Case Report

The magnetic resonance image findings of idiopathic granulomatous mastitis

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ABSTRACT

Idiopathic granulomatous mastitis is a rare disease of the breast. Clinically and radiologically it may mimic breast carcinoma. We report a case of a 34-year-old female patient with this diagnosis, concentrating on magnetic resonance image (MRI) findings and its clinical application. There have been other reports on MRI findings in this entity in the radiological literature, but in our case report, clinical, cytological, pathological, and radiological correlations are also provided.

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Idiopathic granulomatous mastitis (IGM) is a rare entity, which was first described in 1972.[1,2] It is characterized by the presence of non-caseating chronic granulomatous lobulitis in the absence of an obvious etiology.[1,3,4] Other causes of granulomatous mastitis such as tuberculosis, sarcoidosis, foreign body reaction, mycotic infection, parasitic infections, duct ectasia, Wegener's granuloma, and histoplasmosis should be excluded before diagnosing IGM.[3] Clinically, patients might present with a hard lump that mimics carcinoma, which may lead to nipple retraction and sinus formation.[1,4] Even mammographic and fine needle aspiration cytology (FNAC) findings are sometimes interpreted as malignant.[2,5] The etiology of IGM is still unknown. Damage to the ductal epithelium produced by local trauma, extravasated secretions, an underlying autoimmune process, or by an unknown infective etiology, is thought to induce a localized immune response and subsequent lymphocyte and macrophage migration.[1] Associations with alpha-1-antitrypsin deficiency and hyperprolactinemia have been reported.[1,5] Surgical excision with or without steroid therapy is the mainstay of treatment.

In this paper, we will report a female patient with IGM. The possibility of IGM was raised by the FNAC. Magnetic resonance image (MRI) of the breast was performed before surgical excision to explore the possible advantages of this test when IGM is suspected. Only few previous reports regarding MRI findings in IGM were found in Medline.[3,5]

Case Report. A 34-year-old female patient presented in September 2003 to the Breast Clinic at our department, complaining of a slightly painful right-sided breast lump of one-week duration. She gave no family history of breast cancer. There was no previous use of contraceptive pills. She is a mother of 3 and all were delivered by cesarean section, the last being 5 years ago. She stopped breast-feeding her last child 4 years ago. Her menarcheal age was at 13 years. She gave no history of cigarette smoking, no previous history of tuberculosis, sarcoidosis, other infectious or granulomatous disorders, or evidence of autoimmune diseases. The patient had symptoms of anemia. She gave history of menorrhagia, and

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several years of having an intrauterine contraceptive device. She had no history of hematemesis or melena. Apart from being pale, the patient had a normal general physical examination otherwise. Examination of the right breast revealed an 8x5cm mass, mainly in the upper outer quadrant, but partially involving the lower outer quadrant. The mass was firm but slightly tender. It was not fixed to the underlying muscles, or the overlying skin, which was slightly red above the mass. Two tender, soft, and mobile lymph nodes were felt in the ipsilateral axilla. Examination of the other breast was normal. In view of the short history, an inflammatory process was the first diagnostic possibility. However, due to the presence of only minimal signs of an acute inflammatory disorder, the possibility of a tumoral process that passed unnoticed by the patient was also raised. At ultrasonography, the predominant finding was the presence of a heterogeneous hypoechoic mass. Despite of the presence of a huge mass clinically, mammography showed only the presence of a vague area of increased density with no discrete masses, or suspicious micro-calcifications (**Figures 1a & 1b**). Fine needle aspiration cytology was performed, and was considered to represent an inflammatory process, possibly granulomatous in nature. The aspirated material was highly cellular (**Figure 2**). However, the cytologist recommended an excisional biopsy in view of the presence of some atypical cells (Class III). Chest x-ray revealed no remarkable findings. Serum prolactin level was normal. Tuberculin test was negative. At this point, the possibility of IGM was raised. Magnetic resonance image of the breast was performed before surgical excision, to explore the possible advantages of this test when IGM is suspected. The precontrast MRI revealed some evidence of parenchymal distortion in the outer aspect of the right breast with evidence of edema and thickening of the overlying skin (**Figure 3a**). After the intravenous administration of gadolinium-diethylenetriamine pentaacetic acid (Gd-DTPA), there was a significant progressive enhancement pattern (**Figure 3b**). The lesion was almost replacing the upper outer quadrant of the right breast. Deep in the breast tissue, the lesion appeared regular with smooth enhancement but it became irregular when it approached the more superficial parts of the breast and 2 areas with peripheral-ring shaped contrast enhancement were seen (**Figure 3b**). The postcontrast view demonstrated the incomplete washout (**Figure 3c**). This enhancement pattern was consistent with an active inflammatory or tumoral process.

