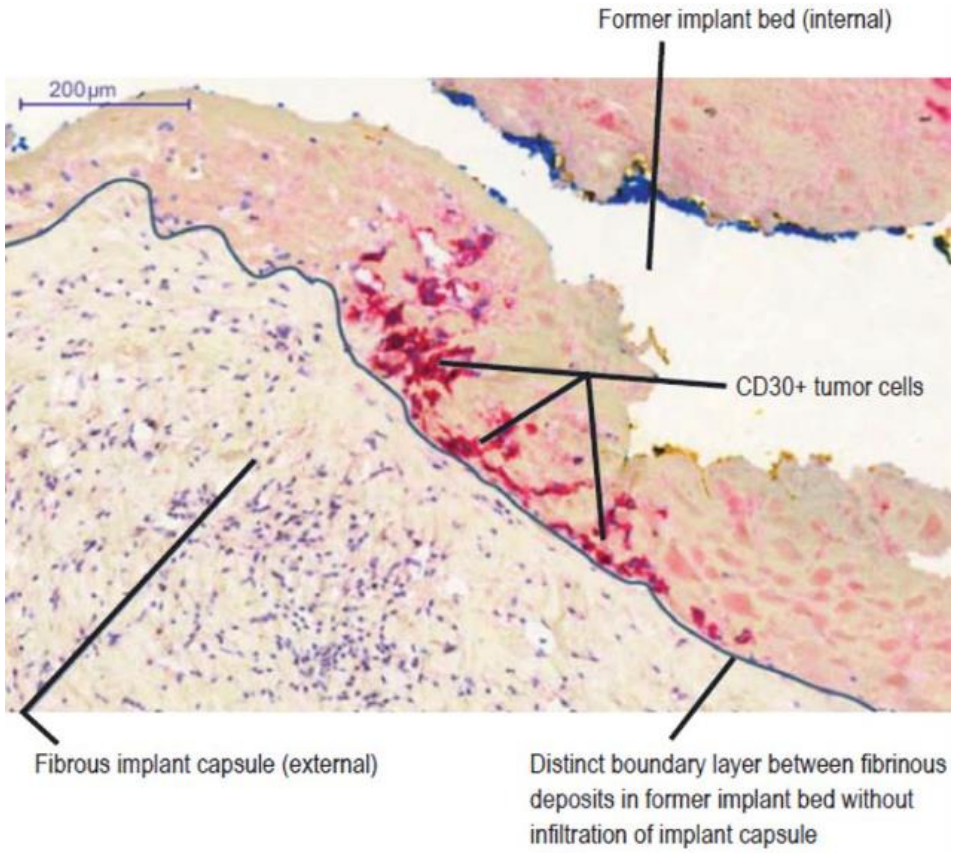


Photo: Leberfinger AN, Behar BJ, Williams NC, et al. Breast Implant-Associated Anaplastic Large Cell Lymphoma: A Systematic Review. *JAMA Surg*. 2017;152(12):1161-1168. doi:10.1001/jamasurg.2017.4026

BIA-ALCL (Breast Implant Associated Anaplastic Large Cell Lymphoma)

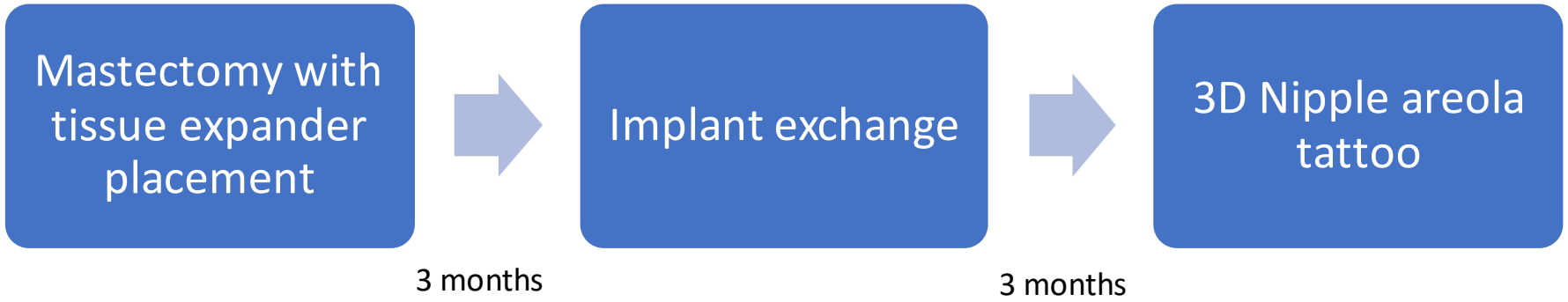


- Diagnosed by ultrasound and FNA
- Treatment: surgical removal of implant and the surrounding capsule
- Survival rate is 89% at 5 years
- **FDA recommendations:** regular monitoring for symptoms of BIA-ALCL, and if you do not have symptoms, there is NO need to remove the implant

Photo: Kricheldorff J, Fallenberg EM, Solbach C, Gerber-Schäfer C, Rancsó C, Fritschen UV. Breast Implant-Associated Lymphoma. *Dtsch Arztebl Int.* 2018;115(38):628-635. doi:10.3238/arztebl.2018.0628

