# Pathology of Idiopathic Granulomatous Mastitis

**Esra Yilmaz**

Firstly, Milward and Gough [1] reported a patient with granulomatous lesions in the breast, which was admitted with cancer-like clinical findings in the breast. In 1972, Kessler and Wolloch described this entity, and then Cohen [2] detailed the pathology of this entity. Until today, the criteria used in the diagnosis of IGM have not been changed much from the criteria defined by Kessler and Wolloch [3].

Although the pathological definitions are known, the diagnosis of IGM is one of exclusion usually. The causes of granulomatous inflammation in the breast are shown in Table 1.

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**Table 1** Causes of granulomatous inflammation in the breast

| Causes |
|---|
| **Infectious** |
| *Mycobacterium tuberculosis* |
| Blastomycosis |
| Cryptococcosis |
| Histoplasmosis |
| Actinomycosis |
| Filarial infection |
| *Corynebacterium* |
| **Autoimmune** |
| Wegener granulomatosis |
| Giant cell arteritis |
| Foreign body reaction |
| **Duct ectasis** |
| Plasma cell mastitis |
| Subareolar granuloma |
| Periductal mastitis |
| **Diabetes mellitus** |
| **Sarcoidosis** |
| **Fat necrosis** |
| **Idiopathic** |

## 1 Fine-Needle Aspiration Cytology

The diagnosis of IGM by fine-needle aspiration cytology (FNAC) is controversial because of overlapping features with other etiologies especially tuberculosis. Specific features for IGM are absent [4]. For the diagnosis of IGM, all other known causes of granulomatous inflammation must be excluded [5]. Whilst some studies in the literature support the useful role of FNAC, others mention that different causes of granulomatous inflammation cannot be differentiated exactly by FNAC [6, 7]. Even so, FNAC is still a notable alternative because of its availability and ease of use. Additionally, FNAC may help in differentiating malignancy and inflammation [6].

Cytologically epithelioid cell granulomas (Figs. 1, 2, 3, 4 and 5), single epithelioid cells, and multinucleated giant cells of foreign body and/or Langhans type are common findings of IGM [7–12]. Epithelioid cell granulomas cannot be demonstrated in all cases depending on, technically, undersampling [7, 8]. Caseous necrosis characterized by ground-glass eosinophilic material is also absent [5, 7, 8, 10, 11]. Necrosis associated with neutrophilic inflammation may be seen [8]. Inflammatory cells commonly consist of neutrophils (Figs. 6, 7, 8, 9 and 10) [7–9]. Lymphocytes, plasma cells, and scanty eosinophils can be seen in variable numbers [5, 7–13].