The hemoglobin level was 5.6gm/dl. Further detailed hematological evaluation revealed that this was an iron deficiency anemia due to menorrhagia, complicating the use of intrauterine contraceptive device. Gastroscopy and colonoscopy were within normal limits. As the investigations performed so far did not conclusively rule out an underlying breast tumor, it has been decided to excise the lesion. The hemoglobin level was raised to 9gm/dl by blood transfusion. The lesion was excised with a thin margin of surrounding normal breast tissue. Frozen section evaluation confirmed the benign nature of the mass. During the same procedure the intrauterine contraceptive device was removed. Gross pathological evaluation revealed a firm 8.5x6.5x5cm mass, which was difficult to separate from the surrounding normal tissues. The cut surface showed a firm yellowish mass, with tiny cyst-like spaces. Histology was consistent with IGM, and showed the presence of non-caseating granulomas centered on breast lobules, with epithelioid histiocytes, lymphocytes, plasma cells, polymorphonuclear leukocytes and multinucleated Langhans-type giant cells. The lobular architecture was diffusely obliterated (**Figure 4**). Postoperatively, the patient was given iron supplements to correct her anemia. The wound healed completely in 10 days. Periodic acid-Schiff and Ziehl-Neelsen acid fast stains failed to identify any specific causative organism.

The patient developed erythema nodosum over both shins 2 weeks after surgery. Every effort was made to rule out sarcoidosis as an underlying disorder. The chest x-ray was repeated and did not show any hilar adenopathy. Serum calcium level was normal. The serum level of angiotensin-converting enzyme was normal. Transbronchial biopsy was negative. The patient did not have any evidence of uveitis or conjunctivitis. The erythema nodosum had an excellent response to a short course of prednisolone 15mg daily and disappeared after 4 weeks. The patient did not have any evidence of *streptococcal* or viral infection. Serum mycoplasma immunoglobulin IgM was negative. There was no clinical evidence of local recurrence of IGM in the right breast after 18 weeks of follow up.

Discussion. The diagnosis of IGM is challenging. The clinical picture is not specific. More than 50% of the reported cases of IGM were initially mistaken for breast carcinoma.[6] Even the FNAC, the ultrasonic, and the mammographic findings are sometimes misleading.[2] This has led to several examples of unnecessary mastectomies in the medical literature.[1,2] Unawareness by surgeons, cytologists, and radiologists add to this diagnostic confusion. Prior to the case reported here, another 18 cases were reported from the same department.[1] This might explain why the possibility of IGM, was considered early in the course of the management of this patient. This also was the rationale behind performing the MRI of the breast. The idea was to

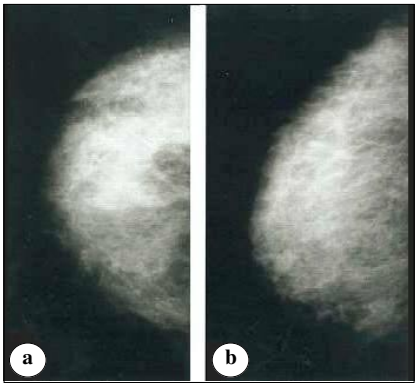


Figure 1 - Right sided mammogram of a 34-year-old female patient with a huge idiopathic granulomatous mastitis. Note the presence of a vague increased density in the absence of a discrete mass or suspicious micro-calcifications in both **a)** the craniocaudal and **b)** the oblique views.

