Case Report
Running Title: Mitotically Active Sclerosing Stromal Tumor of the Ovary
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Bilateral Mitotically Active Sclerosing Stromal Tumor of the Ovaries: A Rare Case Report

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Abstract
Sclerosing stromal tumor (SST), a rare benign sex cord–stromal neoplasm, predominantly affects young women. Although SST typically demonstrates low mitotic activity and an indolent clinical behavior, mitotically active variants and bilateral presentations are exceptionally uncommon and may closely mimic malignant ovarian tumors. This diagnostic overlap is further complicated when proliferation indices such as Ki-67 are markedly elevated.
We report the case of a young woman presenting with bilateral ovarian masses, both demonstrating classical morphologic features of SST yet exhibiting unusually high mitotic activity and a markedly elevated Ki-67 proliferation index. Histopathologic examination revealed pseudolobular architecture with alternating cellular and edematous areas, abundant thin-walled branching vasculature, and a mixed population of spindle and luteinized stromal cells. Immunohistochemical evaluation showed strong positivity for inhibin and smooth muscle actin, with negative cytokeratin expression, findings supportive of SST despite the atypically high proliferative activity. No nuclear atypia, tumor necrosis, or other features suggestive of malignancy were identified.
This case underscores the importance of comprehensive clinicopathologic and immunohistochemical correlation in distinguishing mitotically active SST from malignant ovarian neoplasms. Awareness of these rare, benign variants is essential to avoid overdiagnosis and prevent unnecessary radical surgery, particularly in young women in whom fertility preservation is critical.

Keywords: Case report, Ovarian neoplasms, Sex cord-gonadal stromal tumors, Cell proliferation, Immunohistochemistry

Introduction

Sclerosing stromal tumor (SST) of the ovary is a rare benign neoplasm within the sex cord–stromal tumor category, initially characterized in 1973 by Chalvardjian and Scully. While SST accounts for only a small

fraction of ovarian stromal tumors, its occurrence in reproductive-age women, often in the second and third decades, underscores its clinical importance for fertility preservation and accurate diagnosis.[1, 2] Although the classical description of SST includes low mitotic activity and benign behavior, emerging reports have documented a subset of mitotically active or bilaterally presenting tumors, challenging conventional diagnostic paradigms.[3, 4]

Clinically, SST presents with nonspecific symptoms such as pelvic or abdominal discomfort, distention, menstrual irregularities, or a palpable pelvic mass; hormonal manifestations may occasionally occur. Imaging features can mimic malignant ovarian lesions, given the solid nature of the mass and its vascular pattern.[5, 6] On ultrasonography and Doppler evaluation, SST frequently demonstrates increased vascularity, correlating with its hallmark thin-walled branching vasculature. Magnetic resonance imaging may show heterogeneous enhancement and signal intensity similar to malignant tumors, complicating preoperative differentiation.[7]

Histopathologically, SST is defined by a distinct pseudolobular architecture: sharply demarcated hypercellular and hypocellular areas separated by collagenous or edematous stroma. The presence of numerous thin-walled branching vascular channels is a key diagnostic clue.[1, 4] The cellular component typically includes spindle-shaped, oval and polygonal luteinized cells, contributing to its unique morphological spectrum. Immunohistochemically, SST consistently expresses inhibin, calretinin and smooth muscle actin (SMA), whereas epithelial markers such as cytokeratin are typically negative. This immunophenotype aids in distinguishing SST from other sex cord-stromal tumors and spindle cell mimickers.[8]

Despite its benign classification by the 2020 World Health Organization (WHO) 5th edition, rare cases of SST exhibit elevated mitotic figures or high Ki-67 proliferation indices, and even bilateral involvement has been recorded.[4, 10] These findings may provoke misclassification as malignant neoplasms, potentially leading to unnecessary radical interventions. Therefore, integrating clinical presentation, imaging, histopathology and immunohistochemistry is essential for accurate diagnosis and appropriate management.

In this report, we present a rare case of bilateral, mitotically active SST of the ovaries with a markedly elevated Ki-67 index. Through this case, we emphasize the diagnostic challenges and highlight the importance of combining morphologic and immunophenotypic assessment to avoid overtreatment.

Case Presentation

A 25-year-old woman presented with a one-week history of progressive abdominal distention accompanied by dull lower abdominal discomfort. She denied gastrointestinal, urinary, or systemic symptoms, including nausea, vomiting, altered bowel habits, dysuria, fever, or weight loss. Her menstrual cycles were regular, and she had no significant past medical or surgical history. There was no family history of gynecologic or endocrine malignancies.

