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Case Report

A large benign struma ovarii with atypical imaging findings ☆

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ABSTRACT

Struma ovarii is a mature ovarian teratoma characterized by the predominant presence of thyroid-tissue components. Typically, struma ovarii presents as relatively small masses (<10 cm) that often appear as multilocular cystic tumors with solid components. Herein, we report the unique case of a 44-year-old female with a large tumor including a solid mass. The solid components of the tumor comprised typical thyroid tissues with multiple small cystic structures containing colloid-like material. Given the rarity of struma ovarii, atypical imaging features can sometimes be misleading. This article highlights the unusual magnetic resonance imaging characteristics of a large struma ovarii, with a specific focus on the presence of solid components.

Introduction

Struma ovarii is a mature ovarian teratoma primarily composed of thyroid-tissue components and is an exceedingly rare tumor [1,2]. Struma ovarii typically presents as relatively small masses (<10 cm), that often appear as multilocular cystic tumors with solid components [1,3]. Herein, we report an unusual case involving a large struma ovarii with significant solid components. Emphasizing the presence of large solid components, this article provides a comprehensive review of the literature on this rare type of ovarian tumor.

Case report

A 44-year-old, gravida 0, para 0 woman presented to our hospital complaining of sudden lower abdominal pain while walking. The patient had been treated for infertility for 10 years, and no significant findings were detected on routine ultrasonography at that time. During the internal examination, a neonatal-sized soft mass was palpated on the anterior surface of the uterus, without any tenderness. Laboratory tests revealed a slightly elevated serum cancer antigen 125 level (56.3 ng/mL; normal level < 35 ng/mL). Other tumor markers,

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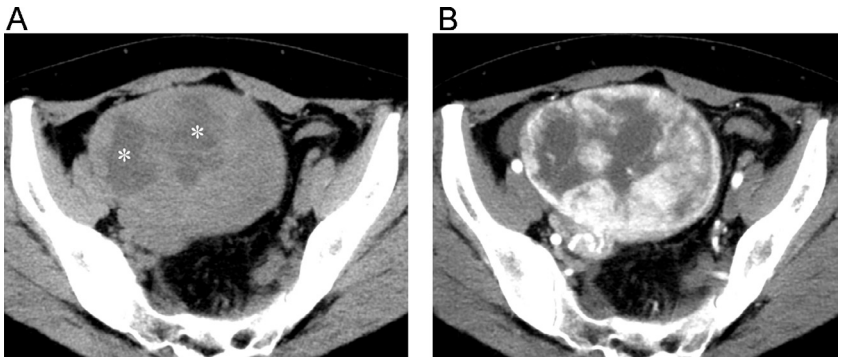

Fig. 1 – CT images showing an ovoid-shaped solid mass measuring 12 x 9 x 8 cm^3 arising from the right ovary. (A) Nonenhanced CT shows a mass with central areas with low density (indicated with asterisks) and peripheral areas with iso density compared to muscles. (B) In the early phase, contrast-enhanced CT shows heterogeneous enhancement of the peripheral areas of the mass.
CT: computed tomography.

including cancer antigen 19–9 (11.7 U/mL; normal level ≤ 37 U/mL), carcinoembryonic antigen (1.0 ng/mL; normal level < 5.0 ng/mL), human chorionic gonadotropin (2.1 mIU/ mL; normal level ≤ 3.0 mIU/mL), α-fetoprotein (2.1 ng/mL; normal level ≤ 10.0 ng/mL), and human epididymis protein 4 (47.3 pmol/L; normal level ≤70.0 pmol/L) were all within normal ranges. Since there were no symptoms of hyperthyroidism, such as palpitations, hyperhidrosis, or tremor of the limbs, thyroid function tests were not performed.

