Introduction

No Disclosures

Medical illustrations by Kelly Rosso, MD
Personal photos provided by patients with consent
Clinical photos by consent

Breastfeeding Medicine

- Internationally recognized multidisciplinary specialty
- Historically has consisted of family practice doctors, pediatricians, neonatologists, ob/gyns but increasingly generating interest across all disciplines
  - Breast/general surgery, anesthesia, ENT, dermatology, radiology
- Academic journal and society fellowship

Lactation Consulting

- International Board Certified Lactation Consultant (IBCLC)
  - 1000 patient hours, generally 90 online hours if MD/DO
  - Biannual standardized exam
- Founded in 1985 by La Leche League startup funding to standardize lactation education and care
  - Currently 31K IBCLCs worldwide
- Journal of Human Lactation, Clinical Lactation, International Breastfeeding

Baby Friendly Hospital Initiative

- WHO and UNICEF launched in 1991 to implement practices that protect, promote, and support breastfeeding
- Follows "10 Steps"
- Currently 152 countries worldwide
- Related code that regulates marketing of breastmilk substitutes

BFHI promotes things like …

- "Skin to skin" immediately post-birth
- "Rooming in" (no separation of mom and baby unless medically necessary)
- No formula unless medically indicated
  - No formula "gift bags" or free samples
- Lactation consulting assistance

A Quick Guide to WHO Code Basics

What does the Code cover?

- Formula milk
- Any food or drink that would substitute for breastfeeding eg teas or foods aimed at babies under six months, or formula aimed at any age
- Bottles
- Teats or nipples

Who is expected to follow the Code?

- Manufacturers, distributors, and retailers of any of the above items
- Health care workers, both professionals and volunteers
- Health care facilities—hospitals, clinics, etc

What must be on the label?

- Labels must be in the local language
- Information must include the hazards associated with artificial feeding
- Labels cannot use idealising language or images eg a happy baby sleeping, or a protective shield suggesting baby is in a protected bubble against disease

What IS allowed under the Code?

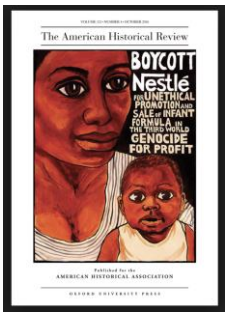
- ✔ Use of formula with safe preparation, for babies who need it
- ✔ Sale of products with technical information eg "125 ml polycarbonate bottle"
- ✔ Scientific and factual information for health professionals eg contains certain proteins
- ✔ Accurate information on safe formula preparation is required on all labels

What is NOT allowed under the Code?

- ✖ Promotion to parents: advertising, free samples
- ✖ Promotion to health professionals: gifts, free samples
- ✖ Promotion in health facilities: posters, free formula, gifts
- ✖ Promotion of unsuitable products for babies (such as sweetened condensed milk)

la leche league international

Public and global health



- Aggressive formula advertising in developing countries continues today
- Lack of fresh water, formula often mixed with contaminated water or diluted and concurrent promotion of branded bottled water
  - 6-25x more likely to die of diarrhea
  - 4x more likely to die of pneumonia
- Free samples in hospital impairs establishment of lactation, samples no longer free after hospital but dyads remain dependent on formula

UNICEF

Infant risks of less breastfeeding

- Increased mortality
  - Necrotizing enterocolitis
  - SIDS
- Increased Infection
  - GI
  - Respiratory
  - Otitis media
- Increased metabolic disorders
  - Obesity
  - Type 1 and 2 DM
- Increased malignancy
  - Leukemia
  - Lymphoma
- Lower IQ

Dose response important: Higher protection with exclusivity

AAP 2012; Schwartz et al Obs and Gyn 2009; Strathearn et al Pediatrics 2009

Maternal risks of less breastfeeding

- Increased psychological disorders
  - Postpartum depression
- Increased reproductive risks
  - Increased postpartum bleeding
  - Decreased child spacing
  - Persistence of pregnancy-related insulin resistance
- Increased CV disorders
  - HTN, CV disease, stroke
- Increased metabolic disorders
  - Increased visceral fat
  - Increased DM

Dias and Figueiredo J Affect Dis 2014; Campbell and Gray Am J Ob and Gyn 1993

Financial impact

United States Breastfeeding Committee Calculator
http://www.usbreastfeeding.org/p/cm/ld/fid=438

Health impact of breastfeeding for the United States

Changing from rates of... ... to rates of	Initiation 82.5 90	Exclusive in hospital 69.7 90	3 mo exclusive 46.6 90	6 mo exclusive 24.9 90	6 mo any 55.3 90	12 mo any 33.7 90

would prevent...

Medical Costs
$2,405,023,438
($1,907,415,042 to $3,435,992,657)

Non Medical Costs
$1,093,681,596
($890,235,488 to $1,330,166,696)

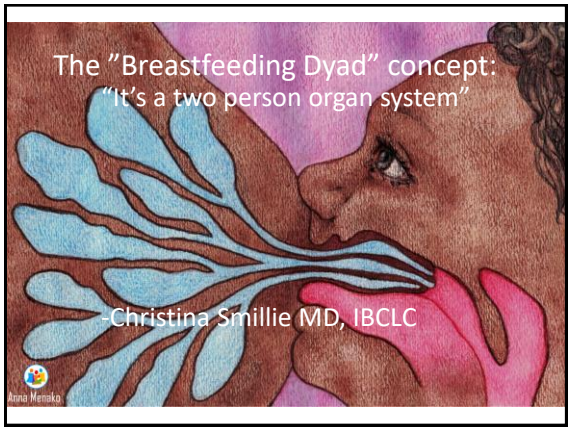
Death Costs
$10,798,725,299
($1,156,363,092 to $21,585,947,064)

Maternal deaths
2,057
(-788, 5,271)

Child deaths
543
(-8, 1,161)

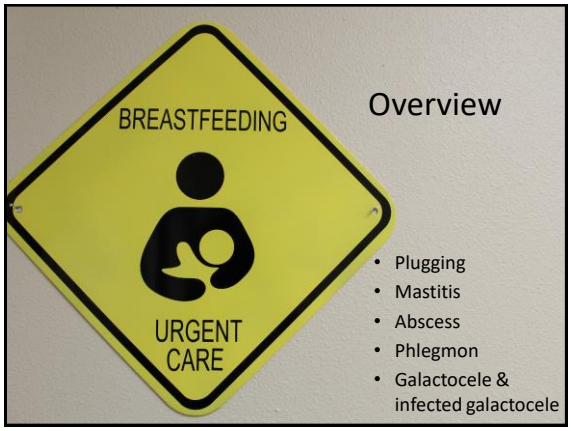
Society recommendations

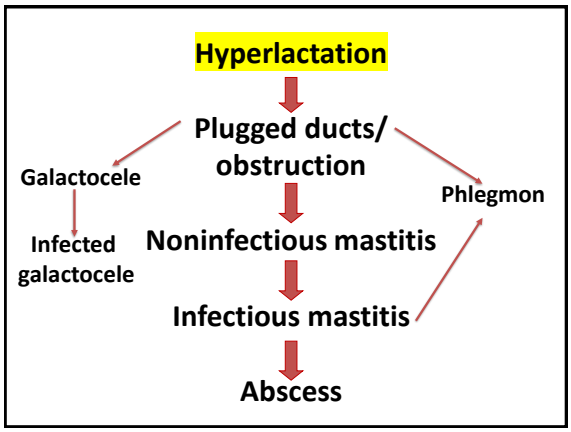
- WHO, ABM, AAFP
  - Exclusive breastfeeding until six months
  - Add solids at six months
  - Breastfeed at least two years
- ACOG
  - Exclusive for six months
  - Continue for one year or longer
- AAP (receives funding from formula industry)
  - Exclusive until *about* six months
  - Add solids *around* six months
  - Continue for at least one year or as long as desired



Breast surgeons are essential in care of the dyad: Course timetable

- Appendicitis of lactation: obstructive and inflammatory conditions
- Nipple areolar complex
- Breast masses and conditions
- Breast cancer
- Plastic surgery
- Lactation primer for breast surgeons
- Take home tools

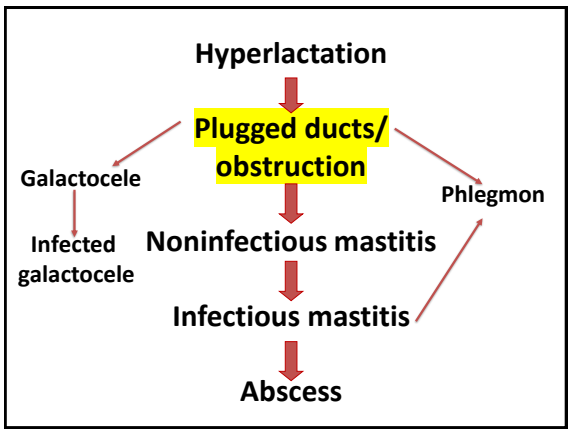




Hyperlactation or "oversupply"

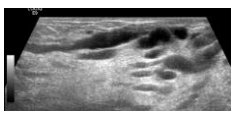
- No precise definition
- Production of milk in excess of what baby needs
  - 450-1200ml term infant
    - doesn't change over time
- Can be localized issue to one breast or one ductal system/quadrant

Lawrence and Lawrence Breastfeeding: A guide for the medical profession 2016; ABM protocol #33



Plugged duct

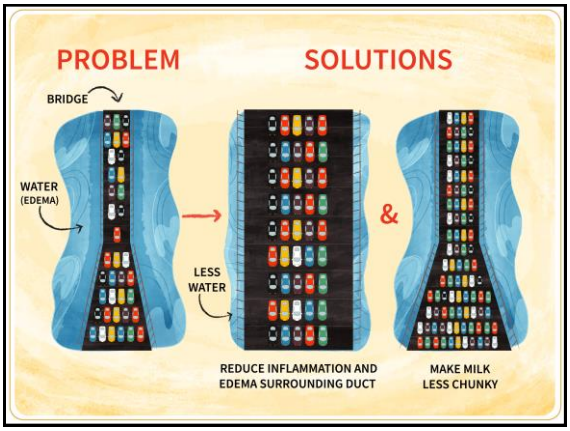
- Localized area of milk stasis with distension of ductal tissue
- Symptoms
  - Tender, full area or lump
  - No redness, fever, or systemic signs
  - Breast may not feel "soft" in that area



Plugged duct risk factors

- Non-physiologic feeding
  - Nipple shields
  - Pumping
- Hyperlactation/oversupply
- Subacute mastitis (bacterial dysbiosis)
- Anatomic
  - Lactiferous sinus pooling of milk

Berens et al ABM Protocol #26, Eglash, Newman, breastfeedinginc.ca



Plugged duct treatment: Behavioral interventions

- **Breastfeed to loosen plug**
  - Baby's dynamic mouth/suck empties best
  - Avoid pump if possible; will stimulate production without removing milk physiologically
- Moist heat, ice, ibuprofen
- Do NOT overfeed on affected breast ("back up more cars behind the traffic jam")

Witt et al 2016

Plugged duct treatment: Behavioral interventions

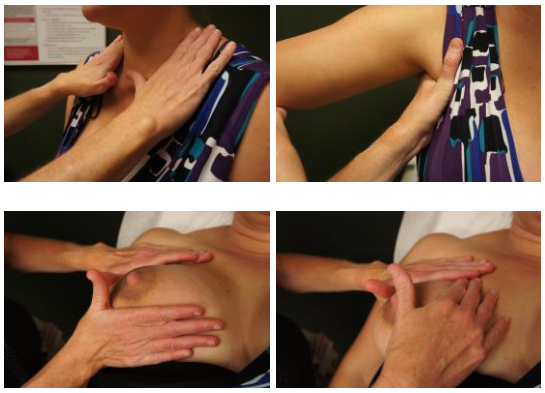
- Therapeutic ultrasound
  - Thermal and nonthermal effects, including acceleration of metabolic rate, reduction of pain, increased circulation
  - 5-6.5 mins treatment sessions in one study ranged from 1-7 with resolution within one week for most patients
  - Method
    - Frequency 1mHz, intensity 2.0 W/cm2
    - 5-6.5 mins for area 2-3x the head of the probe

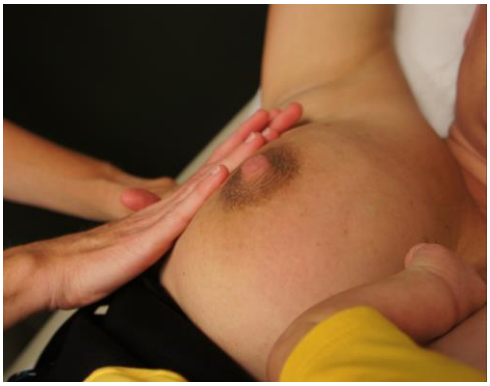
Cameron 2013, Cooper and Kowalsky 2015

Lymphatic massage for plugged duct

- Reduces swelling by assisting movement of lymph fluid, decreasing edema, softening fibrosis
- Technique
  - "Very gentle touch/traction of skin - "like petting a cat" (lift skin to allow flow of lymphatic drainage and vascular decongestion)
  - Ten small circles at junction of IJ and subclavian
  - Ten small circles in axilla
  - Continue with light touch massage from nipple towards clavicle, axilla
- Start during pregnancy if experiencing painful rapid breast growth, and use as needed postpartum for engorgement

Images: Kelly Ross, MD, Ezzo et al 2015

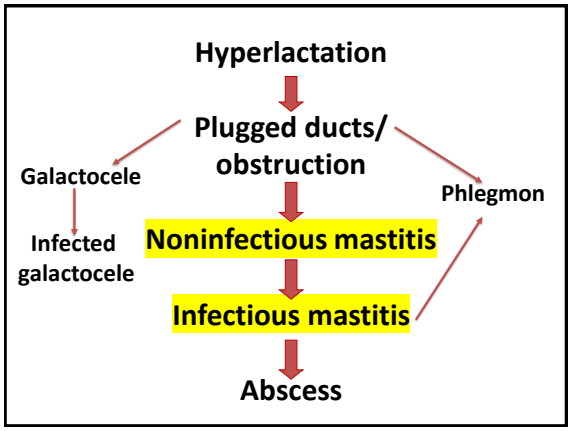


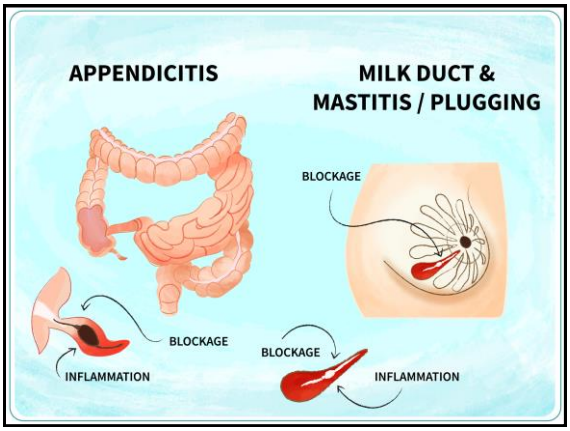


Plugged duct treatment: Supplements, considerations

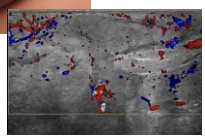
- Sunflower lecithin 5000mg-10g/day prevention
- Poke root/phytolocca acutely
- Image if it doesn't resolve; rule out galactocele or mass
- Determine acute plugging versus more chronic

Berens et al ABM Protocol #26, Eglash, Newman, breastfeedinginc.ca





Mastitis presenting symptoms



- Overall incidence 9-20%
  - 8-19% recurrent
  - 5-10% abscess formation
- Sudden onset breast pain and erythema
- Systemic symptoms
  - Lactating breast metabolically active organ
  - Myalgias, flu-like symptoms, headache, fatigue, fever, tachycardia
- Tender breast, erythema in ductal distribution or retroarelar
- May have associated nipple trauma
- Ultrasound: edema, hyperemia, +/- hypoechogenicity

Amir et al Breastfeeding Med 2014, Amir, ABM protocol #4, Hamosh and Goldman Human Lactation 2

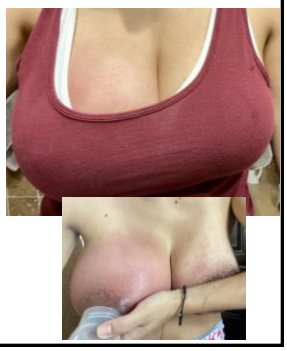
Mastitis Treatment

- EXAMINE THE PATIENT
- Address predisposing factors
  - Hyperlactation - #1, Pump use, Nipple shields
- Physiologic nursing
  - Do not "pump to empty" or overfeed on affected breast
- Ice, heat, ibuprofen
- NO MASSAGE
- Probiotic with *lactobacillus salivarius, fermentum-*
  - *Not ready for prime-time*
- Antibiotics – **all are SAFE; don't pump and dump!**
  - Usually MSSA
  - Some clinicians will wait 12-24 hours prior to starting antibiotics

Amir et al Breastfeeding Med 2014

Consequence of Excessive Pumping

- Unilateral iatrogenic hyperlactation
  - No feedback inhibition
    'big fat hog of a baby'
- Patient instructed to feed or pump "to empty" after first episode mastitis
- Developed recurrent mastitis until she started feeding on the less full breast (ultimately a 3:1 or 4:1 ratio)



Resolution after cessation of pumping and attention to feeding emptier side first

Breastfeeding Mastitis Algorithm for ER and Urgent Care

Breastfeeding Mastitis

If concerned for abscess, order diagnostic ultrasound.
In obvious abscess, clinical diagnosis may be made

Ultrasound Without Abscess

- Dicloxacillin 500mg QID
- If history of MRSA: Clindamycin 300mg QID or TMP/Sulfa DS BID
- Alternate: Erythromycin 500mg QID, cefdinir 300mg bid
- Note: Keflex has poor penetration in lactating breast tissue
- OTC probiotics to prevent diarrhea
- Follow up with breast surgery

Questions?
Call Dr. Katrina Mitchell
Cell: (646) 709-6048

Abscess < 5cm

- Aspirate with 18 gauge needle; milk may be sticky and needle may need to be cleared with saline
- Alternative is 11 blade stab incision with drain placement, as aspiration may require repeat procedures and may not fully drain loculated milk, even in smaller abscesses
- Culture
- Antibiotics as above; OTC probiotics
- If loculated/not well drained, send to breast surgery/IR
- Follow up with breast surgery

Abscess > 5cm

- STAT drainage via 11 blade stab incision and drain placement
- Or IR consult for aspiration, pigtail catheter drainage, and culture
- Antibiotics as above; OTC probiotics
- Follow up with breast surgery

Additional Information

- Minimally invasive drainage of abscess is the standard of care for lactating women
- Encourage women to continue breastfeeding; abrupt weaning worsens inflammation
- Encourage women to continue feeding from the affected side; there is no harm to mother or baby
- If the infant has no allergies, there is no need to pump and dump while taking antibiotics

Recurrent Mastitis

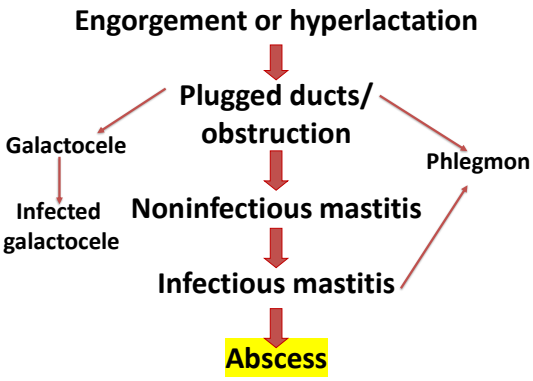
- Treatment
  - Readdress any predisposing risk factors
    - Hyperlactation!!!!
  - Midstream breastmilk culture
  - Empiric change of antibiotics
    - know your community (widespread clindamycin resistance now)
  - Sunflower lecithin to reduce viscosity of milk, 2.4 grams bid-qid
  - Consider imaging

Branch-Elliman et al Clin Infec Dis 2012, Amir et al Breastfeeding Med 2014; Kvist et al Int Breastfeeding J 2008

Breastmilk Culture

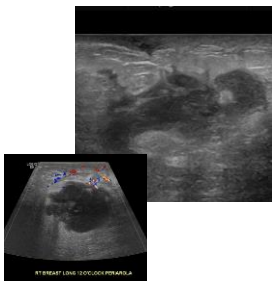
- Midstream breastmilk culture
  - Prep NAC
  - Use sterile gloves
  - Hand express into sterile container
  - Send as a body fluid culture, not a wound culture
    - Wound culture will miss coag neg staph

UNC Mastitis Algorithm



Abscess

- Often peri/retroareolar due to covergence of ducts, stasis
- Risk Factors: hyperlactation, pumping, nipple shields, delayed or inadequate treatment of mastitis, **SLEEPY BABY** (i.e. inadequate physiologic removal of milk)
- May have absence of systemic findings
- Evaluation
  - Physical exam
  - +/- ultrasound



Cottrell et al J Diag Med Sono 2016

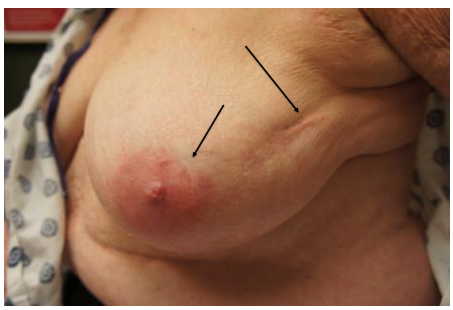
Mastitis can progress to retroareolar abscess if untreated

Continued breastfeeding

Abscess treatment: Past -> surgical incision and drainage

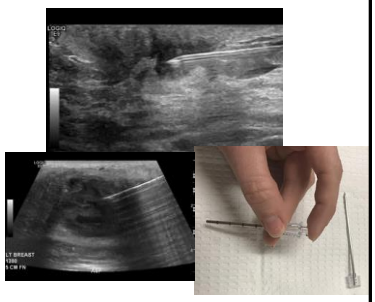
Images: Laura Tauritz Bakker

Abscess treatment: Past -> surgical incision and drainage



Abscess treatment: Present

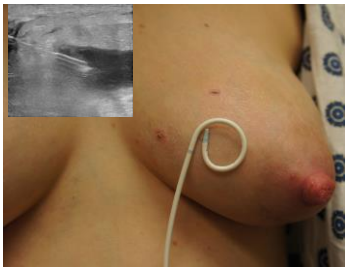
- Drainage, culture, antibiotics
- Smaller abscesses (<3-5 cm): aspiration with 18 or larger gauge needle (11G)
  - **vs. 11 blade stab incision/penrose for definitive drainage in clinic**



Eryilmaz et al The Breast 2005, Giess et al J Clin Ultrasound 2014 , Christiansen et al Br J Rad 2005

Abscess treatment: Present

- Larger abscesses (> 5 cm)
  - Interventional radiology (IR)w/ 8F catheter
  - 11 blade stab incision/penrose drain placement in clinic



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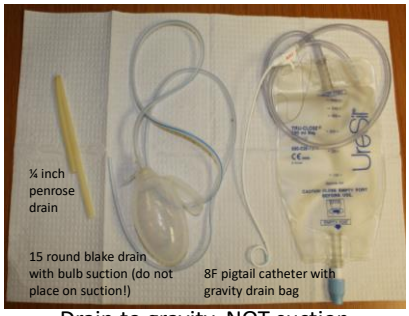
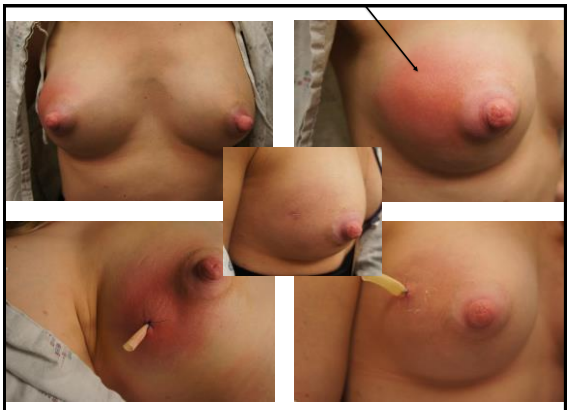


Drain to gravity, NOT suction

NO VAC!!!



