
CASE REPORT

Popcorn-like Calcification in the Breast: More Than Meets the Eye?

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ABSTRACT

We present a case of a 56-year-old woman who had mammographic findings of coarse popcorn-like calcification in the right breast. In year 2000, the patient had benign lumps in both breasts, which were excised. Subsequent ultrasound examination revealed a 0.7 cm x 0.4 cm hypoechoic nodule. The lesion displayed irregular superficial margin and thus was assigned Breast Imaging Reporting and Data System category 4 with a decision to proceed with a biopsy. Core needle biopsy and histopathology showed involuting fibroadenoma without evidence of malignancy. In view of the discordant results, subsequent excision was performed which confirmed osseous metaplasia. This case report aimed to describe a relatively rare occurrence of mammary osseous metaplasia arising from an involuting fibroadenoma. Coarse popcorn-like calcifications on mammogram are commonly thought to be invariably benign and are therefore not subjected to further imaging or follow-up. What is not commonly known, however, is the fact that these calcifications can progress to osseous metaplasia as demonstrated in this patient. Literature reviews have shown a few cases of mammary osseous metaplasia that transformed into osteosarcoma. Therefore, this case deserves to be highlighted to radiologists and surgeons alike that mammographically detected coarse popcorn-like calcification in the breast could in fact represent osseous metaplasia. Henceforth, such cases warrant a more thorough evaluation, and possibly excision with histopathological evaluation to exclude sarcomatous transformation.

Key Words: Breast diseases; Fibroadenoma; Metaplasia; Ossification, heterotopic

中文摘要

爆米花狀（粗大鈣化）的乳房鈣化：並非如眼所見？

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本文報告一名56歲女性，乳房鉬靶檢查/X線檢查顯示其右側乳房有粗大的爆米花狀鈣化影。2000年時，病人兩側乳房曾發現有良性腫塊，已手術切除。隨後的超聲檢查發現0.7厘米 × 0.4厘米的低迴聲結節。病灶邊緣形態不規則，被認定為BI-RADS IV級，並決定進行活檢明確。穿刺活檢和組織病理學顯示為複雜性纖維腺瘤，無支持惡性腫瘤的依據。由於不同檢查結果不完全一致，決定為病人進行切除，後被確診該病灶為骨化生。這個病例意在報道由複雜性纖維腺瘤引起的乳腺骨化生，這是相對少見的病例。乳房鉬靶檢查/X線檢查中見到粗大的爆米花狀鈣化一般被視為良性，且不會安排進一步的影像學檢查及隨訪。然而，從這個病例所見，與常規不同，這些鈣化可能會演變成骨化

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生。文獻亦有記載少數病例是從乳腺骨化生轉化為骨肉瘤。放射科和外科醫生應加倍留意，如果乳房鉬靶檢查/X線檢查顯示有粗大的爆米花狀鈣化，可能代表有骨化生。如有類似情況便須為病人作全面評估，可以的話應作切除及組織病理學評估以排除肉瘤病變的可能性。

INTRODUCTION

Mammary osseous metaplasia is an uncommon occurrence in human population and appears mammographically as popcorn-like calcification. This potentially results in diagnostic errors, as most radiologists would traditionally associate popcorn-like calcifications with involuting fibroadenomas. Metaplastic ossification in the breast has rarely been described in the literature with the only important

clinical implication of a possible sarcomatous transformation.¹ We highlight the following case that illustrates the rare occurrence of intramammary osseous metaplasia arising from an involuting fibroadenoma.

CASE REPORT

A 56-year-old woman presented with a mammographic screen-detected large popcorn-like calcified fibroadenoma in the upper outer quadrant of right breast in October 2010 (Figure 1). Approximately 10 years prior, the patient has had several benign lesions excised from both breasts. Ultrasound findings of the mammographically detected calcified lesion revealed a 0.7 cm x 0.4 cm hypoechoic nodule. The lesion had an irregular margin at its superficial aspect and contained coarse calcification, which had cast posterior shadows. The lesion was thereby categorised as suspicious with Breast Imaging Reporting and Data System (BI-RADS) category 4 (Figure 2). An ultrasound-guided biopsy found hyalinised fibrous stroma surrounding the benign-appearing glands with fibroadipose tissue. There was no evidence of atypia or malignancy. In view of the discordant results, the patient then went on to have a hookwire localisation excision of the lesion as there was concern of a non-represented specimen. The 1.5-cm operated specimen had focal areas of osseous metaplasia consisting of bone trabeculae and bone marrow formation. In addition, there was florid hyperplasia and apocrine metaplasia without atypia or malignancy (Figure 3).

