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ISOLATED TUBERCULOUS MASTITIS: A DIAGNOSTIC CHALLENGE IN A YOUNG POSTPARTUM FEMALE

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ABSTRACT

Background: Tuberculous mastitis is a rare manifestation of extrapulmonary tuberculosis, accounting for less than 0.1% of all breast lesions in developed countries and approximately 3–4% of surgically treated breast diseases in tuberculosis-endemic regions. Primary isolated breast tuberculosis without evidence of pulmonary or disseminated disease is exceptionally uncommon. Owing to its nonspecific clinical and radiological presentation, it frequently mimics breast carcinoma or idiopathic granulomatous mastitis, posing a significant diagnostic challenge.

Case Presentation: A 26-year-old lactating woman, eight months postpartum, presented with a gradually enlarging painful lump in the right breast of two weeks' duration. Clinical examination revealed a firm, mobile 2 × 1 cm retroareolar mass located at the 7–8 o'clock position without skin changes or axillary lymphadenopathy. Ultrasonography demonstrated a 2.2 × 1.4 cm heterogeneously isoechoic lesion with internal anechoic areas and was categorized as BI-RADS 4A. Fine-needle aspiration cytology demonstrated granulomatous mastitis. Owing to persistent clinical suspicion, the specimen was subjected to GeneXpert MTB/RIF testing, which confirmed Mycobacterium tuberculosis with rifampicin sensitivity. Chest radiography revealed no evidence of pulmonary tuberculosis, establishing the diagnosis of primary isolated tuberculous mastitis. The patient was treated with a nine-month anti-tubercular regimen (2 months of isoniazid, rifampicin, pyrazinamide, and ethambutol followed by 7 months of isoniazid and rifampicin). She achieved complete clinical and radiological resolution following completion of therapy.

Discussion: Primary tuberculous mastitis remains a rare clinical entity despite the high prevalence of tuberculosis in endemic countries. The disease often masquerades as malignancy because neither clinical examination nor imaging reliably differentiates it from breast carcinoma. Histopathology demonstrating granulomatous inflammation should prompt microbiological confirmation, and molecular diagnostic techniques such as GeneXpert provide rapid and highly specific diagnosis. Early recognition enables timely medical therapy while avoiding unnecessary surgical procedures.

Conclusion: Tuberculous mastitis should remain an important differential diagnosis in young lactating women presenting with suspicious breast masses in tuberculosis-endemic regions. A multidisciplinary diagnostic approach incorporating imaging, histopathology, and molecular testing facilitates early diagnosis and successful treatment with anti-tubercular therapy.

KEYWORDS: Primary breast tuberculosis; Tuberculous mastitis; GeneXpert; Granulomatous mastitis; Breast lump; Extrapulmonary tuberculosis; Lactation; BI-RADS 4A; Case report

INTRODUCTION

Tuberculosis (TB) remains one of the leading infectious causes of morbidity and mortality worldwide despite substantial advances in public health and antimicrobial therapy. According to the World Health Organization, millions of new cases of tuberculosis continue to be diagnosed annually, with developing countries accounting for the majority of the global disease burden. Although pulmonary tuberculosis represents the predominant manifestation, extrapulmonary tuberculosis contributes to approximately 15–20% of all reported cases and may involve almost any organ system. Among these manifestations, breast tuberculosis is one of the rarest forms, accounting for less than 0.1% of breast lesions in developed nations and approximately 3–4% of surgically managed breast diseases in tuberculosis-endemic regions.

The breast has traditionally been regarded as relatively resistant to Mycobacterium tuberculosis. Similar to skeletal muscle and splenic tissue, breast parenchyma provides an unfavorable environment for bacillary proliferation owing to its high oxygen tension and intrinsic tissue characteristics. Consequently, breast involvement generally occurs secondary to pulmonary or extrapulmonary tuberculosis through lymphatic, hematogenous, or direct contiguous spread. Primary isolated tuberculous mastitis, in which no other focus of tuberculosis can be identified, is therefore exceedingly uncommon and remains a diagnostic curiosity.

