International Journal of Science and Research (IJSR)
ISSN: 2319-7064
Impact Factor 2025: 7.089

Giant Abdominopelvic Leiomyosarcoma of Indeterminate Pelvic Origin: A Multimodality Imaging and Surgical Diagnostic Dilemma

Vishal J[1], Chethan T. N[2], Prashant G Patil[3]

[1]Postgraduate, Department of Radiodiagnosis, Akash Institute of Medical Sciences and Research Centre, Bengaluru, Karnataka, India

[2]Assistant Professor, Department of Radiodiagnosis, Akash Institute of Medical Sciences and Research Centre, Bengaluru, Karnataka, India

[3]Professor and Head of Department, Department of Radiodiagnosis, Akash Institute of Medical Sciences and Research Centre, Bengaluru, Karnataka, India

Abstract: ***Background**: Determining the organ of origin of giant abdominopelvic masses remains a major diagnostic challenge because the distortion of normal pelvic anatomy can obscure anatomical relationships. Multimodality imaging plays a pivotal role in lesion characterization; however, accurate localization may remain difficult despite advanced imaging techniques. **Case Presentation**: A 50-year-old woman presented with menorrhagia, dysmenorrhea, irregular menstrual cycles, and progressive abdominal distension. Clinical examination revealed a large abdominopelvic mass corresponding to a 28–30-week gravid uterus. Initial ultrasonography suggested a large uterine mass with an additional posterior wall fibroid. Contrast-enhanced magnetic resonance imaging demonstrated a giant, predominantly solid pelvi-abdominal lesion with heterogeneous T2 hyperintensity, restricted diffusion, and heterogeneous post-contrast enhancement, corresponding to an O-RADS MRI score of 5. Contrast-enhanced computed tomography demonstrated omental fat stranding, nodularity, and the ovarian vascular pedicle sign, favoring an adnexal origin. Despite comprehensive multimodality imaging, the precise organ of origin remained indeterminate because of extensive distortion of the pelvic anatomy. The patient underwent staging laparotomy with total abdominal hysterectomy, bilateral salpingo-oophorectomy, omentectomy, bilateral pelvic lymph node dissection, and appendicectomy. Histopathological examination with immunohistochemistry established the diagnosis of a high-grade leiomyosarcoma (FNCLCC Grade 3). **Conclusion**: This case highlights the complementary role of ultrasonography, MRI, and CT in evaluating giant pelvic masses while emphasizing their limitations in determining the organ of origin in exceptionally large tumors. Recognition of ancillary imaging findings, including the ovarian vascular pedicle sign, together with multidisciplinary clinicopathological correlation, is essential for accurate diagnosis and optimal surgical management.*

Keywords: Giant abdominopelvic mass; Leiomyosarcoma; Multimodality imaging; Magnetic resonance imaging; Computed tomography; O-RADS MRI; Ovarian vascular pedicle sign

1. Case Presentation

A 50-year-old multiparous woman presented to the Department of Obstetrics and Gynecology with complaints of menorrhagia, dysmenorrhea, and irregular menstrual cycles for four months. She also reported progressive abdominal distension over the same duration. There was no history of weight loss, anorexia, fever, altered bowel or bladder habits, or abnormal vaginal discharge. Her past medical, surgical, and family histories were unremarkable.

On general physical examination, the patient was conscious, cooperative, and hemodynamically stable. Pallor was noted. There was no icterus, cyanosis, clubbing, lymphadenopathy, or pedal edema. Vital parameters were within normal limits.

Abdominal examination revealed marked distension with a large, firm, midline abdominopelvic mass corresponding clinically to an approximately 28–30-week gravid uterus. The mass occupied the lower abdomen and pelvis, with dullness to percussion over the lesion. Cardiovascular, respiratory, and neurological examinations were unremarkable.

Based on the clinical findings, the initial differential diagnoses included a large uterine leiomyoma, abnormal uterine bleeding secondary to a fibroid uterus, and a giant ovarian neoplasm.

2. Laboratory Investigations

Routine hematological evaluation demonstrated anemia with mild leukocytosis. Serum tumor marker evaluation revealed a markedly elevated CA-125 level (338 U/mL) and elevated lactate dehydrogenase (LDH, 408 U/L). Serum AFP, CEA, CA 19-9, and β-hCG were within normal limits.

