



Management of Common Complications of Lactation

The Breast Surgeon's Role in Examining the Science and Debunking Old Myths

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KEYWORDS

- Lactation • Breastfeeding • Mastitis • Breast abscess • Galactocele • Milk fistula • Nipple bleb

KEY POINTS

- Breast surgeons are well poised to promote evidence-based recommendations for lactation-related breast disorders.
- Milk fistula is an uncommon complication of invasive procedures and is best managed with continued breastfeeding.
- To avoid the need for repeat aspirations, lactational abscesses and infected galactoceles may be drained with a stab incision and percutaneous drain insertion at bedside.
- Lactation-related nipple wounds should be treated with closed, moist wound healing.
- “Plugging” represents ductal inflammation rather than macroscopic obstruction, and lactational mastitis is more often inflammatory than infectious.
- Fungal infections do not contribute to breast and nipple pain during lactation.

INTRODUCTION

Although lactation consultants traditionally have assumed care of breastfeeding mothers, many women require thorough evaluation and treatment by physicians, which may involve diagnostic evaluation of medical conditions, prescribing antibiotics, or performing invasive procedures such as abscess drainage. Despite the complexity of lactation as a physiologic process and challenges in caring for these patients, lactation education in medical school and residency is extremely limited.

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Breast surgeons possess intimate knowledge of breast anatomy and physiology and regularly interface with breast pathology and radiology. Therefore, they are in a unique position to recognize and reframe traditional breastfeeding recommendations that may be flawed. Surgeons also can provide insight into appropriate wound care for conditions such as nipple trauma and perform invasive procedures such as drainage of fluid collections. This article reviews common management approaches for complications of lactation applicable to surgical practices.

MILK FISTULA

Myth

Procedures should be avoided on the lactating breast due to the risk of milk fistula.

Science

Milk fistula is rare if lactation and surgical interventions are managed appropriately.^{1,2} After a procedure, patients should not avoid breastfeeding. In fact, the preferential flow of breastmilk through the nipple will decrease the flow through a needle or incision tract. On the other hand, patients should not be counseled to “pump to empty” their breasts or breastfeed more frequently on the affected breast, as this will cause increase in milk production, which will promote fistula persistence.

Treatment

Large surgical incision and drainage should be avoided in lactation patients. Any incision made should be as small as possible, and as distant from the nipple areolar complex as possible. If a distal incision is not possible, it should be made outside the region where an infant latches or pump flanges contact the skin. Periareolar incisions, although cosmetic, are particularly high risk due to the potential for latch or pump trauma.

Patients should feed physiologically after a procedure. Local anesthetic agents are not absorbed orally by the infant, and blood is safe for the infant to ingest.³ A transient fistula will form after any procedure but is expected to close within a week if lactation is managed appropriately.

Should a persistent, high-output fistula develop, a distal diverting drain can be placed to hasten closure¹ (**Fig. 1**). Milk passing through a fistula tract may be collected and is safe to feed to the infant.⁴ Absorbent dressings may be used to prevent skin maceration from moisture but should be removed before breastfeeding, as they are potential choking hazards and/or may interfere with latch. Wound vacuum systems should not be used on the lactating breast, as this will promote chronic fistulization and maintain tract patency.

DRAINAGE OF ABSCESS AND GALACTOCELE

Myth

Fluid collections in the lactating breast require operative incision and drainage or aspiration alone.

Science

As surgeons have moved away from large incision and drainage procedures performed on the lactating breast in the operating room setting, they have turned to minimally invasive aspiration approach.⁵ However, aspiration alone can result in incomplete drainage.⁶ Unlike simple breast cysts, abscesses and galactoceles in the lactating breast contain breastmilk, which is highly viscous and loculated

