

Skin changes of the female breast: A guide to assessment and management



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Background

The breast can be affected by a wide range of dermatological conditions. Some conditions are unique to the skin of the breast, whereas others occur elsewhere on the body. General practitioners (GPs) will see both benign and malignant skin conditions of the breast; a nuanced approach to assessing and managing these conditions is required.

Objective

This paper gives an overview of the breast skin changes commonly seen in a GP practice, with aetiology, symptoms and guidance on treatment and management.

Discussion

The symptoms of breast skin conditions might overlap. Failure to resolve with adequate treatment could indicate a serious underlying aetiology and the patient needs to be seen by a specialist for further investigation. Early referral decreases morbidity and, in malignant disease, mortality.

THE BREAST IS A MODIFIED sebaceous gland (sweat gland) designed to secrete milk. The skin of the breast is thinner than other areas of the body and is highly innervated, making it more sensitive. The nipple-areolar complex, which is a uniquely modified pigmented area of skin sits in the middle of the breast.¹ The skin of the breast is a window into underlying breast disease and, as such, dermatological conditions can be the first visible manifestation of underlying breast pathology. Dermatological conditions of the breast can be divided into infectious, inflammatory and malignant conditions, as well as a few other miscellaneous conditions. There is crossover in presenting symptoms of many of these dermatological conditions, which can make diagnosis difficult and underscores the importance of careful assessment to distinguish between the conditions (see Appendix 1; available online only). The breast is an area of considerable psychosexual importance, and a dermatological condition affecting the breast might have significant psychological and sexual sequelae.

Infectious causes

Breast infection or infective mastitis is included in this article because it can cause symptoms on the skin, which can be confused with other underlying breast conditions. It can

be divided into lactational and non-lactational infections. The rates of lactational mastitis are variable in the literature with the World Health Organization (WHO) review giving rates of between 5% and 50% of breastfeeding women² and a Cochrane report suggesting rates up to 33%.³ Australian data suggest a lactational mastitis rate of 20%, which is most common in the first six weeks of breastfeeding. The most common causative organism is *Staphylococcus aureus*, and first-line antibiotic recommendations are flucloxacillin or dicloxacillin 500 mg qid for five days.⁴ Studies show that treating mastitis with antibiotics shortens the episodes and reduces the progression to abscess formation.² Patients should keep breastfeeding or expressing milk during treatment to reduce milk stasis in the breast. Tetracyclines, ciprofloxacin and chloramphenicol are contraindicated in breastfeeding. Some infective mastitis and about 40% of breast abscesses are polymicrobial and can contain aerobes and anaerobes. If there is no response after a few days of appropriate antibiotics, culture of breast milk is recommended.²

Between 3% and 11% of lactational mastitis cases develop an abscess. Although incision and drainage used to be a mainstay of management, ultrasound-guided needle aspiration of the abscess is now the

preferred option, in conjunction with the appropriate antibiotics.^{2,5} Needle drainage allows adequate material for culture of the organism, results in shorter healing time, higher success rates (78–92%), better cosmesis and reduced hospital admissions. Several appointments might be necessary to adequately treat the infection by needle aspiration.⁶ Not all patients, however, can be successfully treated non-surgically, and hospital admission and incision and drainage might be necessary if percutaneous drainage is not successful.

Periductal mastitis (non-lactational mastitis)

This is a benign breast condition characterised by inflammation and infection of the breast ducts. Periductal mastitis is often used interchangeably with duct ectasia, but they are now thought to be two separate diseases with separate aetiologies, the former being infective and the latter due to physiological aging.⁷ Periductal mastitis tends to occur in younger women of reproductive age and presents with a painful, localised mass or a thickened area in the breast, usually accompanied by erythema (pink and shiny nipple) and nipple discharge that might be purulent or bloody. Smoking is a major risk factor, with smokers up to 90% of affected patients.⁷ This is possibly due to the effect of smoking on the immune

system and ductal epithelium. The condition primarily involves the subareolar region and can lead to abscess formation if untreated. The clinical presentation can mimic other breast conditions, such as breast cancer, requiring thorough diagnostic work-up, including mammography and ultrasound, to exclude malignancy. A biopsy might also be performed to confirm the diagnosis.⁷

Treatment typically involves antibiotics targeting the most common pathogens (eg *S. aureus*). First-line antibiotic therapy often includes oral antibiotics such as dicloxacillin; however, anaerobic cover with metronidazole is also recommended, especially in smokers.⁸ In cases of chronic or recurrent periductal mastitis, surgical interventions, including duct excision (ductectomy), might be necessary in severe cases. Smoking cessation is a critical part of management as it has been shown to significantly reduce the risk of recurrence. Recurrence is common, and ongoing management might be required.⁸

Nipple candidiasis

This presents as nipple and breast pain, often described as burning and stinging during breastfeeding and after feeding has finished (not just with latching on, which might be due to skin breakdown or poor attachment). Other symptoms are deep, aching breast pain radiating into the back or down the arm. The

nipple itself might look normal but might also have erythema and cracking. The baby might have signs of oral thrush, such as white plaques.

