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BREAST TUBERCULOSIS-A RARE PRESENTATION OF COMMON DISEASE WITH DIAGNOSTIC AND THERAPEUTIC CHALLENGE.

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Abstract

Background: Breast tuberculosis is a rare extra pulmonary tuberculosis presentation usually misdiagnosed as carcinoma, pyogenic abscess or idiopathic granulomatous mastitis. Detection of tubercular bacilli by ZN stain, culture and CBNAAT along with caseating granuloma on histopathology helps in diagnosis.

Aims and Objectives: To study the clinico-pathological characteristic of breast tuberculosis and diagnostic accuracy of CBNAAT for early and specific diagnosis in reference to histopathological test

Material and Methods: 38 cases of BTB between August2012 to July 2017 were studied. Culture for acid-fast bacilli, smear positivity on Z-N staining, CBNAAT, and cytological and histological examination was done for confirmation.

Results: Prevalence of BTB in this study was found to be 3.95% .The risk factors were reproductive age (20-35), multiparity, lactation and low socioeconomic status. Unilateral lump in the upper outer and central quadrant of the breast was the commonest observation. Only 34.2% were diagnosed provisionally as BTB rest 73.68% were misdiagnosed as fibroadenoma, breast abscess and malignancy Clinically nodulo-caseous variety(55.6 %) disseminated (18.4%) and tubercular abscess (26.3%) were seen. Sensitivity of ZN staining, culture, FNAC and histopathology is 15.8%,5.8%, 74% ,100%respectively. Sensitivity, specificity, positive predictive value, and negative predictive value for the CBNAAT test were 81.818%, 93.103%, 93.10%, and 81.82% respectively.39.4% were cured completely with ATT with 60.52% with residual lesions needed surgery

Conclusion: This study highlights the importance of early diagnosis and aggressive medical and if required surgical management to cure this disease. CBNAAT should be used as an additional test to conventional smear microscopy, culture, FNAC and histology.

Keywords-Breast tuberculosis, CBNAAT, Extrapulmonary tuberculosis, breast lump

Introduction

Tuberculosis is a global public health problem disease with extra-pulmonary form of tuberculosis accounting for only 18% of global prevalence.(1).Breast tuberculosis (BTB) is a very rare form of extra pulmonary tuberculosis (EPTB) persisting even today, since Sir Astley Cooper first described it in 1829.(1).The incidence of this rare clinical entity is less than 0.1% in developed countries and 3-4.5% of breast lesions in endemic countries like India.(1)The incidence of EPTB is on the rise worldwide due to increasing prevalence of immunosuppressive diseases and multidrug resistance tuberculosis but still, BTB constitutes only 0.1% of EPTB.(2,3)

The non-specific clinical and imaging characteristics and lack of familiarity of clinicians with this rare entity along with non-availability of confirmatory test have led to increased rates of underreporting and underdiagnoses. Clinically as it simulates with more common breast lesions such as breast carcinoma, pyogenic abscess, fibroadenoma, duct ectasia and other granulomatous and fungal diseases, it poses a diagnostic challenge.(1,2) Resistance of breast tissue to the survival and multiplication of tubercular bacilli may be the cause of this

extreme rarity (1,2). Although gold standard diagnostic modality of BTB is demonstration of acid fast bacilli (AFB) by microscopy and culture, histopathological evaluation showing caseating epithelioid granuloma is also diagnostic of BTB. There is no single efficacious test for diagnosing BTB, as paucibacillary nature decreases the sensitivity of the investigations, posing more challenges in diagnosis and is commonly overlooked (1,2) Breast is an organ of cosmetic importance and lactation and young females are most commonly affected by BTB. So a misdiagnosis and delayed diagnosis is a misfortune for the patient as BTB can be completely cured conservatively by drugs whereas treatment of the differential diagnosis varies from steroid to major disfiguring surgeries like mastectomy.(2) A major breakthrough in the diagnosis of EPTB has been achieved by the introduction of CBNAAT which a rapid, automated, cartridge based nucleic acid amplification assay detecting nucleotide sequences unique to M. tuberculosis directly in the specimens and gives results within few hours. It is used for simultaneous detection of Mycobacterium tuberculosis complex and rifampicin resistance accurately in EPTB. (1).The timely and accurate diagnosis by strong clinical suspicious along with molecular test is necessary for the proper treatment of this rare but curable benign breast disease.

