



From Plasmacytoma to Rib Tuberculosis: The Case of A Breast Mass With An Unexpected Diagnosis

Hafedh Abbassi¹, Badra Bannour¹, Sarra Yacoub², Ekram Guerbej¹, Imen Bannour¹, Samir Hidar¹,
 Moncef Mokni²

¹Department of Obstetrics and Gynecology, University of Sousse Faculty of Medicine of Sousse, Farhat Hached Teaching Hospital, Sousse, Tunisia
²Department of Pathology, University of Sousse Faculty of Medicine of Sousse, Farhat Hached Teaching Hospital, Sousse, Tunisia

ABSTRACT

Tuberculosis (TB) of the rib is an uncommon manifestation of extrapulmonary TB that can pose significant diagnostic challenges, especially when presenting as a breast mass. We report the case of a 74-year-old woman who presented with a left breast lump, initially suspected to be a plasmacytoma due to its imaging characteristics and clinical history. The mass was surgically excised, and histopathological analysis revealed granulomatous inflammation with caseous necrosis, suggesting TB. TB-polymerase chain reaction confirmed the diagnosis, despite negative Ziehl-Neelsen staining. The patient was treated with anti-tubercular therapy for twelve months, resulting in a favorable clinical outcome. This case highlights the importance of considering rib TB in the differential diagnosis of breast masses, particularly in endemic areas, and underscores the role of comprehensive diagnostic evaluations for timely and effective treatment.

Keywords: Breast disease; plasmacytoma; surgery; tuberculosis

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Key Points

- Tuberculosis must be considered as a differential diagnosis of breast masses, especially in endemic areas.
- The diagnosis can be challenging.
- Tuberculosis remains a major cause of death and morbidity while being easily treatable.

Introduction

Tuberculosis (TB) remains a major health issue worldwide. The causative agent is the acid-fast bacillus *Mycobacterium tuberculosis*. In 2022, the Global Tuberculosis Report estimated that 10.6 million people developed TB (1). Tunisia is no exception in terms of TB infection being a country with intermediate endemicity, with a recorded incidence of 29 per 100,000 inhabitants in 2017 (2). Following screening campaigns and the National Tuberculosis Control Program implemented since 1978, the incidence has stabilized, particularly for the pulmonary form which constitutes 62% of all TB cases.

M. tuberculosis most commonly affects the lungs, followed by lymph nodes (18 per 100 000 in 2017 in Tunisia) (2), pleura, bones, joints, and the genito-urinary system. It may rarely cause miliary TB and meningitis TB (3). Extrapulmonary TB has been reported to constitute 15–20% of all TB cases (4). Musculoskeletal TB is a very uncommon form of extrapulmonary TB, constituting 1–5% of all cases, with spinal TB, also known as Pott's spine, being the most common (3,

4). Rib involvement is rare, accounting for 0–5% of musculoskeletal TB and 0.1% of total TB cases, with fewer than 50% of the patients having active pulmonary TB (3, 5).

Cold abscesses of the chest wall and rib caries pose a diagnostic challenge, even for astute clinicians, due to their insidious and varied presentations (6). In addition, rib osteomyelitis (OM) can have various etiologies besides TB, including chronic non-specific OM, rib involvement following empyema necessitatis, eosinophilic granuloma, syphilis, and both malignant and benign tumors. Among these tumors, multiple myeloma can be a cause of rib OM (7).

The diagnosis of TB can often be missed because of the rarity of TB as a cause of symptomatic breast disease and efforts are directed at the more common causes, such as carcinomas or other benign lesions (8).

Herein, we report the case of an elderly female patient, who presented with a large breast mass, with imaging initially suggesting a plasmacytoma of the rib, but was subsequently diagnosed with rib tuberculosis after surgical resection.