Several physiological conditions appear to increase susceptibility to breast tuberculosis. Women of reproductive age, particularly those who are multiparous or actively lactating, are affected more frequently. During lactation, increased vascularity of the breast together with ductal dilatation and minor epithelial trauma may facilitate

inoculation and proliferation of Mycobacterium tuberculosis. Nevertheless, even in tuberculosis-endemic countries such as India, primary breast tuberculosis remains an uncommon diagnosis that is frequently overlooked during the initial clinical evaluation.

The clinical presentation of tuberculous mastitis is notoriously variable and often indistinguishable from other breast pathologies. Patients typically present with a unilateral breast lump that may or may not be associated with pain, abscess formation, nipple retraction, sinus formation, or axillary lymphadenopathy. Because constitutional symptoms such as fever, weight loss, and night sweats are frequently absent, clinical suspicion is often low. Furthermore, mammographic and ultrasonographic findings are nonspecific and commonly overlap with those of breast carcinoma, pyogenic abscess, and idiopathic granulomatous mastitis. Consequently, radiological assessment alone is insufficient to establish the diagnosis.

Histopathological examination demonstrating granulomatous inflammation remains an important step in the diagnostic evaluation; however, granulomatous inflammation itself is not pathognomonic for tuberculosis. Other infectious and noninfectious conditions, including idiopathic granulomatous mastitis, fungal infections, sarcoidosis, and foreign-body reactions, must also be considered. Conventional microbiological techniques such as Ziehl–Neelsen staining and mycobacterial culture often have limited sensitivity because breast tuberculosis is usually paucibacillary. Recent advances in molecular diagnostics, particularly the GeneXpert MTB/RIF assay, have substantially improved diagnostic accuracy by enabling rapid detection of Mycobacterium tuberculosis complex while simultaneously assessing rifampicin resistance. Early microbiological confirmation facilitates prompt initiation of anti-tubercular therapy and minimizes unnecessary surgical intervention.

Anti-tubercular therapy remains the cornerstone of treatment, with surgery reserved primarily for obtaining tissue diagnosis, draining abscesses, or managing residual lesions refractory to medical treatment. When diagnosed early, primary tuberculous mastitis carries an excellent prognosis, and complete clinical resolution can generally be achieved with standard multidrug therapy.

We report the case of a 26-year-old lactating postpartum woman presenting with a painful BI-RADS 4A right breast mass that clinically and radiologically mimicked breast carcinoma. Histopathological examination demonstrated granulomatous mastitis, while GeneXpert MTB/RIF confirmed Mycobacterium tuberculosis without evidence of pulmonary disease, establishing the diagnosis of primary isolated tuberculous mastitis. Following completion of a nine-month anti-tubercular regimen (2HRZE/7HR), the patient achieved complete clinical and radiological recovery. This report highlights the importance of maintaining a high index of suspicion for breast tuberculosis in endemic regions and emphasizes the pivotal role of molecular diagnostics in differentiating this uncommon entity from breast malignancy and other granulomatous breast diseases.

Case Presentation

A 26-year-old multiparous woman presented to the General Surgery outpatient department with complaints of a painful lump in her right breast of two weeks' duration. She was eight months postpartum and actively breastfeeding her only child. The swelling had gradually increased in size and was associated with intermittent dull aching pain over the preceding week. There was no history of nipple discharge, nipple retraction, trauma, fever, night sweats, anorexia, weight loss, or other constitutional symptoms suggestive of tuberculosis. She had regular menstrual cycles and denied any previous history of tuberculosis, prior anti-tubercular treatment, breast disease, or breast surgery. There was no known contact with individuals diagnosed with tuberculosis, and HIV serology was negative.

On physical examination, the patient was afebrile and haemodynamically stable. Local examination of the right breast revealed a firm-to-hard, mobile, mildly tender mass measuring approximately 2 × 1 cm situated in the retroareolar region at the 7–8 o'clock position. The overlying skin appeared normal without erythema, ulceration, sinus formation, peau d'orange, or tethering. There was no nipple inversion or discharge. Examination of the left breast was unremarkable. No palpable axillary, supraclavicular, or cervical lymph nodes were detected.