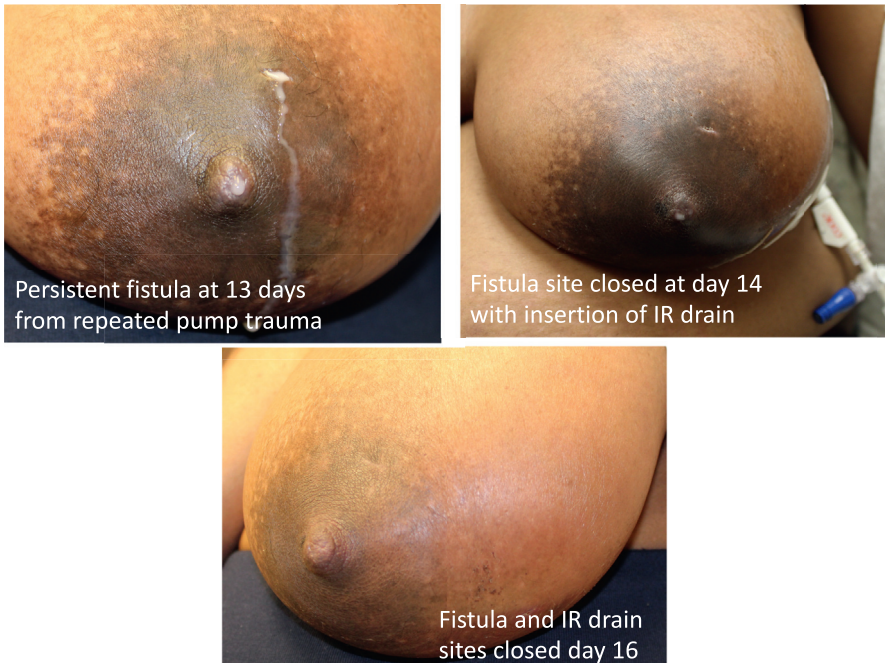


Fig. 1. Transient milk fistula in setting of hyperlactation and pump trauma, located near nipple areolar complex with resolution 24 hours after placement of distal diverting Interventional Radiology (IR) drain.

(**Fig. 2**). Therefore, a needle aspiration alone will likely remove only part of the fluid collection, particularly if it is chronic. If a needle aspiration is successful in removing the entire volume of an acute collection, the area can refill with milk very quickly and require repeated procedures.⁷

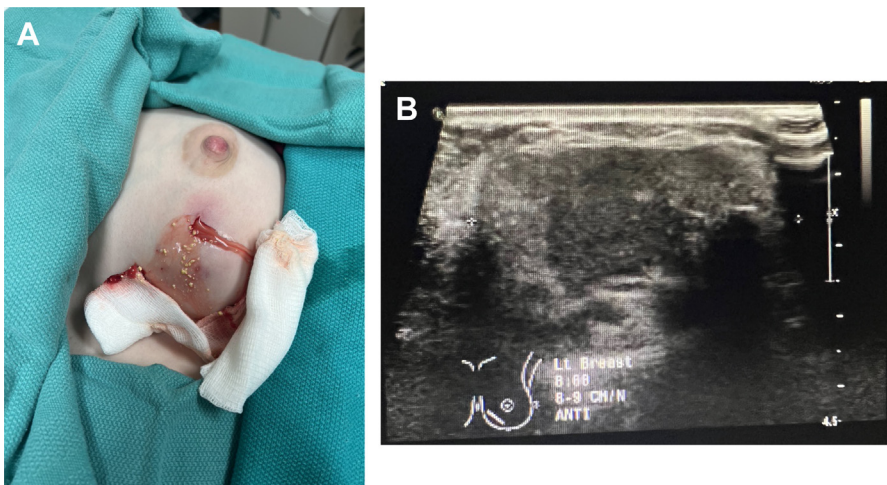


Fig. 2. (A) Chronic, loculated fluid collection demonstrating thick milk chunks at definitive drainage after needle aspiration failed to resolve. (B) Ultrasound image corresponding to semisolid appearance of the collection.

Treatment

Lactational abscess and infected galactocele require drainage for source control. Drainage may also be appropriate for symptomatic noninfected galactoceles. Small stab incision and drain placement will definitively resolve fluid collections in the lactating breast.⁸ The small stab incision allows for access to the cavity with an instrument that can be used to disrupt loculations and provide complete drainage, such as a hemostat. A stent or drain can be placed to allow passive decompression of the area for 3 to 5 days; this could involve a Penrose drain, Seromacath, Blake drain, or other wicks such as a small foley catheter. Drains should be placed to gravity rather than suction.