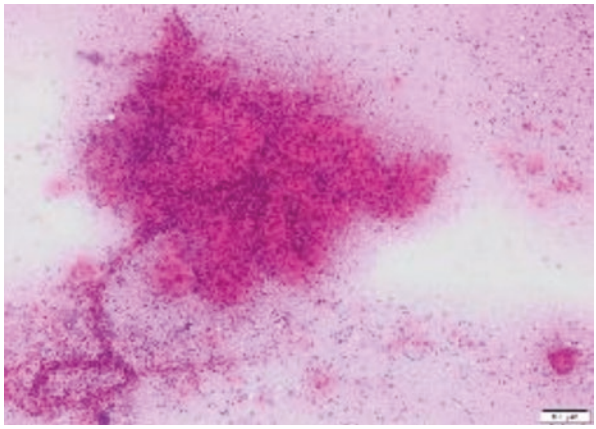

**Fig. 1** Granulomas composed of epithelioid cells (HE × 100)

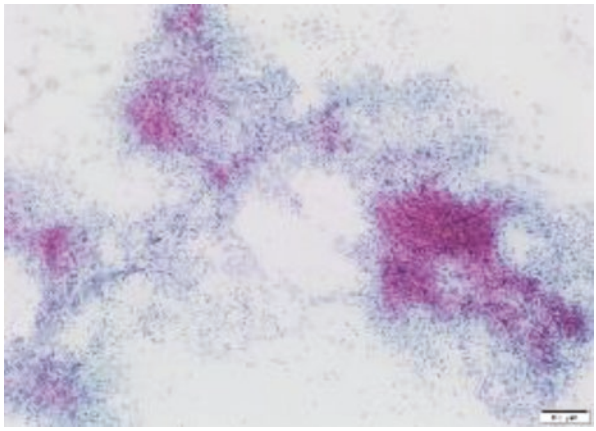

**Fig. 2** Granulomas composed of epithelioid cells (PAP × 100)

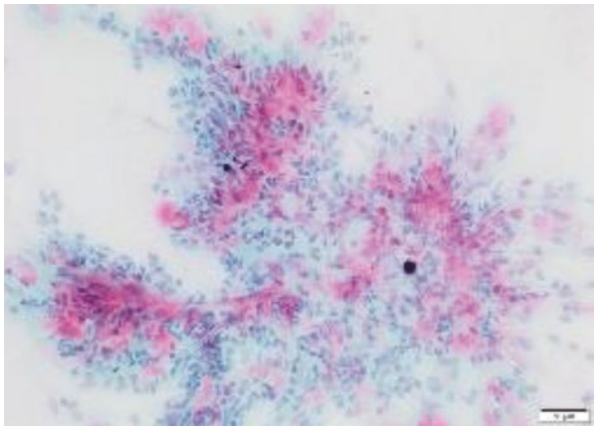

**Fig. 3** Granulomas composed of epithelioid cells (PAP × 200)

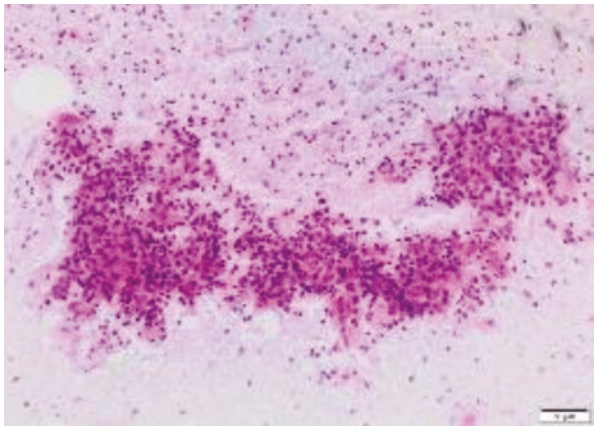

**Fig. 4** Granulomas composed of epithelioid cells (HE × 200)

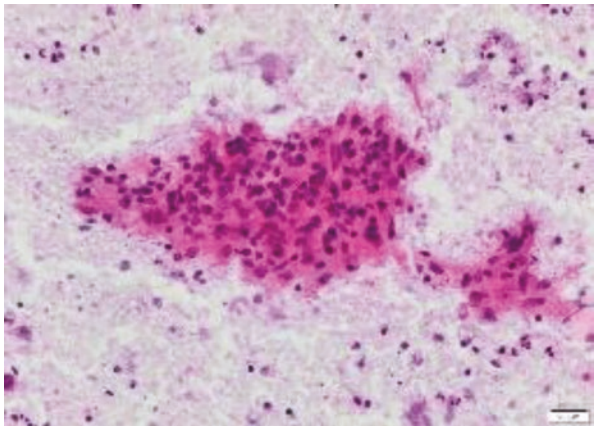

**Fig. 5** Granulomas composed of epithelioid cells (HE × 400)

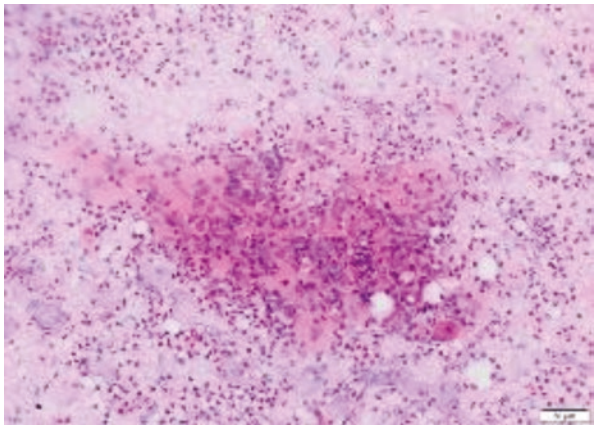

**Fig. 6** Epithelioid cell granuloma with neutrophilic inflammation (HE × 200)

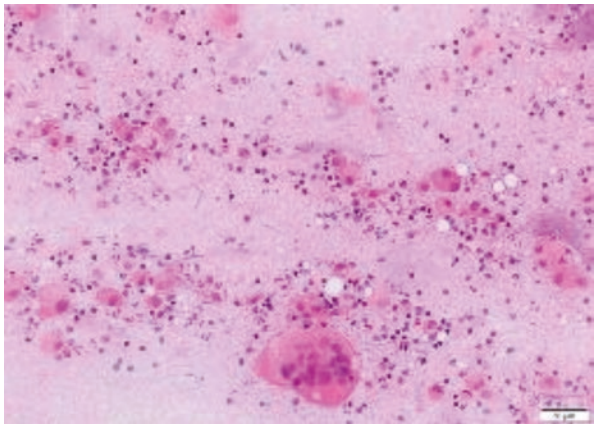

