Intraparenchymal Leiomyoma of the Breast: A Case Report and Review of the Literature

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Abstract. We report a case of an intraparenchymal leiomyoma of the breast with description of the radiologic, histopathologic, and immunohistochemical findings. To the best of our knowledge, this is the first case of an intraparenchymal leiomyoma of the breast diagnosed by core needle biopsy and the 22nd case described in the literature. In addition, we review the literature on this uncommon breast neoplasm.

Keywords: leiomyoma, breast neoplasm

Introduction

Leiomyomas are benign smooth muscle neoplasms that can occur anywhere in the body. When they occur in the breast they are more commonly seen in the subareolar position and have been reported in both men and women [1]. Intraparenchymal leiomyomas of the breast are described exclusively in women and are extremely rare with only 21 cases reported in the literature [2-22]. Diagnosing these lesions as benign is essential for proper treatment. We report a case of an intraparenchymal leiomyoma of the breast and summarize the radiologic, histopathologic, and immunohistochemical findings. To the best of our knowledge, this is the first case of an intraparenchymal leiomyoma of the breast diagnosed by core needle biopsy.

Case Report

A 48-yr-old woman presented with a non-palpable low density oval mass at the 9 o’clock position of the left breast, 14 cm from the nipple, that was detected by screening mammography. The patient’s physical examination was unremarkable. There was no evidence of skin changes, nipple discharge, or axillary lymphadenopathy. Her past surgical history was significant for 2 excisional breast biopsies, 8 and 18 yr previously, that were benign. She was pre-menopausal and not on hormone therapy. She had her menarche at 11 yr of age and her first full-term pregnancy at 35 yr of age. She had a significant family history in that her paternal grandmother developed breast cancer postmenopausally.

Imaging findings. Mammographic images showed a 1.2 cm isodense, oval mass with indistinct margins in the left breast (Fig. 1). The mass was located in the medial, posterior aspect of the breast within the retroglandular fat. The mass was assessed as a BI-RADS category 4, suspicious finding. The mass was not visualized on sonography.

Pathologic and immunohistochemical findings. A stereotaxic mammotome core biopsy was performed using a vacuum assisted device and an 11-gauge needle. The mammotome biopsy showed a circumscribed proliferation of bland spindle-shaped cells forming interlacing bundles and fascicles (Fig. 2). The spindled cells had ovoid nuclei, delicate chromatin, and small inconspicuous nucleoli with...
abundant eosinophilic cytoplasm. No evidence of necrosis or mitotic activity was seen. Immunohistochemical stains showed diffuse strong positivity for desmin and smooth muscle actin (Fig. 3) and focal strong positivity for muscle specific actin. Immunohistochemical stains for CD34 and S100 protein were negative. A smooth muscle tumor, specifically a leiomyoma, was favored. The patient underwent surgical excision of the lesion. On gross examination, a 1.0 cm well circumscribed, rubbery, white mass with a white whorled cut surface was noted. Histologically, the mass consisted of interlacing fascicles of spindle-shaped cells. The nuclei of the spindle-shaped cells were ovoid with blunt ends and uniform nuclei with delicate chromatin, and occasional small nucleoli; the cells had abundant eosinophilic cytoplasm and indistinct cell borders (Fig. 4). No mitotic figures, cytologic atypia, or necrosis was seen. Immunohistochemical staining was identical to that seen in the core needle biopsy. A diagnosis of intraparenchymal leiomyoma was made.

Discussion

Unlike leiomyomas found in the uterus and gastrointestinal tract, leiomyomas of the breast parenchyma are extremely rare. All cases have occurred in women, most commonly between the fifth and seventh decade of life. This contrasts with the more common superficial leiomyoma of the areolar region of the breast that occurs in both sexes [1]. Only 21 cases of intraparenchymal leiomyoma of the breast have been reported to date [2-22] (Table 1). Our case represents the 22nd description of this uncommon neoplasm and the first case diagnosed by needle core biopsy.
Table 1. Clinical findings in 22 reported cases of intraparenchymal leiomyoma of the breast.

