



A Case Report of Well-Differentiated Liposarcoma Presenting as a Primary Inguinal Mass: Diagnostic Challenges and Management

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ABSTRACT

Introduction: Liposarcoma (LPS) is the most common soft tissue sarcoma in adults, yet its presentation as a primary mass in the inguinal region is exceedingly rare. This atypical location poses a significant diagnostic challenge, as the clinical signs often mimic more common benign conditions such as inguinal hernia or lipoma, which can lead to delayed diagnosis or inadequate initial management. This report details a case of well-differentiated liposarcoma (WDLS) in the inguinal canal, highlighting the clinical, radiological, and pathological nuances critical for accurate diagnosis and definitive treatment.

Case Illustration: A 49-year-old male presented with a one-month history of a right inguinal lump that had rapidly enlarged over the preceding week, accompanied by intermittent pain. Physical examination revealed a mobile, tender mass measuring approximately 2x3 cm. Ultrasound imaging was pivotal, identifying a solid, heterogeneous, vascularized lesion, which raised the suspicion of a neoplasm beyond a simple lipoma. The patient subsequently underwent a wide excisional biopsy.

Histopathological examination revealed a tumor composed of mature adipocytes with scattered atypical, hyperchromatic stromal cells and neoplastic lipoblasts, confirming the diagnosis of well-differentiated liposarcoma. A notable and potentially misleading feature was the presence of a prominent "chicken wire" vascular pattern within the stroma, a finding more classically associated with myxoid liposarcoma.¹

Discussion: This case underscores the importance of maintaining a high index of suspicion for malignancy in patients presenting with atypical inguinal masses. Preoperative imaging, particularly ultrasound with Doppler, is invaluable for identifying features suggestive of sarcoma, thereby guiding appropriate surgical planning toward a wide excision rather than a simple enucleation. The finding of a "chicken wire" vascular pattern within a WDLS represents a significant diagnostic pitfall, emphasizing the need for comprehensive morphological assessment and, in equivocal cases, ancillary molecular testing to avoid misclassification and subsequent inappropriate adjuvant therapy. Wide surgical excision with negative margins remains the cornerstone of treatment for localized WDLS.

Conclusion: Well-differentiated liposarcoma is an essential, albeit rare, differential diagnosis for solid inguinal masses. Optimal patient outcomes are contingent on a multidisciplinary approach encompassing astute clinical suspicion, appropriate imaging, meticulous pathological evaluation, and definitive surgical management. Given the high risk of local recurrence and the potential for dedifferentiation into a more aggressive sarcoma, a

long-term, lifelong surveillance is mandatory following initial treatment.

Keywords: Liposarcoma, Well-Differentiated Liposarcoma, Inguinal Tumor, Spermatic Cord, Soft Tissue Sarcoma.

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INTRODUCTION

The Epidemiological Landscape of Liposarcoma

Soft tissue sarcomas (STS) are a rare and heterogeneous group of malignant neoplasms of mesenchymal origin, with an incidence of approximately 7 per 100,000 people, accounting for about 1% of all adult cancers (Gounder et al., 2024). Among these, liposarcoma (LPS) stands out as one of the most frequently diagnosed subtypes, comprising 13-20% of all STS cases in adults (Gounder et al., 2024; Schwartz et al., 2010; Wikipedia, 2024). The incidence of LPS is gradually increasing, with a peak diagnostic age of around 50 years, and it demonstrates a slight predilection for males, who account for approximately 60% of new cases (Gounder et al., 2024; Crago and Brennan, 2016). The patient in this report, a 49-year-old male, fits squarely within this key demographic. The etiology of liposarcoma remains largely idiopathic. While most cases are sporadic with no identifiable cause, general risk factors for STS have been proposed, including prior therapeutic radiation, certain familial cancer syndromes (e.g., Li-Fraumeni syndrome), damage to the lymphatic system, and long-term exposure to specific toxic chemicals (Gounder et al., 2024; Crago and Brennan, 2016).