Symptoms can be subtle and difficult to diagnose. If diagnosed, mother and baby are treated together. Treatment of the mother is miconazole oral gel/cream or nystatin cream to the nipple with no need to wipe it off before the next feed. Treatment of the baby is 1.5 ml of miconazole oral gel (Daktarin), which can be administered with a clean finger to the cheeks and tongue.⁹ If pain is worsened by cold, Raynaud’s of the nipple is a differential diagnosis (see ‘Raynaud’s phenomenon of the nipple’).⁷ If there is significant itching or rash, dermatitis is a differential (see ‘Inflammatory causes’).

Inflammatory causes
Atopic dermatitis

Atopic dermatitis (AD) is commonly known as eczema, can occur anywhere on the body, including the nipple, areola and breast skin, and causes chronic itchy, flaky skin. Up to 20% of people with AD develop AD of the nipple and areola. In some patients, this is the only site involved.¹⁰ Most cases of nipple dermatitis are bilateral.¹⁰ Nipple AD frequently flares during breastfeeding and is the cause of 50% of nipple dermatitis that occurs during breastfeeding. It can also co-occur with allergic or irritant contact dermatitis during breastfeeding.¹⁰

Treatment is similar to AD elsewhere on the body (see Table 1). Potent topical steroids such as mometasone furoate 0.1% ointment are useful on the nipple as they moisturise and treat, and – if the woman is breastfeeding – will be absorbed before the next feed.¹¹ These can be used for up to seven days,¹¹ as the nipple skin is thin and prone to atrophy.¹⁰ In the context of breastfeeding, ointments should be applied after a feed.¹¹

Caution must be maintained in treating what looks like intractable dermatitis for long periods of time, as there might be serious underlying pathology. A skin punch biopsy might be necessary to rule out other disease.

Contact dermatitis

This can be divided into allergic contact dermatitis (ACD) or irritant contact dermatitis (ICD) causes. Allergic sources include

Table 1. Treatment of atopic dermatitis¹²

Non-drug treatment	Pharmaceutical treatment
Avoid triggers: <ul style="list-style-type: none">• Heat: hot baths, showers, bedding• Irritants: soap, detergent, rough fabric, exfoliants• Allergens: products containing fragrance, essential oils, food ingredients (eg oatmeal)• Animal dander, house mites, pollens, grasses	<ul style="list-style-type: none">• Topical corticosteroids^A eg mometasone furoate 0.1% (breastfeeding compatible)¹⁰• Calcineurin inhibitors (anti-inflammatory drugs), eg pimecrolimus and tacrolimus (likely breastfeeding compatible)¹⁰
Use cold compresses, soap substitutes or bath oil	
Moisturise: Keep skin well moisturised. ^B Tailor moisturiser to site (greasy moisturiser to dry areas, lighter moisturiser to hairy areas)	

^AAll topical therapies should be wiped off the nipple before breastfeeding. Expressed breast milk is recommended for this rather than water as it is less irritating to the skin.¹⁰
^BMoisturisers with ceramides to repair skin barrier and moisturiser with prebiotics to assist skin flora might be more efficacious.

Table 2. Treatment of breast psoriasis¹³

First-line	<ul style="list-style-type: none">• Short term (2 weeks): low-dose topical steroids• Long term: topical immune modulators(tacrolimus), calcitriol, calcipotriol
Second-line	Topical antimicrobials, emollients, tar-based products
Third-line	Botulinum toxin injections, excimer laser therapy, certain systemic agents (anti-TNF, anti-IL-17 therapy)

IL, interleukin; TNF, tumour necrosis factor.

detergents or fabric softeners (up to 36%),¹² new fabrics in bras (new man-made materials can cause a reaction), tattoos and nipple piercings. Irritant causes are mechanical (‘jogger’s nipple’) from ill-fitting clothing or excess rubbing. Allergic contact dermatitis in the context of breastfeeding might have both irritant and allergic causes. For example, irritant causes might include nipple trauma from nursing and moisture-induced injury, while several allergens might be found in nipple creams, including camomile, lanolin, aloe vera, vitamin E and fragrances.

