Pre-operative Diagnosis of Invasive Ductal Carcinoma within a Fibroadenoma by Mammography

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ABSTRACT

Fibroadenomas are the most common benign breast tumors, in which carcinoma rarely develop. We report the imaging findings of an invasive ductal carcinoma arising within the existing fibroadenoma in a 34-year-old young lady. It was diagnosed pre-operatively under suspicious mammographic findings and the malignant diagnosis was confirmed by excision biopsy. The mass showed an explosion of large popcorn-like calcifications with nests of fine pleomorphic calcifications therein, a lobular shape and an obscured margin. The calcifications in the mammogram correlated with histology so well to make the definitely pre-operative diagnosis possible. This case also reminds us that radiologists should always pay attention to the associated malignant imaging characteristics whenever a mass demonstrates typical benign looking calcifications.

CASE REPORT

The patient was a 34-year-old young lady, who presented herself with a recently enlarged right breast lump. It had been observed since high school. There was no history of any other diseases and no family history of breast cancer was reported. A physical examination revealed a 3-cm sized well-defined movable mass at a 12 o’clock position, 2 cm from her right nipple. Axillary and supraclavicular lymph nodes were not palpable. An ultrasound revealed an oval-shaped, mainly circumscribed, heterogeneous hypo-echoic mass with obvious echogenic dots and dense posterior acoustic shadowing (Fig. 1). Several other smaller hypo-echoic nodules were also found in both breasts. Multiple fibroadenomas were considered by the surgeon. The mammography did not only demonstrate popcorn-like coarse calcifications, but also nests of fine pleomorphic calcifications within a lobular-shaped, intermediate dense, obscurely margined mass in the upper portion of her right breast (Fig. 2). These calcifications were too unusual to be ascribed to be pure involuting fibroadenoma, since not all of them were conglomerate, dense and large. The pre-operative diagnosis of a ductal carcinoma in situ (DCIS), with

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Figure 1.
Sonography reveals an oval-shaped, wider than taller, circumscribed, heterogeneous hypoechoic mass with echogenic dots and dense posterior acoustic shadowing.

Figure 2.
Mammogram MLO a. and spot magnified CC view b. showed a 4cm lobular mass with intermediate density, an obscure margin and pleomorphic microcalcifications nested within popcorn like coarse calcifications in the right upper hemisphere.
a possible invasive component within an old fibroadenoma was made. The patient chose to have an excision open biopsy performed and the histopathology showed both in-situ and invasive ductal carcinoma in the background of a fibroadenoma. The carcinoma restricted itself dominantly to the involuting fibroadenoma (Fig. 3). Immuno-histochemical studies were positive for estrogen and progesterone receptors. After a modified radical mastectomy, the final pathologic staging was T2N0M0 by AJCC seventh edition. The patient’s course has been uneventful during two years of post-operative treatment.

DISCUSSION

A fibroadenoma is defined as “a heterogeneous group of genuine biphasic lesions, combining an epithelial component and a quantitatively predominant stromal component” according to the classification of the World Health Organization. It is a frequent cause of nodules in young women, with a peak incidence between 20 year and 35 year old women. They are multiple in 15% of the patients. They are estrogen-dependent, as they grow during pregnancy and under hormone replacement therapy, they participate in lactation and often decrease in the menopause. Conservative management of biopsy-proven fibroadenoma at any age has been reported as a safe alternative to surgical excision, because of their low malignant potential [4].

Fibroadenoma has been rarely associated with the development of malignancy with only over a hundred cases reported in world literature. The histological diagnosis of carcinoma arising within a fibroadenoma has been based on the criterion that the carcinoma cells were limited to a well-defined fibroadenoma or only focally extended into adjacent stroma or ducts, as has been observed in our present case. There is no evidence that these fibroadenomas themselves ever would transform. However, DuPont et al. observed in a case-control study that complex fibroadenomas (those with a cyst greater than 3mm in diameter, sclerosing adenosis, epithelial calcifications or papillary changes) increased the relative risk for future breast cancer development to 3.1 [5]. It is probably not the fibroadenoma that is significant but the epithelial changes contained within contributing to the increased risk, similar to the case of an atypical hyperplasia. A carcinoma occurring in a fibroadenoma may be considered an accidental occurrence of location as the epithelial component of a fibroadenoma is subjected to the same stimuli as rest of the breast parenchyma.

