Chondroid Lipoma of the Shoulder: Case Report and Review of the Literature

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Abstract:
Chondroid lipoma (CL) is a rare soft tissue tumor that usually occurs in middle-aged adults and is slightly more common in women. It is characterized by well-circumscribed groups of mature adipocytes of fatty tissue associated with islands of the chondromyxoid matrix but not mature chondrocytes. Clinically, CL appears as a slowly growing, painless mass in the extremities, especially the back and neck. CL must be distinguished from chondrolipoma (CLP), another benign lipoma characterized by mature adipocytes and chondrocytes. Immunohistochemistry (IHC) studies are often positive for S-100 protein and vimentin and are useful in differentiating CL from other tumors with similar histomorphology. The presence of mixed lipomatous and chondroid matrix tissue makes CL a challenging diagnosis and can be misdiagnosed as other benign or malignant tumors, and the patient does not receive the appropriate management. Although benign, an accurate diagnosis and successful surgery are required to prevent recurrence and ensure the patient has a good outcome. We present the case of a 31-year-old woman who presented with a large left shoulder soft tissue mass. The mass was suspicious for sarcoma, but with the appropriate use of IHC and molecular studies, the diagnosis of chondroid lipoma was rendered, and the patient received the proper treatment.

Keywords: Chondroid lipoma, Chondrolipoma, Chondromyxoid, Adipocytes, Matrix

Introduction:
Chondroid lipoma (CL) is a rare lipoma variant characterized by its unique histopathological features and clinical presentation. CL represents a distinct entity within the spectrum of adipocytic tumors, exhibiting a combination of mature adipocytes and chondroid matrix components. CL is extremely rare and can easily be confused with other variants of lipomas, such as chondrolipoma (CLP) and more malignant neoplasms such as myxoid chondrosarcoma and liposarcoma.

Despite its benign nature, chondroid lipoma can pose diagnostic challenges due to its atypical radiographic and histological features, often mimicking malignant neoplasms such as myxoid chondrosarcoma or liposarcoma. Typically occurring in middle-aged adults, chondroid lipoma most commonly presents as a painless, slowly growing soft tissue mass located in the subcutaneous tissues of the extremities or trunk. However, it can also manifest in other anatomical locations, such as the head and neck region. Diagnosis often requires clinical evaluation, radiographic imaging, histopathological examination, and immunohistochemical analysis. The diverse morphological spectrum, advances in imaging techniques, and molecular pathology have improved diagnostic accuracy and management strategies for chondroid lipoma.

The etiology of chondroid lipoma remains unclear, with no specific predisposing factors identified to date. On the other hand, some cases have been linked to trauma or previous surgery, which suggests that mechanical stimuli may play a part in how this tumor forms. Additionally, while most chondroid lipomas occur sporadically, rare cases of familial occurrence have been reported, indicating a potential genetic component in a subset of cases. Further research is warranted to elucidate the underlying mechanisms and identify potential risk factors associated with the development of chondroid lipoma.

We present a case of this rare tumor in a 31-year-old woman. It was initially suspicious for sarcoma, but with the use of immunohistochemistry (IHC) and molecular studies, it was correctly diagnosed as a chondroid
lipoma, and she received the optimal treatment. We review the relevant literature, including clarifying the nomenclature, investigations, differential diagnosis, management, and molecular alterations.

**Case Presentation:**

A 31-year-old woman presented with a large left shoulder soft tissue mass. The patient reported that she noticed the mass at least four years ago, but she decided to seek medical attention due to the recent increase in size, and she was starting to have limitations with activities that involve the left shoulder. Physical examination showed a large soft tissue mass, approximately 8x5 cm, at the superior lateral aspect of the left arm. She showed a reduction in the range of movement of the left shoulder. The mass was mostly rubbery, with scattered firm to hard areas. About half of the mass was mobile, and the other was fixed to the underlying structures. The overlying skin was intact and did not show any changes. The patient did not report recent changes in her weight. On the ultrasound, there was a mixed echogenic mass. On the CT scan, there was a well-defined, heterogeneously enhancing mass with areas of fat attenuation that changed. The mass partially extended into the underlying muscles. In MRI studies, the mass appeared predominately hypointense to the surrounding muscles, with focal hyperintense areas on T1-weighted images. The mass showed a well-defined hyperintense mass with lobulated areas on T2 images. The radiological interpretation was inconclusive; it favored benign mass but expressed concern due to its large size and heterogeneity. Sarcoma was not ruled out, and a tissue diagnosis was recommended before therapeutic intervention.

