Learning objectives

The purpose of our educational exhibit is to:

- Illustrate the clinical, imaging and pathologic features of chronic granulomatous mastitis (CGM)
- Describe the spectrum of radiologic findings seen in chronic granulomatous mastitis on mammography, ultrasound (including Shear Wave Elastography-SWE) and magnetic resonance imaging (MRI).
- Describe imaging criteria that help to differentiate CGM from breast cancer, which it mimics clinically and on imaging.
- Create awareness of this entity amongst young radiologists, surgeons and pathologists and discuss management options.

Background

Introduction

Chronic granulomatous mastitis (CGM), also termed as granulomatous lobular mastitis or granulomatous lobulitis, is a rare, benign, chronic inflammatory disease of the breast, characterized by granulomatous inflammation of the breast lobules. This entity was first described by Kessler and Wolloch in 1972(1). The incidence of this condition is uncertain with only a few hundred cases reported in the published literature(2). It is important to be aware of CGM as it resembles breast cancer clinically and on imaging.

Epidemiology

Chronic Granulomatous Mastitis most commonly involves women of child-bearing age, although a few cases have also been reported in male patients (3). A number of risk factors like use of oral contraceptive pills, pregnancy, breast feeding, autoimmune origin, infection with yet unidentified pathogens, breast trauma, hyperprolactinemia, and alpha-1-antitrypsin deficiency have been described, but a definite etiology has not yet been proven (4). Granulomatous inflammation may be idiopathic (an entity well described in the Western literature), or secondary to other breast diseases as periductal mastitis, tubercular or fungal infections, ruptured cysts, fat necrosis and systemic disorders as sarcoidosis, Wegener’s granulomatosis (Figure 1). Most of the cases in developing countries are either due to breast infections that persist because of inadequate antibiotic therapy or due to endemic infections as tuberculosis. Hence CGM secondary to other causes is not uncommon in the developing world(5,6).

Clinical features
Patients with CGM often present with a hard, palpable breast mass that has been present for a few months, with or without erythematous skin changes. Other symptoms may include pain, skin thickening, sinus formation, nipple retraction and axillary lymphadenopathy (2,7). The disease is classically unilateral, although bilateral involvement has been reported in the literature(4). As the clinical symptoms are of long duration and a hard lump is found on examination, a provisional diagnosis of carcinoma breast is usually made.

Images for this section:

![Diagram](image)

**Fig. 1:** Chronic granulomatous mastitis (CGM): etiology
Findings and procedure details

**Imaging studies**

*Mammography*

A number of imaging appearances have been described. A large focal asymmetric density or an irregular ill-defined mass are the most common findings (7) (Figure 2). Multiple small masses, architectural distortion (Figure 7), diffuse increase in the breast density, skin thickening and nipple retraction may also be seen. Mammograms could even be normal, depending on the size and location of the CGM lesion at the time of diagnosis and the density of the surrounding breast parenchyma(2,7). Microcalcification is highly unusual, though cases have been reported in the literature(8).

*Ultrasound*

The most common appearance is an irregular hypoechoic mass associated with multiple fingerlike extensions. Other frequent appearances include single or multiple masses (Figure 8), parenchymal distortion with or without acoustic shadowing and multifocal abscess cavities. Axillary lymphadenopathy and skin thickening are seen in almost 50% of the patients(2,5,7). Fluid clefts or tubular hypoechoic extension in an ill-defined breast lesion are highly suggestive of chronic inflammation in a woman of reproductive age group (Figure 3).

*Shear Wave Elastography*

Shear Wave Elastography is very helpful in differentiating CGM from carcinoma. The CGM lesions as well as perilesional stroma are soft on elastography with maximum elastography values less 80 kPa (Figure 4), as is expected for benign lesions(9,10). On the other hand, elastography values for malignant masses are higher.

*MRI*

The signal intensity is variable on non-contrast T1W and T2W images. However, T2W hyperintensity points towards a benign etiology (2). Although non-specific, a variety of appearances have been described for CGM on contrast administration: areas of non-mass like enhancement (segmental or regional), nodular lesions, lesions with peripheral ring like enhancement, homogeneous / heterogeneous enhancing masses or parenchymal distortion(2). The most characteristic finding of CGM is lesions with peripheral, ring-like enhancement that represent micro-abscesses within the breast (Figure 5). Lesions show variable contrast kinetics with some lesions showing rapid enhancement and others showing progressive enhancement (Figure 5).