The elevated CA-125, together with the imaging appearance of a large solid pelvic mass, increased suspicion of an ovarian epithelial malignancy, whereas the normal germ-cell tumor markers reduced the likelihood of a germ-cell neoplasm.

Investigation	Patient Value	Reference Range	Interpretation
Hemoglobin	9.1–10.4 g/dL	12–15 g/dL	Low
Total Leukocyte Count	19,180–36,400 /mm³	4,000–11,000 /mm³	Elevated
ESR	20–60 mm/hr	<20 mm/hr	Elevated
CA-125	338 U/mL	<35 U/mL	Markedly Elevated
LDH	408 U/L	100–250 U/L	Elevated
AFP	2.20 ng/mL	<10 ng/mL	Normal
CA 19-9	11 U/mL	<37 U/mL	Normal
CEA	0.867 ng/mL	<3 ng/mL	Normal
β-hCG	<0.2 mIU/mL	<5 mIU/mL	Normal

3. Ultrasound Findings

Transabdominal ultrasonography demonstrated a large, heterogeneous pelvi-abdominal mass occupying the majority of the pelvis and lower abdomen. The lesion appeared contiguous with the uterine fundus, suggesting a uterine origin. An additional heterogeneous lesion arising from the posterior uterine wall was identified, consistent with a posterior wall fibroid. Minimal free fluid was present within the Pouch of Douglas. No hydroureteronephrosis was identified. The massive size of the lesion significantly limited the evaluation of the ovaries, particularly the right ovary, making the determination of the exact organ of origin difficult. Based on the ultrasonographic appearance, the initial radiological impression favored a large uterine leiomyoma with degeneration, although a giant adnexal mass could not be confidently excluded.

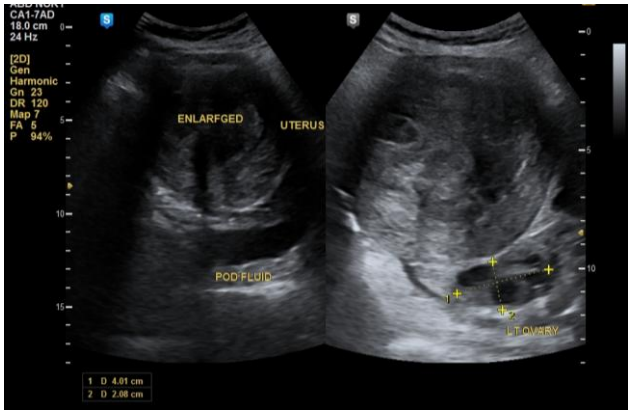

Figure 1: Grey scale ultraound image demonstates predominently hypoechoic fibroid within the enlarged uterus, minimal POD fluid and left ovary

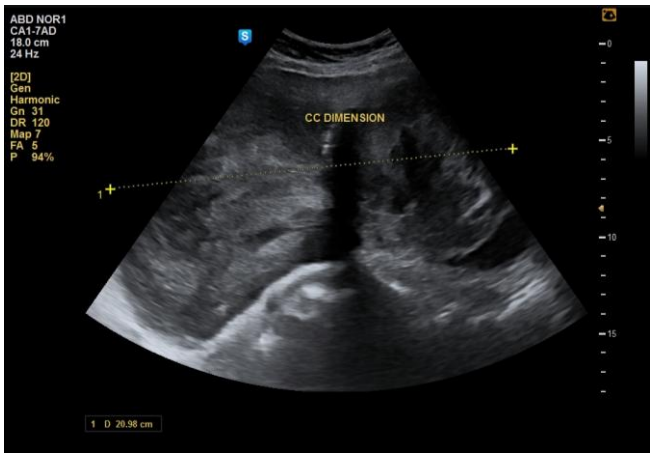

Figure 2: Grey scale ultrasound image demonstrates a large pelviabdominal lesion, heterogenous in echotexture and free fluid in POD

Radiological Impression after Ultrasound: The ultrasound examination suggested a large uterine mass; however, because of the extensive distortion of the pelvic anatomy and the inability to separately visualize the left ovary, the examination remained inconclusive regarding the true site of origin. MRI was therefore recommended for further characterization.

