

CASE REPORT

Immunohistological study of ovarian mature cystic teratoma with extremely elevated SCC antigen level

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Abstract

Squamous cell carcinoma (SCC) antigen is a reliable tumor marker for various cancers, including cervical cancer and lung cancer, and was recently reported to correlate with the severity of inflammatory skin diseases such as atopic dermatitis. Herein, we present a case of a 47-year-old female patient who presented with acute abdomen rupture due to a mature cystic teratoma of the ovary, approximately 11 cm in diameter on imaging examination, prompting emergency laparoscopic surgery. The patient had no symptoms of atopic dermatitis. The operative findings showed no evidence of torsion, but the membrane was partially ruptured, leading to the leakage of the cyst contents. The operation was completed after excising the adnexa and intraperitoneal lavage. The postoperative results revealed a markedly high serum SCC antigen level of 55.3 ng/dL, which was normalized at 2 months postoperatively. Postoperative histopathological examination revealed no squamous cell carcinoma component but a marked lymphocytic infiltrate under the squamous epithelium, suggesting a high degree of inflammation. Additionally, immunostaining demonstrated a cluster of differentiation (CD) 8+ lymphocyte predominance over CD4+ lymphocytes, similar to the histology of atopic dermatitis. Altogether, our findings suggest that the abnormally high SCC antigen levels might be attributed to the presence of severe inflammation in the mature cystic teratoma rather than an underlying malignancy and support the notion that SCC antigen may be a useful marker beyond its established role in cervical and lung cancers.

Keywords

Mature cystic teratoma; SCC antigen; Atopic dermatitis-like inflammation of the ovary; Immunohistochemistry

1. Introduction

Mature cystic teratomas (MCT) are common benign neoplasms representing 10%–20% of all ovarian tumors [1, 2]. However, malignant transformation of MCT is rare, occurring in only 1%–2% of cases [2]. Squamous cell carcinoma (SCC) is the most frequent malignancy arising from MCT, accounting for approximately 80% of cases [3]. The preoperative prediction of malignant formation of MCTs using tumor markers is not well established [4, 5]. Some institutions have incorporated tumor markers such as carbohydrate antigen (CA) 19-9 and SCC antigens for predicting adnexal malignancy, but their usefulness in tumor differentiation remains controversial [6]. Recently, SCC antigens have been demonstrated to correlate with the pathogenesis of inflammatory skin diseases such as atopic dermatitis.

Herein, we report the case of a ruptured MCT with markedly elevated SCC antigen levels that underwent emergency surgery for acute abdomen, in which postoperative immunohistological analysis revealed inflammation in the squamous epithelial component resembling atopic dermatitis but no evidence of

malignant transformation.

2. Case presentation

The reported patient is a 47-year-old pre-menopausal woman, para 0, gravida 0, who reported deteriorating abdominal distention and increasing pain. She described the pain as being sharp, constant and associated with nausea. She had no significant past medical or surgical history and no history of benign inflammatory skin diseases, such as psoriasis and atopic dermatitis, or other inflammatory diseases, such as asthma. Her vital signs were within normal limits. The physical examination noted tenderness and guarding in the left lower quadrant of the abdomen. Abdominal-pelvic computed tomography (CT) scan for differential diagnosis of pelvic masses revealed a heterogeneous cystic lesion containing fat density, which was considered as teratoma (Fig. 1). Her white blood cell count and C-reactive protein were elevated to 9900/ μ L and 17.9 mg/dL, respectively. Preoperative tumor markers were as follows: CA-125, 44.0 U/mL (normal range, <35 U/mL); carcinoembryonic antigen (CEA), 5.8 ng/mL (normal range, <5.0

