

An Extra-gastrointestinal Stromal Tumor Masquerading as an Adrenal Mass: A Case Report and Review of the Literature

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Case Report

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Abstract

Background:

Extra-gastrointestinal stromal tumors (EGISTs) are rare mesenchymal neoplasms arising outside the gastrointestinal tract, most often in the omentum, mesentery, or retroperitoneum. Presentation as a suprarenal mass mimicking primary adrenal pathology is exceedingly uncommon, with only isolated cases reported in the literature. We describe the clinical course, diagnostic evaluation, surgical management, and pathological findings of a retroperitoneal EGIST that was preoperatively presumed an adrenocortical carcinoma.

Case Presentation:

A 74-year-old woman presented with left flank pain. Computed tomography (CT) imaging demonstrated a 5.8 x 6.1 x 4.9 cm heterogeneous left suprarenal mass with central necrosis, raising concern for adrenocortical carcinoma (ACC), pheochromocytoma, or metastatic disease. Comprehensive hormonal evaluation was negative. CT of the chest confirmed no metastatic disease. The patient underwent robot-assisted retroperitoneal laparoscopic left adrenalectomy with periaortic lymph node dissection. Final pathology revealed a low-grade GIST (spindle cell type, 7.5 cm, CD117+) arising from retroperitoneal soft tissue with the adrenal gland identified as a separate, uninvolved structure. Staging: pT3N0M0R1 (0/4 lymph nodes positive). The patient was discharged on postoperative day 2 without complications.

Conclusion:

GIST should be included in the differential of large retroperitoneal suprarenal masses. Immunohistochemistry — particularly CD117 (c-Kit) — is essential for definitive diagnosis. KIT/PDGFRα mutational analysis is mandatory to guide adjuvant tyrosine kinase inhibitor therapy. Multidisciplinary oncologic review is warranted given the R1 resection and paucity of outcome data for retroperitoneal EGISTs.

Background

Gastrointestinal stromal tumors (GISTs) represent the most common mesenchymal neoplasms of the gastrointestinal tract and arise from the interstitial cells of Cajal (ICC) or their multipotent progenitors. They are characterized by gain-of-function mutations in the KIT (c-Kit) proto-oncogene receptor tyrosine kinase in approximately 75–80% of cases, with PDGFRα mutations accounting for an additional 5–10%. The stomach is the most frequent primary site (~ 60%), followed by the small intestine (~ 30%), with colorectal and other GI sites constituting the remainder.

Extra-gastrointestinal stromal tumors (EGISTs) are a rare subset arising outside the GI lumen, comprising fewer than 5% of all GIST diagnoses. The most common extra-GI sites include the omentum, mesentery, and retroperitoneum. Adrenal or periadrenal EGIST has been described only in isolated case reports and remains one of the rarest presentations of this tumor type.^[1, 2]

The clinical and radiological features of retroperitoneal suprarenal EGISTs overlap substantially with those of adrenocortical carcinoma (ACC), pheochromocytoma, adrenal schwannoma, and metastatic disease. This diagnostic ambiguity has significant clinical implications, as management of each entity differs considerably. Preoperative percutaneous biopsy of suspected adrenal malignancy is generally contraindicated due to the risk of tumor seeding and potential adrenal hormone crisis in unrecognized pheochromocytoma. Accurate pathological diagnosis following surgical excision, with appropriate immunohistochemical and molecular characterization, is therefore paramount.

We present a case of a retroperitoneal EGIST in a 74-year-old woman that presented as a large suprarenal mass indistinguishable from ACC on preoperative imaging, along with a review of the relevant literature on diagnostic evaluation, surgical management, and the implications of positive surgical margins and molecular genotyping in this rare entity.