Magnetic Resonance Imaging Findings

To further characterize the lesion and determine its site of origin, contrast-enhanced MRI of the abdomen and pelvis was performed.

MRI demonstrated a large, heterogeneous, predominantly solid pelvi-abdominal mass occupying almost the entire pelvis and lower abdomen, extending superiorly to the level of the L2 vertebral body. The lesion displaced adjacent bowel loops superiorly and peripherally with significant distortion of normal pelvic anatomy, making localization of the organ of origin difficult.

T1-weighted Imaging: The lesion was predominantly hypointense on T1-weighted images with scattered internal areas of intermediate signal intensity. No convincing macroscopic fat or hemorrhagic component was identified. The lesion appeared closely related to the uterus; however, a distinct tissue interface was demonstrated on several sequences, making a uterine origin uncertain.

T2-weighted Imaging: On T2-weighted sequences, the mass demonstrated predominantly heterogeneous hyperintense signal intensity with multiple internal areas of variable signal, reflecting tumor heterogeneity. The lesion exhibited well-defined margins without frank invasion of adjacent bowel loops.

The uterus was enlarged and contained multiple intramural leiomyomas, including a posterior wall fibroid demonstrating imaging characteristics typical of a uterine leiomyoma. These coexisting uterine fibroids further complicated the radiological assessment by creating the impression of a possible uterine origin on initial evaluation.

The right ovary was visualized separately within the Pouch of Douglas, whereas the left ovary could not be identified independently from the mass.

Diffusion-weighted Imaging (DWI): Diffusion-weighted imaging demonstrated focal areas of marked diffusion restriction predominantly along the inferior and left lateral aspect of the lesion.

Apparent Diffusion Coefficient (ADC): Corresponding low ADC values confirmed true restricted diffusion, indicating hypercellular viable tumor rather than cystic degeneration or necrosis. Restricted diffusion involving the enhancing solid component increased the likelihood of an aggressive malignant neoplasm.

Dynamic Contrast-enhanced MRI: Following intravenous gadolinium administration, the lesion demonstrated heterogeneous enhancement predominantly within the solid components, corresponding to the regions showing diffusion restriction on DWI. The enhancing solid tissue demonstrated greater enhancement than the adjacent myometrium. No enhancing papillary projections or obvious internal septations were identified. Minimal ascites was present.

Ancillary MRI Findings: Additional MRI findings included:

- Enlarged uterus with multiple intramural fibroids.
- Multiple cervical nabothian cysts.
- Right ovary visualized separately within the Pouch of Douglas.
- Left ovary could not be separately identified.
- Dilated left ovarian vein coursing toward the left renal vein.
- Minimal pelvic free fluid.

The inability to identify the left ovary separately from the lesion, together with the dilated ovarian vein, favored an adnexal origin despite the lesion's close relationship with the uterus.

O-RADS MRI Assessment: Based on the MRI morphology, enhancement characteristics, and restricted diffusion, the lesion was assigned an O-RADS MRI Score 5, indicating a high probability of malignancy. The principal imaging features supporting this assessment included:

- Predominantly solid composition.
- Marked post-contrast enhancement.
- Restricted diffusion.
- Large tumor size.
- Indeterminate pelvic origin.
- Associated minimal ascites.

MRI Impression: MRI demonstrated a large predominantly solid malignant pelvi-abdominal mass with imaging features highly suspicious for malignancy. Although the lesion remained closely related to the uterus, visualization of the right ovary separately and the presence of a dilated left ovarian vein favored a left adnexal origin. Associated uterine leiomyomas and distortion of pelvic anatomy precluded confident determination of the exact organ of origin.

