

Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.elsevier.com/locate/radcr

Case Report

‘Not your average breast lump!’-Primary tuberculosis mimicking chronic abscess: A rare case report [☆]

Mohamad Irfan Mohd Zamri^{a,b,1}, Shafora Bibi Samri^{a,b,*}, Lau Chiew Chea^{a,b}, Nur Hartini Mohd Taib^{a,b}, Wan Faiziah Wan Abdul Rahman^{b,c,2}

^a Department of Radiology, Hospital Universiti Sains Malaysia, Kubang Kerian, Kelantan 16150, Malaysia.

^b School of Medical Sciences, Health Campus, Universiti Sains Malaysia, Kubang Kerian, Kelantan 16150, Malaysia

^c Department of Pathology, School of Medical Sciences, Universiti Sains Malaysia, Health Campus, Kubang Kerian, Kelantan 16150, Malaysia

ARTICLE INFO

Article history:

Received 23 March 2024

Revised 15 May 2024

Accepted 17 May 2024

Keywords:

Breast tuberculosis

Breast lump

Mastitis

Abscess

Ultrasound

ABSTRACT

Primary breast tuberculosis is a rare disease under extrapulmonary tuberculosis category. It tends to affect females of reproductive age rather than postmenopausal women or pre-pubescent girls. This rare form of disease poses a challenge in diagnosing as imaging can mimic the appearance of both benign and malignant breast lesions. We describe a case of primary breast tuberculosis in a young female who presented with a persistent left breast lump. and was diagnosed with chronic left breast abscess. Histopathological examination of the lesion was consistent with granulomatous mastitis, secondary to mycobacterium tuberculosis infection. The patient was treated with a 6-month course of anti-tuberculosis drug with complete resolution of the symptoms and the left breast lesion on serial ultrasound imaging.

© 2024 The Authors. Published by Elsevier Inc. on behalf of University of Washington.

This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>)

Introduction

Tuberculosis (TB) is an infectious disease secondary to mycobacterium tuberculosis bacillus and survives by replicating itself within the host's macrophages [1]. TB remains a global

health concern despite advancement in medical treatment. According to World Health Organization (WHO), in 2021, about 10.6 million peoples were infected and a total of 1.6 million people died from TB (including 187,000 HIV patients) worldwide. Although TB mainly targets the lungs, other organs are also at risk of infection.

[☆] Competing Interests: The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

* Corresponding author.

E-mail address: shafora@usm.my (S. Bibi Samri).

¹ First author.

² Co author.

<https://doi.org/10.1016/j.radcr.2024.05.041>

1930-0433/© 2024 The Authors. Published by Elsevier Inc. on behalf of University of Washington. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>)

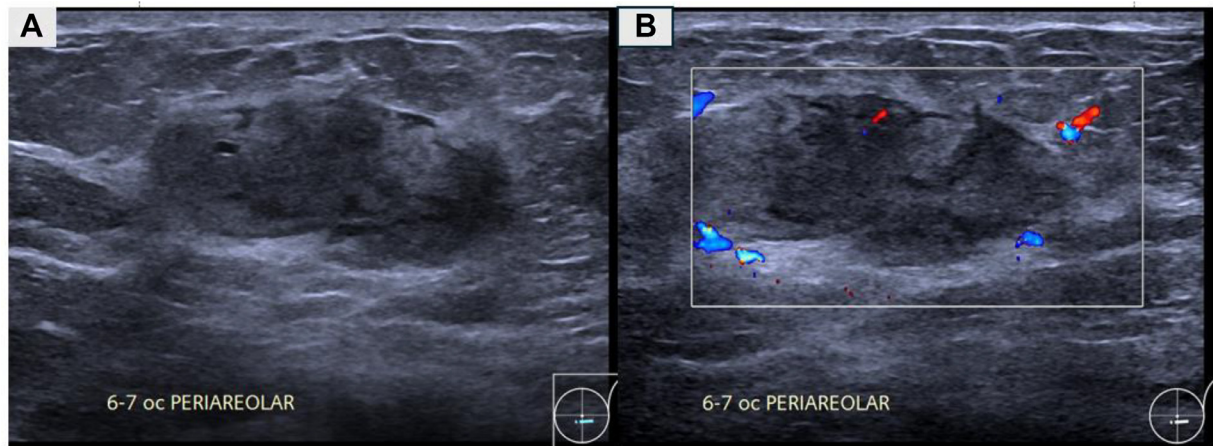


Fig. 1 – A well-circumscribed heterogeneous hypoechoic lesion parallel to the skin at 6-7 o'clock periareolar region (A). Minimal vascularity at the periphery of the lesion on color Doppler (B).

