

Mature ovarian cystic teratoma with “sack of marbles” appearance on magnetic resonance imaging

A case report

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Abstract

Introduction: Mature ovarian cystic teratoma is a cystic fatty tumor. Presence of floating fat balls in an ovarian cystic teratoma looking like a “sack of marbles” on magnetic resonance imaging (MRI) is a rare finding.

Patient concerns: Herein, we report a 38-year old woman who was admitted to our hospital presenting with an abdominal mass and abdominal pain.

Diagnosis: Ultrasonography revealed a giant cystic mass in the pelvis; T1-weighted MRI revealed multiple spherical signals in the lesion.

Interventions: She underwent exploratory laparotomy and was histopathologically diagnosed with benign cystic teratoma.

Outcomes: Finally, the patient recovered after operation. Until December 2018, she had been still healthy without recurrence of tumors.

Conclusion: The aim of this case report was to present “sack of marbles” appearance on MRI, which will impress other doctors and improve the diagnosis of such diseases.

Abbreviations: CT = computed tomography, MRI = magnetic resonance imaging, T1WI = T1-weighted image, T2WI = T2-weighted image.

Keywords: magnetic resonance imaging, ovarian cystic teratoma, sack of marbles

1. Introduction

Teratomas are germ cell tumors containing well-differentiated embryologic tissues from 3 germ cell layers.^[1] Ovarian cystic teratoma (also known as ovarian dermoid cyst) is the most commonly encountered ovarian germ cell neoplasm.^[2] Due to the heterogeneity of ovarian cystic teratoma, patients demonstrate a wide spectrum of radiological presentations.^[1] Presence of floating fat balls in an ovarian cystic teratoma looking like a “sack of marbles” in an ovarian cystic teratoma on magnetic

resonance imaging (MRI) is a rare finding. We describe the MRI findings of such a case, which may imply the diagnosis of mature ovarian cystic teratoma.

2. Case presentation

A 38-year old woman was admitted to our hospital on December 1, 2014. The patient had an abdominal mass for 4 months, and she had been experiencing abdominal pain for 4 days at admission without any other known chronic diseases. Her physical examination results were unremarkable. Complete blood count, test of coagulation function, and tumor markers showed no obvious abnormalities. Ultrasonograph (Esaote, Genoa, Italy) revealed a giant cystic lesion sized 15 cm × 15 cm in the pelvis, in which multiple round hyperechoic masses were seen. Computed tomography (CT) (Fig. 1 A) also confirmed a huge cystic mass in the pelvis with uniform density and clear boundary, and no enhancement in enhanced CT scan. T1-weighted image (T1WI) on horizontal position scanning showed pelvic giant cystic lesions, with complete capsule, clear boundaries, and multiple round-like T1WI equal signal shadows (Fig. 1 B). T2-weighted image (T2WI) on horizontal position scanning showed pelvic giant cystic lesions, with complete capsule, clear boundaries, and multiple round-like T2WI high signal shadows (compared with muscle) (Fig. 1 C). T2WI with fat suppression on horizontal position scanning showed the intracapsular multiple round-like signal, which was slightly lower than that on conventional T2WI, indicating that there was a small

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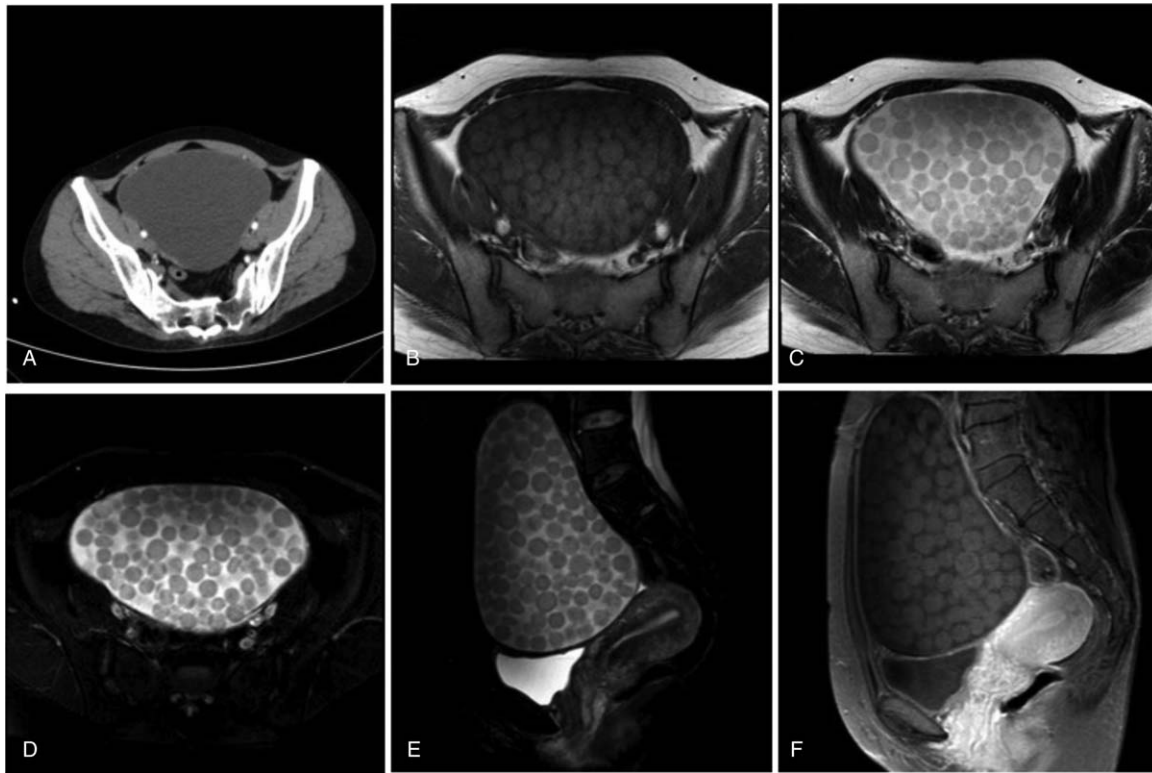