Routine laboratory investigations, including complete blood count, were within normal limits. The Mantoux test was positive. Ultrasonography of the right breast demonstrated a 2.2 × 1.4 cm heterogeneously isoechoic, well-circumscribed, parallel-oriented lesion containing small internal anechoic areas in the retroareolar region at the 7–8 o'clock position (Figure 1). Based on the imaging characteristics, the lesion was categorized as BI-RADS 4A, raising suspicion for malignancy and necessitating tissue diagnosis.

Fine-needle aspiration cytology (FNAC) demonstrated granulomatous mastitis with epithelioid cell granulomas and multinucleated giant cells without evidence of malignancy (Figure 2). In view of the granulomatous pathology and the patient's demographic profile, GeneXpert MTB/RIF assay was performed on the aspirated material. The test detected Mycobacterium tuberculosis complex with rifampicin sensitivity, thereby establishing the microbiological diagnosis of tuberculosis .

A chest radiograph revealed no evidence of active or healed pulmonary tuberculosis (Figure 3). In the absence of any other tuberculous focus, a diagnosis of primary isolated tuberculous mastitis was established.

The patient was initiated on anti-tubercular therapy under the National Tuberculosis Elimination Programme (NTEP) consisting of a two-month intensive phase with isoniazid, rifampicin, pyrazinamide, and ethambutol (2HRZE) followed by a seven-month continuation phase with isoniazid and rifampicin (7HR). As there was no abscess formation or extensive tissue destruction, surgical intervention beyond diagnostic FNAC was not required.

The patient was reviewed at regular intervals throughout therapy. Progressive reduction in breast pain and lump size was noted during follow-up, with complete clinical resolution by the completion of treatment. Follow-up

ultrasonography demonstrated complete disappearance of the lesion without residual collection or suspicious abnormality (Figure 5). At the end of nine months of anti-tubercular therapy, the patient remained asymptomatic with no evidence of local recurrence or systemic tuberculosis.

DISCUSSION

Tuberculous mastitis is an uncommon manifestation of extrapulmonary tuberculosis and remains a diagnostic challenge owing to its rarity and its close resemblance to more common breast pathologies such as carcinoma and idiopathic granulomatous mastitis. Sir Astley Cooper first described breast tuberculosis in 1829 as "scrofulous swelling of the bosom," yet nearly two centuries later it continues to be an infrequently encountered clinical entity. Even in tuberculosis-endemic countries, breast tuberculosis accounts for only 0.25–4.5% of surgically treated breast diseases and less than 1% of all breast lesions, while primary isolated disease without any demonstrable extramammary focus remains particularly rare.

Breast tissue is considered relatively resistant to Mycobacterium tuberculosis, similar to skeletal muscle and splenic tissue, owing to its poor suitability for bacillary multiplication. Infection may occur through lymphatic spread, hematogenous dissemination, direct extension from contiguous structures, or ductal inoculation. Primary breast tuberculosis, however, develops in the absence of any identifiable focus elsewhere and is believed to result from direct inoculation through minor ductal or nipple trauma. Pregnancy and lactation are recognized predisposing factors because increased vascularity, ductal dilatation, and repeated nipple trauma create favourable conditions for bacillary implantation. Our patient, an eight-month postpartum lactating woman, belonged to the demographic group most frequently affected according to published literature.

The clinical presentation of breast tuberculosis is notoriously heterogeneous. Patients commonly present with a solitary unilateral breast lump, often accompanied by pain or tenderness, while constitutional symptoms are absent in the majority of cases. Skin ulceration, sinus formation, nipple retraction, and axillary lymphadenopathy occur mainly in advanced disease. Our patient presented with a painful unilateral breast lump without constitutional symptoms or lymphadenopathy, illustrating the subtle presentation that often delays diagnosis. Furthermore, the absence of previous tuberculosis or contact history lowered the initial clinical suspicion.

Radiological findings in breast tuberculosis are nonspecific and frequently overlap with those of breast carcinoma. Mammography and ultrasonography may demonstrate irregular masses, heterogeneous hypoechoic lesions, abscesses, or architectural distortion without characteristic distinguishing features. In the present case, ultrasonography revealed a BI-RADS 4A lesion, appropriately raising suspicion for malignancy. Several published series have similarly reported breast tuberculosis masquerading as BI-RADS 4 or BI-RADS 5 lesions, emphasizing that imaging alone cannot reliably differentiate tuberculosis from carcinoma. Consequently, tissue diagnosis remains mandatory in all suspicious breast lesions.