In addition to the surgical management, many patients developing fluid collections during lactation require treatment of idiopathic or iatrogenic hyperlactation. Patients should not be instructed to massage their breast, as this results in tissue necrosis and phlegmon development.^{9–13} Ice and antiinflammatory medication by mouth should be recommended for symptomatic relief. Antibiotics may be indicated if significant surrounding cellulitis exists.

MASTITIS

Myth

Mastitis represents a bacterial infection resulting from milk stasis, engorgement, and “plugging.”

Science

When an infant sleeps through the night or mothers do not express their milk at work as regularly as the infant breastfeeds at home, patients experience transient engorgement and pain. Women may also develop breast erythema and edema from congested capillaries and interstitial fluid (**Fig. 3**), which can cause sweating, fever, and chills, as it is an inflammatory process in a body organ with robust blood supply. This systemic inflammatory response syndrome may be mistaken for signs and symptoms of infection, raising alarm for impending development of bacterial mastitis.¹⁰ However, unless a

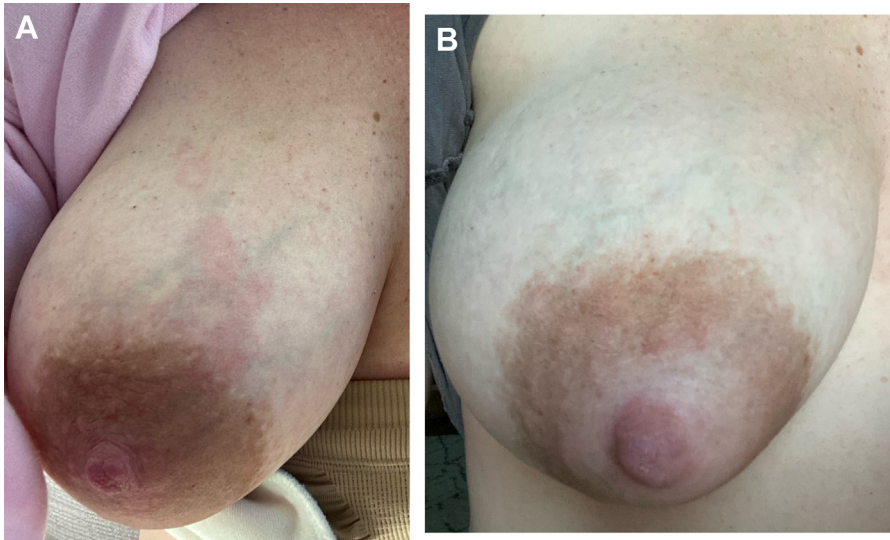


Fig. 3. Acute inflammatory mastitis (A) managed with decreased removal of breastmilk, ice, and antiinflammatory medication, with resolution of erythema (B).

person has developed a very rare rapidly progressive soft tissue infection, it is otherwise very unusual for average bacterial mastitis to present this quickly.

Lactation literature commonly describes a theory that mastitis results from milk stasis. Mothers are warned to avoid long stretches without breastfeeding or pumping to avoid build-up of stagnant milk and progression to “plugging” and infectious mastitis. However, there is no scientific evidence to support the idea that mastitis results from milk stasis. In contrast to a passive repository such as a bladder, the breast is a gland with production regulated by Feedback Inhibitor of Lactation (FIL). Therefore, continued removal of milk increases production and worsens tissue edema and inflammation. Reduced removal of milk will allow for FIL to downregulate production and enable resorption of milk not used.

Mastitis results from underlying microbiome disruption and ductal inflammation¹¹ and is therefore often observed in patients with hyperlactation and/or blebs. Most cases of lactational mastitis are purely inflammatory and can be resolved with conservative measures and appropriate management of lactation. Breastmilk contains numerous immunologic cells and substances that counteract infection. In similar fashion, it is uncommon for stagnant milk contained in a galactocele to become infected without an inciting event such as instrumentation.

