Dermatological Conditions of the Breast

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KEYWORDS

• Dermatology of breast skin • Nipple • And areola

KEY POINTS

- Most skin findings on the breast do not represent breast cancer.
- Infectious conditions are often fungal or viral in nature.
- Atopic, allergic, and irritant dermatitis can be treated with removal of the offending agent, emollients, topical steroids, with phototherapy and systemic medications for recalcitrant cases.

INTRODUCTION

Many visits to a breast specialist involve concerns related to the skin of the breast, not the breast parenchyma itself. There are a wide variety of skin disorders that can present on the skin of the breast, chest, and axilla ranging from malignancies to infections to inflammatory conditions. Some of these may present during breastfeeding. Often these are directed to the breast surgeon for concern of inflammatory breast cancer or Paget's disease or because they are thought to require surgery for management, such as hidradenitis.

A thorough history and physical are indicated including past medical history, autoimmune diseases in the patient or family, family cancer history, medications, immunization status, breast imaging, breast examination, and examination of the skin on other parts of the body. Questions should be asked regarding initial symptoms, changes or duration of skin lesions, prior episodes, alleviating or aggravating factors, and any changes in medications or substances contacting the skin.

This review was designed as a dermatology primer for breast surgeons to include the most common neoplasms (**Table 1**), infectious processes and their mimickers (**Table 2**), and inflammatory conditions (**Table 3**) that can present on or involve the breast.

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Table 1
Neoplasm summary

Neoplasm	Breast Location	Other Common Locations	Painful	Pruritic	Appearance	Risk Factors	Biopsy Needed/ Helpful
Paget's	Unilateral nipple	None	No	No	Scaly or ulcerated nipple	Usual breast cancer risk factors	Yes
Inflammatory breast cancer	Any	None	Yes	Maybe	Erythematous skin, skin edema (Peau d' orange)	Same as breast cancer risk factors	Maybe
Dermatofibrosarcoma protuberans	Any	Trunk, proximal extremities, head, neck	No	No	Slow growing, small, firm, skin-colored plaque or raised lesion	Young to middle age, women, Blacks	Yes
Cutaneous T cell Lymphoma	Any	Buttocks, thighs, chest, abdomen, back	No	No	Erythematous scaly patches, telangiectasia, mottled hypo or hyperpigmentation		Yes
Basal cell Cancer	Upper chest	Face, head, neck, arms legs	No	No	Flesh colored pearl or pink patch	Lifetime sun exposure, immunosuppression	Yes
Squamous cell cancer	Upper chest	Face, ears, neck, back, arms	No	No	Red, firm, raised lesions or scaly patches	Lifetime sun exposure, pale lighter skin, immunosuppression	Yes
Melanoma	Any	Any skin, mucosal surfaces, retina, meninges, dura, eye	No	No	Darkly pigmented lesions with irregular borders, multiple colors	Sun exposure, tanning bed, men, prior skin cancer, family history, immunosuppression	Yes
Seborrheic keratoses	Any	Any	No	No	Tan to brown, papillomatous, papules or plaques	Older age	No

Table 2
Infections and their mimickers

Infectious Conditions and Mimickers	Breast Location	Other Common Locations	Painful	Pruritic	Appearance	Risk Factors	Biopsy Needed/Helpful
Tinea Corporis	any	any	No	Yes	Annular scaly plaques	immunosuppression	No (KOH can help)
Tinea Versicolor	Central chest	Upper back, shoulders	No	Yes	Hyper- or hypopigmented thin scaly macules	Worse in hot climate, summer months	No (KOH can help)
Candidiasis	Infra-mammary	Mucocutaneous sites, lower abdomen	No	Yes	Erythematous plaque with satellite pustules	Obesity, immunosuppression	No
Herpes Zoster	Dermatomal	Face, back	Yes	No	Clustered vesicles on an erythematous base	Older age, immunosuppression	No
Hidradenitis Suppurativa	Infra-mammary	Axillae, inguinal folds, gluteal cleft	Yes	No	Nodules and tracts with purulent drainage	Female, African American	No
Pyoderma Gangrenosum	Any	Any	Yes	No	Deep ulcer with overhanging gray border	IBD, RA	Yes (rule out other causes)

Table 3
Inflammatory condition summary

Inflammatory Conditions	Breast Location	Other Common Locations	Painful	Pruritic	Appearance	Risk Factors	Biopsy Needed/ Helpful
Atopic dermatitis	Usually nipple	Any	No	Yes	Erythematous scaly papules and plaques	Genetic and environmental factors	No
Contact dermatitis	Any	Any	No	Yes	Pruritic, erythematous, edematous papules and plaques	Eczema	No
Seborrheic dermatitis	Central chest	Scalp, face, ears	No	Yes	Erythematous patches with greasy scale	Host response to Malassezia, Parkinson's disease	No
CARP	Central chest	Neck, back	No	Mild	Brown keratotic verrucous papules and reticulated plaques	Endocrine imbalance, host response to Malassezia	No
Benign familial pemphigus	Inframammary	Intertriginous (axillae, inguinal folds)	Yes	No	Flaccid blisters and erosions, foul-smelling vegetative plaques	Autosomal dominant	Maybe
Psoriasis	Any	Usually scalp, elbows, lower back, knees	No	Yes	Erythematous patches and thin plaques with or without white scale	Family history, environmental factors, preceding streptococcal infection	Maybe
Morphea	Any	Any	Maybe	No	Erythematous or violaceous plaques that progress to atrophic plaques with a violaceous border	Mechanical trauma, radiation, injections	Yes
Lichen sclerosus	Any	Genitalia, chest, upper back, abdomen	Maybe	Maybe	Blueish-white papules and plaques that process to atrophic plaques with telangiectasias	HLA-DQ7 autoantibodies, antibodies to ECM-1, concomitant autoimmune disease (thyroid disease, vitiligo)	Yes