Granulomatous inflammation on FNAC or core needle biopsy significantly narrows the differential diagnosis but is not specific for tuberculosis. Idiopathic granulomatous mastitis, fungal infections, sarcoidosis, granulomatosis with polyangiitis, foreign-body reactions, and fat necrosis must all be considered. In tuberculosis-endemic countries, microbiological confirmation should therefore be actively pursued whenever granulomatous mastitis is identified.

Traditional diagnostic methods have several limitations. Ziehl–Neelsen staining demonstrates acid-fast bacilli in only a minority of breast tuberculosis cases because the disease is typically paucibacillary. Mycobacterial culture remains the diagnostic gold standard but requires several weeks and often yields negative results. The introduction of nucleic acid amplification tests such as GeneXpert MTB/RIF has transformed the diagnosis of extrapulmonary tuberculosis by providing rapid identification of Mycobacterium tuberculosis complex while simultaneously detecting rifampicin resistance. In our patient, GeneXpert established the diagnosis within a short time, allowing prompt initiation of anti-tubercular therapy and avoiding unnecessary surgical excision. Increasing evidence suggests that molecular diagnostics should be incorporated routinely into the evaluation of granulomatous breast lesions, particularly in high-burden countries.

Primary breast tuberculosis is diagnosed only after excluding tuberculosis elsewhere in the body. The normal chest radiograph, absence of respiratory symptoms, and lack of systemic disease in our patient fulfilled the diagnostic criteria for isolated primary breast tuberculosis. Such cases remain uncommon and continue to enrich the limited literature available on this entity.

The standard management of breast tuberculosis is medical rather than surgical. Current WHO and NTEP recommendations advocate multidrug anti-tubercular therapy using the same principles as pulmonary tuberculosis. Surgical intervention is reserved for obtaining tissue diagnosis, drainage of abscesses, excision of persistent sinuses, or management of residual masses that fail to respond to chemotherapy. Our patient achieved complete clinical and radiological resolution with a 2HRZE/7HR regimen, reinforcing the excellent therapeutic outcomes achievable with timely diagnosis and appropriate medical management alone.

A review of recently published case reports demonstrates several recurring themes. Most patients are women of reproductive age, commonly during pregnancy or lactation, presenting with unilateral painful breast lumps that initially raise suspicion for malignancy. Histopathological examination usually reveals granulomatous inflammation, whereas microbiological confirmation is increasingly obtained through GeneXpert or polymerase chain reaction. The overwhelming majority respond favourably to standard anti-tubercular therapy without requiring definitive surgery. Our case closely mirrors these observations and further supports the expanding role of molecular diagnostics in establishing an early diagnosis.

This case underscores several important clinical messages. First, clinicians should maintain a high index of

suspicion for breast tuberculosis in young women presenting with suspicious breast masses in endemic regions, particularly during lactation. Second, BI-RADS 4 lesions should not be presumed malignant until histopathological and microbiological confirmation is obtained. Third, GeneXpert offers a rapid, reliable, and clinically valuable diagnostic tool in granulomatous breast lesions. Finally, early recognition and institution of anti-tubercular therapy can achieve complete cure while avoiding unnecessary surgical procedures and preserving breast tissue.

