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Research Article

RAPIDLY PROGRESSIVE LEFT RENAL LIPOSARCOMA IN A YOUNG MALE: A CASE REPORT

DR. NAGESH AMANKAR[1] ,DR. KSHITIJ RAGHUVANSHI[2],DR. SHIVAMSHEKHAR SINGH[3],DR. PARITOSH CHANDRA[4]

[1] MBBS, MS, DNB, DrNB UROLOGY RESIDENT, RUBY HALL CLINIC, PUNE, MAHARASTRA, INDIA.
[2] MBBS, MS, MCH(UROLOGY), F.M.I.S.(U.K.), SENIOR CONSULTANT-UROSURGEON, ROBOTIC & KIDNEY TRANSPLANT SURGEON, RUBY HALL CLINIC, PUNE, MAHARASTRA, INDIA.
[3] MBBS, MS, DrNB UROLOGY RESIDENT, RUBY HALL CLINIC, PUNE, MAHARASTRA, INDIA.
[4] MBBS, DNB, DrNB UROLOGY RESIDENT, RUBY HALL CLINIC,
PUNE, MAHARASTRA, INDIA.

*Corresponding Author
DR. NAGESH AMANKAR- RUBY HALL CLINIC,40, SASSOON ROAD,
PUNE, MAHARASTRA, INDIA. 411001

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Abstract: ***Introduction:*** Retroperitoneal liposarcomas are rare soft tissue malignancies that typically present late due to their deep location and indolent growth. Well-differentiated liposarcoma (WDLPS) is generally considered a low-grade tumor; however, atypical presentations with misleading imaging features and rapid progression can pose significant diagnostic challenges.**Case Presentation:** We report a case of a 35-year-old male who presented with progressive left flank pain for one year, which worsened over the preceding two months. Initial magnetic resonance imaging (MRI) in November 2024 revealed a lobulated lesion in the left perinephric space measuring 2.5 × 5.1 × 7.2 cm, with imaging features suggestive of a benign vascular malformation. Follow-up MRI in March 2026 demonstrated a marked increase in size to 8.9 × 12.9 × 17.6 cm, with additional satellite lesions and mass effect on the left kidney, indicating rapid progression. The lesion showed T2 hyperintensity with progressive enhancement and no diffusion restriction, continuing to mimic benign pathology. The patient underwent surgical excision, initially attempted robotically and converted to open approach. Histopathological examination revealed well-differentiated liposarcoma, inflammatory type, confirmed by immunohistochemical positivity for CDK4 and MDM2. Notably, the renal parenchyma was uninvolved despite significant tumor size. **Conclusion:** This case highlights an unusual presentation of perinephric liposarcoma in a young patient, characterized by rapid growth and atypical imaging features mimicking benign lesions. It underscores the importance of close radiological follow-up and early surgical intervention in enlarging retroperitoneal masses, even when initial imaging suggests benign etiology.

Keywords: Retroperitoneal liposarcoma; perinephric mass; inflammatory liposarcoma; MRI; flank pain; rapid tumor progression; CDK4; MDM2

INTRODUCTION

Retroperitoneal sarcomas are rare malignant tumors arising from mesenchymal tissues, accounting for approximately 10–15% of all soft tissue sarcomas and less than 1% of all adult malignancies [1]. Among these, liposarcoma represents the most common histological subtype, comprising nearly 40–50% of retroperitoneal sarcomas [2]. These tumors typically originate in the deep soft tissues of the retroperitoneum, including the perinephric space, and are often characterized by slow growth and insidious clinical presentation.

Liposarcomas are histologically classified into well-differentiated, dedifferentiated, myxoid, and pleomorphic subtypes, each with distinct biological behavior and prognosis [3]. Well-differentiated liposarcoma (WDLPS), also referred to as atypical lipomatous tumor in surgically amenable sites, is considered a low-grade malignancy with a tendency for local recurrence but limited metastatic potential [4]. A rare variant of WDLPS is the inflammatory subtype, which is characterized by dense inflammatory infiltrates and may mimic inflammatory or benign conditions both clinically and radiologically [5].

Retroperitoneal liposarcomas pose a diagnostic challenge due to their deep location and nonspecific symptoms. Patients often remain asymptomatic until the tumor attains a considerable size, leading to delayed diagnosis [6]. When symptoms do occur, they are usually related to mass effect, including abdominal or flank pain, early satiety, or compression of adjacent organs such as the kidney, bowel, or major vessels [7]. Because of this silent growth pattern, tumors are frequently large at the time of detection, often exceeding 10 cm in diameter.

