



Review of the diagnosis and management of benign breast issues during pregnancy and lactation

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Abstract: Pregnancy and lactation are associated with significant changes to the breast tissue as a result of stimulation from high levels of estrogen and progesterone. The changes in breast tissue that occur during this time can make the diagnosis of new pathologies challenging. While the majority of the breast conditions that can arise during pregnancy and lactation are benign, it is important for the clinician to have a broad differential diagnosis to initiate the appropriate workup. The majority of issues that arise are new or enlarging breast masses, which are frequently benign fibroadenomas, lactating adenomas, or galactoceles. While mammography has been proven to be safe in pregnancy, ultrasound is the preferred imaging modality and a biopsy may be required to rule-out malignancy. Pregnant women can also present with bloody nipple discharge, but this is typically self-limited condition that just requires close follow-up. Many women who are lactating can also present with engorged breasts, and breast and nipple pain, which can complicate breast feeding. Lactating breasts are also at risk for developing to mastitis or abscesses. In addition, lactating women can develop viral and fungal skin infections of the areola and nipple. This review will discuss the diagnosis and safe management of these conditions.

Keywords: Pregnancy; lactation; breast mass; fibroadenoma; galactocele; mastitis; abscess

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Introduction

Women who are pregnant or lactating undergo significant changes to their breast tissue. It is not uncommon for a new breast complaint to arise during this time; however, structural changes to the breast during pregnancy can make the evaluation of these issues challenging. Fortunately, most pregnant women who present with a breast issue have benign pathology. One study of 1,248 women in Nigeria found that 17.9% of the participants had a breast disorder diagnosed during pregnancy or 6 months postpartum. Nearly 70% of the women were diagnosed with a breast mass and 21.1% were diagnosed with an abscess, infection, or mastitis (1). It is important for all physicians who care for pregnant women, including obstetricians, primary care

physicians, and breast surgeons, to be able to diagnose and manage disorders of the breast that arise during this period in a woman's life. The aim of this review is to outline the common benign conditions that can occur in pregnancy and lactation. Benign breast masses, including their workup and management, as well as common causes of breast and nipple pain during lactation, will be discussed.

Physiologic changes of the breast in pregnancy

During pregnancy, breast tissue is exposed to high levels of estrogen and progesterone, which promote complete structural maturation of the breast (2). During the first trimester, estrogen stimulates rapid lobular ductal proliferation, as well as the formation of buds of alveoli,

Table 1 Differential Diagnosis of a Breast Mass in Pregnancy and Lactation

Mass	Workup	Management
Fibroadenoma	Physical exam, ultrasound, +/- mammogram or biopsy if concerning features	Observation, surgical excision if concerning features or symptomatic
Lactating adenoma	Physical exam, ultrasound	Observation with close post-partum follow-up
Galactocele	Physical exam, ultrasound	Observation versus aspiration if infected
Abscess	Physical exam, ultrasound	Antibiotics, aspiration versus incision and drainage
Axillary breast tissue	Physical exam, ultrasound if concerning	Observation
Breast cancer	Physical exam, ultrasound, mammogram, biopsy	Surgery, oncology referral

where the milk will eventually be produced. In addition, there is increased vascularity and blood flow as the result of angiogenesis (3). In the second and third trimester, progesterone stimulates lobular hyperplasia. The result of all of these changes is a much higher glandular to stromal tissue ratio (2).

Towards the end of the third trimester, prolactin and oxytocin are secreted from the posterior pituitary gland, which stimulates alveoli to take up nutrients from the blood to start to produce colostrum (3). After a woman gives birth, there is a rapid decline in progesterone and an increase in prolactin and oxytocin, which transitions the breast tissue from a proliferative state to a secretory state to produce high volumes of milk (4).

Work up of a breast mass in pregnancy

The increase in breast volume, density, nodularity, and vascularity during pregnancy and lactation can have implications for the ability of physicians to detect and image breast lesions (5,6).

All women should undergo careful clinical examination of the breast at the first obstetrical visit. If a breast mass develops during pregnancy or when a woman is breast-feeding, ultrasound should be the initial test performed. In pregnant women, the breast tissue appears hypoechoic in ultrasound images, and ultrasound has an 87% sensitivity for breast masses (5,7). When using ultrasound in lactating women, breast tissue appears hyperechoic, and ultrasound has up to a 100% sensitivity of detecting breast masses. Ultrasound has the advantages of being inexpensive, quick, provides an effective assessment of breast structures, and poses no radiation risk to the patient and the fetus (8).