Breast psoriasis

Breast psoriasis is a chronic, non-contagious, proliferative and inflammatory disease of the skin thought to have an autoimmune aetiology where skin cells multiply up to 10 times faster than normal, causing erythematous plaques covered with silvery scales. It can occur anywhere, including breast skin, nipples and inframammary fold (inverse psoriasis), can be refractory to treatment (see Table 2) and can

mimic Paget’s disease of the nipple. It might also flare during breastfeeding.¹⁰

Granulomatous mastitis

This is a rare condition with multiple aetiologies, including infective, idiopathic and autoimmune. *Corynebacterium kroppenstedtii* has recently been identified as a causative ‘organism of interest’ for this disease. It can be difficult to culture and identify.¹⁴ Granulomatous mastitis (Figure 1) is usually found in premenopausal, parous women with a history of lactation, and is more common in women of Asian, Hispanic and Middle Eastern origin. Presenting symptoms and differential diagnoses are shown in Appendix 1.

This can be a difficult condition to treat, probably due to the multifactorial nature of the disease, with long durations of treatment required before resolution. Triple assessment is necessary to establish the diagnosis, including core needle biopsy and microbiological assessment to identify

a causative agent. Treatment previously included observation alone, antibiotics (either alone or in combination with other treatments), systemic steroids, oral methotrexate and surgery. A newer treatment protocol targets both the potential infective and inflammatory elements of the disease. The schedule consists of adequate antibiotic treatment with a lipophilic antibiotic, such as doxycycline or clindamycin, and intralesional triamcinolone injections.¹⁵ This method is having excellent success, is well-tolerated by patients and has shortened the time it takes to resolve this disease, with decreased recurrence rates.¹⁶

Malignant causes
Paget’s disease of the nipple

Paget’s disease of the nipple was described as ‘an eczematous change in the skin and nipple preceding an underlying mammary cancer’ in 1874 by Sir James Paget.¹⁷ It is thought to be caused by malignant ductal cells migrating along the basement membrane of ducts into the nipple epidermis.¹⁸ It accounts for up to 4.9% of breast malignancies and can occur in both women and men with the average age of diagnosis at age 57 years; though it can occur at any age from adolescence to adults in their 80s.¹⁹ It is more often found in association with high-grade ductal carcinoma in situ (DCIS) and invasive cancer rather than lower-grade lesions.

Initial symptoms include burning, itching and change of sensation, with development of redness, scaling, crusting and excoriation of the nipple (Figure 2). It begins centrally on the nipple and spreads out to the areola, and eventually to the surrounding skin. Patients have typically been treated for eczema and treated with topical steroids for 10–12 months before being referred to a specialist.²⁰

Diagnosis is a full-thickness skin biopsy. A wedge biopsy of the nipple extends more deeply into the breast tissue and aids the diagnosis of the underlying cancer.²¹ Breast imaging is an essential part of the work-up, with mammogram and ultrasound a minimum requirement. More recently, contrast enhanced mammography (CEM) and MRI have become available. These provide more accurate breast imaging with higher sensitivity and specificity, and are



Figure 1. Granulomatous mastitis.



Figure 2. Paget’s disease of the nipple.

fast becoming the imaging modality of choice for this often difficult-to-diagnose malignancy where up to 50% of patients might have normal mammographic findings.^{22,23}

Treatment is surgery, either lumpectomy or mastectomy,²⁴ with removal of the nipple-areola complex. Axillary surgery is performed if invasive cancer is present. Adjuvant therapies and prognosis depend on the stage of the underlying cancer.

Inflammatory breast cancer

Inflammatory breast cancer (IBC) is a rare but aggressive form of breast cancer that accounts for only 1–6% of all breast cancer diagnoses. It is characterised by rapid onset, aggressive clinical presentation and poor prognosis compared to other types of breast cancer.²⁵ IBC is not a specific histological subtype of breast cancer, rather it is a collection of specific symptoms, which leads to an aggressive cancer being diagnosed as an inflammatory cancer.

The disease is named for the noticeable inflammation and erythema of the breast, which is caused by the accumulation of lymph fluid. The tumour cells invade the lymphatic vessels in the dermis, resulting in swelling, skin changes and an inflammatory appearance. The underlying pathology is of poorly differentiated, aggressive tumours, with a high likelihood of metastasis at the time of diagnosis. Up to one-third of cases are triple negative²⁵ and around 20–40% might be human epidermal growth factor

receptor 2 (HER2) positive.²⁵ The aetiology of IBC is not completely understood, but risk factors are similar to those of other breast cancers, including hormonal influences, family history and genetic mutations. Other potential risk factors include age (young women), obesity, race (Black women have 50% higher rates)²⁵ and a history of breast cancer or radiation exposure.