In this paper, we share our experience of this rare, easily misdiagnosed but treatable disease highlighting its clinico-pathological characteristic and diagnostic accuracy of CBNAAT for early and specific diagnosis of breast tuberculosis.

AIMS AND OBJECTIVES:

1] To study the clinic-pathological profile of breast tuberculosis and its associated risk factors

2] To estimate the diagnostic accuracy of CBNAAT in reference to gold standard histopathological test for diagnosing BTB

MATERIAL AND METHOD:

This was a prospective non-randomized observational study conducted in a medical college setting from Aug 2012- July2017 after obtaining consent from all patients included in the study in accordance with the inclusion criteria. Lesions were diagnosed as tubercular by culture and Zeil-Neilson staining (ZN staining), histology and/ or by CBNAAT.

Inclusion criteria:

1. All patients above 18 years who were diagnosed as breast tuberculosis by triple assessment and CBNAAT

2. All patients who consented to be a part of the study

Exclusion Criteria: 1.Breast lump patients with malignancy or phylloides on histopathology .
2. Seriously ill patients who had to be referred to other department for treatment of co- morbidities and lost to follow up

Method:

All patients of breast lesions underwent triple assessment which includes clinical examination, radiological and pathological assessment. The patients were considered positive for breast TB if demonstrated a positive culture for acid-fast bacilli, smear positivity on Ziehl–Neelsen staining, positive CBNAAT (PCR) examination for TB, or cytological and histological findings in favour of infection.

The demographic data, obstetric and lactation status, relevant detailed history related to breast lesions, constitutional symptoms and associated comorbidities were elicited and detailed clinical examination was tabulated. Ultrasonography and chest x -ray was done in all patients. Pus and sinus discharge was sent for culture sensitivity, AFB culture, ZN stain for AFB and CBNAAT. Fine needle aspiration cytology (FNAC) was done as the initial investigation in all breast lumps. HPE with ZN staining for AFB was done in tissues obtained by core biopsy, edge biopsy from sinus, abscess wall curetting and/or excisional biopsy. CBNAAT-Polymerase chain reaction (PCR) with primer of insertion sequence (IS) 6110 fragment, was done in all tumour tissue, fluid or pus to confirm the presence of bacilli. All the findings were tabulated in MS-Excel.

During the study period, anti-tubercular treatment (ATT) were was given as per Revised National Tuberculosis Programme (RNTCP) guidelines to all patients. Minimal surgical intervention was done when required as in aspiration, incision drainage with biopsy from the wall of abscesses cavity, excision of non-healing ulcer, and edge biopsy of discharging sinus. Residual lump and sinus tracts were excised after completion of treatment. All patients were followed up for six months after ATT.

Statistical analysis: Percentages, sensitivity and specificity, positive and negative predictive value. Descriptive analysis was done for demographic, clinical, and radiographic features. The results are presented as mean percentages for continuous variables and number/percentage for categorical variables. Data was tabulated and analysed on MS excel.