<table>
<thead>
<tr>
<th>Ref. #</th>
<th>Age (yr)</th>
<th>Duration (mo)</th>
<th>Location</th>
<th>Size (cm)</th>
<th>Symptoms</th>
<th>Treatment</th>
</tr>
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<tr>
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<td>46</td>
<td>48</td>
<td>RUO</td>
<td>6.0</td>
<td>Discomfort</td>
<td>NR</td>
</tr>
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<td>Discomfort</td>
<td>Excision</td>
</tr>
<tr>
<td>4</td>
<td>45</td>
<td>180</td>
<td>RL</td>
<td>3.0</td>
<td>Pain X 2 months</td>
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<td>5</td>
<td>58</td>
<td>204</td>
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<tr>
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<td>Discomfort</td>
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<td>7</td>
<td>40</td>
<td>120</td>
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<td>10</td>
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<td>8</td>
<td>50</td>
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<td>Tenderness</td>
<td>Excision</td>
</tr>
<tr>
<td>9</td>
<td>52</td>
<td>0.5</td>
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</tr>
<tr>
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</tr>
<tr>
<td>15</td>
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<td>12</td>
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<td>10</td>
<td>Rapidly enlarging mass</td>
<td>Excision</td>
</tr>
<tr>
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<tr>
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<td>None</td>
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RUO, right upper outer, RL, right lower, C, central, RUI, right upper inner, LLO, Left lower outer, RUC, right upper central, LU, left upper, LUI, left upper inner, LUO, left upper outer, LI, left inner, NR, not reported.

Most reported cases gave no evidence of systemic disease or lymphadenopathy, but some complained of discomfort or pain. Skin changes were noted in only one case [21]. Size was variable with a range from 5 mm to 13.8 cm [5,8,11]. Most patients had a history of the mass for several yr, up to 26 yr in one report [6]. Cases reported after 1947 were treated with segmental excision [tylectomy] with good outcomes and no evidence of recurrence [7-22]. In a report by Boscaino et al [23], 2 cases initially diagnosed as leiomyoma recurred, one as a smooth muscle tumor of uncertain prognosis and the other as a leiomyosarcoma. Careful evaluation of these cases showed that while these neoplasms were bland appearing, they had mitotic activity of 2 mitotic figures per 10 high-power fields and thus may be better classified as smooth muscle neoplasms of indeterminate prognosis, instead of ordinary leiomyomas [23].

The histologic findings in our case are typical. Commonly the tumor is composed of interwoven bundles of spindle-shaped smooth muscle cells. The spindled cells are characterized by blunt-ended nuclei and abundant eosinophilic cytoplasm. While mitotic figures have been described in a few reports of intraparenchymal leiomyomas [2-4], none have shown abundant mitotic activity, necrosis, or evidence of atypical nuclei. Immunohistochemically, these lesions are characterized by positivity for muscle specific actin, desmin, and vimentin. In
addition, these lesions are found to be negative for S-100 protein and cytokeratin [10]. An epithelioid variant of intraparenchymal leiomyoma has been described [12]. While the histologic findings of an intraparenchymal leiomyoma are similar on core biopsy as compared to excisional biopsy, the small amount of tissue obtained by core biopsy may make an accurate diagnosis more challenging.

Differentiating benign intraparenchymal leiomyoma from other breast lesions is essential to determining proper treatment. Tumors included in the pathologic differential diagnosis include leiomyosarcoma, the spindle cell variant of adenomyoepithelioma, myofibroblastoma, fibromatosis, benign nerve sheath tumors including neurofibromas, and benign and malignant phylloides tumors [10,17,22].

Leiomyosarcoma is the most important lesion to be distinguished from an intraparenchymal leiomyoma as the treatment, recurrence rates, and prognosis differ [24]. Similar to intraparenchymal breast leiomyomas, these tumors seldom are associated with lymphadenopathy or skin and nipple changes and many are present for many years prior to diagnosis [24]. On mammography these lesions appear similar to benign lesions as they are well circumscribed [25]. Since leiomyosarcoma and intraparenchymal leiomyomas share similar clinical and radiologic presentations, histologic examination is essential to definitively diagnose them. Histologically, leiomyosarcomas show marked cytologic atypia, numerous mitotic figures, atypical mitotic figures, vascular invasion, and necrosis [26].