**Fig. 7** Multinucleated giant cells, single epithelioid cells, and inflammatory cells commonly consist of neutrophils (HE × 200)

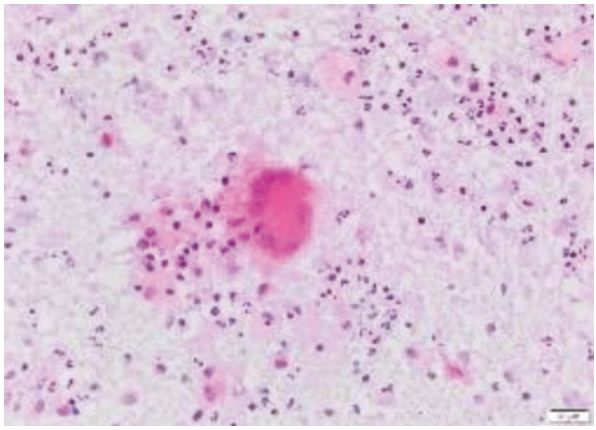

**Fig. 8** Multinucleated giant cells, single epithelioid cells, and inflammatory cells commonly consist of neutrophils (HE × 400)

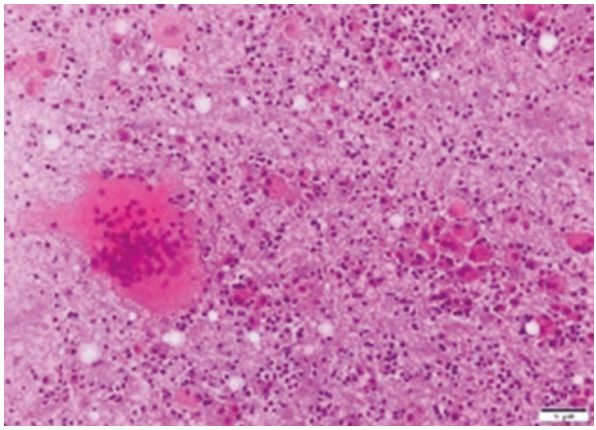

**Fig. 9** Multinucleated giant cells, single epithelioid cells, and inflammatory cells commonly consist of neutrophils (HE × 200)

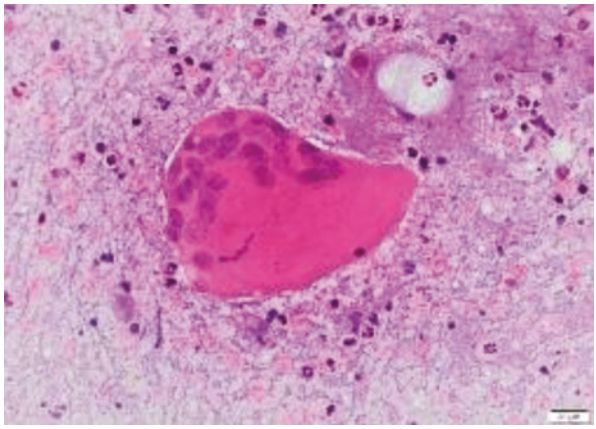

**Fig. 10** Multinucleated giant cells, single epithelioid cells, and inflammatory cells commonly consist of neutrophils (HE × 400)

## 2 Gross Pathology

Macroscopic specimens typically consist of greyish-white to tan-colored cut surface with a faintly nodular architecture. In some cases, small foci of abscess formation can be seen [14, 15].