WHO Classification and Molecular Pathogenesis

The World Health Organization (WHO) classifies liposarcomas into four principal subtypes based on their distinct histological and molecular profiles, which correlate with their clinical behavior: 1) Well-Differentiated Liposarcoma (WDLS), also termed Atypical Lipomatous Tumor (ALT) in the extremities; 2) Dedifferentiated Liposarcoma (DDLs); 3) Myxoid Liposarcoma (MLS); and 4) Pleomorphic Liposarcoma (PLS) (Gounder et al., 2024; WebPathology, 2021; Radiopaedia.org, n.d.). WDLS is the most common subtype, accounting for 31-50% of all liposarcoma diagnoses (Gounder et al., 2024; Sarcoma UK, n.d.). It is considered a low-grade malignancy characterized by slow growth and a high propensity for local recurrence if inadequately excised, but it possesses a negligible risk of metastasis, reported to be less than 1% (OrthoBullets,

2023). A defining molecular characteristic of both WDLS and the higher-grade DDLS is the amplification of the chromosomal region 12q13-15. This amplification leads to the overexpression of critical cell cycle-regulating oncogenes, most notably murine double minute-2 (*MDM2*) and cyclin-dependent kinase-4 (*CDK4*) (OrthoBullets, 2023; Sarcoma Oncology Center, n.d.; Yang et al., 2020; Binh et al., 2010). This genetic signature is a powerful diagnostic tool and a key driver of tumorigenesis in this subset of liposarcomas (Sirbaboma and Gopinath, 2022).

The Diagnostic Conundrum of Inguinal and Spermatic Cord Liposarcoma

Liposarcomas most commonly arise in the deep soft tissues of the extremities (particularly the thigh) and the retroperitoneum (OrthoBullets, 2023; Crago and Brennan, 2016; Schwartz et al., 2010). Primary presentation in the inguinal region or arising from the spermatic cord is an exceptionally rare event, with the existing literature consisting predominantly of case reports and small case series, totaling fewer than 300 reported cases worldwide (Leibovitch et al., 1995; Wang et al., 2025; Hammad et al., 2015; Hansen et al., 2017). This anatomical rarity creates a significant diagnostic challenge. The typical clinical presentation is that of an insidious, slow-growing, and often painless mass, as was observed in the patient presented herein (OrthoBullets, 2023; Leibovitch et al., 1995; Schwartz et al., 2010; Hajj et al., 2017). This non-specific presentation causes inguinal liposarcoma to closely mimic a range of far more common and benign conditions, including inguinal hernia, hydrocele, lipoma of the cord, varicocele, or epididymal cysts (Leibovitch et al., 1995; Hammad et al., 2015; Schwartz et al., 2010). This clinical ambiguity frequently leads to a delayed diagnosis or, more critically, an incorrect preoperative diagnosis, which can result in an inadequate initial surgical approach and a higher risk of local recurrence (Hajj et al., 2017).

Rationale, Research Gap, and Novelty of this Report

The primary objective of this report is to provide a detailed account of a rare case of primary inguinal WDLS, tracing the diagnostic pathway from initial presentation to definitive management.

A significant research gap exists in the literature regarding the correlation of non-specific clinical and initial imaging findings with the more nuanced and sometimes confusing histopathological features of WDLS in this location. While the existence of inguinal liposarcoma is documented, few reports delve into the potential diagnostic pitfalls that can arise during microscopic examination (Hammad et al., 2015). The novelty of this case report lies in its in-depth analysis of a specific and potentially misleading histopathological feature: the presence of a "chicken wire" vascular pattern within the tumor. This pattern is classically considered a hallmark of myxoid liposarcoma, and its presence in a WDLS represents a critical diagnostic challenge for pathologists. By meticulously documenting this case, this report aims to serve as a valuable educational resource for surgeons, radiologists, and pathologists, emphasizing the importance of a high index of suspicion and comprehensive evaluation when encountering an atypical inguinal mass (Bolodeoku et al., 2016).

CASE ILLUSTRATION

Patient Presentation and History

A 49-year-old male presented to the surgical outpatient clinic with a chief complaint of a palpable lump in his right inguinal region. The patient first noticed the lump approximately one month prior to presentation. He reported that it was initially small but had undergone a noticeable and rapid increase in size over the last week. The mass was associated with intermittent, dull pain that was not constant and not related to physical activity. A detailed review of systems was negative for constitutional symptoms such as fever, chills, night sweats, unexplained weight loss, or anorexia. The patient specifically denied any history of the lump appearing or disappearing with changes in posture or intra-abdominal pressure (e.g., coughing or straining), which argued against a diagnosis of a reducible inguinal hernia. His past medical history was unremarkable, with no known chronic illnesses, previous surgeries, or history of trauma to the groin area. He was not taking any regular medications and had no known drug allergies.

