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Imaging Diagnosis of Breast Tuberculosis[1]

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Purpose : To evaluate the radiologic findings of breast tuberculosis.

Materials and Methods : The authors evaluated the radiologic findings of five cases of surgically confirmed tuberculosis of the breast. Patients were examined with mammography (n=5), ultrasonography (n=3), and MRI (n=2). All patients were female. Four patients had unilateral lesion and the remaining one patient had bilateral breast tuberculosis.

Results : Mammographic findings were mainly radioopaque mass density without secondary signs. Two patients showed secondary signs such as skin thickening, parenchymal distortion, and nipple retraction. Ultrasonographic findings were variable but helpful in differentiating benign from malignant breast lesions. MRI findings were more helpful in differentiating abscess from malignant lesions.

Conclusion : Radiologic findings were useful to diagnose tuberculosis of the breast, but fine needle aspiration biopsy and culture were needed for suspicious radiologic findings.

Index Words : Breast, MR
Breast, US
Tuberculosis, soft tissues

INTRODUCTION

Tuberculosis is a chronic infectious disease caused by mycobacteria of the tuberculosis complex, mainly Mycobacterium tuberculosis. Hippocrates aptly named the disease phthisis, which is synonymous with pulmonary tuberculosis and its associated asthmatic breathing, after noting the marked cachexia associated with it (1). During the 18th century, the disease was known as the white plague.

Tuberculosis of the breast is a rare disease and was first described in London in 1829 (2). Since then over 700 cases were reported. The majority of the reports were from the past generations. Now, tuberculosis of the breast became a very rare disease in western countries and is reported in developing countries sporadically. But, the incidence of tuberculosis of the breasts tending to increase with the increasing number of immunocompromised patients and of breast augmentation (3, 4). Breast tuberculosis presents with variable findings, thus it is difficult to differentiate tuberculosis from other diseases of the breast.

We wish to describe radiologic findings of this rare disease which has not been well described in the literature.

MATERIALS and METHODS

Between May 1983 through July 1993, 5 cases were confirmed as tuberculosis of the breast surgically in our institute. Authors retrospectively evaluated radiologic findings of tuberculosis of the breast for differentiation from other breast diseases. Authors used film screen mammography (CGR Senographe 500T, Columbia, Md, USA or GE DMR, Milwaukee, Wis, USA, craniocaudad and mediolateral view), ultrasonography (Aloka 650, Tokyo, Japan, Acuson 128, or Acuson 128/10Xp, Mountain View, California, USA) and magnetic resonance imaging (Magnetom 1.0T 42 SP active shield type, Siemens, Erlangen, Germany) using dou-

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ble contrast and postcontrast Flash 2D TR/TE, 32/10 msec, Flip angle 30°, matrix size 256 × 256, FOV 300 mm. 3 Aquisition, swap and switch saturation were performed to compensate the cardiac motion artifact. Gd-DTPA were injected 0.16 mmol/kg body weight through antecubital vein after selection of 3 slices of breast lesion. Postcontrast Gd-DTPA enhanced dynamic study of the breast were done for 5 minutes at 1. 18 minutes interval for the analysis of amount, pattern and speed of enhancement. All patients were female and the age of the patients were between 25 to 63 years. All patients were examined with mammography and three patients were examined with ultrasonography. Two patients were examined with magnetic resonance imaging (MRI).

Authors divided and examined the breast into 5 sectors such as subareolar, upper outer(UO), upper medial(UM), lower outer(LO), and lower medial(LM).

RESULTS

Table 1 shows the clinical information of the patients. Palpable mass was the most common symptom (4/5) and pus discharge in the nipple was the chief complaint in one patient. The duration of the symptom varied from ten days to five years. Tuberculosis of the other foci was seen in three of five patients. Left side breast was involved in three patients and right side breast was involved in three patients.

