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IP Journal of Diagnostic Pathology and Oncology

Journal homepage: <https://www.jdpo.org/>

## Case Series

## Malignant mural nodule in ovarian mucinous neoplasms - Needle in a haystack

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## ARTICLE INFO

## Article history:

Received 20-07-2023

Accepted 14-12-2023

Available online 31-01-2024

## Keywords:

Mural nodules

Mucinous tumors

Ovarian tumors

## ABSTRACT

Ovarian mucinous tumors with mural nodules are very rare surface epithelial-stromal tumors. The mural nodules are divergent neoplasms that may be benign or malignant. The latter may be in the form of a sarcoma, carcinosarcoma, anaplastic carcinoma, or a variety of other recognized histotypes of carcinoma. They represent the part of the tumor which is undergoing divergent differentiation or collision tumors. Here, we report two such cases to discuss the histo-morphological and immunohistochemical features with prognosis. Case 1 is a 15-year-old female presented with right sided abdominal mass for 4 months. She underwent right salpingo-oophorectomy. On histopathological examination -borderline mucinous neoplasm of ovary with a mural nodule showing rhabdoid differentiation. On immunohistochemistry – malignant mural nodule confirmed to be an anaplastic carcinoma, rhabdoid type. Case 2 is a 16-year-old female presented with abdominal mass associated with pain for the past 1 year. She underwent a left salpingo- oophorectomy with left groin node debulking and abdominal wall deposits excision. On histopathological examination – mucinous carcinoma of ovary with a malignant mural nodule showing morphological features of carcinosarcoma. On immunohistochemistry – malignant mural nodule confirmed to be a sarcoma-like mural nodule, pleomorphic and spindle cell type. A malignant mural nodule can be associated with poor prognosis regardless of the benignity of the associated mucinous tumor. Hence, careful and meticulous examination of this rare lesion within a mucinous cystic tumor supplemented by immunohistochemistry aids in the sometimes, difficult differential diagnosis among these types of mural nodules.

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## 1. Introduction

Mural nodules in epithelial neoplasms of the ovary are rare surface epithelial-stromal tumors. Epithelial neoplasm in the background of a mural nodule can be serous or mucinous cystic neoplasms with majority being mucinous ovarian tumors.<sup>1</sup> These mural nodules are grossly and microscopically different from the mucinous neoplasms from which they are arising. They may be benign or malignant. The latter revealing a sarcoma, carcinosarcoma, anaplastic carcinoma, or some of the varied recognized histotypes of carcinoma.<sup>2</sup>

Mural nodules are hypothesized to represent the part of the tumor which is undergoing divergent differentiation or collision tumors.<sup>3</sup> The sarcoma-like mural nodules (SLMN) have a characteristic growth of spindle cell proliferation, with atypical and vesicular nuclei arranged in a herringbone pattern.<sup>4</sup> A focus of anaplastic carcinoma from the SLMN had to be differentiated from sarcomatous nodule based on a few features: the size was larger (range 0.5–12 cm), poor circumscription, absence of prominent inflammatory reaction without multinucleated giant cells, along with obvious carcinomatous differentiation.<sup>5</sup>

Herein, we report two such cases to discuss the histo-morphological and immunohistochemical features with

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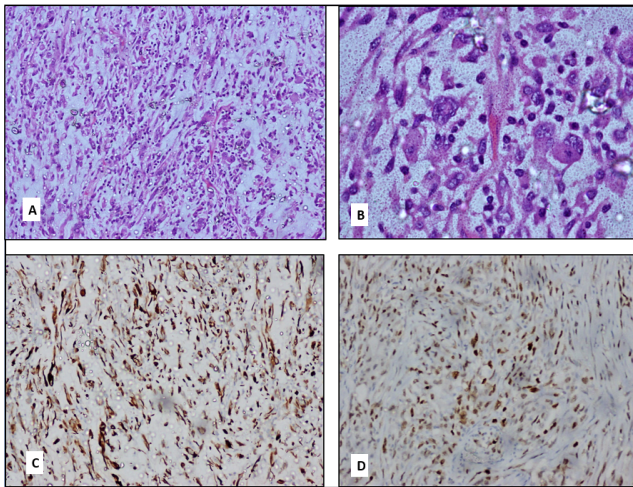
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prognosis.