Left photos: Kevin Rodbell, MD

Recognize the diagnosis

Images: Chantal Reyna, MD

Recognize the diagnosis

Recognize the diagnosis

Image: Anthony Lucci, MD

Recognize the diagnosis

Abscess treatment: Continue to feed from affected breast

Abscess treatment:
Timely management and encouragement!

DUMP THE PUMP:

Nature made a breastfeeding dyad - not a triad

- Complications often result from oversupply stimulated by excessive pumping
- Pumping can stimulate production without adequately emptying
- Adds stress to mom
- Rx: if medically possible -> baby on breast, hand express, use pump as **last** intervention

SACK THE PACK

- Adds stress to mom and provider
- Lactating breast not meant to granulate like other areas of body
- May promote persistent fistula

What happens when you pack?

- Packing is soaked immediately with milk
- Persistent fistula
- Excessive granulation

Images: Ellen Neplily

Engorgement or hyperlactation

Plugged ducts/ obstruction

Galactocele

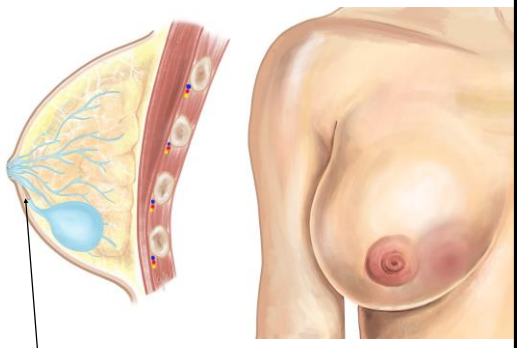
Infected galactocele

Phlegmon

Noninfectious mastitis

Infectious mastitis

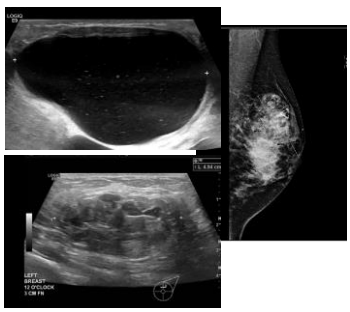
Abscess



Plug -> Persistent Plug -> Galactocele

Galactocele

- Milk retention cyst (i.e. persistent plug)
  - Initially milk filled, but gradually becomes extremely thick, semi-solid material
- Well-defined lesion on ultrasound with thin walls but can mimic other benign or malignant lesions if chronic

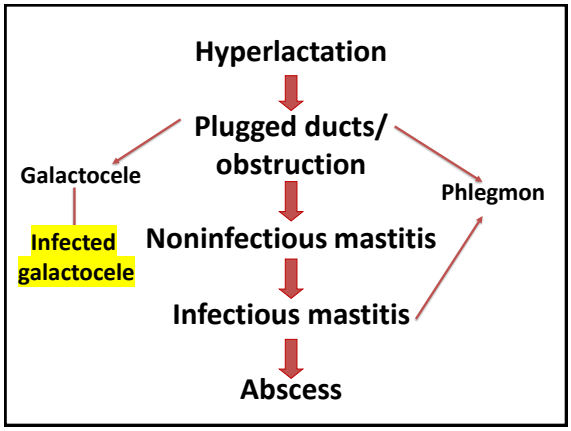


Cuoto et al Breast J 2016

Galactocele treatment

- US general surgery boards: aspiration with 18G needle
- However, stagnant, sticky, loculated milk can be difficult to remove via 18G
- Can start with aspiration → if not completely empty or requires repeated aspirations without resolution …
  - DRAINAGE CATHETER

Ghosh et al Breast J 2004

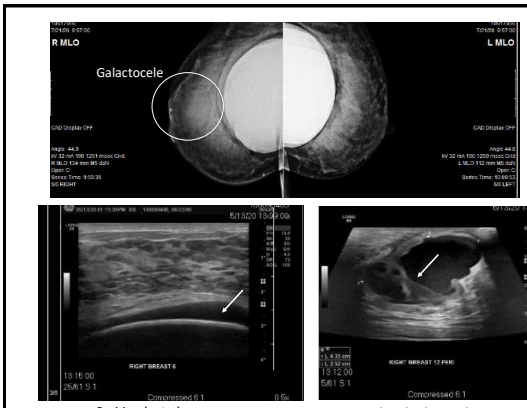


Infected galactocele

- Repeated aspirations can convert uninfected galactocele to infected galactocele
- Often most wise to offer upfront small drainage catheter

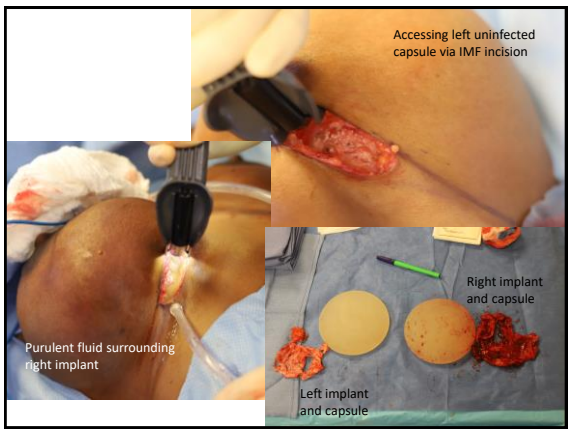
Ghosh et al Breast J 2004

Infected implant, abscess, and right galactocele



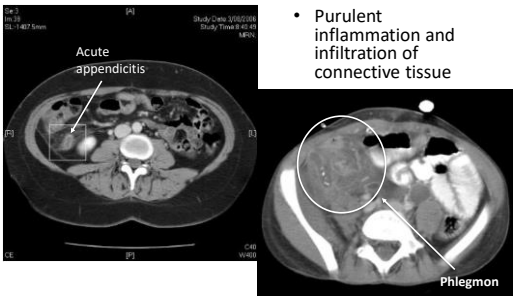
Peri-implant abscess

Loculated galactocele



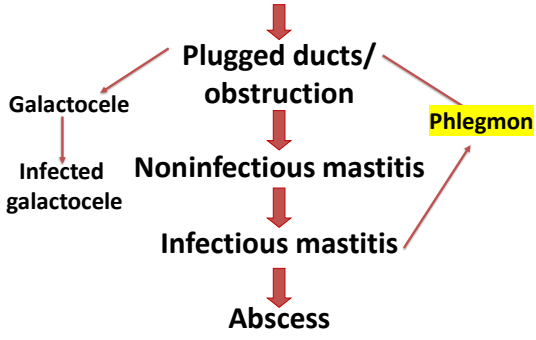
Post op day 6

Phlegmon



- Purulent inflammation and infiltration of connective tissue

Emergency Diagnostic Radiology, Radiopaedia.org

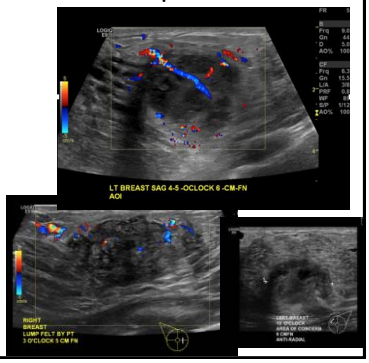


Lactational phlegmon

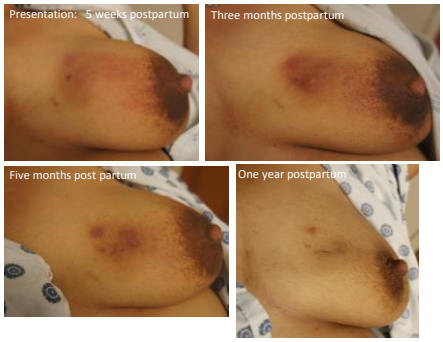
- In contrast to galactocele or abscess (discrete fluid collection), this is persistent mass without drainable collection
  - Often a/w infectious or inflammatory history
  - Ductal distribution
  - With or without overlying erythema

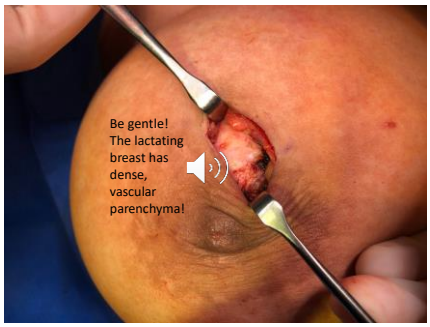
Phlegmon treatment and follow-up

- Extended antibiotics (~30 days)
- +/- drainage catheter?
- Q3 month interval exam to ensure resolution, rule out occult mass
- Biopsy if suspicious features



Lactational phlegmon





Phlegmon: Avoid excessive massage

Milk fistula

- Rare complication: 1.3% incidence in lactating cohort
- Communication between duct and skin
  - Spontaneous versus complication of biopsy or drainage
- Management
  - **Feed physiologically and encourage drainage via nipple**
    - Lactating breast very vascular, wants to heal itself if managed properly
  - **MUST address underlying factors that led to abscess**
    - Hyperlactation, excessive pumping, nipple shield use, mastitis with resistant organism

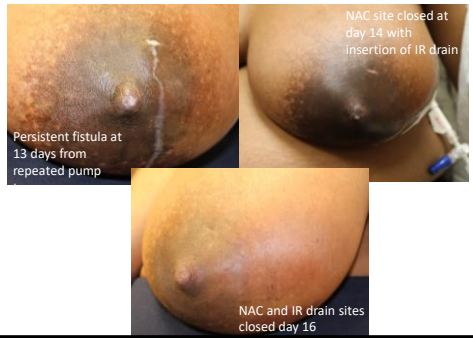
Johnson and Mitchell, ACS 2019, Dominici et al Breast Dis 2010, Larsen and Valente Breast J 2016

But what about this …

- Pumping to empty breast stimulates hyperlactation, potentiates trauma, and WILL form a fistula and/or hypertrophic granulation tissue if continued

Consequence of patient told to "pump to empty"

Milk fistula
in area of pump trauma



Milk fistula

- May not even be persistent in the setting of an untreated abscess and mastitis …

Take home points

- Eliminate pump, nipple shields
- Sunflower lecithin for plugging
- Timely management
- Small caliber drain provides more definitive resolution than repeat aspiration
- Always feed from breast affected by mastitis, abscess, but don't overfeed!
- Utilize physical therapy techniques of therapeutic ultrasound and lymphatic massage

Overview

- Trauma
- It's NOT YEAST
  - Subacute mastitis
  - Blebs
  - Vasospasm
  - Dermatitis
- Bloody discharge, r/o Paget's or nipple adenoma
- Miscellanous
  - Sebaceous cyst, hyperkeratosis, EP, NAC cyst, piercing recanalization, skin tags, palpable lactiferous sinuses, prominent Montgomery glands

Pumping …

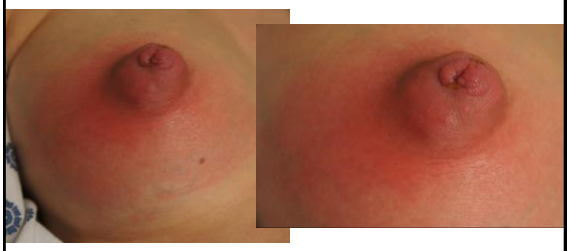
Pump trauma

Pump trauma

Be wary of lubricants like coconut oil –
can allow moms to turn up suction to dangerously high levels

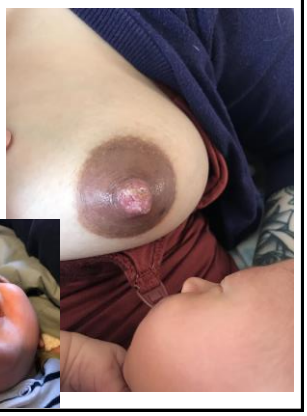
Pump trauma: fissure at 11:00

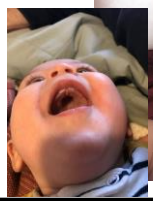
Pump trauma -> plug -> abscess



Early latch trauma

- 73-76% have mild to moderate discomfort by day 3
  - 19-26% have cracks
  - Sore nipples down to 27% by day 10





Blair, DeCarvalho, Oliveira, Centuori

Trauma treatment

- Lubricated, moist/closed healing environment
  - Think general surgery burns, wound care
- Do not "air dry" or soak in Epsom salt
- Hydrogel pads, balm without lanolin (lanolin allergenic), medihoney (baby may reject taste), polymem, mepilex
  - Be mindful of coconut allergy in other products
  - Your hospital may be able to stock mepilex
- PRN 0.1% triamcinolone for severe injury/pain
  - Avoid APNO ("all purpose nipple ointment" from compounding pharmacies)
    - Also has antifungal and antibacterial that is not needed and potentiates allergy; relief in this compound is generally from the steroid

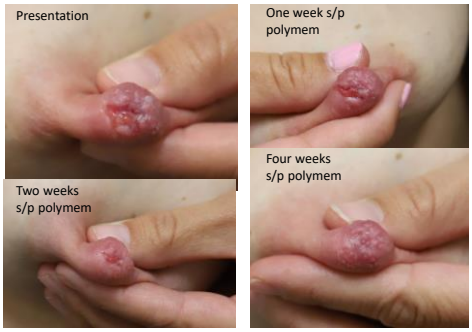
Berens et al ABM Protocol #26

Pump trauma treatment

- Avoid nipple shells: cause nipple areolar complex edema, worsen trauma due to inability to deep latch

Invaginations: evert to assess for trauma

Some wounds need debridement via gentle dressing



Infant biting

- Dirty wound, no suturing -> close by secondary intention with basic wound care support

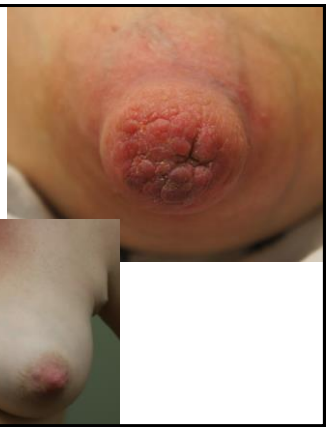
Infant bite wound with fibrinous exudate – needs DEBRIDEMENT

Nipple piercing hematoma from latch trauma

- Moist heat for spontaneous drainage
- NSAID for pain
- Aspirate/stab incision if large

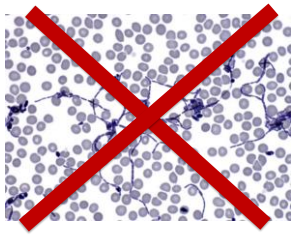
Larger breasts = challenging latch

Large nipples = even more challenging latch (may need to EP until baby bigger)



Reframing old myths: Most issues in breastfeeding are NOT YEAST

- Historically, "yeast" has been implicated as cause of pain in breastfeeding but new research is debunking this myth
- What you actually need to do is rule out the next conditions we will discuss
  - Subacute mastitis, blebs, vasospasm, dermatitis,
  - Otherwise what remains is likely pain from hyperlactation, engorgement and we will discuss this in lactation primer (i.e. the less medical parts of lactation and more supportive)



PLOS ONE

RESEARCH ARTICLE

Mammary candidiasis: A medical condition without scientific evidence?

Esther Jiménez[1☯], Rebeca Arroyo[1☯], Nivia Cárdenas[1☯], María Marín[1], Pilar Serrano[2], Leonides Fernández[1], Juan M. Rodríguez[1*]

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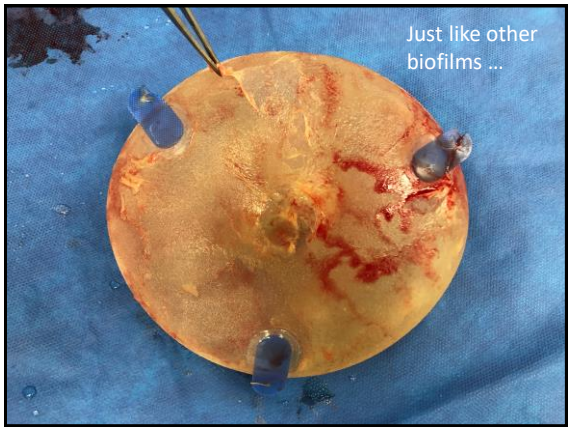
Many physicians, midwives and lactation consultants still believe that yeasts (particularly *Candida* spp.) play an important role as an agent of nipple and breast pain despite the absolute absence of scientific proofs to establish such association. In this context, the objective

lected from the participating women. Results showed that the role played by yeasts in breast and nipple pain is, if any, marginal. In contrast, our results strongly support that coagulase-negative staphylococci and streptococci (mainly from the mitis and salivarius groups) are the agents responsible for such cases. As a consequence, and following the recommendations of the US Library of Medicine for the nomenclature of infectious diseases, the term "mammary candidiasis" or "nipple thrush" should be avoided when referring to such condition and replaced b "subacute mastitis".

Subacute mastitis (bacterial dysbiosis)

- Imbalance of natural breast flora akin to vaginal yeast infection or bacterial vaginosis
- May have history of previously treated acute mastitis
- Nipples/latch can be very tender and have scabbing, blebs, biofilm; underlying breast pain and plugging

Eglash et al JHL 2006, Milk Mob 2015



Subacute mastitis treatment

- Breastmilk culture
- Empiric treatment
  - Azithromycin 500 mg QD x 4 weeks
    - Intracellular action on lactocytes
- Sunflower lecithin to reduce plugging
- Treat hyperlactation
- Probiotic

Eglash et al J Human Lact 2006, Milk Mob 2015

Subacute mastitis resolution

Resolved 5 months pp after 30 days azithromycin

Nipple bleb ("milk blister") – NOT yeast

- Painful inflammatory lesion on surface of nipple orifice; can be large or small, multiple or single

O'Hara Breastfeed Med 2012

Nipple blebs can be obvious

Or subtle …
patient with "cracked nipple" (bleb) and mastitis at 5 months pp

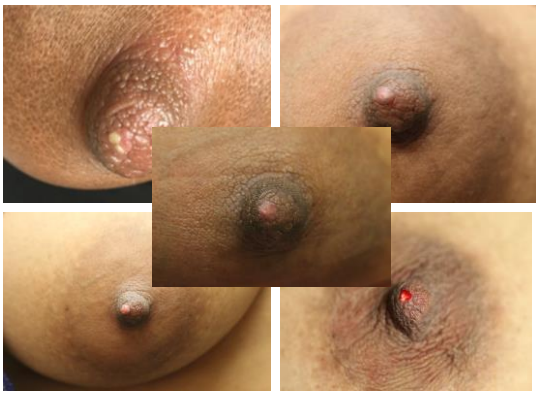
Multiple blebs and mastitis in setting of hyperlactation

Bleb ductal obstruction

Acutely obstructing nipple bleb: unroof horizontally with 18 gauge needle

- Unroof horizontally - DO NOT PROBE!
- Other principles of management
  - Triamcinolone 0.1% topical creme
  - Sunflower lecithin powder
  - Resolve predisposing factors
    - Resolve hyperlactation, excessive pumping
    - Antibiotics if question of subacute mastitis

Underlying plugging at orifice



Another chronically traumatized bleb

Chemical trauma:

nipple bleb s/p gentian violet ("yeast treatment") x 1 month

A bleb years after breastfeeding?

