Fibromatosis of the breast parenchyma with a benign-like nodular appearance

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Abstract
Introduction
This report discusses Fibromatosis of the breast parenchyma with a benign-like nodular appearance.

Case report
We report the clinical, sonographic and pathologic features of a rare case of primary fibromatosis of the breast parenchyma in a 29-year-old female. Unlike most cases reported in the literature, this tumour presented an oval-shaped nodular mass lacking the typical infiltrating (finger-like) margins both at ultrasonography and macroscopic examination. Frozen section diagnosis revealed a spindle cell proliferation entrapping mammary ducts and lobules and, thus, the provisional diagnosis of 'fibromatosi-like spindle cell proliferation' was rendered, but the possibility of a spindle cell metaplastic carcinoma could not be completely ruled out. The final diagnosis was achieved in formalin-fixed tissues by a combined morphological and immunohistochesmical study. Tumour was composed of long, interlacing fascicles of bland-looking spindle-shaped cells embedded in a variably fibrous stroma. Only focally tumour margins were of infiltrative type. Immunohistochemically, neoplastic cells were stained diffusely with vimentin, smooth muscle actin and β-catenin.

Conclusion
We believe that a correct diagnosis of breast fibromatosis, even on frozen sections, is primarily dependent on awareness by pathologists that this tumour can rarely arise in this unusual site.

Introduction
Deep-sited fibromatosis, also known as 'desmoid-tumour' or desmoid-type fibromatosis, is an infiltrative fibroblastic/myofibroblastic tumour with high risk of local recurrence, but no metastastic potential. It originates principally from the fascia or aponeuroses of muscles of the abdominal wall, shoulder, pelvic girdle, thoracic wall, back, thigh and head and neck region. This tumour can also arise from the mesentery, pelvis and retroperitoneum (so-called 'intra-abdominal desmoids').

Only rarely, desmoid-type fibromatosis may occur at unusual sites, including the breast parenchyma. Primary fibromatosis of the breast is a rare lesion with an incidence of about 0.2% that of breast carcinoma. In fact, mammography reveals non-calcified, hyperdense masses with finger-like margins, while its sonographic appearance reveals speculated, irregular hypoechoic masses with posterior shadowing. Only rarely, cases with mammographic and sonographic features consistent with a benign lesion are available in the English literature.

We herein describe a rare case of fibromatosis of the breast parenchyma presenting as a benign-like nodular mass in a 29-year-old woman. Clinical, sonographic and pathological features are reported and differential diagnostic problems are discussed.

Case Report
A 29-year-old woman presented with a painless mass in the lower outer quadrant of her right breast; the mass had been present for 4 months. Clinically, the mass was not movable and firm in consistency, without overlying skin dimpling or retraction. No axillary lymphadenopathy was noted. Her medical history was unremarkable with

Case Report

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All authors abide by the Association for Medical Ethics (AME) ethical rules of disclosure.

Fibromatosis of the breast parenchyma was assessed in a 54-year-old woman who had no antecedent injury or surgical trauma. The patient showed no stigmata and had no family history suggestive of Gardner’s syndrome or multicentric familial fibromatosis. Ultrasonography showed a 2.5-cm, oval-shaped, mildly hypoechoic mass with heterogeneous internal echo pattern, focally indistinct margins and slightly posterior acoustic enhancement (Figure 1). Microcalcifications and bilateral edge shadowing were not seen. These imaging features were non-specific and the possibility of a phyllodes tumour was suggested. The patient underwent wide surgical excision of the lesion and the surgeon required intra-operative frozen section-based diagnosis. Pathologist made a provisional diagnosis of ‘fibromatosis-like spindle cell proliferation’ (Figure 2), suggesting that a final diagnosis could be rendered only on a formalin-fixed sample, because the possibility of a spindle cell metaplastic carcinoma could not be completely ruled out.

The surgical specimen of the breast measured 7 × 4.5 × 4 cm and contained a central firm, whitish nodular mass measuring 2.5 cm in greatest diameter, with apparently well-circumscribed margins (Figure 3). Histologically, at low magnification, a variably cellular mesenchymal tumour with a fascicular growth pattern and focally infiltrative margins was seen (Figure 4). Tumour was composed of uniform, bland-looking, spindle-shaped cells arranged in long interlacing fascicles separated by a variable amount of fibrous stroma, entrapping mammary ducts, lobules and fat tissue (Figure 5). The spindle cells had a palely eosinophilic cytoplasm and elongated normochromatic nuclei (Figure 5). Cellular atypia, mitoses, necrosis and haemorrhage were not seen. Notably, the more cellular areas blended into hypocellular and more fibrotic areas. Only focally keloid-like fibroscarrotic areas were seen. Rarely, foci of lymphocytes were found. Surgical margins were tumour-free.

Immunohistochemical studies were performed with the labelled streptavidin–biotin peroxidase detection system using the Ventana automated immunostainer (Ventana Medical Systems, Tucson, AZ, USA). A large panel, including the following antibodies, was used: vimentin, epithelial membrane antigen (EMA), pan-cytokeratins (MNF116; AE1/AE3), CD10, S-100 protein, HMB45, α-smooth muscle actin, desmin, myogenin, P63, CD117, oestrogen and progesterone receptors, ALK-1 protein and β-catenin. Neoplastic cells were stained with vimentin, α-smooth muscle actin (Figure 6) and β-catenin. No immunoreactivity was obtained with any other antibodies. On the basis of morphological and immunohistochemical features, a diagnosis of ‘fibromatosis of the breast parenchyma’ was rendered.