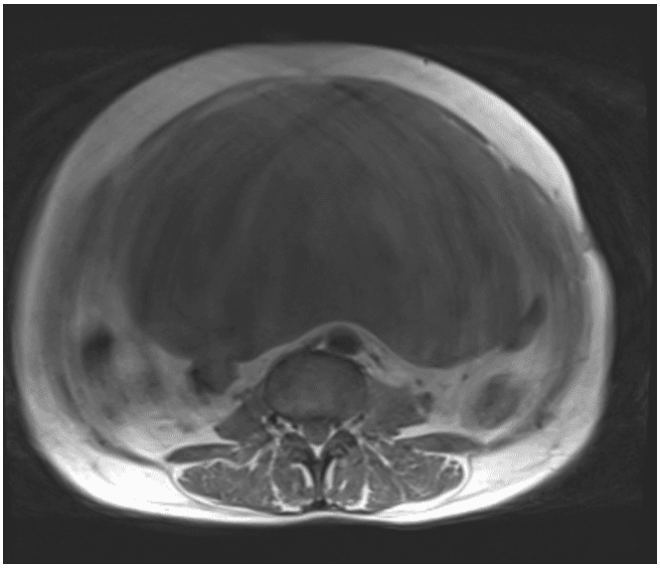

Figure 3: Axial T1-weighted MRI demonstrating a predominantly hypointense giant pelvi-abdominal mass.

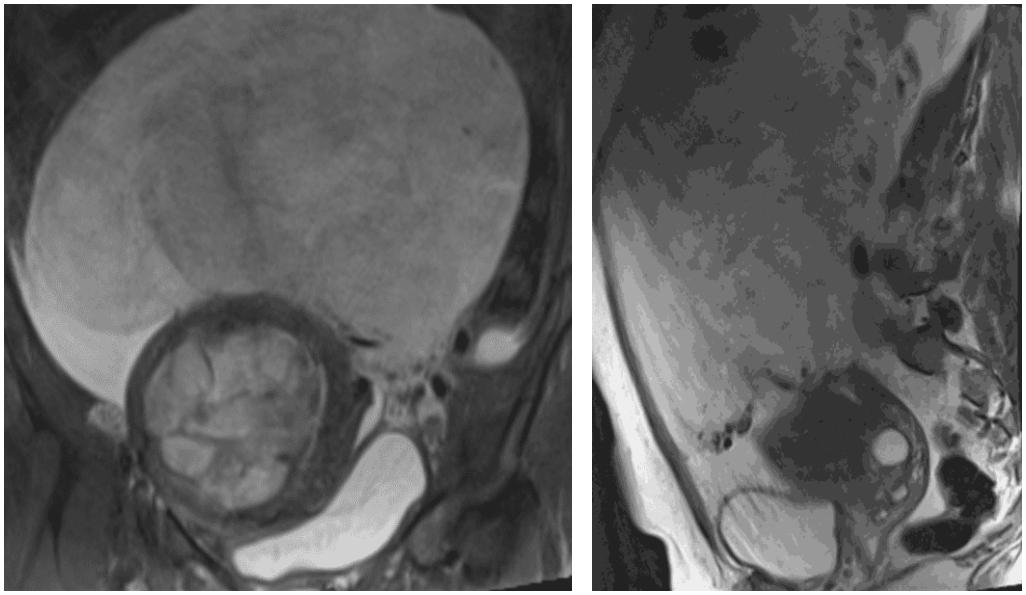

Figure 4: Coronal and sagittal T2-weighted images demonstrating a heterogeneous predominantly hyperintense mass extending superiorly to the L2 vertebral level with peripheral displacement of bowel loops.

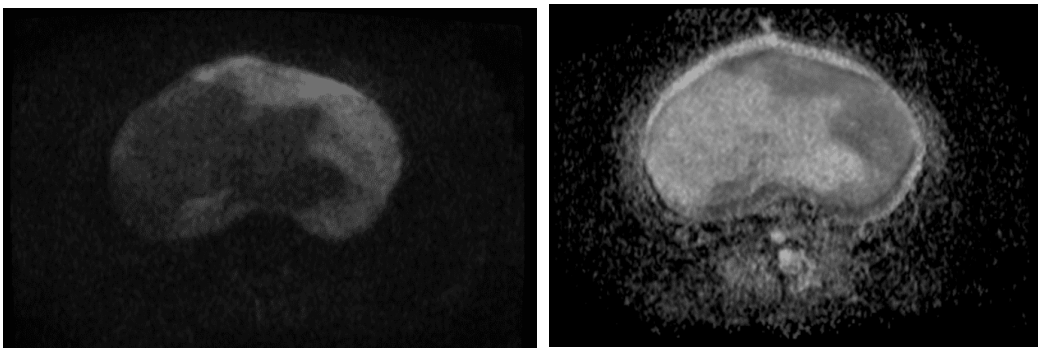

Figure 5: Diffusion-weighted imaging and ADC maps demonstrating focal restricted diffusion within the enhancing solid component

