

# Primary Osseous Metaplasia of Right Breast

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## Abstract

Osseous metaplasia of the breast is considered to be one of the rare breast conditions. It is characterized by the presence of normal bone tissue within the breast. We report a case of benign osseous metaplasia in a 58-year-old woman presenting with mastalgia and mass in the right breast. A lumpectomy was performed. On the pathological examination, the mass was composed completely of benign bone trabeculae with no epithelial component which was confirmed by negativity of immunohistochemistry.

## Keywords

Osseous Metaplasia, Breast, Benign, Fibroadenoma

## 1. Introduction

Osseous metaplasia (OM) or “heterotopic bone formation” of the breast is considered to be one of the rare breast conditions; normally the breast stroma is composed of fibrous tissue and fat. Rarely the breast stroma contains bone, in which case it called osseous metaplasia that characterized by the presence of normal bone tissue within the breast parenchyma. The majority of cases are associated with malignancy and few are described with benign lesions. This is why almost all lesions are suspicious and careful diagnosis should be done for all lesions.

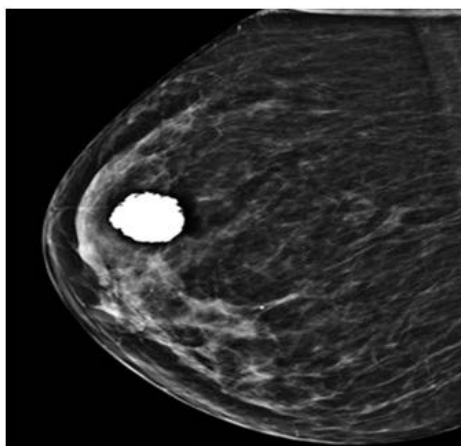
We present a rare case of MS which was diagnosed in our laboratory.

## 2. Case Presentation

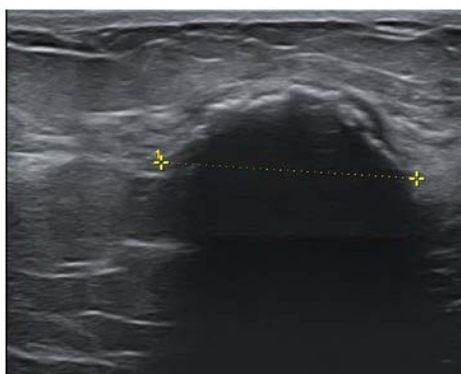
A 58-years-old female who had morbid obesity (BMI: 41.4) and known to be hypertensive. She presented with right painless breast mass for the last 35 years with history of mastalgia in the last few months. The mass is static in size with

no associated skin changes on nipple discharge. She has no relevant family history of breast cancer or personal history of previous breast biopsy or a diagnosis of cancer. The patient is multiparous and post-menopausal for the last 6 years. She is not smoker. Clinical breast examination, revealed hard, mobile mass at 12 o'clock on the right breast, the mass was approximately  $3 \times 2$  cm on palpation. Screening mammogram showed large mid upper quadrant totally calcified benign looking lesion about  $2.7 \times 2$  cm (BIRADS3) (**Figure 1**) and follow up ultrasound suggests that it was a calcified fibroadenoma (**Figure 2**).

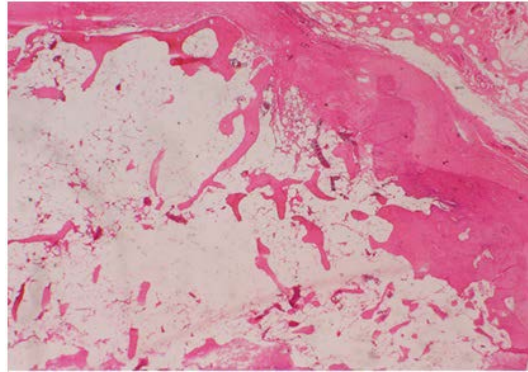
Decisional right breast excisional biopsy was done with uneventful post-operative follow ups. Macroscopic description showed a single piece of bony hard tissue measuring  $3.7 \times 3.2 \times 2.3$  cm with irregular smooth outer surface. Microscopically, there was a well circumscribed mass composed of benign bonetrabeculae and mature adipose tissue with no breast ducts or fibrous stroma, the remaining attenuated peripherally located breast tissue showed hyalinization, benign looking ducts and scattered lymphocytes (**Figures 3-5**). Immunohistochemical epithelial markers were negative indicating that no residual epithelial component within the bony lesion. Diagnosis of benign osseous metaplasia was confirmed. Following the surgery, the surgery site healed with minimal scar with uneventful reassuring subsequent follow up visits.



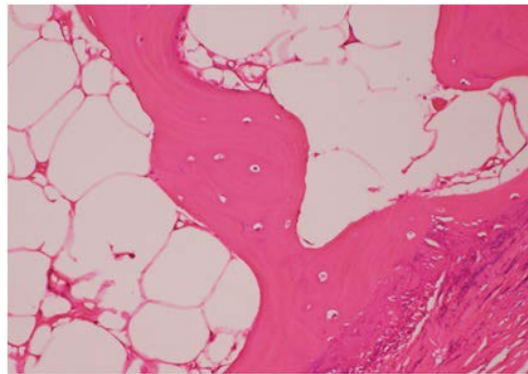
**Figure 1.** Mammography: Large totally calcified lesion.