Hyperkeratosis of the nipple & areola	Nipple, areola	None	No	Mild	Hyperpigmented verrucous papules and plaques	May be hormonally driven	No
Cyst of Montgomery	Areola	None	No	No	Erythematous nodule if inflamed or obstructed	none	No
Radiation dermatitis	Any	Any	Maybe	Maybe	Variable: mild erythema, ulceration, necrosis	Prior radiation therapy	Yes
Pemphigus	Any	Any	Yes	No	Crusted erythematous erosions	Can be associated with malignancy	Yes
Raynaud's	Nipple	Fingers, toes	Yes	No	Nipple discoloration	Cold climate, nicotine use, family history, systemic sclerosis	No
Superficial thrombophlebitis	Any	Chest wall	Yes	No	Erythematous, tender, linear cord	Recent surgery, hormone therapy, infection, tight clothing	No
Calciphylaxis	Any	Any	Yes	No	Ulcerated, necrotic plaques	End-stage renal disease, warfarin use	Yes

NEOPLASMS

Seborrheic Keratosis

Seborrheic keratoses (SKs) are benign growths that develop in men and women during adulthood. The pathogenesis of SKs is thought to be multifactorial and may be related to the disruption of epidermal growth factor receptors. SKs present as tan to dark brown papillomatous, waxy papules, and small plaques on the trunk, face, or extremities. The "stuck on" appearance with or without an overlying scale can help differentiate SKs from melanoma.[1] SKs are commonly asymptomatic; although, they can become inflamed or pruritic. Typically, the onset of SKs is gradual over years. A sudden eruption of SKs, referred to as the "Leser-Trelat sign" can be associated with multiple malignancies, including breast cancer.[2] Due to the benign nature of SKs, the lesions can be monitored or excised if symptomatic or located in cosmetically sensitive areas.

Paget's Disease

Paget's disease is a rare presentation of breast cancer. The skin of the nipple can present with eczematous type findings, ulceration, or erosion with unilateral involvement. Clinical findings may be confined to the skin but in more than 90% of cases, the underlying breast parenchyma is involved with invasive breast cancer or at least, ductal carcinoma in situ.[3] Treatment is similar to other early-stage breast cancers and may be driven by the extent of the underlying breast involvement.

Inflammatory Breast Cancer

Inflammatory breast cancer represents 2% of all breast cancers. There are no current molecular markers to distinguish inflammatory from noninflammatory breast cancer and therefore, is considered a clinical diagnosis. Patients with inflammatory breast cancers present with rapidly evolving skin changes including diffuse erythema and induration.[4] National Comprehensive Cancer Network (NCCN) guidelines require erythema and edema of at least one-third of the breast for a clinical diagnosis of inflammatory breast cancer.[5] Skin punch biopsy can confirm the diagnosis if dermal lymphatic involvement is identified histologically but a negative result does not exclude inflammatory breast cancer.[4] An expert panel recommended using a time interval to distinguish between true inflammatory breast cancer (</ = 6 months) and one with secondary erythema from locally advanced breast cancer (6 months).[6] Most inflammatory breast cancers present with regional nodal involvement, and many will also present with distant metastases.[4] A multimodal treatment approach including chemotherapy, surgery and radiation are used when treating for curative intent.

Dermatofibrosarcoma Protuberans

Dermatofibrosarcoma protuberans (DSFP) are a rare, low-grade malignancy originating from the fibroblastic mesenchymal cells in the dermis. It represents less than 0.1% of all malignancies. The most common locations to find a DSFP are the trunk (40%–50%), proximal extremities (30%–40%), head, and neck (10%–15%). The incidence is higher in women and Black patients, and the highest incidence is between ages 25 to 45. DSFPs have been reported in patients with immunodeficiency conditions as well as pregnancy.[7] Infrequently, these can be found in the breast.[8] In the early stages, these present as a slow-growing, painless, firm, skin-colored plaque, or protuberance. Biopsy is recommended for diagnosis. Surgical excision with wide local excision or Mohs micrographic surgery can be used depending on the location involved. DSFP involving the trunk are commonly treated with wide local excision.