Overview of recovery from implant based reconstruction

- Initial surgery of mastectomy with tissue expander placement is about 2-4 hours depending on unilateral vs. bilateral
  - Overnight stay at the hospital
  - 4-6 week recovery
  - JP drain care postop
- Exchange surgery is about 1-2 hour surgery
  - Outpatient procedure
  - Average 2 week recovery


Mastectomy with tissue expander placement
3 months
Implant exchange
3 months
3D Nipple areola tattoo

Preop

Preop

Bilateral implants with 3D nipple areola tattoo

Right implant reconstruction, no nipple reconstruction

Preop

Bilateral silicone gel implants
with nipple sparing mastectomy

Implant Complications

In the immediate postop setting

- Hematoma
- Seroma
- Dehiscence/Implant Exposure
- Delayed healing or mastectomy skin necrosis
- Cellulitis

Implant Complications

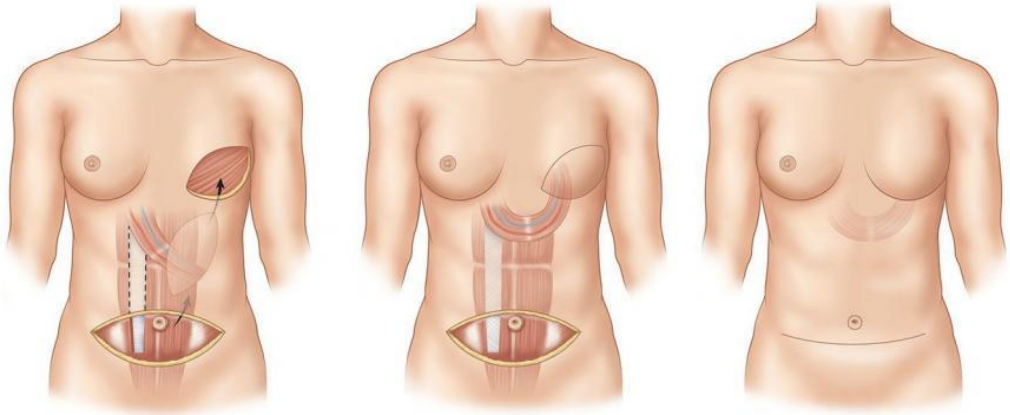
Long Term Considerations

- Capsular Contracture
- Rupture
- Nipple malposition in setting of nipple sparing mastectomy
- Rippling
- Anaplastic Large Cell Lymphoma
- Breast implant associated illness

