Pictorial essay

Med Ultrason 2020, Vol. 22, no. 2, 230-235
DOI: 10.11152/mu-2331

Ultrasound pattern and diagnostic accuracy of primary ovarian endometrioma and its recurrence: a pictorial essay

Vlăduț Săsăran[1], Codruța Maria Alexa Bad[2], Daniel Mureșan[3], Lucian Puşcaşiu[1]

[1]Department of Obstetrics and Gynecology, "George Emil Palade" University of Medicine, Pharmacy, Sciences and Technology Târgu Mureş, [2]Department of Obstetrics and Gynecology, County Hospital Târgu Mureş, Târgu Mureş, [3]Department of Obstetrics and Gynecology, "Iuliu Haţeganu" University of Medicine and Pharmacy, Cluj Napoca, Romania

Abstract

The authors present their experience in ultrasound patterns of primary and recurrent endometrioma and correspondence with histopathological results, using 2D and color Doppler ultrasound examination. Cases of primary and recurrent endometriomas, as well as other false positive diagnosis are presented. The presence of the peripheral, healthy ovarian tissue, is the principal difference between the primary endometrioma and their recurrence. The arousal of papillary projections or solid-type echostructure decreases the likelihood of an endometrioma without histological atypia. Postmenopause modifies the ultrasound features of endometrioma by decreasing homogeneity and echogenicity.

Keywords: ovarian endometrioma; recurrence; ultrasound

Introduction

Endometriosis, a disease with a major impact on life and infertility, has an incidence that can reach 15% [1], out of which 44% is represented by ovarian endometrioma [2]. Pharmacotherapy or expectation is accepted in women with endometrioma. Recurrence of the removed endometrioma ranged between 9.1 and 27.1% after 24 months, depending on the type of surgical intervention [3]. Therefore, the accuracy of non-invasive diagnosis is crucial.

Received 25.11.2019 Accepted 12.01.2020
Med Ultrason
2020, Vol. 22, No 2, 230-235
Corresponding author: Codruța Maria Alexa Bad
Department of Obstetrics and Gynecology,
County Hospital Târgu Mureş,
29 Köteles Sámuel street,
540057, Târgu Mureş, Romania
Phone: +40-787-754310
Fax: +40-265-211098
E-mail: codrutza_bad@yahoo.com

Guerriero et al distinguished by ultrasound (US) 2 forms of echostructure: 1) an homogenous, hypoechogenic, round structure, with lower echoes, no papillary projections and poor vascularisation and 2) an homogenous, hypoechogenic, round structure, with lower echoes, but with an echogenic portion and no detectable Doppler flow [4,5].

Van Holsbeke et al [6] described in premenopausal endometriomas various aspects: unilocular cysts with ground glass echogenicity of the cyst fluid in half of the cases:17 % had solid parts, 73% had ground glass echogenicity and 17% were multilocular. Papillary projections were found in 10% of the caseswith color Doppler flow in 2.5% of the cases [6]. The authors concluded that the aspect of a cyst with ground glass echogenicity and maximum four locules, but with no papillations or blood flow on color Doppler, is the optimal rule for US detection of premenopausal endometriomas. Still, the experience of the examiner is considered more important than strict rules applied to echostructures, probably because the ultrasonographer also takes into consideration the

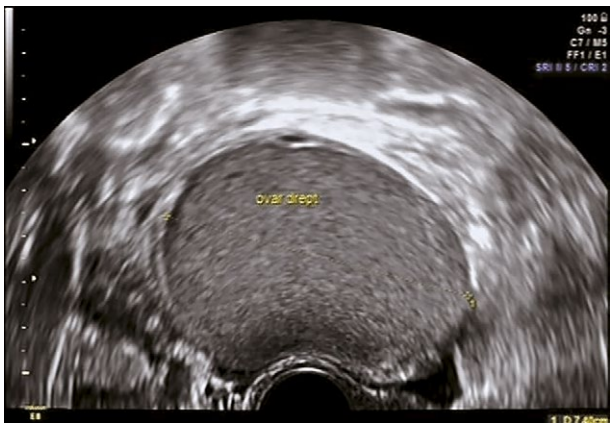

Fig 1. Primary homogenous endometrioma with "ground glass echogenicity" and "crescent sign". A thin capsule is visible, together with minimal, microfollicular ovarian tissue.

