

# Large Subpectoral Lipoma on Screening Mammography

Andres Su<sup>1\*</sup>, Laurie Margolies<sup>1</sup>

*1. Department of Radiology, Icahn School of Medicine at Mount Sinai, New York, USA*

\* **Correspondence:** Andres Su, MD, Department of Radiology, Icahn School of Medicine at Mount Sinai, One Gustave L. Levy Place, Box 1234, New York, NY 10029-6574, USA  
(✉ [andres.su888@gmail.com](mailto:andres.su888@gmail.com))

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## ABSTRACT

A 61 year-old woman presenting for bilateral screening mammogram was found to have an oval fat-density mass in the posterior right breast, partially visualized, with anterior displacement and thinning of the pectoralis major muscle. This mass was found on CT and MRI correlation to represent a large fat-containing mass, likely a lipoma, deep to the pectoralis major. On subsequent screening mammograms, the visualized portion of the mass remained stable. Subpectoral lipomas and intramuscular lipomas within the pectoralis major are rare, and their appearance on mammography may not be familiar to most radiologists. A review of the literature and a discussion of their appearance on multiple imaging modalities is provided.

## CASE REPORT

### CASE REPORT

A 61 year-old woman presented for bilateral screening mammogram. The patient was unwilling to provide prior breast imaging. She denied personal history of breast cancer, breast intervention, or family history of breast cancer. In the right breast on mediolateral oblique (MLO) view, an oval, circumscribed, fat-density mass was partially visualized in the posterior breast, deep to the pectoralis major muscle, with anterior displacement and thinning of the muscle margin. On craniocaudal (CC) view, the mass lay outside the field of view and was not visualized, although image quality was deemed adequate for a screening mammogram based on measurement of the posterior nipple line.

At our institution, the patient had undergone a recent contrast-enhanced computed tomography (CT) of the abdomen and pelvis for abdominal pain. On the superior most slices, a fat-density mass was partially visualized deep to the lateral pectoralis major muscle, displacing the muscle anteriorly. On the available images, this oblong, well-defined mass measured up to 4.5 x 0.8 cm (transverse x anterior-posterior).

Although the mass was incompletely visualized on mammography, its circumscribed and homogeneously fatty appearance was reassuring. The mammogram was assigned the BI-RADS 2 category: benign findings with recommendation for routine annual screening mammography. Since the mass was retromammary and fat-containing, it did not merit a BI-RADS 0 category requiring further evaluation with ultrasound. As is standard practice at our institution, the patient was repeatedly asked to procure prior imaging for comparison, but none was ultimately provided.

On screening mammograms one year and four years after the first, the visualized portion of the mass remained stable. On the most recent mammogram, the mass was included on CC view for the first time in the far posterior depth, resembling the contour of the normal pectoralis major muscle, but distinguished from muscle by the presence of fat density.

The patient subsequently underwent contrast-enhanced magnetic resonance cholangiopancreatography (MRCP) to evaluate an indeterminate hypodensity seen in the pancreatic body/tail on CT. On the superiormost images on post-contrast T1-weighted images, a much larger portion of the subpectoral

mass was visualized, measuring up to 11.3 x 2.9 cm (transverse x anterior-posterior). The mass followed fat intensity on all sequences including single-shot fast spin echo (SSFSE) T2, fat-saturated T2, and fat-saturated precontrast T1. There were no soft tissue components, T2-hyperintense foci, or thick or nodular septations. Post-contrast images demonstrated no focal enhancement within the mass. There was no similar lesion on the left. On MRI, the mass was interpreted as most consistent with a lipoma.