Autologous Reconstruction

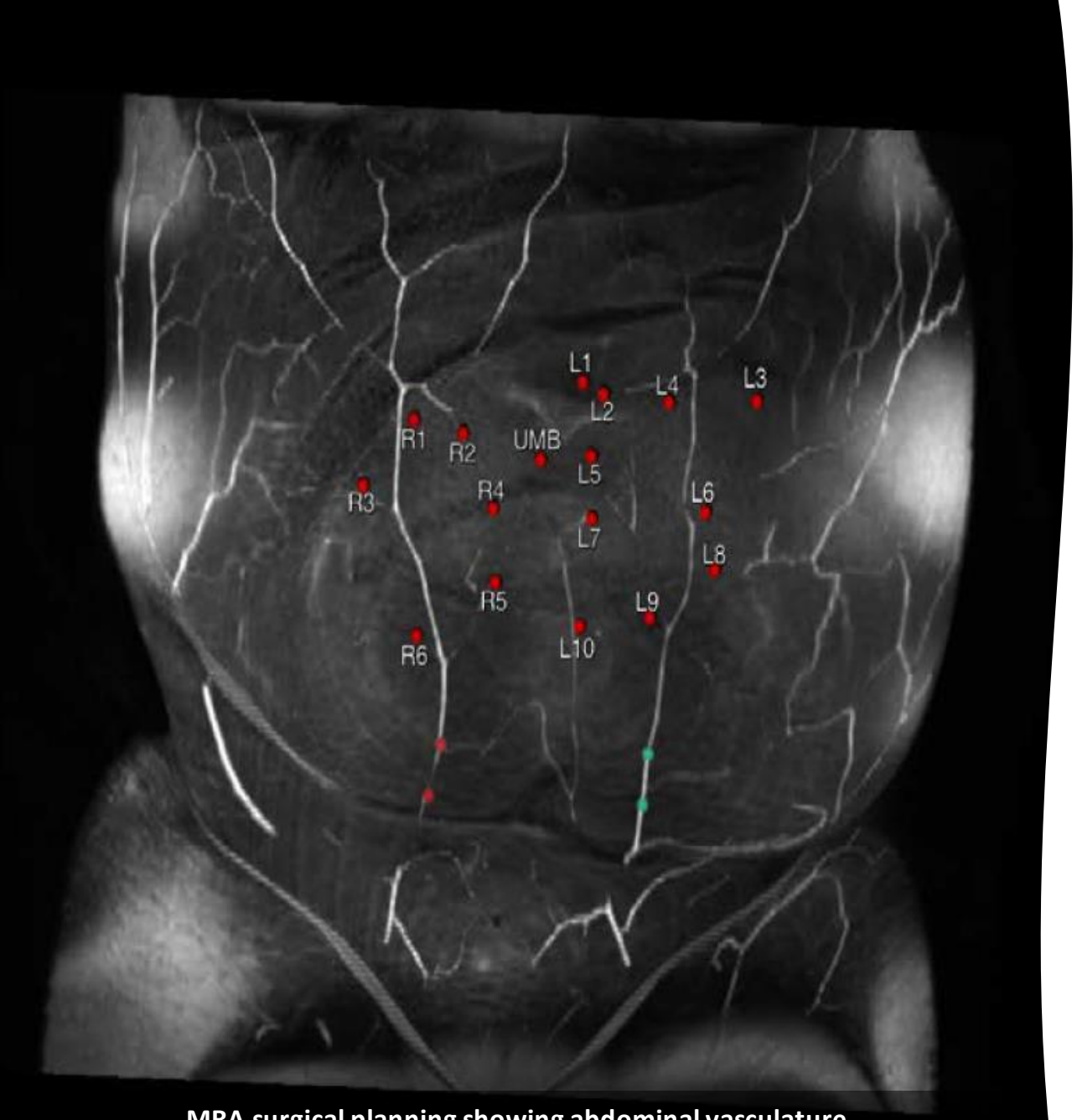
Autologous reconstruction

- Breast reconstruction using a patient's own tissue
- "Flap" in plastic surgery is defined as a unit of tissue that is transferred from its original (donor) site in the body to another (recipient) site based on a blood supply
- Introduction of the pedicled transverse rectus abdominis myocutaneous (TRAM) flap in the 1980s
- Technical advances led to the development of free flaps based on perforators (specific blood supply)
  - Free flap involves advanced technique and training in microsurgery



Pedicled TRAM flap for left breast reconstruction

Photo: https://uihc.org/health-topics/breast-reconstruction-after-cancer-treatment

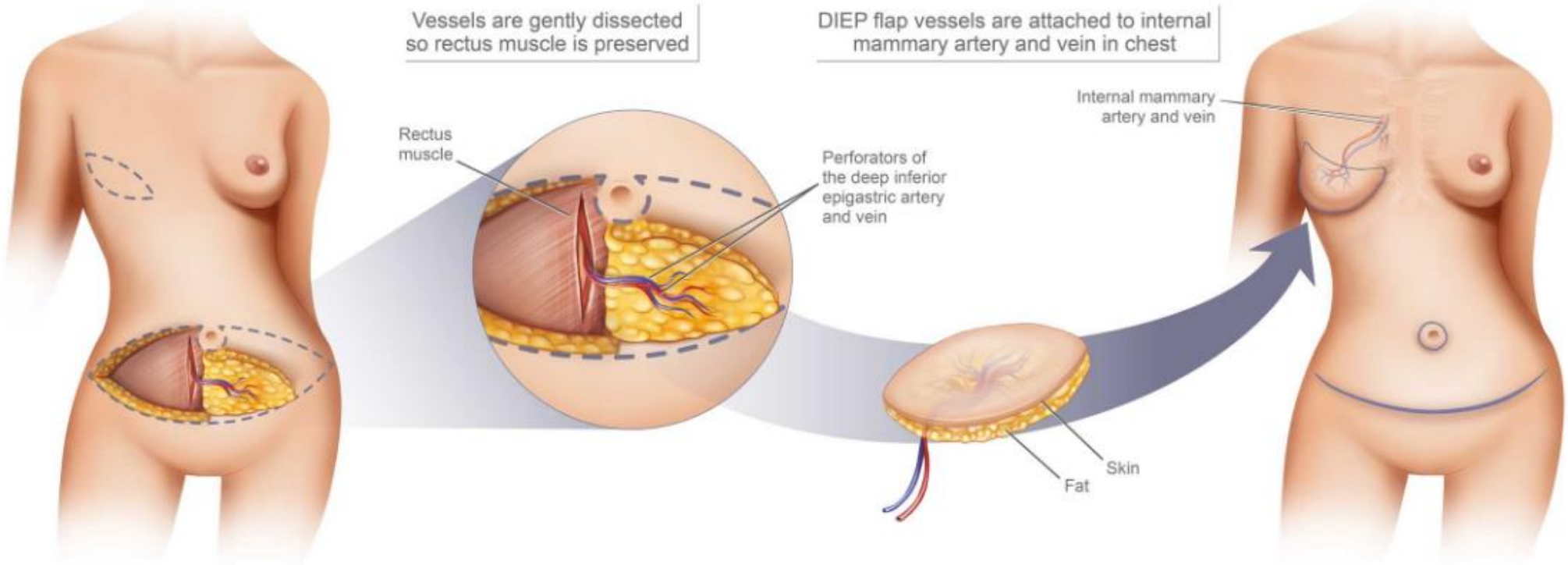


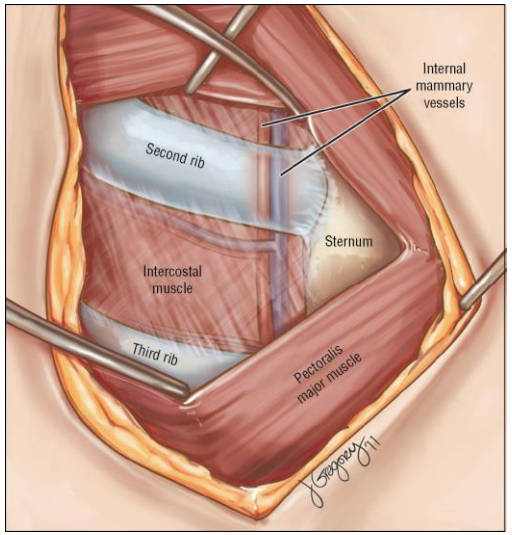
MRA surgical planning showing abdominal vasculature