Corresponding Author:
Hafedh Abbassi; abbassi.hafedh@gmail.com

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Case Presentation

A 74-year-old woman presented with a left breast lump discovered during self-examination four months prior to her admission. She has no family history of breast carcinoma. The patient did not experience any pain, swelling, or nipple discharge. She did not report weight loss or night sweats. At first, the lump was disregarded by the patient and she only sought consultation after noticing an increase in size. Physical examination revealed a soft, non-tender, well defined mass, approximately 5x6x3 cm, in the outer quadrants of the left breast. The mass was adherent to the pectoralis muscle. There was no skin or nipple retraction, nor signs of inflammation. No axillary or supraclavicular lymph nodes were palpable, and the examination of the contralateral breast was normal. The patient was afebrile and pulmonary auscultation showed no abnormalities. The mammography of the left breast showed in both mediolateral oblique (MLO) view and craniocaudal view, an opaque, oval-shaped mass, measuring approximately 6 cm in its largest dimension. The image was heterogeneous with calcifications and slightly irregular contours, appearing to be deep and in contact with the left pectoral muscle (Figure 1a, b). The ultrasound (US) revealed a 57x28 mm tissue mass, located at the anterior arc of the fifth rib. The mass was hypoechoic and heterogeneous with peripheral calcification. Infiltration of the pectoral muscle was noted with associated edema of the overlying tissue, suggestive of focal mastitis (Figure 2).

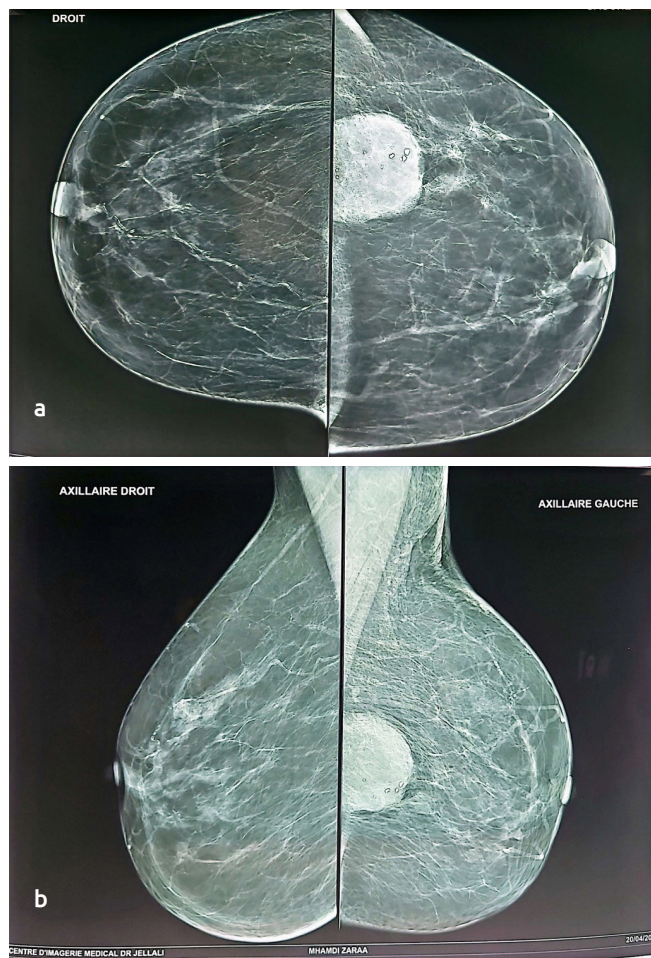


Figure 1. Mammography showing a deep opaque, oval-shaped mass with contact with the pectoral muscle (a) Craniocaudal projection, (b) Mediolateral Oblique projection

These findings suggested a possible plasmacytoma of the rib and the left breast was classified as ACR BI-RADS 0.

Due to the proximity to the chest-wall and the possibility of rib involvement, a thorax computed tomography (CT) was performed. The mass appeared as a hypodense, well-defined, lesion, with a bony erosion of the anterior arc of the left fifth rib with density of the surrounding soft tissues and infiltration of the left breast. A mild pleural thickening of reactive appearance, adjacent to the bony destruction, was also noted (Figure 3).