Vasospasm/Raynaud's of nipple – NOT YEAST

- Cutaneous vasoconstriction of nipple that causes pain
  - White->blue->red
  - Can last up to 45 mins
- Triggered by cold (hot shower to cold room), suck, pressure (pump)
- Pain usually worse after baby de-latches; may radiate throughout breast
- If persistent, can cause nipple ischemia -> trauma -> worsening pain
- Differentiate from other trauma
  - Overpumping, poor latch

Berens et al ABM Protocol # 26

Vasospasm/Raynaud's of nipple

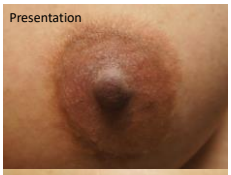
- Rx: HEAT at all times
  - wool pads, hand warmers, old wood sweater
- Wound care for secondary trauma as needed
- Nifedipine for severe cases
  - Verapamil if low blood pressure
- Avoid nicotine, caffeine, vasoconstrictive drugs

Contact dermatitis: not yeast

- Often history of eczema, allergic tendency
- Symptoms
  - Itchy and/or painful nipple, areola
  - Cracks, scabs
  - Erythematous
  - May have oozing of open areas
- Assess allergies
  - Baby medication or food
  - Laundry detergent
  - Breast pad material
  - New nursing bra
  - Pump parts
  - Nipple crème, topical abx
- Tx
  - Remove allergen
  - 0.1% triamcinolone

Berens et al ABM Protocol # 26, photo: Pamela Berens

Not Paget's (and not yeast)



Berens et al ABM Protocol # 26

Not Paget's (and not yeast)

Presentation

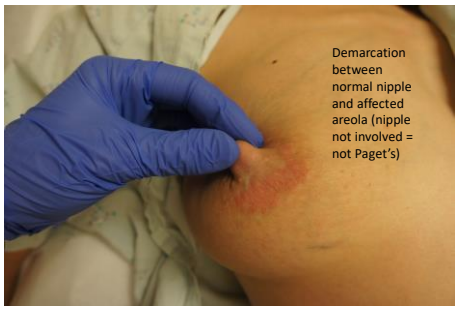
Three months later with some recurrence after cessation of steroid

Dermatitis, not yeast

ALWAYS ask what baby has eaten

- Well-defined, scaly plaque x 2-3 weeks with 14-month baby nursing
- Mom allergic to bananas
- Also common with antibiotics

Not Paget's



And ask where baby touching

- 35F followed for nipple blebs, areola flaking/itching, plugging
- Persistent left nipple flaking 3 months after cessation breastfeeding; asymmetric c/w right nipple

Baby weaned but still attached to breast

- Imaging negative
- Punch biopsy: mild acanthosis, hyperkeratosis, and slight superficial dermal sclerosis. Findings non-specific and suggest chronic rubbing

Herpes and shingles

- Shingles
  - Can spread like chicken pox
- Herpes simplex
  - Can cause herpes in infant
  - Often given to moms from nursing toddlers
- Treatment
  - Avoid contact on that breast
  - Keep covered until lesions scab over
  - Express and discard on affected breast
  - Nurse on contralateral breast
  - Antiviral medications are safe

Shingles

Photo: Anne Eglash, MD

Herpes

Photos: Anne Eglash, MD and Pamela Berens, MD

Miscellaneous

"Rusty pipe" vs. pathologic nipple discharge

- 20% of pregnant and lactating women may have b/l rusty or bloody discharge that is physiologic and resolves spontaneously

ACR Imaging of Pregnant and Lactating Patients 2018

Pathologic nipple discharge

- Pathologic: Unilateral, single duct, bloody or clear
  - Order ultrasound and mammogram

ACR Imaging of Pregnant and Lactating Patients 2018

Nipple adenoma

- Benign proliferative process of lactiferous ducts
  - Also known as EAN (erosive adenomatosis of the nipple, nipple papillomatosis, papillary adenoma of nipple)
- Can mimic Paget's
- Presents with nipple nodule, nipple erosion, nipple discharge

Lee and Boughey Breast J 2016

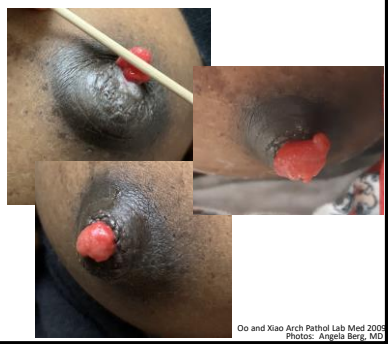
S/p subtotal adenoma excision three months prior to pregnancy

39 weeks pregnant

3 months postpartum using nipple shields

Syringomatous adenoma

- Rare benign neoplasm
- Can infiltrate/ proliferate and be locally destructive
- Tx: excise



Oo and Xiao Arch Pathol Lab Med 2009
Photos: Angela Berg, MD

Pyogenic granuloma

- Benign vascular tumor of skin/mucous membranes
- Can grow rapidly, often pedunculated
- Relationship to trauma and possibly HSV/HPV
- Tx: laser, excision with coagulation

Wollina et al Mac J Med Sci 2017
Photos: Karen Bodnar, MD, IBCLC

Paget's

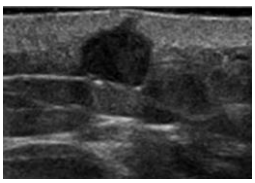
- 1% of all malignancies, generally postmenopausal
- A/w pre-invasive or invasive underlying disease
- Starts on nipple and moves to areola
  - Eczema is opposite
- Stages
  - Early: red, shiny
  - Intermediate: roughened nipple
  - Late: flattening of nipple, scaly erythematous lesion
  - Very late: complete loss of nipple

Geffroy D and Doutriaux-Dumoulins I Diag and Interv Imaging 2015
Kothari et al Cancer 2002

Breast cancer recurrence

Sebaceous cyst

- Most often midline or inframammary fold, but can occur anywhere on breast/nipple-areolar complex
- Ultrasound appearance of simple cyst with tracking to skin



Wynne E and Louis A Rad Case Rep 2011

Sebaceous cyst

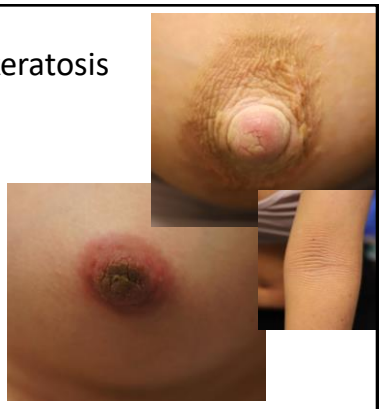
- May present infected
  - Warm compress, antibiotic, incision and drainage
- Other specialties may counsel patient that cyst will drain spontaneously during breastfeeding, but surgical excision gold standard for resolution (ideally pre-pregnancy)

Sebaceous cyst presenting during pregnancy and spontaneously draining postpartum

Images: Kathy Leeper, MD, IBCLC

Hyperkeratosis

- Thickening of stratum corneum (outer layer skin) usually with abnormal quality of keratin
- Tx
  - Calcitrene (synthetic derivative of Vitamin D, calcitriol)
  - Keratolytic moisturizer (urea or lactic acid)
  - Laser definitive



Goldstein JA and Gurge RM J Drugs and Derm 2008

Areola Leiomyoma

- Benign tumor comprised of smooth muscle
  - Most common in uterus (fibroids)
- Extremely rare in the breast but occurs on areola due to presence of smooth muscle
- Treatment is excision, recurrence is rare

Sampaio et al Radio Bras 2016

Exclusive pumping milk crust

Nipple piercing orifice recanalization

Simple cysts

Skin tags (squamous papilloma): may grow in pregnancy

- Can present issue with latch, become traumatized
- Excise sharply
  - One interrupted 6.0 prolene closure or dermabond (skin glue)
    - Remove suture at 3-5 days
- Counsel for keloid, ductal orifice obstruction

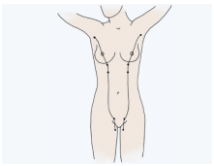
Lentigo and seborrheic keratosis

Viral warts (verruca vulgaris)

- Benign papillomas that arise from infection of epidermal or mucosal cells with HPV
- May clear spontaneously
- Excise if large and will interfere with latch or to rule out rare malignant transformation
- Salicylic acid, cryotherapy, laser

Lynch et al BMJ 2014

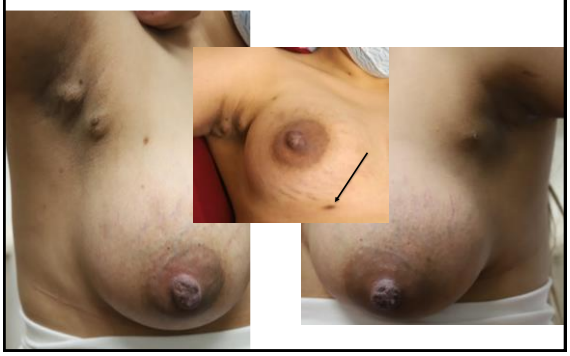
Accessory or supernumerary nipple



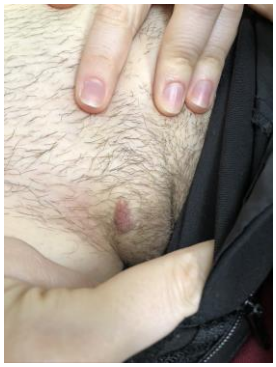
- 5% of the population
- Left > right
- Male > female
- "Polythelia" = areola plus nipple
  - Areola may not have nipple but every nipple does have areola

Schmidt Eur J Ped 1998

Multiple accessory nipples



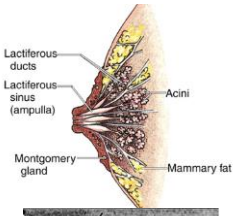
Accessory nipples with milk production



Not everything
in the nipple line
is an accessory nipple

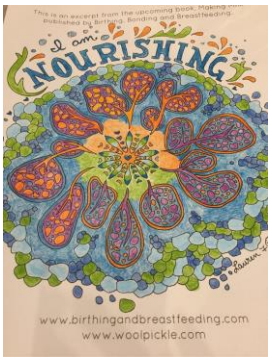
Palpable lactiferous sinuses

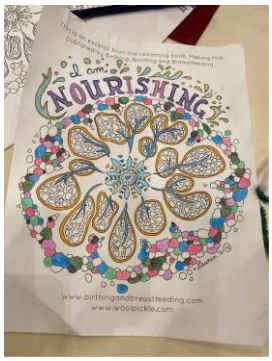
- 2 mm collecting ducts drain each breast segment
- Coalesce into 5-8 mm subareolar lactiferous sinuses
- Sinuses (9-20) drain at nipple surface
- May present as palpable mass



Nicholson BT, Harvey JA, Cohen MA Radiographics 2009

Dilated sinuses during letdown





Palpable Retroareolar Ducts

Montgomery Glands

- Naturally enlarged during pregnancy and lactation
  - Lubrication and scent that draws baby to breast
- Can become obstructed like any other sebaceous gland
  - Treatment
    - Salicylic acid
    - Warm compress
    - Gentle expression
    - Drainage for abscesses

Doucet et al PLOS One 2009

Montgomery Gland Obstruction

- Wipe off coconut oil (or don't use lubrication at all!) after pumping as it can cause obstructed glands

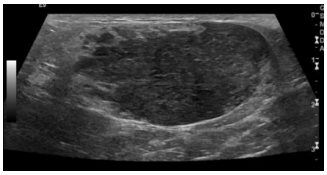
Take Home Points

- Pump trauma: moist, closed wound healing
- Dermatitis, vasospasm, subacute mastitis, blebs should be considered rather than yeast
- Do not continually traumatize blebs with unroofing; use steroid crème and resolve underlying plugging
- Strict warmth with vasospasm usually resolves pain, trauma
- Excise nipple lesions during pregnancy that may interfere with breastfeeding

Benign masses and breast conditions

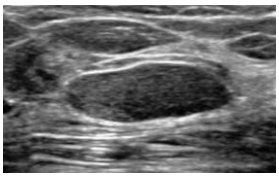
Overview:
Conditions stimulated by pregnancy and lactation

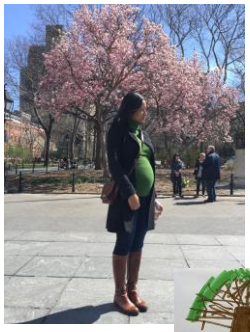
- Hypertrophy and gigantomastia
- Dependent edema
- Lactating adenoma
- Emergence of prominent accessory breast tissue
- Prominent lymph nodes
- Other benign changes



Overview:
Benign masses and conditions *not specific* to pregnancy and lactation … *but can concurrently present*

- Unique characteristics and management strategies
  - Idiopathic granulomatous mastitis
  - Fibroadenoma
  - Hamartoma
  - High-risk benign
  - Dermatitis
  - Mondor's disease
  - Breast pain
    - Generally different ddx/management in lactating versus non-lactating women



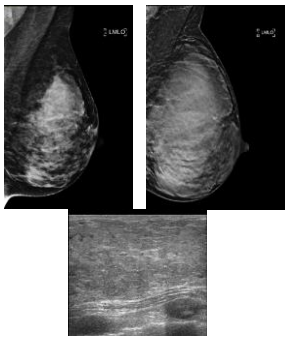


Pregnancy

- 3-4 weeks pregnancy: ductal branching and lobular formation
- Most growth by 22 weeks but edema can increase after that
- Mid-pregnancy: secretory development
- Last trimester: further increase in lobular size due to hypertrophy of cells
- Nipple size increases due to prolactin

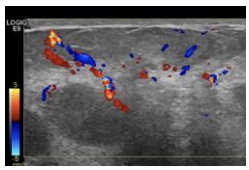
Common radiographic changes

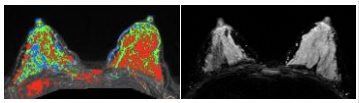
- Overall marked increase in parenchymal density
- More hypoechoic on u/s during pregnancy due to decrease in fibrofatty stroma
- During lactation, more hyperechoic due to high fat content of milk



Increased vascularity

- Both pregnancy and lactation
- Significant background enhancement on MRI
- Diffusely increased T2 signal due to increased water content





Gestational gigantomastia

- Poorly defined incidence and likely a spectrum of enlargement
  - 50 case reports in the literature
- Unknown etiology
  - (? Hormonal factors)
- Extreme cases can cause skin ulceration and parenchymal necrosis
- Treat with lymphatic massage, breast support, image if asymmetric or focal mass to rule out inflammatory breast cancer

Mangla J Midwife Health 2017

Gestational gigantomastia

- Day 3 postpartum extreme engorgement
- Day 4-10 progressive to necrosis

Photos: Karen Palmer

Gestational gigantomastia

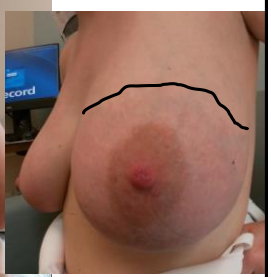
- Day 14 necrotic tissue excised, negative pressure dressing applied
- Day 21 initial granulation

Photos: Karen Palmer

Dependent edema

- If symmetric, bilateral
  - Reassurance
  - Supportive bra
  - PT
  - Massage
- Asymmetrical, not resolving
  - Punch biopsy and imaging

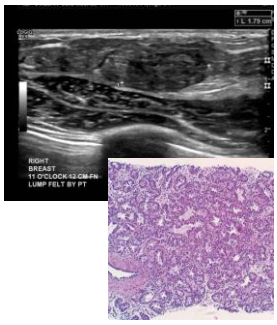
Images: Stacy Carter, MD



Images: Casey Rosen-Carole, MD

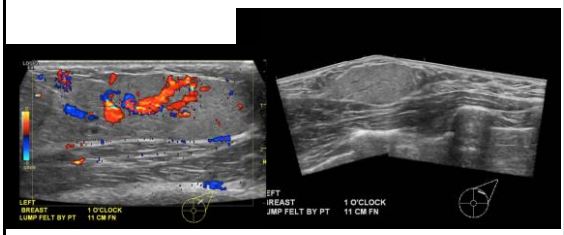
Lactating adenoma

- Dense lactational tissue most common axillary tail and UOQ
  - Likely a result of hormonal stimulation
- Usually regress spontaneously with weaning
- Close f/u w/ imaging and exam, +/- biopsy



Nebreda et al J Hum Lact 2016

Lactating adenoma

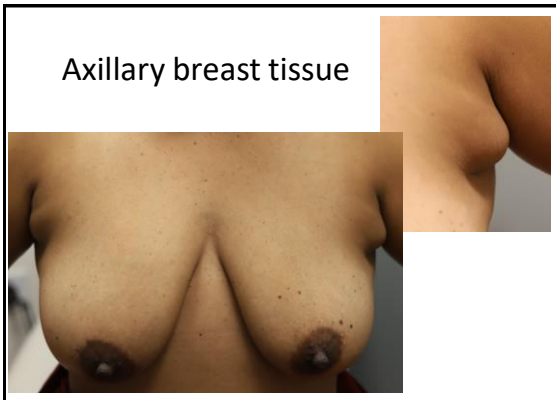


Axillary breast tissue

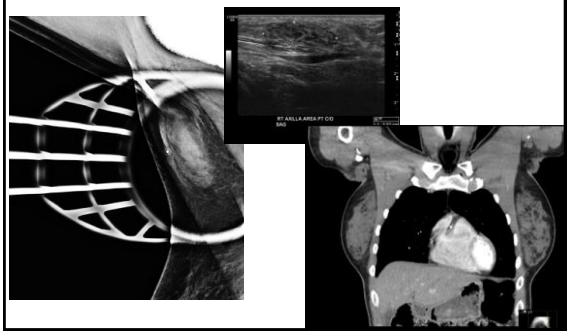
- Approximately 1% of the population, higher in Asian and Native American
- Reassurance, usually no need to image
- If imaged, will show normal fibroglandular ectopic breast tissue
- Treat if symptomatic with mastitis protocol

Marshall MB et al Surg Onc 1996

Axillary breast tissue

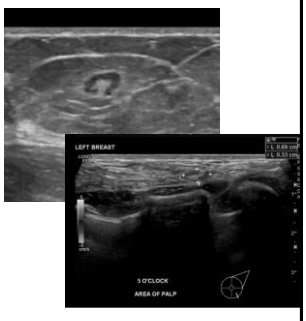


29 year old breastfeeding patient: Benign glandular tissue with lactational change



Intramammary lymph nodes

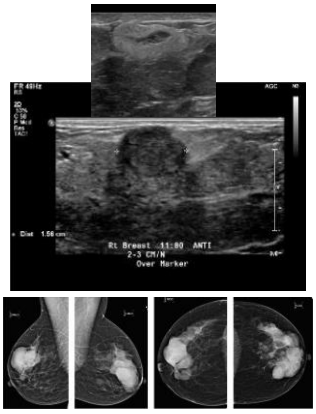
- May present as palpable mass, may be more prominent due to bacterial exchange between baby and mother's breast
- Reassurance if no worrisome exam or radiographic findings
- Core needle biopsy if typical imaging features not demonstrated (e.g. loss of fatty hilum)



Vijan SS et al Surgery 2009

Prominent axillary nodes

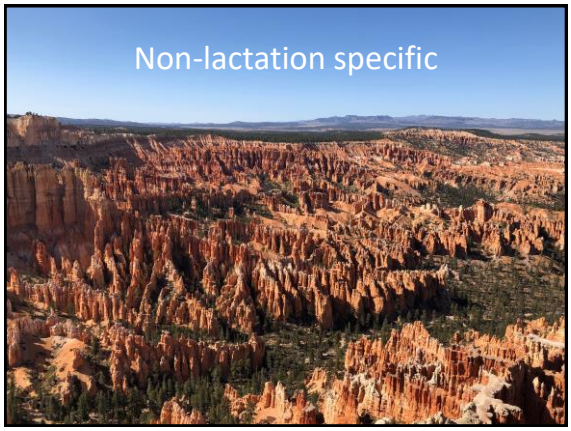
- Common in lactation
- Benign appearance



Fat necrosis

- Results from trauma to breast
- Can have non-specific or worrisome appearance on imaging and exam (firm, irregular)
- Prove diagnosis with core needle biopsy and no further intervention

Kerridge WD Rad Res Prac 2015



Non-lactation specific

Idiopathic Granulomatous Mastitis

- Need to control symptoms of disease while protecting breastfeeding
- Prednisone orally decreases supply
- Cannot breastfeed after intralesional injection kenalog

Freeman et al Am J Surg 2017

Presentation
- pain, mass, old fistulae
- 40 ml/1ml Kenalog with 3ml 1% lidocaine injected
- mom instructed on weaning left breast

Three weeks
- Decreased pain, mass
- New spontaneous fistula

Six weeks
- Fistula closed

Weaned left, feeding right (at six weeks f/u)

9 and 12 weeks
(no injection at six weeks)


44 year old 4 months after weaning


Breastfeeding protective? Unknown.

- Patient was breastfed herself x 2 years; then breastfed two children x 2 years each

- Right breast IGM (mass only, resolved after two years)
- Left breast mass/fistula one year later

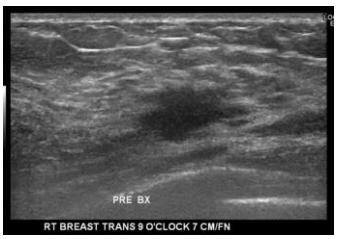
Hidradenitis Suppurativa


- Inflammatory disease of hair follicles in axilla, groin with fistuale and abscess formation
  - Smokers, obesity
- Rx PRN drainage, intralesional steroids
- Like IGM, control symptoms of disease while protecting breastfeeding
  - Cannot breastfeed after intralesional injection kenalog

Hs-foundation.org

Risk lesions

- Lesions in the breast that are not cancer but increase the future risk of cancer
  - E.g. Radial scars/complex sclerosing lesions, atypical ductal hyperplasia, LCIS



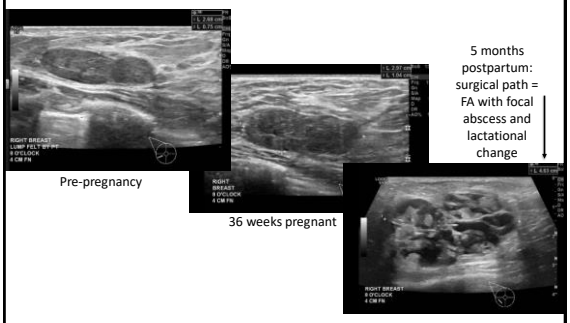
1.5 cm irregular hypoechoic mass, CNB: CSL

Gao et al Radiology 2018

Risk lesions

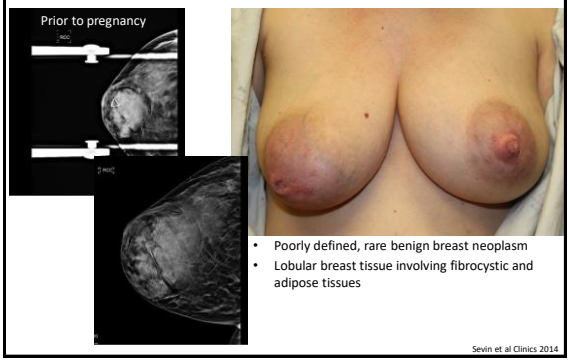
- Excisional biopsy under local while pregnant
- Florid nodular sclerosing adenosis with focal sclerosis, myoepithelial hyperplasia

Fibroadenoma evolution



Yan BY et al Histopath 2016

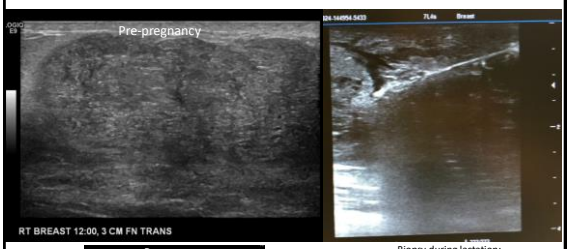
Hamartoma

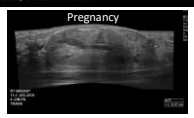


- Poorly defined, rare benign breast neoplasm
- Lobular breast tissue involving fibrocystic and adipose tissues

Sevin et al Clinics 2014

Hamartoma

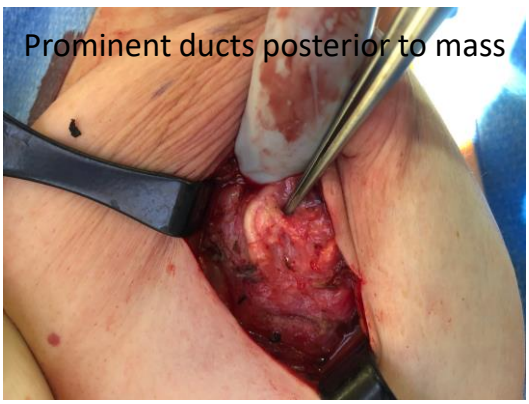




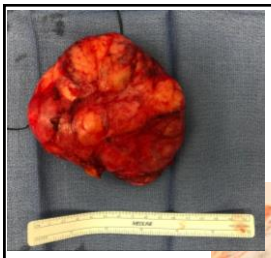
Biopsy during lactation: milk coursing through lesion

Resection at 12 months postpartum

Prominent ducts posterior to mass



Closure with nipple eversion



Gross pathology:
breastmilk throughout lesion

2 weeks post-op:
No fistula or other complications

5.5 weeks post-op: one-time drainage that resolved spontaneously

Periductal mastitis
three weeks postpartum

Contact dermatitis

- Ask **what baby has touched or ingested**
  - E.g. antibiotics mom to which mom may be allergic

Berens et al ABM Protocol # 26

Contact dermatitis

New nursing bra dermatitis (also check nursing pads)

PUPPP:

Pruritic urticarial papules & plaques of pregnancy

- Poorly understood, likely multifactorial etiology (vascular, immunologic)
- Usually appears third trimester, multiple gestation pregnancies
- Usually regresses within six months postpartum
- Steroid crème, oatmeal baths, avoid antihistamines in breastfeeding

ACOG FAQ Skin Conditions During Pregnancy

Idiopathic peripartum hives

Candida

- Warm areas
  - IMF, axilla

Obese, diabetic, immunocompromised

*Yeast is not “contagious”!