Clinical Examination Findings

On general physical examination, the patient was afebrile and hemodynamically stable. The examination of the cardiovascular, respiratory, and abdominal systems revealed no abnormalities. There was no palpable hepatosplenomegaly or generalized lymphadenopathy. Local examination of the inguinal regions revealed a distinct finding on the right side. A firm, palpable mass, measuring approximately 2x3 cm, was identified within the right inguinal canal. The mass was mobile in relation to the overlying skin and deeper structures. Palpation elicited mild tenderness. The overlying skin was normal in appearance, with no signs of inflammation such as erythema, warmth, or discharge. The left inguinal region and bilateral testes were normal on examination.

Diagnostic Investigations

Laboratory Analysis

Preoperative laboratory investigations were performed to assess the patient's baseline health and fitness for surgery. The results were all within normal physiological ranges, indicating no underlying systemic inflammatory process, anemia, or coagulopathy. A summary of the key findings is presented in Table 1.

Table 1: Summary of Preoperative Laboratory Investigations

Examination	Result	Unit	Reference Value
HEMATOLOGY			
White Blood Cell (WBC) Count	9.75		4.10 - 10.90

Examination	Result	Unit	Reference Value
Neutrophil (%)	44.7	%	37.0 - 72.0
Lymphocyte (%)	39.4	%	20.0 - 50.0
Monocyte (%)	7.4	%	0 - 14.0
Red Blood Cell (RBC) Count	4.76		4.40 - 5.90
Hemoglobin (HGB)	14.3	g/dL	13.2 - 17.3
Hematocrit (HCT)	42.6	%	40.0 - 52.0
Platelet (PLT) Count	240		150 - 450
COAGULATION			
Bleeding Time (Duke)	2.00	minutes	1.0 - 3.0
Clotting Time	10.00	minutes	5.0 - 15.0

Imaging Evaluation (Ultrasound)

A high-frequency ultrasound of both inguinal regions was conducted to characterize the palpable mass. The examination of the left inguinal region was unremarkable. The right inguinal ultrasound revealed a well-defined, solid lesion measuring approximately 3.21 x 3.13 x 1.28 cm, with a calculated volume of 6.76 mL. The lesion exhibited a heterogeneous internal echo pattern and was predominantly hyperechoic. A pivotal finding was the presence of an internal Doppler signal, indicating vascularity within the mass. This feature significantly increased the suspicion of a neoplastic process, as simple lipomas are typically avascular. The mass was located deep to the superficial fascia and superficial to the deep fascia, approximately 1.5 cm medial to the right spermatic cord. The radiologist's impression was a solid heterogeneous lesion suspicious for a dysplastic process, with a differential diagnosis including lipoma versus liposarcoma, or potentially an inflammatory process.