On physical examination, the abdomen appeared markedly distended with a firm, non-tender abdominopelvic mass extending above the umbilical level. Mild shifting dullness indicated the presence of ascites. Vital signs were stable, and the patient remained afebrile.

Pelvic ultrasonography demonstrated a large, predominantly solid right ovarian mass measuring 89 × 77 × 61 mm with heterogeneous echogenicity and peripheral vascularity, and a mixed solid–cystic left ovarian lesion measuring 87 × 72 × 30 mm. A moderate amount of free pelvic fluid was

identified. No peritoneal nodularity, omental thickening, or pelvic lymphadenopathy was observed.

Routine laboratory investigations including complete blood count, serum electrolytes, liver and renal function tests, and coagulation profile were within normal reference ranges. Tumor markers (CA-125, CEA, AFP, β-hCG, LDH, and Inhibin B) were all normal.

The patient underwent exploratory laparotomy. Intraoperatively, both ovaries were enlarged and replaced by well-circumscribed masses with intact capsules and smooth outer surfaces. No evidence of omental deposits, peritoneal implants, or enlarged pelvic or para-aortic lymph nodes was identified. Bilateral ovarian tumor excision was performed with preservation of ovarian tissue.

Gross examination revealed solid tan-white masses with focal cystic changes. Cut surfaces showed alternating firm and edematous areas without hemorrhage or necrosis.

Microscopic examination demonstrated a pseudolobular pattern composed of alternating hypercellular and hypocellular areas separated by edematous stroma (Figure 1). Numerous thin-walled branching vascular channels were present. The hypercellular areas contained spindle-shaped and oval stromal cells interspersed with polygonal luteinized cells. Mitotic activity was increased, reaching up to 20 mitoses per 10 high-power fields, but atypical mitoses and tumor necrosis were absent.

Immunohistochemical analysis showed diffuse cytoplasmic positivity for inhibin and SMA. Cytokeratin was negative. The Ki-67 proliferation index was markedly elevated, approaching 70% (Figure 2).

Timeline

Time	Clinical event
One week before admission	Progressive abdominal distension and lower abdominal discomfort developed.
At presentation	Physical examination revealed a large abdominopelvic mass and ascites.
Diagnostic workup	Pelvic ultrasonography demonstrated bilateral ovarian masses. Tumor markers were within normal limits.
Surgery	Exploratory laparotomy and bilateral ovarian tumor excision with preservation of ovarian tissue were performed.
Histopathological evaluation	Microscopic examination and immunohistochemical studies confirmed bilateral mitotically active sclerosing stromal tumor.

Follow-up and outcomes

The postoperative course was uneventful. The patient recovered well after surgery and was discharged in stable condition. No immediate postoperative complications were observed.

Ethics approval

This study was approved by the Research Ethics Committee of Isfahan University of Medical Sciences (ethics code: IR.ARI.MUI.REC.1404.200).

Discussion

SST is a rare benign ovarian sex cord–stromal neoplasm predominantly affecting young women in their reproductive years. Although classically associated with minimal mitotic activity and indolent clinical behavior, recent literature has highlighted the existence of mitotically active variants that may present diagnostic challenges, particularly when accompanied by elevated Ki-67 indices or bilateral involvement.[1,3,7] These atypical features can mimic more aggressive sex cord–stromal or even epithelial neoplasms, underscoring the importance of careful integration of clinical,

radiologic, morphologic, and immunophenotypic features.

The characteristic pseudolobular architecture of SST—consisting of sharply demarcated hypercellular and hypocellular areas separated by edematous or collagenous stroma—remains a central diagnostic hallmark. Numerous thin-walled branching vascular channels contribute to its distinctive appearance and help differentiate SST from cellular fibroma, thecoma, and other spindle cell tumors.[3,7] Despite the elevated mitotic count observed in our case, the absence of necrosis, nuclear pleomorphism, and atypical mitotic figures strongly supported the benign nature of the tumor. As highlighted in recent analyses, increased mitotic activity in SST may reflect stromal remodeling rather than true malignant potential.[7]

According to the WHO Classification of Female Genital Tumors 5th edition, SST is categorized as a benign sex cord–stromal tumor with well-defined morphologic and immunophenotypic criteria.[1] Importantly, WHO emphasizes that proliferation markers such as Ki-67 should not be interpreted in isolation when evaluating ovarian stromal tumors. Although high Ki-67 values may initially raise concern for malignancy, published reports clearly show that elevated proliferation indices in SST do not correlate with adverse clinical outcomes.[3, 10]

