Case Report

Primary Mucinous Carcinoid of the Ovary Arising in a Mature Cystic Teratoma: A Case Report with Review of the Literature

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Primary mucinous carcinoid of the ovary is an extremely rare neoplasm with less than thirty cases reported in the English literature. The clinical behavior and pathologic features have not been well characterized. Here we report a case of a 42-year-old female who underwent laparoscopic salpingo-oophorectomy for a left ovarian mass. The ovary was received for histopathologic evaluation in multiple pieces among which a 1.1 cm firm tan nodule was identified. Histologically, this nodule composed of small glandular structures scattered in pools of mucin adjacent to a mature cystic teratoma. The glands were lined by goblet and columnar cells and showed no appreciable atypia. Immunohistochemistry revealed intense, diffuse staining pattern of the mucinous tumor component for CK20, CDX-2 and villin and focal patchy positivity for CK7 and chromogranin. Metastatic tumors from the GI tract and Krukenberg tumors were considered in this patient's differential diagnosis. She subsequently underwent a total abdominal hysterectomy with staging and appendectomy. However, no evidence of primary gastrointestinal malignancy or residual ovarian disease was found. The histologic and immunohistochemical characteristics of the tumor, its intimate association with a mature cystic teratoma and the absence of primary malignancy elsewhere are compatible with the diagnosis of a primary ovarian mucinous carcinoid tumor. This case is presented to raise the awareness of a rare tumor entity among the pathology and gynecologic communities.

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Key Words*: ovary, mucinous carcinoid, metastatic gastrointestinal adenocarcinoma, cystic teratoma*

INTRODUCTION

Primary ovarian carcinoid tumors are exceedingly rare, accounting for less than 1% of all carcinoid tumors.[1,2] There are four histologic types including insular, trabecular, strumal and mucinous with the latter type being the least common variant.[3,4] Fewer than thirty cases of primary ovarian mucinous carcinoid tumors have been reported in the literature and the clinicopathologic behavior of this type of tumor has not been well characterized.[5-7] In this report, we describe the clinicopathologic and immunohistochemical features of a primary mucinous carcinoid tumor of the ovary associated with a mature cystic teratoma.

CASE REPORT

The patient was a 41-year-old Caucasian female, gravida 1, para 0, who presented with intermittent pelvic pain for years and increased fatigue for three months prior to her hospital admission in early 2010. Her previous history was significant for a left fallopian tube ectopic pregnancy in 2003 and an excised right ovarian dermoid cyst in 2008. Imaging showed a cystic left ovary and she underwent a laparoscopic left salpingo-oophorectomy. The ovary appeared slightly enlarged and multicystic with a smooth surface. No abnormalities were seen involving the uterus, cul-de-sac, appendix, liver or the gallbladder. An initial diagnosis of metastatic mucinous carcinoma, suggestive of gastrointestinal tract origin was made based on the histopathologic findings. A month later, a second surgery was performed on her for total abdominal hysterectomy, lymphadenectomy, partial omentectomy and appendectomy, which identified no further evidence of malignancy. The previous case was reviewed in consultation by an expert in gynecologic pathology and neuroendocrine marker studies were added to arrive at a final histologic diagnosis of primary mucinous carcinoid of the ovary. The patient has been asymptomatic and disease free for 2 years.

METHODS

Immunohistochemical staining of the tumor was performed on 10% formalin fixed, paraffin embedded tissue sections using the avidin-biotin-immunoperoxidase method, with 3-amino-9-ethyl carbazole as the chromogen and hematoxylin as the counterstain. The sections were stained with

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monoclonal antibodies to CK7, CK20, chromograinin, synaptophysin and CD56. Immunohistochemical staining for CDX2 and villin were performed at US Labs (2601 Campus Drive, Irvine CA, 92612; CLIA I.D. #05D0923321).