## DISCUSSION

### Etiology & Demographics:

Lipomas are one of the most common mesenchymal tumors and occur for the most part sporadically. In a minority of cases, lipomas occur in patients with a known genetic predisposition such as the PTEN hamartoma tumor syndrome [1]. Typically, lipomas present in adulthood between the ages of 30 and 60 as slow-growing masses. Subcutaneous lipomas occur more commonly than intra-abdominal, intramuscular, or intraosseous lipomas [2]. The etiology of lipomas remains unclear, but a combination of endocrine, metabolic, and genetic abnormalities contributing to overgrowth of mature adipocytes is suspected. Lipomas are also known to develop following chronic (such as occupational) and acute trauma. Proliferation of adipose tissue following rupture of fibrous septae and herniation of fat has been proposed as a pathophysiology in post-traumatic cases [3]. Post-traumatic lipomas have been reported in many locations including the lower extremities, buttocks, abdomen, shoulders, face, and hands [4]. When secondary to acute trauma, they typically become apparent 2-12 months after an event [3]. There is a single reported case of post-traumatic lipoma developing in a subpectoral location, which presented four months after a motor vehicle accident with trauma to the chest [4].

Overall, lipomas found within the pectoralis major or in a subpectoral location are extremely rare. Four cases of subpectoral lipoma have been reported in the English-language literature to date [4,5,6,7], and additional cases may be found in the international literature [8,9]. Three cases of lipoma and two cases of liposarcoma have been described in an intramuscular location within the pectoralis major [2,10,11,12,13]. Of course, lipomas of the breast itself are more common than either subpectoral or intramuscular pectoralis major lipomas. Moreover, small lipomas in general are more common than large or "giant" lipomas, defined as those that measure over 10 cm in greatest dimension, as in our case [7, 14].

### Clinical & Imaging Findings:

Reported cases have presented with a unilateral chest wall bulge or swelling, with or without a discrete palpable mass. Contraction of the pectoralis major muscle may exaggerate the bulging of the lipoma [7] or displace it superiorly [4]. The mass may be tender [5] or non-tender [4] to palpation. The presence of associated symptoms in the ipsilateral upper

extremity is variable. Two cases in the literature describe thoracic outlet syndrome secondary to subpectoral lipomas, with symptoms including weak handgrip, a cold upper extremity, arm swelling, and paresthesias [5,6].

On CT, a subpectoral lipoma appears as a well-circumscribed, homogeneous, fat-density mass displacing the pectoralis major muscle anteriorly. In contrast, an intramuscular lipoma expands the muscle itself and is sometimes interspersed with muscle fibers, resulting in an infiltrative appearance. On magnetic resonance imaging (MRI), the mass follows the intensity of fat on T1 and T2 images, and fat saturation should confirm the presence of macroscopic fat. On post-contrast imaging, the lipoma should demonstrate no significant enhancing nodular or mass-like components. On mammography, the lipoma may be seen as a partially visualized, far posterior, fat-density mass displacing the pectoralis major muscle anteriorly. Like any primarily fatty lesion, the subpectoral lipoma should appear hyperechoic on ultrasound relative to the adjacent muscle.

Although there is some overlap in imaging appearance between lipomas and well-differentiated liposarcomas, the existing literature suggests some key differentiating features. Imaging can reliably identify lipomas when they demonstrate a homogeneous fatty composition. Thin septations may be seen in lipomas and are not in and of themselves suggestive of malignancy. Thick septations, on the other hand, favor liposarcoma. In a significant minority of cases (almost a third in one case series), lipomas may demonstrate nonadipose regions and/or calcification on imaging. On pathology, these changes are often attributed to fat necrosis with secondary inflammation and myxoid or fibrous change. However, a significant nonadipose, enhancing component comprising more than 25% of the lesion, or with a nodular or mass-like appearance, confers a higher likelihood of malignancy. The larger the lesion, the more likely it is to represent liposarcoma, particularly greater than 10 cm. Male sex and age greater than 60 years both increase the likelihood of liposarcoma over lipoma. [15]

### Treatment & Prognosis:

Treatment, if indicated or desired, is complete surgical excision, which may be performed for aesthetic reasons, symptomatology secondary to mass effect, or risk of malignancy. Transaxillary approaches are more commonly described than an inframammary approach [4,5,6]. One case report describes the intraoperative use of an endoscope to facilitate submuscular dissection [7]. In both reported cases of thoracic outlet obstruction secondary to subpectoral lipoma, symptoms resolved following excision at five-week and six-month follow-up, respectively [5,6].