**Establishing the diagnosis**
Although radiological findings can suggest the diagnosis of CGM in an appropriate clinical setting, the imaging findings are not specific and the diagnosis is best established by histopathology. Tissue biopsy is necessary to rule out malignancy and a stereotactic, ultrasound-guided or vacuum-assisted biopsy can be performed. Image guidance again plays a crucial role here to get adequate tissue samples from representative areas. These samples may be examined for acid fast bacilli and sent for culture. Fluid from the clefts or abscesses can be aspirated for polymerase chain reaction (PCR) for *Mycobacterium tuberculosis* DNA and also for culture. A general approach to a patient of reproductive age group presenting with a hard, breast lump of long duration is depicted in Figure 9.

**Histopathology**

Hematoxylin and Eosin (H&E) stains are used for the histologic analysis. Chronic granulomatus inflammation centered on the lobules is the characteristic finding in granulomatous mastitis. Microabscesses, epithelioid macrophages and multinucleated giant cells (Figure 6) may be demonstrated in tubercular or other chronic infections. Presence of acid fast bacilli, a positive PCR test for *M. tuberculosis* or a positive culture confirms the diagnosis of tuberculosis. Idiopathic CGM is a diagnosis of exclusion and is characterized by presence of non caseating granulomas and absence of other systemic illnesses.

**Treatment**

Management of CGM is conservative and surgery is reserved for resistant cases. Long antibiotic course is prescribed for cases with pyogenic etiology(2,6). Anti-tubercular drug regimen should be initiated for tubercular granulomatous mastitis. The idiopathic variety and secondary CGM caused by connective tissue diseases can be treated by steroids (5,7) An approach to management of a patient with CGM according to etiology is discussed in Figure 10.

**Complication and follow up**

Recurrence is a well-known complication(2). Even a breast carcinoma probably arising from CGM has also been reported in the literature (11). Hence long term follow up is needed. After the initial episode, follow up ultrasound should be performed every 6 months until the disease has resolved. Surveillance with annual mammography is also recommended(2).

**Images for this section:**
Fig. 2: Mammogram of a 35 year old lady with a hard lump in right breast since 5 months: Mediolateral oblique (MLO) and craniocaudal (CC) reveal asymmetric density in upper, outer quadrant of right breast (arrows).
Fig. 3: Ultrasound of the same patient as in Figure 2: Extended field of view image (top) depicts ill defined areas of increased echogenicity in the right breast with presence of fluid clefts within (arrows). B mode ultrasound images (bottom) show a round, echogenic mass surrounded by a fluid cleft (curved arrow) - no posterior acoustic shadowing is seen.
**Fig. 4:** Ultrasound doppler (top) and Shear Wave Elastography (SWE) image (bottom) of the same patient as in Figure 2: Internal vascularity is not seen within the lesion, but is increased in the surrounding stroma. SWE image (bottom) reveals that the perilesional stroma is soft (elastography value- less than 80 kPa).

**Fig. 5:** Dynamic contrast enhanced MRI of the same patient as in Figure 2: Multiple ill defined enhancing lesions are seen in the background of enhancing parenchyma in outer half of right breast- one of the lesions is showing peripheral rim enhancement suggestive of a small abscess (arrow). The lesions showed progressive, plateau type of enhancement (Type II enhancement curve) on dynamic post contrast MRI (left).
**Fig. 6:** Hematoxylin and Eosin (H and E) staining of tissue biopsy sample from same patient as in Figure 2. Lobulocentric inflammation and granulomas with multinucleated giant cells are seen (arrows). Culture for Mycobacterium tuberculosis was positive and a diagnosis of tubercular chronic granulomatous mastitis was made.
Fig. 7: Mammogram of a 37 year old lady with multiple episodes of pain and redness in the lower half of right breast: multiple small high density masses are seen in left breast causing architectural distortion (arrows)
**Fig. 8:** Ultrasound images of the same patient as in Figure 7: multiple small echogenic masses are present (arrows) with increased vascularity in adjacent breast parenchyma. No posterior acoustic shadowing is seen behind these masses.
Fig. 9: Approach to diagnosis in a patient of reproductive age group presenting with a hard breast lump of chronic duration
Fig. 10: An approach to management of a patient with CGM according to etiology.
Conclusion

Chronic granulomatous mastitis is a benign chronic inflammatory process. Though the idiopathic variety is very rare, CGM due to periductal mastitis, poorly treated pyogenic mastitis, and chronic tubercular or fungal infections is common in developing countries. The clinical and radiological findings are commonly mistaken for. The radiologist plays a crucial role as he/she may be the first one to suggest the diagnosis, and may also acquire tissue samples for pathology from representative areas under image guidance. Histopathological confirmation of CGM combined with exclusion of malignancy and other causes of granulomatous disease is of utmost importance in guiding clinical decision making and preventing inappropriate and unnecessary mastectomies.

Personal information

References


