

# Hidradenitis Suppurativa-Induced Breast Abscess and Congenital Nipple Inversion Mimicking Inflammatory Breast Cancer with Review of the Literature

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## Abstract

Inflammatory breast cancer (IBC) is an aggressive, but rare, malignancy that may present cutaneously, so dermatologists may be some of the first providers to observe the initial clinical signs. A number of benign conditions may mimic the cutaneous and radiographic features of IBC. We present a case of a patient with hidradenitis suppurativa of the breast complicated by abscess formation with cutaneous findings mimicking IBC, including abrupt erythema, edema, nipple retraction, and peau d'orange changes. This case highlights dermatologic findings that should prompt an urgent evaluation for IBC, features that differentiate clinical mimickers from IBC, and potential pitfalls in diagnosing IBC if an improper or incomplete workup is pursued. We also present a review of the literature regarding mimickers of IBC.

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## INTRODUCTION

Inflammatory breast cancer (IBC) is an aggressive, but rare, malignancy that may present cutaneously, so dermatologists may be some of the first providers to observe the initial clinical signs. Urgent workup is needed as IBC accounts for 7% of mortality caused by all breast cancers, despite the fact that it accounts for only about 2-4% of all breast cancer in the United States.<sup>1-2</sup> Diagnostic criteria for IBC include acute erythema (onset less than three months) occupying at least one third of the breast, peau d'orange changes, edema, warmth, and pathologic confirmation of invasive carcinoma.<sup>3</sup> Notably, a palpable mass within the breast is frequently absent in IBC. Diagnosis based on clinical features alone is challenging given its morphologic overlap with benign inflammatory dermatoses. While a punch biopsy may aid in the diagnosis, nonspecific histopathologic findings are common and cannot exclude IBC. Therefore, urgent evaluation with both mammography and breast ultrasound +/- core-needle biopsy are frequently needed for diagnosis. Mammography allows for evaluation of the contralateral breast and provides information regarding microcalcifications and architectural distortion,<sup>3</sup> while ultrasound can detect the parenchymal changes and skin thickening in IBC with a high sensitivity of 96% (versus mammography with a sensitivity of 84%).<sup>4</sup> The reduced accuracy of mammograms may result from sub-optimal mammographic breast compression due to pain and increased mammographic density from widespread edema in IBC.<sup>3</sup> An additional limitation of mammography is that the sensitivity of mammography for detecting cancer is lower in dense breasts.<sup>5</sup> This limitation may be further compounded in patients with obesity and high BMI, both of which are associated with HS.

## CASE

A 50-year-old woman with a history of bilateral axillary and inframammary hidradenitis suppurativa (HS) and left nipple inversion since childhood was hospitalized due to lower extremity cellulitis and was incidentally found to have skin changes of the left breast. The patient reported progressive erythema, swelling, and purulent discharge of the left breast one month prior to evaluation without any preceding trauma. She reported that her longstanding left nipple inversion had remained stable during this time. She had a strong family history of breast cancer. Examination of the left breast revealed nipple inversion and retraction with periareolar erythema and a peau d'orange background.

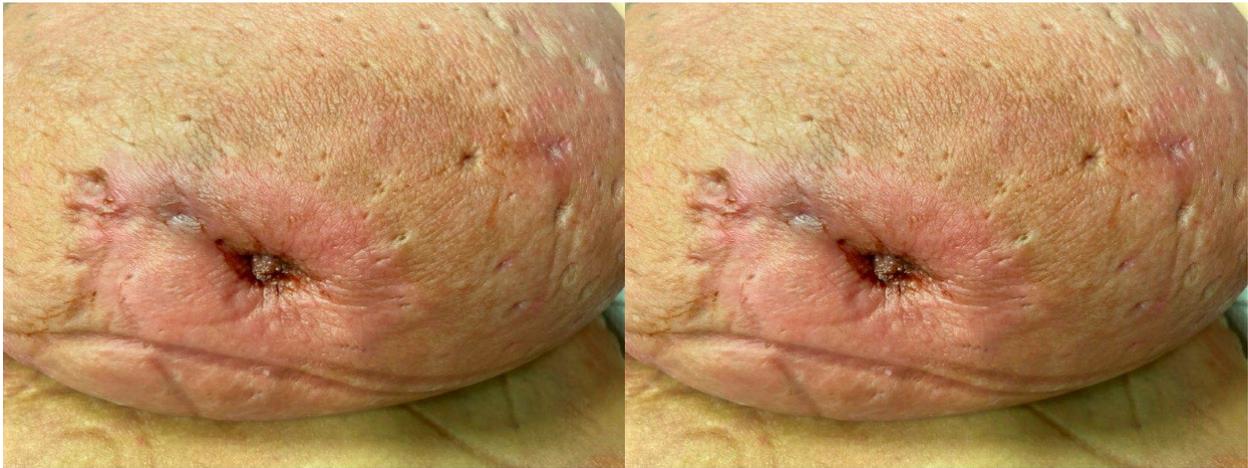


Figure 1. *Nipple inversion and retraction with periareolar erythema, edema, and a peau d'orange background on the left breast*