An incisional biopsy was performed, and the tissue sampling showed predominately lobules of solid masses separated by a rich vascular network within fibrous septae. The lobules were arranged in nests, cords, and solid sheets composed of a mixture of cells, including mature adipocytes, early-developing lipoblasts of variable size mixed with mature adipocytes, and early-developing chondroblast-like cells in a background of myxohyaline chondroid matrix. Mature adipocytes were identified, but mature chondrocytes were not. Some cells showed worrisome features, including undifferentiated bland cells with minimal cytoplasm, small, univacuolated to multivacuolated lipoblasts with fat droplets scalloping bland nuclei (Figure 1 A, B). Although the early developing lipoblasts and chondromyxoid matrix features were suspicious for liposarcoma or myxoid chondrosarcoma, no significant nuclear atypia or mitotic activity was noted. The histomorphological differential diagnosis of consideration was a well-differentiated lipomatous tumor, myxoid liposarcomas, and extraskeletal myxoid chondrosarcoma. Other considerations included myoepithelioma of soft tissue, soft tissue chondroma, and chondroid lipoma. The background matrix was tested with toluidine blue and alcian blue special stain at low PH with a positive reaction confirming the chondroitin sulfate substrate and its chondroid matrix nature. The PAS special stain highlighted the intracytoplasmic glycogen. IHC studies showed S100 strongly positive in mature adipocytes but weakly positive in early lipoblasts, and lipomatous cells were positive for cyclin D1. The tumor cells were negative for cytokeratins, EMA, CD 34, HMB45, SMA, and MDM2. The IHC studies were supportive of the diagnosis of chondroid lipoma. For fear of possible sarcoma, the family decided to confirm the diagnosis with molecular testing. The tumor showed Chromosomal translocation t(11;16) (q13;p12-13), resulting in the fusion of C11orf95 and MKL2 genes. The histomorphology, IHC, and molecular studies confirmed the diagnosis of chondroid lipoma.

The mass was completely excised with safe, adequate surgical margins. No postoperative treatment was recommended, and the patient was followed for 28 months with no recurrence or change at the surgery site.

**Discussion:**

Lipomas are defined as freely movable and well-circumscribed benign tumors of adipose tissue. Within the spectrum of lipoma classifications, chondroid lipomas (CLs) represent a particularly rare subset distinguished by the presence of proliferation of mature adipocytes admixed with multivacuolated lipoblast-like cells in a myxohyaline and chondromyxoid matrix. No mature chondrocytes are present in CLs. 1 CLs must be distinguished from chondrolipomas (CLPs), which show the proliferation of mature adipocytes and chondrocytes. The term "chondroid lipoma" was introduced by Meis and Enzinger in 1993 following their analysis of 20 clinical cases presenting with atypical adipose tumors to describe the combination of cellular tissues that make up the lesion. 8

Similarly, a case was reported in 1986 by Chan et al., who described the tumor as an "extraskeletal chondroma with lipoblast-like cells," though a definitive diagnostic term was not established then. 9 Radiographic imaging techniques often struggle to discern the benign nature of chondroid lipomas from potentially malignant lesions due to the heterogeneous composition of the tumor and its ossified elements. 10 Because of the amalgamation of different cell lines, it can be mistaken for more malignant lesions like liposarcomas and myxoid chondrosarcomas, so proper histopathological investigations and familiarity with its characteristics are essential for an accurate diagnosis. 7
Consensus on the etiology of chondroid lipomas has yet to be reached, and there are currently three working hypotheses trying to explain this unique tumor’s etiology. In a case report by Piattelli et al., it was hypothesized that undifferentiated mesenchymal cells underwent neoplastic transformation, leading to the differentiation of multiple cellular lineages in one tissue mass.11 Alternatively, another theory claims the emergence of cartilaginous metaplasia in already neoplastic adipose tissue. The third theory considers a chondroid lipoma with glandular components similar to a choristoma, a benign overgrowth of normal tissue in an abnormal location.12 Recent evidence from emerging cases suggests a potential genetic predisposition to chondroid lipoma development, with the identification of a reciprocal t(11;16) (q13;p13) translocation.10 This type of translocation was identified in our reported case and was confirmatory to the diagnosis of CL.

CLs exhibit a predilection for female patients and typically manifest between 14 and 70, with a median onset between 30 and 40 years.13 While these tumors rarely occur in children under ten years of age, no discernible racial or geographic predispositions have been observed.10 Most CLs will be present in the head’s superficial muscular or skeletal fascia (including the oral cavity), neck, limbs, chest wall, and torso.7 Although risk factors for chondroid lipomas remain largely unknown, they may mirror those associated with lipomas in general, including trauma, infection, and chronic irritation.14

Chondroid lipoma typically presents as a painless mass. Patients may notice a lump or swelling in the affected area. There have been reports of associated tingling and radiating pain. In cases such as these, they are often misdiagnosed as neural tumors such as neurofibromas schwannomas or malignant peripheral nerve sheath tumors.6