NCCN guidelines recommend a 2–4 cm margin.[9] Adjuvant radiation may be considered for fibrosarcomatous variant or if excision for DSFP did not achieve at least 1 cm margins.[7]

Dermatologic Malignancies

For squamous cell carcinoma (SCC), basal cell carcinoma (BCC) and melanoma, ultraviolet (UV) solar radiation is the main factor in development. UV exposure induces carcinogenesis through DNA damage causing mutations as well as the decreased ability of the immune system to recognize and remove these malignant cells. Cumulative UV exposure is directly related to the risk of developing SCC and BCC while sun exposure specifically during adolescence is the main risk for melanoma. There are other risk factors including family history, chemical exposure, use of tanning beds, human papillomavirus, skin type, presence of melanocytic nevi, and immunosuppression, such as in organ transplant recipients.[10]

Basal Cell Carcinoma

These are the least aggressive skin cancers. These present as a flesh-colored pearly or pink patch of skin. Given the pathogenesis, these are mostly found on the sun-exposed skin, such as the face, head, neck, arms, legs, and abdomen. It is rare but BCC has been reported on the nipple and areolar complex (NAC) with a higher rate of metastasis, 9.1%.[11,12] When BCC occurs on the NAC, it is more likely in men as this area has less sun exposure in women. These are diagnosed with a skin biopsy and can be treated with topical 5-fluorouracil if superficial.[13] Surgical excision is an option but patients who are poor operative candidates, but have aggressive or recurrent forms, may be treated with radiation or systemic medication.[10]

Squamous Cell Carcinoma

Squamous cell carcinomas form from the keratinocytes in the epidermis. These can be seen as red, firm bumps or scaly patches in sun-exposed skin, most commonly ear, face, neck, chest, and back. Ulceration can develop if untreated. They are more common in patients with pale, lighter skin.[13] These are diagnosed by skin biopsy. Treatment can include photodynamic therapy, topical chemotherapy agents, curettage, and electrodessication or surgical excision.[10]

Melanoma

Melanoma represents a small percentage of skin cancers but is considered more deadly than other skin cancers. The overall incidence is rising. Melanomas arise from the uncontrolled growth and proliferation of melanocytes. These are usually found in the dermis of the skin but can arise anywhere melanocytes are found.[14] Approximately 4% to 5% of melanomas are found in noncutaneous sites such as mucosal surfaces, the eye, dura, or meninges. There are cases reports of primary melanoma of the breast itself.[15] These often present as pigmented lesions with asymmetrical lesions, irregular borders, uneven coloring, size greater than 0.4 cm, or evolving lesions (**Fig. 1**). Early-stage cutaneous melanomas are treated with surgical excision with margin width and sentinel node surgery depending on the thickness of the melanoma. Later stage disease can now also be treated with adjuvant targeted therapies and immune checkpoint inhibitors.[16]

INFECTIONS

Fungal Infections

Tinea corporis appears as annular scaly plaques on the trunk or extremities caused by a dermatophyte infection limited to the stratum corneum. Tinea versicolor can appear

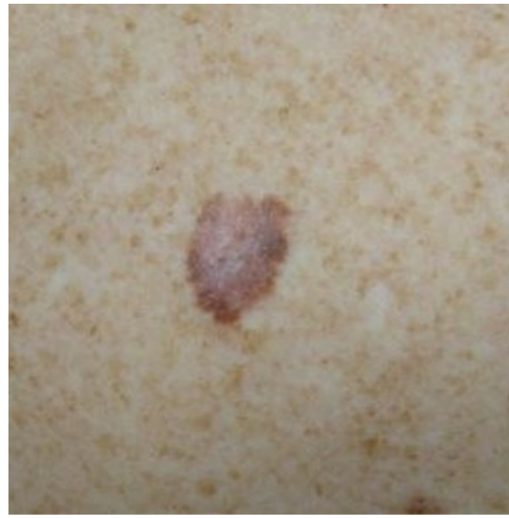

Fig. 1. Melanoma.

as hyper- or hypopigmented small round patches with fine scale, favoring seborrheic areas such as the central chest but can extend onto the breast. Scale becoming more apparent after scraping or stretching the skin is called the evoked scale sign and can help differentiate from other conditions.[17,18] Residual pigmentary alteration can often take weeks to months to improve, but does not signal treatment failure, and patients should be counseled accordingly. Mucocutaneous candidiasis is common in the inframammary folds and presents as erythematous patches often with satellite papules and pustules. Diagnosis, causative organisms, and treatment are in **Table 4**.[18]

Herpes Zoster (shingles)

Herpes zoster is due to the reactivation of varicella zoster virus. It is characterized by a painful eruption of clustered vesicles which is usually preceded by pain in the affected area. It erupts in a dermatomal distribution and can involve the breast when involving dermatomes T1–T5. Diagnosis is usually made by clinical appearance alone, but can be confirmed with Tzanck smear, PCR, DFA, or viral culture. Acyclovir, valacyclovir, and famciclovir are FDA approved for treating herpes zoster and one of these options should be initiated as soon as possible during the disease course to prevent postherpetic neuralgia. Patients with moderate to severe pain from herpes zoster can be started on gabapentin or low-dose tricyclic antidepressants to prevent postherpetic neuralgia.[19]

INFLAMMATORY

Hidradenitis Suppurativa

Hidradenitis Suppurative (HS) is a chronic inflammatory skin disease primarily affecting the intertriginous or apocrine gland-bearing areas, including axillae (**Fig. 2**), breast (**Fig. 3**), and groin.[20] HS affects about 1% of the population and is more common in women and Black patients.[21] Characteristic skin lesions of HS include double comedones, nodules, abscesses, and sinus tracks which lead to scarring.[22] HS is graded using the Hurley scale. Obesity, smoking, polycystic ovarian syndrome, and metabolic syndrome are associated with HS, and HS can lead to decreased quality