Case Presentation

History and Physical Examination

A 74-year-old woman with a history of hypertension and hyperlipidemia presented to the emergency department with left flank pain. She denied hematuria, dysuria, unintentional weight loss, abdominal pain, or fevers. Episodic palpitations, flushing, diaphoresis, or headaches consistent with catecholamine excess were absent. Past surgical history included bilateral knee arthroplasties, total abdominal hysterectomy, bilateral breast reduction, colonoscopy, appendectomy, and knee arthroscopy. Family history was notable for diabetes mellitus, heart disease, and hypertension in maternal relatives, with no genitourinary malignancies reported. The patient was a non-smoker, denied alcohol and substance use, and exercised regularly. She was married and living independently.

Physical examination revealed no acute distress. Vital signs were within normal limits. Abdominal examination demonstrated a soft, non-distended abdomen without palpable mass, guarding, or rebound. There was no costovertebral angle tenderness. Neurological examination was intact.

Diagnostic Imaging

Contrast-enhanced CT of the abdomen and pelvis demonstrated a well-defined, solid mass in the left suprarenal region measuring approximately 5.8 x 6.1 x 4.9 cm (Fig. 1). The mass was rounded with heterogeneous attenuation, mild enhancement, and central non-enhancing necrosis. Two small internal calcifications were identified. The mass exerted mild mass effect on adjacent structures with slight

displacement of the splenic hilum and abutment of the gastric fundus without evidence of direct invasion. Multiple small hypodense hepatic lesions were incidentally noted. The stomach and small bowel appeared unremarkable. The large bowel was mildly dilated with fecal loading without focal mural thickening. The radiologic differential diagnosis included adrenocortical carcinoma, pheochromocytoma, and metastatic disease.

Hormonal Evaluation

A comprehensive hormonal workup was performed to evaluate for functional adrenal tumor. Results are summarized in Table 1. Plasma metanephrine and normetanephrine levels were both within normal reference ranges, excluding pheochromocytoma diagnosis. Serum aldosterone was undetectable with plasma renin activity within normal limits, leading to < 20:1 aldosterone to renin ratio and making primary hyperaldosteronism unlikely. Serum cortisol was low-normal; in the absence of clinical hypercortisolism, this was non-diagnostic for Cushing syndrome. Urinalysis was unremarkable. Taken together, the hormonal evaluation was consistent with a non-functional adrenal mass.

Table 1
Hormonal and Laboratory Evaluation for Adrenal Mass

Test	Result	Reference Range	Interpretation
Plasma Metanephrine	< 2 pg/mL	< 57 pg/mL	Normal
Plasma Normetanephrine	110 pg/mL	< 148 pg/mL	Normal
Serum Cortisol	4.03 mcg/dL	Variable	Low-normal
Serum Aldosterone	< 1 ng/dL	2–9 ng/dL (supine)	Low
Plasma Renin Activity	3.07 ng/mL/h	0.2–3.3 ng/mL/h	Normal
DHEA-S	24 mcg/dL	15–157 mcg/dL (postmeno.)	Low-normal
Urinalysis	Unremarkable	-	Normal

Staging and Pre-operative Evaluation

CT of the chest with intravenous contrast (Fig. 2) demonstrated clear lungs without suspicious pulmonary nodules, no mediastinal or hilar lymphadenopathy, and an unchanged 6 cm heterogeneous left adrenal mass on limited upper abdominal images. No lytic or blastic bony lesions were identified. The chest CT was interpreted as negative for metastatic disease.

The patient was counseled on the risks and benefits of left retroperitoneal laparoscopic adrenalectomy with lymph node dissection and consented to proceed. Pre-operative laboratory studies (CBC, comprehensive metabolic panel) were obtained and in acceptable range.