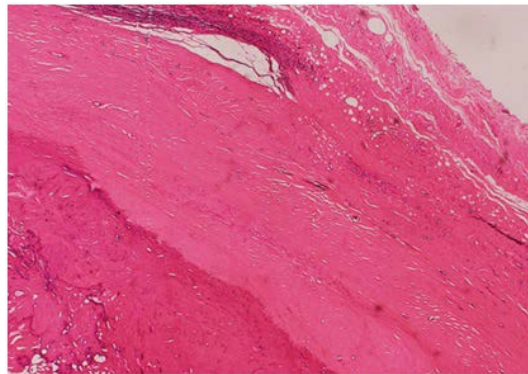
**Figure 2.** Ultrasound image shows totally calcified lesion measuring about 2.7 cm.



**Figure 3.** H and E stain low power (2×) view show bone trabeculae.



**Figure 4.** H and E stain low power (20×) view show benign bone trabeculae.



**Figure 5.** H and E stain low power (2×) view show hyalinization at the mass periphery.

### 3. Discussion

In spite of paucity of osseous metaplasia, it has been reported in some organs including the breast, gastrointestinal tract, lung, thyroid, parathyroid, and pancreas [1] [2]. In the breast the presence of OM has been reported in relation to both benign and malignant breast conditions [3]. With the majority being associated with malignant breast conditions and very few cases were reported with benign breast conditions or even with no underlying lesions [2] [4] [5]. Benign breast lesions with OM include fibroadenoma, mammary pleomorphic adenoma, benign mesenchymoma, phyllodes tumor, fibromatosis and primary loca-

lized amyloid tumors; while malignant lesions are fibrosarcoma, malignant mesenchymoma, osteoid sarcoma, osteogenic sarcoma and osteochondrosarcoma [6].

All cases of primary osseous metaplasia described in the literature were female patients with lump in the upper outer quadrant of their left breasts [2] [4] [5]. The main complaint was either mastalgia or/and lump. Our patient age was above 45 years which is similar to other cases except for one patient aged 38 years [5]. Radiological finding varies from benign findings that suggest calcified fibroadenoma to findings that suspicious for malignancy [4]. The size of the lump ranged from 2 - 5 cm in largest dimension.

This is the first case of benign osseous metaplasia described in the right breast with no associated pathology or underlying chronic illnesses.

First case of OM was described in early 10<sup>th</sup> century. Virchow in 1863 was the first one to postulate the pathophysiology and he reported that osteoblasts were modified fibroblast and that they were transformed by metaplasia [7]. According to Gal. Cambos, *et al.* "the origin of metaplastic bone is like the development of normal bone, it may originate either from fibrous tissue or may be secondary to cartilage formation" [7], even though no pathophysiology is known.

The development of bone in breast stroma is associated with many mammary lesions and multiple pathogenesis have been postulated [8] such as chronic inflammation and chronic ischemia [9], trauma can also be a cause and sometimes no cause is actually found to initiate the response [10].

A case of osseous metaplasia has been reported in saline breast implantation. And the explanation stated was a latent foreign body reaction to the capsule material of the saline breast implant itself and this was the early manifestation [7].

First postulated step in the metaplasia is that the precursor cells (fibroblast) differentiate a long a new pathway by signals initiated by cytokines, growth factors and extracellular matrix component in the cell environment. For example, bone morphogenic protein (BMPs) a member of the TGF-B superfamily induces chondrogenic or osteogenic expression in stem cells while suppression the differentiation into muscle or fat. These growth factors acting as external triggers then induce a specific transcription factor that lead to cascade of phenotype specific gene toward a fully differentiated cell [10].

After the initial transformation and in estrogen rich tissue differentiation directed toward the bone directly without going through the cartilage formation as osteoblasts are estrogen sensitive [11] along with the absence of the opposing osteoclastic activity will lead to the persistence of the newly formed bone.

In the described cases including this case, the triggering factor is unknown but may be calcification of a hyalinized fibroadenoma (dystrophic calcification) that starts focally and extends over the years. A phenomenon that may represent the final destination of hyalinized fibroadenomata if left without surgery, this theory is supported by the radiologic finding, smooth regular macroscopic appearance and the presence of hyalinization at the periphery of the lesions, yet the possibility that osseous metaplasia may be de novo process within the breast is still valid.

## 4. Conclusion

Benign mammary osseous metaplasia is a rare entity that needs further research to understand the pathogenesis. Radiological features may be helpful to differentiate benign from malignant osseous tissue in the breast. Core biopsy may yield nonconclusive results in case of benign OM and excisional biopsy is advised.

## Consent

A conditioned informed consent obtained from the patient not to disclose personal photos or personal identification information.

## Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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