Table 4
Summary for fungal infections[19]

Diagnosis	Causative Organism	Diagnosis	Treatment
Tinea versicolor	Malassezia (Pityrosporum) yeasts	KOH examination of skin scrapings with both hyphal and yeast forms; "spaghetti and meatballs"	*Topical ketoconazole shampoo or cream* Alternatives: zinc pyrithione and selenium-containing shampoos used as a body wash
Tinea corporis	Microsporum, Trichophyton, and Epidermophyton species	KOH examination of a skin scraping showing branching hyphae	*Topical terbinafine cream or topical azole creams (clotrimazole, econazole)* Alternatives: May consider oral antifungals (terbinafine, griseofulvin, azole antifungals) if recalcitrant to topical therapy
Candida	C. Albicans	Usually by the clinical appearance. Can do fungal culture or KOH scraping showing budding yeast and pseudohyphae	*Topical nystatin cream or topical azole (ketoconazole) antifungals* Alternatives: May consider oral fluconazole if recalcitrant to topical therapy

of life and depression.[21] The exact pathophysiology of HS remains unknown, but current research suggest it is hyperkeratosis and rupture of the follicular unit, followed by the upregulation of autoinflammatory pathways.[23] Treatment options are outlined in **Table 5**[20]

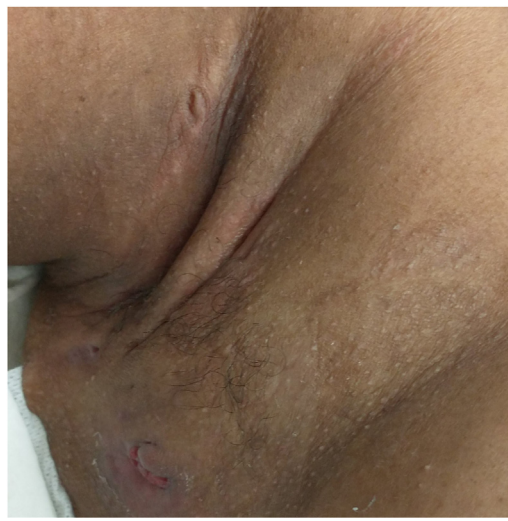

Fig. 2. Axillary hidradenitis.

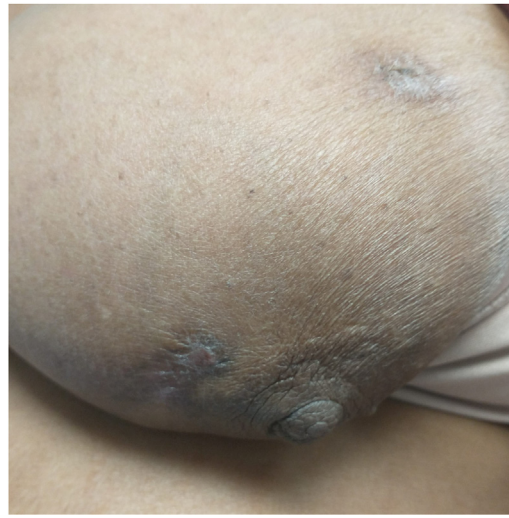

Fig. 3. Hidradenitis on the breast.

Pyoderma Gangrenosum

Pyoderma gangrenosum (PG) is a rare neutrophilic dermatosis characterized by rapidly progressive, painful ulceration (**Fig. 4**). It occurs most commonly on the lower limbs, but can occur on the breast, especially after biopsy or surgery due to a process termed pathergy.[24] It can often be misdiagnosed as a wound infection after surgery and should be considered in cases whereby standard therapy is unsuccessful.[24] Clinically, PG begins as an inflammatory papule or pustule that expands into an exudative painful ulcer with gray overhanging borders.[25,26] Other underlying conditions associated with PG include inflammatory bowel disease and rheumatoid arthritis.[26] Management includes immunosuppressant therapy such as oral corticosteroids and TNF-alpha inhibitors, avoiding surgical debridement, and applying nonadherent dressings.[25]

Atopic Dermatitis

Atopic dermatitis (AD) is an inflammatory condition affecting 10% to 30% of children and 2% to 10% of adults. AD is caused by both genetic and environmental factors leading to epidermal barrier dysfunction, immune dysregulation, and alterations of the cutaneous microbiome.[27] AD is characterized by a broad clinical spectrum. In adolescents and adults, lichenified plaques with variable amounts of scale, crust, and fissuring are typically seen. Nipple eczema is a common presentation of AD in women (**Fig. 5**). It is typically bilateral and primarily seen in adolescent girls but can also present during pregnancy and breastfeeding.[22,28] When seen in breastfeeding, it can predispose lactating women to bacterial or viral super-infection.[27] Nipple eczema can be exacerbated by chronic friction and can be seen in runners or other athletes. AD on the breast can be managed like presentation elsewhere on the body; however, care should be taken to minimize the use of super potent topical steroids as the breast tissue is thin and prone to atrophy. First-line treatments include low-moderate potency topical steroids, calcipotriene cream, and topical calcineurin inhibitors. Special consideration should be taken when treating lactating women as all medications cannot safely be consumed. Patients should be instructed to wipe *off* any topical