Operative Management

The patient underwent robot-assisted retroperitoneal laparoscopic (RAL) left adrenalectomy with periaortic lymph node dissection under general anesthesia. Trocar placement included an 8 mm left upper quadrant incision for Veress needle insufflation (15 cmH₂O), three 8 mm robotic trocars, a 12 mm assistant trocar, and a 5 mm midline port. The white line of Toldt was incised; the descending colon was swept medially. Gerota's fascia was entered. The gonadal vessel was identified and protected. After meticulous hilar dissection, the adrenal vein was ligated with hemolock clips and divided. The splenorenal and splenocolic ligaments were divided and the splenic flexure mobilized. A large adrenal mass was dissected free with the adrenal gland, and enlarged periaortic lymph nodes were included in the specimen. The specimen was retrieved in an Endocatch bag through an extended 12 mm port incision. Fascia was closed with looped PDS suture; skin with staples. Total estimated blood loss was 200 mL. The patient was transferred to the post-anesthesia care unit in stable condition without immediate complications.

Post-operative Course

Post-operative day 1 laboratory studies revealed mild hyponatremia (sodium 132 mmol/L), mild hyperkalemia (potassium 5.4 mmol/L), creatinine 1.20 mg/dL (GFR 48 mL/min/1.73m²), and hemoglobin 11.0 g/dL with microcytic indices (MCV 72.9 fL). These findings were attributed to post-surgical fluid shifts, pre-existing anemia, and the patient's chronic antihypertensive medications. The patient was ambulating and tolerating diet by postoperative day 1 and was discharged home on postoperative day 2 in stable condition.

Pathological Findings

The resected specimen — designated 'left adrenal gland' — consisted of a 97.5 gram firm, brown, multinodular mass measuring 7.5 x 5.5 x 5 cm. A separate, flattened, yellow-orange adrenal gland (5 x 3.1 x 0.6 cm) was loosely adherent to the mass. Sectioning revealed a heterogeneous pale tan-to-yellow cut surface with hemorrhage and possible necrosis, grossly abutting but not invading the adrenal gland (Figs. 3A and 3B).

Microscopic examination revealed a gastrointestinal stromal tumor (GIST), spindle cell type, of low histologic grade (G1). The mitotic rate was 1 mitosis per 5 mm² and the Ki-67 proliferation index was approximately 1–2%. Maximum tumor dimension was 7.5 cm. Surgical margins were microscopically positive (R1). The adrenal gland showed no tumor involvement. Periaortic lymph nodes showed no metastatic disease (0 of 4 nodes).

Immunohistochemical staining results are summarized in Table 2. The immunoprofile — CD117 positive with negativity for smooth muscle actin, desmin, S100, HMB-45, MART1, and CAM 5.2 — confirmed the

diagnosis of GIST and excluded smooth muscle tumors, neural tumors, melanoma, and epithelial/adrenocortical neoplasms.

Table 2
Immunohistochemical Stain Results

Marker	Result
CD117 (c-Kit)	Positive
Smooth Muscle Actin (SMA)	Negative
CAM 5.2	Negative
Desmin	Negative
S100	Negative
HMB-45	Negative
MART1	Negative
Ki-67 Proliferation Index	~ 1–2%
Estrogen Receptor (ER)	Negative

Pathologic staging: pT3 (tumor > 5 cm), pN0 (0/4 regional lymph nodes), pM0 (no distant metastasis on imaging), R1 (microscopically positive margin). Formal NIH/modified NIH risk stratification was noted as 'cannot be determined' given limited outcome data for non-gastrointestinal sites. KIT/PDGFRA mutational analysis was not performed and is strongly recommended.

Clinical Timeline

A summary of the clinical timeline is presented in Table 3.

Table 3
Clinical Timeline of Key Events

Timepoint	Setting	Key Event / Finding
Day 0	Emergency Department	Presentation with left flank pain; CT abdomen/pelvis reveals large left suprarenal mass (5.8 x 6.1 x 4.9 cm)
Day 5	Urology Clinic	Initial urology consultation; hormonal workup and CT chest ordered
Day 5	Laboratory	Hormonal evaluation: negative for pheochromocytoma, primary hyperaldosteronism, and hypercortisolism
Day 19	Radiology	CT chest with contrast: lungs clear, no metastatic disease; left adrenal mass unchanged
Day 19	Urology Clinic	Pre-operative evaluation; consents obtained; proceed with surgery
Day 24	Operating Room	Robot-assisted left retroperitoneal laparoscopic adrenalectomy + periaortic lymph node dissection (EBL 200 mL)
Day 26	Hospital Discharge	Discharged home on POD #2; outpatient follow-up in 2 weeks
Day 27 (est.)	Pathology	Final pathology: GIST, spindle cell type, low-grade, CD117+, pT3N0M0, R1