It also should be noted that external compression by a bra or tight clothing can obstruct ducts is not scientifically founded.

Treatment

With early inflammatory mastitis, patients should feed physiologically (eg, eliminate breast pump usage if possible, and do not continue “overfeeding” on the affected breast). Reducing overstimulation of an engorged or inflamed breast will allow down-regulation of milk production through the FIL receptor.¹² Patients should never be counseled to “pump to relieve engorgement” as this prevents FIL from activating and perpetuates hyperlactation.

Patients can use ice and antiinflammatory medication by mouth such as nonsteroidal antiinflammatory drugs and/or obtain pain relief from acetaminophen. Ice is generally the most helpful, but some people also prefer heat for comfort. Therapeutic ultrasound can use thermal energy to reduce inflammation and pain, as can lymphatic drainage.¹³ A supportive bra is necessary during lactation to prevent dependent lymphedema and back pain. Massage should be strictly avoided. If symptoms persist or worsen, antibiotics should be considered¹⁴ (**Table 1**). Women should be counseled that there is no medical indication to “pump and dump” while taking these antibiotics. The Relative Infant Dose (RID) estimates an infant’s exposure to a medication through breastmilk and depends on multiple factors including the medication’s plasma concentration, half-life, solubility, and oral bioavailability. In general, medications with RID less than 10% are considered safe.

MESSAGE

Myth

“Plugging” represents occlusion of ducts by stagnant milk, and “plugs” should be extruded through massage.

Science

The sensation of “plugging” does not represent discrete collections of breastmilk. More accurately, a “plug” represents a focal area of congested capillaries, distended alveolar cells, and tissue edema. The root cause of “plugging” relates to tissue

Antibiotic	Dosage	Special Considerations	Relative Infant Dose (RID)^a
Dicloxacillin, flucloxacillin	500 mg four times a day for 10–14 d		0.6%–1.4%
Cephalexin	500 mg four times a day for 10–14 d	Gram-negative rod coverage	0.4%–1.5%
Clindamycin	300 mg four times a day for 10–14 d	MRSA coverage	0.9%–1.8%
Trimethoprim-sulfamethoxazole	Double strength (160 mg-800 mg) twice a day for 10–14 d	MRSA coverage; contraindicated in G6PD deficiency; caution in premature infants and newborns <30 day old	Trimethoprim: 3.9%–9.9% Sulfamethoxazole: 2.1%–3.1%

Abbreviation: MRSA, methicillin-resistant *Staphylococcus aureus*.

^a Data from InfantRisk Center, Texas Tech University Health Sciences Center.

hypervascularity, edema, and ductal narrowing from microbiome changes and luminal inflammation.¹⁵

Lactation consultants often recommend massage for “plugs.” However, this recommendation lacks scientific validity and causes tissue trauma that can result in significant complications. As surgeons are well aware, lactating breasts have robust blood supply, lymphatic vessels to drain increased interstitial fluid during lactation, nerves, fibroadipose tissue, and functional glandular tissue with a complex network of interlacing ducts. Attempts to extrude a milk “plug” from a duct with aggressive massage will result in tissue trauma, edema, collapse of ducts, and capillary damage. All patients report worsened pain with massage. As we would injure a thyroid, pancreas, or other functional gland with massage or tissue mishandling during a surgical procedure, it similarly must be avoided in the lactating breast. Massage is associated with development of lactational phlegmon (Fig. 4), particularly in the setting of hyperlactation or excessive pumping.⁹

Treatment

Deep manual massage, vibrators, electric toothbrushes, or any commercial breast massage products designed to extrude a “plug” should be strictly avoided. Patients with symptomatic “plugging” should be evaluated for proinflammatory conditions such as hyperlactation and subacute mastitis. Patients can use ice for both pain relief and vasoconstriction. Therapeutic ultrasound, also used to treat conditions such as radiation fibrosis, can reduce inflammation and pain through application of thermal energy (Fig. 5).¹⁶ If a mass or erythema persists, diagnostic breast imaging should be performed.¹⁷

NIPPLE WOUND CARE IN LACTATION

Myth

Nipple wounds in lactating women should be treated with drying agents and topical antibiotics to prevent progression to mastitis.