Radiological imaging plays a pivotal role in the initial evaluation of retroperitoneal masses. Contrast-enhanced computed tomography (CECT) and magnetic resonance imaging (MRI) are the modalities of choice for characterization, assessment of extent, and surgical planning [8]. However, atypical imaging features, particularly in non-lipomatous or inflammatory variants, can lead to diagnostic ambiguity. In such cases, lesions may mimic benign vascular malformations such as hemangiomas or venolymphatic malformations, especially when fat content is minimal or absent [9].

Progressive enhancement patterns and absence of diffusion restriction may further complicate differentiation from benign entities.

A notable clinical concern in retroperitoneal liposarcoma is the potential for significant interval growth. Although well-differentiated tumors are generally slow-growing, certain cases demonstrate unexpectedly rapid progression, raising suspicion for aggressive biological behavior or dedifferentiation [10]. Therefore, interval imaging and careful radiological follow-up are crucial in patients with indeterminate retroperitoneal lesions. Histopathological examination remains the gold standard for definitive diagnosis. The presence of lipoblasts, atypical stromal cells, and amplification of MDM2 and CDK4 on immunohistochemistry are characteristic features of well-differentiated liposarcoma [11]. These molecular markers are particularly useful in distinguishing WDLPS from benign adipocytic tumors and other soft tissue lesions.

Complete surgical excision with negative margins remains the cornerstone of management for retroperitoneal liposarcoma [12]. Due to the proximity of vital structures, organ-preserving surgery is often challenging, and recurrence rates remain high even after apparently complete resection [13]. Early diagnosis and timely surgical intervention are therefore critical in improving patient outcomes. In this context, we report a rare case of rapidly progressive left perinephric liposarcoma in a young male, which initially mimicked a benign vascular lesion on imaging. The case is unique due to its atypical radiological appearance, significant interval growth over a short duration, and histopathological confirmation of an inflammatory variant of well-differentiated liposarcoma. This report highlights the diagnostic challenges associated with such lesions and underscores the importance of vigilant follow-up and early surgical management.

CASE REPORT

A 35-year-old male presented with complaints of left flank pain for one year, which was initially dull aching and intermittent but had progressively worsened over the preceding two months, becoming continuous and severe in intensity. There was no history of hematuria, dysuria, fever, weight loss, or bowel disturbances. The patient had no known comorbidities and no significant past medical or surgical history.

Initial radiological evaluation was performed with contrast-enhanced magnetic resonance imaging (MRI) of the abdomen on admission, which revealed a lobulated T2 hyperintense lesion in the left anterior perinephric space, measuring 2.5 × 5.1 ×7.2 cm, abutting the anterior conal fascia and indenting the left kidney. The lesion demonstrated progressive centripetal enhancement without diffusion restriction, with internal hypointense foci corresponding to calcifications. Two additional smaller lobulated lesions measuring 2.7 × 1.8 cm and 2.5 × 1.6 cm were also noted in the left lateral perinephric space. Based on these imaging features, a provisional diagnosis of venolymphatic malformation or cavernous hemangioma was considered .

The patient was subsequently lost to follow-up and re-presented with worsening symptoms. A repeat contrast-enhanced MRI performed on follow up visit demonstrated a marked interval increase in the size of the lesion, now measuring 8.9 × 12.9 × 17.6 cm, indicating significant tumor progression. The lesion remained lobulated and T2 hyperintense with internal calcific foci and showed progressive enhancement without arterial phase uptake or diffusion restriction. It was seen abutting and compressing the left kidney, with associated mild perinephric fat stranding and minimal fluid collection. Two additional lesions had also increased in size, measuring 5.5 × 4 cm and 2.2 × 2 cm, respectively . Despite the significant increase in tumor size, no hydronephrosis, vascular invasion, or distant metastasis was noted. The right kidney and other abdominal organs, including liver, pancreas, spleen, and adrenal glands, were unremarkable.

Study Selection Process

All identified records were imported into reference management software, and duplicates were removed. Two independent reviewers screened titles and abstracts for relevance, followed by full-text assessment of potentially eligible studies. Discrepancies between reviewers were resolved through discussion and consensus, with involvement of a third reviewer when necessary. The study selection process was documented using a PRISMA flow diagram [20].