Table 5
Hidradenitis treatment by Hurley stage[20,24]

Hurley Stage	Topical Medical Therapy	Systemic Medical Therapy	Surgical Treatment
I	Clindamycin 1% Resorcinol 12% Benzoyl peroxide 5 or 10% Antimicrobial washes: Benzoyl peroxide or chlorhexidine	Doxycycline 100 mg twice daily Adjunctive hormonal therapy: Oral contraceptives ± spironolactone	• Intralesional triamcinolone (3–5 mg), repeat monthly as needed • May consider punch debridement or excision of individual lesions
II	See above	First line: Doxycycline 100 mg (or other tetracycline antibiotics) twice daily Second line: Clindamycin 300 mg twice daily- monotherapy OR Clindamycin-Rifampin combination • Clindamycin 300 mg twice daily • Rifampin 300 mg twice daily Third line: TNF-α inhibitors • Adalimumab 40 mg q wk (after loading dose)	Intralesion triamcinolone (see above) May consider punch debridement or excision of individual lesions Deroofing of sinus tracts Sinus tract excisions Carbon dioxide laser
III	See above	See above for first and second line Third line: TNF-α inhibitors Adalimumab 40 mg q wk (after loading dose) OR Infliximab 5 mg/kg every 8 wk (after loading dose)	See above Radical wide local excision

Data from Saunte DML, Jemec GBE. Hidradenitis Suppurativa: Advances in Diagnosis and Treatment. JAMA. Nov 28 2017;318(20):2019-2032. https://doi.org/10.1001/jama.2017.16691 and Orenstein LAV, Nguyen TV, Damiani G, Sayed C, Jemec GBE, Hamzavi I. Medical and Surgical Management of Hidradenitis Suppurativa: A Review of International Treatment Guidelines and Implementation in General Dermatology Practice. Dermatology. 2020;236(5):393-412. https://doi.org/10.1159/000507323.

medications before breastfeeding.[22] While many patients are able to achieve adequate control with topical therapies and emollient use, patients with recalcitrant AD may require phototherapy or systemic medications, including Dupilumab.[29,30]

Contact Dermatitis

Contact dermatitis can be divided based on the causative agent, either allergic or irritant. Allergic contact dermatitis (ACD) is caused by a type 4 delayed hypersensitivity reaction.[31] ACD acutely presents as pruritic, erythematous, edematous papules and plaques, which commonly can be weeping or blistering (**Fig. 6**). Chronically, well-demarcated lichenified scaly plaques are seen in the affected areas. Common allergens involved in ACD on the breast include CI + Me-isothiazolinone, a preservative seen in detergents, sanitary wipes, and fabric softeners, cobalt chloride, seen in metal

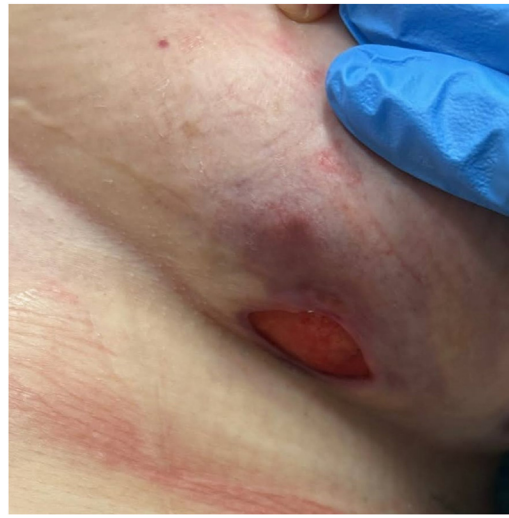

Fig. 4. Pyoderma gangrenosum.

fasteners and jewelry, and nickel sulfate, also seen in metal fasteners.[32] Cyanoacrylate glue, commonly known as Dermabond, has also been shown to cause ACD when used for wound closure. Cross-reaction with other acrylate products, such as cosmetic products including acrylic nails and eyelash extension glue, can trigger a delayed-type hypersensitivity response with Dermabond use.[33]

The management of ACD is centered around the identification of causative allergen, patient education, and treatment of symptoms. Patch testing can be performed to determine the causative agent. Once identified, extreme care should be taken to avoid the allergen. Skin inflammation can be treated, with topical steroids and moisturization.[31] Irritant contact dermatitis (ICD) is a nonimmunological phenomenon caused by the direct cytotoxic effect due to a chemical or physical insult. Clinical findings

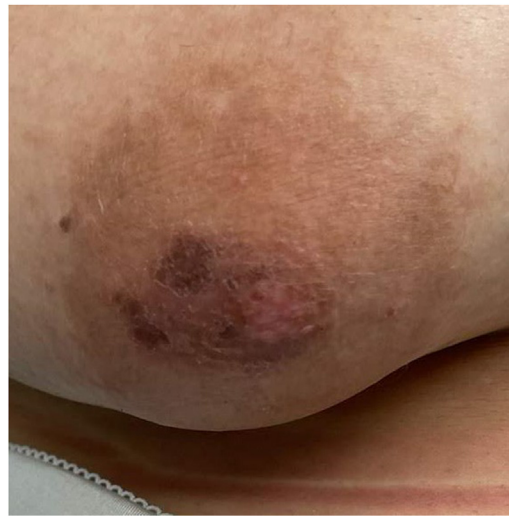

Fig. 5. Nipple dermatitis or eczema.