OBSERVATIONS-

Table 1: Distribution of study participants according to risk factors

Risk Factors	Risk Factors	Number	Percentage
Socio-economic status	BPL(below poverty line-as per ration card)	24	63.15%
	APL(above poverty line)	14	36.84%
Location(residence)	Urban	12	31.56%
	Rural	26	68.42%
Age (18-60 yrs.)	18-30 yrs.	22	57.89%
	31-40 yrs.	14	36.84%
	41-50 yrs.	1	2.63%
	>51 yrs.	1	2.63%
Marital Status	Unmarried	2	5.2%
	Married	36	94.7%
Obstetric History N(subtotal)=36	Pregnancy	0	0%
	Nulliparous	7	18.4%
	Multiparous	29	80.5%
Lactation History	Lactating	8	21%
	Non lactating	28	77.77%
Associated Tubercular lesion	Absent	34	89.47%
	Present	4	10.52%
	i) Genital Tuberculosis	2	5.2%
	ii) Pulmonary Tuberculosis	2	5.2%
Family history of TB	Positive	2	5.2%
	Negative	36	94.7%
Type of Breast tuberculosis	Primary BTB	34	89.47%
	Secondary BTB	4	10.52%
Co morbidities	Diabetes	1	2.6%
	Carcinoma	1	2.6%
	HIV	0	0
	None	36	94.7%

Table 2: Distribution of study participants as per their Clinical Presentation

Clinical Types of BTB	Clinical features	No.	%
Nodulo-caseous-55.26%	Breast lump +/-Pain	15	39.5%
	Breast lump with sinus	6	15.7%
Disseminated -7,18%	Multiple Sinus (without lump)	7	18.42%
Tubercular abscess-26.31%	Breast Abscess	6	16%
	Non-healing ulcer (drained abscess)	4	10.5%
Associated clinical features	Constitutional symptoms	5	13%
	Infertility	7	18.4%
	Axillary lymphadenopathy	14	36.8%
Side of the affected breast	Quadrant of the affected breast		
Right Breast [n -21(55.2%)]	Outer Quadrant	7	18.4%
	Inner Quadrant	6	16%
	Central/ Subareolar	8	21%
Left Breast [n=15(39.4%)]	Outer Quadrant	6	16%
	Inner Quadrant	2	5.2%
	Central/ Subareolar	7	18.4%
Bilateral [n=2, 5.2%]	Upper outer & lower outer quadrant	2	5.2%
Focal	Unifocal	36	94.7
	Multifocal	2	5.2%
Provisional (clinic- radiological) Diagnosis	Fibroadenoma	6	16%
	Breast Abscess	10	26.3%
	Tubercular	13	34.2%
	Malignancy	9	23.7%

Table 3: Radiological Investigations

Modalities	Findings	NO.	%
Ultrasonography of Breast and Axilla (done in all)	Hypo-echoic masses	8	21%
	Heterogeneous mass+/-internal echoes	13	34.2%
	Sinus Tract	6	15.8%
	Thick walled abscess	6	15.8%
	Focal duct ectasia+/- cystic lesions	5	13%
	Associated Axillary lymphadenopathy	16	42%
X–Ray Chest (done in all)	Healed calcifications	2	5.2%

Table 4: Investigations-Pathological

Specimen (n=38)	Positive	Negative	Sensitivity	Specificity	Positive predictive value	Negative predictive value
AFB-ZN staining-n 38	6 (15.8%)	32 (84.2%)	18.52%	100%	100.00%	33.33%
AFB(culture)=17	1(5.88%)	16(94%)	6.67%	100.00%	100.00%	12.50%
FNAC n=38	28(73.68%)	10(26.3%)	74.07%	27.27%	71.43%	30.00%
HPE=38	29(76.3%)	9(23.7%)	100.00%	90.91%	100.00%	96.43%
CBNAAT TB=38	27(71%)	11(29%)	81.818%	93.103%	93.10%	81.82%