In the case of a pathologically proven benign lipoma, the primary risk is recurrence following surgery, especially in the setting of an incomplete resection.

Differential Diagnosis:

On mammography, the curvilinear density representing the compressed, overlying muscle and retroglandular fat may be mistaken for a skin fold. Anterior displacement of the muscle margin and the absence of muscle density posterior to this curvilinear density should raise suspicion for a fat-containing retromammary mass.

The principal task on cross-sectional imaging is to exclude features suggestive of aggressive soft tissue malignancy such as liposarcoma.

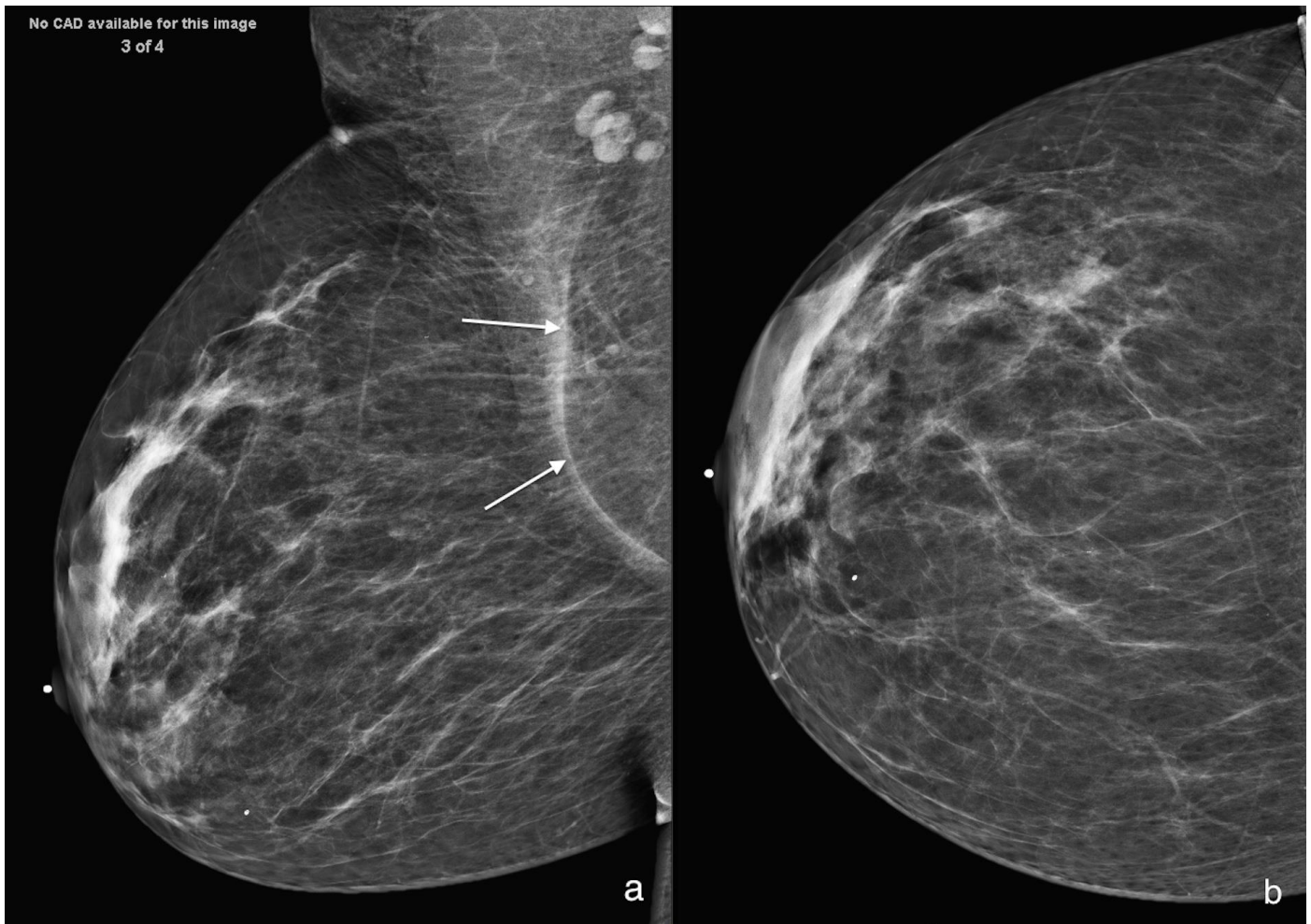