Mammography is not contraindicated in pregnancy with appropriate abdominal shielding. The fetal radiation

dose from a 4-view mammogram is less than 0.03 mGy, which is insignificant and has not been associated with teratogenic effects (8). However, the increased density of breast tissue and increased vasculature limits the ability of mammography to detect lesions. The sensitivity of mammography in this setting varies from 74% to 90% (8,9). If a mass is found on ultrasound that is concerning for malignancy, or if ultrasound is not able to find an etiology for a palpable mass, it is reasonable to obtain targeted views with mammography to evaluate for microcalcifications or architectural distortion.

Intravenous gadolinium can cross the placental and enter the fetal circulation. Given the lack of data on fetal effects in this patient population, MRI is not recommended in the workup of a palpable breast mass in pregnancy.

If findings on ultrasound or mammography are suspicious, such as ill-defined borders, irregular shape, lesions that are taller than they are wide in diameter, or the presence of macrocalcifications, a biopsy is indicated. Core needle biopsy is generally safe. However, the increase in vascularity and milk ducts in the breast tissue do increase the risk of hematomas, infection, or milk fistula. If a patient develops a milk fistula after a biopsy, the most effective treatment is the cessation of lactation (10).

In summary, breast ultrasound is typically the first-line imaging modality in pregnancy, but mammography is a safe option with appropriate shielding to workup more concerning masses.

Benign breast masses in pregnancy and lactation

The differential diagnosis of a breast mass during pregnancy and lactation can be found in *Table 1*. Fibroadenoma is one of the most frequent lesions detected during

pregnancy and lactation. Fibroadenomas that may have been undetected before pregnancy can enlarge in response to elevated estrogen levels (7). A fibroadenoma typically presents as a painless, firm, mobile rubbery mass. On ultrasound, fibroadenomas are typically hypoechoic, solid oval masses with regular borders and no posterior acoustic shadowing (5). Fibroadenomas that enlarge during pregnancy will typically regress after delivery or when lactation ceases. Therefore, if asymptomatic, surgical excision can be deferred unless there is clinical concern for malignancy. Rarely, fibroadenomas in pregnancy can outgrow their blood supply and can infarct and become painful (3). In this case, surgical excision may be required for symptom management (6). Typically, it is recommended to defer surgery until the second trimester, when the risk of miscarriage or preterm delivery is the lowest. In addition, fibroadenomas can develop secretory hyperplasia and produce milk, which can result in rapid enlargement and show fat-fluid levels on imaging (7).

Women who present with giant fibroadenomas (>5 cm) prior to becoming pregnant, should be counselled on the risk for these lesions to enlarge during pregnancy. Therefore, it would be reasonable to discuss prophylactic surgical excision in this setting.

Lactating adenoma is a benign entity that is the result of lobular hyperplasia that eventually presents as a palpable mass (11). Lactating adenomas typically occur in the third trimester and during lactation, but can occasionally arise in the first or second trimesters (5). Lactating adenomas present similar to fibroadenomas as a painless, soft, and mobile mass that can recur with subsequent pregnancies. They are difficult to distinguish from fibroadenomas on ultrasound as they have similar features. There have been reports of the coexistence of invasive ductal adenocarcinoma with a lactating adenoma; therefore, while lactating adenomas can be observed, close follow-up is warranted to ensure the mass regresses after pregnancy and lactation (12). If the mass does not resolve, further workup with imaging and biopsy should be pursued.

A galactocele presents as a soft mass that occurs as the result of a blocked duct, and is the most common lesion during lactation (5). They are typically unilocular when located in the central portion of the breast or multilocular when in the periphery. These lesions can become painful if they become infected or necrotic. On ultrasound, a galactocele can have variable features, depending on the amount of water, fat, and protein in the lesion. It typically appears as a cystic lesion that can have coarse speckling

and acoustic shadowing (3). Galactoceles can usually be observed, but if symptomatic or infected, ultrasound-guided aspiration should be performed (7).