The skin and nipple of the right breast were normal. A punch biopsy revealed lymphangiectasias with sclerotic collagen, suggestive of lymphedema without evidence of malignancy. Mammography showed diffuse skin thickening, nipple inversion, and an ill-defined mass with architectural distortion behind the left nipple (Breast Imaging Reporting and Data System 4: suspicious for malignancy). An ultrasound detected a mixed echogenic collection in the subareolar left breast in the setting of ultrasonographic skin and trabecular thickening, concerning for possible cancer; however, the patient had a slightly larger echogenic collection in the same location on an ultrasound performed four years prior. In contrast to the mammogram, the updated ultrasound was therefore reassuring against IBC, allowing for close monitoring with repeat imaging. One month later, after she finished antibiotics for chronic leg wounds, her breast edema and purulent drainage had improved. A repeat ultrasound showed further interval reduction in the left subareolar collection, suggestive of an abscess instead of malignancy in the context of her chronic HS. Therefore, further workup with a core needle biopsy was deferred.

### METHODS

Conditions mimicking IBC were identified by a literature search in PubMed using the following terms: (“inflammatory breast cancer” AND mimic) or (“inflammatory breast cancer” AND misdiagnosis). On April 10, 2023, 40 articles met the search criteria. Articles were included in our review if they addressed other breast diseases with cutaneous features similar to IBC, as well as criteria for differentiating these from IBC. There were 15 papers that met this final criteria. Of the 15 results that met our search criteria for mimickers of IBC, five articles discussed idiopathic granulomatous mastitis (IGM),<sup>6-10</sup> two articles discussed primary lymphoma of the breast,<sup>11-12</sup> and one article each discussed: tuberculosis masses,<sup>13</sup> necrotizing fasciitis,<sup>14</sup> arthropod bite mastitis,<sup>15</sup> vasculitis,<sup>16</sup> postsurgical changes,<sup>17</sup> postradiation dermatitis,<sup>18</sup> morphea,<sup>19</sup> and HS-associated lymphedema.<sup>20</sup> Several additional mimickers of IBC were identified using literature cited by the articles from our search. A summary of the mimickers of IBC identified through our review can be seen in Table 1.

<b>Mimicker of Inflammatory Breast Cancer</b>	<b>Features distinct from Inflammatory Breast Cancer</b>	<b>Source</b>
<b>Idiopathic Granulomatous Mastitis</b>	<ul style="list-style-type: none"> <li>• Younger patients</li> <li>• Recent history of giving birth or breastfeeding, with elevated prolactin being a risk factor</li> <li>• Less likely to be Caucasian</li> <li>• More likely to display systemic symptoms such as fever and malaise</li> <li>• There are multiple simultaneous areas of peripheral infection with abscesses</li> <li>• Core biopsy shows noncaseating granulomas, multinucleated Langerhans giant cells, and predominant neutrophilic background with accompanying lymphocytes</li> </ul>	6-10
<b>Primary Lymphoma of the Breast</b>	<ul style="list-style-type: none"> <li>• Less likely to have nipple retraction or discharge</li> </ul>	11-12
<b>Tuberculosis Mass</b>	<ul style="list-style-type: none"> <li>• Breast mass which is typically located in the central or upper outer quadrant of the breast</li> <li>• Typically present for months to years</li> <li>• There may be constitutional symptoms of tuberculosis (malaise, pyrexia, and night sweats)</li> </ul>	13
<b>Necrotizing Fasciitis</b>	<ul style="list-style-type: none"> <li>• Elevated Laboratory Risk Indicator for Necrotizing Fasciitis score</li> <li>• More likely to display crepitation and darkening of the skin</li> </ul>	14
<b>Arthropod Bite Mastitis</b>	<ul style="list-style-type: none"> <li>• Sudden onset of symptoms (within 24 hours of the bite) and core biopsy shows hypersensitivity reaction</li> </ul>	15
<b>Vasculitis</b>	<ul style="list-style-type: none"> <li>• Ultrasound shows hypoechoic circumferential arterial wall thickening with perivascular fat infiltrations (similar to the halo sign in large arteries)</li> </ul>	16
<b>Postsurgical Changes</b>	<ul style="list-style-type: none"> <li>• Recent history of breast procedure along with localized breast edema</li> </ul>	17
<b>Postradiation Dermatitis</b>	<ul style="list-style-type: none"> <li>• Recent history of breast radiation along with sharply demarcated erythema</li> </ul>	18