Abdominal ultrasound revealed a 10 × 8 cm^2 mass in the pelvis with uneven blood flow. Computed tomography (CT) was performed to rule out any emergency gynecological diseases and revealed a smooth ovoid solid mass with cystic components measuring 12 × 9 × 8 cm^3 in the right adnexal region (Fig. 1). On nonenhanced CT (Fig. 1A), the mass demonstrated heterogeneous low density, with no calcification or fatty component. Contrast-enhanced CT revealed a solid component with strong contrast enhancement and several cystic areas with low attenuation and no contrast enhancement in the early phase (Fig. 1B).

Magnetic resonance imaging (MRI) was performed to evaluate the ovoid mass in the right ovary (Fig. 2). On T2-weighted images, the mass consisted of a low-intensity solid component and numerous high-intensity cystic components (Fig. 2A). On fat-suppressed T1-weighted images, the solid components showed a signal intensity comparable to that of skeletal muscle, whereas the cystic components showed low intensity (Fig. 2B). Dynamic contrast revealed strong partial enhancement of the solid components in the early phase (Fig. 2C), followed by the spread of the contrast effect over all solid components in the delayed phase (Fig. 2D).

Our preoperative radiological diagnosis was sclerosing stromal tumor of the ovary, mainly based on the presence of a solid and hypervascular tumor in a menopausal woman. The differential diagnosis was a malignant epithelial stromal tumor.

The patient underwent right salpingo-oophorectomy. Macroscopically, the tumor appeared as an ovoid solid mass with cystic components (Fig. 3A). Microscopically, thyroid-tissue follicles of various sizes were observed using hematoxylin and eosin staining (Fig. 3B: ×40, 3C: ×200). The pathological diagnosis was struma ovarii of the right ovary. The patient showed no signs of local or distal recurrence for 2 years postoperatively.

Discussion

Struma ovarii is a rare specialized mature ovarian teratoma that accounts for nearly 3% of ovarian teratomas [1,2] and is characterized by thyroid-tissue components constituting >50% of the overall tissue [1,2]. Most cases are asymptomatic and incidentally found during imaging examinations for other purposes. Struma ovarii typically occurs in women aged 20-40 years, similar to mature cystic teratoma, and the incidence of struma ovarii peaks in the fifth decade of life [1,2]. The symptoms are usually nonspecific and similar to those of mature cystic teratomas. Hyperthyroidism occurs in 5%-8% of patients [4]. Benign struma ovarii typically have a good prognosis, and treatment necessitates surgical removal of the ovary, which is usually sufficient. Malignant struma ovarii are less common, with no standardized treatment or well-evaluated prognosis. Given the similarities with thyroid cancer, the general consensus is to treat malignant struma ovarii like thyroid cancer—with surgical tumor resection and adjuvant radioactive iodine therapy [5]. Accurate preoperative radiological imaging diagnosis of struma ovarii is important to avoid unnecessary surgery because 95% of struma ovarii are benign and occur in premenopausal women, although the MRI findings are similar to those of malignant ovarian tumors [6].

MRI is a valuable diagnostic tool for assessing ovarian lesions, including malignant and benign tumors. Several studies have reported the MRI characteristics of struma ovarii, which include a unilateral multilocular mass with solid components and thick septations that shows low signal intensity on T2-weighted images [7–10,12]. Heightened contrast enhancement