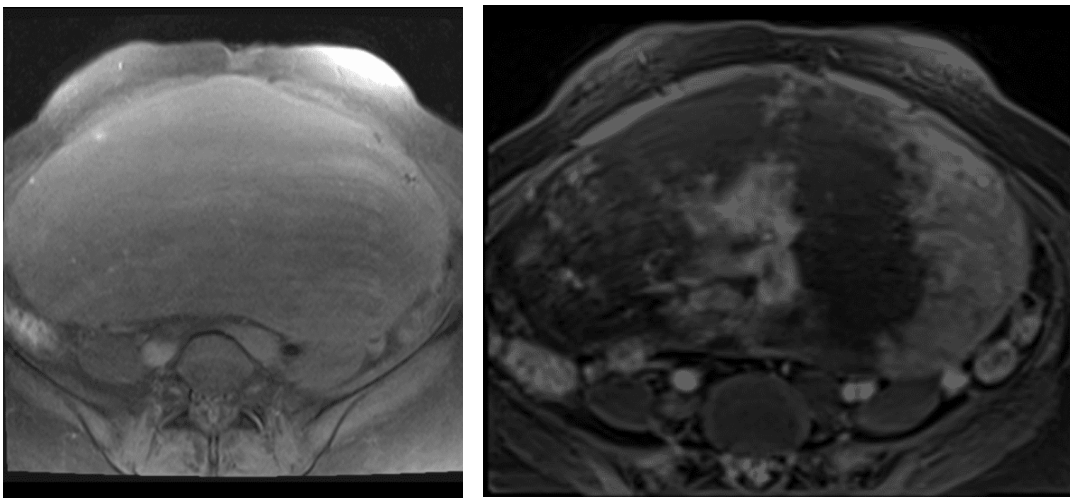

Figure 5: Post-contrast fat-suppressed T1-weighted images demonstrating heterogeneous enhancement corresponding to the areas of restricted diffusion.

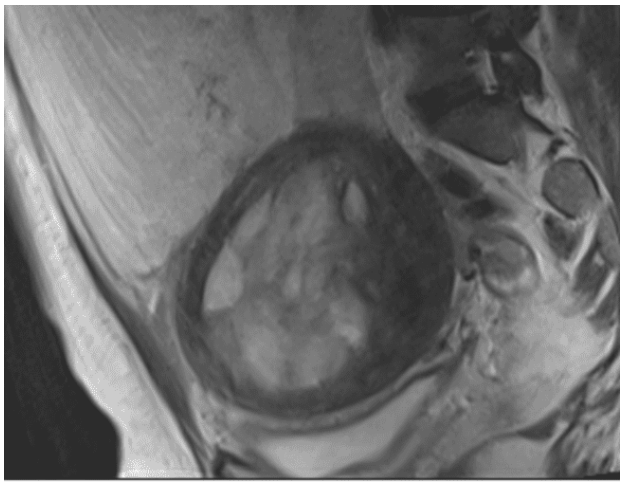

Figure 7: Coronal T2-weighted image demonstrating the enlarged uterus with multiple leiomyomas and separate visualization of the right ovary

4. Contrast- Enhanced Computed Tomography Findings

Contrast-enhanced CT of the abdomen and pelvis was subsequently performed to evaluate lesion extent, characterize enhancement, and identify ancillary imaging features that could aid in determining the organ of origin.

The lesion occupied much of the abdominal cavity, extending from the pelvis to the level of the L2 vertebral body, with marked superior and lateral displacement of bowel loops. The mass demonstrated heterogeneous enhancement, corresponding to the enhancing solid components identified on MRI.