<b>Morphea</b>	<ul style="list-style-type: none"> <li>• Tissue biopsy will show features of sclerosis</li> </ul>	19
<b>Hidradenitis Suppurativa Associated Changes (i.e., lymphedema, abscess)</b>	<ul style="list-style-type: none"> <li>• History of hidradenitis suppurativa and punch biopsy reveals lymphedema; repeat imaging will show improvement over time</li> </ul>	20-21
<b>Infection (i.e., abscess or mastitis)</b>	<ul style="list-style-type: none"> <li>• Appears sicker with localized tenderness, fever, and leukocytosis</li> </ul>	22
<b>Mammary Duct Ectasia</b>	<ul style="list-style-type: none"> <li>• Unilateral well-demarcated erythema involving less than one-third of the breast</li> </ul>	22
<b>Mondor Disease (superficial thrombophlebitis)</b>	<ul style="list-style-type: none"> <li>• Preceding trauma followed by a tender breast mass</li> </ul>	22
<b>Fat Necrosis</b>	<ul style="list-style-type: none"> <li>• Preceding trauma followed by a tender breast mass</li> </ul>	22

Table 1. *Mimickers of IBC and their distinguishing features*

## DISCUSSION

The most common mimicker that appeared in our review was IGM. IGM is an uncommon, benign, and chronic inflammatory condition of the breast. This condition presents clinically as a painful progressive breast mass which may cause nipple retraction or inversion and fistulae or abscess formation, along with peau d'orange formation involving multiple simultaneous areas in any quadrant, but usually sparing the subareolar region.<sup>6</sup> As the imaging findings for IGM are extremely similar to those of IBC, diagnosis usually requires fine needle aspiration (FNA) and core biopsies which show characteristic findings on histology, include noncaseating granulomas, multinucleated Langerhans giant cells, and a predominant neutrophilic background with accompanying lymphocytes.<sup>6</sup> This is the gold standard of diagnosis for IGM.<sup>7</sup> One study found that in comparison to patients with periductal mastitis, patients with IGM are younger, have given birth more recently, and are less likely to be Caucasian.<sup>8</sup> A recent history of breastfeeding is also common in IGM.<sup>9</sup> Elevated prolactin levels have been shown to be a risk factor for IGM.<sup>10</sup> The patient may also report systemic symptoms of fever and malaise.<sup>10</sup> These aspects of a patient's history can all help raise clinical suspicion for IGM in comparison to other mimickers.

Primary breast lymphoma (PBL) also appeared more than once as a mimicker of IBC. PBL may present as a painful breast mass with skin fixation and cutaneous inflammatory changes (erythema and edema), although nipple retraction and discharge are rare in PBL.<sup>11-12</sup> As the clinical presentation and imaging findings of breast lymphoma and carcinoma are similar, biopsy is once again the gold standard procedure to establish a diagnosis, and FNA approaches a sensitivity of 90%, although confirmation with a core needle biopsy is recommended.<sup>11</sup>

One uncommon mimicker of IBC is a tuberculosis mass.<sup>13</sup> Because these masses are frequently fixated to the skin and/or chest wall, they can be confused with inflammatory breast cancer. Features that may favor tuberculosis include a chronic history of months to years, as well as possible constitutional symptoms of tuberculosis, such as malaise, pyrexia, and night sweats.<sup>13</sup> We also identified one report of necrotizing fasciitis mimicking IBC.<sup>14</sup> In the advanced stages, the crepitation and darkening of the skin with tissue necrosis can indicate necrotizing fasciitis. However, in the early stages, the Laboratory Risk Indicator for Necrotizing Fasciitis (based on serum C-reactive protein, white blood cell count, hemoglobin, sodium, creatinine, and glucose values) can be helpful in identifying those who are more likely to have necrotizing fasciitis.<sup>14</sup> Another rare mimicker of IBC is arthropod bite mastitis. Our literature search revealed one case of a patient with a three-month history of a right breast erythematous macular rash with scaling, revealed skin thickening, and a questionable underlying mass on ultrasound.<sup>15</sup> An ultrasound-guided biopsy was performed, showing a hypersensitivity reaction. One helpful characteristic recommended by the authors to distinguish this from IBC is that arthropod bite mastitis symptoms are typically sudden and the erythema and symptoms appear within 24 hours of the bite, compared to a three-month interval for IBC.<sup>15</sup> Breast vasculitis was also reported as a rare mimicker of IBC. However, ultrasound findings of hypoechoic circumferential arterial wall thickening with perivascular fat infiltrations (similar to the halo sign in large arteries) can be helpful for a presumptive diagnosis of breast vasculitis.<sup>16</sup>