Fig. 4. Ultrasound image of inflammatory phlegmon.

Science

Surgical training provides strong education in wound care techniques and teaches the difference between traumatized versus infected tissue. Surgeons debride devitalized tissue and understand the need to provide absorption for serous fluid and fibrinous exudate. However, traditional lactation recommendations have contradicted principles of closed, moist healing for wound care. Patients are often counseled to express a small amount of breastmilk onto nipple wounds and allow it to air dry. They also may be recommended to soak nipples in Epsom salt or salt water and to use a hair dryer to prevent moisture build-up. They are also often instructed to avoid wearing a bra or allow anything touch the nipples.

In addition, breastfeeding patients with nipple wounds are often warned they are at risk for ascending intraductal infection, that is, bacterial mastitis. They are therefore encouraged to apply topical antibiotics to their wounds. However, it is very uncommon for open, vascularized wounds to become secondarily infected in immunocompetent hosts. Overutilization of antibiotics contributes to disruption of the microbiome and development of multidrug-resistant pathogens. Routine use of topical antibiotics for open wounds is not recommended.¹⁸ Furthermore, the hypothesis that bacterial mastitis is a result of ascending infection from nipple wounds is not supported by breast anatomy and physiology.¹⁹ The highly vascular nature of the lactating breast and the multiple immune components of breastmilk prevent such infection.⁸



Fig. 5. Therapeutic ultrasound technique.

Treatment

Care of the nipples is summarized in [Box 1](#).

FUNGAL INFECTIONS

Myth

Yeast is a common cause of nipple and breast pain and infections in lactating women.

Science

Although the lactation world for decades has implicated yeast as a causative agent in symptomatology of pain, redness, and/or itching of the nipple and breast, there is no scientific evidence to support this claim.¹⁵ New reports demonstrate the mis- and overdiagnosis of this condition.²⁰

Symptomatic fungal infections result from host-microbiome disruption and occur most commonly in the vaginal mucosa or in the inframammary region of the breast. Yeast infections also may occur in skin folds of patients with morbid obesity and in patients with immunosuppression (eg, diabetes, immunologic disorders such as human immunodeficiency virus/AIDS, or in the setting of chemotherapy). Although yeast is ubiquitous in normal skin flora, pathogenic infections of the nipple and breast in immunocompetent individuals are extremely uncommon. The lactating nipple has robust blood supply, and breastmilk has multiple antibacterial properties, making epidermal and deep soft tissue infections rare.

Patients may believe they improve after antifungal treatment; this is related to the antiinflammatory effect some people obtain from antifungals or the fact they removed a contact allergen they had been using (eg, nipple balm containing lanolin). However, the improvement is almost always not definitive, and patients will return for repeat treatment or seek alternative interventions.

Breastfeeding women whose infants are diagnosed with thrush are often advised that they are at risk for yeast infections of the nipple and breast. They are instructed to take antifungals and sterilize bottles and breast pump parts to prevent infection. However, thrush is not contagious. More importantly, infant thrush in full-term, immunocompetent babies is not nearly as common as the lactation world describes. Many babies simply have a white coating on their tongue and/or cheeks from normal breastmilk.

Treatment

Evaluate for common cause of nipple irritation and pain, including trauma, nipple blebs, vasospasm, hyperesthesia, and dermatitis. Patients with nipple trauma require closed, moist wound healing. Patients with symptomatic blebs should be treated with a medium-potency steroid such as 0.1% triamcinolone.²¹ Vasospasm and hyperesthesia resolve with constant warmth (wool pads and other insulating bra liners, heating pads, and so forth) and/or the selective serotonin reuptake inhibitor class of drugs.^{22,23}

A diagnosis of dermatitis requires determination of the inciting agent and its discontinuation, as well as a short course of topical steroid ([Fig. 8](#)).²⁴ Atypical dermatitis and dermatitis that does not respond to appropriate therapy should raise concern for Paget disease of the nipple and be evaluated with diagnostic breast imaging and biopsies.