Table 5: Distribution of participants as per treatment done

Modalities	N	%
Conservative	15	39.47%
Incision & Drainage	6	15.8%
Excision of lump(Wide Local Excision) (residual lump, inconclusive FNAC, Suspicious of malignancy)	11	31.57%
Excision of sinus tract	2	5.2. %
Excision of non-healing ulcer	4	10.52%
TOTAL	23	60.52%
Modalities	N	%
Conservative	15	39.47%
Incision & Drainage	6	15.8%
Excision of lump(Wide Local Excision) (residual lump, inconclusive FNAC, Suspicious of malignancy)	11	31.57%
Excision of sinus tract	2	5.2. %
Excision of non-healing ulcer	4	10.52%
TOTAL	23	60.52%
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Excision of sinus tract	2	5.2. %
Excision of non-healing ulcer	4	10.52%
TOTAL	23	60.52%

FIG-1 CLINICAL TYPES OF BREAST TUBERCULOSIS-

Figure No. 1a Nodulocasseous variant

Figure No. 1b Disseminated variant

Figure No. 1c Tubercular Abscess

FIG-2-USG AND PRE AND POST TREATMENT

Figure No.2a-. USG showing heteroechoic mass with internal echoes

Figure No 2b-. Post I&D nonhealing ulcer

Figure No.2c-Healed sinus and post I&D nonhealing ulcer after ATT

FIG-3 PATHOLOGICAL SLIDES

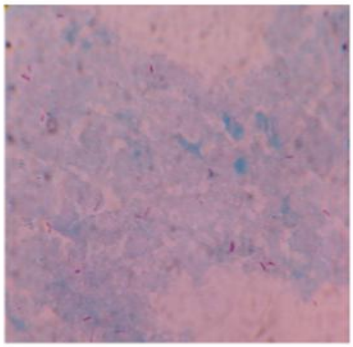

Figure No 3 a. Ziehl Nelson stain 100X magnification field showing acid fast bacilli

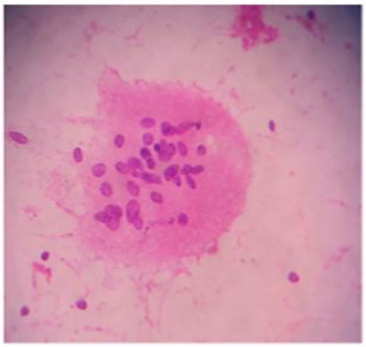

Figure No. 3b Fine Needle Aspiration cytology showing Langhans Giant Cell (Haematoxylin & Eosin Stain,High Power View 40X).

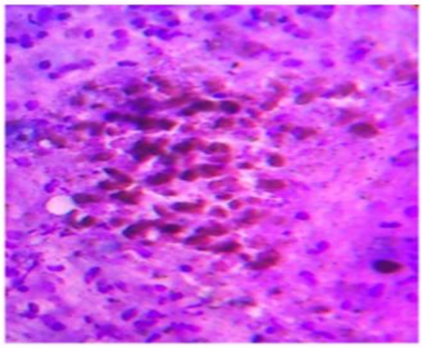

Figure No.3c PAP stain in high power view (40X) showing epitheloid cell granuloma along with inflammatory cells in the background.

Results

A total of 1280 patients of breast disease were examined from August 2012 to July 2017, out of which 960 (75%) had benign breast disease and 38 patients were diagnosed by triple assessment as breast tuberculosis. So prevalence of tuberculosis of breast in this study was found to be 3.95% .

The demographic evaluation revealed all were females with a predominant incidence in the reproductive age of 20-35yrs (Table-I). The risk factors found were reproductive age, multiparity, lactation history and low socioeconomic status (Table I) Constitutional symptoms of tuberculosis was present in 13% cases in this study. Primary breast tuberculosis was present in 34(89.5%). Unilateral lump located in the upper outer and central quadrant of the breast was the commonest observation. (Table-II) Out of 38 patients only 13(34.2%) were diagnosed provisionally as BTB rest 73.68% were misdiagnosed as fibroadenoma 6(16%), breast abscess10 (26.3%) or malignancy 9(23.7%) (Table II)

Clinically 55.6 % were of nodulo-caseous variety, disseminated variant found in 18.4% and tubercular abscess was seen in 26.3%. In our study, lesions were found 55.2% in right breast, 16% in left breast and 5.2% were bilateral and multifocal

Radiological features on ultrasonography are summarised in Table III. The commonest ultrasonographic pattern showed heteroechoic mass with internal echoes (34%) and axillary lymphadenopathy but were not diagnostic of BTB.