The differential diagnosis of SST includes a spectrum of ovarian spindle cell and sex cord–stromal tumors. Mitotically active cellular fibroma may exhibit increased cellularity and mitoses but lacks the pseudolobular pattern, distinctive vascular network, and luteinized stromal cells typical of SST.[3] Adult granulosa cell tumor may contain luteinized cells and occur in young women; however, adult granulosa cell tumor typically displays nuclear grooves, Call-Exner bodies, and FOXL2 mutations, and shows cytokeratin positivity—features not seen in SST.[8] Sertoli–Leydig cell tumors can also mimic SST morphologically but usually demonstrate tubular differentiation, androgenic symptoms, and consistent cytokeratin expression.[8] The integration of vascular pattern, stromal heterogeneity, and immunoprofile in the present case effectively excluded these mimickers.

Immunohistochemistry remains instrumental when morphology alone is insufficient. SST commonly expresses inhibin, calretinin, and SMA, supporting its sex cord–stromal and myoid differentiation. In contrast, epithelial markers such as cytokeratin are typically negative.[5, 8] Although an elevated Ki-67 index approaching 70% is unusual, recent studies on mitotically active SST variants have confirmed that proliferation markers do not predict malignant behavior when evaluated alongside benign morphologic features.[3, 10] Therefore, interpretation must consider the entire clinicopathologic context.

Bilateral SST is exceptionally rare, with only sporadic cases described in recent literature.[7] Bilateral ovarian masses frequently raise suspicion for metastatic disease, synchronous ovarian tumors, or hormonally active neoplasms. However, bilateral involvement has not been shown to alter prognosis in SST. In our case, the lack of capsular rupture, surface involvement, or peritoneal nodules further supported its benign biological behavior despite its bilateral presentation.

The markedly elevated proliferative index and increased mitotic figures observed in this case highlight the diagnostic pitfalls associated with mitotically active SST. While such features may prompt initial concern for malignancy, several recent reports demonstrate that these histologic findings do not correlate with recurrence or metastasis during follow-up.[3, 7, 10] This emphasizes the importance of avoiding aggressive or radical surgical procedures when clinical, morphologic, and immunophenotypic findings support a benign diagnosis.

In conclusion, this case illustrates the diagnostic complexity associated with mitotically active and bilateral variants of SST. Comprehensive evaluation—including clinical context, radiologic findings, stromal architecture, vascular patterns, and immunohistochemical profile—is essential for accurate diagnosis. Recognition of these atypical but benign variants is crucial to avoid misdiagnosis and prevent unnecessary radical surgery, especially in women of reproductive age.

Conclusion

In summary, SST of the ovary is an uncommon but distinctive benign neoplasm within the sex cord‑stromal category, and recognition of its characteristic clinicopathologic features remains essential for accurate diagnosis and optimal management. Despite the typical benign morphology, rare variants exhibiting elevated mitotic figures, high Ki-67 proliferation indices, or bilateral presentation may mimic malignant ovarian tumors both clinically and radiologically. These atypical findings have the potential to generate considerable diagnostic uncertainty; however, comprehensive evaluation incorporating morphologic architecture, stromal composition, vascular pattern, and immunohistochemical profile reliably distinguishes SST from its malignant mimickers.

The present case highlights this diagnostic complexity, demonstrating a bilateral, mitotically active SST with a markedly elevated Ki-67 index, yet displaying no cytologic atypia, necrosis, or aggressive architectural features. Such observations reinforce the principle that proliferation markers should not be interpreted in isolation and must be integrated into the broader histopathologic context. Adequate awareness of these benign variants is critical to prevent unnecessary radical surgical interventions, particularly for young women in reproductive age in whom ovarian preservation is of paramount importance.

Ultimately, the clinical outcome for SST, including mitotically active and bilateral forms, remains overwhelmingly favorable when managed appropriately. Complete surgical excision is curative in the vast majority of cases, and long-term follow-up studies consistently show no recurrence or malignant transformation. This case underscores the importance of maintaining a high index of suspicion for SST, especially when evaluating solid ovarian masses in young women, and highlights the value of correlating morphology with immunohistochemical patterns to ensure a correct diagnosis. Increased familiarity with these histopathologic subtleties will support more accurate diagnostic decision-making and help avoid overtreatment in future cases.

Informed Consent

Written informed consent was obtained from the patient for publication of this case report and the accompanying clinical, pathological, and immunohistochemical images. A copy of the written consent is available for review by the Editor upon reasonable request.