Discussion

EGISTs: An Overview

GISTs are the most common mesenchymal tumors of the gastrointestinal tract, with an estimated incidence of 11–14 per million persons per year. EGISTs constitute a small but clinically important subgroup. Lin et al. (2023) described six patients with primary retroperitoneal EGIST, noting that all were classified as high-risk by NIH criteria and all harbored KIT exon 11 mutations.^[1] Hou et al. (2003) similarly described nine cases of intra-abdominal EGISTs, reporting CD117 positivity in 8 of 9 cases.^[2] The pathogenesis of EGISTs remains debated, with hypotheses including ectopically distributed interstitial cells of Cajal or a common KIT-expressing mesenchymal progenitor.

Differential Diagnosis of Large Suprarenal Masses

The initial radiologic differential appropriately included ACC, pheochromocytoma, and metastatic disease. Bhat and Tiyaath (2016) outlined that adrenal masses > 4 cm warrant surgical consideration with comprehensive biochemical evaluation.^[3] Gaujoux et al. (2017) emphasized that ACC typically presents with large size, irregular margins, and combined hormonal hypersecretion, and that needle biopsy is contraindicated given the risk of tumor seeding.^[4] In this case, normal plasma metanephrine and normetanephrine levels excluded pheochromocytoma. The negative hormonal panel and negative

chest CT supported resection. EGIST was not considered preoperatively — a diagnostic pitfall well-illustrated by this case.

Surgical Approach and Outcomes

Robot-assisted retroperitoneal laparoscopic adrenalectomy was employed with favorable outcomes: 200 mL estimated blood loss and a two-day postoperative stay. For large adrenal masses, some guidelines have historically favored open surgery to reduce rupture risk; however, accumulating evidence supports minimally invasive approaches in experienced hands even for large lesions. The robotic platform enhances dexterity and visualization for complex hilar dissection. This case demonstrates the feasibility of RAL adrenalectomy for a 7.5 cm EGIST with periaortic lymph node dissection.

Pathological Diagnosis and Immunohistochemistry

The definitive diagnosis depended entirely on the immunohistochemical panel. CD117 (c-Kit) positivity — present in approximately 95% of GISTs — alongside negativity for SMA, desmin, S100, HMB-45, MART1, and CAM 5.2, is diagnostic of GIST while excluding smooth muscle tumors, peripheral nerve sheath tumors, melanoma, and carcinomatous differentiation.^[1, 2] Notably, DOG1 (discovered on GIST-1/ANO1) staining was not performed; this marker is positive in > 95% of GISTs including many KIT-negative cases and should be co-stained to maximize diagnostic confidence.^[11, 12]

The histologic features of this tumor were notably low-grade relative to most reported retroperitoneal EGISTs: spindle cell morphology, mitotic rate of 1/5mm², and Ki-67 of only 1–2%. Lin et al. (2023) found that all six retroperitoneal EGIST cases in their series were high-risk, with > 5 mitoses per 50 HPF and Ki-67 > 5% in half of cases.^[1] This patient's indolent histology may indicate more favorable biology, though long-term surveillance remains essential.