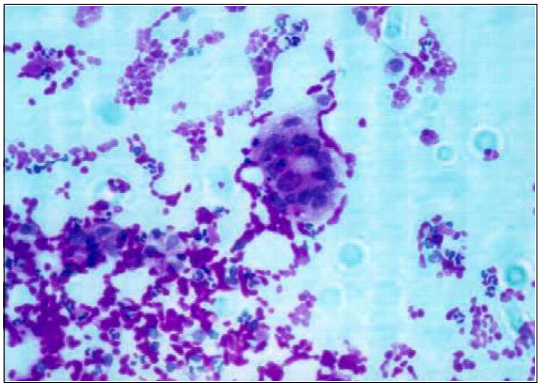
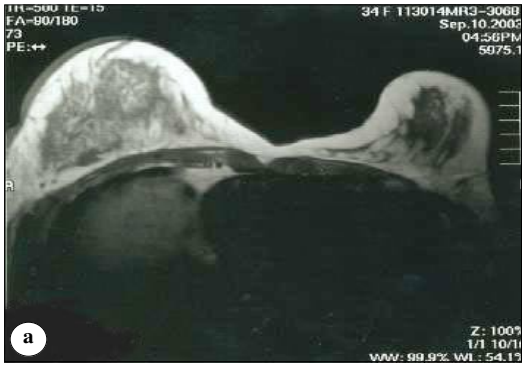
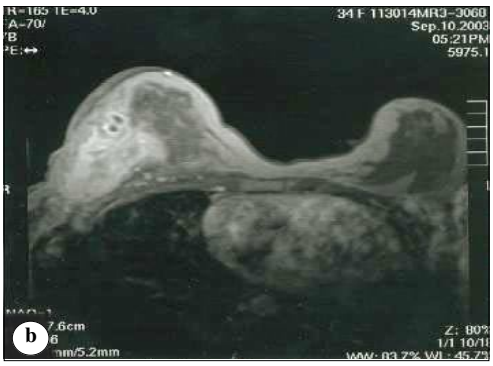


Figure 2 - Fine-needle aspiration cytology of a 34-year-old female patient with idiopathic granulomatous mastitis. The aspirate is highly cellular with preponderance of mononuclear cells. The presence of occasional giant cells raises the possibility of an underlying granulomatous process (hematoxylin eosin stain, 400x).





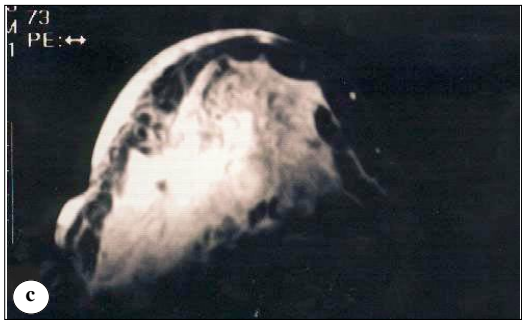


Figure 3 - The magnetic resonance image (MRI) findings in idiopathic granulomatous mastitis of the right breast. **a)** The precontrast MRI revealed some evidence of parenchymal distortion in the outer aspect of the right breast with evidence of edema and thickening of the overlying skin. **b)** The gadolinium-diethylenetriamine pentaacetic acid-enhanced dynamic MRI revealed a significant progressive enhancement pattern. The lesion was almost replacing the upper outer quadrant of the right breast. Deeply the lesion appeared regular with smooth enhancement but it became rather irregular in the more superficial parts with two areas of peripheral-ring shaped contrast enhancement. The enhancement was seen from first minute view and was progressive thereafter. **c)** The postcontrast view demonstrated the incomplete washout.

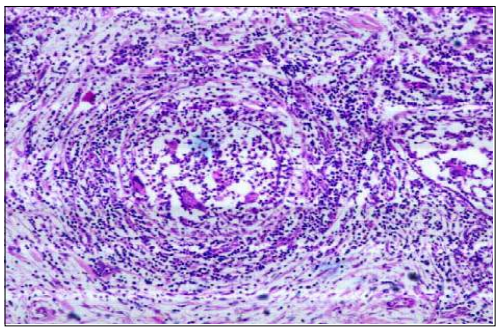


Figure 4 - Hematoxylin eosin stain of idiopathic granulomatous mastitis. Note the presence of non-caseating granulomas centered on breast lobules, with epithelioid histiocytes, lymphocytes, plasma cells, polymorphonuclear leukocytes and multinucleated Langhans-type giant cells. The lobular architecture is diffusely obliterated (250x).

see whether MRI would facilitate the diagnosis of IGM. Only few previous reports regarding MRI findings in IGM were found in Medline.[3,5]