The breast is a rare site of extrapulmonary TB infection with a 0.1% incidence in developed countries but can reach up to 3%-4% in TB endemic countries such as India and Africa [2–4]. Reproductive age group, multipara, and actively lactating women including HIV patients are often affected [2,3]. Lactation increases susceptibility of the breast to TB infection due to increase vascular proliferation within the breast that expedites infection and promotes bacilli dissemination [5]. Unfortunately, this can be misdiagnosed as breast cancer in elderly patients and mimic pyogenic breast abscess in younger patients, where it will lead to a delayed diagnosis and hence delayed management [5,6]. We report a case of 30-year-old female with a left breast lump, initially treated as a chronic left breast abscess. This write-up aims to highlight the necessity of repeat biopsy in a chronic breast abscess and discusses the breast TB features on ultrasound.

Report

A 30-year-old female, para 2, actively lactating, with no known illness, complained of progressive increase of left breast lump over 4 months, associated with pain and nipple discharge. Breast examination revealed an irregular palpable lump at the lower quadrant of left breast (periareolar region 6 o'clock position) measures 3 × 3 cm. The lump was mobile, nontender on palpation with erythematous overlying skin. She was diagnosed with mastitis, and she completed 1 course of antibiotic, however the palpable lump does not resolve. Breast ultrasonography (US) showed a well-circumscribed heterogeneously hypoechoic lesion measured 1.7 × 3.5 × 2.6 cm (AP × W × CC) at 6 to 7 o'clock periareolar region of left breast (Fig. 1A). There was no calcification or moving echogenic debris seen within the lesion. Minimal perilesional vascularity seen on color Doppler (Fig. 1B). Strain elastography showed soft lesion with a normal fat to mass ratio of 1.06 (Fig. 2A). Cystic contents were noted within the lesion as evidence by blue-green-red (BGR) pattern on the Tsukuba score (Fig. 2B).

Initial US guided biopsy of the lesion showed pus-like material mixed with blood. Histopathological examination (HPE)

results showed as inflamed granulation tissue without evidence of malignancy. The patient was diagnosed with a left breast abscess and given another course of antibiotics. However, 10 months later, the patient claimed that the breast lump persisted. Another repeat biopsy was done, and HPE revealed epithelioid granulomas in a background of dense lymphoplasmacytic infiltration (Fig. 3A). There were scattered Langhans type giant cells seen (Fig. 3B). Ziehl-Neelsen staining was positive for acid fast bacilli that consistent with mycobacterium tuberculosis (Fig. 4).

The provisional diagnosis was revised to primary extrapulmonary breast tuberculosis as other systemic organ examinations were unremarkable. An anti-tuberculosis (TB) regime was initiated, including oral rifampicin, isoniazide, pyrazinamide, ethambutol and pyridoxine. Post completion of the 6-month course of anti-TB treatment, the patient claimed that the breast lump had disappeared while upon US, the breast lesion was completely resolved.

Discussion

Breast tuberculosis (BTB) is a rare type of extrapulmonary tuberculosis, as the breast parenchyma is supposed to be more resistant to infection due to an unfavorable environment for bacterial proliferation, thus hindering tuberculosis bacteria survival [2–4]. However, due to the escalation of underlying immunosuppressive diseases such as acquired immunodeficiency syndrome (AIDS), the evolution of drug-resistant strains of mycobacterium tuberculosis (MTB) and immigrants from endemic areas, there has been an upsurge in BTB cases [3,4].