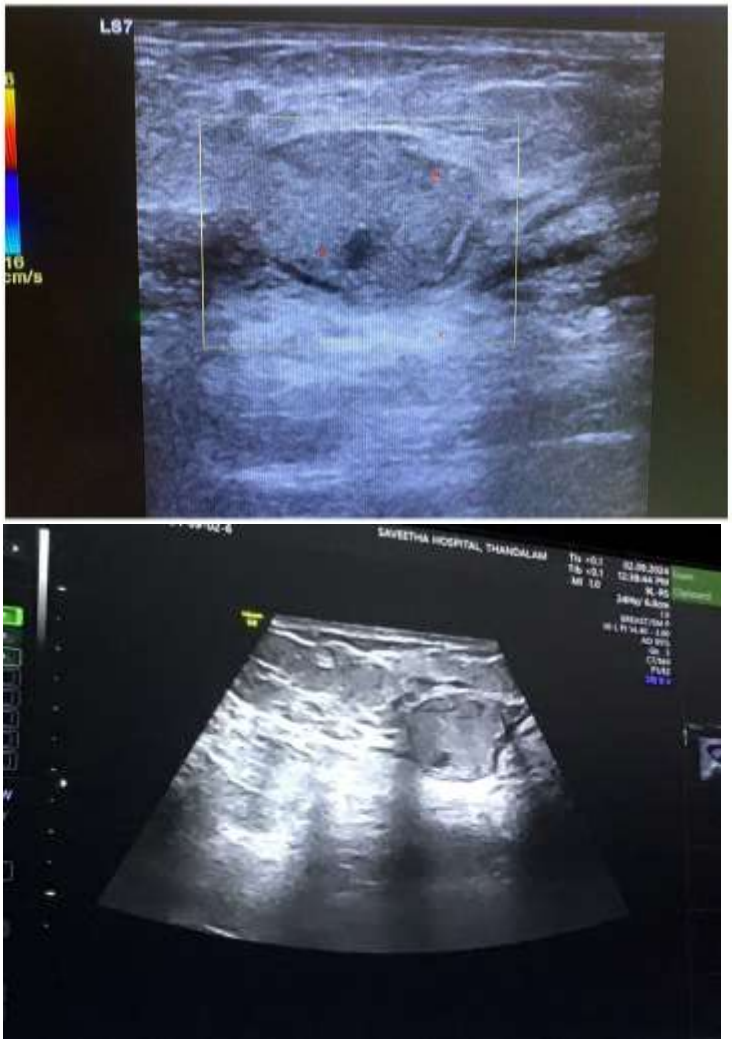

Figure 1: Ultrasound showing BI-RADS 4A lesion.

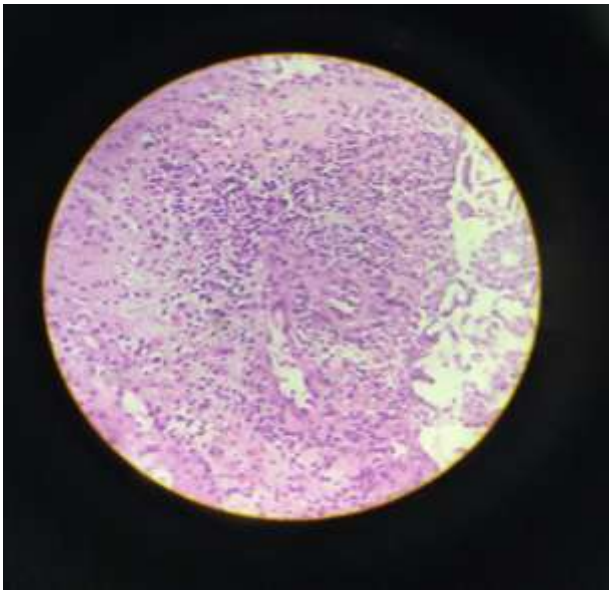

Figure 2: FNAC photomicrograph showing granulomatous inflammation.