Table 2 shows the mammographic findings of the patients. Mass was seen in all patients and it showed either homogeneous (3/6) or heterogeneous (3/6) density. The size of the masses were variable from 3 mm to 40 mm. The shape of masses were oval or round. All masses showed increased internal density (6/6). The halo of mass was absent (2/6) or partially visible (4/6). Calcification was seen in two patients. Spiculation was seen in one patient (Fig. 1). Parenchymal distortion with skin thickening was seen in two patients. Nipple retraction with parenchymal distortion and skin thickening was seen in one patient who showed pus discharge from the nipple (Fig. 2). And the third patient showed bulging and stretching of superficial fascia above the ill defined increased breast density. The

Table 1. Clinical Manifestations in 5 Patients with Breast Tuberculosis

Patient	Sex	Age	Symptom	Period	Location	Tbc. in other foci
1	F	30	nipple discharge	5 Y	Rt. subareolar	none
2	F	25	mass	2 M	LUO, RUM	mediastinal, cervical Tbc. lymphadenitis
3	F	27	mass	6 M	RUO	rib Tbc.
4	F	63	mass	10 D	LUM	none
5	F	47	mass	1 M	LUO	pulmonary Tbc.

*Tbc. : tuberculosis LUO : left upper and outer RUM : right upper and medial
RUO : right upper and outer LUM : left upper and medial

Table 2. Mammographic Findings of Breast Tuberculosis

Patient	1	2	2	3	4	5
Breast pattern	N1	DY	DY	DY	N1	P2
Mass						
number	1	1	1	1	1	1
size	3 mm	35 mm	7 mm	30 mm	10 mm	40 mm
shape	oval	round	oval	spherical	oval	round
border (define)	well	ill	well	ill	well	well
internal density	increased	increased	increased	increased	increased	increased
halo	−	partial	partial	partial	−	partial
homogeneity	homo	homo	hetero	hetero	hetero	homo
location	Rt. subareolar	LUO	RUM	RUO	LUM	LUO
Calcification	−	−	+	−	−	2, discrete
Spiculation	−	−	+	−	−	−
Cooper's lig. change	−	−	−	+	−	−
Skin thickening	+	−	+	−	−	−
Parenchymal distortion	+	−	+	−	−	−
Nipple retraction	+	−	−	−	−	−
Vessel change	−	−	−	−	−	−

vascular change, ductal change, and the Cooper's ligament thickening were not seen in all patients.

Table 3 shows the ultrasonographic findings of the patients. Mass was seen in three patients which showed hypoechoic (3/4) or intermediate echoic (1/4) internal echogenicity. The internal echogenecity of the masses was variable; two masses showed homogeneous and the others showed heterogeneous pattern. Three masses had thick boundary with welldefined border. One had ill-defined border. The posterior shadowing could not be seen but posterior enhancement was seen in all patients (4/4). The lateral shado-