## 3 Histopathology

The major histopathologic change in IGM is non-necrotizing granulomatous inflammation centered in breast lobules with or without intralobular microabscess formation [16, 17]. Granulomas (Figs. 11, 12, 13, 14, 15, 16 and 17) include epithelioid histiocytes and multinucleated giant cells (Fig. 18, 19 and 20) with varying numbers of lymphocytes, plasma cells, neutrophils, and eosinophils (Figs. 21, 22 and 23) [16, 18, 19]. As a result of inflammatory progression, confluent granulomas, fat necrosis, abscess formation, and fibrosis can damage lobular architecture [14, 15]. The microcystic spaces seen in the center of abscesses do not contain foreign material or secretion (Figs. 24, 25, 26, 27 and 28) [14, 15]. Ductal or lobular epithelial squamous metaplasia is an unusual finding in IGM [14, 15].

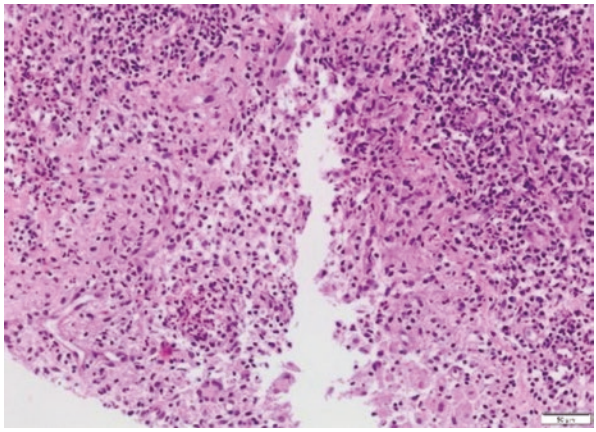

**Fig. 11** Non-necrotizing granulomatous inflammation. Granulomas composed of epithelioid histiocytes, multinucleated giant cells, and varying numbers of lymphocytes, plasma cells, neutrophils, and eosinophils (HE × 200)

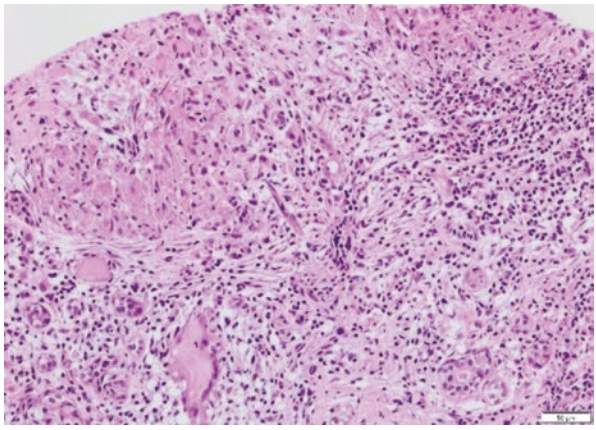

**Fig. 12** Non-necrotizing granulomatous inflammation. Granulomas composed of epithelioid histiocytes, multinucleated giant cells, and varying numbers of lymphocytes, plasma cells, neutrophils, and eosinophils (HE × 200)