Although the presence of AFB or culture is essential to confirm diagnosis, only in 15.8%, AFB, could be demonstrated by Z-N staining and culture was positive in only one case. Definitive diagnosis was mainly based on histopathological examination in all patients (Table- IV) Sensitivity for fine-needle aspiration cytology (FNAC) was 74% as opposed to 100% for histology. The clinical characteristics, the sensitivity of the investigative methods in diagnosing breast TB and the results of treatment were all analysed. When CBNAAT test results were compared with the histologically confirmed diagnosis of tuberculosis, the sensitivity, specificity, positive predictive value, and negative predictive value for the CBNAAT test were 81.818%, 93.103%, 93.10%, and 81.82% respectively.(Table IV)

All patients were given DOTS as per RNTCP guidelines. 15(39.4%) were cured completely after receiving anti-tuberculosis drugs alone. Conservative surgical intervention was required for 23(60.52%) cases which had residual lesions There was no recurrence of breast TB during the average follow-up period of 6 months after completion of ATT.(Table V)

Discussion

BTB is often underreported and misdiagnosed so generally over-treated as malignancy, although it is five times less common than carcinoma of the breast even in endemic countries (3) The prevalence of BTB in this study was 3.95% within range of national statistics(1)Breast is exposed to hormonal changes periodically during menstruation, pregnancy and lactation making them more vascular hence, prone for injury and infection in females of reproductive age group.(4,5) Multiparous, lactating women of reproductive age group (20-35yrs) are the most affected in this study also and as per literature though some cases in prepubertal, elderly females and males were also reported.(3,5)The risk factors associated with BTB as per literature includes multiparity, pregnancy, lactation, trauma, past history of suppurative mastitis and immunocompromised conditions such as diabetes, carcinoma, immune deficiency syndrome, immunosuppressive therapy and poor nutrition due to low socioeconomic status, was also found in this study.(2,5) Lactation was found positive in 7-35% in various studies and it was 21% cases in this study but pregnant or HIV patients were not found. History of TB was reported in 19% of cases of BTB in literature and in this study it was 10.5% (1,6) suggesting that history of tuberculosis should be considered during evaluating breast lump.

There is no standardized classification of BTB. Mckeown and Wilkinson classified BTB based on pathogenesis as primary when the breast lesion was the only foci of tuberculosis and secondary when there was other foci elsewhere in the body apart from breast.(5,9) As per Vassilakos primary BTB is rare but many studies and in our study primary BTB was found in 89% of cases. This is debatable as breast tissue is resistant to tuberculous infection and EPTB foci in lymph node may be easily missed clinico-radiologically.(2,3,9). Breast may become infected by tuberculosis infection by direct spread of ductal infection, haematogenous spread, lymphatic spread or spread from pleura or chest wall.(2,5,9). Secondary BTB is caused by retrograde lymphatic spread as suggested by Cooper, which is presumed by presence of ipsilateral axillary lymphadenitis in 33-50% cases of BTB as in our study it was 37% cases.(1,3 6).