Table 1: Radiological Progression of Lesion (MRI Findings)

Parameter	MRI (Baseline)	MRI (Follow up)
Main lesion size	2.5 × 5.1 × 7.2 cm	8.9 × 12.9 × 17.6 cm
Additional lesions	2.7 × 1.8 cm, 2.5 × 1.6 cm	5.5 × 4 cm, 2.2 × 2 cm
Signal intensity	T2 hyperintense	T2 hyperintense
Enhancement	Progressive centripetal	Progressive centripetal

Diffusion restriction	**Absent**	**Absent**
Calcifications	**Present**	**Present**
Mass effect	**Indenting kidney**	**Compressing kidney**
Radiological impression	**Benign vascular lesion**	**Same differentials maintained**

Given the rapid progression and increasing symptom severity, the patient was planned for surgical intervention. A robotic-assisted approach was initially attempted, but due to limited working space and operative difficulty, the procedure was converted to open surgery. Intraoperatively, a large lobulated mass arising from the left perinephric region was identified, carefully dissected from surrounding structures, and excised in toto. Adequate vascular control was achieved, and hemostasis was secured. The postoperative period was uneventful, and the patient remained hemodynamically stable.

Gross examination of the excised specimen revealed two soft tissue masses, with the largest measuring 19.0 × 12.0 × 10.5 cm and the smaller measuring 7.5 × 5.2× 4.0 cm, with an aggregate weight of approximately 1.5 kg. The cut surface was solid, grey-white, and homogeneous, with focal yellowish areas.

Microscopic examination showed a malignant tumor composed of fibrocollagenous stroma with scattered atypical stromal cells, exhibiting hyperchromatic pleomorphic nuclei and moderate cytoplasm. Focal areas demonstrated lipoblasts, characterized by multivacuolated cytoplasm and indented nuclei. Tumor giant cells were also noted. Importantly, no significant mitotic activity, necrosis, or dedifferentiation was identified. The tumor stroma showed dense inflammatory infiltrates composed predominantly of plasma cells and lymphocytes, consistent with the inflammatory variant. Immunohistochemistry revealed diffuse positivity for CDK4 and MDM2, with focal positivity for S100, confirming the diagnosis of well-differentiated liposarcoma (inflammatory type) .
Assessment of Heterogeneity

Table 2: Operative Findings and Surgical Details

Parameter	Observation
Surgical approach	Robotic converted to open
Tumor location	Left perinephric space
Relation to kidney	Compressed but not infiltrated
Vascular involvement	None
Resection	Complete excision achieved
Intraoperative complications	None
Postoperative status	Stable

Table 3: Histopathological and Immunohistochemical Findings

Parameter	Findings
Tumor type	Well-differentiated liposarcoma
Variant	Inflammatory type
Cellular features	Pleomorphic stromal cells, lipoblasts
Mitosis / necrosis	Not significant
Dedifferentiation	Absent
Inflammatory infiltrate	Plasma cells, lymphocytes
CDK4	Positive
MDM2	Positive
S100	Focal positivity

DISCUSSION

Retroperitoneal liposarcomas are uncommon malignancies that typically present late due to their deep anatomical location and indolent clinical course. However, the present case demonstrates an unusual clinical behavior characterized by rapid interval progression in a relatively young patient, along with atypical radiological features, making it diagnostically challenging.

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Figure 1: Coronal MRI images: Coronal T2-weighted MRI images showing a large lobulated hyperintense lesion in the left anterior perinephric space, causing indentation and compression of the left kidney, with heterogeneous internal signal and areas corresponding to calcifications.