Deep Inferior Epigastric Perforator (DIEP) flap

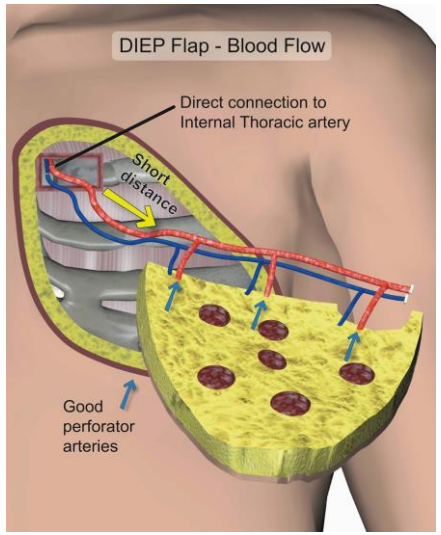
- This is the most commonly used free flap in breast reconstruction in which we use lower abdominal tissue to reconstruct the breast
- Only skin and fat harvested from the abdomen
  - Decreased abdominal morbidity in comparison to TRAM flap
- Patients usually have preop imaging (MRA or CTA) to look at blood vessels
- Vasculature: DIEP vessels
- Anastomosis to internal mammary vessels (typically)

Deep Inferior Epigastric Perforator (DIEP) Flap





Internal mammary vessel exposure



https://centerforbreastreconstruction.com/diep-flap-surgery-and-reconstruction-procedure/

Deep Inferior Epigastric Perforator (DIEP) flap

- Indications
  - Patient must have adequate donor site volume
  - Take into consideration previous abdominal surgery
  - Great option if patient has been radiated or needs delayed breast reconstruction
- Contraindication
  - previous abdominoplasty
  - history of clotting disorder
  - lack of adequate tissue volume
  - smoking

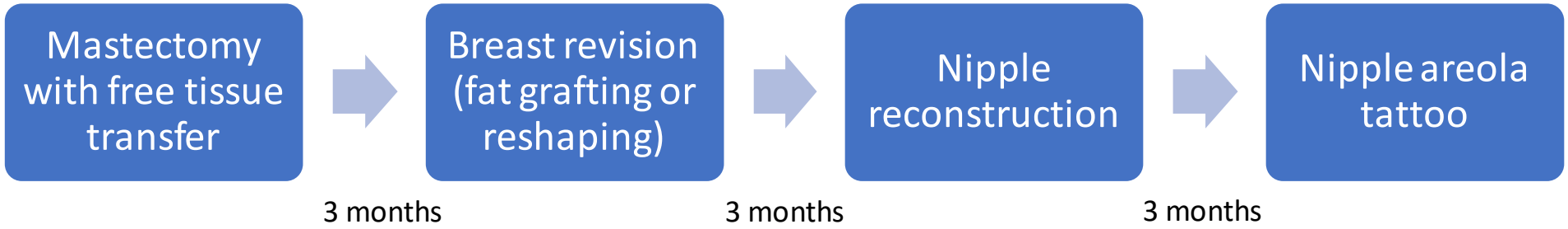
Preop

Postop bilateral DIEPs

Photos courtesy of Dr. Joseph Dayan

Overview of recovery from autologous reconstruction

- Surgery is 6-8 hours by skilled microsurgeon
- Admission for 3-5 days
- Pain control – Enhanced Recovery After Surgery (ERAS) Program
  - Abdominal TAP blocks with Exparel
  - Toradol standing postop q 6 hours
  - Minimizing use of narcotics postoperatively


Mastectomy with free tissue transfer
Breast revision (fat grafting or reshaping)
Nipple reconstruction
Nipple areola tattoo
3 months
3 months
3 months

Deep Inferior Epigastric Perforator (DIEP) Flap

Unilateral DIEP reconstruction (right) and symmetrizing mastopexy (left)

Bilateral DIEP flap reconstruction

Bilateral DIEP flap reconstruction

Unilateral DIEP flap reconstruction (right)

Deep Inferior Epigastric Perforator (DIEP) Flap

Nipple Sparing Mastectomies

Delayed DIEPs

S/P left mastectomy and tissue expander reconstruction followed by radiation treatment