Clinically BTB is grouped into three types as (i) Nodulocaseous tubercular mastitis. (ii) Disseminated/Confluent tubercular mastitis (iii) Tubercular abscess (4)

(i) Nodulocaseous type- is the most common type in 55.6% cases in accordance to 75% cases reported in literature, presenting as a slow growing breast lump in the upper outer and central quadrant of the breast with or without sinus and axillary lymphadenopathy mimicking fibroadenoma or carcinoma.(4,6,7) Pain in lump was the most symptom presented in 42% of cases in various

studies and 39.5% of cases in this study making it significant symptom of BTB (6)There have been cases of coexisting BTB and carcinoma breast reported as also in this study leading to diagnostic difficulties.(5,8)

(ii) Disseminated type is associated with caseation and sinus formation, so presents as multiple chronic discharging sinuses with or without lump involving the entire breast reported in older women mostly, which is the typical presentation of tubercular lesion but not so common.(n-7, 18.4%) and misdiagnosed as inflammatory breast cancer, idiopathic granulomatous mastitis or common fungal infections like actinomycosis (1,7)

(iii)Tubercular abscess type is similar to other pyogenic abscess, but later caseate and form non-healing ulcer with skin involvement It is commonly misdiagnosed as abscess in 30% of young patients of BTB, here it was in 26.3% cases (2,4) So recurrent inflammation and abscess formation in nonlactating women, not responding to standard treatment should raise suspicion and samples should be sent for TB analysis even in absence of any history.(3)

Both the breast are more or less equally affected with only 3% bilateral involvement but in this study it was 5.2% (3,5) Constitutional symptoms of tuberculosis were found infrequently as in 16-20% of cases in various studies.(2). The average duration of presentation of symptoms after onset of disease was usually less than a year in most studies, 6-8 month in this study.(4,8)

Lesions due to tuberculosis have no specific radiological findings.(7,8) BTB is a great mimicker with no pathognomic clinico- radiological features hence can be easily misdiagnosed as a benign lesions such as antibioma, fibroadenoma, breast abscess, fatty necrosis, duct ectasia, granulomatous infections like idiopathic granulomatous mastitis, actinomycosis, Wegners granulomatosis, or neoplastic lesions like carcinoma.(2,7) In our study 34.2% were diagnosed provisionally as BTB rest 73.68% were misdiagnosed as fibroadenoma (16%), breast abscess (26.3%) or malignancy (23.7%)(2,7)

Diagnosis of BTB is done by as clinic-radiological suspicion, FNAC and histopathological examination, culture for AFB and Z-N staining as per International Standards for Tuberculosis Care.(12) The gold standard diagnostic test of BTB is detection of AFB by ZN staining by microscopy or by solid or liquid culture accounting for 12% positivity by ZN staining and 26% by culture is in various studies and but we found it to be 6% and 15.8% respectively due to paucibacillary samples.(6,9).

Fine needle aspiration cytology (FNAC) is the most common tissue diagnostic method with 43-73% accuracy, 28% -64% sensitive (5,6,11) Histopathological diagnosis of BTB is made by demonstration of a chronic caseous necrotizing granulomas and Langhans-type giant cells with or without the demonstration of the AFB by ZN staining from specimens obtained by core biopsy, edge biopsy or biopsy from the abscess wall.(5,13) , Histopathological evaluation is 84.4% sensitive and 78.9% specific, low specificity is due of the presence of granulomas in other diseases (6,13). We found FNAC to be 74% sensitive and 27% specific whereas histopathology was 100% sensitive and 90% specific for BTB in our study, suggesting core biopsy as a gold standard diagnostic modality instead of FNAC as gives more diagnostic yields.(8)

Limitations of the investigations are delayed reporting, false negativity and low sensitivity of culture in paucibacillary sample, microscopy by ZN staining not able to differentiate between other Mycobacterium species and histology in absence of caseating necrosis and AFB bacilli involves all granulomatous diseases.(6,8) Hence, diagnosis of BTB is still has to be made on clinical suspicion alone, leading to misdiagnosis and unnecessary TB treatment or poor outcomes from subtreated cases