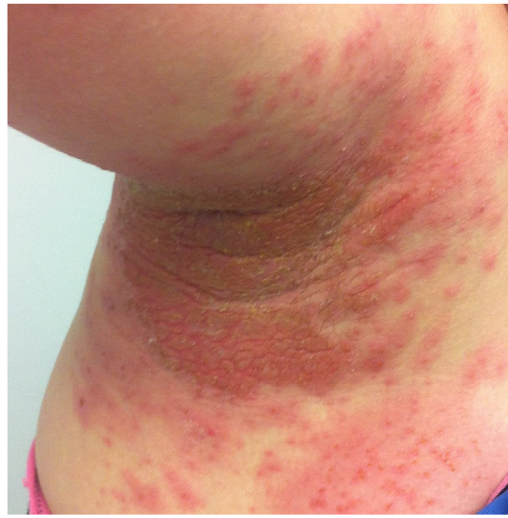

Fig. 6. Allergic contact dermatitis.

are typically well-demarcated, polymorphic, and can include erythema, edema, ulcerations, and necrosis. On the breast, ICD can result from exercise, mechanical injury, or moisture-related injury during breastfeeding.[22,34]

Seborrheic Dermatitis

Seborrheic dermatitis is an inflammatory condition found in infants, children, and adults. In adults, seborrheic dermatitis is chronic and is mostly seen in the 5th and 6th decades of life. Seborrheic dermatitis occurs in areas of active sebaceous glands, such as the scalp, glabellar area, nasolabial folds, and central chest. Seborrheic dermatitis is typically found on the central chest rather than the inframammary folds, as seen in intertrigo. It is thought to be triggered by a commensal yeast, *Malassezia furfur*, which has been isolated from cutaneous sebaceous glands. Clinical findings of seborrheic dermatitis include erythematous patches with the overly greasy scale with or without vesiculation and crust.[35] The management of seborrheic dermatitis is targeted at controlling levels of Malassezia with topical azole shampoos or creams and controlling inflammation with low-potency topical steroids. Patients should also be counseled that seborrheic dermatitis is a chronic condition and maintenance treatment should be used to avoid flares.[35]

Confluent and Reticulated Papillomatosis

Confluent and reticulated papillomatosis (CARP) is a benign proliferation seen in teenagers and young adults. CARP is more common in female patients. The etiology of CARP is unclear and may be related to endocrine imbalance, dysfunctional keratinization, or host response to *M furfur*. The clinical presentation consists of asymptotic or mildly pruritic brown keratotic, verrucous papules that coalescence in a thin reticulated plaque on the intermammary area (**Fig. 7**), neck, and back (**Fig. 8**).[1] CARP can be treated with oral tetracyclines, topical antifungals, or combination therapies.[36]

Psoriasis

Psoriasis is a chronic inflammatory disorder resulting from genetic predisposition and environmental triggers. Onset is bimodal with peaks between 20 and 30 years of age

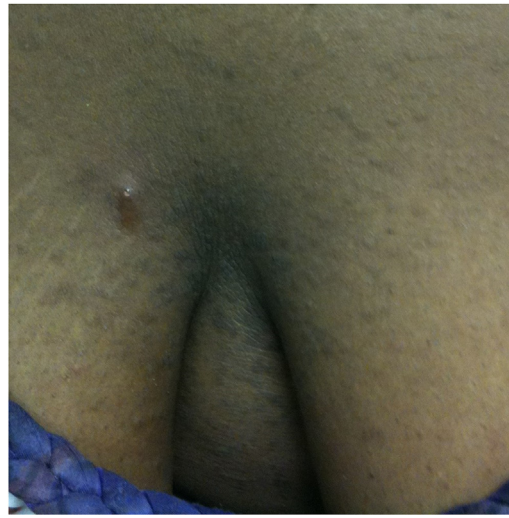

Fig. 7. CARP presenting in the intramammary region

and 50 and 60 years of age. Patients will often report a positive family history of psoriasis. Pathogenesis of disease is thought to be related to the increased activity of T-helper cells and numerous cytokines. In genetically predisposed patients, triggers such as the Koebner phenomenon (onset after injury to the skin), infections, stress, and certain medication use can elicit the onset of psoriatic disease.[37]

Any area of the breast and nipple can be involved but when the inframammary fold, as well as other intertriginous areas, are involved, it is termed inverse psoriasis (**Fig. 9**). Inverse psoriasis can be mistaken for intertrigo, candida infection, or seborrheic dermatitis. Inverse psoriasis presents as well-demarcated erythematous patches and thin plaques with or without white scale. Diagnosis of inverse psoriasis is usually clinical; however, a biopsy can confirm the diagnosis.[38]

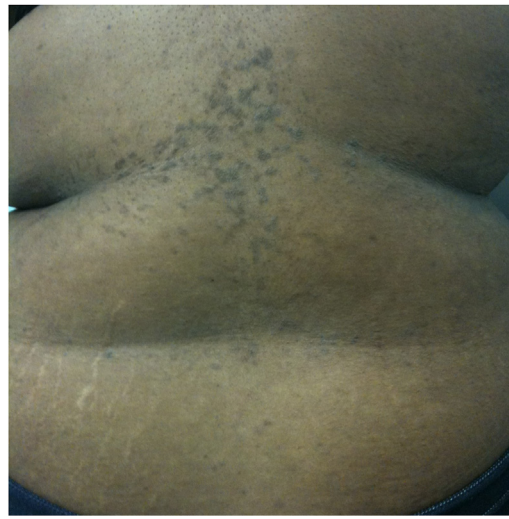

Fig. 8. CARP presenting on the back.