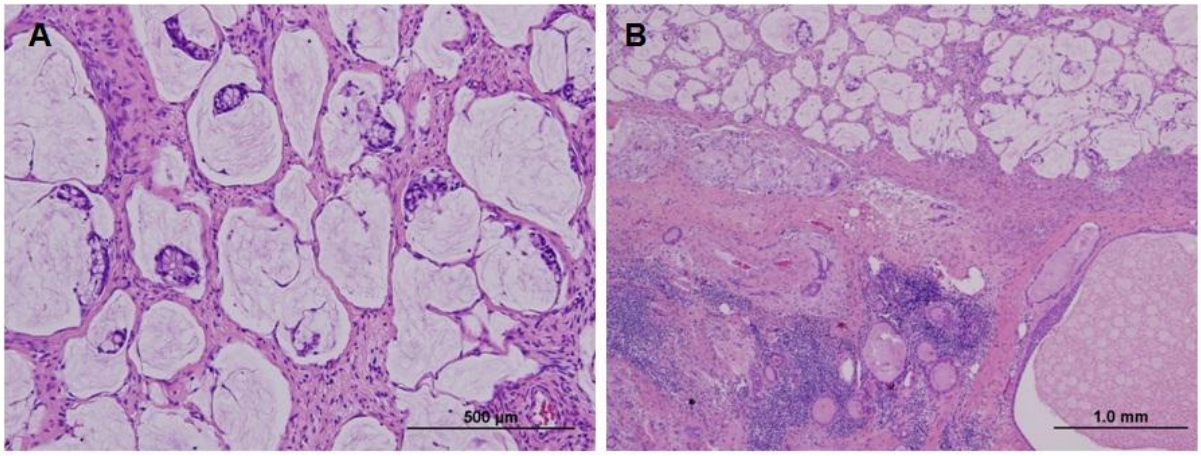

Figure 1. **A.** Well-differentiated mucinous carcinoid of ovary. Tumor composed of small glands floating within pools of mucin, surrounded by fibrous septae. Glands with goblet cells interspersed among columnar cells. No atypia is seen. **B.** Well-differentiated mucinous carcinoid (top) with an adjacent mature cystic teratoma.

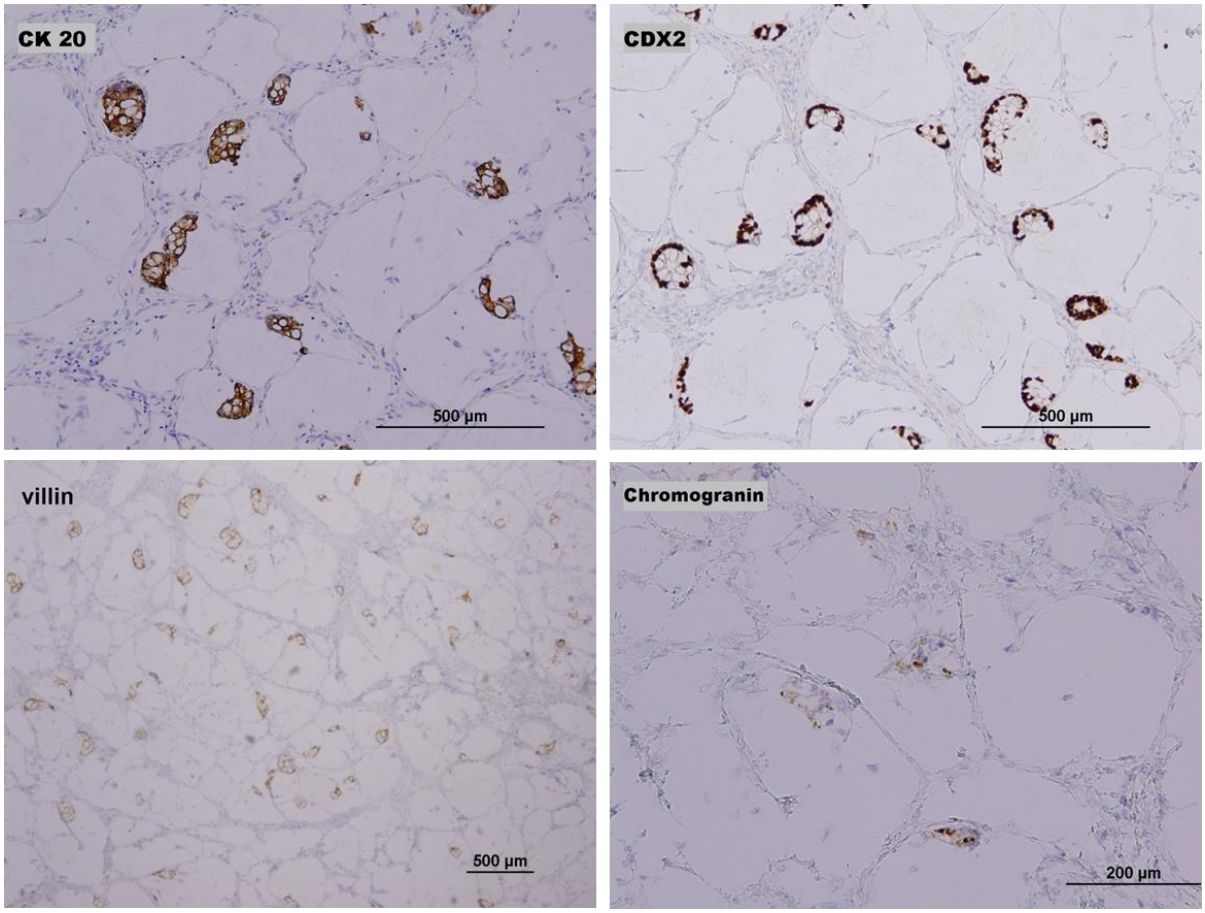

Figure 2. Immunohistochemistry of the primary ovarian mucinous carcinoid. Tumor cells stain positive with CK20, CDX2, and villin; scattered cells stain positive with chromogranin.