Koebnerization in eczema from frequent hand expression

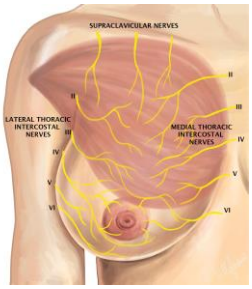
Mondor's Disease (superficial thrombophlebitis)

- Most often secondary to trauma
- Painful
- Superficial cord or mass just under skin
- Rx moist heat, NSAIDs, therapeutic ultrasound
- Image if any question of deeper lesion or no history of trauma

Whitaker-Worth et al J Am Acad Derm 2000

Breast and nipple pain

- No scientific evidence to support diagnosis of yeast
- Consider dermatitis, blebs, vasospasm (particularly in large breasts or history of implants), subacute mastitis (hyperlactation, exclusive pumping, ex-NICU, c-section)
- Rule out pregnancy, return of menses
- If suspicious for subacute mastitis, breastmilk culture and rx antibiotics and/or probiotics
- Address latch and positioning
  - Laid back or side lying position particularly helpful for vasospasm/large breast



Jimenez et al 2017, Berens et al 2016, Kristensen et al 2016 and 2018, Muddana et al 2018

PLOS ONE

RESEARCH ARTICLE

Mammary candidiasis: A medical condition without scientific evidence?

Esther Jiménez[1*], Rebeca Arroyo[1*], Nivia Cárdenas[1*], María Marín[1], Pilar Serrano[2], Leonides Fernández[1], Juan M. Rodríguez[1*]

1 Dpt. Nutrition, Food Science and Food Technology, Complutense University of Madrid, Madrid, Spain, 2 Unidadde Endocrinologia y Nutrición, Hospital Virgen del Rocío, Seville, Spain

Many physicians, midwives and lactation consultants still believe that yeasts (particularly *Candida* spp.) play an important role as an agent of nipple and breast pain despite the absolute absence of scientific proofs to establish such association. In this context, the objective

lected from the participating women. Results showed that the role played by yeasts in breast and nipple pain is, if any, marginal. In contrast, our results strongly support that coagulase-negative staphylococci and streptococci (mainly from the mitis and salivarius groups) are the agents responsible for such cases. As a consequence, and following the recommendations of the US Library of Medicine for the nomenclature of infectious diseases, the term "mammary candidiasis" or "nipple thrush" should be avoided when referring to such condition and replaced by "subacute mastitis".

ABM Pain protocol

BREASTFEEDING MEDICINE
Volume 11, Number 2, 2016

DOI: 10.1089/bfm.2016.29002.pjb

ABM Protocol

ABM Clinical Protocol #26: Persistent Pain with Breastfeeding

Pamela Berens,[1] Anne Eglash,[2] Michele Malloy,[2] Alison M. Steube,[3,4] and the Academy of Breastfeeding Medicine

A central goal of The Academy of Breastfeeding Medicine is the development of clinical protocols for managing common medical problems that may impact breastfeeding success. These protocols serve only as guidelines for the care of breastfeeding mothers and infants and do not delineate an exclusive course of treatment or serve as standards of medical care. Variations in treatment may be appropriate according to the needs of an individual patient.

Exclusive pumping: Microbiome disruption?

Breast Milk Is Teeming With Bacteria — That's Good for the Baby

Breast-fed milk may nourish a baby's microbiome in ways that bottled breast milk can't.

The numbers of bacteria in breast milk are relatively low, but breast-feeding seems to have an outsize impact in populating a baby's microbiome with good bacteria. Alexander Heinz/Alamy

By Apoorva Mandavilli

June 12, 2019

Breast milk that is pumped and delivered by bottle is generally better than formula, Dr. Azad said. But she had some additional news that some working mothers may find unsettling: Pumped breast milk may not deliver the benefits of the sugars that arrive in breast milk straight from the source.

Dr. Azad and her colleagues studied 393 Canadian mother-infant pairs and found that pumped breast milk seems to be richer in some harmful bacteria, and has few bifidobacteria. Many variables can affect the quality of pumped breast milk, including the type of pump, how the milk is stored and the cleanliness of the bottles and nipples. Dr. Azad's work suggests that direct contact between the mother's breast and the baby's mouth is important: When a baby nurses, some denizens of its oral microbiome may traverse back into the mother's breast.

In other words, the benefits of breast-feeding may derive from myriad factors, including the many microbiomes in the mother's body — in the breast milk and on the skin of the breast — and in the baby's mouth and gut.

"I don't want the message to be that expressed human milk is bad," Dr. Bremer said. "It's that there are other factors involved. When you disrupt that experience of baby sucking on the mom's breast, what do you lose? Or what's gained by that process? The science is more ripe now to start delving into those questions."

Summary

Breastmilk contains a complex community of bacteria that may help seed the infant gut microbiota. The composition and determinants of milk microbiota are poorly understood. Among 393 mother-infant dyads from the CHILD cohort, we found that milk microbiota at 3–4 months postpartum was dominated by inversely correlated Proteobacteria and Firmicutes, and exhibited discrete compositional patterns. Milk microbiota composition and diversity were associated with maternal factors (BMI, parity, and mode of delivery), breastfeeding practices, and other milk components in a sex-specific manner. Causal modeling identified mode of breastfeeding as a key determinant of milk microbiota composition. Specifically, providing pumped breastmilk was consistently associated with multiple microbiota parameters including enrichment of potential pathogens and depletion of bifidobacteria. Further, these data support the retrograde inoculation hypothesis, whereby the infant oral cavity impacts the milk microbiota. Collectively, these results identify features and determinants of human milk microbiota composition, with potential implications for infant health and development.

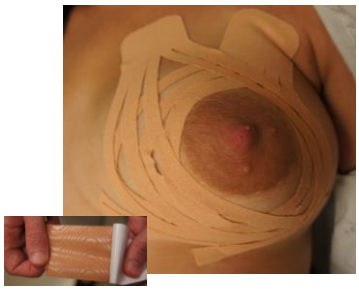
Breast and nipple functional pain

- If all else ruled out, consider functional pain as well as address possibility of depression/anxiety
  - Particularly stress associated with exclusive pumping
- Pharm approaches for functional pain
  - Zoloft 50 mg (safest SSRI in lactation)
  - Cetirizine 10mg QD
  - Propranolol 20-80mg BID-TID (??!)
  - ? Neurontin (case report documents 600 mg TID?!! For back pain)

Kristensen et al 2016, Muddana et al 2018

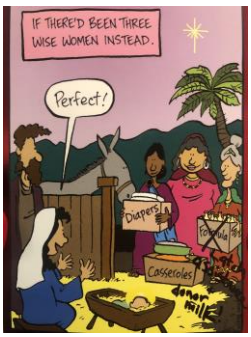
Consider PT techniques: Lymphatic massage, kinesiology tape

- Lifts superficial skin, opening surface lymphatics
- Massaging effect during movement
- Enhances efficiency of deeper lymphatics by allowing maximum contraction of pectoralis muscle
- Decrease pain, decrease congestion of lymphatics or hemorrhages under the skin
- Technique
  - Two pieces for each breast
  - Each piece cut into five equal strips
  - Start at superior aspect of breasts and drape circumferentially, leaving space for infant latch



Pekyavas et al 2014, Berens and Brodribb 2016, Brown and Langdon 2014

Take home points



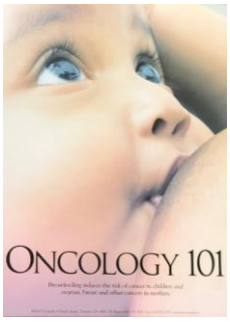
- Masses may be related to pregnancy/lactation(e.g. lactating adenoma) or may be unrelated and simultaneously occur during pregnancy/lactation (e.g. fibroadenoma)
- It's not yeast: consider functional breast pain in history of depression/anxiety, exclusive pumping, hyperlactation
- Dermatitis on both the NAC and breast skin is extremely common
- Image and biopsy for diagnosis/treatment purposes

Breastfeeding and Breast cancer

Overview

- Supporting lactation in survivors
- Managing lactation in a pregnant or breastfeeding patient who is diagnosed with breast cancer
- Radiology and nuclear medicine studies
- Breast cancer screening pregnancy and lactation

The relationship between parity, lactation, and breast cancer is complex



- "Crossover effect"
  - **Promotional effect during pregnancy and lactation** with **crossover to protective effect** in postmenopausal women with age at first pregnancy of < 25
  - Specific genomic signature after full-term pregnancy
    - **Cellular differentiation** and change in attachment of epithelial cells to basement membrane
    - **Down-regulation of genes** related to **cellular proliferation**
    - Attachment of epithelial cells to basement membrane, **intercellular adhesion**
    - **Down-regulation of estrogen, progesterone, HER2 receptors**

Collins et al Oncologist 2015, Stuebe et al Arch Int Med 2009, John et al Int J Can 2018, Nichols et al Annals IM 2019, Collaborative Group Lancet 2002, ElShamy Oncotarget 2016, Schedin Nature Reviews 2006

The relationship between parity, lactation, and breast cancer is complex

- Conflicting studies, but most conclude reductions in different populations for breastfeeding
  - 4.3% lifetime risk reduction for every 12 months BF
  - **First degree relative** and **BRCA I mutation** carriers **highest decrease** in breast cancer development related to breastfeeding
  - **Decreased risk of TNBC**, particularly in African descent
  - "Oncogenic elimination hypothesis" for TNBC
    - **Proliferation-inducing oncogene** expression to promote mammary gland development may undergo full terminal differentiation/would be **detected by immune system during physiologic weaning**
    - In **forced weaning**, oncogene-overexpressing **cells still in stem cell** stage and would **escape immune system** recognition and become TNBC precursors

Collins et al Oncologist 2015, Stuebe et al Arch Int Med 2009, John et al Int J Can 2018, Nichols et al Annals IM 2019, Collaborative Group Lancet 2002, ElShamy Oncotarget 2016, Schedin Nature Reviews 2006

Managing lactation in breast cancer survivors

Survivors: general support

About Pink Warrior House Foundation

Pink Warrior House

Fundraising

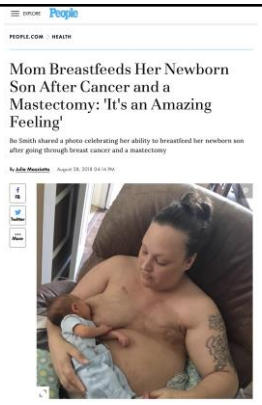
Our Team

- Prenatal consult with breastfeeding medicine and lactation consultant
- Peer-to-peer support groups
- Concern from survivors about development of new primary, but no evidence exists that pregnancy or breastfeeding will increase risk of new primary cancer

Gorman et al J Can Surv 2009, Azim et al BCRT 2009, Connell et al Health Care Women Int 2006

Surgery: mastectomy

- No lactation with mastectomy, skin sparing mastectomy, nipple sparing mastectomy
  - Lactation after mastectomy should not be encouraged nor expected; if significant engorgement or milk production → concern for residual parenchyma and ? Surveillance screening vs. return to OR for completion mastectomy
- Unilateral breastfeeding can provide milk not just for singleton, but for twins
  - Counsel on antenatal hand expression
  - Early postpartum for the vital single breast: protect it. Watch for nipple trauma, baby weight gain


People

PEOPLE.COM / HEALTH

Mom Breastfeeds Her Newborn Son After Cancer and a Mastectomy: 'It's an Amazing Feeling'

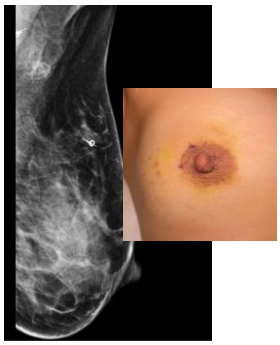
Bo Smith shared a photo celebrating her ability to breastfeed her newborn son after going through breast cancer and a mastectomy

By Julie Mazziotta August 28, 2018 04:16 PM

Johnson and Mitchell, ASO in publication, Michaels and Wanner J Hum Lact 2013, Chapman et al Midwifery 2013

Remember that nipples can be reconstructed (buttock graft in this patient)…
Doesn't mean nipple is functional!

Breast conserving therapy: surgery



- Systematic review: can produce milk, but reduced quantities
- Subareolar resection may sever terminal ducts
- Periareolar incisions may impact nipple innervation and/or latch from scarring; may affect milk ejection reflex
- Rodent models do demonstrate recanalization
- But remember that radiation may have most impact

Leal et al Expert Rev Anticancer Ther 2013, Schlenz et al Plastic Reconstr Surg 2000, Karacalar et al Ann Plast Surg 2005

Breast conserving surgery

- 26 year old 6 weeks postpartum
- Hx left fibroadenoma with focal DCIS
- Excision via superior periareolar incision age 22
- No adjuvant radiation
- Normal milk production

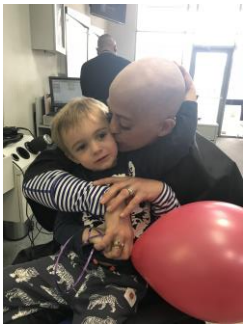
Breast conserving therapy: radiation impact

- Epithelial atypia in the terminal ductal-lobular units, atypical fibroblasts, fibrosis, atrophy, and non-specific vascular changes that appears to be irreversible
- Decreased skin/NAC elasticity
- Changes in milk composition
  - increased sodium concentration

Schnitt et al Hum Pathol 1984, Moore et al Am J Surg Pathol 2004, Green Int J Radiat Oncol Biol Phys 1989, Guix B Int J Radiat Oncol Biol Phys 2000

Chemotherapy

- Causes irreversible histopathological changes that may impact milk production in the future
- PABC cohort: less breastfeeding success
  - 34% vs. 91%, particularly if more cycles and received earlier in pregnancy
  - suggests effect on lactogenesis I
- Prenatal and postpartum counseling that milk supply can be varied among individuals from remaining breast



Stopenski et al Breastfeed Med 2017

Endocrine therapy

- AI's transfer into breastmilk and suppress estrogen formation in infant
- No data on tamoxifen transfer in breastmilk
  - Tamoxifen inhibits lactogenesis II but unknown effect on established milk production
- European Society of Breast Cancer Specialists allows tamoxifen to be interrupted for pregnancy and/or breastfeeding
- POSITIVE enrolling 500 women ages 18-42 who have completed 18-30 months endocrine therapy with interruption of up to two years for pregnancy and breastfeeding; results expected soon

Shaaban Eur J Obstet Gynecol Reproduc Biol 1975, Masala et al Br J Obstet Gynaecol 1978, Cardoso et al Eur J Cancer 2012, Pagani et al Breast 2015

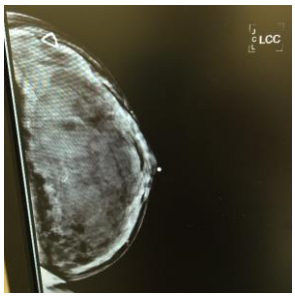
Diagnosed while pregnant

Imaging studies

- Ultrasound s/s not altered with pregnancy
- Mammography 86% sensitivity during pregnancy
  - Decreased fat, increased water may alter mammographic appearance of mass
  - With shielding, fetal dose 0.004 Gy (threshold 100 Gy)
- No MRI with gadolinium in pregnancy

Shah et al ASO 2019

Mammograms are safe and effective in both pregnancy and lactation



- Bilateral mammogram: 3-5 mGy radiation
- Equivalent to the average background radiation incurred over 2 months
- Shielded uterus < 0.004 mGy

Hendrick et al AJR Am J Roent 2010

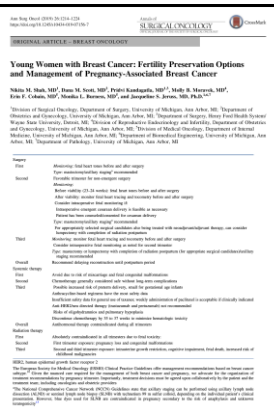
Staging Studies

- CXR
- Liver ultrasound
- MRI without contrast skeletal survey
- MRI brain if central nervous symptoms
- Labs, echo prior to chemo

Shah et al ASO 2019

Treatment

- Confirm fetal dates to guide treatment safety
  - Early termination does not improve outcomes
- Chemotherapy
- *Anti-HER2 therapy**
- Surgery
- *Radiation/endocrine therapy**



Young Women with Breast Cancer: Fertility Preservation Options and Management of Pregnancy-Associated Breast Cancer

*Not during pregnancy

Shah et al ASO 2019

Surgery: Breast

- Mastectomy vs. BCS no difference in survival
  - **1st/2nd trimesters: mastectomy**
    - Can perform lumpectomy if chemo anticipated (i.e. do not want too great a delay to radiation if RT alone planned)
  - **3rd trimester: mastectomy vs. lumpectomy**

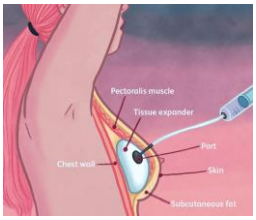
Keleher et al JACS 2002; Zgouri et al BCRT 2013, Kuczkowski Obstet Gyn Surv 2004, Case Clin Ob Gyn 2016

Surgery: Perioperative Issues

- Primary complication pre-term labor
- Delayed gastric emptying, hypercoagulability
- 1st trimester: Attempt to defer
  - Increased risk miscarriage, lower birthweight
    - May be related to underlying medical condition, surgery than exposure to anesthesia itself
- 2nd/3rd trimester
  - After 20 weeks, position left lateral decubitus
  - Doppler or u/s preceding/following surgery and continuous after 24 weeks
  - Consent for emergency c-section

Keleher et al JACS 2002; Zgouri et al BCRT 2013, Kuczkowski Obstet Gyn Surv 2004, Case Clin Ob Gyn 2016

Surgery: Breast Reconstruction



- Delay definitive reconstruction
  - Limit operative time, possible complications
  - Difficulty in achieving symmetry
- Small retrospective study 12 patients TE, 1 implant
  - No infection, hematoma, flap necrosis, capsular contracture
  - No adverse fetal outcomes
  - One patient local recurrence 19 months post-mastectomy, one patient leakage after RT

Lohsiriwat et al Breast 2013

Surgery: Axilla

- No blue dye
  - Avoid isosulfan blue due to anaphylaxis risk
  - Methylene blue crosses placenta, teratogen
- Technetium safe
  - Lower than background radiation (8.2 mGy) but still, inject day of/intraop
- SLNB->send nodes intraop->ALND

Toesca et al Gync Surg 2014

Chemotherapy

- Contraindicated first trimester (organogenesis)
- Standard third-generation regimen ACT
  - DD regimens safe; can allow for shorter period of treatment/completion further from delivery
  - Taxanes less data but still safe
    - However, majority in YWBC Study had taxanes post-delivery
- MTX contraindicated,
- Cisplatin/carboplatin may be used, but a/w higher toxicity due to decreased albumin
- Neulasta, steroids in short duration, anti-emetics all safe

Amant et al Lancet Oncol 2012; Cardonick et al Cancer J 2010, Mir et al Ann Oncol 2010, Case Clin Ob Gyn 2016

Chemotherapy

- Stop week 35/36 prior to delivery
  - Reduce risk of infections, hemorrhage
  - Delivery after 35 weeks ideal for fetal lung maturity
- If continuing chemo, resume 3 weeks after delivery
- Fetal malformations no greater than general population
  - Placental protection from chemo agents
    - **Different than breastfeeding**
  - Greatest complication IUGR
  - Growth scans every 4 weeks or before each cycle chemotherapy starting 24-28 weeks

Amant et al Lancet Oncol 2012; Cardonick et al Cancer J 2010, Mir et al Ann Oncol 2010, Case Clin Ob Gyn 2016

Chemotherapy in pregnancy with anticipated breastfeeding postpartum

- Chemotherapy usually resumed 3 weeks after birth
  - As early as 7 days
- Can allow mom to feed initial postpartum for stabilization, colostrum/early milk and then wean for resumption of chemotherapy

Shah et al ASO 2019

Contraindicated in Pregnancy (Give Postpartum)

- Anti-HER2 Tx
  - Renal, pulmonary malformations, oligohydramnios
- Endocrine
  - Tamoxifen: 20% birth defect rate
  - AI/LH agonists not safe
- Radiation

Zagouri et al BCRT 2013

Diagnosed postpartum while breastfeeding

PABC and Postpartum Breast Cancer

- PABC traditionally defined as occurring during pregnancy or within one year postpartum
- New arguments to distinguish cancer occurring during pregnancy versus that in the postpartum period
- This may encompass a timeline of breast involution for up to **20 years**
  - **Risk peaks at 5 years PP**

Cancer July 1, 2012

Editorial

Pregnancy-Associated Breast Cancer

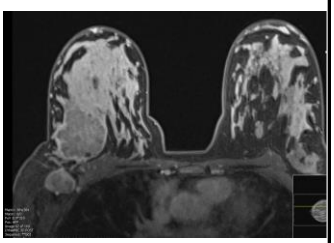
An Entity Needing Refinement of the Definition

Virginia F. Borges, MD MHSc[1,2] and Pepper J. Schedin, PhD[3,4,5]

Pregnancy, as a modifier of risk for developing breast cancer, confers a "dual effect" of both increased risk followed by subsequent protection for younger mothers. Although the protective effect of pregnancy is broadly appreciated, all women, regardless of their age at first birth, have a subsequent period of years during which they are at increased risk for the development of breast cancer.[1] For first-time mothers aged 25 years or younger, the risk is modestly increased compared to nulliparous women, and in a large Norwegian cohort, has been shown to last approximate 9 years, at which time a cross-over effect occurs.[2] This cross-over effect then changes the role of pregnancy from one of breast cancer promotion to subsequent protection. For a woman who delays childbearing until age 30 to 35, the risk for breast cancer is significantly increased compared to younger mothers, and the cross-over effect is delayed until her 60s.[3] Women who wait until age >35 years for their first childbirth permanently increase their risk of breast cancer compared to nulliparous women.[4] Rather surprisingly, peak incidence of breast cancer does not occur during pregnancy or in the immediate postpartum period, but rather approximately 6 years postpartum.[5] Breast cancers diagnosed during pregnancy or within the postpartum period have been reported to present with more adverse clinical characteristics and are variably reported to have worsened breast-cancer specific outcomes for the mother. A review of these "pregnancy-associated breast cancers" was published by our group in 2009.[6]

Postpartum Breast Cancer

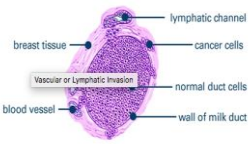
- Cases diagnosed after pregnancy but within five years postpartum have a 3x increased risk of distant recurrence and death compared to nulliparous cases
  - Meta-analysis of 3628 patients up to 2 years PP: significantly higher risk of death
  - Driven by PP diagnosis
  - **Survival of patients diagnosed during pregnancy not different than controls**
- Poorer prognosis when adjusted for biologic subtype, stage, and year of diagnosis



Callihan et al Breast Cancer Res Treat 2013, Lambe et al N Engl J Med 1994, Azim et al Cancer Res Treat 2017

Why?