## TEACHING POINT

Subpectoral lipomas and intramuscular lipomas of the pectoralis major, whether idiopathic or post-traumatic, may present as a clinically palpable mass with or without associated symptoms, or be found incidentally on screening mammography as a fat-density, far posterior mass displacing the overlying muscle anteriorly. Cross-sectional imaging is useful to evaluate for aggressive features, monitor for stability over time, and/or plan for surgical (typically transaxillary) resection.

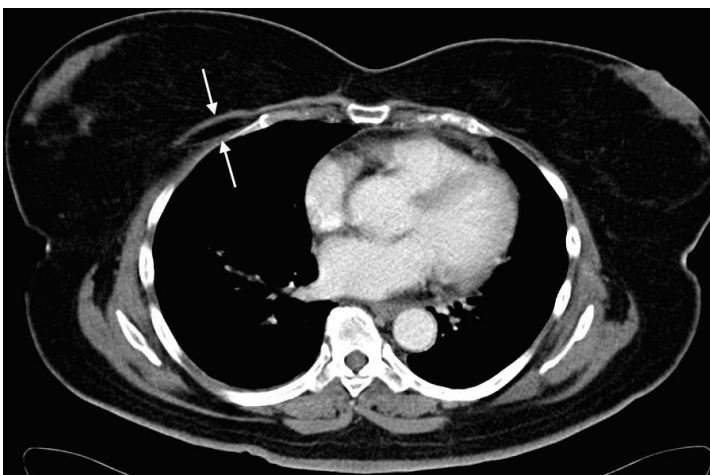
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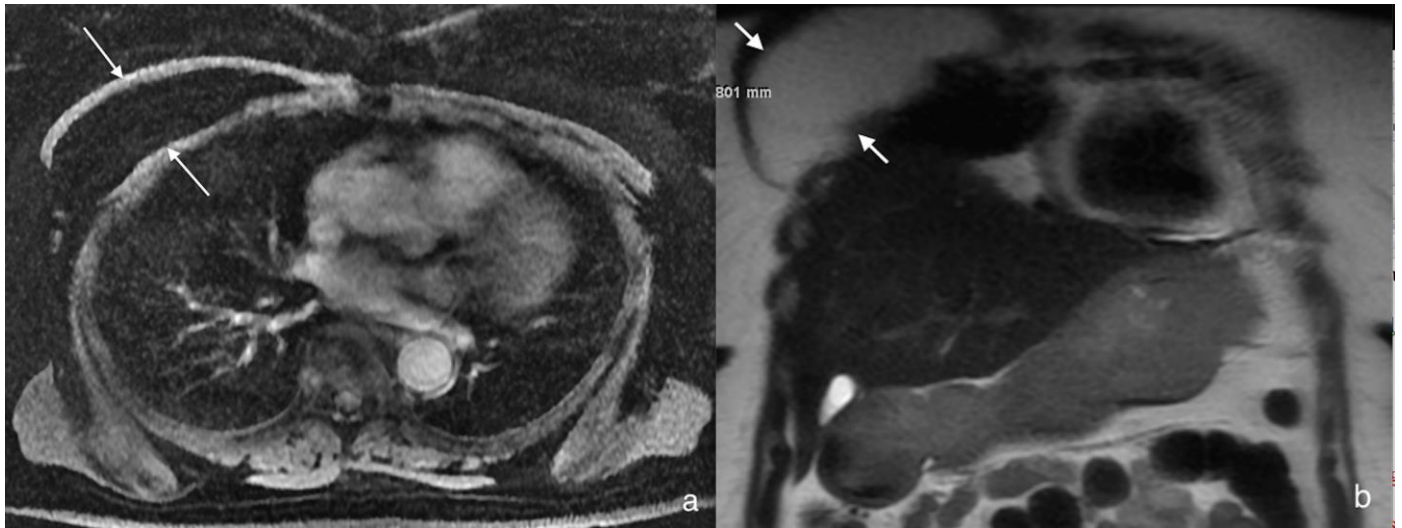
## FIGURES