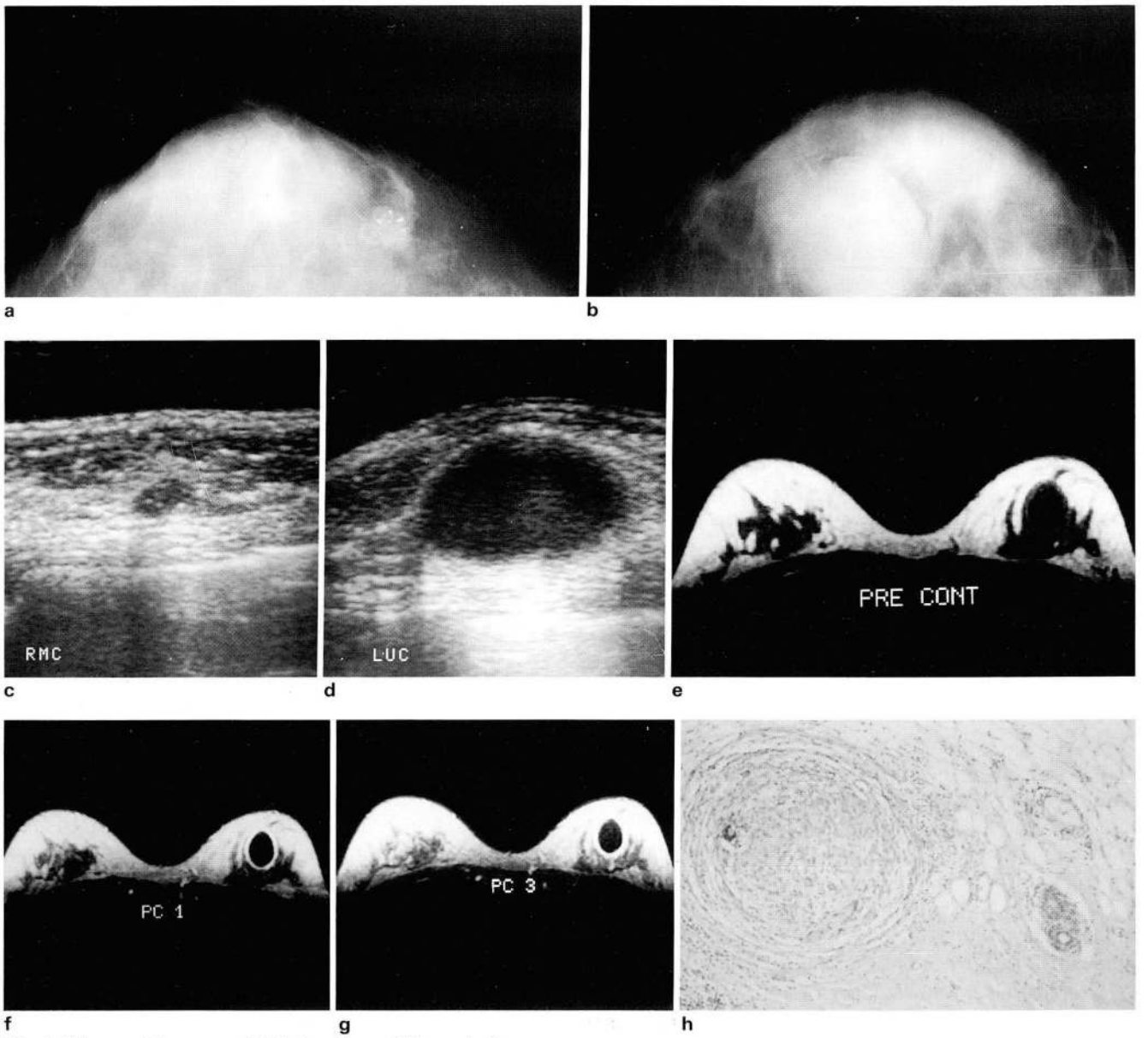

Fig. 1. 25-year-old woman with bilateral breast tuberculosis.

a. craniocaudad view mammogram shows calcified and spiculated mass with focal thickening of superficial fascia in RUM.

b. Craniocaudad mammogram shows a localized well circumscribed mass with radiolucent halo in LUC.

c. Ultrasonogram shows mixed and heterogeneous echoic lesion with posterior shadowing and some enhancement.

d. Ultrasonogram shows a localized well circumscribed cystic mass with posterior enhancement and lateral shadowing. Some internal echogenicities are seen in the cystic mass.

e. MRI shows slightly intermediate lower signal intensity lesion surrounding the signal void central area in precontrast study.

f, g. In the postcontrast study, thick walled ring enhanced cystic lesion is seen in LUC and spiculated nodule with signal void lesion in RUM are not enhanced suggesting old healed tuberculoma.

h. Microscopic finding of left breast mass showed a focus of granulomatous inflammation composed of epithelioid cells with several giant cells of Langhans type.