BTB can be primary, when the breast lesion is the only area involved, which is extremely rare, or secondary, in which there is a pre-existing TB focus elsewhere in the body [4,7]. The primary form occurs from the spread of infection through cracks in the nipple and skin abrasions [2,3,7]. In the secondary form, the breast parenchymal tissue may get infected from different routes either hematogenous, lymphatic or direct contact

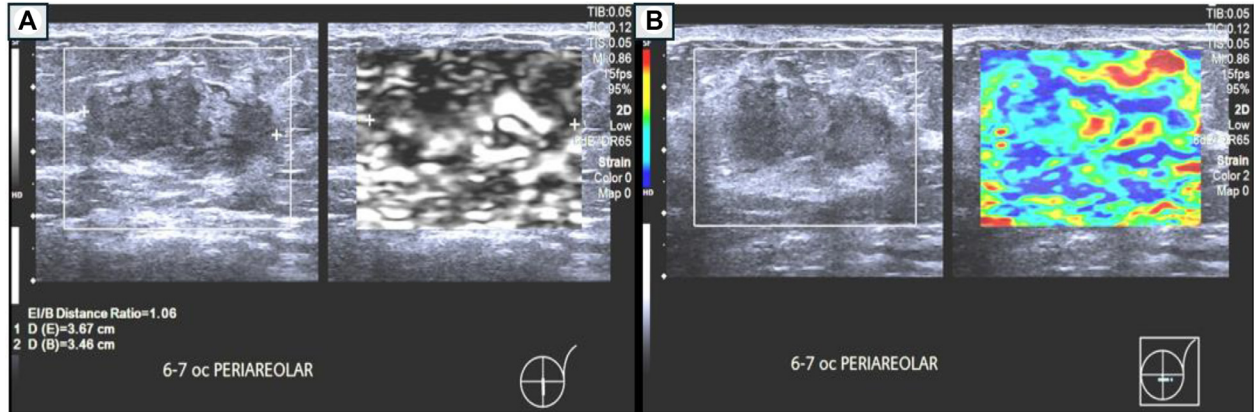


Fig. 2 – Strain elastography shows a soft lesion with a normal fat to mass ratio of 1.06 indicative of benign lesion (A). The lesion had cystic contents evidence by a blue-green-red pattern on the Tsukuba color score (B).

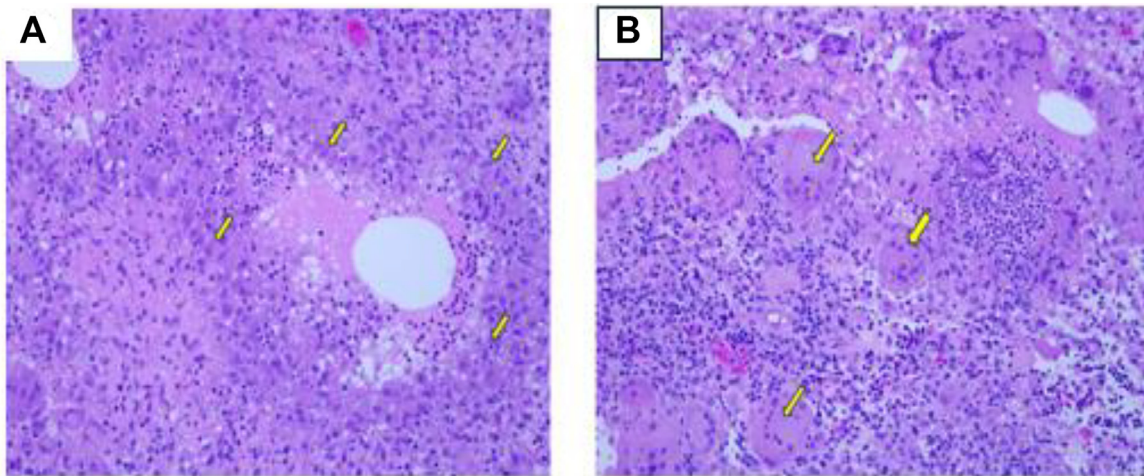


Fig. 3 – Histopathological examination of the breast biopsy shows multiple epithelioid granulomas characterized by accumulation of epithelioid cells (arrows) with surrounding areas of caseous necrosis (A). Scattered Langhans giant cells (arrows) within the epithelioid granulomas (B).