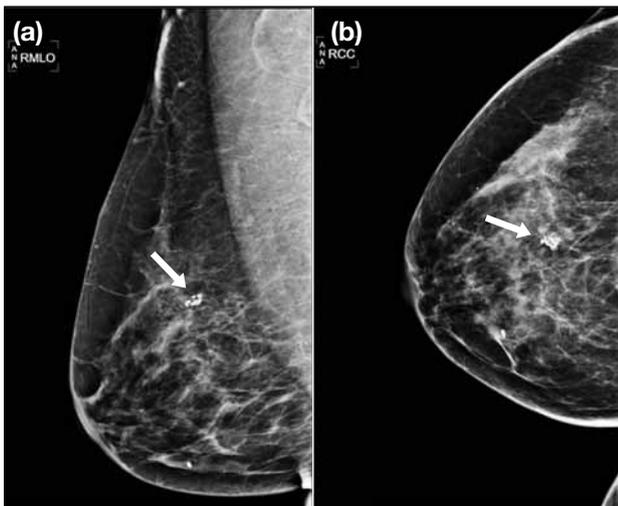


Figure 1. The (a) mediolateral oblique and (b) craniocaudal views of the patient's mammogram show the popcorn-like calcification in the upper outer quadrant of the right breast (arrows).

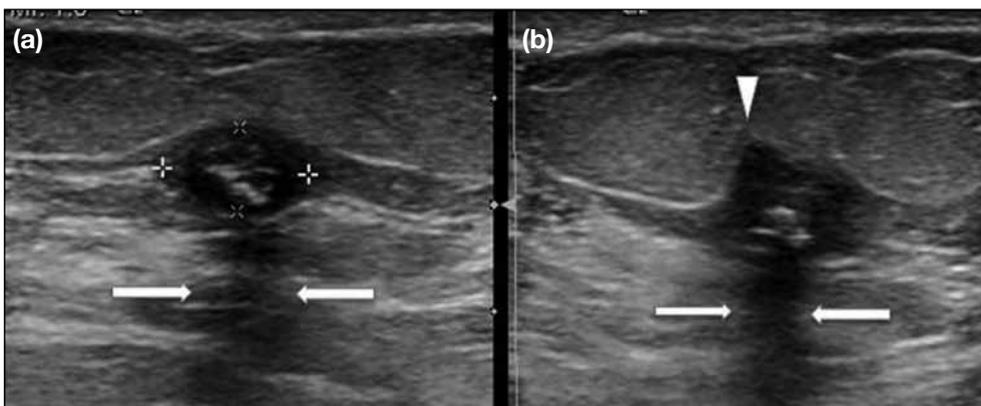


Figure 2. Ultrasound images of the right upper outer breast lesion taken in the (a) radial and (b) antiradial plane, show the irregular margin superiorly with the 'calcification' and posterior shadowing BI-RADS 4 assignment. The lesion is 0.7 cm x 0.4 cm in size (calipers), with an irregular margin (arrowhead). Posterior shadowing cast by the lesion is also shown (arrows).