Diffuse omental fat stranding and multiple omental nodules were identified along the right lateral aspect of the lesion, raising concern for peritoneal involvement.

A prominent left ovarian vein was visualized, extending from the lesion to the left renal vein, producing the ovarian vascular pedicle sign. This ancillary sign strongly suggested a left adnexal origin despite the extensive distortion of pelvic anatomy.
The uterus remained enlarged with multiple leiomyomas. No hydronephrosis or distant visceral metastases were identified on the available imaging.

CT Impression: Contrast-enhanced CT favored a left adnexal malignant neoplasm based on the ovarian vascular pedicle sign, while also demonstrating omental fat stranding and nodularity suggestive of local disease extension. However, due to the lesion's massive size and intimate relationship with the uterus, definitive localization of the organ of origin remained challenging.

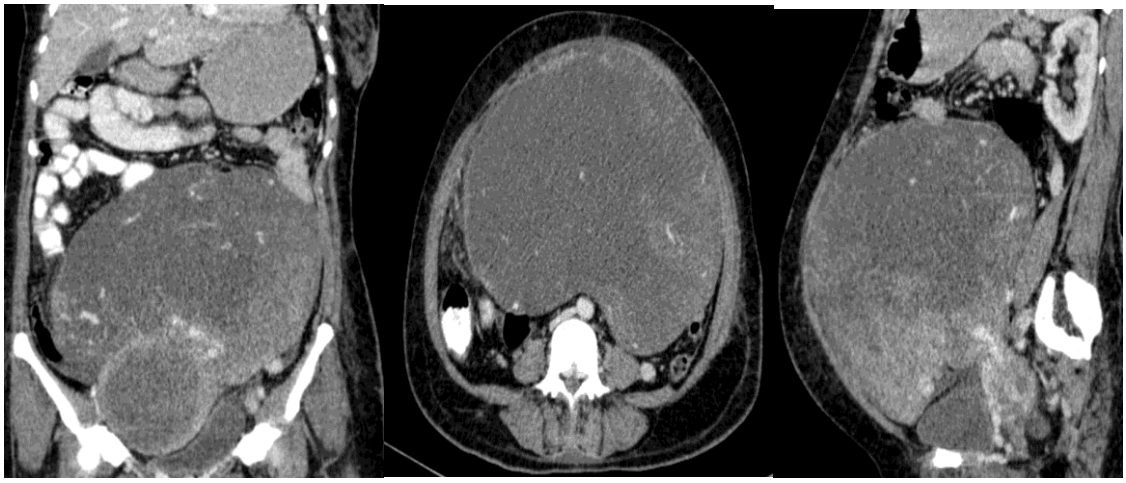

Figure 8: Contrast-enhanced CT demonstrates enhancement in the areas corresponding to diffusion restriction as seen on MRI. Omental nodularity and fat stranding are noted along the right lateral wall of the lesion

5. Intraoperative Findings

The patient subsequently underwent staging laparotomy. Intraoperatively, a giant highly vascular pelvic mass occupying the pelvis and lower abdomen was identified. The mass was densely adherent to the uterus, and the left ovary and fallopian tube could not be identified separately from the lesion. Multiple uterine leiomyomas were present. Omental adhesions to the mass were carefully lysed, and the left ureter required ureterolysis because of dense adherence to the tumor. En bloc total abdominal hysterectomy with bilateral salpingo-oophorectomy, total omentectomy, bilateral pelvic lymph node dissection, appendicectomy, and peritoneal washings were performed. Suspicious deposits over the appendiceal epiploica and sigmoid epiploica were excised for histopathological examination. Estimated blood loss was approximately 1800 mL, requiring transfusion of two units of packed red blood cells.