It is important to consider chondroid lipoma in potential diagnoses, even when a mass is initially identified as sarcoma. This consideration is particularly relevant when the mass demonstrates extreme hardness, clear demarcation, and a lobulated appearance alongside a low SUVmax value (tracer uptake in ROI / injected activity/patient weight). To avoid unnecessary overtreatment because of a wrong diagnosis, it is important to distinguish between chondroid lipoma and sarcoma, especially when the mass has a low SUVmax value, even though a biopsy suggested it was sarcoma at first.15 CL may also present similarly to liposarcoma and myxoid chondrosarcoma due to the presence of a chondromyxoid matrix. The presence of fat content, chondroid-like calcifications on CT, and a chondromyxoid matrix on MRI collectively provide crucial indications for an accurate diagnosis.16 However, given the heterogeneous nature of the lesion, malignancy cannot be definitively ruled out based solely on imaging. Therefore, a biopsy and histopathological examination are imperative for a conclusive diagnosis.

Histologically, CL is a well-circumscribed tumor with an amalgam of mature adipocytes and a series of sheets and cords of cells with clear vacuolated cytoplasm reminiscent of lipoblasts or chondroblasts in a chondromyxoid matrix. The chondroid areas may exhibit variable degrees of cellularity and may contain focal areas of calcification but no mature chondrocytes. The adipocytes are mature and uniform, with no or minimal nuclear atypia within the adipocytic component. Fibrous septa may also be present, dividing the tumor into lobules.15,17,18 The entity presents as a slow-growing, asymptomatic mass commonly found in the cephalic region and the limb girdle areas, with more scant presentations in the proximal extremities.18

CL develops from skeletal muscle fascia, skeletal muscle, and subcutaneous tissue.3 Aloul et al. reported a case where CL was found to be in a female breast. An important differentiating factor that allowed the definition of this entity was the IHC studies.15 Lipoblast and chondroblast-like cells with clear vacuolated cytoplasm are particularly positive for vimentin and S100, with variable staining for cytokeratin and CD68 antigen, while fully negative for EMA, HMB45, CD36, and alpha-smooth muscle actin.1,19,20 Chondrolipoma (CLP) is a differential diagnosis for CL, which can be ruled out by the presence of purely mature cartilaginous and adipose tissue without clear vacuolated lipoblastic cells.18 Extraskeletal myxoid chondrosarcoma contains multinucleated giant cells and is positive for keratin, EMA, and muscle-specific actin. These results are incompatible with CL. Myxoid liposarcoma is defined by a plexiform vascular pattern of atypical spindle cells and is positive for vimentin, CD36, and S100 markers.3 These elements rule out CL. Due to CL’s classification as a benign tumor, marginal resection will suffice as treatment.15 The caveat is in the fact that overdiagnosis is a pitfall that is a possibility with CL due to confusion with malignant tumors, as mentioned above.

Surgical excision remains the primary treatment modality for large chondroid lipomas in the shoulder region. The surgical procedure removes the tumor mass while preserving surrounding healthy tissues and structures critical for joint function. Following surgical intervention, postoperative rehabilitation is integral in restoring normal joint function while minimizing complications such as stiffness or adhesion formation. Physical therapy protocols should focus on gradually increasing the range of motion exercises and strengthening regimens tailored to each patient’s needs.

Chondroid lipoma is a rare soft tissue tumor with a challenging, accurate diagnosis. Although rare, recognizing this tumor is important for preventing misdiagnosis and providing appropriate treatment.
Although chondroid lipomas are slow-growing and asymptomatic, postoperative monitoring for any significant changes or symptoms is recommended. Long-term follow-up is recommended to monitor possible recurrence. Reported tumor recurrence highlights the importance of complete resection and long-term follow-up. We add a new case to the limited literature on this tumor, hoping to contribute valuable data to the medical literature, aid in accurate diagnosis and treatment selection, and promote scientific collaboration among healthcare professionals. Therefore, clinicians and pathologists must continue sharing their experiences through publishing these rare cases, as they significantly impact patient care outcomes by expanding our knowledge base concerning this uncommon soft tissue tumor type.

**Figures:**

![Figure 1: Microscopic examination of the chondroid lipoma](image)

1A: Low-power view showing lobules of solid masses separated by a rich vascular network within fibrous septae. The lobules are arranged in nests, cords, and solid sheets composed of a mixture of cells (H&E stain X20)

1B: High-power view showing mature adipocytes, early-developing lipoblasts of variable size mixed with and early-developing chondroblast-like cells in a background of myxohyaline chondroid matrix (H&E stain X40)

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**References:**

1. Alsaleh N. Chondroid lipoma that may mimic malignancy: A case report. Clinical Case Reports. 2023 Oct;11(10).


8. Meis JM, Enzinger FM. Chondroid lipoma: a unique tumor simulating liposarcoma and myxoid