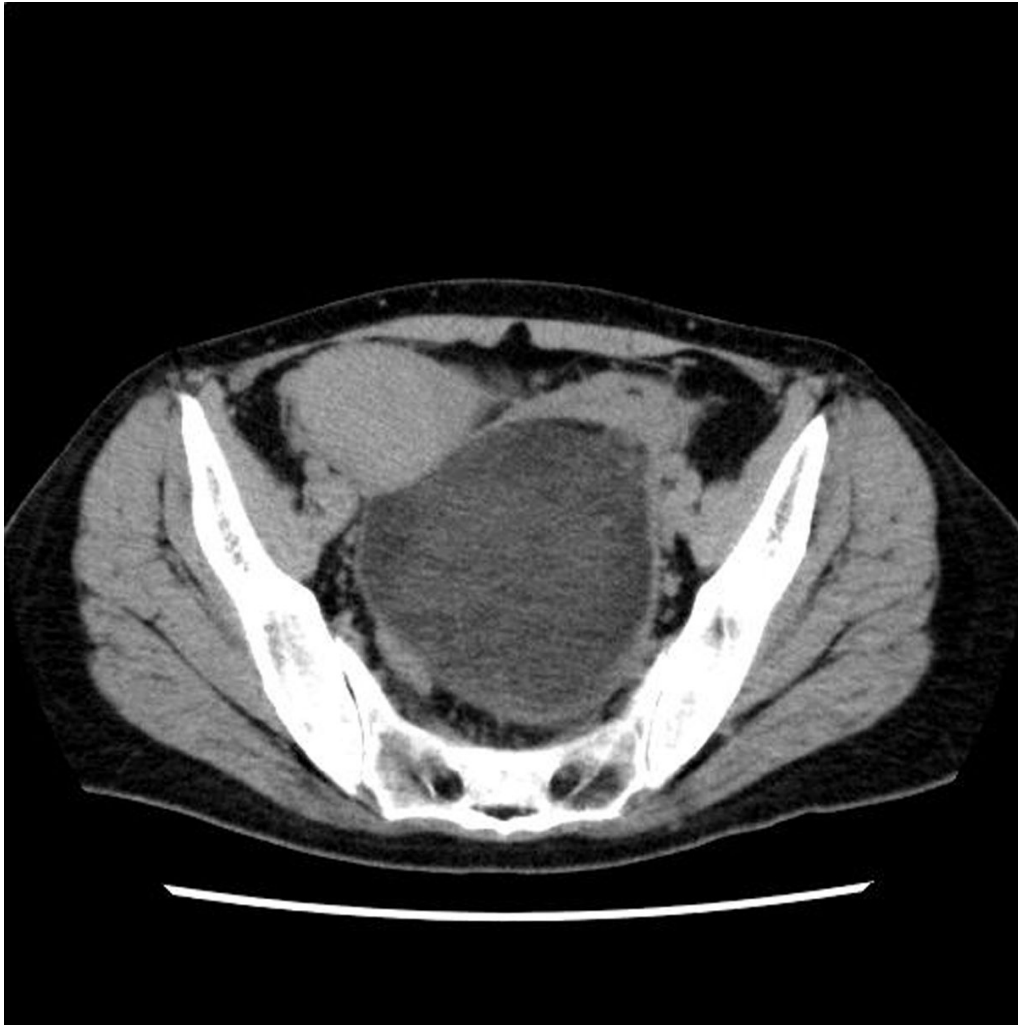


FIGURE 1. CT scan of the pelvis showing heterogeneous cystic lesions containing fat density, which is a characteristic feature of teratoma.

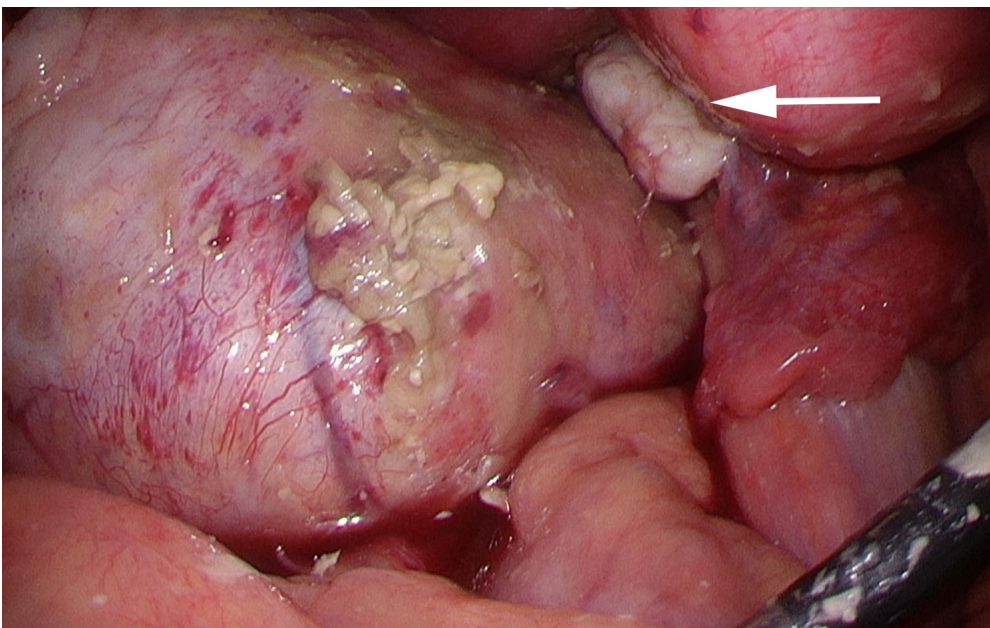


FIGURE 2. Perioperative photographs: perforation of approximately 3 cm in diameter on the left ovarian mass, while the right ovary appeared normal (arrow).