Axillary breast tissue may be seen in 2–6% of women, and can be misdiagnosed as a lipoma or lymphadenopathy (13). Frequently this normal variant goes unnoticed, but hormonal stimulation during pregnancy can result in the rapid growth of this tissue and it can become symptomatic. This extra tissue may then resemble a mass, which can be distressing for the patient and diagnostically challenging for the clinician. There are case reports of lactation occurring through the skin pores above axillary breast tissues (14). Typically, management of axillary breast tissue is conservative as the tissue typically regresses after lactation. However, symptoms can worsen with subsequent pregnancy, so some women may elect to have this tissue surgically removed (13).

In summary, fibroadenoma and lactating adenoma are the most likely causes of benign breast masses during pregnancy and lactation; galactoceles can also occur in lactating breasts. Axillary breast tissue may present like a mass in the axilla, but usually regresses once a woman is no longer breastfeeding.

Other benign breast conditions in pregnancy

Nipple discharge can occur in up to 20% of women during pregnancy. Bloody nipple discharge is thought to be due to proliferation of epithelial cells and vasculature in the breast tissue, can be unilateral or bilateral, and is sometimes referred to as the “rusty pipe syndrome” (8,15). Conservative management of bloody nipple discharge in pregnancy is generally accepted as this condition is frequently self-limited (16). However, these women should be closely followed for the rest of their pregnancy and in the post-partum period. If there is persistent unilateral bloody nipple discharge more than two months after delivery, then a more extensive workup should be pursued to rule out a malignant cause (6).

Pregnancy-induced gigantomastia is a very rare condition associated with bilateral diffuse, hormonally driven massive breast enlargement (17). This condition can become so severe that it leads to tissue necrosis and infection (6). Typically, breast tissue will regress after the woman gives birth, but gigantomastia can recur in subsequent pregnancies and some women may want to pursue reduction mammoplasty. However, women should also be counselled that there is a risk of breast reduction impacting future success with breast feeding. Studies have demonstrated that preserving

Table 2 Differential diagnosis of breast and nipple pain in lactation

Condition	Signs and symptoms	Management
Direct nipple trauma	Painful blistering, cracks, and fissures	Referral to lactation consultant, all-purpose nipple ointment or lanolin
Engorgement	Painful, bilateral swelling and distention of breast tissue	Early breastfeeding, hand expression or pumping, warm compresses
Eczematous dermatitis of the nipple	Painful and pruritic, oozing and crusting of the skin	Low or medium-strength cortisone topical ointment
Psoriasis of the nipple	Well-demarcated erythematous plaques	Topical cortisone cream or vitamin D cream
Raynaud's phenomenon of the nipple	Severe and throbbing pain, often after cold exposure; blanching of the nipple	Avoiding cold exposure, Nifedipine
Mastitis	Unilateral or bilateral inflammation of breast tissue, fever, myalgias, fatigue	Antibiotics, continue breastfeeding
Fungal infections	Severe burning, shooting, or stabbing pain that can radiate to chest wall; associated with oral thrush or diaper rash	Topical antifungals, continue breastfeeding
Herpes Simplex Virus infections	Small, painful vesicles on an erythematous base	Oral acyclovir, do not breastfeed with active lesions.

the column of subareolar breast parenchyma can mitigate this risk (18).

Benign breast conditions in lactation

Nipple and breast pain are common complaints during the post-partum period when a woman begins breastfeeding, and can have several different etiologies as listed in *Table 2*. The National Center for Chronic Disease Prevention and Health Promotion conducted the Infant Feeding Survey in 2009, and found that only 3.3% of women reported no pain with breastfeeding during the first week (19). While this pain is thought to be in part hormonally influenced, there is also a contribution from direct nipple trauma, blistering, cracks, and fissures from suboptimal positioning and latch, as well as tongue tie in the newborn and palatal anomalies (19,20). Nipple pain with lactation often leads to early cessation of breast-feeding, which has been associated with higher risk of developing postpartum depression (21). Therefore, it is important to have early involvement with a lactation consultant in women who experience pain with breastfeeding. All-purpose nipple ointment or lanolin may also be recommended to ease the pain (20).