Significance of R1 Resection and Adjuvant Therapy Considerations

The R1 resection status requires careful multidisciplinary evaluation. A meta-analysis by Zhi et al. (2016) demonstrated that microscopically positive margins significantly impair disease-free survival (HR 1.596; 95% CI 1.128–2.258) and that adjuvant imatinib may attenuate this recurrence risk.^[5] However, a population-based cohort by Hølmekjær et al. (2018) demonstrated that R1 resection without tumor rupture was not independently associated with recurrence (5-year RFS: R0 87.6% vs R1 93%; $p = 0.638$), challenging automatic adjuvant therapy after R1 resection in the absence of rupture or other high-risk features.^[5–7]

The most critical gap is the absence of KIT and PDGFRA mutational analysis. Adjuvant imatinib is most effective for KIT exon 11 mutations, moderately effective for KIT exon 9 mutations (requiring double-dose), and ineffective for PDGFRA D842V mutations (where avapritinib is indicated). Wild-type GISTs may harbor SDH, NF1, or BRAF alterations with distinct therapeutic implications. Mutational profiling is therefore essential and not merely confirmatory.^[11, 12]

NIH Risk Stratification and Surveillance

Formal NIH risk stratification cannot be reliably applied to retroperitoneal EGISTs, as these models were validated primarily in gastric and small intestinal primaries.^[10] The pathology report appropriately acknowledged this limitation. Management should be guided by close multidisciplinary oncology collaboration incorporating mutational analysis results. Per NCCN and ESMO GIST guidelines, surveillance imaging with CT or MRI of the abdomen and pelvis with contrast at 3–6 month intervals for the first 3–5 years, followed by annual imaging thereafter, is recommended.^[11, 12] Given the atypical location and limited natural history data for periadrenal EGISTs, a more intensive initial surveillance schedule may be prudent.

Conclusion

We present a rare case of a low-grade extra-gastrointestinal stromal tumor arising from retroperitoneal soft tissue and presenting as a large left suprarenal mass indistinguishable from adrenocortical carcinoma on preoperative imaging. Robot-assisted retroperitoneal laparoscopic adrenalectomy was accomplished safely with minimal blood loss and a two-day hospital stay. Definitive diagnosis was established by immunohistochemical profiling demonstrating CD117 (c-Kit) positivity. Key lessons include:

- GIST should be included in the differential diagnosis of large retroperitoneal suprarenal masses, even when radiologic features suggest an adrenal primary.
- Comprehensive hormonal workup is essential to exclude functional tumors prior to surgical planning.
- CD117 (c-Kit) immunohistochemistry is the cornerstone of GIST diagnosis; DOG1 co-staining is recommended to maximize sensitivity and specificity.
- KIT and PDGFRA mutational analysis is mandatory at initial diagnosis to guide adjuvant tyrosine kinase inhibitor selection.
- R1 resection without tumor rupture may not independently worsen prognosis, but multidisciplinary oncologic review and close surveillance imaging are essential.^[5, 6]
- Given the extreme rarity of this presentation, prospective reporting of additional cases is encouraged to characterize the natural history, optimal surgical approach, and long-term outcomes of adrenal-region EGISTs.

Abbreviations

- GIST
gastrointestinal stromal tumor
- EGIST
Extra-gastrointestinal stromal tumor

- CT
Computed tomography
- ACC
adrenocortical carcinoma
- ICC
interstitial cells of Cajal

Declarations

Clinical trial number: not applicable.

Ethics approval and consent to participate

Not Applicable

Consent for publication

Written informed consent was obtained from the patient for publication of this de-identified case report. All patient identifying information has been removed or generalized in compliance with HIPAA guidelines. Dates are presented as a relative timeline. Provider names, institutional names, and geographic identifiers below state level have been redacted. Radiology images have been programmatically de-identified by removing all DICOM header overlays.

Availability of data and materials

Data sharing is not applicable to this article as no datasets were generated or analyzed during the current study.

Competing interests

The authors declare that they have no competing interests

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Authors' contributions

ET, VA, and BA evaluated the patient, led management of diagnostics and care, and performed adrenalectomy. SM, LL, FM, and SK analyzed patient's case, compiled data, and were writers in the manuscript. All authors read and approved the final manuscript.