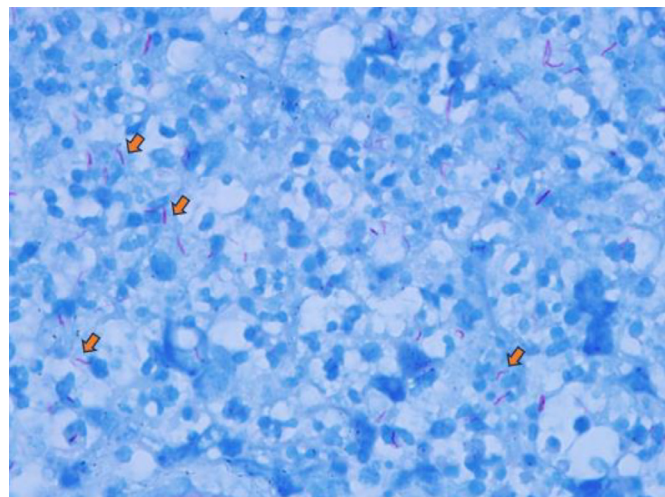


Fig. 4 – Scattered acid fast bacilli (arrows) in a Ziehl-Neelsen (ZN) stain. The bacilli stained red in blue stain.

from adjacent structures (pleural, mediastinum, ribs and sternum) [2,4,7]. Retrograde lymphatic spread from the lungs via the tracheobronchial, paratracheal, mediastinal lymph nodes, and finally, the internal mammary nodes is the most accepted theory as about 50% to 75% cases of tubercular mastitis had axillary node involvement [3,4]. The commonest site for BTB is the upper outer quadrant likely related to the lymphatic spread hypothesis from an axillary lymph node to the breast parenchyma [2]. Lactation increases the risk of breast TB up to 30%, possibly due to ductal ectasia and increased blood vessel proliferation [7]. As in our case, we believe that our patient had primary BTB as she was actively lactating prior to diagnosis. She possibly had a nipple crack and acquired the infection through a ductal infection. In addition, the breast collection was around the periareolar region with no axillary node involvement, thus supporting our above theory that our patient got the infection from a ductal infection rather than lymphatic spread.

Ultrasound is one of the best tools to locate and characterize BTB lesions. Characteristics of the lesions include size, shapes, orientations, margins, echogenicities, calcifications, posterior acoustic features, and blood-flow signals can be analysed [7]. McKeown and Wilkinson (1952) divided BTB into five different types: nodular caseous tuberculous mastitis, sclerosing tuberculous mastitis, tuberculous mastitis obliterans, disseminated tuberculous mastitis, and acute miliary tuberculous mastitis [4,8,9]. The commonest type, nodular caseous tuberculous mastitis presents as a slow growing, painless mass. On ultrasound, it appears as an oval, nonvascular heterogenous hypoechoic mass with indistinct margins, resembling the appearance of a fibroadenoma in the early stage [8,10,11]. A large hypoechoic to anechoic, fluctuating abscess with dense content and internal echogenicity can also be seen [8,11]. In the later stages, fistulas may develop near the nipple-areolar complex or over the skin with conglomerate lymph nodes, resembling breast cancer.

Tewari and Shukla (2005) modified BTB classification into a simpler and suitable classification for clinical practice [8]. The classification is in the form of nodulo-caseous tubercular mastitis, tubercular breast abscesses and disseminated tubercular mastitis [8]. This literature also highlighted that the commonest presentation of BTB lesion is tubercular breast abscess, particularly affecting young women [4,8]. Sclerosing tuberculous mastitis, tuberculous mastitis obliterans and acute miliary tuberculous mastitis are rarely reported nowadays [4].