When infants undergo thrush treatment, mothers do not need to undergo antifungal treatment themselves. Topical and oral antifungals are not indicated in lactation. Antifungal creams and ointments applied to the nipple or to the mouth of the baby can be very irritating to the nipple and areola, worsening vasospasm and causing surface

Box 1**Clinics care points: care of the nipples during lactation**

- Moist, closed wound healing principles should be followed, with the use of nonallergenic ointments/balms and sterile, absorbent dressings (Fig. 6).
- Avoid ointments/balms containing potentially allergenic ingredients such as lanolin and petroleum.
- APNO (All Purpose Nipple Ointment) should be avoided. This compounded prescription ointment contains an antifungal, antibacterial, and a steroid. Although often recommended by lactation consultants and readily prescribed by the physicians to whom patients are referred, this nonspecific medication can cause additional complications. Although patients may achieve some pain relief due to steroids and antiinflammatory properties of the antifungal, this potential benefit is outweighed by the risks of impaired wound healing from steroids and of microbiome disruption from nonselective elimination of normal flora. Furthermore, other ingredients in this ointment may cause dermatitis. This medication is generally expensive, even for patients with insurance.
- Breast shells designed to “keep the nipple dry” or “protect the nipple from the bra” worsen swelling in the nipple, cause areola compression, and subsequently worsen pain.
- Do not use drying agents such as antiseptics, alcohol, or Epsom salt soaks (Fig. 7). Similarly, do not use a hair dryer to blow hot, dehumidified air on nipples. These practices cause tissue desiccation, which is counterproductive for wound healing and increase the risk of skin breakdown.

wounds from contact dermatitis. Gentian violet can cause nipple ulceration and mouth ulceration in a baby and should not be used.²⁵ Pump parts, infant toys, and other household items do not need to be sterilized; in fact, harsh detergents may worsen epidermal barrier breakdown and allergy, which is often at the root of the mother's symptomatology.

NIPPLE BLEBS**Myth**

Nipple blebs are caused by trauma from shallow infant latch.

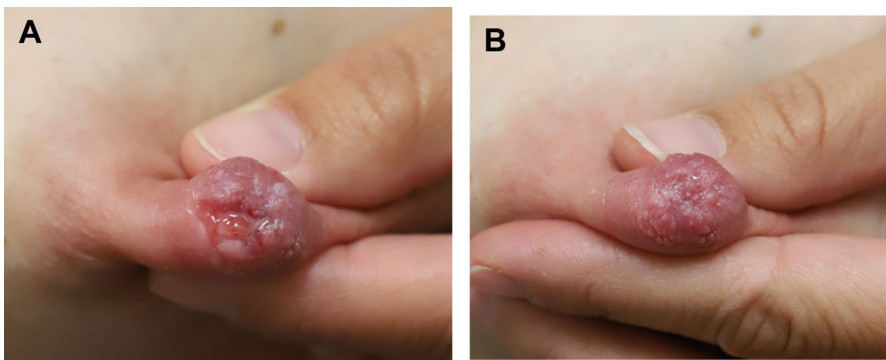


Fig. 6. Nipple previously air dried (A), with resolution of tissue defect with PolyMem therapy (B).



Fig. 7. Blistering from small pump flanges worsened with Epsom salt soaks.

Science

Blebs appear as small white, yellow, or red blisterlike lesions on the surface of a nipple. They are inflammatory lesions that may occlude a nipple orifice. They reflect underlying ductal inflammation and microbiome disruption with biofilm formation.²¹ Blebs are associated with hyperlactation (oversupply), pumping (which alters the breast microbiome), c-section births (which also alter the breast microbiome), and other characteristics of individual variation in microbiome expression.²⁶ Blebs are not related to infant trauma or latch in any way. Because blebs are very painful, moms often believe the infant has a poor latch or otherwise has contributed to the problem. However, this represents an association rather than causation.

