Diagnostic and Interventional Radiology in Idiopathic Granulomatous Mastitis

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ABSTRACT

Idiopathic granulomatous mastitis is a chronic, benign, inflammatory disease of the breast. If the radiological findings are known, patients can be referred for biopsy in the early period. The diagnosis of the disease must be based on a histologic confirmation. After diagnostic and therapeutic management, a radiological follow-up is conducted using an appropriate imaging tool. In this study, we highlight the radiologic evaluations for idiopathic granulomatous mastitis and present specific cases.

Keywords: Diffusion-weighted imaging, doppler ultrasonography, elastography, granulomatous mastitis/diagnostic imaging, magnetic resonance imaging

Introduction

Idiopathic granulomatous mastitis is a chronic, inflammatory, benign disease of the breast. Benign and malignant breast diseases show similarity with regard to clinical and radiological outcomes [1]. Therefore, it is essential to evaluate the imaging findings accurately and provide a fast, conclusive diagnostic path [2]. A pathologic confirmation not only provides discrimination from malignancy, but also enables the provision of the most appropriate treatment regimen to the patient.

The etiology of autoimmunity, pregnancy-lactation, hyperprolactinemia, oral contraceptives, alpha 1 antitrypsin deficiency, smoking, and trauma has been demanded [3]. The most common clinical symptoms of idiopathic granulomatous mastitis include erythema, edema, variable sized-sensitive-palpable unilateral breast mass, nipple retraction, ulceration, discharge, and axillary lymphadenopathy [4]. However, patients may also have more bizarre presentations, particularly in subclinical forms.

Interventional Procedures

The disease must be diagnosed through a pathological evaluation. Fine needle aspiration is principally supportive in detecting purulent secretions at the early stage. Nevertheless, it could not be satisfactory in distinguishing malignant and other benign inflammatory disorders. A core biopsy should be preferred for this purpose. Although larger tissues can be obtained, vacuum-assisted biopsies may result in fistula development. A diagnostic excisional biopsy is not preferred due to substantial scratching, loss of breast symmetry, breast deformity, and the possibility of unhealed ulcers or sinus tract formation [5, 6].

For the diagnostic management of granulomatous mastitis, not only the tool but also method is of great importance. Particularly, as mentioned below, sampling of lesions with different radiological and pathological components, such as edema, inflammation, necrosis, and abscess, requires skill and expertise. Sample collection from the thick walls of the necrotic lesions or abscesses and specimens of inflamed areas having vascular signals will provide an adequate pathological result (Figure 1).

Mammography

A mammogram may show thickening of the skin, focal or global asymmetry, irregular focal mass, trabecular coarseness or distortion in the parenchyma, smooth-edged mass, calcification, or lymphadenopathy...
findings [7, 8]. Mammography may not show any findings particularly in dense breasts (Figure 2).

**Ultrasonography**

Thickening of the skin, an irregular hypo-echogetic mass with tubular extensions, smooth-edged hypo-echogenic mass, hypo-hyperechoic-heterogeneous mass, masses that tend to coalesce, heterogeneous parenchyma, parenchymal edema, distortion, acoustic shadowing, abscess, sinus tract formation or lymphadenopathy may be detected [9] (Figure 3). On a greyscale, granulomatous mastitis lesions are seen as very heterogeneous lesions with a wide range of brightness. Based on this idea, a study on the texture analysis of granulomatous mastitis and carcinoma lesions showed that texture analysis may be a proficient method in differentiating between granulomatous mastitis and breast carcinoma. It may offer measurable statistics about the lesions and an unbiased evaluation compared to a visual inspection [10].

Additionally, ultrasonography is the main follow-up tool after an appropriate treatment regimen.

**Doppler Ultrasonography**

Prominent arterial and venous Doppler signals can be found in the inflamed parenchyma [11]. In addition, Doppler signals are also helpful for a biopsy guidance. During a classical biopsy procedure, it has to be avoided a biopsy trace falling into any vascular structure. In contrast, if granulomatous mastitis is suspected, biopsy specimens must be obtained from vascularized Durur-Subasi I. Radiology of Granulomatous Mastitis Eurasian J Med 2019

Figure 1. a-d. Identification of idiopathic granulomatous mastitis should be established histologically. A tubular, hypo-echogenic, well-bordered lesion without acoustic shadowing is sampled using a core biopsy device (arrow) (a). Lesions having necrotic constituents should be evaluated carefully and necrotic portions (stars) should not be sampled (b). Thick walls (c) and vascularized areas (d) have to be chosen for a proper histologic result during the biopsy procedure.