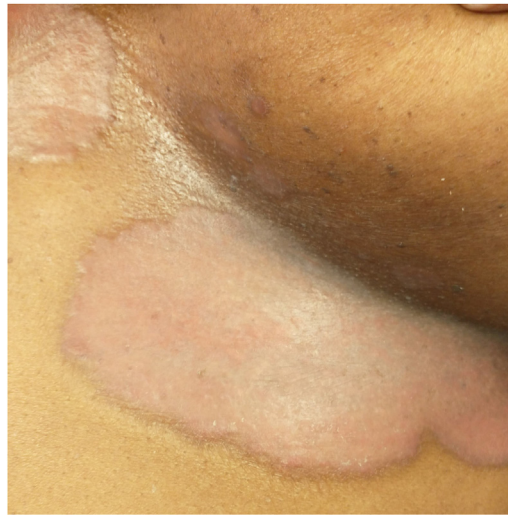

Fig. 9. Inverse psoriasis.

Treatment of psoriasis depends on the degree of disease, areas affected, and presence or absence of joint involvement. In general, mild–moderate plaque psoriasis can usually be managed with topical corticosteroids, vitamin D analogs, or topical calcineurin inhibitors. For inverse psoriasis, first line treatment includes low to mid-potency topical corticosteroids, topical calcineurin inhibitors (tacrolimus or pimecrolimus), or topical vitamin D analogs (calcipotriol) along with emollients. Topical calcineurin inhibitors and vitamin D analogs are the treatment of choice for the inframammary area and nipple because they are less likely to cause skin atrophy as they do not affect collagen synthesis.[38] While systemic and biologic therapies, such as adalimumab and ustekinumab, are commonly used in generalized recalcitrant plaque psoriasis, few studies have been performed for isolated inverse psoriasis.[38,39]

Morphea

Morphea, also known as localized scleroderma, is an inflammatory disease that leads to cutaneous fibrosis and, in certain subtypes, internal involvement. Morphea is more common in women than men and increases in prevalence with increasing age. Cutaneous sclerosis seen in morphea is thought to be due to vascular damage, activated T cells, and altered connective tissue production by fibroblasts. The onset of morphea is likely caused by a triggering event, such as mechanical trauma, injections, or radiation.

The most common variant of morphea, plaque-type, presents as erythematous or violaceous plaques on the trunk. Initially, the lesions can be asymptomatic. The plaques will gradually increase in size and become shiny and sclerotic, often with a violaceous border and atrophic center. As sclerosis progresses, the adnexa is also affected, and the areas become anhidrotic and hairless. Patients may also notice both hypo and hyperpigmentation, and telangiectasias of the affected area.[40]

On the breast, it has been shown that morphea can be triggered by radiation therapy. Postirradiation morphea (PIM) has been described as sudden onset sclerosis of the skin at least 1 month to several years after radiotherapy treatments. Prevalence of PIM is 1 in 3000 cases of postbreast cancer radiation. The sclerosis is typically limited

to the irradiated area and the nipple and areola are spared.[41,42] PIM is clinically and histologically indistinguishable from morphea; however, patients will have a history of radiation to the affected area.

Management of morphea, including PIM, includes skin biopsy to confirm diagnosis and treatment manage symptoms and prevent progression of disease. It must be distinguished from lichen sclerosis which initially presents as bluish-white papules and polygonal plaques. Like morphea, these lesions evolve into scar-like plaques with telangiectasias and an atrophic or wrinkled surface. Development of lichen sclerosus has been seen after the treatment of breast cancer with anastrozole and radiation therapy.[43] Li and colleagues also showed an increased prevalence of breast cancer in patients with lichen sclerosus.[44] Initial treatment options include topical corticosteroids for both morphea and lichen sclerosis.[40] Systemic treatment options for severe cases include methotrexate, pentoxifylline, oral corticosteroids, or acitretin.[40,42,45]

Hyperkeratosis of the Nipple and Areola

Hyperkeratosis of the nipple and areola (HNA) is a benign condition characterized by the unilateral or bilateral development of hyperpigmented verrucous papules and plaques involving the nipple and areola. Lesions can affect both men and women but are mostly seen in postpubertal women. A variant of HNA has also been described in pregnancy and during the postpartum period.[46,47] The pathogenesis is unclear; however, because HNA is typically seen postpuberty and similar lesions are seen during pregnancy, the disease may be hormonally driven. Although HNA is typically asymptomatic or mildly pruritic, it will persist without therapy. Treatment options include 6% salicylic acid gel, 2% lactic acid lotion, mild topical corticosteroids, and topical retinoic acids. Cryotherapy, carbon dioxide laser treatment, and surgical removal have also been used in refractory cases.[46,47]