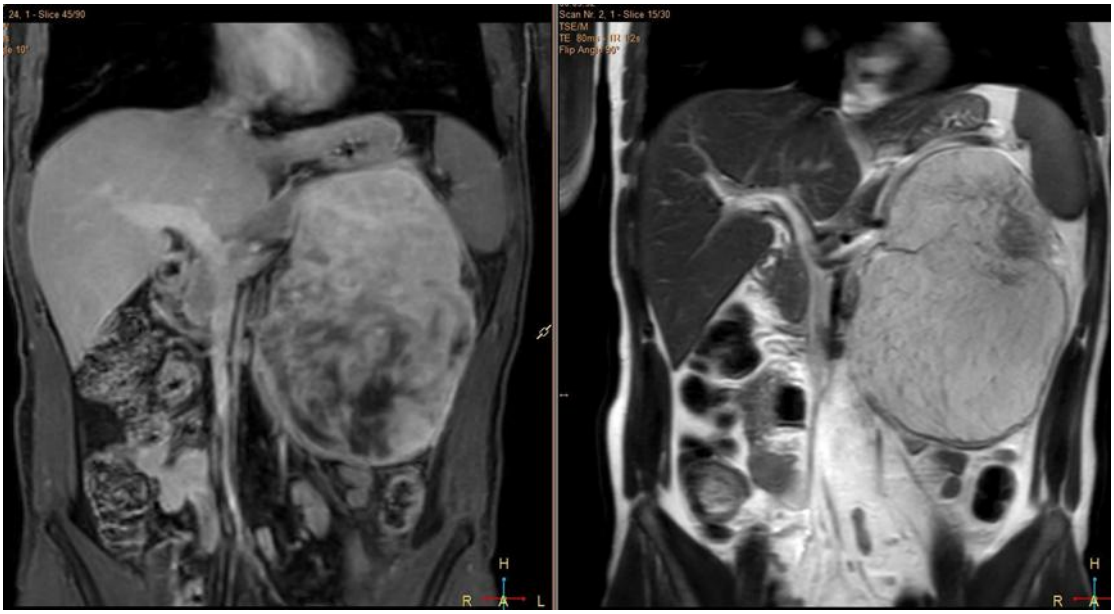
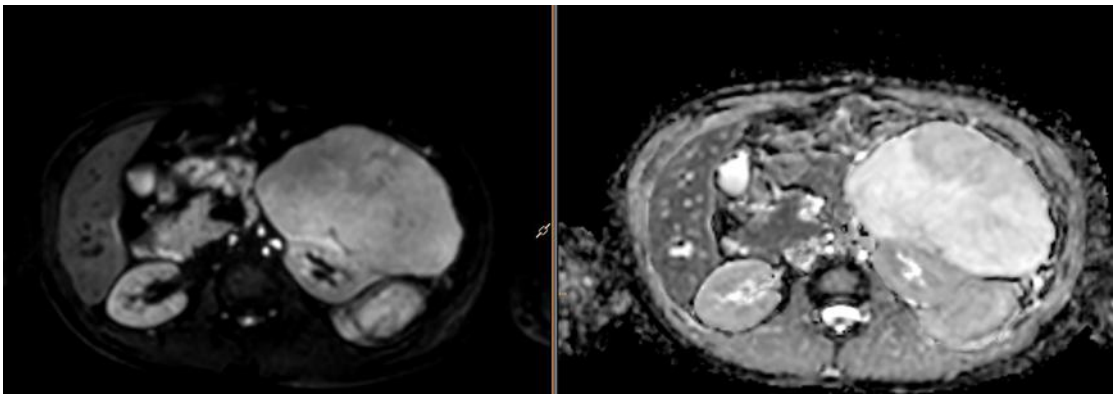


Figure 2: Axial MRI images: Axial MRI images (contrast-enhanced and diffusion-weighted sequences) demonstrating a well-defined lobulated perinephric mass with heterogeneous signal intensity and progressive enhancement, with no diffusion restriction, causing mass effect on the left kidney.



Liposarcomas most commonly occur in the fifth to seventh decades of life, with a median age of presentation around 50–65 years [14]. In contrast, our patient was 35 years old, highlighting the rarity of early-onset retroperitoneal liposarcoma. Similar findings were reported by Dalal et al., who observed that younger age at presentation is uncommon and may be associated with atypical tumor biology or

delayed diagnosis [10]. The relatively young age in our case adds to its uniqueness and emphasizes the need for clinical vigilance even in younger populations presenting with nonspecific flank pain.

One of the most striking features of this case is the rapid tumor progression, with the lesion increasing from 7.2 cm to 17.6 cm in maximum dimension over approximately 16 months, representing more than a twofold increase in linear dimension and a substantially

greater increase in tumor volume. Well-differentiated liposarcomas are generally described as slow-growing tumors; however, cases of accelerated growth have been reported, particularly in retroperitoneal locations where

space permits expansion [15]. Gronchi et al. reported that retroperitoneal sarcomas may exhibit variable growth kinetics, and interval enlargement should raise suspicion for aggressive behavior or possible dedifferentiation [6]. Interestingly, in the present case, despite rapid growth, no histological evidence of dedifferentiation was observed, suggesting that even well-differentiated variants can occasionally demonstrate aggressive enlargement.