- Postpartum breast involution
  - **Apoptosis of epithelium** returns breast to non-secretory state
  - Process **mimics wound healing**
    - Increased macrophage density, collagen deposition, and **stromal remodeling**
- **Lymphagiogenesis** is physiologic to clear apoptotic epithelium in lactation
  - But also present in chronic wounds, cancer, inflammation
- Postpartum tumor cells demonstrate increased **pro-lymphatic activity**



Lyons et al J Clin Invest 2014

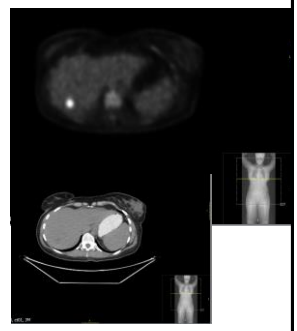
COX-2 and NSAIDs: pre-clinical data

- Increased immature monocytes, reduced T cells in mammary gland involution
- The prostaglandin-generating enzyme COX-2 has been identified as influential for the pro-tumorgenic processes that occur during involution
- NSAIDs have been identified as targeting this COX-2 activity
  - Reverse presence of immature monocytes
  - Promote tumor border accumulation of T cells
  - Blunt lymphangiogensis
  - Reduce fibroblast activation
  - Lower tumor growth and dispersion
- No trials in humans yet

Pennock et al J Immuno Cancer 2018

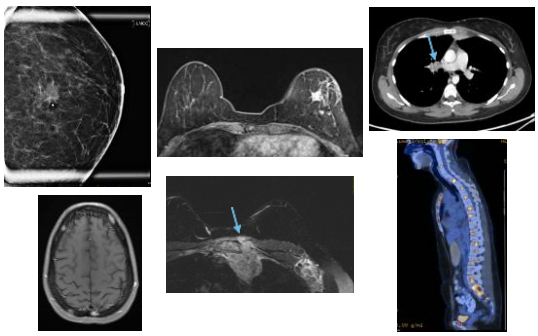
Postpartum Breast Cancer

- Postpartum state preferentially supports metastases in liver
  - Hepatocyte apoptosis, extracellular matrix remodeling, deposition of collagen
- Also increased risk for brain metastases

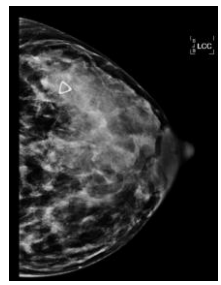


Goddard et al Cancer Discov 2017

Postpartum breast cancer propensity to metastasize: 33F 6 months after cessation breastfeeding

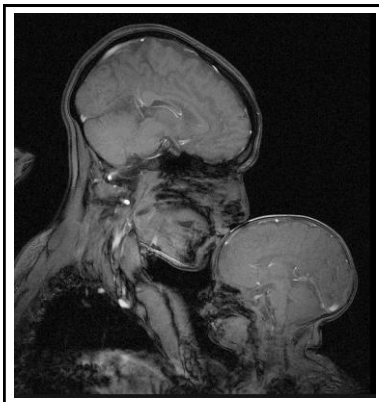


New diagnosis: general principles



- Involve IBCLC, breastfeeding medicine physician
- Early weaning can impact mom's mental health; need psychosocial support
- Weaning often needed
  - Taper frequency of breastfeeding/milk expression
- Herbal/OTC (sage/Sudafed) vs. pharmacologic agents (cabergoline 0.25-0.5 mg q3 days x 2-3 days)

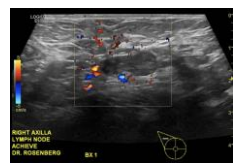
Stuebe et al J Womens Health 2014, Eglash Breastfeed Med 2014

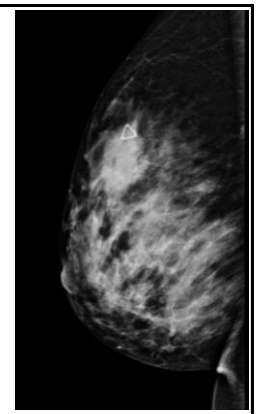


Radiology studies

Image: Rebecca Saxe, MIT/Smithsonian

Ultrasound and 3D mammogram





ACR Imaging of Pregnant and Lactating Women 2018

Mammograms are safe and effective in both pregnancy and lactation

- Bilateral mammogram: 3-5 mGy radiation
- Equivalent to the average background radiation incurred over 2 months

Hendrick et al AJR Am J Roent 2010

Prior to imaging, remove milk

- Reduces parenchymal density resulting from retained milk
- **Encourage patient to bring baby or pump to imaging appointment**
- **Feed normally after – do not "pump to keep breast empty"!**

ACR Imaging of Pregnant and Lactating Women 2018

Biopsies are safe and effective

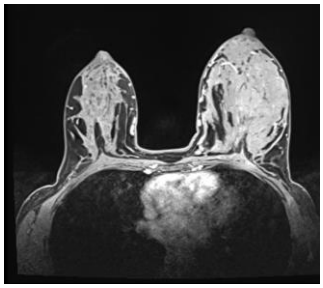
- Milk fistula rate low if managed appropriately
- Even with development of fistula, tends to be transient and self-resolving over the course of weeks

Johnson and Mitchell, ACS 2019; in submission

Consequence of patient told to "pump to empty" after CNB

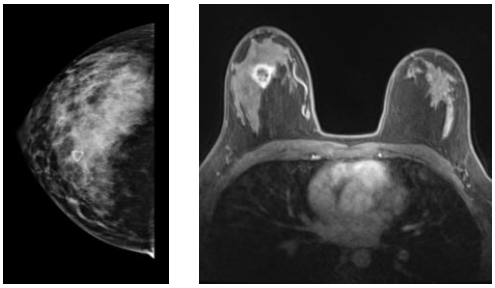
MRI for extent of disease

- Safe in lactation, NOT in pregnancy due to gadolinium
- Increased background parenchymal enhancement due to physiologic hypervascularity and diffusely increased T2 signal from milk
- Despite this, multiple reports document accuracy in setting of lactation



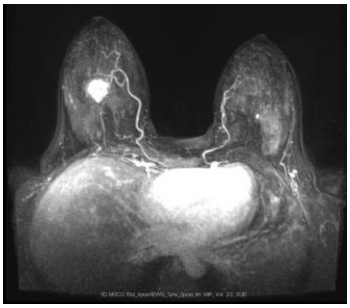
Vashi et al AJR 2013, Sabate et al Radiographics 2007, Espinosa et al Radiology 2005, Oh et al Br J Radiology 2017

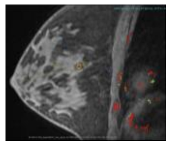
MRI may detect mammographically occult lesions



ACR Contrast Media 2012, Talele et al Breast Journal 2003

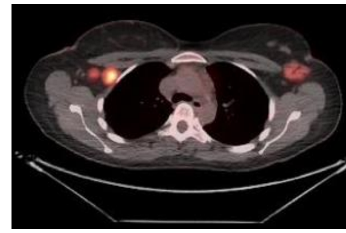
As well as lead to additional biopsies





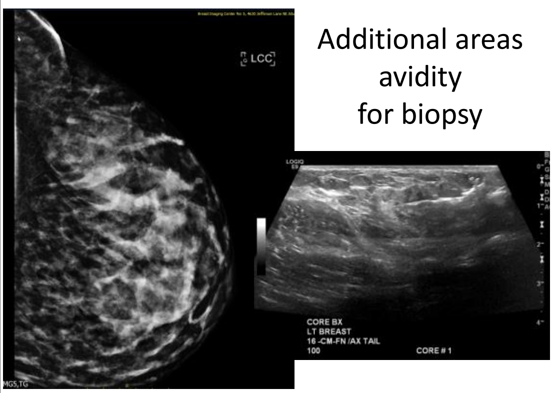
Staging studies

- Bone scan, PET radioisotopes not excreted in breastmilk
- However, external radioactivity of organs can require separation of dyad
- Expressed milk can be frozen and allowed to decay radioactivity over specified half lives and then fed
- Note additional areas of avidity may prompt additional workup



Leide-Svegborn et al Eur J Nucl Med Mol Imaging 2016

Additional areas avidity for biopsy



PET CT and FDG-18

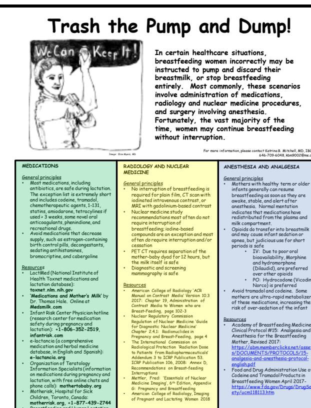
- Very little FDG is excreted into breast milk and **the milk itself is safe for infants**
- However, the lactating breast **does** accumulate FDG
  - Contact between mother and child should be limited for 12 hours to minimize external radiation
  - Express milk and feed to the baby via bottle

ACR Contrast Media 2012

"Trash the Pump and Dump!"

CT with iodinated contrast, MRI with gadolinium contrast: **No need to interrupt breastfeeding!**

ACR Contrast Media Version 10.3, 11th edition 2012
Image: Eliza Myers, MD

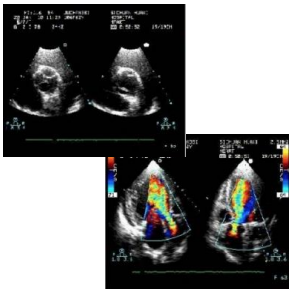

Trash the Pump and Dump!

In certain healthcare situations, breastfeeding women incorrectly may be instructed to pump and discard their breastmilk, or stop breastfeeding entirely. Most commonly, these scenarios involve administration of medications, radiology and nuclear medicine procedures, and surgery involving anesthesia. Fortunately, the vast majority of the time, women may continue breastfeeding without interruption.

MEDICATIONS | RADIOLOGY AND NUCLEAR MEDICINE | ANESTHESIA AND ANALGESIA

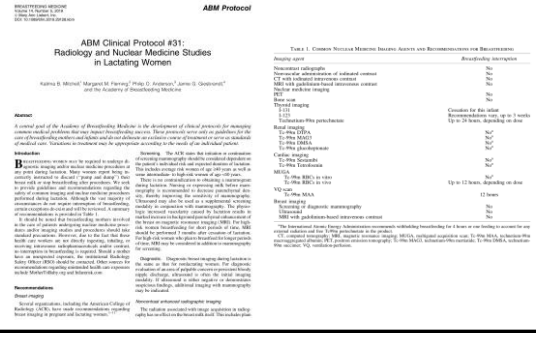
Cardiac function evaluation prior to chemotherapy

- Consider echocardiogram as an alternative to nuclear medicine imaging (MUGA).
- When MUGA is performed, length of interruption varies depending on method of Tc-99m RBC labeling and dose administered (max interruption 12 hours)



Mettler and ICRP

Open access protocol at bfmed.org



ABM Protocol

ABM Clinical Protocol #31:
Radiology and Nuclear Medicine Studies in Lactating Women

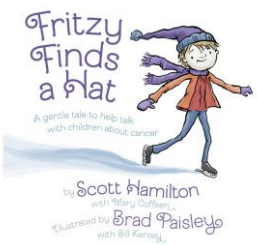
Chemotherapy and breastfeeding

- No breastfeeding while receiving cytotoxic therapy for breast cancer
  - 2013 review demonstrates long-half life, high rate of transfer (including doxorubicin and cisplatin)
- Carboplatin and paclitaxel pass readily into breastmilk
- Infantile neutropenia after cyclophosphamide
- No human data on lactation and anti-HER2 but given in combo with chemo
  - Though low likelihood of monoclonal antibody excretion into breastmilk

Pistilli et al Cancer Treat Rev 2013, Griffin et al J Human Lact 2012, Amato Med J Aust 1977, Duvoqola J Natl Med Assoc 1979

Chemotherapy

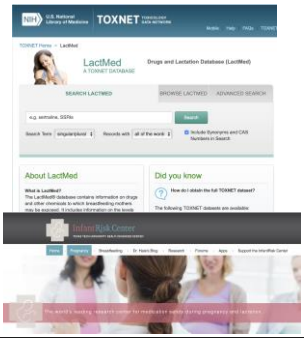
- Patients may ask to express and discard milk to maintain production, and breastfeed in between cycles
  - Has been done with short chemo cycles for lymphoma
- Wait five serum half lives of agent with longest half life
- Consider
  - Risk for plugging, mastitis in setting of neutropenia
  - Whether baby will take breast intermittently q2-3 weeks
  - Nipple trauma during these intermittent latch periods
  - Alterations of microbiome of breastmilk



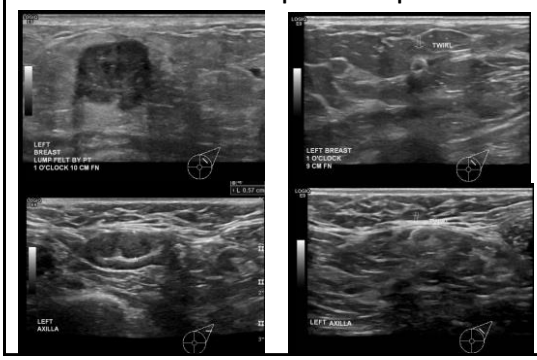
Anderson Breastfeed Med 2016, Urbaniak et al Microbiome 2014

Questions as agents change

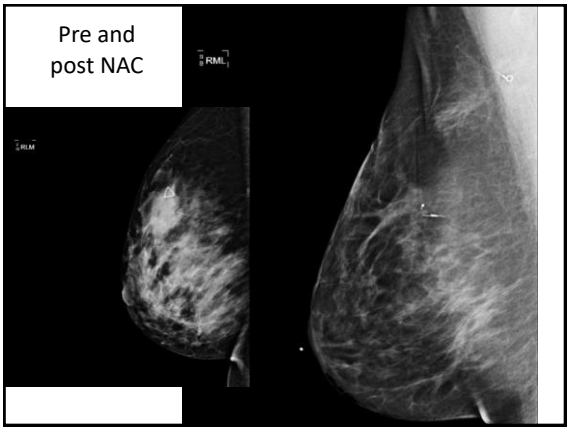
- LactMed
  - Phil Anderson, PharmD
  - Toxnet.nlm.nih.gov
- Texas Tech Infant Risk
  - Thomas Hale, PharmD
  - Infantrisk.com



Breast and axilla pre and post NAC



Pre and post NAC



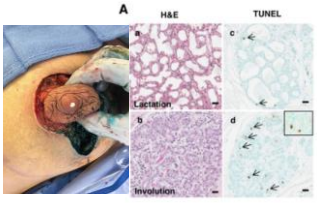
Surgery

- PABC cohort from MD Anderson: overall wound complication rate of 9%, consistent with rates in general population
- No milk fistula
- Total versus partial mastectomy no difference in complication rates
- No need for additional antibiotic prophylaxis; it is likely vascular breast and antimicrobial components confer natural protection

Dominici et al Brest Dis 2010, Hill and Newburg Nutr Rev 2015

Surgery: when to operate

- Involution well studied in mouse models
- Most women report minimal milk production a few weeks after weaning and high levels epithelial apoptosis observed six weeks after weaning
- Human mammary involution not complete until 12-18 months after weaning
- No surgery delayed due to these theoretical concerns



Jindal et al Breast Cancer Res 2014

Surgery: overall recommendation

- Mastectomy = feed contralateral
- Partial = likely to need RT = feed contralateral and wean affected

Axillary staging

- No data on transfer of vital dyes such as methylene blue or isosulfan blue into breastmilk, nor on bioavailability
- ? 24 hour interruption of methylene blue after IV but not intradermal recommendations exist
- Life threatening neonatal toxicity from enteral adminstration of methylene blue
- No data on intradermal injection of radiotracers from sentinel lymph node biopsy
- Some societies suggest 0-12 hours after IV technetium-99 radiotracers, so 24 hour interruption fits well within clinical scenario

Allegaert et al J Pediatr Surg 2004, Sills Arch Pediatrc Adolesc Med 1994, Albert J Pediatr Surg 2004, Giammarile et al Eur J Nucl Med Mol Imaging 2013, Mattsson et al Ann ICRP 2015

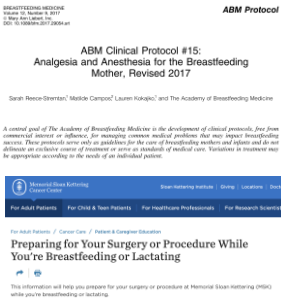
CPM

- NCCN recommends CPM vs. high-risk imaging surveillance for high-risk patients
- Consider delaying CPM until childbearing complete
- Cochrane review concluded that while CPM decreases incidence of breast cancer, insufficient evidence exists whether this translates to survival benefit
- CPM increases risk of surgical complications
- Unknown whether future breastfeeding and chemoprevention reduces risk more than CPM

NCCN Version 2.2019, Carbine et al Cochrane Database Syst Rev 2018, Eck et al Ann Surg Oncol 2014, Silva et al Ann Surg. Oncol 2015

Perioperative considerations

- Perioperative lactation support program modeled by MSKCC
- ABM outlines recommendations for individualized perioperative lactation plans
- Appropriate medication selection, judicious fluid management, allowing for nursing or expressing milk in recovery room minimizes mastitis and unnecessary interruptions in lactation



Rieth et al Breastfeed Med 2018, Reece-Stremtan et al Breastfeed Med 2017, Shachar et al Oncologist 2017

Radiation therapy

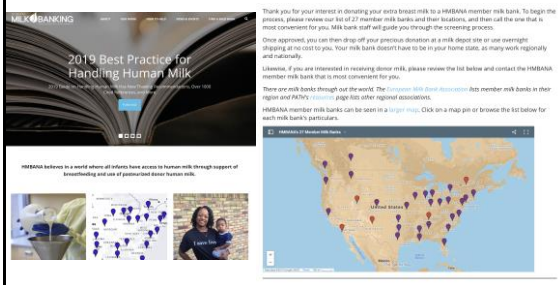
- Fields restricted to affected breast only
- Histopathologic changes, NAC and skin changes, changes in content of milk as above
- Likely increased risk of wound complications including abscess and fistula
- ? Partial breast radiation (still not advised)
- Feed contralateral breast

Endocrine therapy

- Nuanced discussion if patient still breastfeeding at time of completion of above therapy
- AI's transfer into breastmilk and suppress estrogen formation in infant
- No data on tamoxifen transfer in breastmilk
  - Tamoxifen inhibits lactogenesis II but unknown effect on established milk production
- European Society of Breast Cancer Specialists allows tamoxifen to be interrupted for pregnancy and/or breastfeeding
- POSITIVE enrolling 500 women ages 18-42 who have completed 18-30 months endocrine therapy with interruption of up to two years for pregnancy and breastfeeding

Shaaban Eur J Obstet Gynecol Reproduc Biol 1975, Masala et al Br J Obstet Gynaecol 1978, Cardoso et al Eur J Cancer 2012, Pagani et al Breast 2015

Baby's needs: Donor human milk



BREASTFEEDING MEDICINE
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ABM Position Statement

Academy of Breastfeeding Medicine's 2017 Position Statement on Informal Breast Milk Sharing for the Term Healthy Infant

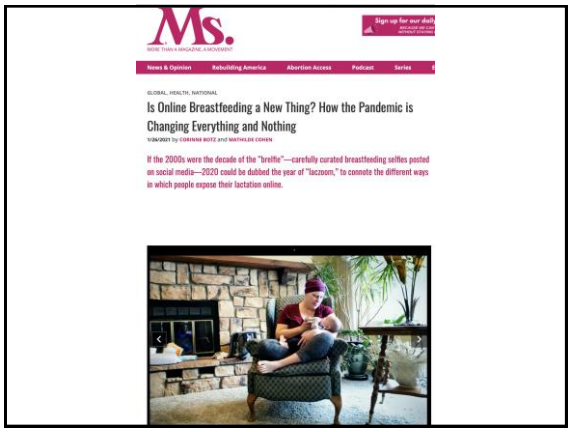
Natasha K. Sriraman,[1] Amy E. Evans,[2] Robert Lawrence,[3] Lawrence Noble,[4] and the Academy of Breastfeeding Medicine's Board of Directors

Conclusions

Educated healthcare providers are well positioned to help mothers and families make informed choices about infant nutrition. ABM recognizes that informal milk sharing is an increasingly common practice with potential health benefits for the term healthy infant, but encourages adherence to these guidelines to reduce risk and make milk sharing as safe as possible. By following these recommendations on (1) medical screening of the donor and (2) safe milk handling practices, ABM provides practical guidance to providers regarding informal breast milk sharing to help patients and families make informed choices.

Internet-based breast milk sharing, and especially the purchase of milk over the internet, is strongly discouraged since (1) the donors are unknown to the recipient and/or cannot be medically screened and (2) the milk is often not suitable for consumption upon arrival.

Informal milk sharing



ABM Clinical Protocol #34:
Breast Cancer and Breastfeeding

Helen M. Johnson, MD,[1] Katrina B. Mitchell, MD,[2] and the Academy of Breastfeeding Medicine

Abstract

A central goal of The Academy of Breastfeeding Medicine is the development of clinical protocols for managing common medical problems that may impact breastfeeding success. These protocols serve only as guidelines for the care of breastfeeding mothers and infants and do not delineate an exclusive course of treatment or serve as standards of medical care. Variations in treatment may be appropriate according to the needs of an individual patient.

Background

BREAST CANCER is the most common malignancy in women worldwide, with 1 in 20 women developing the disease during her lifetime.[1] It represents the leading cause of cancer deaths and disability-adjusted life-years among women.[2] In addition, breast cancer imparts significant morbidity and mortality among men, albeit at substantially lower rates.

Breast cancer treatments may affect breastfeeding in multiple ways. Breastfeeding women diagnosed with breast cancer may require medications or therapies that decrease milk production or are contraindicated during lactation. Women treated for breast cancer before or during pregnancy may have reduced lactational capacity due to surgical removal of breast tissue and/or damage to breast tissue from radiation. Given these unique challenges and the various other health benefits associated with oral breastfeeding,[3] women with a new or remote breast cancer diagnosis require unique support of lactation.

The aim of this protocol is to guide clinicians in the delivery of optimal care of breastfeeding women as it relates to breast cancer, from screening to diagnosis, treatment, and survivorship. Throughout this protocol, the quality of evidence, based on the Oxford Center for Evidence-Based Medicine 2011 Levels of Evidence[4] (Levels 1–5), is noted in parentheses.

Recommendations

Screening breastfeeding women for breast cancer

Limited evidence exists regarding breast cancer screening in the breastfeeding population (Box 1). The American College of Radiology recommends continuation of routine screening depending on the anticipated duration of breast-feeding and the individual's lifetime risk of breast cancer[5] (Level 4). However, guidelines for routine breast cancer screening of nonlactating women vary between nations, and controversy exists regarding screening eligibility, method, and interval[6] (Level 1).

Expert consensus guidelines have been published for breast cancer screening of breastfeeding women at increased risk of breast cancer due to deleterious *BRCA* mutations[6] (Level 4). These guidelines advise that women planning to breastfeed for at least 6 months continue routine screening, including mammography, and that breastfeeding women may elect to defer mammography and/or magnetic resonance imaging (MRI) until 6 to 8 weeks after weaning.