Treatment

Asymptomatic blebs do not require any specific treatment. Blebs causing milk obstruction warrant treatment to reduce underlying ductal inflammation and decrease the viscosity of milk. Sunflower lecithin by mouth is effective for breastmilk emulsification and can help to both treat and prevent blebs.²¹ Therapeutic ultrasound can also be used to reduce breast inflammation.

Symptomatic blebs occluding an orifice should be treated with oral lecithin as well as a topical medium-potency steroid such as 0.1% triamcinolone cream.²¹ Blebs should not be routinely unroofed with a sterile needle or other means, as this may transiently relieve milk obstruction in an associated ductal orifice but will also cause local tissue trauma and can lead to scarring (**Fig. 9**).²⁷ This scarring can result in permanent occlusion of the nipple orifice. Patients should be instructed not to attempt to squeeze out a bleb or pick at it with their fingernails, as this can cause bleeding and further trauma.

NIPPLE/AREOLAR LESIONS AND PIERCINGS

Myth

Women with nipple/areolar lesions and nipple piercings should be discouraged from breastfeeding.

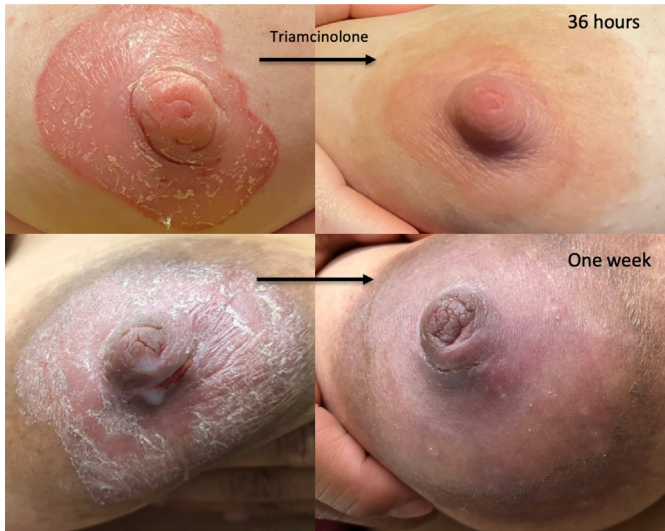


Fig. 8. Two patients with contact dermatitis worsened by caustic antifungal agents with resolution after treatment with topical steroids.

Science

Several lesions can occur on the nipple/areolar complex including nipple adenomas, skin tags, eczema, and hyperkeratosis. Patients with these conditions are often advised to avoid breastfeeding due to concerns about latch and milk extraction, as well as theoretic risks of an infant choking on a protruding lesion or suffering toxicity from medications used to treat dermatologic conditions.

Patients with nipple piercings may be advised to avoid breastfeeding altogether due to concerns about milk fistulae. Milk will indeed pass through the piercing sites (**Fig. 10**); however, this does not negatively affect milk production or extraction, nor does it pose a risk to the mother's health in any way.

Treatment

Women with nipple/areolar lesions should be evaluated by a breastfeeding medicine physician prenatally. These physicians may recommend removal of larger lesions if they are concerned about interference with latch or potential for tissue trauma. Surgical excision can be performed under local anesthesia during pregnancy or lactation with minimal risk.

In most of the cases, prenatal evaluation of nipple/areolar lesions will consist of review of the lactational safety of medications and reassurance. Topical steroids, keratolytic ointments, and most immunomodulators used for conditions such as eczema, psoriasis, and hyperkeratosis are safe in lactation, with the exception of methotrexate.²⁷ Nipple shields should not be recommended to cover nipple/areolar complex lesions, as there is no benefit to this practice and nipple shields are associated with decreased physiologic milk transfer and increased risk of microbiome disruption and mastitis.²⁸

Ideally, patients should remove nipple piercings during early pregnancy, as the nipple is expected to hypertrophy and can make later removal more difficult. Nipple piercings are a choking hazard, and patients should not breastfeed with them.