Laboratory investigations including serum electrolytes, kidney, and liver functions were performed and came back within normal limits. Given the suspected diagnosis of plasmacytoma, serum protein electrophoresis was requested to identify a monoclonal gamma peak, but came back normal.

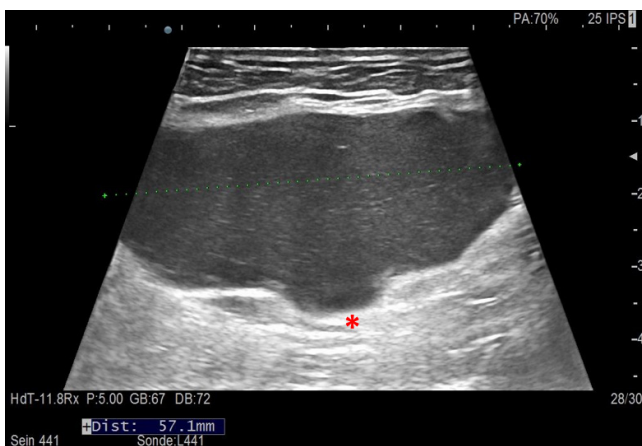


Figure 2. US of the breast showing a hypoechoic and heterogeneous mass with infiltration of the pectoral muscle (asterisk *)

US: Ultrasound



Figure 3. Axial CT section showing a hypodense lesion, with a bony erosion of the anterior arc of the left 5th rib with density of the surrounding soft tissues and infiltration of the left breast (arrow)

CT: Computed tomography

Considering the patient's age, the imaging findings, and the suggested diagnosis, a surgical excision of the mass was decided upon for curative and histopathological diagnostic purposes. The mass was separated from the mammary surrounding tissue. Due to its connection with the pectoralis muscle and the fifth rib, its excision was difficult and led to the accidental rupture of its contents, consisting of a whitish pus. Debridement was performed to remove the adherent cyst wall and any inner osteomyelitic lesions. A drain was then inserted to the site of the cyst in the breast and adequate drainage was ensured.

Gross histological exam revealed an empty and large cystic formation. Wall cyst showed hemorrhagic rearrangement. Histological exam revealed multiple and confluent granulomas made of epithelioid and numerous Langerhans cells without central necrosis (Figure 4). These granulomas surrounded galactophoric canals and cyst wall (Figure 5). Marked palisading of epithelioid cells was noticed on the surface of the cyst along with fibroid deposit (Figure 6). Even with negative Ziehl-Neelsen staining, the diagnosis of TB was highly likely. The diagnosis of TB was then confirmed using conventional TB-polymerase chain reaction (TB-PCR) performed on paraffin embedded tissue.

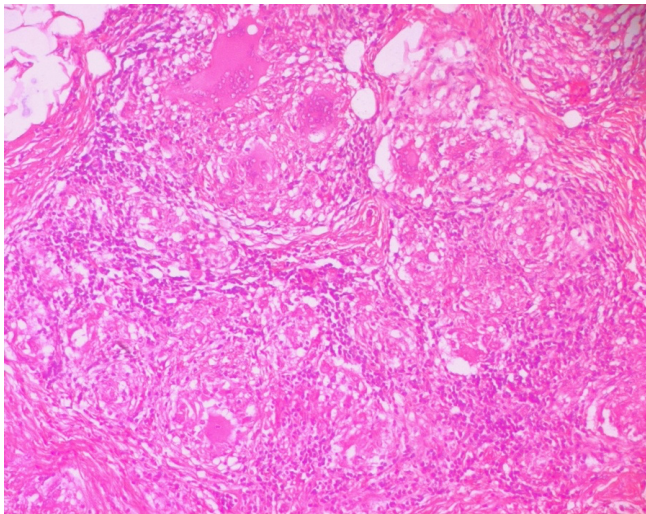


Figure 4. Microscopic exam (HEx10) showing multiple and confluent granulomas made of epithelioid and Langerhans cells