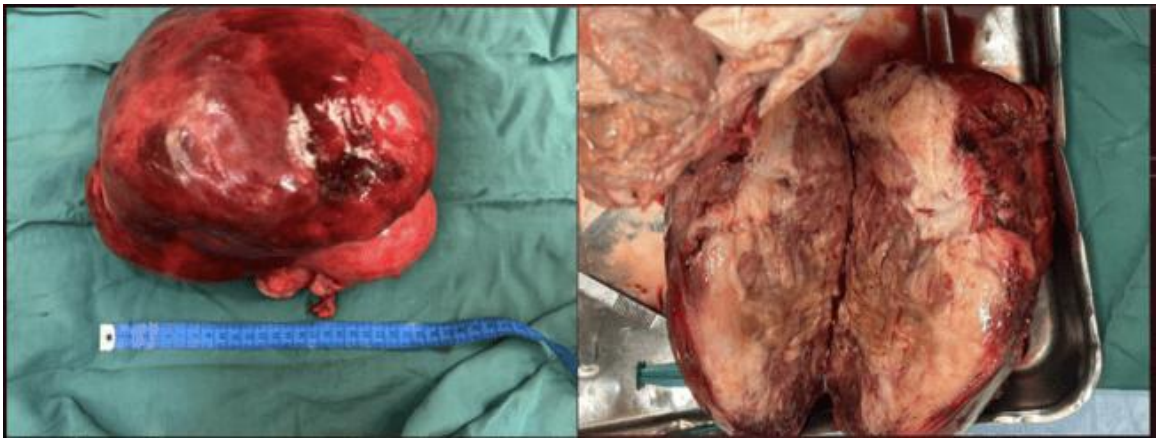

Figure 9: Excised specimen demonstrates a solid mass adherent to the uterus with non visualization of ovaries.

6. Discussion

Leiomyosarcoma is a malignant mesenchymal neoplasm arising from smooth muscle cells. Within the female pelvis, the uterus represents the most common site of origin, whereas primary ovarian leiomyosarcoma is exceedingly rare. However, in exceptionally large pelvic leiomyosarcomas, the normal anatomic relationships may be completely effaced, making determination of the organ of origin difficult.

The initial step in evaluating a pelvic mass is the identification of its organ of origin. This distinction is crucial because it substantially narrows the differential diagnosis and influences surgical planning. Imaging features that aid localization include the claw sign, beak sign, bridging vessel sign, and ovarian vascular pedicle sign. However, in exceptionally large tumors, these signs may be absent, distorted, or difficult to appreciate because the lesion replaces normal pelvic anatomy.

In our patient, ultrasonography suggested a uterine origin because the lesion appeared contiguous with the uterine fundus, and an additional posterior wall fibroid was identified. Ultrasound is the preferred first-line imaging modality for pelvic masses because it is inexpensive, readily available, and provides excellent evaluation of gynecological structures. Nevertheless, its performance decreases considerably in giant lesions, as the entire tumor cannot be evaluated within a single field of view and adjacent organs may not be separately visualized. This limitation was evident in our case, where the left ovary could not be identified independently, preventing confident determination of the lesion's origin.

MRI served as the principal problem-solving modality. The superior soft-tissue contrast enabled detailed assessment of

lesion morphology, internal architecture, diffusion characteristics, and enhancement pattern. The tumor demonstrated heterogeneous T2 hyperintensity, restricted diffusion, and avid enhancement of the viable solid components. These features are characteristic of aggressive malignant tumors and justified the assignment of an O-RADS MRI Score 5, indicating a very high likelihood of malignancy. MRI also demonstrated preservation of a tissue interface between the uterus and the mass on selected sequences, arguing against a straightforward uterine origin. However, extensive displacement of pelvic structures prevented unequivocal localization.

One of the most valuable ancillary findings was the visualization of the right ovary separately, whereas the left ovary was not identified independently. In addition, a dilated left ovarian vein was seen coursing from the lesion toward the left renal vein. This appearance corresponds to the ovarian vascular pedicle sign, originally described by Lee et al., and represents one of the most useful CT signs for determining ovarian origin in large pelvic masses. Although the sign favored an adnexal origin in our case, the coexistence of multiple uterine leiomyomas and the lesion's close relationship with the uterus continued to create diagnostic uncertainty.

Contrast-enhanced CT complemented MRI by better depicting the vascular anatomy, enhancement characteristics, and extent of disease. The enhancing solid components corresponded closely to the regions of restricted diffusion on MRI, increasing confidence that these represented viable tumor rather than degenerative change. CT additionally demonstrated diffuse omental fat stranding and nodularity, findings concerning for peritoneal involvement. These observations were important for preoperative assessment and surgical planning.