## 2. Case Report

### 2.1. Case 1

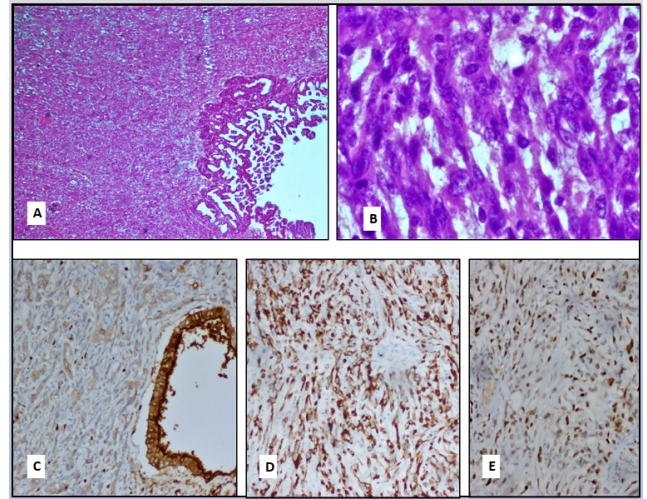
A 15-year-old female presented with a right sided abdominal mass for the past 4 months. On radiological examination, a solid-cystic ovarian mass is identified measuring 12x10x7cm; suggestive of primary ovarian neoplasm. Patient underwent right salpingo-oophorectomy. Histopathological evaluation revealed a borderline mucinous tumour with a mural nodule composed of sheets of pleomorphic spindle and polygonal cells along with few rhabdoid-like cells in a myxoid background. Further IHC was performed showed CK positivity, aberrant positivity for p53 and negativity for SMA, Desmin, MyoD1, CK7, CK20, WT1. Hence, a final diagnosis of borderline mucinous tumour with a mural nodule exhibiting features of anaplastic carcinoma with rhabdoid differentiation was given.



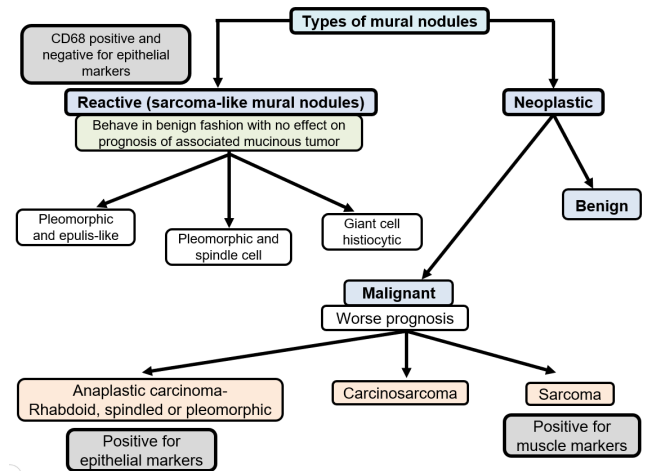
**Figure 1:** Case 1 Ovarian borderline mucinous neoplasm with a mural nodule of anaplastic carcinoma; **A** (H&E 200X) & **B** (H&E 400x): Mural nodule of anaplastic carcinoma composed of sheets of pleomorphic spindle and polygonal cells along with few rhabdoid-like cells in a myxoid background IHC on Mural nodule are strongly positive for CK [**C** - CK (200x)] and show aberrant expression of p53 [**D** – P53 (200x)]

### 2.2. Case 2

A 16-year-old female presented with gradually increasing abdominal pain and abdominal mass for a period of 1 year. CT scan showed an left adnexal mass measuring 18x12x8cm with multiple deposits identified in uterine serosa, omentum and pelvic lymphnodes, left ovary is not visualised separately. Patient underwent total abdominal hysterectomy with groin node debulking and abdominal



**Figure 2:** Case 2 Ovarian invasive mucinous carcinoma with a mural nodule showing features of carcinosarcoma; **A** (H&E 100X): Transitional zone of mural nodule with invasive mucinous glands; **B** (H&E 400x): Sheets of spindle cells exhibiting marked nuclear pleomorphism and active atypical mitotic figures; **IHC** on Mural nodule show weak positivity for CK [**C** - CK (200x)], strong positivity for SMA [**D** – SMA (200x)] and show aberrant expression of p53 [**E** – P53 (200x)]



**Figure 3:** Classification of mural nodules

wall deposit excision. Histopathological evaluation revealed a mucinous carcinoma with a mural nodule composed of sheets of spindle cells exhibiting marked nuclear pleomorphism and active atypical mitotic figures. Further IHC was performed showed CK, SMA positivity, aberrant positivity for p53 and negativity for Desmin, MyoD1, CK7, CK20, WT1. Hence, a final diagnosis of Mucinous carcinoma of ovary with a malignant mural nodule showing morphological features of carcinosarcoma was given.