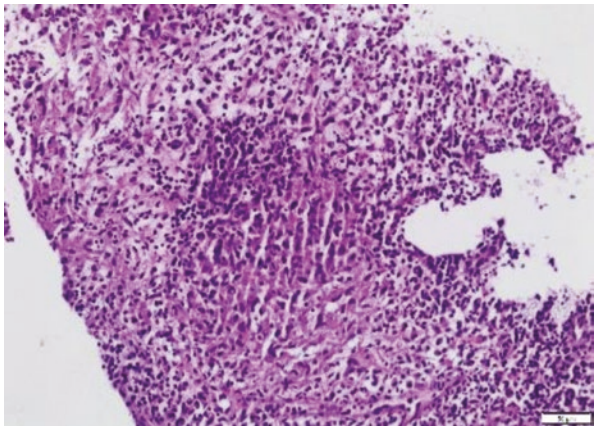

**Fig. 13** Non-necrotizing granulomatous inflammation. Granulomas composed of epithelioid histiocytes, multinucleated giant cells, and varying numbers of lymphocytes, plasma cells, neutrophils, and eosinophils (HE × 200)

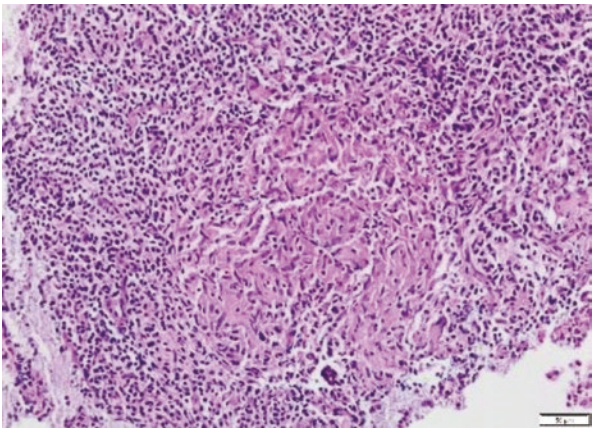

**Fig. 14** Non-necrotizing granulomatous inflammation. Granulomas composed of epithelioid histiocytes, multinucleated giant cells, and varying numbers of lymphocytes, plasma cells, neutrophils, and eosinophils (HE × 200)

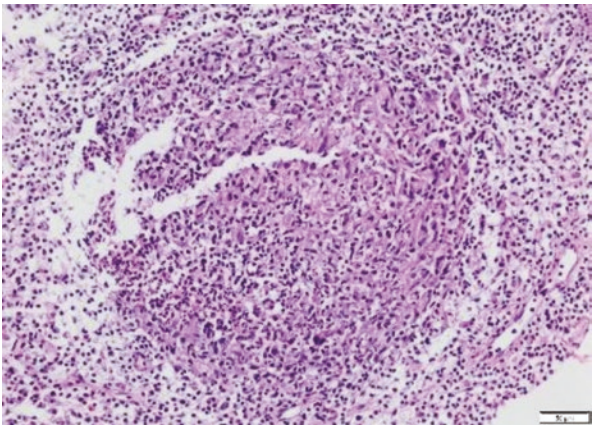

**Fig. 15** Non-necrotizing granulomatous inflammation. Granulomas composed of epithelioid histiocytes, multinucleated giant cells, and varying numbers of lymphocytes, plasma cells, neutrophils, and eosinophils (HE × 200)

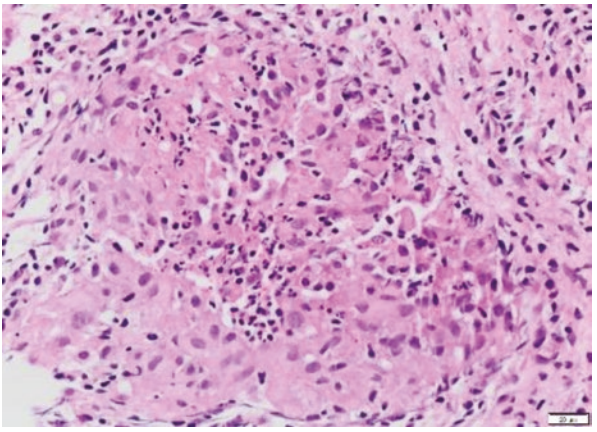

**Fig. 16** Non-necrotizing granulomatous inflammation. Granulomas composed of epithelioid histiocytes, multinucleated giant cells, and varying numbers of lymphocytes, plasma cells, neutrophils, and eosinophils (HE × 400)