The operative findings explained the radiological dilemma encountered in this case. Although MRI and CT favored a left adnexal origin because of the ovarian vascular pedicle sign and the inability to identify the left ovary separately, surgical exploration demonstrated that the mass was densely adherent to the uterus, with the left ovary and fallopian tube inseparable from the lesion. Furthermore, multiple uterine leiomyomas and extensive pelvic adhesions obscured the normal tissue planes, explaining why imaging could not confidently determine the site of origin. Thus, surgical exploration served as the crucial bridge between multimodality imaging and the final histopathological diagnosis.

An elevated CA-125 level further complicated the diagnostic picture. Although markedly elevated CA-125 frequently raises suspicion for ovarian epithelial malignancy, it lacks specificity and may also be elevated in uterine leiomyosarcoma, endometriosis, adenomyosis, peritoneal irritation, and several benign inflammatory conditions. Therefore, serum tumor markers should always be interpreted in conjunction with imaging findings rather than in isolation.

The principal differential diagnoses considered in this patient included degenerating uterine leiomyoma, leiomyosarcoma, ovarian fibroma, fibrothecoma, sex cord-stromal tumor, and epithelial ovarian malignancy. Degenerating leiomyomas may demonstrate heterogeneous signal intensity and variable enhancement but usually lack the marked diffusion restriction observed in our patient. Ovarian fibromas typically demonstrate low T2 signal intensity because of abundant fibrous tissue, while epithelial ovarian malignancies frequently demonstrate papillary projections, multiloculated cystic components, and extensive ascites. The predominantly solid morphology, heterogeneous enhancement, restricted diffusion, and ancillary vascular findings collectively favored an aggressive malignant neoplasm.

In the present case, ultrasonography favored a uterine origin, whereas MRI and CT suggested a left adnexal origin because of the ovarian vascular pedicle sign and the inability to identify the left ovary separately. Surgical exploration also failed to resolve this diagnostic dilemma, as the tumor was densely adherent to the uterus and the left adnexa, with complete obliteration of the normal tissue planes. En bloc resection was therefore performed without definitive intraoperative localization of the tumor origin.

Histopathological examination established the diagnosis of a high-grade leiomyosarcoma (FNCLCC Grade 3). Immunohistochemistry confirmed smooth muscle differentiation with diffuse SMA, h-caldesmon, and vimentin positivity. However, because the tumor extensively involved and obscured the normal anatomical interfaces, histopathological evaluation could not definitively establish whether the neoplasm originated from the uterus or the ovary.

7. Conclusion

To our knowledge, this case represents an unusual example of a giant pelvic leiomyosarcoma in which the organ of origin remained indeterminate despite comprehensive multimodality imaging, meticulous surgical exploration, and detailed histopathological examination. The case highlights the limitations of each diagnostic modality when confronted with massive tumors that obliterate normal pelvic anatomy and underscores the importance of multidisciplinary clinicoradiological-pathological correlation in patient management.

References

[1] Lee JH, Jeong YK, Park JK, Hwang JC. “Ovarian vascular pedicle” sign revealing organ of origin of a pelvic mass lesion on helical CT. American Journal of Roentgenology. 2003;181(1):131–137. https://doi.org/10.2214/ajr.181.1.1810131 Cited by: 126

[2] Nougaret S, Lakhman Y, Bahadir S, Sadowski E, Thomassin-Naggara I, Reinhold C. Ovarian-Adnexal Reporting and Data System for Magnetic Resonance Imaging (O-RADS MRI): Genesis and future directions. Canadian Association of Radiologists Journal. 2022;74(2):370–381. https://doi.org/10.1177/08465371221121738 Cited by: 15

[3] Guillou L, Coindre JM, Bonichon F, et al. Comparative study of the National Cancer Institute and French Federation of Cancer Centers Sarcoma Group grading systems in a population of 410 adult patients with soft tissue sarcoma. Journal of Clinical Oncology. 1997;15(1):350–362. https://doi.org/10.1200/jco.1997.15.1.350 Cited by: 1076