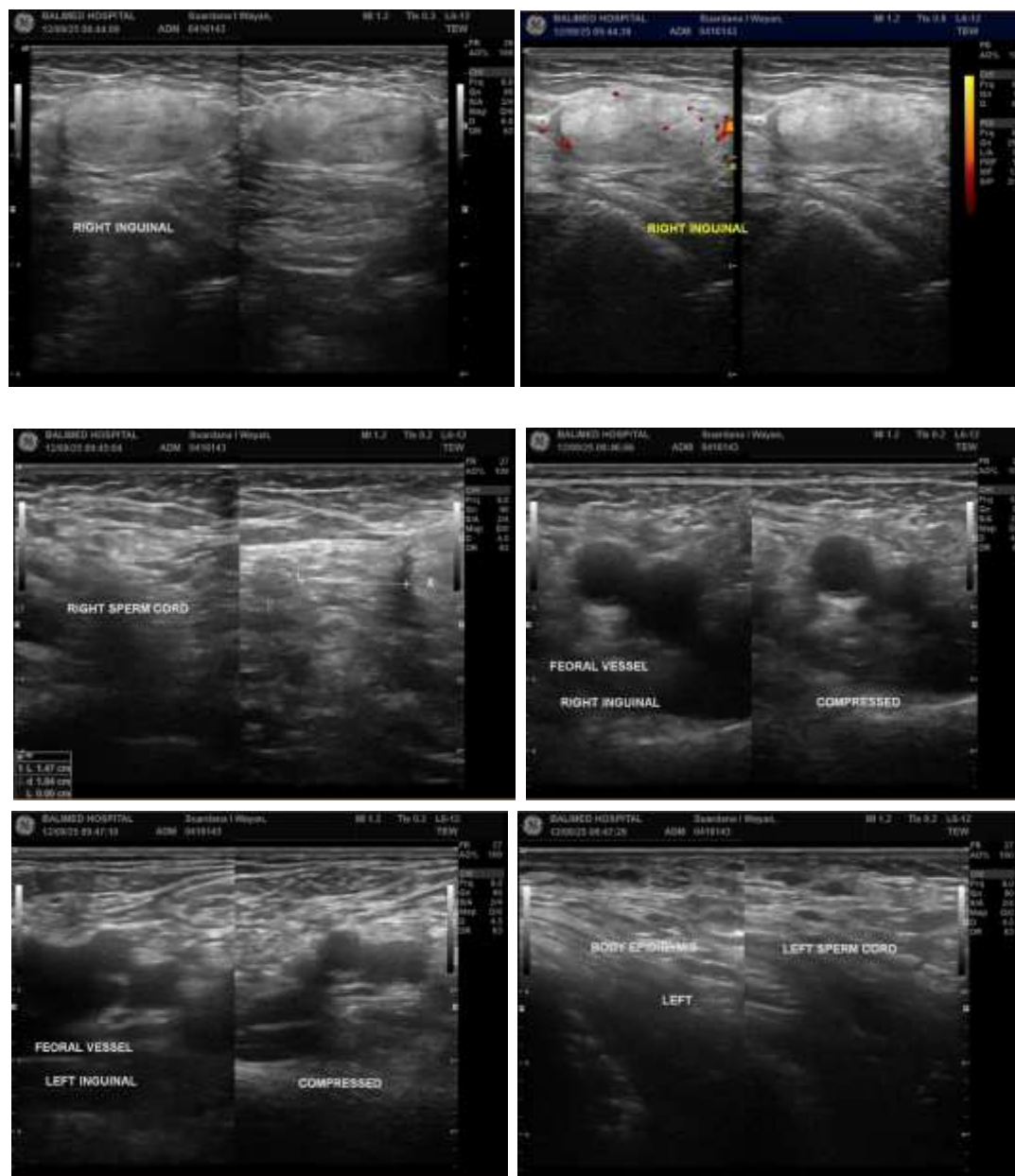


Figure 1. Ultrasound Findings

Surgical Management and Postoperative Course

Based on the combination of a rapidly growing, tender inguinal mass and ultrasound

findings suggestive of a vascularized neoplasm, a preoperative diagnosis of a right inguinal tumor was made, with liposarcoma as a leading differential. The patient provided informed consent and underwent a **wide excisional biopsy** of the mass under anesthesia. Perioperative antibiotic prophylaxis was administered with Cefazoline 1 gram intravenously before the surgical incision. Postoperatively, the patient received a course of intravenous Cefazoline (1 gram twice daily), which was later transitioned to oral Cefixime (200 mg twice daily). Analgesia was managed effectively with oral Paracetamol (500 mg three times daily). The patient's postoperative recovery was uneventful. The surgical wound was managed with dressing changes every two days and healed well without signs of infection or dehiscence. The patient was subsequently discharged from the hospital in good condition.