Mammography, breast ultrasonography, and contrast-enhanced breast MRI are safe during lactation[7] (Level 4). Lactating breasts have several physiologic differences relative to nonlactating breasts that impact their radiographic appearance. Milk ducts are dilated, glandular tissue is more dense, and distinct lactiferous ducts can be identified in most milk[8] (Level 4). Such differences may make interpretation of screening studies more challenging and increase the risk of false-positive results, thereby requiring additional imaging studies and biopsies[9] (Level 4).

Breastfeeding or expressing breast milk immediately before the imaging examination reduces these differences and facilitates detection of abnormalities[9] (Level 4). Utilization of breastfeeding/pumping sessions may further optimize breast cancer screening in this population. Specifically, ultrasonography may offer the highest sensitivity[9] (Level 4) and digital breast tomosynthesis ("3D mammography") may be superior to conventional mammography[9] (Level 4).

Breastfeeding management in women with a history of breast cancer

As breast cancer treatments may reduce lactational capacity, women with a history of breast cancer who would like

[1]Department of Surgery, Brody School of Medicine, East Carolina University, Greenville, North Carolina, USA.
[2]Surgical Oncology, Ridley Tree Cancer Center at Sansum Clinic, Santa Barbara, California, USA.

Breastfeeding and Breast Cancer: Managing Lactation in Survivors and Women with a New Diagnosis

Helen M. Johnson, MD[1], and Katrina B. Mitchell, MD[2]

[1]Department of Surgery, Brody School of Medicine, East Carolina University, Greenville, NC; [2]Breast Surgical Oncology, Presbyterian Healthcare Services – MD Anderson Cancer Network, Albuquerque, NM

ORIGINAL ARTICLE – BREAST ONCOLOGY

TABLE 1 Major sources, with levels of evidence, for key recommendations for lactation management strategies during multidisciplinary breast cancer care.

	Recommendation	Source	Level of evidence
General considerations	Breastfeeding is protective against breast cancer, independent of the effect of parity on cancer risk	Collaborative Group on Hormonal Factors in Breast Cancer[3]	Meta-analysis
Imaging	Ultrasound should be the first-line imaging modality for lactating women with a breast mass	diPietro Alexander et al.[10]	Expert consensus guidelines
	Lactation-related changes on breast magnetic resonance imaging do not preclude detection of breast lesions	Espinosa et al.[11]; Oh et al.[12]	Retrospective descriptive studies
Breast conservation therapy (BCT): lumpectomy and radiation	BCT impairs future lactational ability in most women, via both anatomic and histopathologic effects	Lind et al.[13]	Systematic review
Chemotherapy	Breastfeeding is contraindicated during chemotherapy, due to drug excretion	Pavelli et al.[14]	Narrative review
	It may be possible to safely breastfeed between cycles in some cases	Anderson[15]	Expert opinion
	Breastfeeding success may be diminished in women who receive chemotherapy during pregnancy	Stopinski et al.[16]	Prospective cohort study
Endocrine therapy	Aromatase inhibitors are contraindicated in lactation	The InfantRisk Center[17]; Cardoso et al.[18]	Expert opinion
	It may be safe to defer or interrupt tamoxifen therapy to complete breastfeeding	POSITIVE trial (NCT02268890, https://clinicaltrials.gov)	Randomized clinical trial (in recruitment phase)
Radiation therapy (RT)	Breastfeeding during RT may increase the risk of skin toxicity	Sheehan et al.[19]	Expert opinion
	Irradiated breasts may produce milk with altered biochemical composition	Green[20]; Gass et al.[21]	Case report
Surgery	Milk supply can be achieved and maintained by a single breast	Michaels and Wooten[22]	Observation
	Lactating women undergoing breast surgery appear to have similar rates of wound complications as nonlactating women	Dominici et al.[23]	Retrospective cohort study
	Resumption of breastfeeding of up to 24 h may be advisable after dual-tracer sentinel lymph node biopsy	Giannoudis et al.[24]	Expert opinion; Expert consensus guidelines
	Patients may benefit from perioperative lactation support programs	Kroh et al.[25]	Retrospective descriptive study

Additional considerations

Additional Considerations: Perinatal Mental Health

- Rapid drop in estrogen/progesterone = concurrent drop in serotonin
- Perinatal Mood and Anxiety Disorders (PMADs) most common complication of pregnancy and childbirth
- Affects at least 20% of women and 1/10 partners

JAMA 2019

Multidisciplinary Care

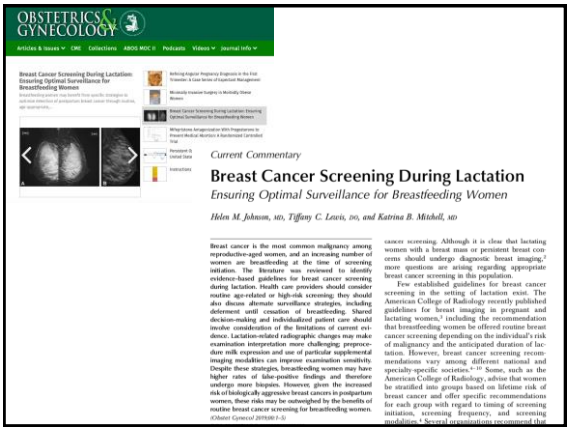
- MFM
- Peds/neonatologist
- IBCLC
- Onco-fertility
- Genetics
- Nutritionist
- Clinical Trials (POSITIVE)
- Oncology psych, SW
- Patient support groups

What about another pregnancy?

- Significantly reduced risk dying
- "Healthy Mother Effect"
  - Even when controlling for this, improved survival
- Interval since pregnancy may have impact
  - Within two years, improved DFS; after = similar
- Breastfeeding does not increase risk of recurrence
- Hypotheses
  - Alloimmunization against cancer cells in subsequent pregnancy
  - Breast cancer cells, fetal cells share common antigens
  - Mother immune system activated during pregnancy and eliminates circulating fetal cells as well as quiescent tumor cells
  - Impact of estrogen and apoptosis

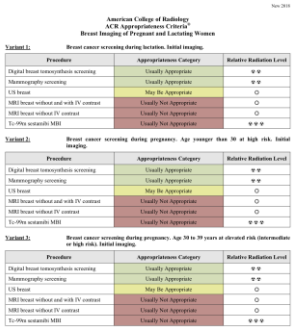
Azim et al Eur J Cancer 2011, Hartman BCRT 2016, Gorman et al J Can Surv 2009, Azim et al BCRT 2009, Connell et al Health Care Women Int 2006

Breast cancer screening in pregnancy and lactation?



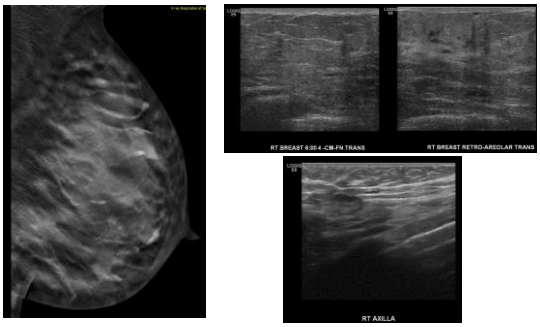
YES!

- Screening MMG or DBT +/- ultrasound
  - Under age 30 and high risk
  - 30-39 intermediate to high risk
  - 40 and over average risk
- Consider MRI in high risk lactating (not pregnant) patients on case-by-case basis

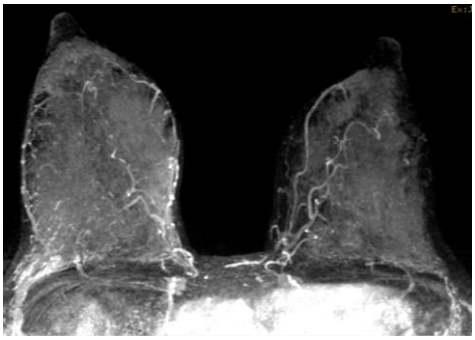


ACR Imaging of Pregnant and Lactating Women 2018

Q6 month screens in 30 year old BRCA I

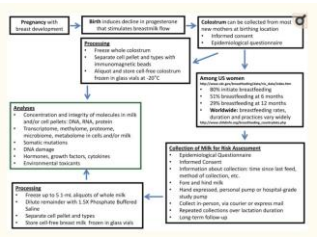


BRCA I hypervascularity at 10 months PP

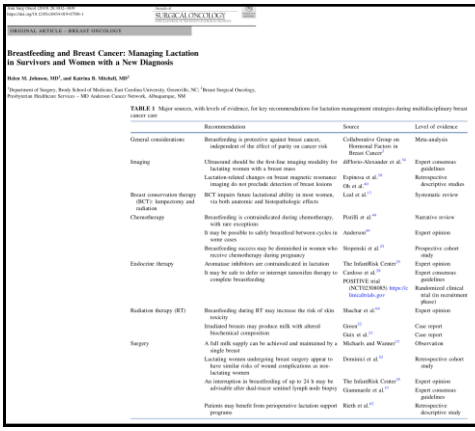


Breastmilk as a biospecimen

- Potential of breastmilk analysis to inform early events in breast carcinogenesis



Murphy et a BCRT 2016



SURGICAL ONCOLOGY

ORIGINAL ARTICLE – BREAST ONCOLOGY

Breastfeeding and Breast Cancer: Managing Lactation in Survivors and Women with a New Diagnosis

Helen M. Johnson, MD[1], and Katrina B. Mitchell, MD[2]

[1]Department of Surgery, Brody School of Medicine, East Carolina University, Greenville, NC; [2]Breast Surgical Oncology, Presbyterian Healthcare Services – MD Anderson Cancer Network, Albuquerque, NM

TABLE 1 Major sources, with levels of evidence, for key recommendations for lactation management strategies during multidisciplinary breast cancer care

	Recommendation	Source	Level of evidence
General considerations	Breastfeeding is protective against breast cancer, independent of the effect of parity on cancer risk	Collaborative Group on Hormonal Factors in Breast Cancer[2]	Meta-analysis
Imaging	Ultrasound should be the first-line imaging modality for lactating women with a breast mass	diFlorio-Alexander et al.[34]	Expert consensus guidelines
	Lactation-related changes on breast magnetic resonance imaging do not preclude detection of breast lesions	Espinoza et al.[35] Oh et al.[40]	Retrospective descriptive studies
Breast conservation therapy (BCT): lumpectomy and radiation	BCT impairs future lactational ability in most women, via both anatomic and histopathologic effects	Lord et al.[41]	Systematic review
Chemotherapy	Breastfeeding is contraindicated during chemotherapy, with rare exceptions	Pistilli et al.[44]	Narrative review
	It may be possible to safely breastfeed between cycles in some cases	Anderson[45]	Expert opinion
	Breastfeeding success may be diminished in women who receive chemotherapy during pregnancy	Stopinski et al.[24]	Prospective cohort study
Endocrine therapy	Aromatase inhibitors are contraindicated in lactation	The InfantRisk Center[29]	Expert opinion
	It may be safe to defer or interrupt tamoxifen therapy to complete breastfeeding	Cardoso et al.[30] POSITIVE trial (NCT02308085) https://clinicaltrials.gov	Expert consensus guidelines Randomized clinical trial (to recruitment phase)
Radiation therapy (RT)	Breastfeeding during RT may increase the risk of skin toxicity	Shachar et al.[4,6]	Expert opinion
	Irradiated breasts may produce milk with altered biochemical composition	Green[43] Guix et al.[42]	Case report Case report
Surgery	A full milk supply can be achieved and maintained by a single breast	Michaels and Wanner[23]	Observation
	Lactating women undergoing breast surgery appear to have similar risks of wound complications as non-lactating women	Dominici et al.[31]	Retrospective cohort study
	An interruption in breastfeeding of up to 24 h may be advisable after dual-tracer sentinel lymph node biopsy	The InfantRisk Center[29] Giammarile et al.[32]	Expert opinion Expert consensus guidelines
	Patients may benefit from perioperative lactation support programs	Rieth et al.[33]	Retrospective descriptive study

Noninvasive Assessment of Lactating Breasts Using Somatic Mutations and DNA Methylation as a Pre-symptomatic Test for *BRCA* Breast Cancer

Study Overview

- **Participants contact UMass Breastmilk lab and we provide a prepaid FedEx package and instructions for mailing a milk sample from each breast, a saliva sample, and a copy of their *BRCA* test results**
- **We assess mutations and DNA methylation in the sloughed epithelial cells in the milk**

Recruiting two groups of women

- **Breastfeeding women with a germline mutation in a *BRCA gene***
- **Breastfeeding women scheduled for a breast biopsy or recently diagnosed with breast cancer regardless of *BRCA* status**

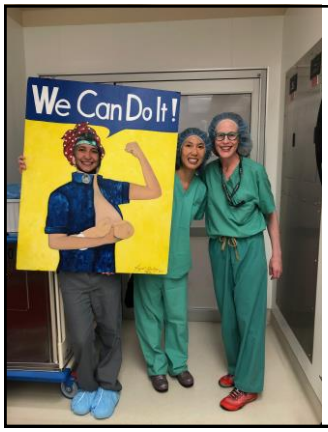
Kathleen Arcaro, PhD
University of Massachusetts Amherst
karcaro@ umass.edu (413) 577-1823
http://www.BreastmilkResearch.org

Take home points

- Surgery, chemo safe in pregnancy after 1st trimester (1st trimester surgery weigh risk/benefit)
  - No blue dye, but technetium is safe for axillary mapping
- Hold chemo week 35/36 and re-start 3 weeks after delivery
  - Can breastfeed baby until chemo resumes
- No radiation, no anti-HER2, no endocrine during pregnancy
- Postpartum breast cancer a distinct clinical entity from those cancers that develop DURING pregnancy
  - Breastfeeding management requires nuanced, multidisciplinary care
- MMG/ultrasound safe in both pregnancy and lactation; no MRI in pregnancy
- Staging studies safe in lactation but no PET CT or bone scan in pregnancy; use alternatives

Key Resources

- Borges and Schedin PPBC work
- ABM Anesthesia, Radiology, and Breast Cancer protocols
- MSKCC perioperative lactation plan
- *Green Journal* Screening of Pregnant and Lactating Patients
- Recent PABC literature search
- Useful clinical summaries of care (e.g. Shah et al ASO 2019 -> helpful table for management of PABC)



Plastic surgery and breastfeeding

Overview

- General considerations
- Reductions
- Augmentation
- Congenital chest wall and breast anomalies
- NAC procedures
- Gender reassignment chest-contouring ("top") procedures

General considerations

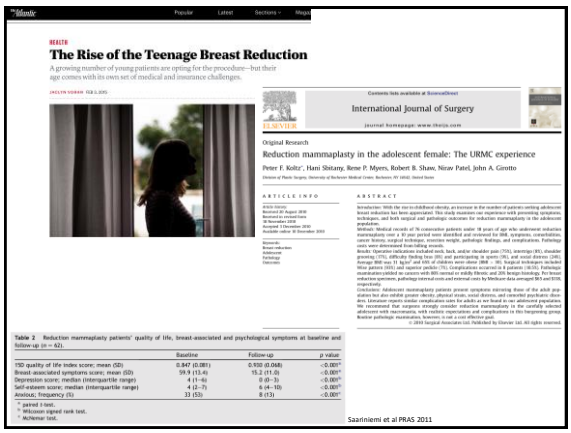
- Background info of *why*
  - E.g. asymmetry/hypoplasia to suggest tuberous breast deformity
- Same volume removed in different individuals may not reflect quality of parenchyma
  - Glandular vs. fatty
- Mechanical aspects of breastfeeding
  - E.g. large augmentation and difficulty latching
- Techniques
  - Parenchymal resection, location of incisions/closure, types of implants, nipple areolar complex
- Time elapsed from surgery

Abatte et al PRS 2017

Reduction mammaplasty (often with mastopexy, aka "lift")

- 432K reductions yearly
- Average age 43; average BMI 32
- Reduces pain, neuropathy, anxiety/depression, intertrigo
- Consistently reported as one of highest patient satisfactions with plastic surgery procedures
- Generally performed after breast growth has stabilized for one year

Fischer et al ASJ 204, ISAPS.org, plasticsurgery.org



HEALTH

The Rise of the Teenage Breast Reduction

A growing number of young patients are opting for the procedure—but their age comes with its own set of medical and insurance challenges.

JACELYN VORHIS

Contents lists available at ScienceDirect

International Journal of Surgery

journal homepage: www.theijs.com

Original Research

Reduction mammaplasty in the adolescent female: The URMC experience

Peter F. Koltz*, Hani Shitany, Rene P. Myers, Robert B. Shaw, Nirav Patel, John A. Girotto

Division of Plastic Surgery, University of Rochester Medical Center, Rochester, NY 14642, United States

ARTICLE INFO

ABSTRACT

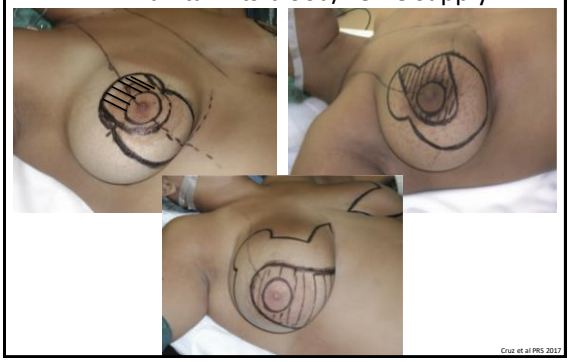
Table 2 Reduction mammaplasty patients' quality of life, breast-associated and psychological symptoms at baseline and follow-up (n = 42).

	Baseline	Follow-up	p value
YSQ quality of life index score; mean (SD)	0.847 (0.081)	0.930 (0.048)	<0.001[a]
Breast-associated symptoms score; mean (SD)	59.9 (13.4)	15.2 (11.0)	<0.001[a]
Depression score; median (interquartile range)	4 (1–6)	0 (0–3)	<0.001[b]
Self-esteem score; median (interquartile range)	4 (2–7)	6 (4–10)	<0.001[b]
Anxious; frequency (%)	35 (53)	8 (13)	<0.001[c]

[a] paired t-test.
[b] Wilcoxon signed rank test.
[c] McNemar test.

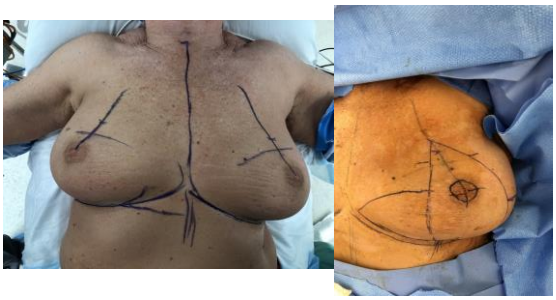
Saarniemi et al PRAS 2011

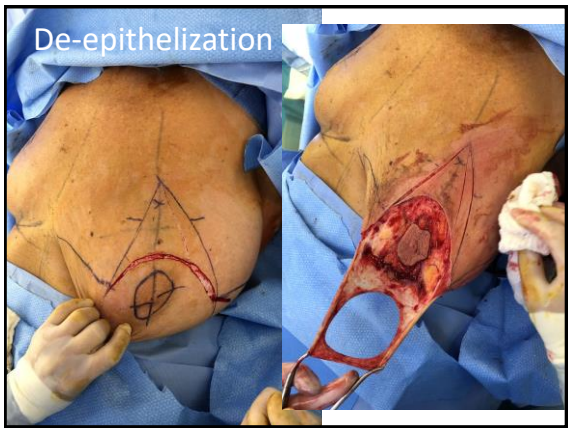
Patterns of reduction reflect how the nipple will maintain its blood/nerve supply

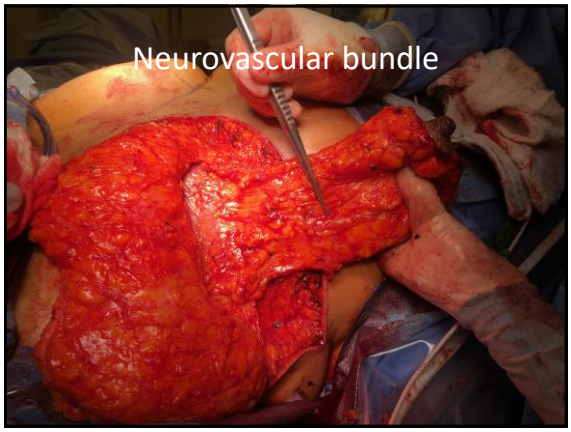


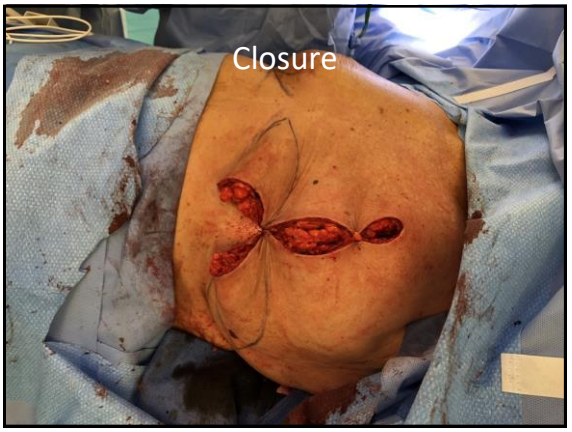
Cruz et al PRS 2017

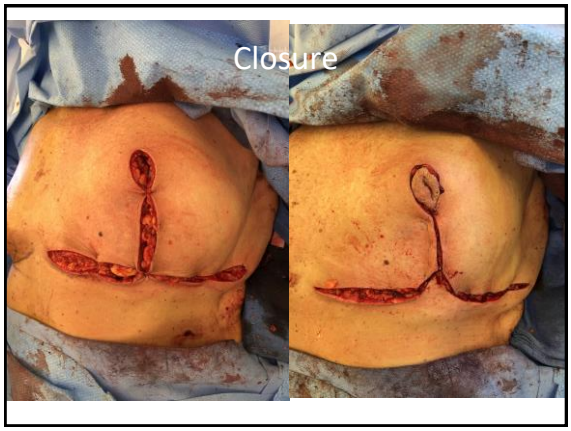
Markings for breast reduction





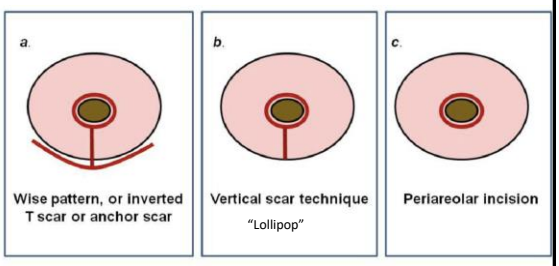






Free nipple graft in reduction (successful breastfeeding > 2 years)

Patterns of closure



The impact of breast reduction surgery on breastfeeding: Systematic review of observational studies

Roni Y. Kraut[1¤*], Erin Brown[2¤], Christina Korownyk[1‡], Lauren S. Katz[3‡], Ben Vandermeer[4‡], Oksana Babenko[1‡], M. Shirley Gross[1,5‡], Sandy Campbell[6‡], G. Michael Allan[1¤]

- Psychosocial factors often described as central issue with breastfeeding success after reductions
  - This review focused on preservation of column of parenchyma from NAC to chest wall (subareolar parenchyma)
- 102 total reported techniques
  - 10 techniques full preservation of NAC to chest wall
  - 35 portion
  - 19 no preservation (i.e. free nipple graft)
  - 38 no preservation information

Kraut et al PLOS one 2017

Results

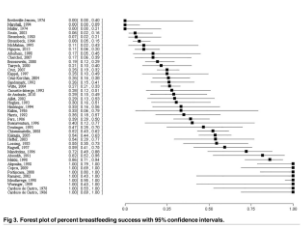


Fig 3. Forest plot of percent breastfeeding success with 95% confidence intervals.