S/P delayed left DIEP flap, nipple reconstruction and tattoo; left mastopexy

S/P right mastectomy followed by radiation treatment

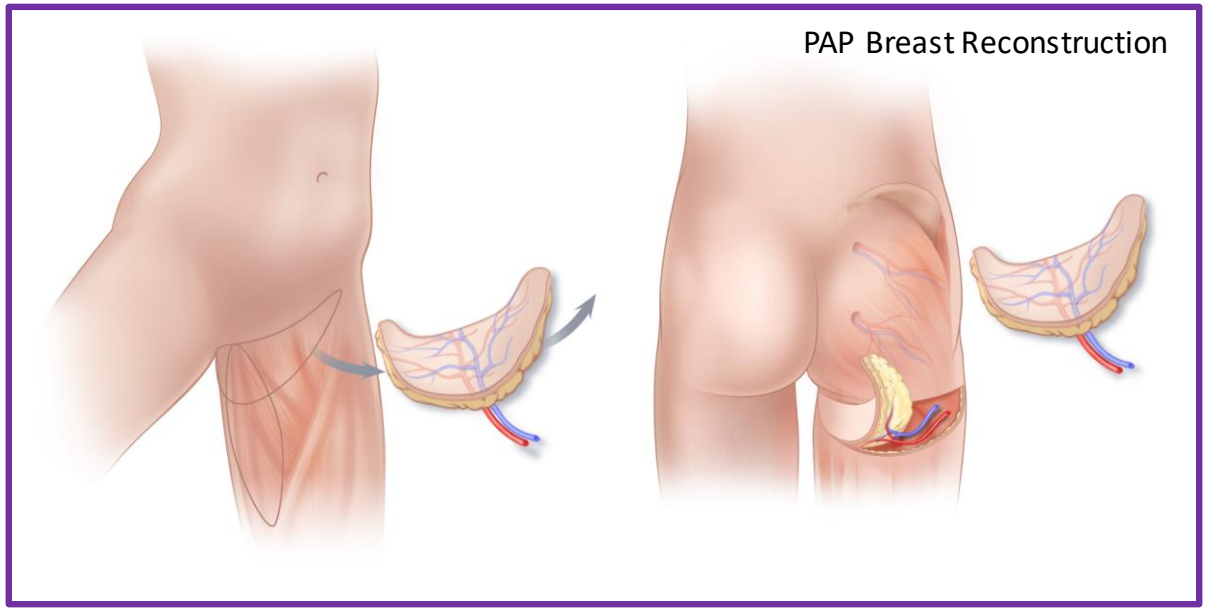
S/P delayed right DIEP and nipple reconstruction with skin graft and tattoo; left mastopexy

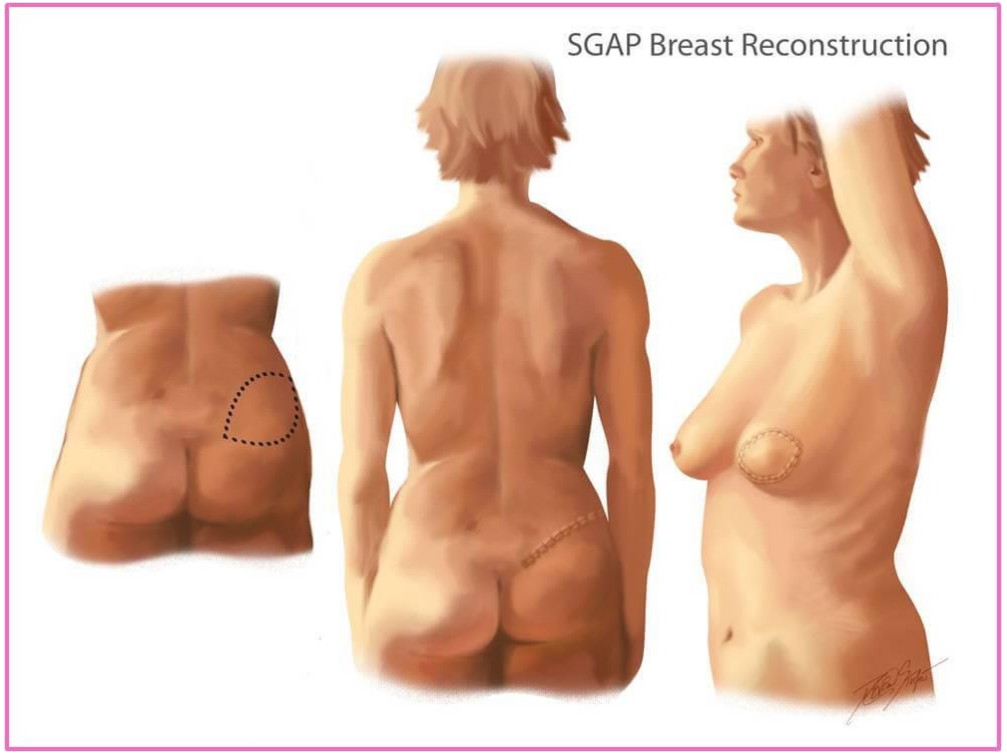
Complications with DIEP flaps

- Flap Failure
  - Less than 1% flap failure rate
- Partial Flap Loss or Fat Necrosis
  - More often with pedicled TRAM flaps than DIEPs
- Abdominal bulge or hernia (TRAM or DIEP flap)
- Decreased sensation at donor site

Other free flap donor sites

- PAP (profunda artery perforator) flap
- SGAP (superior gluteal artery perforator flap)
- DUG/TUG (diagonal or transverse upper gracilis)