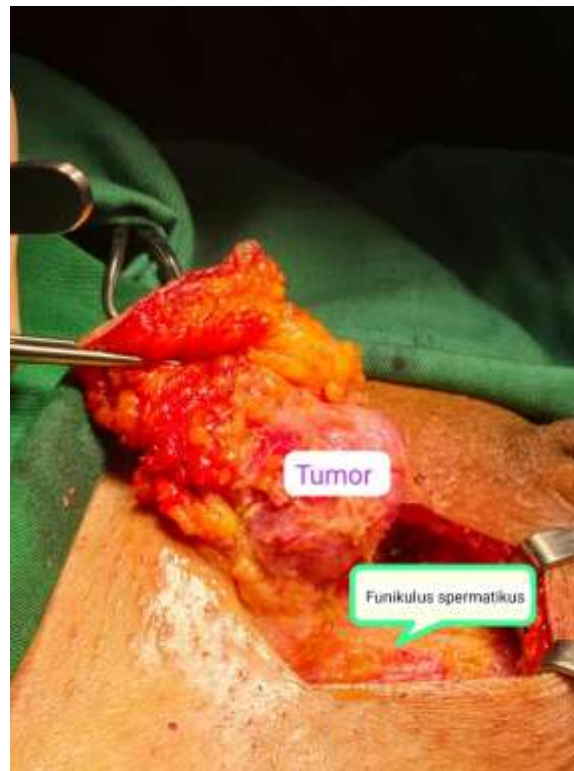


Figure 2. Surgical Management

Definitive Pathological Diagnosis

The excised specimen was sent for histopathological examination for a definitive diagnosis.

Macroscopic Examination

The laboratory received a single piece of tissue measuring cm, covered by an ellipse of skin. On sectioning, the cut surface revealed a well-circumscribed, whitish-brown mass measuring cm. The consistency of the mass was described as rubbery (kenyal).

Microscopic Examination

Microscopic analysis revealed a tumor composed of several lobules, partially encapsulated by a thin fibrous connective tissue. The majority of the tumor consisted of a proliferation of mature-appearing lipocytes (fat cells) of varying sizes, closely resembling a benign lipoma. However, interspersed within the fibrous septa and among the mature adipocytes were the diagnostic hallmark features of WDLS. These included a proliferation of neoplastic lipoblasts, which were smaller than the mature fat cells and possessed eccentric, hyperchromatic nuclei showing mild-to-moderate atypia. In addition to the atypical lipoblasts, scattered bizarre, hyperchromatic stromal cells were also identified. A notable and diagnostically challenging feature was the presence of a prominent vascular proliferation forming a delicate, branching capillary network, described as a "**chicken wire**" pattern. Mitotic figures were not identified, consistent with the low-grade nature of the neoplasm. Based on these combined microscopic features, a final diagnosis was rendered: **Right Inguinal Mass, Excision: Well-Differentiated Liposarcoma.**

DISCUSSION

Liposarcoma as a Deceptive Inguinal Mass

This case serves as a compelling illustration of the diagnostic challenges posed by liposarcoma in the inguinal region. The patient's initial presentation—a slow-growing, minimally

painful mass—is a classic example of the insidious nature of this malignancy, which allows it to effectively mimic more common and benign local pathologies (Leibovitch et al., 1995; Hammad et al., 2015; Hajj et al., 2017). The most frequent preoperative diagnoses for such masses are inguinal hernia and simple lipoma of the spermatic cord. This clinical mimicry carries a significant risk. If a surgeon proceeds with an operation under the assumption of a benign condition, the surgical approach may be a simple hernioplasty or a marginal "shelling out" of the mass. Such an approach is oncologically inadequate for a sarcoma and would almost certainly result in positive microscopic margins. Inadequate initial resection is a primary driver of local recurrence, which has been reported to be as high as 50% for spermatic cord sarcomas (Hajj et al., 2017). A recurrence necessitates more extensive and morbid re-resection, potentially with adjuvant therapies, underscoring the critical importance of the initial surgical plan. This case reinforces a fundamental clinical principle: any firm, growing, or atypical-feeling inguinal mass that cannot be definitively identified as a hernia on physical examination warrants further investigation with preoperative imaging to avoid the pitfall of an unplanned excision (Schwartz et al., 2010).