- Lack of preservation = 4% success, compared to 75% with partial, and 100% with full preservation
- Definition of success also highly variable (often exclusive feeding for three weeks without supplementation but ranged from 1-24 weeks)
  - Not consistent with WHO recommendation of EBF x 6 months

Results

- Lower success rates: higher quality study, prospective study, breastfeeding > 12 weeks, focus of study on breastfeeding
  - **Higher success rates if plastic surgeon was first author**
- Amount of tissue removed, year of operation did not appear to impact breastfeeding
  - Ten studies provided width of pedicle (in all cases > 5 cm)
- Inferior and central pedicles greater successful breastfeeding
- Not enough information to draw conclusions about nipple sensation

Results continued

- Why women did not attempt to breastfeed
  - Lack of support and encouragement predominant reason
- Unsuccessful breastfeeding when attempted
  - 55% insufficient milk
  - 16% reluctance and lack of support

Take home points: BMI

- Obesity independent risk for poor breastfeeding outcomes
  - Impaired lactogenesis, impaired prolactin response to suckling, insulin resistance and low milk production
- Many studies document similar rates success between unoperated macromastia and reductions
  - Nerve traction, mechanical aspects of breastfeeding such as difficulty with latch
- Need for more prospective studies, control groups with similar BMI (i.e. macromastia but not obesity)

Jennie Bever Babendure et al. International Breastfeeding Journal (2015) 10:21
DOI 10.1186/s13006-015-0046-0

INTERNATIONAL BREASTFEEDING JOURNAL

REVIEW Open Access

Reduced breastfeeding rates among obese mothers: a review of contributing factors, clinical considerations and future directions

Jennie Bever Babendure[1], Elizabeth Reifsnider[2], Elnora Mendias[3], Michael W. Mosmarco[4*] and Yolanda R. Davila[5]

Kerrigan et al Plastc Reconstruc Surg 2001, Rasumussen et al Pediatrics 2004 and J Nutri 2001

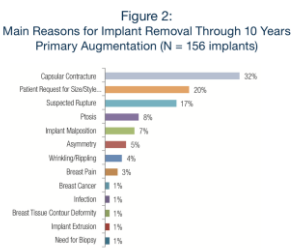
Take home points

- Primary reason *not attempting* breastfeeding: psychosocial
- Reason for *not able* to breastfeed: poor milk production
  - Is this real or perceived?
- Women must be counseled that there are inferior rates of breastfeeding success documented in women who have undergone plastic surgery procedures
- Standardized consent form as well as standardized breastfeeding definition

Kerrigan et al Plastc Reconstruc Surg 2001, Rasumussen et al Pediatrics 2004 and J Nutri 2001

Breast augmentation

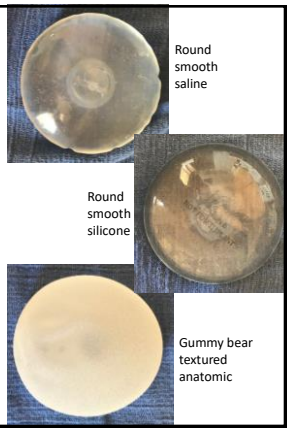
- 1.5 million procedures worldwide; most common cosmetic procedure
  - 40% will have revision
- Average age 34
  - Must be 18 for saline implants
  - Age 22 for silicone
- Considerations
  - Type of implant
  - Size of implant
  - Location of implant
  - Location of incisions



Natrelle

Types of implants

- Implant *filling*
  - Saline versus silicone
    - Saline valve visible on mammogram
    - Silicone can be more fluid or cross-linked gels ("gummy bear")
    - Saline generally lasts at least 10 years, silicone can last for decades
- Implant *surface*
  - Smooth versus textured
    - Textured more vigorous tissue response, prevents migration
      - Associated with Breast Implant Associated Anaplastic Large Cell Lymphoma (BIA-ALCL) and FDA recommended removal in August 2019
      - ? Related to biofilm/bacteria and immune response
- Implant shape
  - *Round versus anatomic*
    - Anatomic more tapered, "natural" but if it migrates, can distort breast

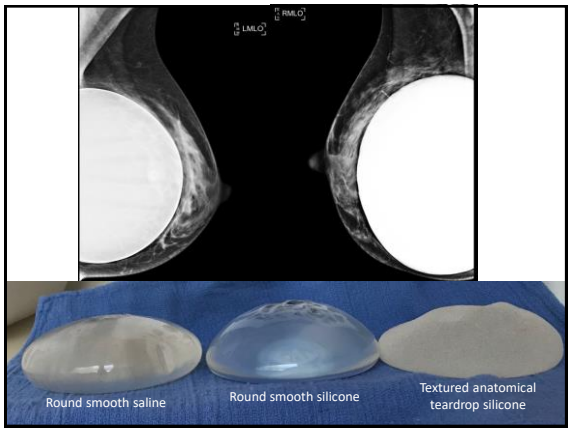


Round smooth saline

Round smooth silicone

Gummy bear textured anatomic

Memphin et al Materials 2018, Stein et al Blood 2000, FDA 2011



Sizes of implants

- Smallest generally 125 cc
- Largest silicone 800 cc
- Largest saline 960 cc
- How do women end up with implants larger than this?
  - Should not overfill by more than 10% without affecting implant integrity but some plastic surgeons will overfill by 50-100%

Jennifer Chan, MD

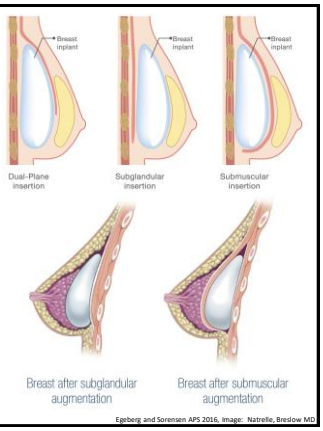
Location of incision

- No difference in nipple sensation based on incision
- Periareolar
- Inframammary
- Axillary
- (Transumbilical – TUBA)

Mofid et al PRS 2006, Stutman et al APS 2012, Image: Natrelle

Location of implant

- Subglandular
- Submuscular
- Dual plane
  - Technically submuscular but pectoralis is released inferomedially so part of implant is exposed inferiorly
  - Provides inferior fullness, less animation



Egeberg and Sorensen APS 2016, Image: Natrelle, Breslow MD

Original Research

Do Breast Implants Influence Breastfeeding? A Meta-Analysis of Comparative Studies

Fengrui Cheng, MD[1], Shuiping Dai, MD[1], Chiyi Wang, MD[1], Shaoxue Zeng, MD[1], Junjie Chen, MD, PhD[1], and Ying Cen, MD, PhD[1]

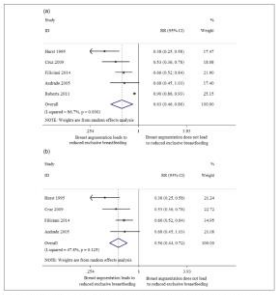
Journal of Human Lactation 2018, Vol. 34(3) 428–433

DOI: 10.1177/0890334418776614
journals.sagepub.com/home/jhl
SAGE

- 5 studies met inclusion criteria
- Primary outcome number of women EBF or breastfeeding; secondary EBF based on incision location
- Issues with quality
  - Time discrepancy between pregnancies when less support for breastfeeding
  - Recall bias
  - Lack of standardized f/u interval

Results

- Women with breast implants significantly less likely to breastfeed
- No statistical difference periareolar vs. inframammary incision
  - nipple sensation from lateral intercostal branch of T4
- Augmentation between births: 87 to 72% drop of breastfeeding



Cheng et al JHL 2018, Ducic et al Aesthetic Surg J 2014

Take home points: effects on lactation

- Attenuation of parenchyma, pressure necrosis
- Damage to ducts/glandular tissue
- Nerve traction

Michalopouls Breast J 2007; Mofid et al PRS 2006, Spear et al PRS 1995, Jones et al PRS 2018

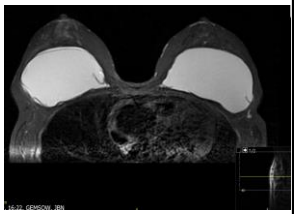
Take home points: effects on lactation

- Capsular contracture (foreign body reaction, graded I-IV)
  - Most common complication
  - 50% will have by 10 years
- Pain, difficulty with latch from inelasticity
- General difficulty with latch from size alone
- Chronic biofilm and chronic inflammation

Michalopouls Breast J 2007; Mofid et al PRS 2006, Spear et al PRS 1995, Jones et al PRS 2018, Headon et al Arch Plast Surg 2015

What about safety of silicone implants?

- Silicone-type substance identified in lactiferous ducts in non-lactating women who had ruptured implants
  - However, chemical identification of silicone not performed
- Report of "RA, scleroderma, abnormal esophageal motility" in childhood, but no test of breastmilk nor documentation of rupture
- Overall old, flawed case reports on implant types pre-1992



Shermis et al Breast Dis 1990, Leibman et al PRS 1992, Teuber et al Int Arch Allergy Immunol 1994, Levin etc at JAMA 1994

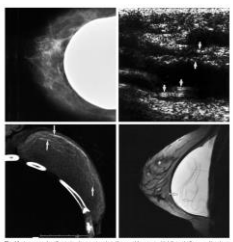
Safe in general

- Anatomic distance
  - Protected by capsule, most often subpectoral location
- Mean silicone levels in breastmilk compared to controls 55 vs. 51 ng/ml
- Mean levels in blood with implants compared to controls 79 vs. 103 ng/ml
- Mean silicone level in cow's milk 708 ng/ml
- Formula 4402 ng/ml

Semple PRS 2007

? Leaking implant

- Image
  - MRI preferred modality for silicone
  - MMG able to detects extracapsular rupture but less commonly intracapsular rupture
  - U/S detection more variable based on operator
- Only 10-20% of silicone implants rupture extracapsularly



Gorczyca et al PRS 2007

Poland syndrome

- Unilateral anomaly of pectoralis muscles, breast, nipple, axillary fold, subcutaneous tissue, ribs, and upper limb
- Wide phenotype variability
- TBN classification
  - Thorax, breast, nipple areolar complex

Romanini et al PRS 2016

Poland syndrome

- Most common anomaly in women T1B1N2; 68% right side rather than left side (similar to male)

Table 2. TBN Classification of Thoracic Anomalies in Poland Syndrome

	Anomaly
T	Thoracic
T1	Hypoplasia or aplasia of pectoralis muscles and soft tissue
T2	T1 and sternal deformity, pectus excavatum and/or carinatum
T3	T1 and rib aplasia
T4	T1, T2, and T3 (muscle, sternum, and rib defect)
B	Breast
B1	Breast hypoplasia
B2	Breast aplasia
N	Nipple-areola complex
N1	NAC hypoplasia with dislocation of <2 cm
N2	NAC hypoplasia with dislocation of >2 cm
N3	Absent NAC

NAC, nipple-areola complex.

Romanini et al PRS 2016

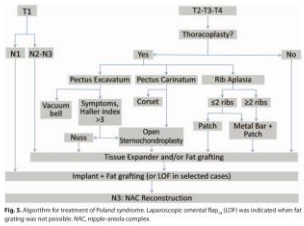


Fig. 5. Algorithm for treatment of Poland syndrome. Laparoscopic omental flap₊ (LOF) was indicated when fat grafting was not possible. NAC, nipple-areola complex.

Fig. 7. Postoperative result in the T3B1N2 patient in Figure 2c after fat grafting, reconstruction in two steps, and contralateral mastopexy.

Romanini et al PRS 2016

Tubular breast deformity

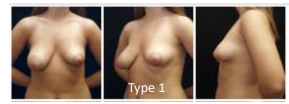
Type	Base	Inframammary Fold	Skin Envelope	Breast Volume	Ptosis	Areola
		TYPE I	TYPE II	TYPE III		
I	Minor constriction	Normal laterally, minor elevation medially	Sufficient	Minimal deficiency, no deficiency, or hypertrophy	Mild, moderate, or severe	Enlargement
II	Moderate constriction	Medial and lateral elevation	Inferior insufficiency	Moderate deficiency	None or mild	Normal, mild, or moderate herniation
III	Severe constriction	Elevation of entire fold, or fold absence	Global insufficiency	Severe deficiency	Mild/moderate	Severe herniation

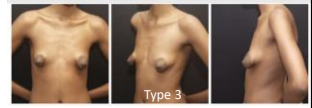
- Congenital breast anomaly that becomes apparent at puberty and greatly impacts lactation
  - Failure of tissue differentiation in fetal thorax; anomaly of fascial connective tissues
- Wide variety of presentations

Kolker and Collins PRS 2015

Tubular breast deformity

- Asymmetry is hallmark
- Breast base constriction, parenchymal hypoplasia, inferior breast skin deformity w/ superior malposition of IMF, areolar herniation
- Usually lack of breast growth and postpartum engorgement

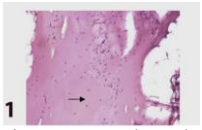




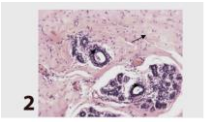
Kolker and Collins PRS 2015

Tubular breast deformity

- Large concentrations of collagen and elastic fibers on the constructive ring of the superficial fascia as well as the glandular structure



Fibrotic tissue surrounding areola



Glandular tissue replaced by fibrosis

Zholtikov APS 2019

Tubular breast deformity reconstructive surgery

Fig. 9. Tuberous breast correction. (Above) Preoperative views of a 32-year-old patient with bilateral type II tuberous breast deformity. (Below) Postoperative views of an excellent result at 12 months after one-stage correction with circumareolar mastopexy and placement of Allergan style 15-371 (371 cc) silicone smooth round implants.

Kolker and Collins PRS 2015

Tubular breast deformity reconstructive surgery

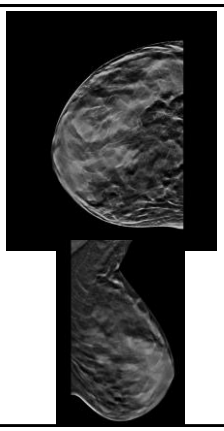
Fig. 10. Tuberous breast correction. (Above) Preoperative views of a 29-year-old patient with bilateral type III tuberous breast deformity. (Below) Postoperative views of an excellent result at 13 months after one-stage correction with circumareolar mastopexy and placement of Allergan style 10-210 (210 cc) (right breast) and 10-180 (180 cc) (left breast) silicone smooth round implants. Despite hypoplasia in all four quadrants and severe constriction, satisfactory correction was achieved in one stage.

Kolker and Collins PRS 2015

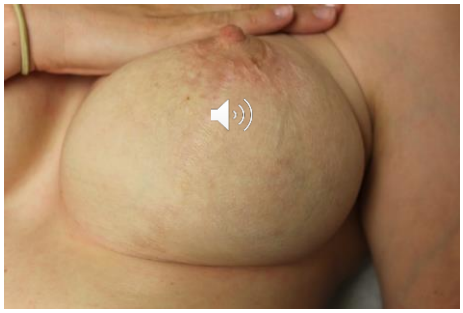
Is this a tubular breast deformity with asymmetry?

IGT vs. UGT

- Anatomically normal breasts
  - Extremely dense on mammogram
- But extremely low milk production (2-3 ounces/day)
- End organ resistance and UGT ("Unresponsive glandular tissue")?
  - Need more research
  - Better common definitions

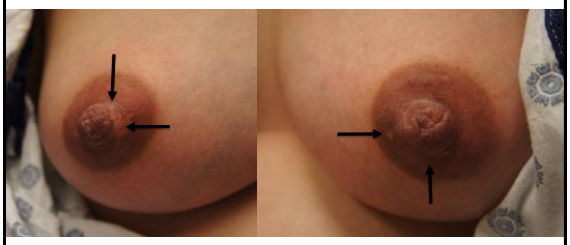


Remember, patients may have had more than one procedure …



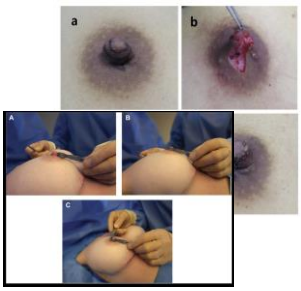
Plasticsurgery.org

Nipple reduction



Countless techniques described

- "Triple flap"
- "Z-plasty"
- "Simplified reduction technique"
  - Reported 1/60 patients who became pregnant was not able to breastfeed due to low milk supply



Basile and Chang APS 2007, Ren et al JPRAS 2013, Moliver et al ASJ 2013

Nipple Inversion

- 3-10% of the population
- Congenital
  - Connective tissue tethering, failure of the lactiferous sinuses to lengthen, failure of growth of mesenchyme
- Acquired
  - Surgery, malignancy

Gould DJ et al Aesthetic Surg J 2015
Park HS, Yoon CH, Kim HJ Aesthetic Plast Surg 1999

Nipple Inversion

- Grade I
  - Everted manually and maintains projection
- Grade II
  - Returns to inverted position
- Grade III
  - Severely retracted and inverted, difficult to evert

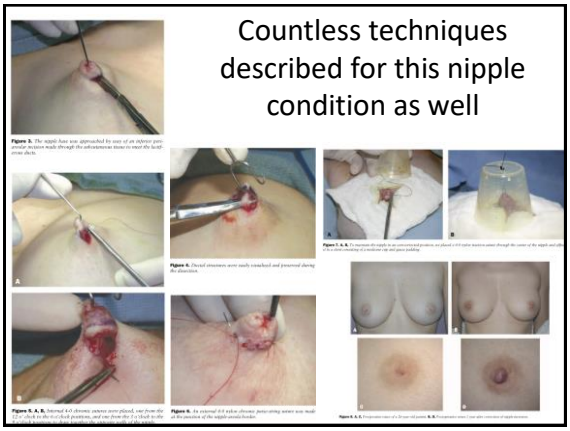
Stevens et al ASJ 2004

Pathologic inversion

Chronic/congenital inversion

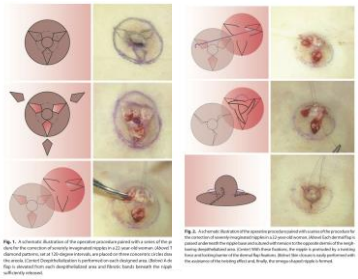
Breastfed two children x two years each exclusively from right breast; left nipple inverted and not able to evert since childhood

Countless techniques described for this nipple condition as well



Korean triple flap or "twist and lock"

- External dermal flaps to stent nipple in an everted position
- No division of ducts but lengthening alongside the ducts



Kim PRS 2005

It's pregnancy, not BF that causes ptosis

- Risk of breast ptosis increases with each pregnancy, but breastfeeding does not have an effect on breast appearance

Rinker et al ASJ 2008

Accessory breast tissue

- Wait to utilize liposuction or excise for axillary breast tissue (or any other cosmetic procedure on breast!) until childbearing complete

Emsen APS 2006

Gender reassignment chest-contouring or "top" surgery

Insights into Practice and Policy

international lactation consultant association

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2019, Vol. 35(2) 223–226
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Lactation Care for Transgender and Non-Binary Patients: Empowering Clients and Avoiding Aversives

Trevor Kirczenow MacDonald[1]

Background

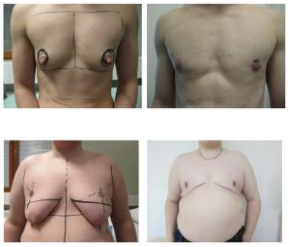
In recent years, we have seen growing awareness by the media, professional health organizations, and academics when it comes to the reproductive and lactation health needs of transgender and non-binary (TGNB) people. Thomas Beatie made headlines in 2007 as the world's "first" pregnant man (Roberts, 2016). The American College of Obstetricians and Gynecologists (2011) published a position statement encouraging its members to educate themselves about transgender health. In 2016, researchers published the first qualitative study about the experiences of transmasculine people with lactation (MacDonald et. al., 2016). The first peer-reviewed case study of a transgender woman who successfully breastfed her infant was published in 2018 (Reisman & Goldstein, 2018).

Surgery and chestfeeding

For transmasculine individuals that have had prior chest surgery and choose to chestfeed their infants, establishing an adequate latch and milk supply are the primary challenges. Different surgical techniques and individual patient characteristics result in varying degrees of chest tissue regrowth during pregnancy. When the chest is flatter and the skin more taut, latching may be difficult, in which case the patient could be encouraged to try molding the tissue with their hand, or using a nipple shield if helpful. Use of a supplemental nursing aid and galactagogues can be discussed in the case of inadequate milk supply (MacDonald et al., 2016).

Mastectomy (+/- free nipple graft) or mammaplasty?

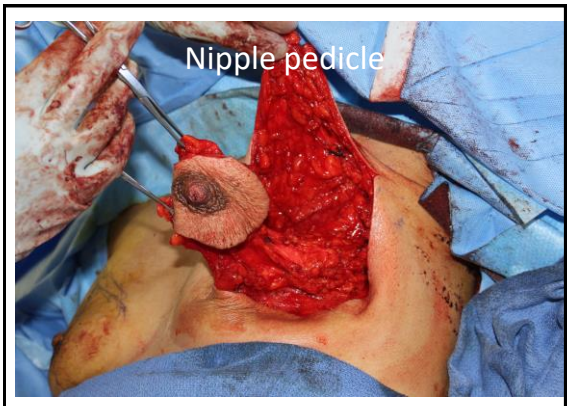
- Concentric circular mastectomy
- Transverse incision
  - Pedicled mammaplasty
  - Mastectomy with free nipple graft



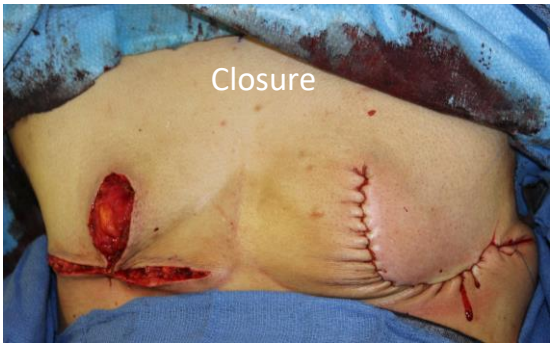
Nelson JPRAS 2009, Kaarlainen et al Scand J Surg 2017

Mammaplasty

Jean Shimanek, MD



Nipple pedicle and surrounding residual parenchyma



Take home points

- Prenatal plus early postpartum evaluation
- Hard to make generalizations; individualize care
- Baby weight gain CLOSELY
  - Weighted feeds (demonstrate transfer of milk)
- SUPPORT!