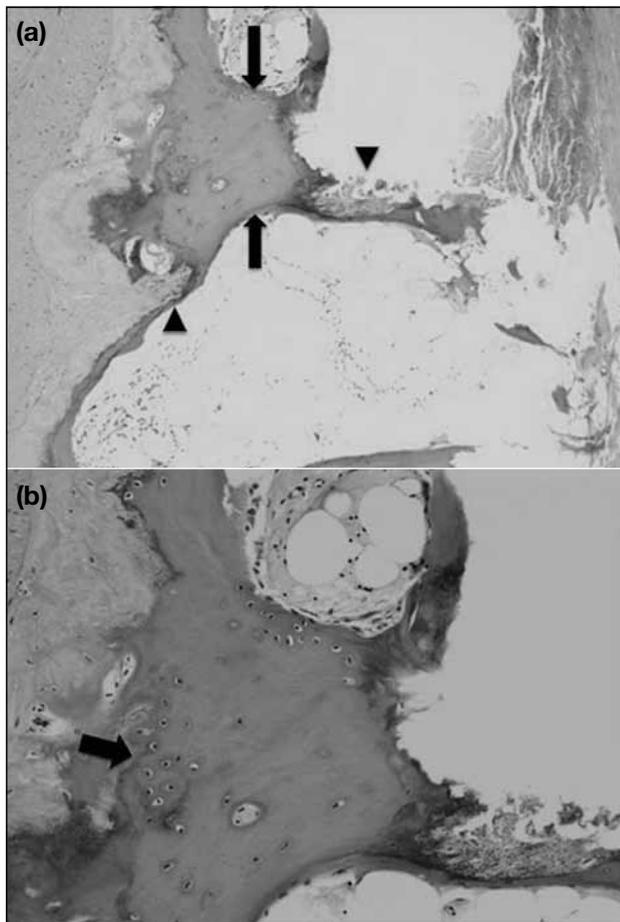


Figure 3. (a) The right breast fibroadenoma shows focal areas of osseous metaplasia consisting of bone trabeculae (arrows) and bone marrow formation (arrowheads) [H&E; original magnification, x 100]. (b) Osteocytes within their lacuna (arrow) are shown (H&E; original magnification, x 200).

DISCUSSION

Mammography is widely used as a screening tool for breast malignancy. Apart from abnormal breast density and masses, abnormalities like calcifications are also looked for. Coarse and dense popcorn-like calcifications are so typical of degenerated fibroadenomas that they are considered BI-RADS category 2, which are definitely benign mammographically. In general, nodules with such calcification do not require additional sonographic evaluation.¹ Ultrasound would only be performed if there are associated specific lesions that needed further assessment.

Calcium deposits in breast tissue result in breast calcification. Calcification needs to be differentiated

from ossification.² Ossification does not commonly occur during calcification whereas calcification is a necessary process during ossification. Calcifications are commonly found on mammography and are classified according to size into macrocalcifications and microcalcifications. Microcalcifications, when suspicious, may be biopsied stereotactically or under ultrasound guidance if an ultrasound-visible lesion is present. Suspicious microcalcifications are an important feature in invasive and in-situ breast carcinomas.³ Benign indeterminate calcifications usually occur due to fibrocystic changes, stromal calcification, and fibroadenomatoid hyperplasia. Less common causes include involutional change, sclerosing adenosis, duct ectasia, apocrine change, mucocele, and blunt duct adenosis.³ Coarse popcorn-like calcifications on mammography are often seen as involuting fibroadenomas.³

Mammary fibroadenomas very rarely exhibit metaplastic ossification.⁴ Ossification is the process of laying down new material by cells called osteoblasts. The exact mechanism by which bone development is triggered remains unclear. Although osseous metaplasia in fibroadenoma is rare, this phenomenon may create difficulty in distinguishing clinical and mammographic primary mammary osteosarcoma, because these lesions can also present as well-circumscribed, radiodense mass.⁵

Primary osteosarcomas of the breast are believed to arise either from mesenchymal cells *de novo*, that is, stepwise progression from osseous metaplasia, or from transformation of osseous metaplasia in a fibroadenoma or phyllodes tumour.⁶ Osseous metaplasia and osteosarcoma arising *de novo* from mesenchymal tissues of the breast have rarely been documented in previous literature.⁷ Smith and Taylor⁸ have classified osseous-containing breast tumours into four groups: lesions similar to mixed tumours of the salivary gland, cystosarcoma phyllodes with bone as stromal component, stromal sarcomas, and adenocarcinoma with osseous metaplasia.⁸

In this patient, the sonographic appearance revealed an irregular margin at the superficial aspect of the calcified lesion and this led to decision of a biopsy to exclude malignancy. Unfortunately, the histopathological results were discordant and showed no evidence of malignancy. Subsequently, an excision biopsy performed revealed osseous metaplasia on histopathology. Follow-up with

mammogram a year later showed no remaining or new areas of calcification. In hindsight, the excision biopsy performed was indeed a right step in the management to prevent the likelihood of sarcomatous transformation occurring within the lesion. It could also be postulated that the metaplastic process had resulted in the irregular outline of the lesion.

There has been reports from previous literature that a malignant phyllodes tumour with osteosarcomatous transformation had occurred in a benign lesion with osseous metaplasia seen 2 years earlier.⁹ Another case had primary mammary osteosarcoma arising de novo from mesenchymal breast tissue, at a site that was biopsied 4 years prior which revealed osseous metaplasia back then.¹⁰ These findings from literature further reinforce the belief that tissues with osseous metaplasia should be excised to achieve comprehensive pathological assessment, as mammary osseous metaplasia can be considered a precursor to formation of osteosarcoma. Breast osteosarcoma is an aggressive disease, resistant to treatment, and offers only a short survival period after diagnosis.

In summary, this case reiterates that coarse popcorn-like calcification in the breast is not necessarily always a benign entity. Such cases if encountered should not be relegated, but need to be evaluated with a high index of suspicion using ultrasound to look for associated lesions or suspicious characteristics, and may necessitate

excision biopsy.

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