Figure 1: Sonography showing an oval-shaped, heterogeneous hypoechoic mass with focally indistinct margins.

Figure 2: Intra-operative frozen section showing a spindle cell proliferation with pushing margins. Uninvolved mammary ducts are seen outside the tumour. Magnification ×100.

Figure 3: Surgical specimen showing a well-circumscribed, whitish, solid, nodular mass.
Histological section from formalin-fixed tissue. The spindle cell proliferation exhibited focally infiltrative margins (lower right corner). Magnification ×80.

The patient is well with no evidence of local recurrence after a 6-year follow-up period.

Discussion
The typical radiological and macroscopic appearance of primary fibromatosis of the breast is that of a solid mass with poorly, frequently finger-like, margins, highly suspicious for malignancy. On the basis of these observations, it is noteworthy that radiological features of primary breast fibromatosis are non-specific, being similar, if not identical, to those described in invasive breast carcinoma. Only rarely, this soft tissue tumour may present with radiological features, suggestive of a benign lesion.

We report a rare case of primary fibromatosis of the breast which presented as a nodular mass with apparently circumscribed margins. Sonography revealed a 2.5-cm, heterogeneous hypoechoic, oval-shaped mass with focally indistinct margins. A wide excisional biopsy was performed and a frozen-section diagnosis of ‘fibromatosis-like spindle cell lesion’ was proposed. Histological examination of the formalin-fixed tissues revealed a bland-looking spindle cell tumour arranged in long, interlacing fascicles that infiltrated mammary fat and ducts/lobules. Notably, tumour margins were only focally of the infiltrative type. This finding explained the benign-like nodular appearance detected at both sonographic and macroscopic examination. Although the histological diagnosis of fibromatosis is usually straightforward for superficial- and deep-seated soft tissue lesions, it may be challenging when this tumour occurs at unusual sites, including breast parenchyma. In this regard, fibromatosis of the breast potentially poses differential diagnostic problems with a wide variety of benign and malignant spindle cells lesions, including nodular fasciitis, inflammatory myofibroblastic pseudotumour, myofibroblastoma, leiomysarcoma, malignant myoepithelioma and fibromatosis-like low-grade sarcomatoid/metaplastic carcinoma. However, in our opinion, desmoid-type fibromatosis of the breast needs to be distinguished, especially from myofibroblastoma, inflammatory myofibroblastic pseudotumour and low-grade sarcomatoid/metaplastic carcinoma. The former is a benign tumour arising in the mammary stroma, which can be confused with fibromatosis in that it is composed of spindle-shaped cells arranged in short intersecting fascicles interrupted by keloidal-like collagen bands. In myofibroblastomas that contain a significant intratumoural fatty component (lipomatous myofibroblastoma), the spindle-shaped cells, closely intermingling with adipocytes, impart a fibromatosis-like infiltrative pattern to the tumour. Unlike myofibroblastoma, fibromatosis exhibits infiltrative, at least focally, margins, entraps fat and glandular breast tissue, and the neoplastic cells lack diffuse expression of desmin, CD34, oestrogen/progesterone receptors and bcl-2 protein. Inflammatory myofibroblastic pseudotumour is a fibro-inflammatory lesion which can be rarely encountered in the breast parenchyma. It is composed of spindle-shaped cells arranged in a fascicular, and less frequently, storiform growth pattern. Unlike fibromatosis, this reactive lesion contains a significant component of inflammatory cells, including plasma cells, lymphocytes and eosinophils. Although it shows immunoreactivity for α-smooth muscle actin, ALK-1 protein is expressed in about 40–50% of cases, while β-catenin, a marker which is typically found...
in most cases of fibromatosis, is not expressed. Fibromatosis-like low-grade sarcomatoid/metaplastic carcinoma is a malignant tumour composed predominantly/exclusively of spindle cells with a minority of epithelioid cells which tend to aggregate in small nests or more rarely, in pseudo-glandular structures. Although there is the possibility that a minority of neoplastic cells of this carcinoma may express α-smooth muscle actin, they show immunoreactivity, at least focally, with cytokeratins and EMA.

The present case emphasizes that primary fibromatosis of the breast may rarely exhibit as a nodular mass with circumscribed margins. This suggests that breast fibromatosis may lack the typical radiological features suspicious for malignancy. The diagnosis is histologically-based and the morphological criteria are similar to those of desmoid-type fibromatosis of soft tissues. We believe that a correct diagnosis of breast fibromatosis, even on frozen sections, is primarily dependent on awareness by pathologists that this tumour can rarely arise in this unusual site. However, due to morphological overlapping between fibromatosis and fibromatosis-like low-grade spindle cell sarcomatoid carcinoma, we recommend a provisional diagnosis of ‘fibromatosis-like spindle cell lesion’ at frozen section biopsy, suggesting that a final diagnosis can be rendered on a surgically-excised lesion by a combined interpretation of morphological and immunohistochemical features.

**Consent**

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal.

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