The Gd-DTPA-enhanced dynamic MRI in our case (**Figure 3b**) showed that IGM is associated with progressive enhancement, which could be smooth or irregular, with foci showing peripheral-ring shaped contrast enhancement pattern, with delayed washout (**Figure 3c**). Such an enhancement pattern can mimic those of inflammatory processes, a proliferative dysplasia, and neoplasm. Our findings were, to a high degree, similar to those reported by Van Ongeval et al.[3] In our case, the enhancement pattern was not similar in all parts of the lesion, adding to the difficulty in interpretation. The areas showing peripheral-ring shaped contrast enhancement pattern most likely represented small abscesses. Such scattered lesions were also noted by the pathologist. Previous reports regarding MRI findings in secondary granulomatous mastitis, such as tuberculous mastitis also share similar findings. In this context, axial T2-weighted MRI was reported to show a hyperintense mass, while axial T1-weighted MRI was reported to show a hypointense mass, as well as diffuse skin thickening and parenchymal distortion.[7] The Gd-DTPA-enhanced dynamic MRI findings in tuberculous mastitis include lesions with significant early enhancement, which could be smooth, or irregular with ring appearance.[7,8] Based on the fact that the MRI findings in IGM can mimic those of other active pathological processes including tumors, and those of other secondary breast granulomatous diseases, we suggest that there is no practical advantage from performing MRI in clinical situations similar to our case. Still, surgery is needed to rule out carcinoma. However, Van Ongeval et al,[3] suggested that the real value of MRI might be in saving some patients unnecessary surgery if an inactive lesion, such as fibrosis or fat necrosis, is present. Such lesions, clinically and mammographically, resemble carcinoma, but would not produce the above-mentioned active MRI enhancement pattern encountered in tumoral or inflammatory processes.

Mammography and ultrasonography are used mainly to rule out malignancy rather than confirming the diagnosis of IGM. Most mammographic images are normal.[3] However, the presence of a focal asymmetrical density on mammography coupled with ultrasonic findings of a large inhomogeneous hypoechogenicity with internal hypoechoic tubular lesions, might suggest the possibility of IGM,[1,9,10] but also of carcinoma. In consistency with this, the mammogram of the patient reported in this paper, showed a vague area of increased density in the right breast, with no discrete masses or calcifications (**Figures 1a & 1b**). At ultrasonography, the predominant finding was the presence of a heterogeneous hypoechoic mass.

The clinical characteristics of the patient reported here were consistent with those described in the literature.[3,4] She is young, she has a firm 8.5x6.5x5cm mass that raised the possibility of a tumoral process, she has axillary lymphadenopathy, she has a unilateral disease, she is a mother of 3 children, and she developed IGM within 5 years of her last delivery. Most patients with IGM are relatively young parous women less than 50 years of age.[3,4] A breast mass that can vary in size from 0.5-9cm, which is often associated with a variable degree of inflammation of the overlying skin and axillary lymphadenopathy in 15% of the cases, is the typical presenting feature.[3] Idiopathic granulomatous mastitis is usually unilateral and can affect any quadrant of the breast, although bilateral involvement has been reported.[1,2] Idiopathic granulomatous mastitis was reported to be associated with parity, pregnancy, lactation, and the postpartum period, with a good proportion of the patients developing the lesion within 5 years of last delivery.[3,4] The association between IGM and use of oral contraceptive pills is controversial. A growing number of reports are refuting such an association.[1,3] The patient reported here never used the contraceptive pills.

The complications of IGM include abscess formation, fistulization, and chronic suppuration.[1] In our case the appearance of erythema nodosum was observed. Despite the fact that erythema nodosum has been reported occasionally in IGM,[4] its occurrence calls for more comprehensive investigations to rule out an underlying systemic disorder, such as sarcoidosis, *streptococcal* infection, or viral infections. The ideal treatment of IGM in view of its rarity is still a matter of debate. However, surgical excision, which most of the time would have been performed for diagnostic purposes is the usual treatment, which as in the case reported here, seems to be adequate.[3,4] With a reported relapse rate of approximately 38%,[1,2] oral steroids, non-steroidal anti-inflammatory drugs, and colchicine were used as possible adjunct treatments.[1,2,6] Steroids may be effective in reducing the recurrence rate,[1] or in shrinking the size of the mass in case a preoperative diagnosis is made, allowing more conservative surgery.[6] They also might be helpful in recurrent cases.[1] On the other hand, the initiation of steroids is often limited by concerns related to the presence of an underlying unidentified infectious etiology. Despite the favorable prognosis of this entity,[1] frequent clinical reassessment is needed in view of the relatively high local relapse rate.

In conclusion, the diagnosis of IGM is difficult as it is rare and the clinical, cytological, and radiological findings can mimic those of carcinoma. This report described the MRI findings in IGM. However, performing this costly test did not seem to

modify the diagnostic or therapeutic approach when a preoperative diagnosis of IGM was raised. Awareness, high index of suspicion, and histopathological confirmation remain to be the cornerstones in the management of this disease.

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