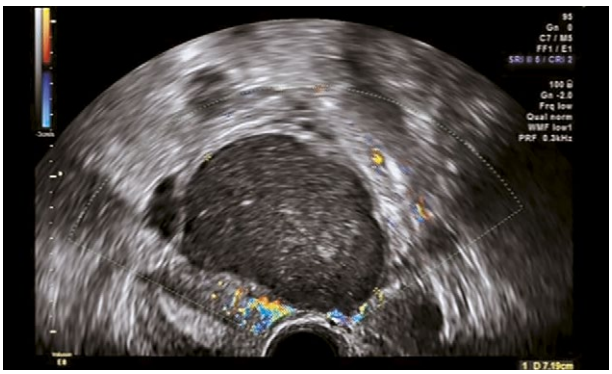

Fig 2. Primary inhomogeneous endometrioma. Areas with miscellaneous echogenicity and disposition are visible inside the cyst, as the blood clots evolve gradually. The inferior part of the cyst is surrounded by a capsule with a minimal Doppler signal- score 1.

clinical information [6]. Appling the rules made by the International Ovarian Tumor Analyses (IOTA) [6] for endometrioma diagnosis, the results obtained are as good as the subjective examination performed by an expert [7].

This pictorial essay presents our experience in 110 patients with primary (76 cases with suspicion, 68 confirmed) or recurrent (34 cases) ovarian endometriomas evaluated by US and surgically treated during a 13-year period. The US examinations were performed using a Siemens G60 Ultrasound (transvaginal probe EC9-4), Voluson E8 Expert or E10 General Electric (probe RIC5-9-D) machines. In the 8 patients with non-confirmed primary endometrioma the final diagnosis was borderline tumours (3 cases), dermoid cyst- mature cystic teratoma (2 cases), haemorrhagic luteal cyst (1 case), fybrothecoma (1 case) and serous papillary cystadenoma (1 case).

Primary homogenous endometrioma with "ground glass echogenicity" and "crescent sign"

Growth of a tumor in normal ovarian tissue dislocates and compresses the normal, microfollicular tissue outwards. [8]. This process leads to the development of an echostructure of peripheral normal ovarian tissue, with or without obvious follicles, which cannot be separated from the cystic formation through compression, during examination. Therefore, this *"ovarian crescent sign"* [8] on US is actually an indicator of the presence of normal, compressed ovarian tissue. Normal ovarian tissue can be identified in 97% of benign tumours [9] (fig 1, fig 2).

Primary versus recurrent endometriomas

We found the *"ovarian crescent sign"* more frequently in primary (64 out of 76 cases, 84.2%) than in recurrent endometriomas (22 out of 34 cases, 64.7%). This fact was explained through the decrease of healthy ovarian tissue after the first surgical intervention [10]. The size of primary endometrioma was higher compared with

Fig 3. Primary endometrioma with papillary projection. An excrescence with a base and height of over 1 cm is visible at 11 o' clock inside the cyst (which measures over 5 cm in diameter). This structure presents a higher echogenicity than the rest of the cyst component.

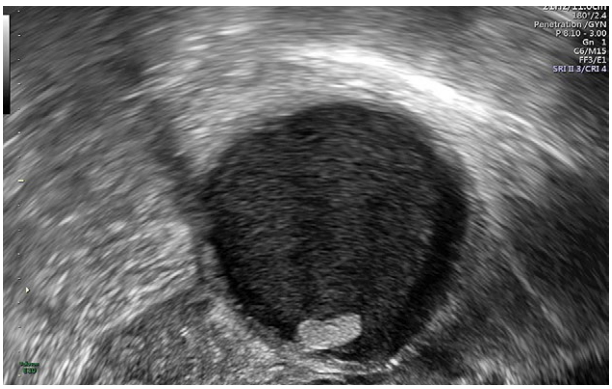

Fig 4. Primary endometrioma with dislodged blood clot which looks like a papillary projection. In supine position, a structure with moderate echogenicity, more than 1.5 cm long, rises at 6 o'clock inside the cyst and is tangent to the capsule by 2 mm. The movement generated by the transvaginal probe detaches the structure from the cystic wall, thus indicating the differential diagnosis.

recurrent endometriomas (55.82±18.02 *vs* 40.47±18.15 mm).

Unilocular and homogenous echostructure versus unilocular-solid structure or with papillary projections

In our cases, 88.18% of the endometriomas were unilocular, with a poor Doppler signal. Unlike the study of Guerriero et al [4], only half of our endometriomas had an homogenous echostructure. The atypical appearance of endometriomas can be related to a tumour with partial solid and partial liquid components, with unilocular-solid structure or with papillary projections (fig 3-5). This fact is connected to the possible evolvement of blood stored inside the cysts.

The false positive diagnosis of endometrioma

The situation of false positive diagnosis of endometrioma based upon echostructure can be related to functional cysts or cystadenomas and appear in 10% of cases [11].