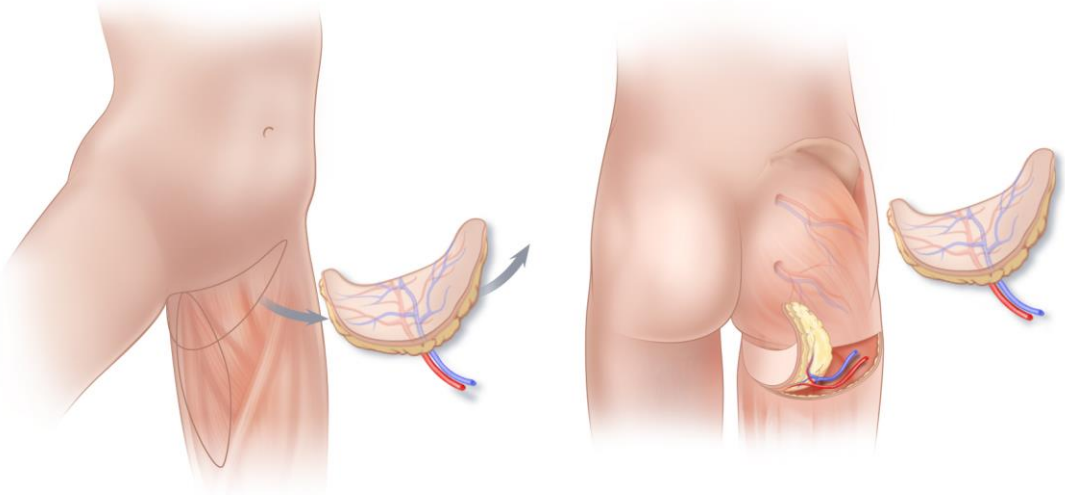
Photos: https://www.hopkinsmedicine.org/breast_center/treatments_services/reconstructive_breast_surgery/superior_gluteal_artery_perforator_flap.html
https://tprsg.com/restorative-techniques/perforator-flap-reconstruction/flap-procedures/the-thigh-as-a-donor-site-pap-dug-and-tug-flaps-new

Bilateral SGAP flap

Preop

Postop

Left DUG flap



Combination autologous and implant based reconstruction

Latissimus dorsi flap with implant

- Typically this is a backup option and not used as a first line option for breast reconstruction
- The latissimus dorsi muscle, fat and skin are rotated based on it's own blood supply. No anastomosis.
- Useful when skin needs to be replaced
- Most common complication is a donor site seroma in the back

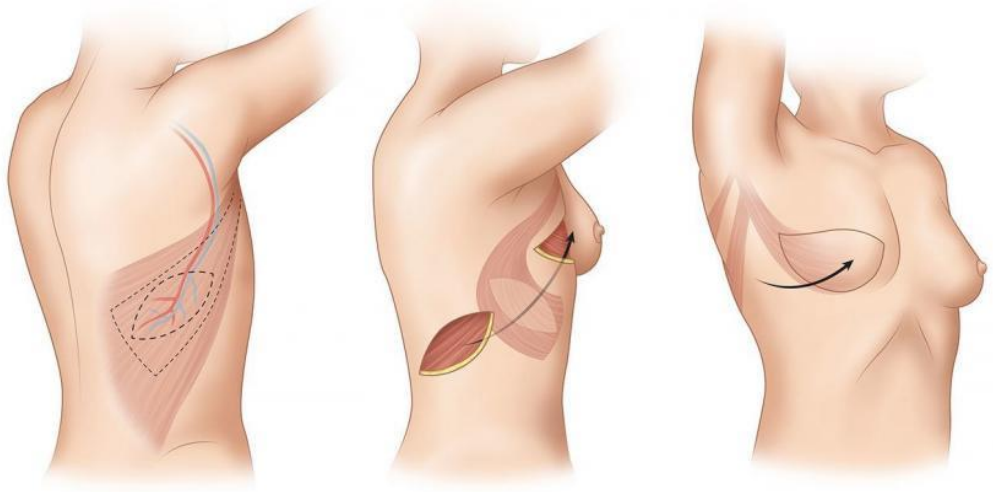
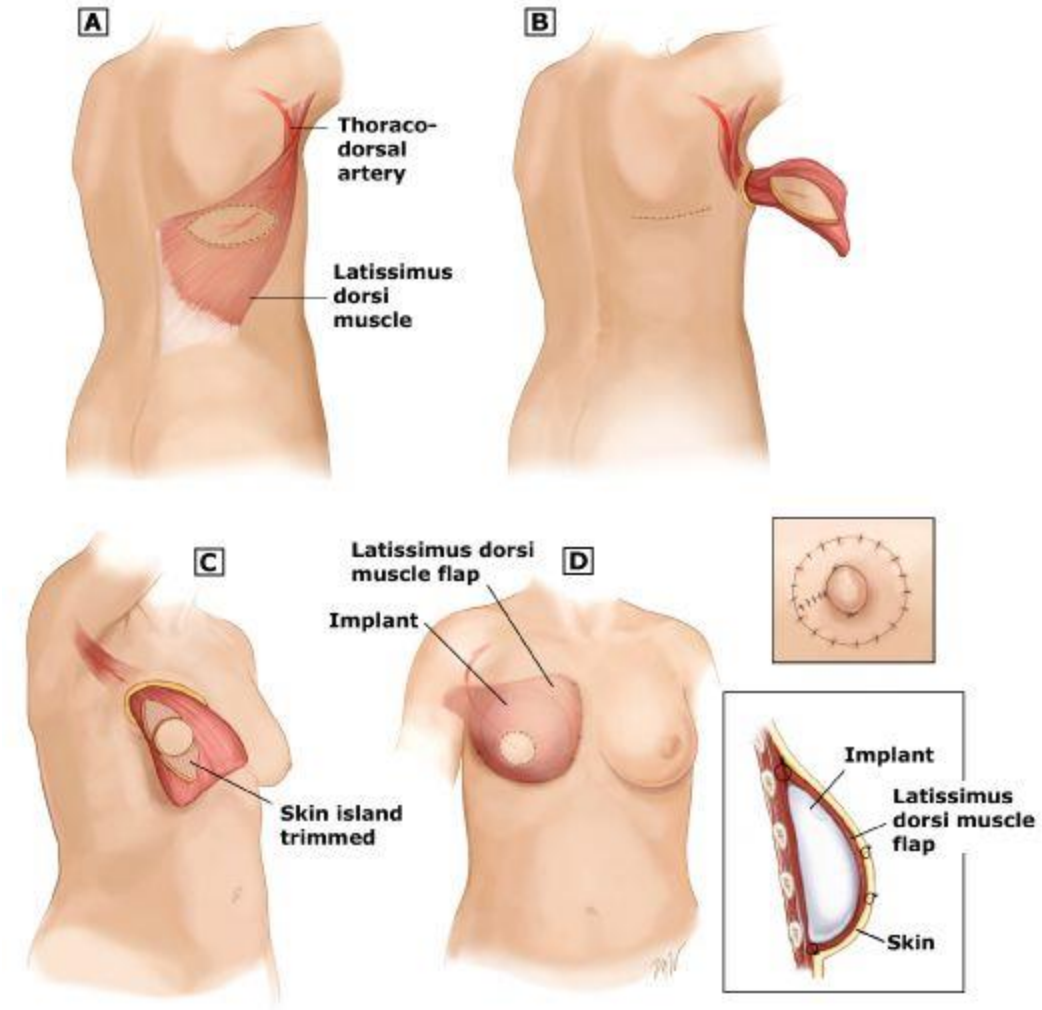