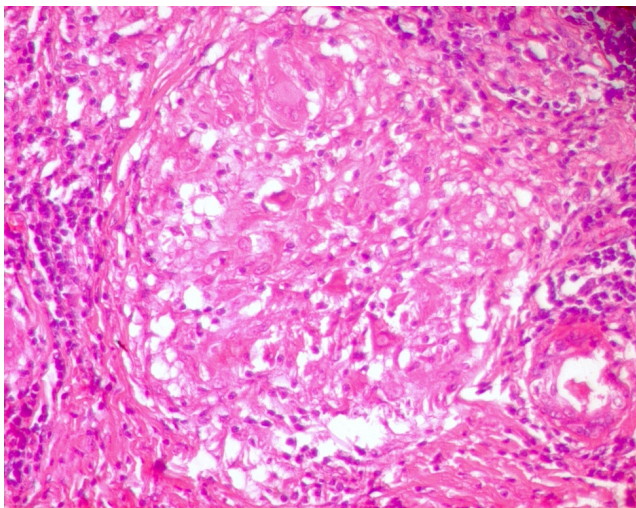


Figure 5. Microscopic exam (HEx40): Granulomas surrounding galactophoric canal (*)

Following the diagnosis, an additional Mantoux test was performed, which was negative. The patient was then prescribed oral anti-tubercular therapy (ATT), for a period of twelve months, according to the guidelines of the Tunisian National Tuberculosis Control Program. The regimen consisted of isoniazid 10 mg/kg, rifampicin 15 mg/kg, pyrazinamide 35 mg/kg and ethambutol 20 mg/kg of body weight for the initial two months, followed by a ten-month therapy with Isoniazid and rifampicin only at the same doses.

The patient's follow-up was uneventful. Written informed consent was obtained from the patient for publication of this case report.

Discussion and Conclusion

TB has been a major cause of morbidity and mortality, especially in developing countries. Although the pulmonary form is the most frequent (1), extrapulmonary TB cases are increasing, posing serious challenges to clinicians. Chest-wall TB is a rare form of extrapulmonary TB (7). Cold abscesses, which are swellings without inflammation, are the characteristic presentation of chest-wall TB (4). Although the definitions vary, chest-wall TB, cold abscesses of the chest-wall, and rib tuberculosis, are all used for the same pathological entity (4).

The pathogenesis of chest-wall TB is commonly lymphohematogenous. It can occur by reactivation of latent foci formed during hematogenous or lymphatic dissemination of primary TB (9). It is less common for the underlying lung to directly extend to the rib (10). We believe that the former route (reactivation of latent foci) is more likely, as our patient did not have a history of exposure to TB or active TB, and the chest CT did not show any pulmonary or pleural lesion suggesting TB.

The presenting symptoms of rib TB usually include a painful or non-tender chest-wall mass or chest pain. The mass can be cystic, doughy, or firm (10). Discharging sinuses can often be observed (11). TB abscesses presenting as breast masses are rare with only a few cases reported to date in the literature (8, 11, 12). This extension could occasionally pass infection to the breast causing a secondary breast tuberculosis, as reported by Wani et al. (11) in the case of a female patient with a six-years history of a breast lump and sinus discharge. We predict that this could have been the natural progression for our patient if diagnosis and management had been delayed. In the present

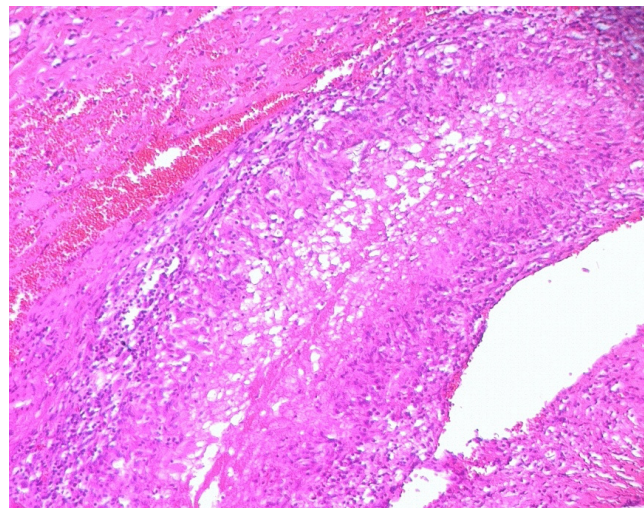


Figure 6. Microscopic exam (HEx10): Palisading of epithelioid cells around fibroid deposit on cyst wall

case, the histologic examination showed a focal mastitis associated with the rib tuberculosis.