Some nipple pain and discomfort may also be the result of dermatologic conditions of the nipple, including eczema of the areola. This typically presents as oozing and crusting of

the skin, that can be painful or pruritic (22). A careful history should be obtained to determine if there are any topical agents or irritants, such as detergent, soaps, and creams, that could be causing the reaction. Eczematous dermatitis of the nipple can be treated with low or medium-strength cortisone ointment twice a day for two weeks, and treatment can be escalated to oral corticosteroids if topical treatments fail to improve symptoms (22). Women who have a history of psoriasis can develop psoriasis of the nipple, which is characterized by well-demarcated erythematous plaques. This can also be treated with topical cortisone cream or Calcipotriene, a vitamin D topical cream (22).

Raynaud's phenomenon of the nipple results from vasospasm of the arterioles, and should be considered in any woman who experiences nipple pain for over four weeks and has failed other therapies (22). Symptoms are often preceded by cold exposure, which causes the nipples to blanch and then become cyanotic, and pain can be severe and throbbing (23). Avoiding cold exposure can help prevent symptoms. Nifedipine, a calcium channel blocker, can be safely taken during breastfeeding to provide prompt relief of pain (23).

Engorgement, also known as milk stasis, is the overfilling of breasts with milk that results in painful bilateral swelling and distension of the breast tissue, usually in the first 48 hours after giving birth. Engorgement can be prevented by early

post-partum expression of colostrum, and longer cumulative time spent breast feeding in the first few days (19). If not treated adequately, it can continue to make breast feeding difficult by interfering with latch or leading to sore and cracked nipples. A Cochrane review of several small studies focused on the treatment of breast engorgement. The various therapies involved in 13 different trials including acupuncture, cabbage leaves, massage, thermal ultrasound, scraping therapy, protease, and oxytocin. However, most treatments only had minor improvement in pain, and the reviewers concluded that there was a significant amount of bias and insufficient evidence to promote widespread use of any of the therapies (24).

Lactation mastitis is unilateral or bilateral inflammation of the breast tissue, that results in pain, swelling and erythema. It can present suddenly, and be associated with fever, myalgias and fatigue (25). Incidence rates in the US are around 9% (26). While mastitis is considered a benign condition, if left untreated it can result in abscess or sepsis. It is thought to occur when bacteria, typically *Staphylococcus aureus*, enter the breast through a cracked terminal duct of the nipple, and can then thrive in the lactose-rich medium from milk stasis. Women are encouraged to continue breast feeding through mastitis, but should be treated with two weeks of a cephalosporin or penicillin, such as cephalexin or dicloxacillin (6,22). These antibiotics are typically safe in breast feeding, but infants should be monitored for side effects. Supportive measures, including heat packs, analgesics, rest and fluids should also be recommended. If symptoms fail to improve after several days of antibiotic treatment, then there should be suspicion for development of an abscess. In some cases, inflammatory breast cancer can also be initially mistaken for mastitis and an ultrasound or mammogram should be considered if symptoms fail to improve with antibiotics (27).

About 4–11% of women with mastitis will develop an abscess, which presents as a hard, tender, and sometimes fluctuant mass with erythema (28). Risk factors for the development of an abscess while breast-feeding include age greater than 30, first pregnancies, gestational age older than 41 weeks, and mastitis (29). They can be diagnosed on physical exam and with an ultrasound showing a hypoechoic lesion with irregular borders. Abscesses will not heal on antibiotics alone. Historically, surgical drainage was recommended. In the last few decades, several series have suggested treating smaller abscesses with ultrasound guided drainage. Christensen *et al.* studied 89 lactating women who developed abscesses that were 3.5 cm large on

average, and found that 86 (97%) were successfully treated with one treatment of ultrasound-guided drainage (30). In another study of 43 lactating women, abscesses that were smaller than 3 cm were treated with ultrasound-guided needle aspiration, and abscesses larger than 3 cm were treated with ultrasound-guided catheter placement. Only one patient subsequently required surgical drainage, but all others were successfully treated with either aspiration or catheter drainage (31). A third study by Colin *et al.* studied 92 lactating women who had in total 105 breast abscesses. The median diameter of the breast abscesses was 4.5 cm. Ultrasound-guided aspiration was successful in 101 (96%) of the women, but 56 (53%) of the women required more than 1 aspiration. There were 4 (4%) women that ultimately required surgery (28). The benefits of needle aspiration include decreased morbidity and faster time to return to breast feeding from the affected breast. There is a recent Cochrane review that pools 4 studies of treatment for abscesses associated with lactation; there was a 17–40% failure rate in treating with aspiration alone the authors found insufficient evidence to recommend one treatment over the other (32). We feel it is reasonable to attempt aspiration of a breast abscess smaller than 4–5 cm and to have close follow-up to ensure resolution of symptoms. Once the abscess is drained, women should continue breastfeeding from the affected breast, to prevent further milk stasis and quicker healing (32,33).