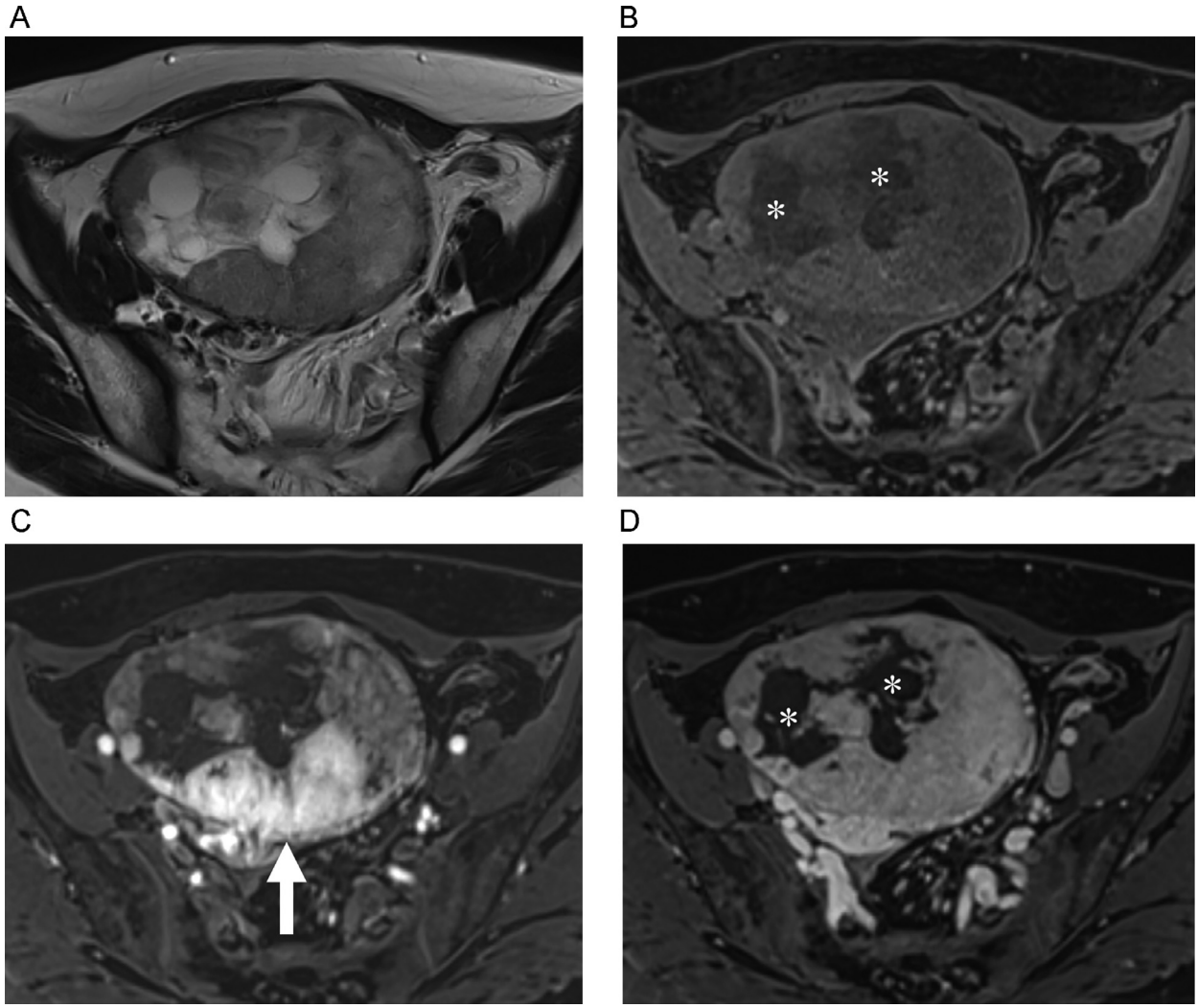

Fig. 2 – MRI shows an ovoid-shaped mass in the right ovary. (A) On axial T2-weighted image, the mass appears heterogeneous with high signal intensity. (B) Fat-saturated axial T1-weighted image shows that the central zone has low intensity (indicated with asterisks) and peripheral areas are almost iso intense compared to muscles. (C) In the early phase of enhanced fat-saturated axial T1-weighted imaging, part of the peripheral area (indicated with an arrow) of the tumor shows a strong contrast enhancement. (D) In the late phase of enhanced fat-saturated axial T1-weighted imaging, cystic components (indicated with asterisks) are observed in part of central area of the tumor. Additionally, moderately enhancing solid components are seen.
MRI: magnetic resonance imaging.