RESULTS

Gross appearance: A purple-tan cystic left ovary was received in multiple pieces with attached dark blood clots (4.3 x 3.2 x 2 cm in aggregate). The 3.2 x 0.5 cm fallopian tube was tortuous and showed surface adhesions. The ovarian tissue fragments were sectioned to reveal a few fluid-filled cysts, hemorrhagic corpora lutea and a 1.1 cm firm, gritty, tan nodule.

Light Microscopy: The tumor nodule was composed of small acinar structures floating in pools of mucin, surrounded by thin fibrous septae. These glands were lined by goblet cells interspersed among columnar cells. The goblet cells exhibited basally located nuclei and cytoplasm distended with mucin. The columnar cells showed moderate amount of eosinophilic cytoplasm and uniform round to oval nuclei. There was no appreciable atypia. Mitotic activity was not seen. No solid growth of tumor cells or necrosis was present. An adjacent mature cystic teratoma was also identified.

Immunohistochemistry: The glandular component of the tumor showed intense, diffuse staining for CK20, CDX-2 and villin, focal positivity for CK7, and patchy positivity for chromogranin. Synaptophysin and CD56 staining were negative.

DISCUSSION

Mucinous carcinoid tumor is the least common variant of primary ovarian carcinoid tumors.[4] Mucinous carcinoid tumor of the ovary is encountered in association with a mature cystic teratoma in fewer than one third of cases. This is in contrast to up to 80% of carcinoid tumors arising in a mature cystic teratoma when all categories are included.[8] Based on a case series study, Baker et al. reported that the age of the patients with this tumor entity ranged from 14 to 74 years and its clinical features were similar to other types of primary ovarian carcinoid tumors.[9] None of these tumors has been associated with carcinoid syndrome. Clement and Young divided primary ovarian mucinous carcinoids into three categories based on their histologic appearance, namely well-differentiated, atypical, and carcinoma arising in mucinous carcinoid.[4] The major differential diagnosis of primary mucinous carcinoid tumor of the ovary includes metastatic tumors from the GI tract such as Krukenberg tumors, and metastatic mucinous carcinoid tumors. Histologic and immunohistochemical differentiation of mucinous carcinoid tumor of the ovary from metastatic mucinous tumors of the gastrointestinal tract is quite difficult, as encountered in our case. Both types of tumors can have nests of goblet cells and argentaffin and argyrophil granules. Immunohistochemically, diffuse positive staining of CK20 and CDX2 has been seen in primary ovarian mucinous carcinoid tumors, even though CDX-2 is a marker of intestinal differentiation,[10] The tumor cells of primary ovarian mucinous carcinoid are variably immunoreactive for synaptophysin and chromogranin.[4] However, gastric carcinomas with neuroendocrine differentiation have been reported in the literature.[12,13] In such cases, clinical and operative correlation is critical to arrive at the correct diagnosis. The established criteria used for differentiating metastatic tumors of the ovary from primary ovarian tumors are still helpful: Tumor bilaterality, presence of multiple ovarian nodules and the finding of a primary tumor in the gastrointestinal tract, all favor matastasis to the ovary. The association of the tumor with a mature cystic teratoma, as seen in our case, strongly favors a primary ovarian origin.[13]

Differentiating primary from metastatic carcinoid tumor of ovary is also a diagnostic challenge, especially in the absence of associating teratomatous elements. The most common primary site of the metastatic ovarian mucinous carcinoid is the appendix. In our case, the patient subsequently underwent a total abdominal hysterectomy with staging and an appendectomy. However, no evidence of primary carcinoid elsewhere was identified. Baker et al.'s study suggested that metastatic mucinous carcinoids in the ovary can have atypical or carcinomatous features of primary carcinoid.[9] Our patient's tumor showed well organized architecture, with minimal cytologic atypia, which can be best classified as "well-differentiated".

The prognosis is expected to be favorable in patients with primary well differentiated mucinous carcinoid tumor of the ovary, although sporadic cases of metastasis has been reported.[5,9] Owing to the rarity of these tumors, very little is known about their clinical behavior and well differentiated ovarian mucinous carcinoid tumors are managed with surgical removal alone. Follow-up of patients and regular surveillance are also critical.[3,14]

In conclusion, this case demonstrates that histopathologic features of primary mucinous carcinoid tumors of the ovary can be identical to metastatic gastrointestinal carcinomas and metastatic mucinous carcinoids from the appendix, which creates diagnostic difficulty for pathologists. Primary mucinous carcinoid tumor of the ovary is a very rare tumor and clinical and operative correlation is required to definitively exclude a primary malignancy elsewhere.

CONFLICT OF INTEREST

The authors have no conflict of interest to disclose.

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