The spindle cell variant of adenomyoepithelioma is a biphasic tumor that has spindled myoid cells that may be confused with the spindled cells seen in leiomyoma, but it also is composed of tubular glands [27]. Immunohistochemistry is useful in distinguishing these lesions, since adenomyoepitheliomas show S-100 protein and cytokeratin positivity [27]. While myofibroblastomas are composed of ovoid to spindle-shaped cells arranged in short intersecting fascicles similar to leiomyomas, they characteristically show broad bands of collagen interspersed between the fascicles [28].

Fibromatosis can show a similar histologic picture, with spindled cells arranged in long sweeping fascicles with a variable amount of fibrous stroma. However, in fibromatosis the lesions usually have infiltrative margins rather than the circumscribed margins noted in intraparenchymal leiomyoma [28].

Benign tumors of nerve sheath origin such as schwannomas or neurofibromas show interlacing bundles of elongated spindle-shaped cells [29,30]. Positivity for S-100 protein can aid in distinguishing these lesions.

On mammography, the majority of intraparenchymal leiomyomas have well-defined margins [10,11,16,17,19,20] that appear homogeneous and moderately [17] or highly dense [19]. Pertinent negatives include the absence of microcalcification, architectural distortion, skin thickening, or nipple retraction [17,19]. In one case the lesion was found to have slightly irregular borders [14].

Sonographically these lesions are mainly solid, circumscribed homogeneous nodules without cystic features. One case was described as a lobulated mass [16] and another was found to have irregular borders [14]. While 2 lesions were described as hypoechoic [18,20], the lobulated mass was noted to be isoechoic to hyperechoic with cystic features [16]. Posterior echoes may be lacking [16], decreased [21], or slightly enhanced [19]. Although the lesion in our case was not visualized on sonography, a solid mass with an isoechoic echo pattern may be relatively inconspicuous when surrounded by fat lobules, possibly explaining the findings in our case. As the sonographic findings are varied, accurately classifying this lesion requires tissue sampling [16,19].

Radiographically the most common differential diagnosis would be a fibroadenoma, the most frequent benign tumor of the breast. Similar to breast leiomyomas, these masses present as well-circumscribed, smooth, mobile masses. Compared to intraparenchymal leiomyomas these tumors usually present in younger women with the peak incidence in the third decade of life [31]. Benign and malignant phylloides tumors are also considered in the differential. Fibroadenomas and benign phylloides tumors can be distinguished histologically as they contain both stromal and epithelial components in various patterns. A lack of malignant features rules out a malignant phylloides tumor.
Whereas the more common subareolar leiomyomas of the breast are believed to develop from smooth muscle tissue found in that region of the breast, the origin of the intraparenchymal leiomyoma remains unclear. Theories include proliferation of smooth muscle cells surrounding blood vessels, teratoid origin with the extreme overgrowth of myomatous elements, differentiation from multipotent mesenchymal cells in breast tissue, and derivation from myoepithelial cells of breast ducts with clear differentiation to smooth muscle, or embryologically displaced smooth muscle cells from the nipple [10,14,17].

The relationship between the use of Tamoxifen and breast leiomyomas remains speculative. Tamoxifen has been shown to increase the growth of uterine leiomyomas; thus it is hypothesized to increase the size of breast leiomyomas. In one case a woman taking Tamoxifen had an increase in the size of a mammary leiomyoma over the course of 3 yr [16]. Whether this increase in size was related to the use of Tamoxifen is unknown, but given the effect of Tamoxifen on uterine leiomyomas, the relationship between breast leiomyomas and Tamoxifen administration should be explored. In another recent report, the possible link between the anti-obesity drugs sibutramine and orlistat and the growth of breast leiomyomas is questioned, but further studies are needed to confirm this association [20].

The treatment for intraparenchymal leiomyoma of the breast is simple excision. Due to the benign nature of these lesions, more extensive surgery is not indicated; however, as noted above, thorough histological examination is essential for a proper diagnosis.

In conclusion, intraparenchymal leiomyoma of the breast is an extremely rare tumor that can clinically and radiographically mimic other breast lesions. While this tumor can be recognized on needle core biopsy, immunohistochemistry can be helpful to characterize the lesion and confirm the diagnosis.

References