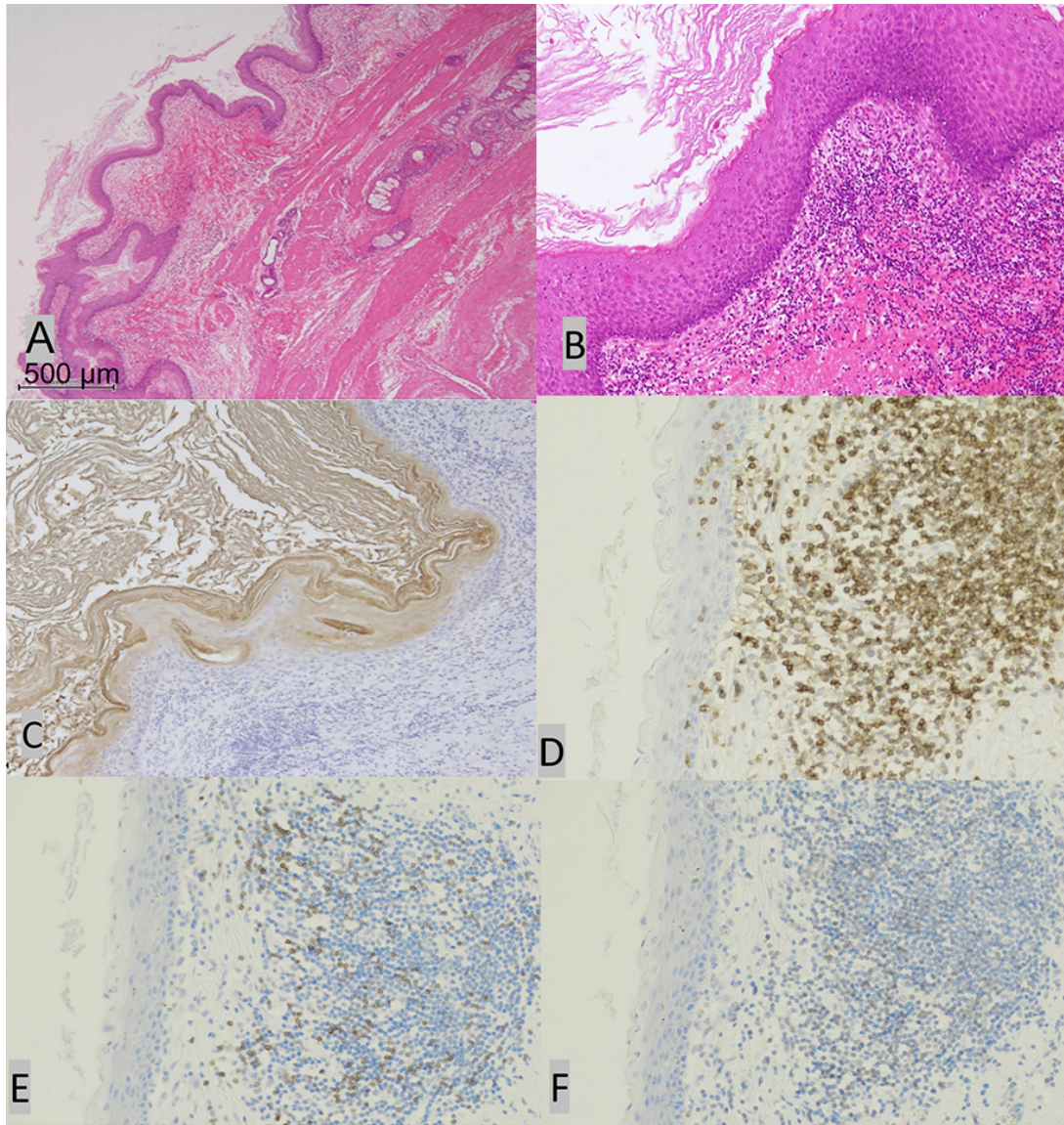


FIGURE 3. Histopathological examination. (A) The cavity of the cyst was lined by squamous epithelium with sebaceous and sweat glands. (B) There was a marked lymphocytic infiltrate under the squamous epithelium. (C) The keratinized squamous epithelial areas were positive for SCC antigen. (D) Clusters of human leukocyte common antigen (LCA)-positive lymphocytes observed under the squamous epithelium. (E) The lymphocytes were predominantly CD8-positive, a marker of cytotoxic T-cells, while (F) there were much fewer CD4-positive lymphocytes, a marker of helper T-cells.

ng/mL); CA 19-9, 21.1 U/mL (normal range, <37 U/mL). Data for SCC antigen level was not available preoperatively.