Zhang et al. classified 45 histopathologically proven BTB lesions into 3 types based on ultrasound features which are nodular, abscess and sinus type. Contrary to Tewari and Shukla (2005), nodular type was the commonest; 25/45 cases (55.5%) followed by the sinus type 13/45 (28.9%) and abscess 7/45 (15.6%). Lesions of nodular type had oval or round shapes with complex echogenicity [7]. In the abscess type, all 7 cases present as a cyst with thick wall and 2 out of 7 cases show hyperechoic internal echoes [7]. Meanwhile, in the sinus type, all lesions show irregular hypoechoic cord-like processes extending to the surface of the breast skin [7].

Calcifications are uncommon findings, can be seen in 20% of BTB lesions [7]. According to Zhang et al., only 8 out of the 45 cases (17.8%) exhibited calcifications, including 6 with macrocalcifications and 2 with microcalcifications. Evaluation

of blood supply to the lesion using color Doppler flow imaging (CDFI) by Zhang et. al showed a promising future exploration. Their study used the Adler flow categorization in which the blood flow of the mass was classified into four categories: 0 (avascular); I (1- or 2-pixels containing blood flow); II (1 main vessel in the area and/or several small vessels); and III (4 vessels or diffuse reticular flow). About 44/45 (97.8%) of the cases were reported to have hypovascular lesions and approximately 80% of the case showed marginal blood flow with an avascular center (Adler flow category 1). These findings might be related to central caseous or liquefaction necrosis that occurs in BTB [7]. As in our case, the lesion is hypovascular with marginal blood flow.

US features in BTB appear related to pathological changes that occur. The nodular type has granuloma or caseous necrosis with only minimal liquefaction necrosis thus appear as a well-circumscribed lesion [7]. The abscess type has a lot of liquefaction necrosis, while the sinus type has broken skin connecting with the BTB lesion [7]. For the nodular type, anti-TB drugs for 6 months is appropriate. For the abscess type, anti-TB drugs combined with abscess aspiration is recommended while in the sinus type, the addition of antibiotics is suggested [7]. In our case, BTB lesion is well-circumscribed heterogeneously hypoechoic lesion, with a central avascular component, and peripheral vascularity. No calcifications or punctate echogenic material was seen within the lesion. Our ultrasound characteristics mostly resemble the nodular type (type I) rather than the abscess (type II) or the sinus type (type III). Thus, 6 months anti TB treatment is appropriate without the need for BTB lesion aspiration or antibiotic treatments.

There are 3 methods used to take breast tissue samples: fine needle aspiration, core needle biopsy, and open biopsy. Core needle biopsy provides better tissue sampling compared to fine needle aspiration and is necessary to confirm the diagnosis [4,9,12]. Open biopsy sample from the lesion, abscess wall, sinus, or an ulcerated area almost always confirms the diagnosis of BTB. However, an open biopsy is not necessarily needed if clinical and radiological findings support BTB lesion with a positive sufficient core needle biopsy [12].

The Mantoux test is usually positive in patients from endemic areas for TB, therefore it will not be helpful in the diagnosis of BTB. BCG-vaccinated people also documented a high false positivity rate due to cross reaction with bacillus Calmette-Guérin (BCG) [12]. Therefore, the gold standard for a tuberculosis diagnosis is growing tuberculosis bacilli with the Ziehl-Neelsen stain [4,8,10]. The only limitation of growing tuberculosis bacilli with the Ziehl-Neelsen stain is that the cultures require a lot of time, and some may show negative results [12]. BTB presents histologically as a form of granulomatous inflammation. However, idiopathic granulomatous mastitis, sarcoidosis, fungal infections such as actinomycosis, plasma cell mastitis, and traumatic fat necrosis can exhibit a tuberculoid-type tissue reaction forming granulomas which are indistinguishable from tuberculosis [3]. Cytological evidence of epithelioid cell granulomas, lymphohistiocytic aggregates and Langhans giant cells with or without caseous necrosis are reliable to diagnose tuberculous mastitis [3,13]. However, in certain cases, the pathological diagnosis of BTB also poses challenges when there is no epithelioid granuloma observed or acid-fast bacilli detected by Ziehl-Neelsen stain-

ing. In such cases, other than repeat biopsy in clinically suspicious cases like retractable mastitis, molecular testing such as polymerase chain reaction (PCR) is helpful. PCR while being a rapid diagnostic tool also has some disadvantages as it has low sensitivity and quite expensive [12].