Figure 2. a-d. Bilateral CC mammography of a patient pathologically proven to have idiopathic granulomatous mastitis (a). In the outer part of the right breast, a low-density mass and patchy increases of parenchymal density are seen. In the sonogram of the patient (b), edematous fat lobules and a heterogeneous hypo-hyper-echogenic mass with acoustic enhancement are appreciated. Another idiopathic granulomatous mastitis patient has a subtle parenchymal coarseness in the inner part of the right breast compared to the left side (c). Magnetic resonance imaging and corresponding ultrasonography image reveal a more prominent disease (d).

Figure 3. a-d. Heterogeneous hypo-echogenic mass with some spiculated extensions (a), tubular extensions to the skin with a skin-located component (b), dilated pus containing ducts (c), are the ultrasonography findings of granulomatous mastitis. In a sonogram, diffuse enlarged, tender lymph nodes can be seen (d)
Elastography

Compressive sonoelastography in idiopathic granulomatous mastitis shows soft properties with low elasticity scores and strain ratios \[12\] (Figures 4 and 5). These features can be attributable to the pathologic properties. Non-caseating granulomas concentrated in the lobules, an inflammatory environment, and lymphoplasmocytic migration may be observed. Microabcesses, necrosis, sinus tracts, and duct ectasia are frequently observed \[3, 13\]. Using acoustic radiation force impulse imaging, idiopathic granulomatous mastitis has been reported to have low median marginal and internal velocities compared to malignant lesions \[14\].

Magnetic Resonance Imaging

Upon magnetic resonance imaging, skin alterations owing to inflammation; T1, T2, and STIR intensity changes; and intense contrast uptake, progressive, plateau or washout pattern; mass lesions with ring enhancement; segmental-regional non-mass enhancement; diffusion changes; necrosis-abscess; fistula tracts; skin abscess; dilated ducts with dense content; enhanced ductal walls, and lymphadenopathy can be perceived \[5, 15, 16\].
Idiopathic granulomatous mastitis is often seen in premenopausal women presenting with signs of mastitis and a mass. Therefore, their initial evaluation is based on ultrasonography rather than mammography and magnetic resonance imaging. An appropriate antibiotic therapy and immediate follow-up are recommended at the first admission. Thereafter, the biopsy has to be performed when there is no clinical improvement. In this clinical setting, magnetic resonance imaging should be used for the evaluation of advanced-aggressive-unresponsive disease when the sensitivity of ultrasonography and mammography is limited due to parenchy-

![Figure 7. a-d. Multi-loculated, necrotic mass with peripheral and septal intense enhancement is seen in the subareolar region of the left breast (a). A diffusion-weighted image of the lesion shows prominent restriction (b). A coronal STIR image shows enlarged left axillary and oval lymph node (c). Upon compressive sonoelastography (d), the lesion appears very soft (elasticity score: 1, strain ratio: 0.54) (Durur-Subasi I. Radiology of Granulomatous Mastitis. Eurasian J Med 2019)](image)

![Figure 8. a-b. Idiopathic granulomatous mastitis of the left breast. There are irregular enhancing (a) and diffusion restricting (b) areas. Pay attention to the components located in the skin (arrows). These microabscesses are enhancing peripherally and restricting diffusion as well (Durur-Subasi I. Radiology of Granulomatous Mastitis. Eurasian J Med 2019)](image)

![Figure 9. a-c. A 28-year-old woman with breast carcinoma. The outer part of the left breast shows intense enhancement with segmental configuration (a). Because of microcalcification suspicion during the ultrasonographic guiding tomosynthesis has been performed before the biopsy. Suspicious calcifications, spiculated margins, and parenchymal distortions are seen (b). Core biopsy confirmed the malignancy (c) (Durur-Subasi I. Radiology of Granulomatous Mastitis. Eurasian J Med 2019)](image)
The author declared that this study has received no financial support.

References