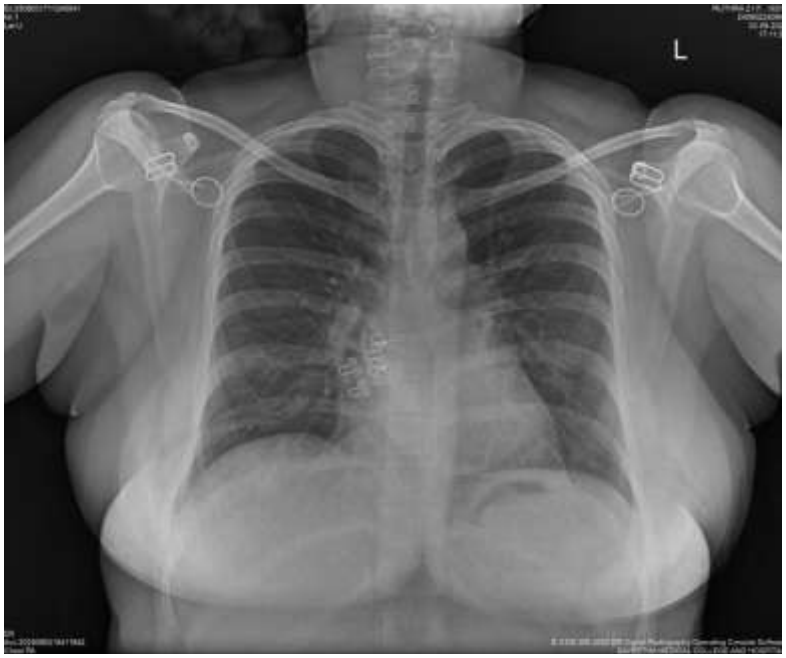

Figure 3: Normal chest radiograph.

Table 1: Timeline of clinical events.

Timeline	Clinical Event
Day 0	Patient presented with painful right breast lump of 2 weeks duration
Day 1	Clinical examination revealed a 2 × 1 cm retroareolar lump at 7–8 o'clock position
Day 2	Ultrasonography showed a 2.2 × 1.4 cm BI-RADS 4A lesion
Day 3	FNAC demonstrated granulomatous mastitis
Day 4	GeneXpert MTB/RIF positive for Mycobacterium tuberculosis (rifampicin sensitive)
Day 5	Chest X-ray normal; diagnosis of primary isolated tuberculous mastitis established
Week 1	Anti-tubercular therapy initiated (2HRZE/7HR)
2 Months	Significant reduction in pain and breast lump
9 Months	Completion of ATT with complete clinical recovery
Follow-up	Ultrasonography showed complete resolution with no recurrence

Table 2: Differential diagnosis of granulomatous breast lesions.

Disease	Clinical Features	Imaging	Histopathology	Microbiology
Tuberculous mastitis	Painful lump ± sinus	BI-RADS 3–5	Caseating granulomas	GeneXpert/AFB positive
Idiopathic granulomatous mastitis	Painful inflammatory lump	Variable	Non-caseating granulomas	Negative
Breast carcinoma	Hard irregular lump	BI-RADS 4–5	Malignant cells	Negative
Pyogenic abscess	Acute painful swelling	Collection	Neutrophilic inflammation	Bacterial culture
Fungal mastitis	Chronic abscess	Variable	Granulomatous inflammation	Fungal stain/culture
Sarcoidosis	Rare	Variable	Non-caseating granulomas	Negative

Table 3: Review of GeneXpert-confirmed primary tuberculous mastitis cases reported in the literature (2015–2026).

Author	Year	Age (years)	Lactating	Presentation	Diagnosis	Treatment	Outcome
Xiao et al.	2020	32	No	Breast lump	Microbiological confirmation	ATT	Complete recovery
Oucharqui et al.	2021	34	No	Breast mass	Histopathology + microbiology	ATT	Complete recovery
Baykan et al.	2021	30	NR	Breast lesion	Imaging + pathology	ATT	Complete recovery

Zeleke et al.	2025	24	No	Breast abscess	Microbiologically confirmed	ATT	Complete recovery
Present case	2026	26	Yes	BI-RADS 4A lump	FNAC + GeneXpert	2HRZE/7HR	Complete recovery

CONCLUSION

Primary isolated tuberculous mastitis is an uncommon form of extrapulmonary tuberculosis that continues to pose a significant diagnostic challenge because of its ability to mimic breast carcinoma and other granulomatous breast disorders. Clinical presentation and radiological findings are often nonspecific, necessitating a high index of suspicion, particularly in young lactating women from tuberculosis-endemic regions. Histopathological evidence of granulomatous inflammation should prompt microbiological confirmation using molecular diagnostic techniques such as GeneXpert MTB/RIF, which enables rapid diagnosis and facilitates timely initiation of anti-tubercular therapy. Our case highlights the importance of adopting a multidisciplinary diagnostic approach integrating clinical assessment, imaging, cytopathology, and molecular testing to avoid unnecessary surgical intervention. Early diagnosis followed by standard anti-tubercular therapy resulted in complete clinical and radiological resolution, emphasizing that medical management remains the cornerstone of treatment. Increased awareness among clinicians is essential to ensure prompt recognition and optimal management of this rare but curable disease.

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