Lactation primer

Overview

- Lactogenesis
- Engorgement
- Nipple pain
- Positioning and latch
- Managing low production
- Managing hyperlactation
- Pump tips
- Milk storage
- Induced lactation
- Weaning
- Common lactation world myths – don't be trapped

"Breastfeeding dinosaur" - Luke Johnson-Mao

Lactation office supplies

- Infant scale
- Nursing pillows, exam table to demonstrate side lying and laid back
- Feeding tube and syringe ("supplemental nursing system" or SNS)
- Ask department to stock mepilex
- Vasospasm wool pad, nipple balm, misc samples
- Breast demos for latch demonstration
- Fun magnets and info cards
- Therapeutic ultrasound

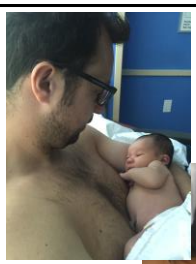
Lactogenesis

- Lactogenesis I
  - Starts mid-pregnancy, secretory differentiation of the lobular alveolar epithelium
  - Colostrum leakage is normal
- Lactogenesis II
  - Onset of copious milk production, usually 30-120 hours postpartum
    - Results from fall in progesterone after delivery and prolactin response to suckling
- Lactogenesis III
  - Maintenance of established lactation; autocrine control from continued removal of milk from breast

Neville et al J Nutr 2001

Immediate postpartum support

- Limit pain meds near the end of labor
- Immediate STS
  - Cardiorespiratory and temperature stabilization, improved autonomic and GI adaptation, growth
  - Decreased pain, cortisol, infant crying, maternal hemorrhage, depression
  - Improved maternal touch/bonding, breastfeeding exclusivity and organization
- Latch within one hour
- Rooming in
- Breastfeeding education
  - Staff observes feeds each shift
- No anti-lactation drugs



AAP Pediatrics 2016

Baby stomach size

- Milk production will increase from about 100/ml day initially to 500 ml/day

Lawrence and Lawrence Breastfeeding 2010

Lactogenesis II: The first week postpartum

- Feedings 10-12 times a day
- Frequent, effective feeding crucial to establish and maintain production
- Focus on baby, not visitors
  - Mom should focus on baby feeding cues and resting
- No pacifiers or supplements unless medically indicated
- Early referral for any issues (see below)

Lawrence and Lawrence Breastfeeding 2010

Lactogenesis III: after the first week

- Nursing q3-4 hours
- 3-4 yellow seedy stools/day
- Always wet
- Content between feedings
- Breasts full before, emptier after
- "An ounce a day keeps the doctor away"

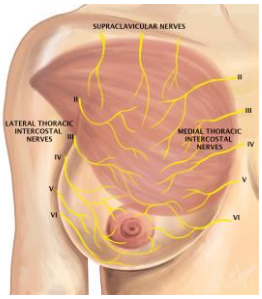
Lawrence and Lawrence Breastfeeding 2010

What can go wrong early on?

- Maternal
  - Engorgement
  - Inelastic NAC with sore, cracked nipples
  - Pain cycle
- Infant (lack of transfer)
  - Sleepy baby
  - Tongue tie
  - Torticollis
- Leads to …
  - Decreased breastfeeding, decreased emptying
  - Then lowered milk supply
  - Then mom supplements as a result of decreased emptying/stimulation
  - Eventually stops breastfeeding

Engorgement pain

- Deep breast pain radiates to NAC pain and NAC pain radiates to deep breast pain



Jimenez et al 2017, Berens et al 2016, Kristensen et al 2018

Engorgement Management

- Optimize latch
  - Reverse Pressure Softening (RPS) and prior to latch
  - Sandwich the breast
  - Remove a small amount of milk before latch
    - Hand pump NOT electric pump (aggressive emptying will worsen engorgement)
- Heat/ice for comfort
- Lymphatic massage ad lib

Cotterman JHL 2004

Lymphatic Massage

- Technique
  - Ten small circles above clavicle near neck
  - Ten small circles in axilla
  - Continue with light touch massage from nipple towards clavicle, axilla
  - "Very gentle touch/traction of skin - "like petting a cat"
- Lifts skin so excess fluid/swelling in breast can drain more easily to lymph nodes
- Start during pregnancy if experiencing painful rapid breast growth, and use as needed postpartum for engorgement

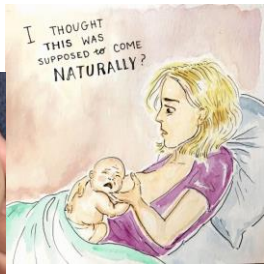
Additional notes about engorgement

- Engorgement is largely tissue edema and not obstructed milk – mastitis and plugging early on very uncommon, usually starts around 2-3 weeks

ABM Protocol #20

Early nipple pain: Often positioning/latch issue exacerbated by engorgement

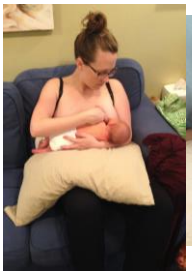
- 11-96% of women have nipple pain at some point during breastfeeding



Blair, DeCarvalho, Oliveira, Centuori

What to do? Position well

- Address any medical issues (e.g. vasospasm, tongue tie)
- Comfortable position important for maternal comfort, effective transfer, deep latch
- "Belly button to belly button"
  - Nose, belly button, knees in one line or shoulder, ear, hip
  - Baby in neutral, relaxed position with its belly touching mom
- Bring baby to mom, not mom to baby
  - Mom stool or pillow



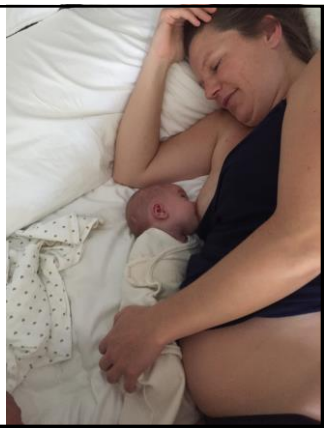
Positioning types

Cradle hold

Cross cradle hold

Side lying (one version)

Another side lying position



Laid back or "biological nursing" (mom on back, baby on belly)

Sitting

Standing

Football

Football

NICU Cross cradle

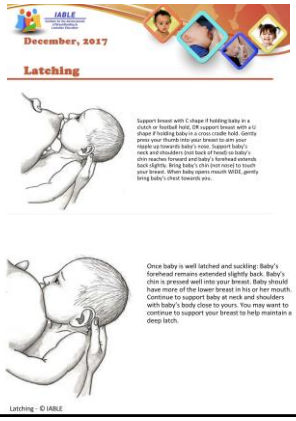
- Left hand "C-hold" sandwiching NAC for latch
- Right arm holding baby

Tandem nursing

Latch goals

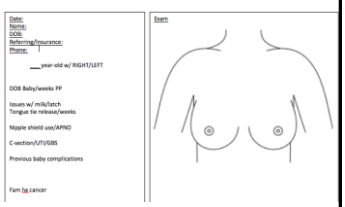
- Nose close to mom's skin
- Wide open latch
- Lips well flanged
- Tongue extends past lip

Asymmetric latch: "nose to nipple"



Baseline history

- Breastfeeding
  - Baby weeks at birth, issues at birth, any issues with early milk production, how often baby is feeding day/night, pumping (ounces per breast), is baby calm/satisfied, gaining weight, diaper wet/BM, pain with latch, any current interventions (nipple shields, balms, etc)



Low milk production ("supply")

- Perceived not real
  - Babies become more effective at eliminating milk as they grow, growth spurts and cluster feeding, snacking, babies who like to be held, CDC vs. WHO growth charts
- Mom lost supply
  - Lack of removal/emptying (e.g. large nipples, initially excellent supply "living off letdown" then eventually no adequate emptying b/c no stimulation of glandular tissue), nipple shield use (no nipple stimulation of prolactin), medications
- Insufficient glandular tissue (IGT) or unresponsive glandular tissue (UGT)
  - INFERTILITY, PCOS, thyroid disorders, DM2, ? Other autoimmune disease, other surgery and/or breast cancer treatment, congenital tubular breast deformity

IABLE 2019

IGT?

Shape/morphology matters more than size

Tubular breast deformity

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Kolker and Collins PRS 2015

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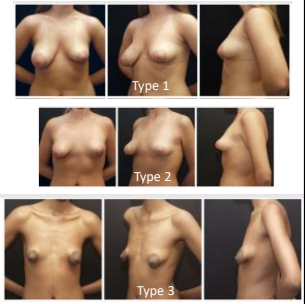


Kolker and Collins PRS 2015

Medical Indications for Supplement

- Hypoglycemia
- Dehydration
- Delayed lactogenesis II
  - Day 5, >10% weight loss
  - Penn State NEWT tool
    - Newbornweight.org
- Meconium on Day 5
- Severe hyperbilirubinemia
- Baby not latching or transferring milk
- Known maternal insufficient supply

Image IABLE, Academy of Breastfeeding Med Protocol #3 bfmed.org

Weighted feeds

- Weigh baby before in dry diaper
- Ensure adequate latch/position
- Listen for audible swallows
- Newborn should not nurse for protracted feedings
  - Means they are not transferring milk and burning calories instead
- Weigh baby after
- Ideally would like to see 30-90 gram change
  - 30 grams = 30 ml = one ounce

Interventions for low production: Effective milk removal

- "Triple feeding"
  - Breastfeeding
  - Pump/Hand expression
  - Return via spoon, cup, feeding tube, bottle
- Supplement with donor milk or formula if true IGT
- Follow CLOSELY q1-2 days until baby weight gain established
  - Triple feeding is exhausting so it should be very time limited and only if baby actually swallowing at breast!
- Avoid production-lowering medications
  - Antihistamines, decongestants, steroids, birth control, placental encapsulation, nicotine, alcohol

Image IABLE, Morton et al J Perinat 2012, Morton JHL 2012

Tube Feeding at the Breast

Finger Feeding

Images: IABLE

Interventions – Galactogogues

- Work best with a mom who has lost milk supply, not IGT
- Herbal supplements to improve insulin sensitivity
  - Goat's rue (metformin derived from this) fenugreek, shatavari (asparagus), milk thistle, fennel, turmeric, ginger, dill, garlic, coriander, cumin, alfalfa
- Phytoestrogens
  - Fenugreek (increases testosterone), shatavarti, milk thistle, fennel, hops, alfalfa
- Food supplements
  - Moringa (raises prolactin), brewer's yeast, grains (oatmeal), hops, garlic, ginger, basil, onion, dill, coriander, anise, chamomile, marshmallow, green veggies, nuts
- Prescriptions
  - Glucophage (metformin)
  - Metoclopramide (dopamine antagonist, increases prolactin), Domperidone (not FDA approved; multiple drug interactions and fatal long QT syndrome)
    - Do not use either with history of depression

Ann Pharmacotherapy Oct 2012 46; 1392, mother-food.com, Lactmed/Toxnet Dec 2018
Breastfeeding Med 13(10) 2018
Breastfeeding Med 13(5) 2018

Hyperlactation or "oversupply"

- No defined criteria but generally more milk produced than baby needs
  - Average baby 500ml-1000ml
  - Breastfed baby does not increase volume over time the way formula fed babies do
- Iatrogenic or idiopathic

ABM protocol #33

Symptoms

- Maternal
  - Pain
  - Nipple trauma
  - Plugging
  - Mastitis
  - Abscess
- Infant
  - Supranormal weight gain
  - Struggles, fusses
  - Explosive stools
  - Refuses second breast


ABM Clinical Protocol #32:
Management of Hyperlactation

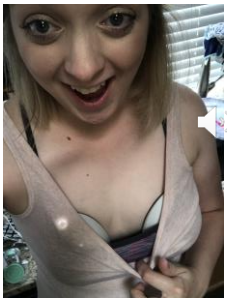
BFMed Protocol

Management

- Behavioral
  - Block feeding
    - Feed only one breast x 3 hours, then alternate
  - Eliminate unnecessary pumping
    - No pumping first three weeks unless mom separated from baby
    - Only hand express or hand pump to comfort
- Sage, peppermint
- Sudafed
- Estrogen containing OCP (only after six weeks due to thromboembolism risk)
- Cabergoline PRN
  - Dopamine agonist also used with pituitary tumors

BF Med Protocol

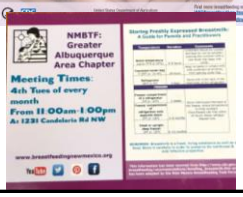
Pumping tips



- Refrigerate, don't wash between pumps
- CDC guidelines for washing, storing
- Q3-4 emptying
- Average 12-15 mins (limit for hyperlactation)
- Storage capacity varies greatly
- Membranes matter
  - Should be dry and replaced if suction not holding
- Average flange 24 mm but this is AVERAGE
  - Nipple shouldn't be stuck
  - Center nipple
  - Good seal
  - COMFORT and no trauma is key

Milk storage and use guidelines

- "Rule of 6"
- Less heating decreases fat loss
- Don't use microwave! – let thaw or place in warm water
- Guidelines for washing parts also available at CDC



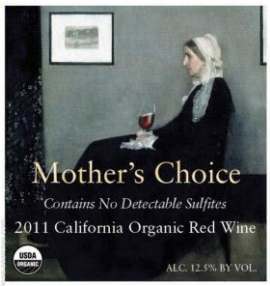
CDC 2018

More common questions: medications

- Pharmacology principles
  - Volume distribution, half life, molecular weight, infant absorption, protein binding, ion trapping, lipid solubility, protein binding
- Safe in pregnancy not necessarily safe in lactation
- Not safe
  - Most chemotherapy
  - Codeine, oxycodone, hydrocodone, tramadol
  - Statins
  - Novel anticoagulants (no data)
  - I-131
  - Smallpox and yellow fever vaccines
- Reduces supply
  - Estrogen, progesterone, prednisone, decongestants, antihistamines, enalapril, bromocriptine/cabergoline, antipsychotics (decrease dopamine)

Alcohol and marijuana

- Alcohol metabolized 1:1 blood: milk, peaks 30-60 mins; delay feed by 2-2.5 hours
- Marijuana NO in breastfeeding
- Marijuana (THC) is stored in fat
  - Baby's brain and breastmilk are high in fat
  - Estimated transfer into breastmilk is 0.8% of maternal dose



Lactmed alcohol 2019, AAP 2018, ACOG 2017

Induced Lactation

- Initiating lactation without pregnancy (adoption, same sex couples)
  - OCP x 4-6 months without interruption (simulate pregnancy)
  - Galactogogues started six weeks before birth
  - Pumping q3 hours six weeks before birth, no more than 5 hour break at night
- Relactation after cessation
  - Expect production to take 6-8 weeks

ABM Protocol #9, Canadianbreastfeedingfoundation.org

Weaning

- Begins with addition of complementary foods
- Weaning pumping
  - Increase interval q2-3 days
  - Do not pump to empty
- Weaning feedings
  - Wean before bed feeding last

Image: Shondinii Walters

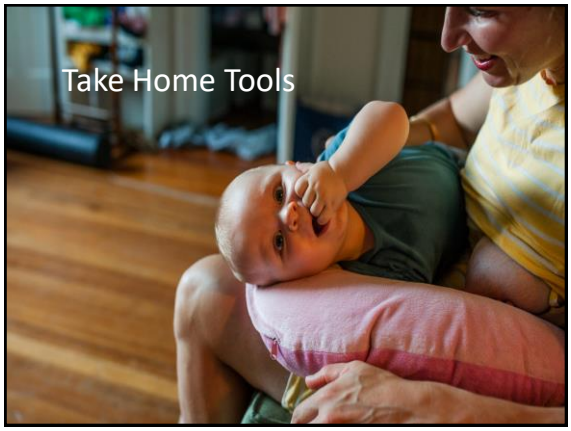
Perinatal Mood and Anxiety Disorders (PMADs)

- Up to 20% of women will experience mood disorder during pregnancy/postpartum
- Incidence higher in breastfeeding difficulty
- Leads to early cessation of breastfeeding
- Antidepressants/ anxiolytics safe in breastfeeding

JAMA 2019; ABM Protocol #18

Take home points

- Lactogenesis begins in pregnancy; ask patients with low production about pregnancy breast growth
- Evaluate low production concern as perceived vs. real
  - Supplement baby when medically indicated
- Hyperlactation requires intervention to avoid maternal/baby complications
- Alcohol safe in moderate volumes; marijuana not safe
- Antidepressants/anxiolytics safe

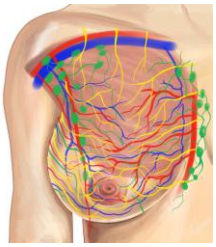


List of key electronic resources

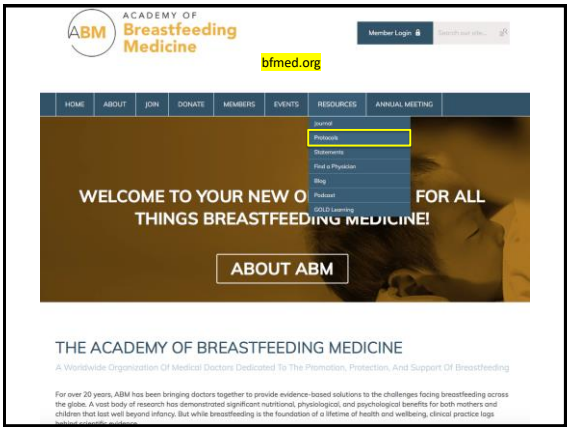
- Handouts
  - Trash the Pump and Dump
  - Breast abscess drainage
  - Mastitis algorithm
  - Breast and nipple pain
  - Lymphatic massage
  - IABLE Breastfeeding resources
  - ACR recommendations for breast imaging during pregnancy and lactation
  - H and P form breastfeeding
  - Galactogogues
  - Postpartum depression
- Manuscripts and protocols
  - Analgesia and anesthesia for the breastfeeding mother ABM protocol #28
  - Breast masses and breastfeeding ABM protocol #30
  - Radiology and nuclear medicine ABM protocol #31
  - MSK perioperative lactation model – BF Med 2018
  - PABC - ASO 2019
  - Postpartum breast cancer – Colorado group BCRT 2013
  - Breastfeeding and breast cancer ASO 2019
  - Lactational phlegmon – Breast Journal 2019
  - Breast cancer screening in lactation – Green Journal 2019

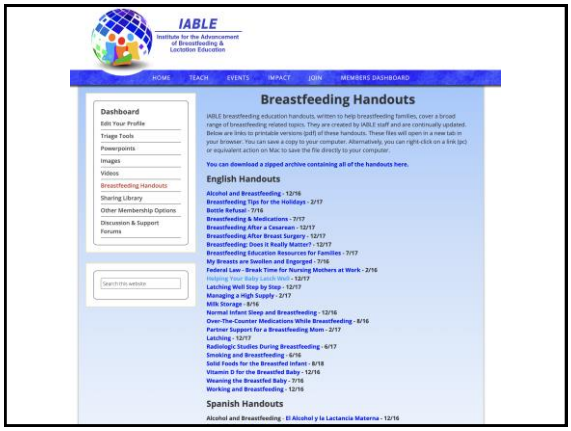
Top tips

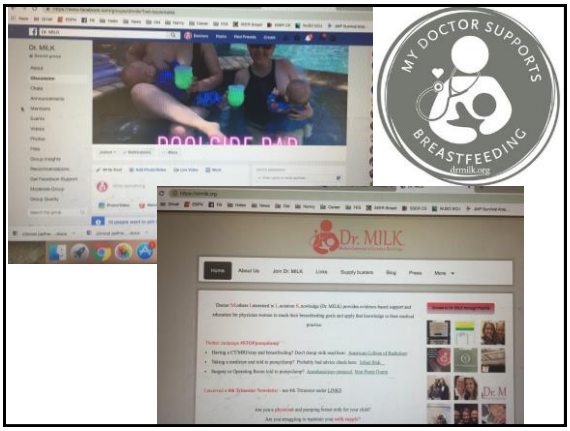
- Avoid pumping in setting of active complications
- Avoid nipple shields – instead investigate why baby won't latch (e.g. engorgement)
- Continue breastfeeding from affected breast during infectious/inflammatory processes
  - Reduces inflammation and promotes physiologic emptying
- No scientific evidence to support the diagnosis of "intraductal yeast"
- Consider perinatal mood and anxiety disorders (PMADs) in patients struggling with persistent complications and/or persistent pain
- Gentle massage, not deep massage (deep massage is "like squeezing a pimple")
- Moist heat for plugging, mastitis and consider investing in therapeutic ultrasound machine

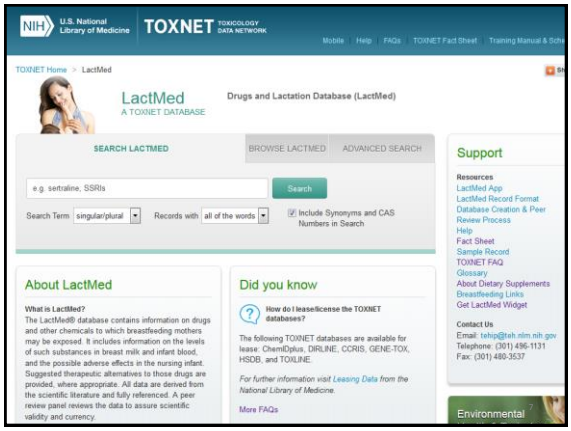


Do not deep tissue massage a hypervascular lactating breast!





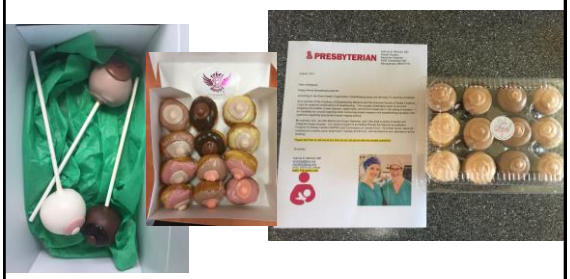


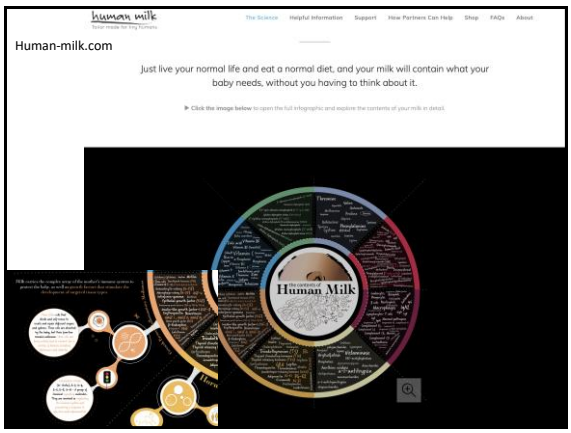


Herbal references

- Nccam.nih.gov
  - Free source for fact sheets about alternative therapies, reports, databases but not specific lactation information
- Herbmed.org
  - Alternative medicine foundation with Pubmed and Medline links
- Naturaldatabase.com
  - Natural medicine comprehensive database

August is World Breastfeeding Month





Mentorship during training

"You've got to find what you love" – Steve Jobs

Thank you!

(thanks, Mom, for breastfeeding me!)

- Ingrid Oaxley
- Jim Campbell
- Eliza Myers
- Rebecca Snyder
- Stacey Carter
- Lola Fayanju
- Rhiana Menen
- Henry Kuerer
- Alisa Sanders and the Houston Lactation Foundation
- Pamela Berens
- Anne Eglash and Mitch Rosefelt
- Academy of Breastfeeding Medicine colleagues and mentors
- Helen Johnson

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