Photo: https://uihc.org/health-topics/breast-reconstruction-after-cancer-treatment

Latissimus dorsi flap with implant



- Indications
  - Patients with history of radiation
  - Failed previous breast reconstruction
  - Patients with considerable previous abdominal surgery
  - Lumpectomy defect
- Relative contraindications
  - Prior posterior thoracotomy
  - Patients who need functional latissimus dorsi (elite athletes, rock climbers, wheelchair users, swimmers, golfers)

Photo: https://somepomed.org/articulos/contents/mobipreview.htm?35/31/36341

Latissimus Dorsi Flap with Implant

Preop: left total mastectomy with no reconstruction and treatment with radiation. Hx of abdominoplasty. Now undergoing right prophylactic mastectomy

Postop: left latissimus flap with silicone gel implant, right silicone gel implant

Latissimus Dorsi Flap with Implant

Nipple Reconstruction

Nipple Reconstruction

- Nipple areola complex (NAC) reconstruction is associated with higher aesthetic and general satisfaction than in breast reconstruction without NAC
- Can often be done in the office in a quick procedure

CV Flap (Local Flap)

Skate Flap with full thickness skin graft

Nipple Share

3D Tattoo

Local Flap (CV Flap)

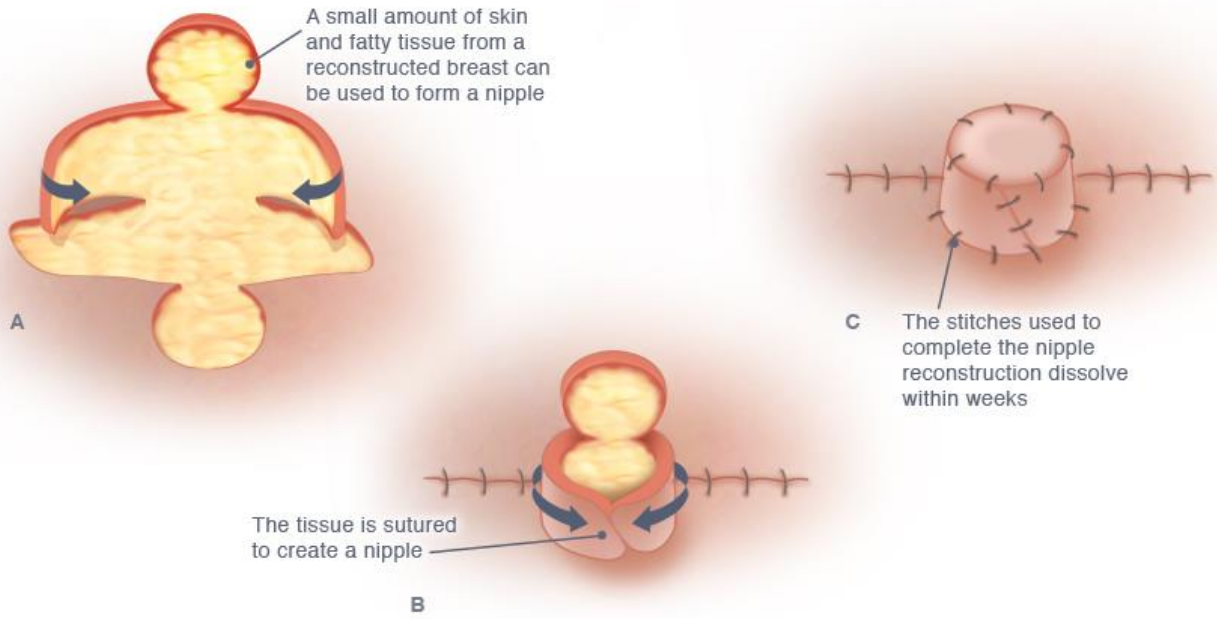


Photo:https://tprsg.com/restorative-techniques/related-breast-surgery-procedures/nipple-reconstruction