Figure 1. (A) Computed tomography. (B) T1-weighted image (T1WI) on horizontal position scanning. (C) T2-weighted image (T2WI) on horizontal position scanning. (D) T2WI with fat suppression on horizontal position scanning. (E) T2WI with fat suppression on sagittal position scanning. (F) Contrast-enhanced T1WI with fat suppression on sagittal position scanning. CT=computed tomography, T1WI=T1-weighted image, T2WI=T2-weighted image.

amount of fat in the intracapsular multiple globules (Fig. 1 D). T2WI with fat suppression on sagittal position scanning showed the intracapsular multiple round-like signal, which was slightly lower than that on conventional T2WI, indicating that there was a small amount of fat in the intracapsular multiple globules (Fig. 1 E). Contrast-enhanced T1WI with fat suppression on sagittal position scanning showed no significant enhancement of multiple globular shadows in the cyst wall and intracyst (Fig. 1 F). Exploratory laparotomy was performed on December 3, 2014. The size of the tumor was approximately 15 cm × 20 cm; the left ovary that was removed showed yellowish color and obvious compression. The tumor mass was soft, and many gray-white spherical structures immersed in transparent fluid were found after incision of the capsule wall. Histopathological examination showed that the cyst wall was lined with keratinized sebaceous gland squamous epithelial hair follicles and ciliated columnar epithelium. The cystic wall was composed of fibrous collagen. The histopathological diagnosis confirmed that it was benign mature cystic teratoma of the ovary. Finally, the patient recovered after operation. Until December 2018, she had been still healthy without recurrence of tumors.

Ethical approval (Research Review No. 12, 2019) was given by the medical ethics committee of Hangzhou Red Cross Hospital to publish this study. The patient has written informed consent for the publication of the present case report.

3. Discussion

Mature cystic teratoma is the most common type of ovarian tumor and includes at least 2 well-differentiated germ cell

layers.^[1] Floating globules usually have a nidus composed of debris, desquamative material, or fine hair shafts that is hyperintense on T2-weighted and hypointense on T1WIs.^[3] On MRI, the free-floating intracystic globules of sebum/fat could appear as multiple rounded hypoattenuating nodules, giving the classical “sack of marbles” appearance.

The presence of floating fat globules in ovarian cystic teratoma is rarely observed, and floating globules do not always have a typical fatty signal because of their mixed content. Till date, only 5 cases of mature cystic ovarian teratoma in which a sign of floating spheres was observed have been reported (Table 1).^[4–8] However, in previous reports, there was no such typical “sack of marbles” appearance on MRI. A case involving spontaneous rupture of a cystic ovarian teratoma has also been reported.^[9] Approximately 1% to 2% of mature teratomas reportedly undergo malignant transformation, with risk factors including patient age >45 years and a squamous cell carcinoma antigen level of >2 ng/mL.^[10]

In our case, CT manifestations were giant cystic space-occupying lesions in the pelvic cavity, with liquid density in the capsule, but no multiple small, round abnormal shadow was seen. The density of the multiple globules in our case was close to liquid density, which were the mixtures of fat and debris. Because the density of debris was slightly higher than that of water, and the density of fat was slightly higher than that of water, the density of the mixture is close to the water, and it is difficult to find it only by CT examination. MRI can show different signals for different components, so it is helpful to perform MRI examination when encountering such cystic space-occupying lesions again. MRI–T2WI fat suppression sequence showed that