Radiologically, retroperitoneal liposarcomas typically demonstrate fat-containing masses with varying degrees of soft tissue components [8]. However, the present case lacked obvious macroscopic fat on imaging and instead showed T2 hyperintensity with progressive centripetal enhancement, leading to an initial misdiagnosis of venolymphatic malformation or cavernous hemangioma. Nishino et al. have described that non-lipomatous variants or tumors with minimal fat content may mimic benign vascular lesions, particularly when enhancement patterns are atypical [9]. Similarly, Messiou et al. emphasized that atypical imaging features in retroperitoneal sarcomas can significantly limit preoperative diagnostic accuracy, necessitating histopathological confirmation [8]. The absence of diffusion restriction and the presence of gradual enhancement in our case further contributed to the diagnostic dilemma.

Another notable aspect is the perinephric location of the tumor, causing compression but not invasion of the renal parenchyma. Retroperitoneal sarcomas frequently displace adjacent organs rather than directly invading them, especially in well-differentiated forms [16]. Lewis et al. observed that organ displacement without infiltration is a common feature in retroperitoneal sarcomas and may allow for organ-preserving surgery in selected cases [7]. In our case, despite the large tumor size (up to 19 cm on gross examination), the kidney was histologically uninvolved, allowing preservation of renal function.

Histopathologically, the diagnosis of well-differentiated liposarcoma (inflammatory type) was confirmed by the presence of lipoblasts, atypical stromal cells, and characteristic immunohistochemical markers including MDM2 and CDK4 positivity. The inflammatory subtype is a rare variant, characterized by dense lymphoplasmacytic infiltrates that can mimic inflammatory or lymphoproliferative disorders [5]. Binh et al. demonstrated that MDM2 and CDK4 amplification is highly sensitive and specific for distinguishing well-differentiated liposarcoma from benign adipocytic lesions [11]. The absence of dedifferentiation, mitotic activity, or necrosis in our case is consistent with a low-grade tumor, although the clinical behavior appeared more aggressive than expected.

Surgical excision remains the cornerstone of management for retroperitoneal liposarcoma. Complete resection with negative margins offers the best chance for local disease control [12]. However, due to the large size and anatomical constraints, complete resection is often challenging. Bonvalot et al. emphasized that even with optimal surgery, local recurrence rates remain high, particularly in retroperitoneal
tumors [13]. In the present case, complete excision was achieved following conversion from a robotic to an open approach, underscoring the technical complexity associated with large retroperitoneal masses.
This case also highlights an important clinical lesson regarding the need for close radiological follow-up in patients with indeterminate retroperitoneal lesions. The initial benign radiological impression led to delayed intervention, during which the tumor demonstrated significant growth. As highlighted by Strauss et al., early surgical consideration should be given in enlarging retroperitoneal masses, even when imaging suggests benign pathology, particularly if there is interval progression [17].

Overall, this case illustrates a rare presentation of retroperitoneal liposarcoma with early age of onset, misleading imaging features, and rapid progression without dedifferentiation, all of which contribute to its clinical significance. It reinforces the importance of integrating clinical, radiological, and pathological findings for timely diagnosis and management.

CONCLUSION

This case highlights a rare presentation of well-differentiated liposarcoma (inflammatory type) arising from the left perinephric space in a young adult, with atypical radiological features and rapid interval progression. Despite being a low-grade malignancy histologically, the tumor demonstrated marked enlargement from
7.2 cm to 17.6 cm within approximately 16 months, emphasizing that well-differentiated variants can occasionally exhibit aggressive growth patterns.
The case underscores the diagnostic limitations of imaging, as the lesion initially mimicked benign vascular malformations due to absence of macroscopic fat and presence of progressive centripetal enhancement. This highlights the need for high clinical suspicion and close radiological follow-up, especially in enlarging retroperitoneal masses, even when initial imaging suggests benign pathology.
Histopathological evaluation with immunohistochemical confirmation (MDM2 and CDK4 positivity) remains essential for definitive diagnosis. Importantly, despite the large tumor size and mass effect, the renal parenchyma was uninvolved, allowing successful organ-preserving surgical excision.

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