Radiation Dermatitis

Radiation dermatitis (RD) is seen in almost all patients undergoing radiotherapy. The onset of acute RD is typically in the first-fourth weeks of treatment and presentation can be polymorphic and range from mild erythema with hyperpigmentation to moist desquamation, ulceration, and necrosis.[22,48] Management of radiation dermatitis is centered around prevention with sun-protective measures and gentle skin care. Treatment options include the use of hydrocortisone 1% cream or mometasone 0.1% cream. Although topical steroids can be used for symptom control, they have not been shown to prevent the development of acute radiation dermatitis.[49] XonRID, a recently developed water-based gel, may be useful in the prevention of acute dermatitis in the future.[48]

Pemphigus Vulgaris & Paraneoplastic Pemphigus

Pemphigus is a group of autoimmune blistering disorder in which IgG antibodies target proteins in the epidermis. There are 3 major forms of pemphigus including pemphigus foliaceous (PF), pemphigus vulgaris (PV), and paraneoplastic pemphigus (PNP). In PF, patients develop crusted erythematous erosions primarily in a seborrheic distribution on the scalp, face, chest, and back. In PV, flaccid bullae, painful erosions on mucosal surfaces and body can be seen.[50] PNP can present in conjunction with many underlying neoplasms. The most common initial presentation of PNP is severe, recalcitrant hemorrhagic stomatitis. Patients will also present other mucosal and cutaneous involvement similar to PV.[50] PNP has been seen in conjunction with breast adenocarcinoma and is associated with tamoxifen use.[51,52] Diagnosis of diseases in the

pemphigus family is performed via clinical examination, H&E skin biopsy, and direct immunofluorescence (DIF). Patients should be referred to a dermatologist for management. Based on the severity of disease, treatment options include topical corticosteroids, oral steroids, and immunosuppressive agents including azathioprine, mycophenolate mofetil, and rituximab (b29). In the cases of PNP, diagnosis and aggressive treatment of the underlying malignancy leads to the improvement of PNP.[51]

Raynaud's Phenomenon

Raynaud's phenomenon (RP) is episodic vasospasm of arteries secondary to various triggers. Risk factors include cold climate, nicotine use, and family history. It can be primary, typically seen in healthy, young females, or secondary, associated with underlying medical problems such as systemic sclerosis.[53,54] RP is typically seen in the fingers and toes but also can involve the branches of the internal and external mammary arteries of the nipple.[53] RP affecting the nipple can present in up to 22% of women of childbearing age and is more common in pregnant and lactating women.[54] It is thought that elevated estrogen levels and emotional stress contribute to the development of RP. RP of the nipple will present as intermittent, sharp, severe nipple pain and discoloration.[54] Diagnosis of RP is clinical and treatment is directed at prevention. Patients should be encouraged to avoid cold climates, optimize stress management, and stop using tobacco. Medical therapies include calcium channel blockers (CCBs), such as nifedipine or amlodipine, both of which are safe to use during breastfeeding. In cases refractory to CCBs, phosphodiesterase type 5 inhibitors, angiotensin receptor blockers, and topical nitroglycerin have been used as well.[55]

Calciphylaxis

Calciphylaxis, also known as calcific uremic arteriolopathy, involves macrocalcifications and occlusion of arterioles, leading to ischemia and necrosis of the affected tissues. It is typically seen in adults with end-stage renal disease or warfarin use in areas of increased adipose tissue, such as the abdomen, buttocks, thighs, and breasts. Presentation can vary to include livedo reticularis, painful subcutaneous induration, ulceration, and necrosis with eschar formation. Livedo reticularis presents as erythematous-violaceous reticulated patches. Lesions are also prone to secondary infection. On the breast, calciphylaxis can lead to peau d'orange changes, mimicking an inflammatory breast cancer.[56,57] Diagnosis can be made with biopsy and through microcalcifications seen on imaging. Patients who present with calciphylaxis on the breast should undergo mammography and sonography. Prognosis is guarded as this condition has a high mortality rate. Treatment of calciphylaxis is multidisciplinary and aimed at symptom management with pain control, wound care, and treatment of contributing conditions. Underlying calcium and phosphate derangements should be managed with hemodialysis or use of calcium and phosphate binders. Sodium thiosulfate and pentoxifylline have been used in the management of calciphylaxis as well.[56–58]

SUMMARY

Based on the number of dermatologic conditions that can present in the breast, it is useful to have a basic working knowledge of such conditions for anyone involved in the care of the breast. Skin biopsy can often be useful in the diagnosis. Referral to dermatology is indicated for many of these conditions.

CRITICAL CARE POINTS/PEARLS AND PITFALLS

- Allergic contact dermatitis can be seen with the use of medical supplies including Dermabond, personal care items, and jewelry
- Psoriasis on the breast presents as nonscaly erythematous plaques in the inframammary fold
- Initial treatment of morphea is topical steroids.
- Any blistering disorders should be biopsied for H&E and direct immunofluorescence to establish the diagnosis as treatment plans can differ.

DISCLOSURE

Dr A.D. Throckmorton has the following disclosures Saunders/Mosby-Elsevier (spouse), Exactech (Spouse), Zimmer (spouse), OsteoCentrics (spouse), Pacira (spouse), Responsive Arthroscopy (spouse), Gilead (self, spouse), Targeted Medical Education (self). Drs S. Pulusani and E. Jones have none.

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