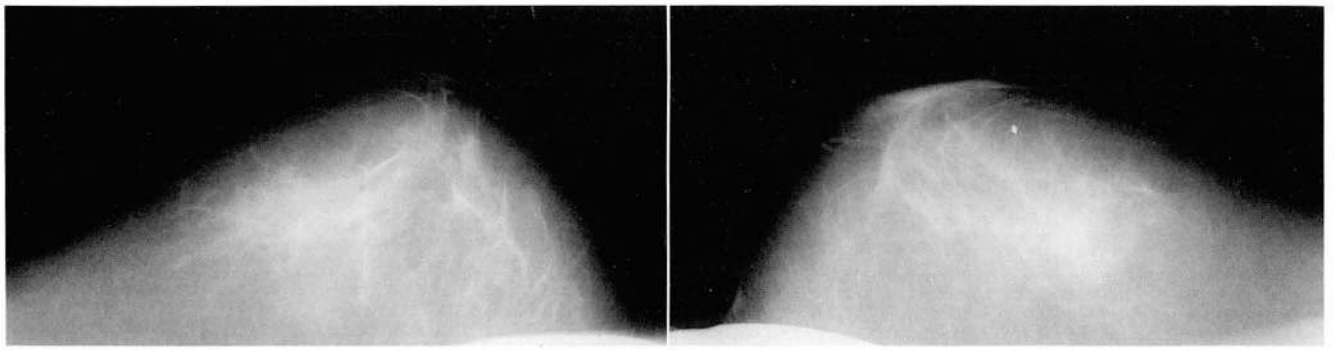

Fig. 2. 30-year-old woman with breast tuberculosis in right subareolar area.
Craniocaudad mammogram shows asymmetric increased density in RUO, and a 3 mm nodule with architectural distortion and focal skin thickening in Rt. subareolar area suggested abscess.

Table 3. Ultrasonographic Findings in Six Patients with Breast Tuberculosis

Patient	2 (Left)	2 (Right)	3	4
Mass	+	+	+	+
size	35 × 22 mm	10.4 × 11.0 mm	19.5 × 46.7 mm	8.7 × 11.8 mm
shape	oval	oval	oval	oval
internal echo	hypoechoic	hypoechoic	intermediate	hypoechoic
homogeneity	homogeneous	heterogeneous	homogeneous	heterogeneous
border	well defined	well defined	well defined	ill defined
	thick, smooth	thick	thick, smooth	round
PS	−	−	−	−
PE	+	+	+	+
LS	+	+	+	−
Calcification	−	+	−	−
C. T.	−	+	−	−
P. D.	−	−	−	−
S. O.	−	−	−	+

*C. T. : Cooper's ligament thickening P. D. : Parenchymal distortion S. O. : Subcutaneous fat obliteration

wing was present in most cases (3/4), but parenchymal distortion was absent (4/4). The thichening of Cooper's ligament and the calcification was seen in one mass. The obliteration of subcutaneous fat was associated with one mass.

MRI of the breast in two patients showed relatively higher signal intensity soft tissue mass in precontrast study (TR/TE, 32/10 msec, flip angle 30°, matrix size 256 × 256). In postcontrast study with Gd-DTPA, prompt but slowly progressive irregularly thick ring enhancement of the wall with central low signal intensity was revealed (2/2). The lesion on the right breast in one patient with bilateral breast lesions showed signal void with spiculation. There was no enhancement in the lesion which had been ahown as spiculated mass with calcifications in film screen mammogram. The left side breast of the same patient showed thick walled ring enhanced cystic mass suggestive more of an infected active abscess (Fig. 1). The other patient showed extension of the lesion to right pectoralis muscle area extending into the breast and ribs (1/2). Ill-defined diffuse and progressive enhancing lesion was seen in right upper and outer portion of the breast suggesting associated inflammatory edema or proliferative dysplasia. These findings suggested active abscess in right pectoralis muscle and associated right axillary lymphadenopathy according to the operative and pathologic findings.

DISCUSSION

Breast tuberculosis was first described by Sir Astley Cooper in London in 1829 (2).