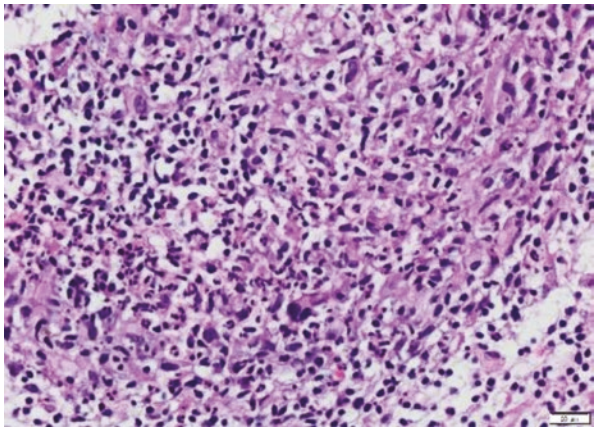

**Fig. 17** Non-necrotizing granulomatous inflammation. Granulomas composed of epithelioid histiocytes, multinucleated giant cells, and varying numbers of lymphocytes, plasma cells, neutrophils, and eosinophils (HE × 400)

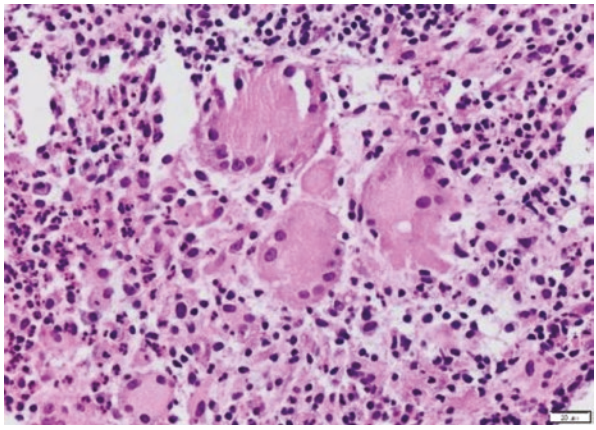

**Fig. 18** Langhans-type multinucleated giant cells in granulomatous inflammation (HE × 400)

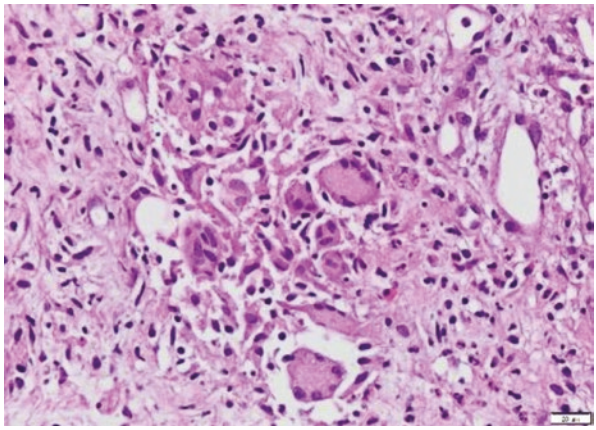

**Fig. 19** Langhans-type multinucleated giant cells in granulomatous inflammation (HE × 400)

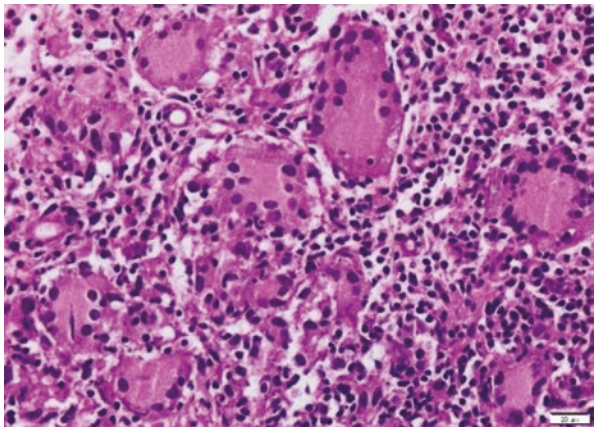

**Fig. 20** Langhans-type multinucleated giant cells in granulomatous inflammation (HE × 400)

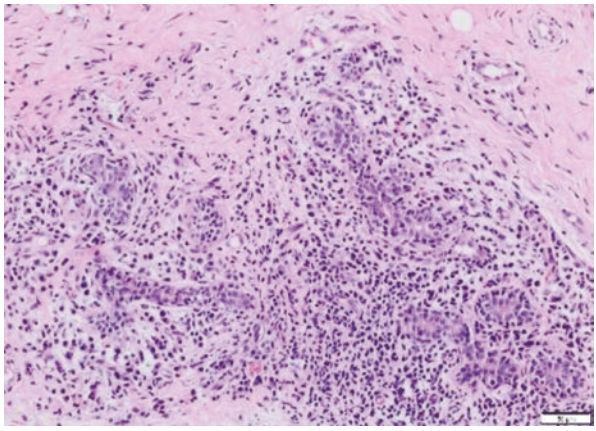