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Not Applicable

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Figures

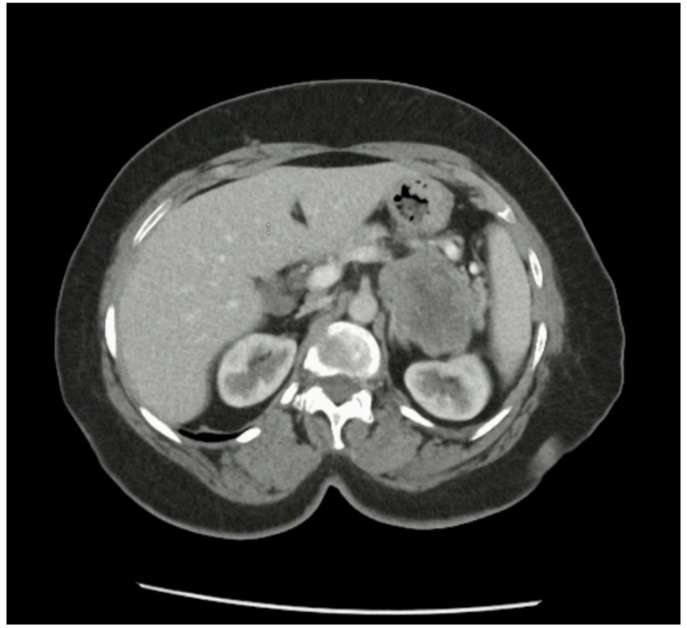
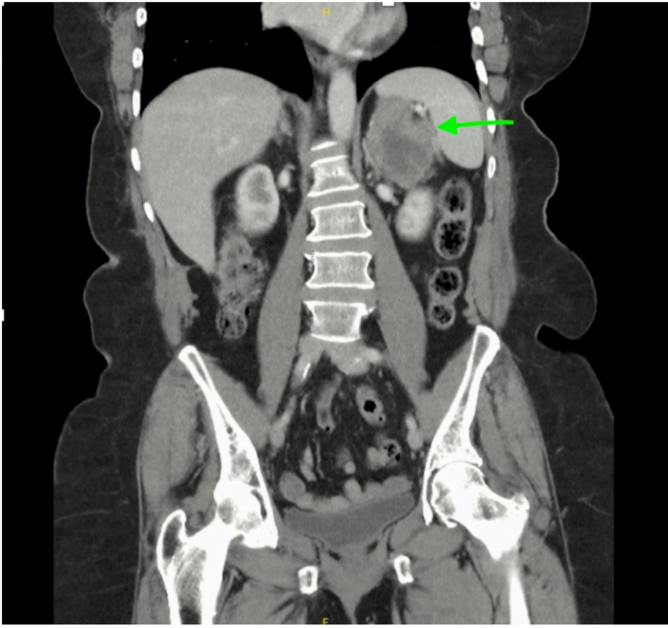


Figure 1

CT abdomen/pelvis with intravenous contrast.