Diagnosis

Diagnosis of IBC is a clinical diagnosis.²⁵ IBC typically presents with rapid changes in the appearance of the breast over a period of weeks to months (Figure 3). The hallmark symptoms include the following:

- Swelling and redness: the affected breast becomes swollen and warm to the touch, with the skin taking on a red or purplish hue due to blocked lymphatic drainage.
- Peau d'orange: the skin might develop a texture resembling the surface of an orange, with pitted indentations due to oedema and lymphatic obstruction.
- Pain: patients often report pain or tenderness in the breast, though it is not always present.
- Breast enlargement: one breast might become significantly larger than the other, sometimes leading to changes in breast shape.
- Nipple changes: the nipple might become inverted or develop a discharge.

Due to its rapid progression and the inflammatory nature of the disease, IBC can often be mistaken for an infection, delaying diagnosis and treatment. Unlike mastitis, IBC is not usually associated with a fever or other systemic features of infection.²⁵ Unlike other breast cancers, IBC only presents as a lump in about one-third of cases,²⁵ making it more challenging to detect using traditional breast self-exams or mammography. Diagnosis involves a combination of clinical evaluation, imaging studies and biopsy (the triple test), which is the gold standard for diagnosis of breast cancer. These patients benefit from contrast enhanced imaging, such as MRI or CEM. A biopsy is essential for confirming the diagnosis. A core needle biopsy or skin punch biopsy is commonly performed to obtain a sample of the affected tissue, which is then examined for cancer cells. Early detection is crucial for improving outcomes.

Treatment

IBC typically requires a multidisciplinary approach, involving neoadjuvant chemotherapy followed by surgery, radiation therapy and targeted therapies such as immunotherapies. Mastectomy is very common as IBC is often too advanced to be treated with breast-conserving surgery (lumpectomy). The goal of treatment is to reduce the size of the tumour, control systemic spread and improve survival outcomes. The prognosis for IBC remains poor compared to other forms of breast cancer. Early diagnosis is key to improved survival.²⁶

Miscellaneous

Raynaud's phenomenon of the nipple

Raynaud's phenomenon of the nipple is caused by vasospasm of the nipple. It occurs primarily in breastfeeding mothers but can occur in women who have never had children. The main symptom is white, painful nipples. Nipples can show a classic triphasic colour change (white, blue, red) or biphasic colour change (white, blue).^{27,28} If breastfeeding, these changes might occur before, during or after feeding. Treatment is symptomatic relief or medication (see Table 3). Symptomatic relief is achieved basically by warming methods and keeping warm (an excellent website is www.summerwarmth.co.nz). Patients are to avoid smoking, caffeine, beta-blockers and vasoconstrictors. Medical treatments (eg calcium-channel blockers) are a last resort when symptomatic treatment does not work, and are not suitable for all.²⁹

White spots/milk bleb/blocked nipple pores

Montgomery glands are found on the areola and normally produce a waxy material, which provides protective lubrication during breastfeeding³⁰ but can secrete milk during and after pregnancy, and can become blocked, enlarged and hard. White dots or raised blebs are seen on the areola. Treatment is warm-water soaks and massage with a face flannel to help clear the blockage. Olive or coconut oil massaged into the nipple might also help clear the blockage. Avoid picking, squeezing or scraping the area as it will traumatise the nipple and might cause infection.³¹ If symptoms do not resolve,



Figure 3. Inflammatory breast cancer.

Table 3. Treatment of Raynaud's phenomenon of the nipple²⁹

Symptomatic	Dietary	Pharmaceutical treatment
Warm nipples: heating pack/hand warmers in bra, warm air-drying (no air-drying of nipples), extra layers, warm shower	^A Evening primrose oil, fish oil	First-line: calcium channel blockers – nifedipine 10–20 mg tds (or SR nifedipine 30–60 mg per day) or amlodipine 5–20 mg per day ^A
Avoid cold: wear socks, slippers; warm house and breastfeeding room	Vitamin B6 (pyridoxine) – 100 mg bd	Second line: phosphodiesterase type 5 inhibitors – sildenafil, tadalafil, vardenafil
Physical massage of nipples when spasming	L-arginine	

^ACan be used while breastfeeding.

SR, slow release

patients can have the tip of a white spot lanced with a needle in the GP's surgery.

Conclusion

Most dermatological changes on the female breast are caused by inflammatory and infective processes. Most will resolve, or significantly improve, in approximately two weeks with the appropriate treatment. However, dermatological changes on the breast can be caused by other, potentially serious, pathologies, making diagnosis in primary care challenging. Failure of dermatological changes to promptly resolve with appropriate treatment might thus require further investigation and referral to a breast specialist.

Key points

- Skin changes in the breast can be the first visible manifestation of serious underlying breast pathology.
- Many skin conditions of the breast have overlapping symptoms and signs (see Appendix 1).
- The triple test (examination, imaging and pathology) is required for any mass-forming lesion in the breast
- Be suspicious of dermatological changes that do not resolve with appropriate treatment; consider further investigation and the involvement of a breast specialist.

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