**Fig. 21** Lobular inflammation including lymphocytes and plasma cells (HE × 200)

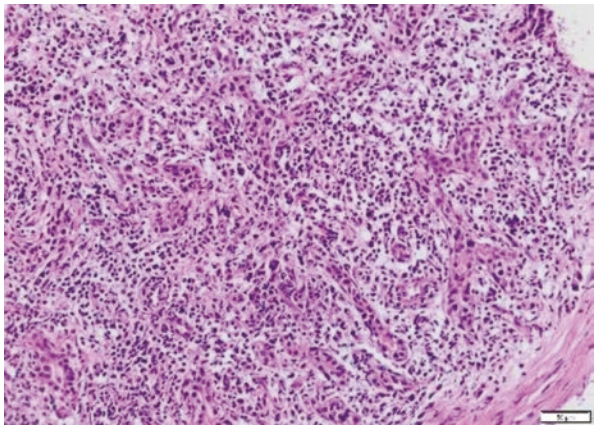

**Fig. 22** Lobular inflammation including lymphocytes and plasma cells (HE × 200)

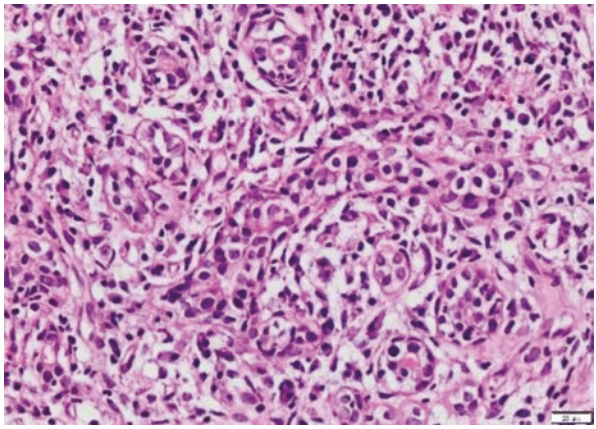

**Fig. 23** Lobular inflammation including lymphocytes and plasma cells (HE × 400)

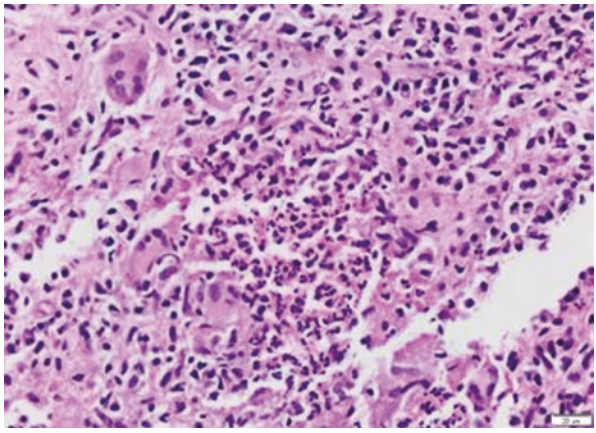

**Fig. 24** Neutrophilic microabscesses (HE × 400)

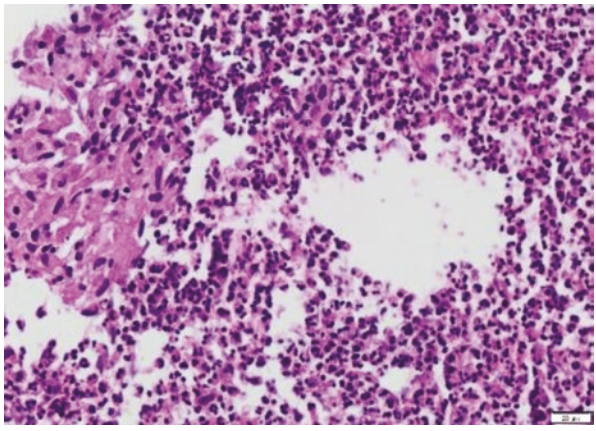

**Fig. 25** A cystic space that does not contain foreign material or secretion surrounded by neutrophils (HE × 400)

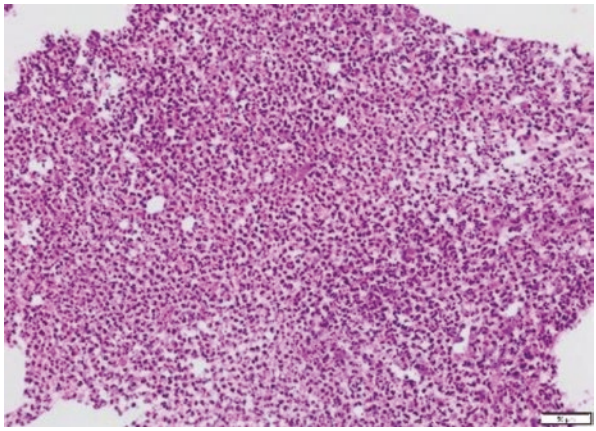