Lactating women can also experience fungal or viral infections of the breast. Yeast infections, typically caused by *Candida albicans*, can be associated with oral thrush or diaper rash in the infant, and typically presents with very severe burning, shooting, or stabbing nipple pain that can radiate to the chest wall. Topical antifungals, such as nystatin cream or clotrimazole 0.1% cream, can be prescribed and are safe for lactation. Oral antifungals may be necessary if topical treatment is not effective (22).

Herpes simplex virus (HSV) infection of the nipple or areola presents as small, painful vesicles on an erythematous base and can be spread to the infant. HSV infection can be diagnosed with serology, viral culture, or Tzank smear (22). The mother should be advised to not breast feed with active lesions, but HSV infection can be treated with oral acyclovir.

In summary, lactating women can develop significant breast and nipple pain from several different causes. Early recognition of the diagnosis and prompt intervention has important implications for women's mental health and the nursing relationship between mother and child.

Table 3 Clinical pearls

Fibroadenoma is the most common benign breast mass in pregnancy

Ultrasound is the preferred imaging modality given the increased density of breasts during pregnancy, but mammogram is safe with appropriate abdominal shielding.

Bloody nipple discharge can be a normal finding during pregnancy and is typically self-limited, but should be followed for resolution within two months of delivery

Mastitis is an infectious condition that can infect up to 9% of breast-feeding women in the United States. It is typically caused by *S. aureus*, and can be treated with antibiotics and continuing to breast feed

Some women with mastitis can develop a breast abscess. Studies have shown success with aspiration of the abscess, but some abscesses may require surgical drainage

Conclusions

Breast tissue undergoes significant changes throughout pregnancy and lactation. A number of various pathologies can arise during this time period, including masses, nipple discharge, pain, and dermatoses. While the majority of these are benign, the clinician must develop a wide differential and perform a thorough workup to adequately rule out malignancy, and diagnose and treat these conditions. *Table 3* lists important clinical pearls to remember.

Clinical scenarios

A 28yo G2P1 female who is 26w4d pregnant presents with a new finding of firm, painless, mobile mass in the upper outer quadrant of her right breast. What is the differential diagnosis and how should the mass be worked-up?

Differential diagnosis includes fibroadenoma, lactating adenoma, breast cyst, and malignancy. Perform a history and physical exam, focusing on the breasts and axillae. An ultrasound should be obtained. If there are any concerning features on the ultrasound, then she should undergo a mammogram and biopsy. If there are no concerning features, the mass should be followed with ultrasound and exam every 6–12 months for a two-year period to establish stability.

A 32yo G1PO female who is 37w6d pregnant presents with 2 days of spontaneous bloody nipple discharge from both breasts. How should this be managed?

A history and physical exam should be performed. The patient can be counselled that bloody nipple discharge in pregnancy is typically self-limited. She should be followed with clinical breast exams after she gives birth. If she continues to experience spontaneous and/or unilateral bloody nipple discharge for two months after delivery, then

further workup should be pursued. She should be reassured that it is okay to continue to breastfeed and that is not harmful to the baby.

A 27yo G0P0 has a stable 2.5 cm fibroadenoma in her the outer upper quadrant of her right breast. She is referred to a breast surgeon as she would like to start trying to conceive and she and her obstetrician are worried about the fibroadenoma growing during pregnancy and lactation. What should she be advised?

The patient can be counselled that fibroadenomas can grow during pregnancy, but will likely regress after delivery and lactation. If the fibroadenoma has no current indications for resection, then she can be followed during her pregnancy with clinical breast exams. If the fibroadenoma changes during her pregnancy, then an ultrasound should be obtained to further characterize the mass and determine if there are any concerning features and whether a biopsy is indicated or not.

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