To address this issue, recently, molecular diagnosis of EPTB has been achieved by the CBNAAT test. It is a rapid , automated, cartridge-based nucleic acid amplification assay which detects only M. tuberculosis DNA (rpo B gene) within 2 hours directly from the clinical specimens and also detects rifampicin resistance but does not detect atypical mycobacteria.(1,13) As per recommendations of WHO 2014 and International Standards for TB care 2014(standard 4) extrapulmonary specimens must also be tested for microscopy, culture and drug sensitivity testing, CBNAAT and histopathological evaluation.(10,13).In this study, taking histology as the gold standard, the sensitivity, specificity, positive predictive value, and negative predictive value for the CBNAAT were 81.818%, 93.103%, 93.10%, 74.07% and for FNAC 74.07%,27.27%, 71.43% and 30% respectively. Some studies also had same experience with the sensitivity, specificity, positive predictive value, and negative predictive value for CBNAAT, as to be 83.3%, 99%, 90.9% and 98.1% respectively and same for FNAC were 16.7%, 99.0%, 66.7%, and 91%, respectively.(12) Our study concludes that CBNAAT is an important tool with moderate sensitivity (81.818%) and high specificity (93.103%) for detection of BTB. In both the studies it is been seen that it had a moderate, positive predictive value, (90%) and very high negative predictive value (98%) can be used to diagnose BTB accurately..(12).

The efficacy of CBNAAT in BTB has not been studied much because of rare clinical occurrence CBNAAT may serve as a valuable diagnostic tool for BTB in clinically overlapping, culture and smear negative and for differentiating from other forms of granulomatous mastitis as it is highly sensitive .BTB should seriously be considered in endemic areas and MTB-PCR should be part of the investigation requested in clinical samples from breast tissues (2)

As per the evidence based recommendations made by the INDEXTB guidelines panel.(10) for EPTB ,Xpert MTB/RIF should be used as an additional test to conventional smear microscopy, culture and cytology in FNAC specimen

Antituberculous therapy (ATT) for 6 months as per DOTS under RNTCP with or without minimal surgical intervention forms the mainstay of treatment today. Complete resolution of lesion was found in 39.5% and 60% of patient had to undergo conservative surgical intervention, consisting of drainage of breast abscess in 15.8%, biopsy from the abscess wall, sinuses and wide local excision of residual lump in 31% cases. Various studies reported 69% of cases treated with ATT and surgical excision in 39%, drainage in 23% and mastectomy in 5% of BTB.(2,6) Simple mastectomy with or without axillary clearance is not advocated and reserved only for cases with extensive disease, poor responders due to multidrug resistance or coexistent carcinoma but no patient needed mastectomy in this study indicating the importance of correct early diagnosis.(6)

CONCLUSIONS

Breast tuberculosis is rarely encountered in clinical practice with no pathognomic features clinically, radiologically and thus a high index of suspicion is needed to prevent misdiagnosis and inappropriate management. CBNAAT should be used as an additional test to conventional smear microscopy, culture, FNAC and histology. ATT remains the mainstay of treatment which can achieve full response with surgery being limited to drainage or excision of residual tissue after ATT. This study highlights the importance of early diagnosis and aggressive medical and conservative surgical management to cure this disease so that major surgical treatment which can potentially cause breast disfigurement can be avoided.

LEARNING POINTS

- Extrapulmonary TB remains a diagnostic challenge.
- Consider breast TB as a differential diagnosis of mammary nodules.
- A high level of suspicion is necessary to make an early diagnosis and start appropriate treatment before irreversible damage takes place.
- Xpert MTB/RIF should be used as an additional test to conventional smear microscopy, culture, FNAC and histology.

ABBREVIATIONS

EPTB-Extrapulmonary tuberculosis
BTB-Breast tuberculosis
AFB-Acid fast bacilli
ZN stain-Zeil Nelson stain
FNAC-Fine needle aspiration cytology
PCR-Polymerase chain reaction
RNTCP-Revised national tuberculosis programme
ATT-Anti tuberculosis treatment
DOTS-Directly observed treatment service
CBNAAT-Cartridge based nucleic acid amplification test
TB-Tuberculosis
MTB/RIF-Mycobacterium Tuberculosis/Rifampicin

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