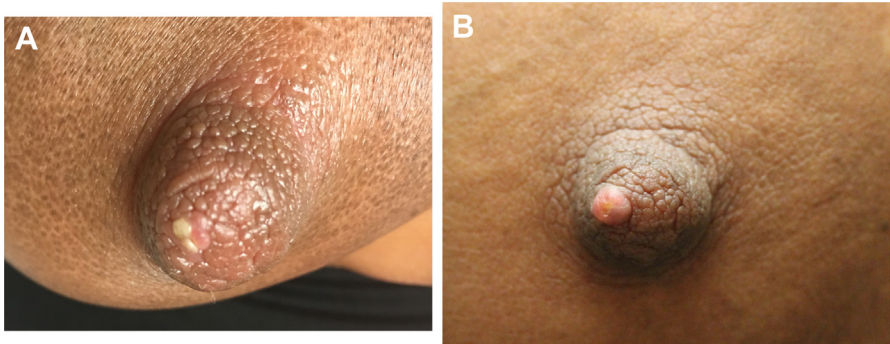


Fig. 9. Nipple bleb at presentation (A) and after chronic tissue trauma from frequent unroofing (B).

When consenting for piercings, women should be counseled that the procedure may result in ductal trauma or scarring that could impair lactation.

INVERTED OR FLAT NIPPLES

Myth

Women with inverted or flat nipples should perform nipple eversion exercises during the prenatal period.

Science

Up to 10% of the female population has inverted or flat-appearing nipples.¹⁹ However, this anatomic variant uncommonly precludes lactation if managed appropriately. In fact, in many cases, the tissue bands tethering the nipple in the inverted position are released by the mechanics of breastfeeding or pumping (**Fig. 11**).²⁷ Prenatal exercises to evert the nipples using a designated suction device or nipple shells have not been shown to improve lactation outcomes.²⁹ In fact, some studies suggest that these exercises have a negative impact on a mother's desire to attempt breastfeeding.³⁰

Treatment

Infants may latch without issue to an inverted nipple. Others may struggle. Performing manual eversion or briefly using a pump before nursing may facilitate infant latch to the stimulus of an erect nipple. Patients with significantly inverted nipples that cannot be



Fig. 10. Nipple piercing orifice with milk emanating from it.



Fig. 11. Patient with nipple slit inversions during pregnancy (A) with everted nipples after breastfeeding and pumping (B).

manually everted on examination may experience the most challenges. They should not be counseled to perform prenatal exercises.

Women with inverted or flat nipples seeking cosmetic surgery should be counseled about the risk of impaired lactation and advised to defer this procedure until child-bearing and breastfeeding are complete. Not only does this surgery sever the terminal ducts resulting in outflow obstruction but it may also disrupt nipple innervation and vasculature. Women with a history of nipple eversion surgery who wish to breastfeed should be referred for prenatal lactation counseling to discuss the potential for impaired lactation, and their newborns should be closely monitored for weight gain and hydration. Recommendations for donor breastmilk and/or formula can be provided if necessary.

SUMMARY

Using their knowledge of breast physiology, histology, and anatomy, surgeons are well equipped to manage challenging complications of breastfeeding, as well as reframe myths in traditional lactation care. Surgeons should recognize that a procedure may result in a transient milk fistula, and both abrupt cessation of breastfeeding and hyperlactation can perpetuate fistula persistence. Needle aspiration of a loculated lactational fluid collection may fail to resolve symptoms without repeated intervention; therefore, a small drain placement at index procedure represents optimal management. Mastitis should be managed by treating hyperlactation, avoiding massage, and using antiinflammatories and ice before antibiotics. Appropriate techniques of closed, moist wound healing should be applied for nipple trauma. Fungal infections of the nipple and breast parenchyma are extraordinarily rare, and common diagnoses such as dermatitis should be explored. Blebs are inflammatory lesions related to ductal microbiome disruption that present on the surface of the nipple, and unroofing

should be avoided. Nipple areolar complex masses, conditions, and/or piercings do not preclude breastfeeding, but patients should be evaluated prenatally to guide appropriate management.

DISCLOSURE

The Authors have no commercial or financial conflicts of interest.

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