The patient underwent an emergency laparoscopy due to suspected torsion or infection associated with the MCT. A large amount of sebaceous material in the pelvic cavity and perforation approximately 3 cm in diameter was observed on the left ovarian mass perioperatively (Fig. 2). Thus, a left salpingo-oophorectomy was performed to ensure complete resection, and the hairs and other materials were also completely removed at the same time. The right ovary appeared normal externally and was not biopsied.

A marked elevation in SCC antigen level was found postoperatively (55 ng/mL; normal range, <1.5 ng/mL). Pathological examination revealed that the cyst cavity was lined by squamous epithelium with sebaceous and sweat glands, hair, columnar epithelium and glial tissues. They were com-

posed of mature components, with no immature or malignant components (Fig. 3A). No abscess formation was observed, although there was a marked lymphocytic infiltrate under the squamous epithelium (Fig. 3B). Immunohistochemical staining showed that the keratinized squamous epithelial areas were positive for SCC antigen (Fig. 3C), and the presence of superficial perivascular infiltrates of human leukocyte common antigen (LCA)-positive lymphocytes under the squamous epithelium (Fig. 3D). These lymphocytes were predominantly CD8-positive (Fig. 3E), a marker of cytotoxic T-cells, while there were much fewer CD4-positive lymphocytes (Fig. 3F), a marker of helper T-cells.

The postoperative course was uneventful, and the patient was discharged 5 days after the surgery. The levels of SCC antigen returned within the reference range two months after surgery.

3. Discussion

In this report, we presented the case of a patient with a ruptured benign MCT who had remarkably high levels of SCC antigen and made a full recovery without complications. SCC antigen is commonly used as a tumor marker for various types of squamous cell carcinoma, including esophageal, lung, head and neck, anal canal and uterine cervix cancers, and can provide important information regarding tumor stage, size, stromal invasion, lymphatic and vascular space status, and lymph node status [7]. However, the usefulness of SCC in diagnosing MCT remains controversial, with reported positive rates ranging from 30% to 67% [4, 5, 8]. In a study by Chiang *et al.* [9], elevated serum SCC antigen was found in only 24 cases (46.1%), leading the authors to conclude that serum SCC antigen alone might be insufficient to exclude a potential malignant transformation of MCT.

Recently, SCC antigens have been implicated in the pathogenesis of inflammatory diseases such as asthma, psoriasis, and atopic dermatitis. Several inflammatory cytokines were shown to correlate positively with the pathogenesis of psoriasis and allergic diseases and induce SCC antigen expression in airway epithelial cells and keratinocytes. In addition, SCC is known to be highly expressed in these diseases, making it a useful diagnostic marker in atopic dermatitis for estimating clinical severity and disease type and assessing response to therapy [10]. In atopic dermatitis, T cells are known to densely infiltrate the skin of lesions, suggesting that T cells play an important role in the pathogenesis of the disease. Although atopic dermatitis has been classically considered a disease induced by CD4⁺ T cells, Nograles *et al.* [11] reported that CD8⁺ T cells isolated from atopic dermatitis skin lesions might produce inflammatory cytokines. It has also been reported that acute atopic dermatitis lesions are infiltrated by a large number of CD4⁺ and CD8⁺ T cells expressing specific inflammatory cytokines [12].

Although it is not uncommon to find a foreign body inflammatory reaction to keratin and hair in MCT, a histological review of 23 MCT cases at our institution in the past 2 years revealed that 18 cases, including this case, had additional histological inflammatory findings such as macrophage and neutrophil accumulation in addition to lymphocytes (unpublished data). In contrast, the histological findings of the present case comprised mainly lymphocyte accumulation without abscess formation, which was similar to the histological findings of atopic dermatitis. Moreover, immunohistology showed a stronger accumulation of CD8⁺ T cells than CD4⁺ T cells. Altogether, these findings suggest that an atopic dermatitis-like inflammatory reaction occurred in the squamous epithelial component of the MCT and might have been responsible for the elevated serum SCC antigen.

4. Conclusions

In cases of mature cystic teratomas with extremely high SCC antigen levels in the absence of other organ malignancy or systemic cutaneous inflammatory disease, the possibility of coexistence of atopic dermatitis-like inflammatory changes should be considered in addition to the possibility of malignant

transformation of the squamous component of mature cystic teratomas.

AVAILABILITY OF DATA AND MATERIALS

The data are contained within this article.

AUTHOR CONTRIBUTIONS

KT—Data curation, Formal analysis, Original draft writing. AS—Data curation, Formal analysis. AY—Review & Editing. MS—Review & Editing. SK—Immunohistochemical investigation. HM—Review & Editing.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

All clinical information and images used in this paper were approved by the ethical committee of Kobe Medical Center (approval number: 1336). The patient gave her written informed consent to publish her case.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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