The few cases of carcinoma arising within fibroadenoma in young women have been reported mostly an incidental finding and of an in-situ type, either lobular or ductal carcinomas [2, 6, 7]. Cases of invasive ductal carcinoma within a fibroadenoma are extremely rare. The largest series of 105 cases by Diaz et al. have shown only seven with an invasive ductal carcinoma [2]. The reason for this was probably the earlier discovery of the malignant neoplasm, when it coexisted with an easily palpable fibroadenoma. However, in a review of Japanese literature [8], invasive ductal carcinoma (6 out of 16 cases) was the most common histological type, which contrasts with findings from previously published reports.

Figure 3

**Figure 3.** a. Lower power field: 10 X. Nests of invasive ductal carcinoma within a sharply-bordered fibroadenoma, accompanied with stromal hyalinization and an intra-canicular structure. **b.** High power field: 200 X. The carcinoma cells have high-grade nuclei and a ductular structure. The left side shows hyalinized and calcified stroma of fibroadenoma.
The mean age reported for patients with carcinoma arising in a fibroadenoma is in their fifth decade (around the age of 43 years), 20 years older than the peak age of women diagnosed with simple fibroadenomas. [2] Although our patient is only 34 years old, her right breast lump had been under observation for more than ten years until it enlarged. There are two possible explanations for this difference in the mean age between patients with simple fibroadenomas and those with fibroadenomas bearing concurrent cancers [6]. One explanation is that a delay in removing the fibroadenoma may be a cause of subsequent growth of an in-situ malignant neoplasm, and the other explanation would be that the two lesions, the benign and the malignant, coexisted independently of each other. None of these two theories has been proven as yet.

The development of an enlargement of a fibroadenoma already present does not always have a suspicious implication [9]. Malignancy within a fibroadenoma is difficult to be clinically detected before an operation. Only a few of the malignant cases reported in published studies were diagnosed pre-operatively [10]. A pre-operative needle biopsy leading to the diagnosis of a carcinoma may be undertaken when the fibroadenoma is symptomatic or any abnormal imaging features. Fibroadenomas that harbor carcinoma may be indistinguishable from common benign fibroadenomas. The radiologic diagnosis of a carcinoma within a fibroadenoma is based on the usual suspicious imaging findings, such as a large size, indistinct margins and clustered microcalcifications [7].

Mammographically, dense large calcifications of a benign involuting fibroadenoma, such as popcorn-like calcifications, when observed within a circumscribed mass, are diagnostic and do not require any biopsy. This presented case showed and expelled of the popcorn-like calcifications with fine pleomorphic calcifications, which was an atypical finding for fibroadenoma. As for margins, density of background breast tissue often impedes the determination of whether it is obscured or indistinct. The margins of mass shown by the ultrasound were mainly circumscribed. Calcifications played an important role to predict the histologic feature. We strongly suspected malignancy within the involuting fibroadenoma before biopsy.

The biologic behavior of a carcinoma occurring in a fibroadenoma is not different from that of a breast carcinoma unrelated to a fibroadenoma [3]. Prognosis depends on the grade and the stage at presentation, but fibroadenoma may attract early attention leading to early detection and hence producing a good outcome.

**CONCLUSION**

Mammography advantageously detects and demonstrates the morphology of calcifications, which sometimes could correlate with histology so well rendering the preoperative diagnosis of a carcinoma within fibroadenoma possible. This case reminds both radiologists and clinicians to be aware of the possibility of the coexistence of a benign and a malignant lesion.

**REFERENCES**