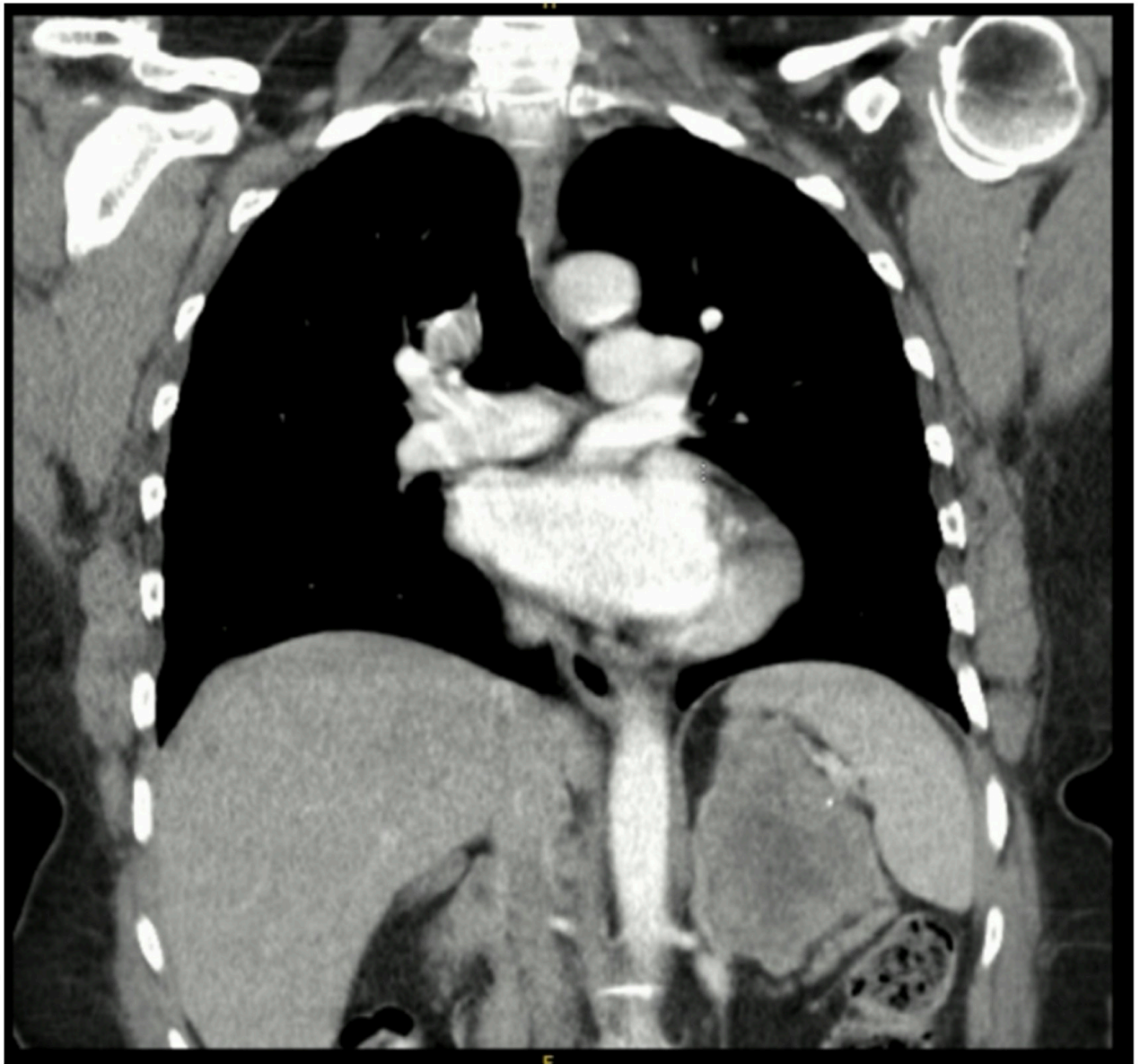


Figure 2

CT chest with intravenous contrast.

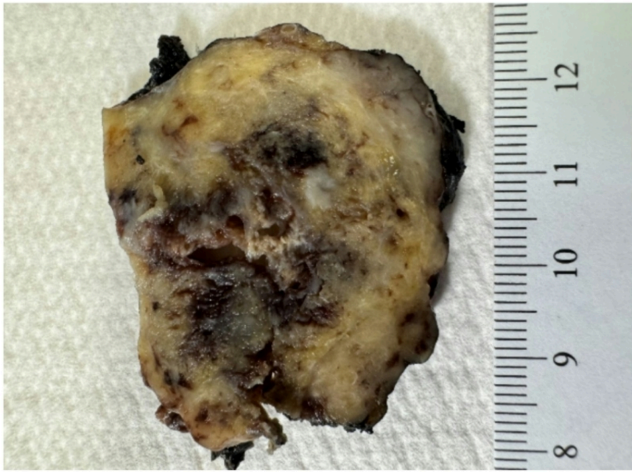


Figure 3

A and B. Gross pathology photographs of the resected specimen on cut section (measurements in centimeters). The tumor demonstrates a heterogeneous pale tan-to-yellow cut surface with scattered areas of dark hemorrhage and necrosis