

CASE REPORT

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# Beautiful and regular vascularization in a borderline ovarian seromucinous tumor detected by microvascular imaging

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## Abstract

**Background** In clinical practice, borderline seromucinous ovarian tumor (SMBT) is hard to differentiate preoperatively on ultrasound.

**Case** We presented a case of SMBT. In this case, microvascular imaging, particularly three-dimensional (3D) microvascular imaging of ultrasound showed the regular distribution of vascularity along the axis of the papillary trunk and branches.

**Conclusion** Microvascular imaging helped improve identify vascularity distribution in the papillary of SMBT and may improve our ability to differentiate SMBTs.

**Keywords** Ovarian tumor, Ultrasound, Borderline ovarian seromucinous tumor, Microvascular imaging

## Introduction

In 2014, a new pathological classification of borderline seromucinous ovarian tumor (SMBT) was included in the World Health Organization (WHO) classifications [1]. SMBTs are considered to be an endometriosis-related ovarian neoplasm and, unlike other types of borderline tumours, endometriosis is found in about 30–70% of ovarian SMBTs. In clinical practice, SMBT is still hard to differentiate preoperatively on ultrasound. We presented

a case of SMBT, in which microvascular imaging of ultrasound helped in the diagnosis.

## Case

A 35-year-old female patient was admitted due to elevated tumor markers for 17 days. Seventeen days ago, the patient underwent a physical examination, which revealed a serum CA125 of 339.8 U/ml and a serum CA199 of >2000 U/ml. Anal examination revealed a right adnexal mass measuring 6 × 5 cm with well-defined margins. The patient had no nausea, vomiting, abdominal pain, bloating or abnormal vaginal bleeding. Contrast-enhanced computed tomography (CT) showed a mass in the right adnexa with a size of 6.3 × 4.5 cm with no lymph node enlargement in the pelvic cavity, considered an ovarian epithelial tumor. Transrectal ultrasonography [Figure 1A] and three-dimensional (3D) transrectal ultrasound [Figure 1B] showed a cystic-solid mass measuring 6.2 × 5.3 × 3.5 cm in the right adnexa, with regular morphology, clear boundary, poor translucency, and papillary

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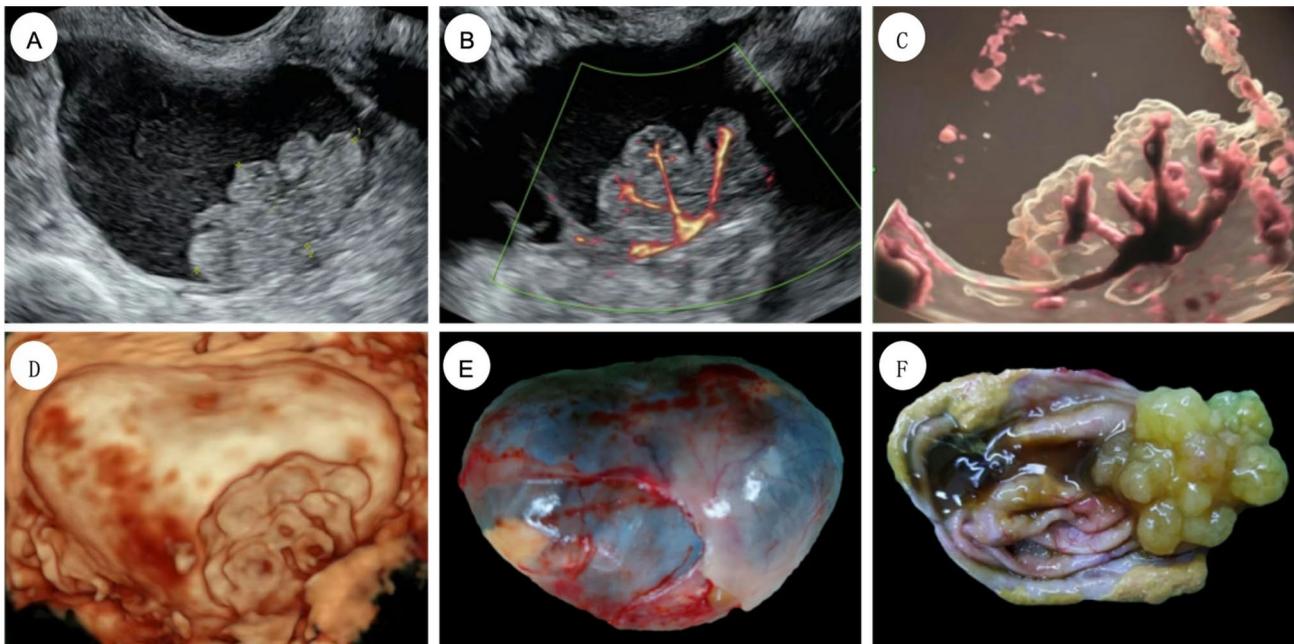
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**Fig. 1** Borderline Ovarian Seromucinous Tumor. Transrectal ultrasound (A) and three-dimensional ultrasound (B) show a cystic-solid mass in the right adnexa with regular morphology, clear border, poor translucency, and papillary protrusions on the wall. Microvascular imaging (C) and three-dimensional microvascular imaging (D) show bifurcation of blood flow into papillary projections, regularly distributed along the axis of the papillary trunk and branches. Intraoperative findings (E) include a cyst with a smooth surface and the cut surface of the cyst (F) shows papillary projections and brownish gelatinous cystic fluid