Skate flap with Full Thickness Skin Graft (FTSG)

Before Tattoo

Intraop

After Tattoo

Bilateral nipple reconstruction with skate and FTSG

Nipple Share

3D Nipple Areola Tattoo

Quality of Life Outcomes

At 1 year after mastectomy, patients who underwent autologous reconstruction were more satisfied with their breasts and had greater psychosocial and sexual well-being than those who underwent implant reconstruction[11]

Chemo and Radiation Considerations

- Chemotherapy
  - Start about 4-6 weeks after surgery
  - Postop infection may cause a delay in chemo
- Radiation
  - Higher rates of capsular contracture, infection and painful expansion with **implant** reconstruction
  - Higher rates of skin contracture, fat necrosis, flap atrophy with **autologous** reconstruction
  - However, overall there are less complications related to XRT with autologous recon in comparison to implants
  - Preferred to radiate a tissue expander rather than a DIEP or implant

Photo: https://www.mskcc.org/cancer-care/diagnosis-treatment/cancer-treatments/chemotherapy

Effects of Radiation

Radiation to Right
Breast Tissue expander

Right delayed DIEP flap

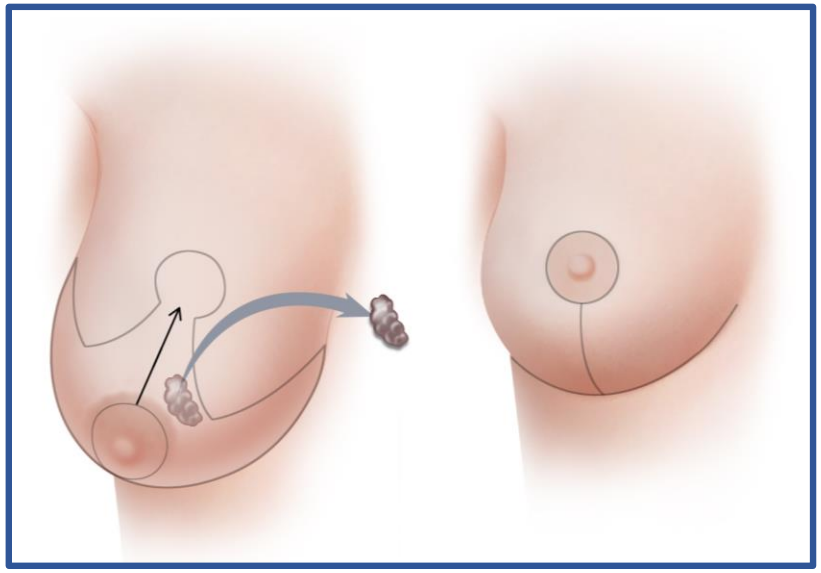
Left implant based reconstruction,
history of radiation to tissue expander

Partial Breast Reconstruction

Partial breast reconstruction

- Breast conservation is the treatment of choice for most stage I and II breast cancers
- Typically with partial mastectomy (lumpectomy) patient will also require radiation for treatment
- Oncoplastic breast reduction is the most common
- If defect is too large or the breast is small, rotational flaps such as latissimus flap or free flaps may be performed
- Fat grafting may also be used to fill small lumpectomy defects

Oncoplastic Breast Reduction



Right oncoplastic reduction, radiation to right breast postop, left breast reduction

https://tprsg.com/restorative-techniques/related-breast-surgery-procedures/oncoplastic-surgery

Recap

Implant based reconstruction

Advantages

- No other scars on the body
- Use of adjacent tissue of similar color, texture
- Shorter operative time and postoperative recovery surgery (2-4 hours for TE placement)
- Autologous reconstruction is always an option later

Disadvantages

- Not a lifetime device, will need to be replaced at some point
- Requires follow up and monitoring for rupture (MRI)

Autologous breast reconstruction

Advantages

- Most natural form of breast reconstruction
- Higher QOL score 1 year postop
- Lower risk of failure and surgical site infection than implants

Disadvantages

- Another scar on the body
- Longer surgery (6-8 hours) and more recovery
- Longer hospitalization (3-5 days vs 1 day)

Breast Cancer Screening After Mastectomy with Reconstruction

- **Physical exam** remains gold standard for detecting locoregional recurrence after mastectomy
- Fat necrosis can occur in patients with flaps or after fat grafting revision to breast reconstruction
  - This is worked up with **ultrasound, possibly biopsy**
- Multidisciplinary discussion is important
- Studies have shown that postmastectomy imaging in breast reconstruction patient for surveillance did not affect overall survival or disease-free survival

Thank you!

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