Breast tuberculosis is seen most often in India where it previously accounted for up to 4.5% of all surgical lesions of the breast (7). Recent reports note a decrease to 1 to 1.2% (7), and in the united States, less than 0.1% of surgical lesions of the breast are due to tuberculosis (7). The lower incidence of breast lesion when compared to other foci of tuberculosis may be a

result of the high resistance offered by the breast to the survival and multiplication of the tubercle bacillus, a resistance similar to that offered by spleen and skeletal muscles (1, 3, 5).

The disease is not limited to females. In one series of 439 patients, as many as 4% were in males (5). In female patients the disease has been reported from the age of 6 months to 84 years (5). However, women in the reproductive age group, especially during the lactational period, are more susceptible. Three of five patients in our series were young under 27 years in age. The other two patients were 47 years old and 63 years old respectively.

Both breasts were reported to be involved with equal frequency (5). Bilateral disease is rare, occuring in 3% of patients (5) and in 20%(1/5) in our series. Right and left breast were equaly involved in our series which is similar to other report (7).

The most common symptom is a lump in the breast (4, 7, 8) and multiple lumps are less frequent as in our cases with usually single lump (4/5). The lump in the breast is usually ill-defined, irregular, occasionally hard, and indistinguishable from a carcinoma. The lump is usually located in upper outer quadrant of the breast (5). Pain in breast tuberculosis is found more frequently than in carcinoma, often being a dull, constant, nondescript ache. The signs of breast tuber culosis include multiple sinuses, ulcers, matted nodes, edema, purulent discharge from the nipple, and nipple retraction. In our cases, the first patient had nipple discharge in right breast. Direct involvement of the nipple and areolar is rare in tuberculosis. Fixation to skin is frequent (5), however, the breast remain mobile unless breast involvement is secondary from tuberculosis of the underlying ribs. Uncommonly, older patient is presented with breast tuberculosis with a mass that mimics carcinoma, whereas the younger patient usually manifests signs of a pyogenic breast abscess (3).

Breast tuberculosis may occur primarily or secondaily. Primary infection, of the breast through abrasions in skin or through duct openings in nipple is a possibility (5). Primary disease is assumed to exist when no other focus of tuberculosis is demonstrated. In earlier reports secondary breast tuberculosis, evidence of an active or a healed lesion in the lungs on radiographic examination was noticed in about half the patients (5). Although it was initially believed that as much as 60% of breast tuberculosis was primary (5), it is now accepted that breast tuberculosis is almost invariably secondary to a lesion elsewhere in the body (5). In our cases, two patients seemed to be primary tuberculosis (2/5) and three patients were secondary tuberculosis (3/5).

The most frequent mode of infection is retrograde lymphatic spread from axillary nodes or occasionally from cervical or mediastinal nodes (5, 7). And it is supported by the fact that 50 to 75% of patients had involvement of axillary nodes at the time of presentation (7). Hematogenous spread and direct extension from contiguous structures are other modes of infection (3) as in our case mainly involving pectoralis muscle.

McKeown and Wilkinson (5) classified breast tuberculosis pathologically into the following categories : a) acute miliary type, b) nodular type, c) disseminated type, d) sclerosing type, e) tuberculous mastitis obliterans.

However, film screen mammographic findings of tuberculosis of the breast are documented as follows; nodular, diffuse, and sclerosing type (1). First, in the nodular type, it is presented as a dense, round area with indistinct margins, closely resembling a carcinoma. Second, in the diffuse form, the findings of tuberculosis simulate inflammatory carcinoma with skin thickening. Third, in the sclerosing type, it is presented as uniformly dense breast without specific findings (10).

In our cases, mammographic findings were oval or round mass (5/6) which were usually well defined, increased density (5/6). In one patient, bulging and stretching of the superficial fascia without clearly demonstrable mass was considered as secondary effect of mass. However, MRI and ultrasonography of the same patient showed 2 × 4.5 cm sized rim enhancing mass which was located in deeper portion of the breast.

In two patients, secondary signs such as skin thickening, parenchymal distortion, and nipple retraction were considered to be due to chronic infection. One patient only showed bulging of superficial fascia. In this patient, the mammographic findings were variable, mimicking benign or malignant breast lesions such as abscess or carcinoma.