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Authors' Contributions

Maryam Derakhshan: Conceptualization, pathological evaluation, manuscript drafting, and critical revision

Pegah Hadipour: Literature review, data collection, manuscript drafting, editing, and manuscript revision
Marzieh Derakhshan: Clinical data acquisition, patient management, and review of clinical information
Elham Omidi: Study supervision, pathological interpretation, critical revision of the manuscript, and final approval of the submitted version
All authors contributed substantially to this work, fulfilled the ICMJE authorship criteria, and approved the final version of the manuscript

Conflict of Interest
None declare.

References

1. McCluggage WG, Singh N, Gilks CB. Key changes to the World Health Organization (WHO) classification of female genital tumours introduced in the 5th edition (2020). *Histopathology.* 2022;80(5):762-78. doi:10.1111/his.14609. PMID:34996131.
2. McCluggage WG. Progress in the pathological arena of gynecological cancers. *Int J Gynaecol Obstet.* 2021;155(Suppl 1):107-14. doi:10.1002/ijgo.13871. PMID: 34669206
3. Goebel EA, McCluggage WG, Walsh JC. Mitotically active sclerosing stromal tumor of the ovary: report of a case series with parallels to mitotically active cellular fibroma. *Int J Gynecol Pathol.* 2016;35(6):549-53. doi:10.1097/PGP.0000000000000292. PMID: 27362564.
4. Devins KM, Young RH, Watkins JC. Sclerosing stromal tumour: a clinicopathological study of 100 cases of a distinctive benign ovarian stromal tumour typically occurring in the young. *Histopathology.* 2022;80(2):360-8. doi: 10.1111/his.14554. PMID: 34467561.
5. Zhou Z, Chen X, Zeng Z, Zhang F, Yan J, Hou G. Imaging characteristics of ovarian sclerosing stromal tumor. *BMC Womens Health.* 2022;22:362. doi:10.1186/s12905-022-01949-x. PMID: 36050720.
6. Xia P, Cui J, Zhou T, Wang Y, Xia F, Guan Q, et al. Computed tomography (CT) and magnetic resonance imaging (MRI) findings of ovarian sclerosing stromal tumour. *Clin Radiol.* 2026;92:107117. doi: 10.1016/j.crad.2025.107117. PMID: 41237717.
7. Mittermair C, Cunha TM, Urbas R, Koch H, Forstner R. Sclerosing stromal tumor of the ovary: a case series and review of the literature. *BJR Case Rep.* 2022;8(2):20210155. doi:10.1259/bjrcr.20210155. PMID: 36177258.
8. Gupta S, Ahuja S, Kalwaniya DS. Immunohistochemistry markers in ovarian and fallopian tube neoplasms: a comprehensive review. *Indian J Surg Oncol.* 2024;15(Suppl 3):465-80. doi:10.1007/s13193-024-02049-y. PMID: 39328739.
9. Pilsworth JA, Todeschini AL, Neilson SJ, Cochrane DR, Lai D, Anttonen M, et al. FOXL2 in adult-type granulosa cell tumour of the ovary: oncogene or tumour suppressor gene? *J Pathol.* 2021;255(3):225-31. doi:10.1002/path.5771. PMID: 34338304.
10. Ayyanar P, Sable MN, Sethi P, Prasad N, Mishra P. An unreported case of intraoperative frozen section diagnosis of a sclerosing stromal tumor of the ovary- A report with a review. *Indian J Pathol Microbiol.* 2024;67(3):684-7. doi:10.4103/ijpm.ijpm_11_23. PMID: 38394394.