Table 1**Five published cases of mature cystic ovarian teratoma with “sack of marbles.”**

References	Ultrasound	CT	MRI
[4]	A large cystic mass was seen, arising from the pelvis. It measured 10 cm × 7 cm × 18 cm. There were numerous rounded hyperechoic structures within the cystic mass	–	MRI confirmed the ultrasound findings of a cystic abdominopelvic mass. It contained multiple, discrete, globules, each approximately 2 cm in diameter
[5]	Sagittal sonogram shows multiple rounded echogenic masses within an ovarian cyst	Contrast-enhanced CT scan reveals multiple rounded fat density areas within the cyst	–
[6]	2D revealed a large cystic lesion in the lower abdomen. Multiple hyperechoic round structures were seen in the cystic lesion On 3D imaging, the round structures from 2D imaging were shown to be multiple globules of indefinite sizes that seemed to adhere to each other and were floating in the cystic fluid	–	The outer portion of the globules was slightly hyperintense to the surrounded fluid and the center of globules showed relatively lower signal intensity on T1-weighted images. On T2-weighted images, the outer portion of globules was hypointense, and the center relatively hyperintense
[7]	–	Axial and coronal CT images showing a large mature cystic ovarian teratoma with multiple free floating intracystic hypoattenuating fat nodules, giving “sack of marbles” appearance	–
[8]	Ultrasound showed a 9 cm thin-walled cystic lesion of the left ovary, containing multiple hyperechogenic globules	–	On MRI the globules were hypointense relative to the abdominal fat on T1-weighted MR images, with no drop in signal intensity on fat suppressed T1-weighted MR images. The globules were hyperintense on T2-weighted MR images. No vegetations, wall irregularity, nor solid, fatty, or calcified components were visible on MRI

CT= computed tomography, MRI= magnetic resonance imaging.

multiple globules in the capsule contained only a small amount of fat. In our case, the globules contained very little fat.

The advantage of MRI over ultrasound is that the hyperechoic shadow of ultrasound is the echo formed by the superposition of multiple components. It is not clear whether there is fat in the globule by ultrasound, while MRI can determine whether there is a small amount of fat in the globule.

All in all, we describe a rare presentation of floating fat globules on MRI, which was initially diagnosed as ovarian cyst based on CT. The presence of “sack of marbles” in ovarian cystic teratoma is rarely observed, indicating the diagnosis of ovarian cystic teratoma. To make an accurate diagnosis, it is necessary to understand the rare findings associated with ovarian cystic teratoma.

Author contributions

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References

- [1] Sahin H, Abdullazade S, Sancı M. Mature cystic teratoma of the ovary: a cutting edge overview on imaging features. *Insights Imaging* 2017;8:227–41.
- [2] Rha SE, Byun JY, Jung SE, et al. Atypical CT and MRI manifestations of mature ovarian cystic teratomas. *AJR Am J Roentgenol* 2004;183:743–50.
- [3] Saba L, Guerriero S, Sulcis R, et al. Mature and immature ovarian teratomas: CT, US and MR imaging characteristics. *Eur J Radiol* 2009;72:454–63.
- [4] Origbani C, Thompson MO, Lowe DG, Setchell M. Mobile globules in benign cystic teratoma of the ovary. *BJOG* 2000;107:135–8.
- [5] Rathod K, Kale H, Narlawar R, et al. Unusual “floating balls” appearance of an ovarian cystic teratoma: sonographic and CT findings. *J Clin Ultrasound* 2001;29:41–3.
- [6] Umesaki N, Nagamatsu A, Yada C, et al. MR and ultrasound imaging of floating globules in mature ovarian cystic teratoma. *Gynecol Obstet Invest* 2004;58:130–2.
- [7] Lee KH. ‘Sack of marbles’ in mature cystic ovarian teratoma. *Abdom Radiol (NY)* 2017;42:1616–7.
- [8] Zeitoun J, Escalard C, Benoist G. MR imaging of cystic ovarian teratoma with internal floating globules. *Diagn Interv Imaging* 2018.
- [9] Fibus TF. Intraperitoneal rupture of a benign cystic ovarian teratoma: findings at CT and MR imaging. *AJR Am J Roentgenol* 2000;174:261–2.
- [10] Minato T, Toyoshima M, Imai N, et al. Mature ovarian cystic teratoma with disseminated nodular lesions in the pleural and peritoneal cavities: a case report. *Radiol Case Rep* 2018;13:671–5.