projections on the wall ( $3.0 \times 2.5 \times 1.5$  cm) [Figure 1A], and the ovarian tissue was visible encircling its periphery in the form of “crescent sign”. Microvascular imaging [Figure 1C] and 3D microvascular imaging [Figure 1D] showed bifurcation of blood flow into papillary projections, regularly distributed along the axis of the papillary trunk and branches, considered a SMBT. Ovarian mass was removed by laparotomy. Intraoperative findings included a 6 cm cyst in the right ovary with a smooth surface [Figure 1E] and the cut surface of the cyst showed papillary projections and brownish gelatinous cystic fluid [Figure 1F]. Besides, a 5 mm brown nodule was seen on the surface of the sacral ligament. Postoperative pathology confirmed an SMBT and ectopic endometrial foci. Immunohistochemistry showed ER (+), PR (partial +), PAX-8 (+), P53 (wild-type expression), Ki-67 (index 5%), WT-1 (-), Villin (-), P16 (partial +), MUC6 (partial +), CA-125 (+).

## Discussion

Pathologically, SMBTs consist of papillae with stratified branches surrounded by an edematous fibrous matrix [2]. A cyst with septa, solid component(s), mural nodules, and blood vessels in the papillary projections are characteristic of SMBTs on imaging [3]. SMBTs can present similarly to serous borderline tumours, and differentiation lies in the origin of the endometriotic cysts [4, 5]. In our case, the SMBT showed a cyst with mural nodules,

poor translucency, and blood vessels in the mural nodules. Moreover, microvascular imaging, particularly 3D microvascular imaging of ultrasound showed the regular distribution of vascularity along the axis of the papillary trunk and branches. The ultrasound distribution of the blood flow was consistent with the microscopic characteristics of the SMBT. Microvascular imaging helped detect very slow flow, especially in small vessels, improve identify vascularity distribution in the papillary of SMBT, and may improve our ability to differentiate SMBTs.

## Acknowledgements

Not applicable.

## Author contributions

Luying Gao: Performed the analysis, prepared the figures, Writing-original draft. Mei Yu: Data curation, Supervision. Dan Wang: Writing-review & editing. Na Su: Conceptualization, Data curation, prepared the figures, Funding acquisition, Writing-review & editing, Supervision.

## Funding

This work was supported by Non-profit Central Research Institute Fund of Chinese Academy of Medical Sciences (2022-RW320-02) and National High Level Hospital Clinical Research Funding (2022-PUMCH-B-064).

## Data availability

No datasets were generated or analysed during the current study.

## Declarations

### Ethical approval and consent to participate

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee(s) and with

the Helsinki Declaration (as revised in 2013). Written informed consent was obtained from the patient for publication of this article and accompanying images. A copy of the written consent is available for review by the editorial office of this journal.

#### Competing interests

The authors declare no competing interests.

Received: 31 March 2025 / Accepted: 17 April 2025

Published online: 02 May 2025

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