Our case reported a reproductive age lactating woman diagnosed with a chronic left breast abscess despite multiple courses of antibiotic treatment. Repeat biopsy confirmed granulomatous mastitis secondary to mycobacterium tuberculosis (MTB). Based on Tewari and Shukla (new classification) and Zhang et al., the sonographic findings of BTB lesion in our case fitted under nodulo-caseous tubercular mastitis and the nodular type respectively which completely treated with 6 months anti-TB drugs.

Conclusion

Primary BTB is extremely rare even in countries that have been battling a high incidence of pulmonary and extrapulmonary tuberculosis. Our case highlighted the sonographic features of BTB and the importance of repeat biopsy in a chronic persistent breast abscess. Radiological and histopathological examination are both important to diagnose BTB lesions and paramount during follow up in assessing treatment response.

Patient consent

The authors have written consent from the patient for the publication of this case report.

REFERENCES

- [1] Bussi C, Gutierrez MG. Mycobacterium tuberculosis infection of host cells in space and time. *FEMS Microbiol Rev* 2019;43(4):341–436. doi:10.1093/femsre/fuz006.
- [2] Marinopoulos S, Lourantou D, Gatzionis T, Dimitrakakis C, Pappaspyrou I, Antsaklis A. Breast tuberculosis: diagnosis, management and treatment. *Int J Surg Case Rep* 2012;3(11):548–50. doi:10.1016/j.ijscr.2012.07.003.
- [3] Baykan AH, Sayiner HS, Inan I, Aydin E, Erturk SM. Primary breast tuberculosis: imaging findings of a rare disease. *Insights Imaging* 2021;12(1):19. doi:10.1186/s13244-021-00961-3.
- [4] Thimmappa D, Mallikarjuna M, Vijayakumar A. Breast tuberculosis. *Indian J Surg* 2015;77(3):1378–84. doi:10.1007/s12262-015-1272-1.
- [5] Cakar B, Ciledag A. Retrospective analysis of seven breast tuberculosis cases. *Experiment Therap Med* 2016;12:3053–7. doi:10.3892/etm.2016.3705.
- [6] Sagara Y, Hatakeyama S, Kumabe A, Sakuragi M, Matsumura M. Breast tuberculosis presenting with intractable mastitis: a case report. *J Med Case Rep* 2021;15:101. doi:10.1186/s13256-021-02712-w.
- [7] Zhang W, Zhang Y, Yang G, Yu T. Features of breast tuberculosis determined by ultrasound imaging: report of 45 cases. *J Int Med Res* 2020;48(7):1–9. doi:10.1177/0300060520910891.
- [8] Tewari M, Shukla H. Breast tuberculosis: diagnosis, clinical features & management. *Indian J Med Res* 2005;122(2):103–10.
- [9] Longman CF, Campion T, Butler B, Suaris TD, Khanam A, Kunst H, et al. Imaging features and diagnosis of tuberculosis of the breast. *Clin Radiol* 2017;72(3):217–22. doi:10.1016/j.crad.2016.11.02.
- [10] Mukerjee P, George M, Maheshwari HB, Rao CP. Tuberculosis of the breast. *J Indian Med Assoc* 1974;62(12):410–12.
- [11] Sakr AA, Fawzy RK, Fadaly G, Baky MA. Mammographic and sonographic features of tuberculous mastitis. *Eur J Radiol* 2004;51(1):54–60. doi:10.1016/S0720-048X(03)00230-4.
- [12] Kilic MO, Sağlam C, Ağca FD, Terzioğlu SG. Clinical, diagnostic and therapeutic management of patients with breast tuberculosis: analysis of 46 cases. *Kaohsiung J Med Sci* 2016;32(1):27–31. doi:10.1016/j.kjms.2015.12.005.
- [13] Khodabakhshi B, Mehravar F. Breast tuberculosis in northeast Iran: review of 22 cases. *BMC Womens Health* 2014;14(1):72. doi:10.1186/1472-6874-14-72.