In general, it is difficult to diagnose breast tuberculosis with film screen mammographic examination. Only as mammography is of limited value since the findings are often indistinguishable from a malignancy, especially when disseminated and sclerosing forms of tuberculous mastitis are present (1). Futhermore about 5% of tuberculosis of the breast are associated with carcinoma (1, 6, 11). However, thick rim enhancement of the wall with central low signal intensity in postcontrast MRI may differentiate it from breast cancer.

It is concluded that careful evaluation with multiple imaging modalities is helpful to differentiate tuberculosis from other breast lesions.

REFERENCES

1. Hale JA, Peters GN, Cheek JH. Tuberculosis of the breast : Rare but still extant. *Am J Surg* **1985** ; 150 : 620-624
2. Cooper A. *Illustration of the diseases of the breast,* Part 1. London : Longman, Rees, Orme, Brown and Green, **1829** : 73-75
3. Hartstein M, Leaf HL. Tuberculosis of the breast as a presenting manifestation of AIDS. *Clin Infec Dis* **1992** ; 15 : 692-693
4. Perry RR, Jaques DP, Lesar MSL, et al. Mycobacterium avium in-

fection in a silicon-injected breast. *Plast Reconstr Surg* **1985** ; 75 :104-106
5. Banerjee SJ, Ananthakrishnan N, Mehta RB, et al. Tuberculous mastitis : A continuing problem. *World J Surg* **1987** ; 11 : 105-109
6. Miller RE, Salomon PF, West JP. The coexistence of carcinoma and tuberculosis of the breast and axillary lymph nodes. *Am J Surg* **1971** ; 121 : 338-340
7. Wilson JP, Chapman SW. Tuberculous mastitis. *Chest* **1990** ; 98 : 1505-1509
8. Apps MCP, Harrison NK, Blauth CIA. Tuberculosis of the breast. *Br Med J* **1984** ; 288 : 1874-1875
9. Nayar M, Saxena HMK. Tuberculosis of the breast ; a cytomorphologic study of needle aspirates and nipple discharges. *Acta Cytologica* **1984** ; 28(3) : 325-328
10. D'Orsi CJ, Feldhaus L, Sonnenfeld M. Unusual lesions of the breast. *Radiol Clin North Am* **1983** ; 21(1) : 67-79
11. Symmers WSC, Mckeown KC Tuberculosis of the breast. *Br Med J* **1984** ; 289 : 48-49

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유방 결핵의 영상진단

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목 적 : 현재 유방 결핵의 방사선학적 소견은 잘 알려져있지 않다. 이에 저자들은 5예의 수술로 확진된 유방 결핵을 경험하였고 그 방사선학적 소견을 알아보았다.

대상 및 방법 : 모든 환자들에게서 X선유방촬영검사가 시행되었으며, 5명중 3명의 환자들에게 유방초음파검사가 시행되었고, 2명의 환자들에게 유방의 자기공명영상진단검사가 시행되었다. 5명의 유방 결핵 환자들은 여성이었고, 4명의 환자는 한쪽 유방에만 유방 결핵이 있었으며 나머지 1명의 환자는 양쪽 유방에 결핵이 있었다.

결 과 : X선유방촬영검사 소견상 주로 이차 징후가 없는 종괴를 보였으며, 두 명의 환자에서는 이차 징후 (피부 비후, 유두함몰, 유방 실질의 비틀림 등)가 보였다. 초음파유방검사상 소견은 다양하였으나 양성과 악성 유방 질환을 감별하는데 도움이 되었으며, 유방의 자기공명영상진단검사에서는 농양의 소견이 잘 나타났다.

결 론 : 유방 결핵의 영상소견은 다양한 형태를 나타내므로 병합적 검사가 유방 결핵을 진단하는데 유용하며 의심스러운 방사선학적 소견을 보이는 유방의 병변에서는 세침흡인생검이 필요할 것으로 생각된다.