The Role of Imaging in Preoperative Triage

While magnetic resonance imaging (MRI) is considered the gold standard for characterizing soft tissue masses due to its superior contrast resolution (OrthoBullets, 2023; Hansen et al., 2017; Atlas of Genetics and Cytogenetics in Oncology and Haematology, n.d.), ultrasound is often the first-line imaging modality employed due to its accessibility and cost-effectiveness. In this case, the ultrasound provided crucial information that altered the clinical management. A simple lipoma typically appears as a well-circumscribed, homogeneous, hyperechoic mass without internal vascularity. The findings in our patient—a heterogeneous echo pattern, solid components, and, most importantly, the presence of internal vascularity on Doppler imaging—were significant red flags. These features are known to be associated with malignancy in lipomatous tumors. The literature confirms that characteristics such as large size (>10 cm), thick septa (>2 mm), nodular non-fatty components, and contrast enhancement (a correlate of vascularity) are highly suggestive of WDLS

over a benign lipoma (OrthoBullets, 2023; Kransdorf et al., 2009; Radiopaedia.org, n.d.). This case effectively demonstrates that a meticulously performed ultrasound can successfully triage an apparently simple inguinal lump, raising the index of suspicion for sarcoma and justifying a more aggressive diagnostic approach like a wide excisional biopsy.

Histopathological Nuances and the "Chicken Wire" Paradox

The definitive diagnosis of WDLS rests on the histopathological identification of atypical, hyperchromatic stromal cells and/or lipoblasts within a background of mature adipocytic proliferation (Radiopaedia.org, n.d.). The microscopic findings in this case were classic in this regard. However, the explicit mention of a "chicken wire" vascular pattern presents a fascinating and critical diagnostic paradox. This intricate, plexiform capillary network is overwhelmingly recognized in the literature as a pathognomonic feature of Myxoid Liposarcoma (MLS), a distinct, intermediate-grade subtype of liposarcoma (Crago and Brennan, 2016; Kilpatrick et al., 2012). This finding could easily lead a pathologist, particularly on a small biopsy, to misdiagnose the tumor as MLS. This is not merely an academic distinction; it has profound therapeutic implications. MLS is known to be relatively sensitive to radiation therapy and certain chemotherapy agents, which are often used in an adjuvant or neoadjuvant setting. In contrast, WDLS is generally resistant to both radiotherapy and chemotherapy, with surgery being the sole effective modality (OrthoBullets, 2023; Sarcoma Oncology Center, n.d.). A misdiagnosis could therefore lead to the administration of ineffective and potentially toxic adjuvant treatments. However, a deeper review of the literature reveals that this is a known diagnostic pitfall. WDLS can contain areas with prominent myxoid stroma, and within these areas, a "chicken wire" vasculature can develop, creating a striking mimic of MLS (Bolodeoku et al., 2016; Flucke and van Noesel, 2017; Lee et al., 2019). The key to the correct diagnosis is a comprehensive assessment of the entire tumor, which will invariably reveal areas of classic WDLS morphology (atypical cells within mature fat) that are not a feature of true MLS (Bolodeoku et al., 2016). This case perfectly highlights the principle that histopathological diagnosis should not rely on a single feature in isolation but on a constellation of findings.

The Modern Standard: Ancillary Molecular Testing

To further clarify these distinctions, the integration of ancillary molecular testing has become the modern standard of care. While not performed in this case, genetic analysis to detect the characteristic amplification of *MDM2* and *CDK4* is now considered the gold standard for confirming a diagnosis of WDLS and distinguishing it from its benign and malignant mimics (Binh et al., 2010; Aleixo et al., 2009; Sirbaboma and Gopinath, 2022). This testing, which can be performed via fluorescence in situ hybridization (FISH) or immunohistochemistry (IHC), is highly sensitive and specific and is invaluable in diagnostically challenging cases. It solidifies the diagnosis, ensures the correct classification, and thereby dictates the appropriate management plan, preventing the use of unnecessary adjuvant therapies (Aleixo et al., 2009).

Table 2: Differential Histopathological and Molecular Features of Major Liposarcoma Subtypes

Feature	Well-Differentiated LPS (WDLS)	Myxoid LPS (MLS)	Dedifferentiated LPS (DDLs)
Overall Grade	Low	Intermediate	High
Key Morphology	Mature adipocytes with scattered atypical stromal cells and/or lipoblasts.	Uniform, bland round/spindle cells in an abundant myxoid stroma.	Abrupt transition from WDLS to a non-lipogenic, high-grade sarcoma.