**Figure 1:** 61 year-old woman presenting for screening mammogram. Findings: On MLO view of the right breast (a), an oval, circumscribed, fat-density mass (arrows) is partially visualized in the posterior breast, deep to the pectoralis major muscle, with anterior displacement and thinning of the muscle margin. No correlate is seen on CC view of the right breast (b). Diagnosis: Subpectoral lipoma. Technique: 106 mAs, kVp 30

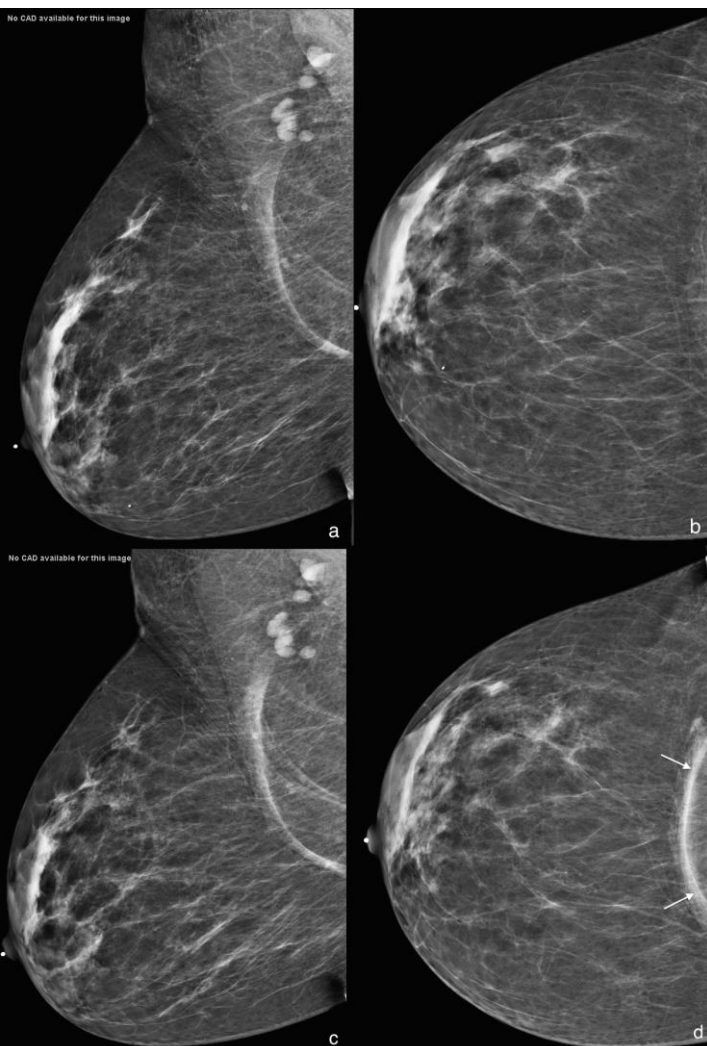


**Figure 2 (left):** 61 year-old woman presenting for CT for abdominal pain. Findings: On the axial images, superiormost slices, an incompletely visualized, homogeneously fat-density mass (arrows) displaces the pectoralis major muscle anteriorly, and measures up to 4.5 x 0.8 cm on the available images. Diagnosis: Subpectoral lipoma. Technique: 306 mA, kVp 120



**Figure 3:** 62 year-old woman presenting for MRI of the abdomen for further delineation of pancreatic hypodense lesion identified on CT. On the superiormost axial post-contrast T1-weighted images with fat suppression (a), a large intermuscular mass is partially visualized displacing the right pectoralis major anteriorly. The mass demonstrates uniform low signal on fat-suppressed images without any thick septation, nodular component, or internal enhancement. The mass is homogeneous and follows fat intensity on the non-fat-saturated coronal T2-weighted images as well (b). Diagnosis: Subpectoral lipoma.