is attributed to the presence of thyroid tissue, which thickens the septa or nodules [11–13]. The characteristic features on CT include high attenuation on noncontrast CT images. This phenomenon is attributed to the thyroid follicles containing gelatinous colloid materials rich in thyroid hormones and iodine compounds [14]. In the present case, the cystic components exhibited low density on noncontrast CT and high signal intensity on T2-weighted magnetic resonance images. However, signal intensity of struma ovarii varies based on the proportion of gelatinous colloid material containing thyroid hormones, and T2-weighted images may manifest a stained-glass pattern [9,14]. The presence of hemorrhage, necrosis, or fibrosis within the cystic components may further influence the signal intensity of the cysts.

Dujardin et al. reported that multiple small cystic components in markedly or moderately enhancing solid components on MRI were characteristic of struma ovarii [12]. They reported that multiple small cystic components with thick septa and small nodules in the markedly or moderately enhancing solid components resulted in a "lacy appearance" [12]. However, we could not detect this imaging feature because our patient presented with large solid components on MRI. Histopathologically, in the area initially thought to be the solid component, a dense cystic structure with thick septa and small nodules consisting of very small thyroid follicles was identified. Therefore, small cystic structures that result in the characteristic lace-like pattern of struma ovarii may not have been readily identified on contrast-enhanced T1-weighted MRI. In the present

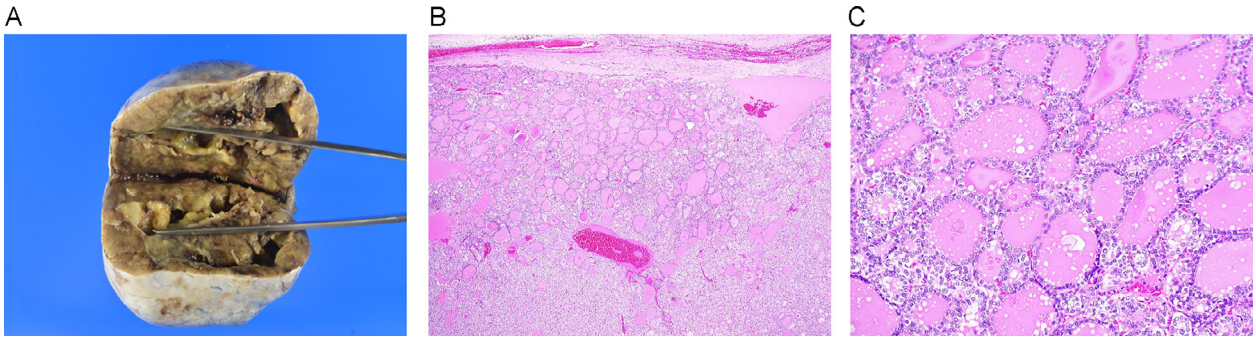

Fig. 3 – Pathological findings. (A) Macroscopically, the tumor appears as an ovoid solid mass with cystic components. (B) Microscopic examination reveals thyroid tissue within follicles of variable size and no necrotic or mitotic areas (H&E staining, ×40). (C) The high-magnification view shows thyroid follicles of various sizes lined by cuboidal epithelial cells and filled with colloid (H&E staining, ×200).
H&E: hematoxylin and eosin.

case, a sclerosing stromal tumor was considered the primary differential diagnosis based on the pronounced contrast effect caused by the congestion of numerous small cystic structures, including solid components. Notably, in our study, the tumor did not exhibit high attenuation on noncontrast CT. This deviation may also be attributed to the relatively small size of the cystic components.

Conclusions

We reported a rare case of struma ovarii comprising a large tumor with significant solid components. Imaging findings of struma ovarii may be atypical depending on the cyst size and concentration of the contents. Future reports of cases will help determine the cause.

Author contributions

All authors provided final approval of the submitted version.

Data availability

Our submission is a case report. Therefore, the data used to support the findings of this case report are included in this article. No additional data are available because this is a case report.

Patient consent

Written informed consent for the publication of this case report was obtained from the patient.

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