Vascular Pattern	Variable; can have myxoid areas with "chicken wire" pattern.	Classic "chicken wire" plexiform capillary network.	Variable, often non-specific.
Key Molecular Alteration	<i>MDM2 / CDK4</i> amplification	<i>FUS-DDIT3</i> or <i>EWSR1-DDIT3</i> fusion	<i>MDM2 / CDK4</i> amplification
Metastatic Potential	< 1%	~10-30%	~15-30%

Source: Compiled from Gounder et al. (2024), OrthoBullets (2023), Flucke and van Noesel (2017), and Wang et al. (2024).

Therapeutic Strategy, Prognosis, and the Need for Surveillance

The management of this patient with a wide excisional biopsy aligns perfectly with the established standard of care for localized WDLS (Sarcoma Oncology Center, n.d.; Wang et al., 2024; Hajj et al., 2017). The primary therapeutic goal is complete surgical resection with negative microscopic margins (R0 resection), as this is the single most important factor in preventing local recurrence (Wang et al., 2024). The prognosis for patients with WDLS of the extremity or trunk, like this inguinal case, is excellent in terms of overall survival. Due to its virtually non-existent potential for distant metastasis, the 5- and 10-year survival rates approach 100% and over 80%, respectively (Lahat et al., as cited in OncoDaily, n.d.; OrthoBullets, 2023). However, this excellent survival prognosis belies two significant long-term risks: local recurrence and dedifferentiation.

Despite adequate surgery, the local recurrence rate for WDLS remains high, and recurrences have been reported up to 15-20 years after the initial operation (Hansen et al., 2017; Kubo et al., 2012). More ominously, a WDLS can transform, or "dedifferentiate," into a high-grade, aggressive sarcoma (DDLs). This transformation, which occurs in up to 20% of WDLS in central body sites, confers the ability to metastasize and is associated with a much poorer prognosis (OrthoBullets, 2023; Schwartz et al., 2010). The follow-up provided in this case notes only that the wound healed well prior to discharge.¹ This highlights a critical distinction between acute surgical success and comprehensive long-term oncologic care. The management of WDLS does not conclude when the sutures are removed. A structured, lifelong surveillance protocol is mandatory. This should consist of regular physical examinations of the surgical site and periodic imaging (MRI or CT) of the primary site and abdomen/pelvis to detect any local or regional recurrence at its earliest, most treatable stage (Cleveland Clinic, 2021; National Cancer Institute, 2024).

CONCLUSION AND RECOMMENDATION

This report details the case of a 49-year-old male with a well-differentiated liposarcoma presenting as a primary inguinal mass, a rare and diagnostically challenging clinical scenario. The insidious presentation, often mimicking common benign conditions, underscores the necessity for clinicians to maintain a high index of suspicion for malignancy in any atypical or progressively enlarging inguinal lump (Hajj et al., 2017). The case demonstrates the pivotal role of preoperative imaging; ultrasound with Doppler can reveal features of heterogeneity and vascularity that are inconsistent with a simple lipoma and should prompt consideration of a sarcoma (Kransdorf et al., 2009). This allows for appropriate surgical planning, centered on a wide local excision, which is the cornerstone of treatment. The histopathological diagnosis, while based on identifying atypical lipoblasts, can be complicated by overlapping morphological patterns, such as the "chicken wire" vasculature seen here. This highlights the importance of comprehensive microscopic evaluation and the growing role of ancillary molecular testing for *MDM2* and *CDK4* amplification to ensure diagnostic accuracy (Aleixo et al., 2009). While the prognosis for localized WDLS is excellent

following complete surgical resection, the long-term risks of local recurrence and dedifferentiation are substantial (OrthoBullets, 2023). Therefore, the successful treatment of the primary tumor should be considered the beginning, not the end, of the patient's oncologic management.

Recommendation: It is strongly recommended that all patients diagnosed with well-differentiated liposarcoma, regardless of location, be enrolled in a structured, long-term surveillance program. This protocol should include regular clinical examinations and periodic radiological imaging of the primary tumor site for life, in order to detect any potential recurrence at an early and manageable stage (National Cancer Institute, 2024).

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