TB of the rib presents with a combination of bone destruction and a soft tissue mass (13). Other etiologies can be responsible for bone destruction, both benign and malignant (10). In the present case, the imaging findings suggested a plasmacytoma of the rib. Despite the fact that TB is the second most common cause of rib destruction after metastases, and that we live in a TB endemic country, TB was not initially suspected. The diagnosis was further obscured by the normality of the physical examination and the clinical history of our patient. In Faure et al. (14) report, 83% of the patients had a history of TB, and there had been active pulmonary TB in 33% of their patients. However, Kuzucu et al. (4) found that none of their patients had a past history of TB or active TB. This demonstrates that chest-wall TB can occur with or without pulmonary TB.

Since rib TB is seen twice as commonly in male patients compared to female patients (10) and involves any part of the rib, the anterior chest-wall being the most common site of infection (15), chest CT is considered the imaging modality of choice (16). Indeed, it is ideal for evaluating tuberculous chest-wall lesions as it demonstrates bone erosion, the nature and extent of soft tissue collections, and accompanying intrathoracic lesions and nodes. In the present case, breast imaging was performed first, because the mass was located in the breast. US and mammography are the two main imaging modalities used to assess breast lesions. However, infiltration of the chest-wall cannot be efficiently evaluated by mammography. MLO projection is preferred when the lesion is near the chest-wall (8). US not only demonstrates internal architecture of the lesion (solid or cystic) but can effectively assess muscle and bone involvement (17), as demonstrated in the present case, which was confirmed by CT.

Final diagnosis rests on histopathological confirmation. Classical caseous necrosis with granulomatous inflammation, with or without Ziehl-Neelsen staining, is sufficient to confirm the diagnosis of rib TB (7). Specimens can be procured by fine needle aspiration and cytology (FNAC) or needle biopsy (7). However, Faure et al. (14) and Chang et al. (18) could only confirm TB after surgical excision and labeled FNAC as an inefficient tool for establishing the diagnosis. The guidelines of Chang et al. (18) have made the TB-PCR test essential for establishing a reliable and prompt diagnosis, especially when rib biopsy is not feasible (7).

There is no standardized therapeutic protocol for rib TB. Medical treatment does not differ from that of pulmonary forms, except for the duration of ATT, which is usually extended to one year. Surgical treatment is controversial; however, it has been proven to be the most effective way to treat chest-wall TB (7). In a large series of 712 cases over 11 years, surgical treatment was recommended for parietal chest-wall TB (19). It was also suggested that surgical debridement is necessary for treating TB of the ribs (20).

Despite initial assumptions, the surgical management of the present case was in accordance with practices reported in the literature, and proved to be effective, as the clinical evolution was favorable.

In summary, the present case emphasizes that the diagnosis of TB should be considered when a breast mass is undiagnosed, particularly with rib involvement, and should always come to mind, especially

in endemic areas. This underscores the need for heightened clinical suspicion and comprehensive diagnostic evaluations to ensure timely and effective treatment.

Ethics

Informed Consent: Written informed consent was obtained from the patient for publication of this case report.

Footnotes

Authorship Contributions: Concept: H.A., E.G.; Design: I.B., Data Collection or Processing: H.A., S.Y.; Analysis or Interpretation: B.B., M.M.; Literature Search: H.A., B.B., S.Y., E.G.; Writing: H.A., B.B., S.Y.

Conflict of Interest: No conflict of interest was declared by the authors.

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