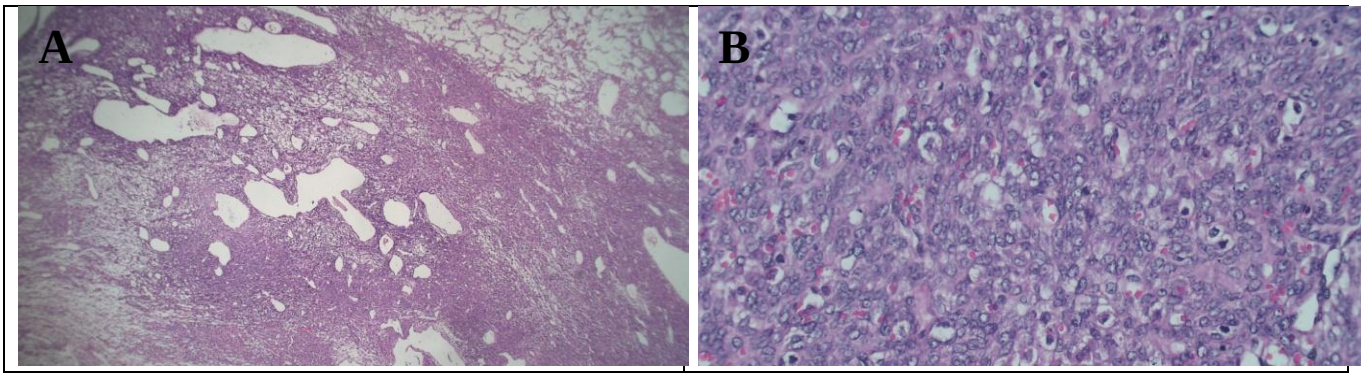

Figure 1. Histopathological features of the ovarian tumor: (A) Pseudolobular pattern composed of alternating hypercellular and hypocellular areas with prominent vascularity (H&E, ×40). (B) High-power view showing increased mitotic activity with up to 20 mitoses per 10 high-power fields (H&E ×400).

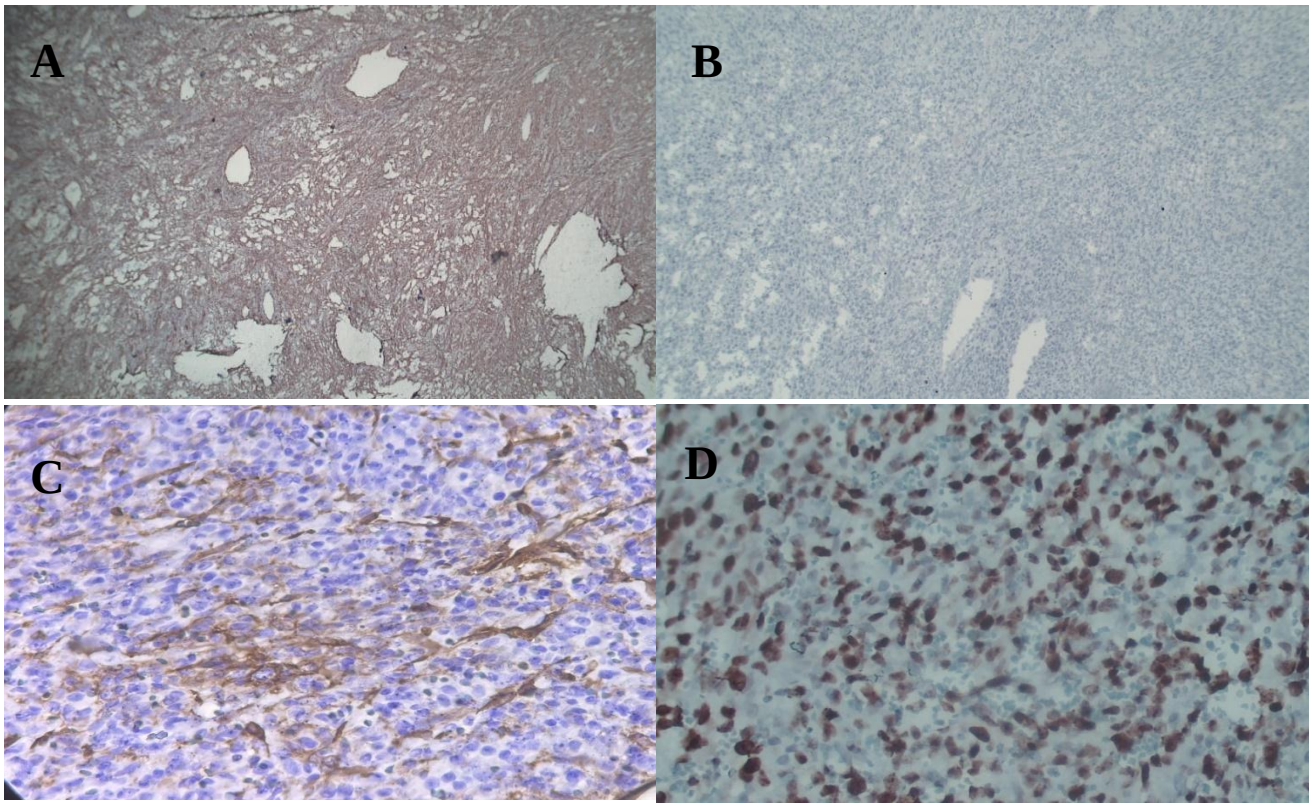

Figure 2. Immunohistochemical profile of the tumor: (A) Inhibin showing strong diffuse cytoplasmic positivity (×40). (B) CK negative in tumor cells (×40). (C) SMA demonstrating strong stromal positivity (×400). (D) Ki-67 showing a markedly elevated proliferative index (×400).
CK: Cytokeratin; SMA: Smooth muscle actin