**Table 1:** Summary of cases with mural nodules

	<b>Case 1</b>	<b>Case 2</b>
<b>Age / Sex</b>	15 years / Female	16 years / Female
<b>Clinical presentation-</b>	Right sided abdominal mass for 4 months	Abdominal mass and gradually increasing abdominal pain for 1 year
<b>Procedure-</b>	Right salphingo-oophorectomy	Left salphingo- oophorectomy with left groin node debulking and abdominal wall deposits excision
<b>Lymph nodes-</b>	Nil	Present- external iliac
<b>Deposits-</b>	Nil	Present- omental, abdominal and uterine
<b>Histopathology-</b>	<b>Borderline mucinous neoplasm of ovary with a mural nodule showing anaplastic carcinoma with rhabdoid differentiation</b>	<b>Mucinous carcinoma of ovary with a malignant mural nodule showing morphological features of carcinosarcoma</b>
<b>Immunohistochemistry:</b>		
CK (spindle cells)	<b>Positive</b>	<b>Positive</b>
SMA (spindle cells)	Negative	<b>Positive</b>
Desmin (spindle cells)	Negative	Negative
MyoD1 (spindle cells)	Negative	Negative
P53 (spindle cells)	<b>Aberrant expression</b>	<b>Aberrant expression</b>
CK20 (mucinous areas)	Negative	Negative
CK7 (mucinous areas)	Positive	Positive
WT1 (mucinous areas)	Negative	Negative

### 3. Discussion

Malignant mural nodules in ovarian mucinous neoplasms are rare entities that pose diagnostic and therapeutic challenges. Meyer introduced the concept of collision tumors, which describes the coexistence of two different neoplasms arising from adjacent areas.<sup>6</sup> This is an appropriate explanation for the tumors under discussion.

The presence of these nodules is associated with aggressive behaviour, increased risk of metastasis, and poorer prognosis.<sup>7</sup> Understanding the intricate histomorphological characteristics, immunohistochemical profiles, and molecular alterations can aid in accurate diagnosis, risk stratification, and individualized treatment planning.<sup>8</sup>

Mural nodules are classified into reactive and neoplastic. The former has three morphological subtypes i.e pleomorphic and epulis-like, pleomorphic and spindle cell, giant cell histiocytic.<sup>9</sup> The latter is could be benign and malignant further classified into anaplastic carcinoma, sarcoma, carcinosarcoma. (Refer Fig. 3)

In Case 1, the histopathological examination revealed a borderline mucinous neoplasm of the ovary with a mural nodule displaying rhabdoid differentiation. Rhabdoid differentiation refers to the presence of malignant cells exhibiting cytoplasmic eosinophilic globular inclusions resembling rhabdomyoblasts. This finding raises concerns about aggressive behavior and poorer prognosis. Upon immunohistochemistry, the malignant mural nodule was confirmed to be an anaplastic carcinoma, specifically of the rhabdoid type. Anaplastic carcinomas are characterized by the presence of pleomorphic, undifferentiated cells with

high mitotic activity, associated with a higher likelihood of metastasis and a worse prognosis.

In Case 2, the histopathological examination revealed a mucinous carcinoma of the ovary with a malignant mural nodule displaying morphological features of carcinosarcoma. Carcinosarcomas, also known as malignant mixed Müllerian tumors, are characterized by the coexistence of malignant epithelial and mesenchymal components. In this case, the malignant mural nodule exhibited pleomorphic and spindle cell types, which are indicative of sarcoma-like features. Immunohistochemistry confirmed the diagnosis of a sarcoma-like mural nodule. Sarcoma-like mural nodules are composed of malignant spindle cells and often exhibit high-grade histological features, suggesting a more aggressive behavior and poorer prognosis.

Immunohistochemical analysis plays a crucial role in confirming the malignant nature of mural nodules and subtyping the components. Markers such as cytokeratins, vimentin, desmin, and Ki-67 can aid in differentiating between epithelial and mesenchymal elements. Molecular markers, such as P53, p16, and  $\beta$ -catenin, have been implicated in the pathogenesis and prognosis of these tumors. Both our cases had aberrant p53 expression, thus implying a poor prognosis.

The prognosis for both cases of ovarian mucinous tumors with mural nodules appears to be unfavourable due to the presence of aggressive histo-morphological and immunohistochemical features. In Case 1, the presence of anaplastic carcinoma with rhabdoid differentiation indicates a higher likelihood of metastasis and a worse prognosis.

Similarly, in Case 2, the presence of a carcinosarcoma with sarcoma-like features suggests an aggressive behaviour and a poorer prognosis.

It is important to note that the prognosis of these cases depends on various factors, including tumor stage, grade, size, lymph node involvement, and the extent of metastasis. Additionally, the treatment approach, such as surgical resection, chemotherapy, and radiation therapy, will also influence the overall prognosis.<sup>10</sup>

#### 4. Conclusion

In conclusion, the presented cases highlight the importance of histomorphological and immunohistochemical evaluation in the diagnosis and prognosis of ovarian mucinous tumors with mural nodules. The identification of aggressive features, such as anaplastic carcinoma and carcinosarcoma, indicates a higher likelihood of metastasis and poorer prognosis.<sup>11</sup> Further studies and long-term follow-up are necessary to determine the optimal management strategies and outcomes for these challenging cases.

#### 5. Source of Funding

None.

#### 6. Conflict of Interest


None.

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**Cite this article:** Selvaraj S, Amirtham U. Malignant mural nodule in ovarian mucinous neoplasms - Needle in a haystack. *IP J Diagn Pathol Oncol* 2024;9(1):80-83.