When dermal lymphatics are interrupted by causes other than tumor emboli, this can also mimic IBC. One case series from our review reported six patients who developed breast edema concerning for IBC after undergoing breast surgery for other cancers.<sup>17</sup> The authors hypothesize that this phenomenon occurs due to the interruption of lymphatic vessels and lymphovenous shunts resulting in associated lymphostasis, which resembles the process of IBC when tumor emboli disrupt dermal lymphatics.<sup>17</sup> This process occurred in a localized manner at a distance from the biopsy site and was associated with

## Case and Reviews

erythema, which may be a result of inflammation from lymphedema itself. The authors recommend that in the setting of a consistent, recent history of breast surgery, reassurance and continued monitoring may be a reasonable approach to spare patients from repeated biopsies or antibiotics.<sup>17</sup> Patients who have received breast radiation for other cancers may also develop an erythema that can be concerning for IBC. Post-radiation dermatitis should be considered for these patients, especially if the erythema is sharply demarcated, as the erythema characteristic of IBC shows a diffuse distribution.<sup>18</sup>

Dermatologic conditions can also mimic IBC. One study from our review identified 15 patients with pathological evidence of morphea involving the breast, with two thirds of these patients initially misdiagnosed with IBC or breast infections.<sup>19</sup> The authors recommend an early tissue biopsy, especially in the setting of breast erythema, given that there are no specific imaging or laboratory studies that can assist in diagnosis in the setting of breast-associated morphea.<sup>19</sup> Inflammatory skin conditions, such as HS, may also mimic IBC. Our review identified one case of a patient with longstanding Hurley III bilateral breast HS who presented with a three-month history of unilateral breast redness and heaviness which did not improve after antibiotics.<sup>20</sup> After a diagnostic mammogram revealed skin thickening and suspicious calcifications, a punch biopsy was performed, resulting in findings consistent with lymphedema.<sup>20</sup> A repeat mammogram at four months was negative for malignancy. Patients with HS of the breast develop follicular plugging and dilation of the pilosebaceous unit leading to subsequent rupture and influx of neutrophils, lymphocytes, and histiocytes. The recruitment of these three cell types can predispose patients to abscess formation within the breast.<sup>21</sup> The inflammatory destruction of lymph vessels in patients with longstanding HS may also lead to the development of lymphedema.<sup>20</sup> This may explain why our patient, who had a history of HS of the breast, experienced a chronic breast abscess without acute features of fever and leukocytosis.

Using references from the above articles, we identified other alternative breast diseases that mimic inflammatory breast cancer with overlapping cutaneous and radiographic features. Acute infections, such as abscess or mastitis, may present similarly; however, patients often appear sicker with localized tenderness, fever, and leukocytosis.<sup>22</sup> An additional IBC mimicker includes mammary duct ectasia, which presents with unilateral well-demarcated erythema involving less than one-third of the breast, but may also have nipple inversion, drainage, and periareolar inflammation.<sup>22</sup> Mondor disease (sclerosing superficial thrombophlebitis of the veins of the anterior thoracic wall) or fat necrosis can present with a tender breast mass which could mimic IBC, however these conditions are both preceded by trauma, unlike IBC, which usually lacks a traumatic insult.<sup>22</sup>

Acquired nipple inversion caused by benign diseases (such as periductal abscess or duct ectasia) appears as a symmetric, transverse slit in the nipple with normal appearing areola. In comparison, inversion from malignancy is typically asymmetric and involves the areola.<sup>23</sup> In this case, the patient reported nipple inversion since childhood, which might suggest a congenital cause for the inversion. In one study, the prevalence of congenital unilateral nipple inversion in females was reported to be around 0.4%, and around 2.8% for congenital bilateral nipple inversion.<sup>24</sup>

## CONCLUSIONS

This case highlights a chronic abscess in the setting of HS mimicking IBC with acute-onset unilateral erythema, edema, and peau d'orange changes in the setting of longstanding unilateral nipple inversion. While subtle differences in morphologic features may support benign breast pathologies, inflammatory conditions such as HS can also mask features of IBC. Physicians should have a low threshold to urgently pursue mammography and ultrasound to exclude IBC and facilitate timely and accurate diagnoses in a high-risk patient population. Similarly, this case illustrates the potential pitfalls of using mammography alone for diagnostic evaluation of patients with HS who are suspected to have IBC. As was seen in this case, an ultrasound may help clarify concerning features seen on mammography, and when prior imaging is available, may also help to determine interval changes that can assist in diagnosis.

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