**Fig. 26** Abscess formation that effaces lobules due to progressive inflammation (HE × 200)

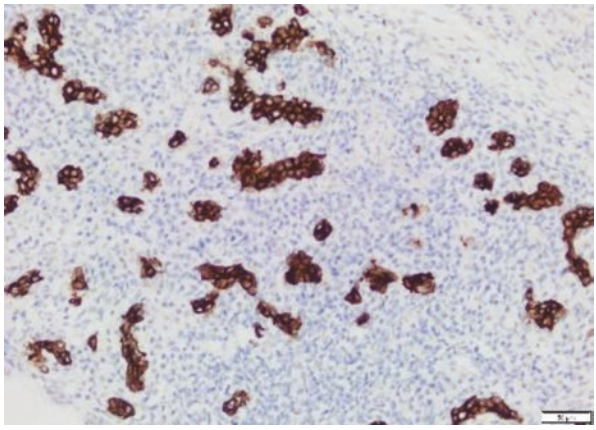

**Fig. 27** Disrupted lobular architecture by AE1/AE3 stain (×200)

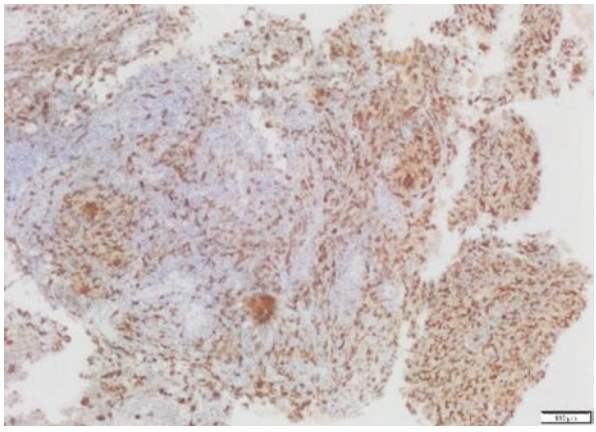

**Fig. 28** CD68-positive epithelioid cells and multinucleated giant cells (×100)

## 4 Ancillary Diagnostic Studies

Gram stain for bacteria, Ziehl-Neelsen for tuberculosis, PAS, and methenamine silver stain for fungal infection provide exclusion of infectious causes of granulomatous inflammation.

Determining T cell predominance, immunohistochemistry for T and B markers may be useful [16].

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