Technique: MR was performed on a GE® 3 T magnet. The parameters are as follows: a) axial T1-weighted sequence with fat suppression after administering 13 mL Multihance® gadolinium intravenous contrast (TR 4.063; TE 1.674), slice thickness 4.6 mm; b) coronal single-shot fast spin echo T2 (TR 1260.8; TE 98.736), slice thickness 5 mm.



**Figure 4 (left):** 62 year-old woman presenting for screening mammogram, with MLO and CC views respectively at one year (a, b) and four years (c, d) after initial screening mammogram. On the most recent mammogram, the mass was included for the first time on CC view (d) in the far posterior depth, resembling the contour of the normal pectoralis major muscle, but distinguished from muscle by the presence of fat density (arrows).  
Diagnosis: Subpectoral lipoma.

Technique on 4/22/2013 mammogram (a, b): 139 mAs, kVp 30

Technique on 10/06/2016 mammogram (c, d): 103 mAs, kVp 30

<b>Etiology</b>	Lipomas are slow-growing masses composed of mature adipocytes. Their etiology is unclear, but a combination of endocrine, metabolic, and genetic abnormalities is suspected. In addition, they are known to develop following chronic or acute trauma. Proliferation of adipose tissue following rupture of fibrous septae and herniation of fat has been proposed as an etiology in post-traumatic cases.
<b>Incidence</b>	Subpectoral lipomas are very rare. There are four reported cases in the English-language literature.
<b>Gender ratio</b>	1 male, 3 female among the reported cases
<b>Age predilection</b>	Ages 30-60 (all lipomas)
<b>Risk factors</b>	Chronic/acute trauma; syndromes such as PTEN hamartoma tumor syndrome
<b>Treatment</b>	Surgical excision if indicated/desired
<b>Prognosis</b>	Lipomas are usually slow-growing but occasionally may enlarge rapidly. If benign, primary risk is recurrence following resection, especially in the setting of incomplete resection.
<b>Findings on imaging</b>	On mammography and CT, the subpectoral lipoma appears as a fat-density mass displacing the pectoralis major muscle anteriorly. On MRI, the lipoma homogeneously follows fat signal on all sequences, and may contain thin septations. On cross-sectional imaging, the mass should contain no thick septations, nodular enhancing components, or other aggressive features.

**Table 1:** Summary table for Subpectoral Lipoma.

<b>Diagnosis</b>	<b>Mammography</b>	<b>CT</b>	<b>MRI</b>
<b>Intramuscular / subpectoral lipoma</b>	Partially visualized, far posterior, fat-density mass displacing the anterior margin of the pectoralis major muscle.	Well-circumscribed, fat-density mass displacing the pectoralis major muscle anteriorly.	Follows the intensity of fat on T1 and T2 images. Fat saturation should confirm the presence of macroscopic fat.
<b>Skin fold</b>	Linear density overlying breast/muscle tissue. Will not displace adjacent tissue. May resolve with repeat imaging or repositioning.	Easily distinguished on cross-sectional imaging.	Easily distinguished on cross-sectional imaging.
<b>Liposarcoma</b>	Variable; may not demonstrate homogeneous fat density.	More likely if thick septations, nodular enhancement, or greater than 25% nonadipose tissue is present, or if larger than 10 cm	More likely if thick septations, nodular enhancement, or greater than 25% nonadipose tissue is present, or if larger than 10 cm

**Table 2:** Differential diagnosis table for Subpectoral Lipoma.

#### ABBREVIATIONS

CC = craniocaudal  
 CT = computed tomography  
 MLO = mediolateral oblique  
 MRCP = magnetic resonance cholangiopancreatography  
 MRI = magnetic resonance imaging

#### KEYWORDS

subpectoral lipoma; chest; MRI; mammography; pectoralis major

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