Valentin et al [12] points out the possibility of its confusion with ovarian teratoma, mucinous and serous cystadenomas, fibroma, benign cysts or haemorrhagic cysts in B mode. In order to decrease the amount of uncertainty between endometrioma and ovarian teratoma or hydrosalpinx, Sokalska et al [13] suggests the use of additional data obtained from colour Doppler examination (fig 6-9).

The borderline tumours after the false positive diagnosis of endometrioma

Van Holsbeke et al [11] found that 1% of the patients (9 out of 713) were actually confirmed with borderline or malignant tumours. We had 3 cases of borderline tumours from 76 cases with a suspicion of primary endometrioma (fig 10).

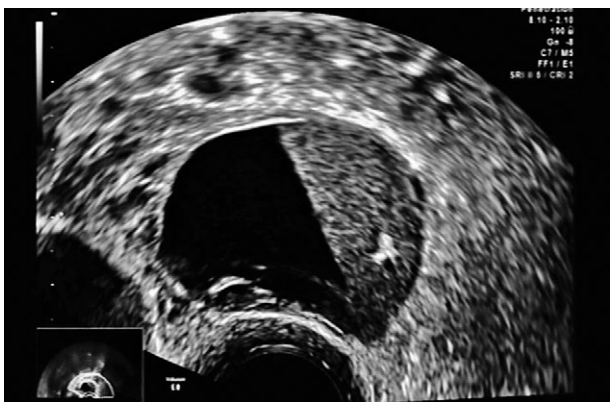

Fig 5. Recurrent endometrioma with bilocular pattern given by the presence of an organised blood clot. On the right side of the cyst a "honeycomb" aspect is visible, with increased echogenicity and delimitation from the rest of the components.

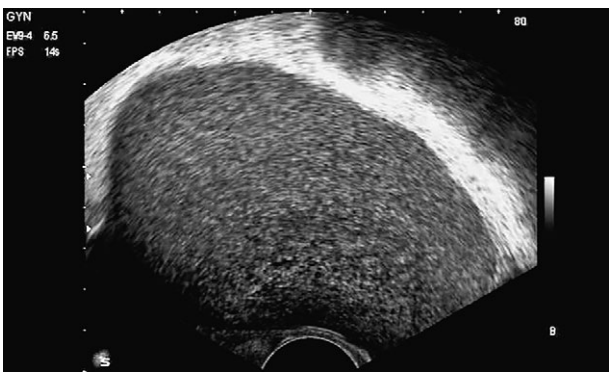

Fig 6. Dermoid cyst with ground glass echogenicity. This feature mimics the characteristics of the US endometrioma with unilocular cystic appearance.

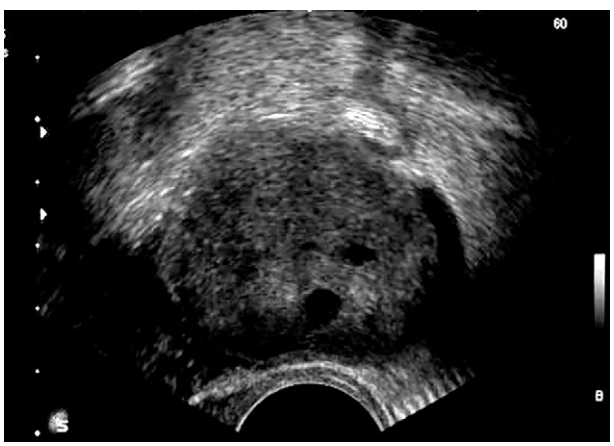

Fig 7. Hemorrhagic luteal cyst. This unilocular, inhomogeneous cyst had a tiny capsule and a small anechoic part, all together with some blood, thus mimicking ground glass echogenicity.

Fig 8. Ovarian fibrothecoma. An unilocular inhomogeneous cyst which apparently had a blood clot content, was confused with a possible endometrioma.

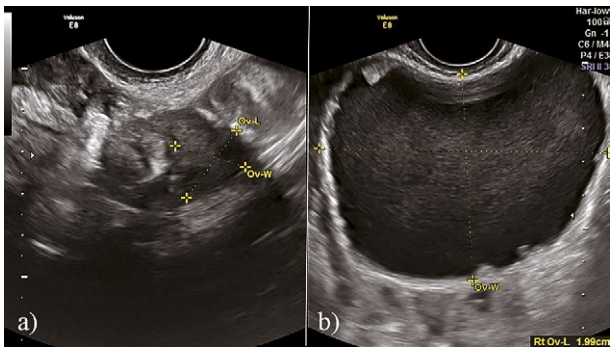

Fig 9. Serous papillary cystadenoma: a) In the right part we see one ovary transformed in a cystic tumour with papillary projections at 6 and 11 o'clock, with ground glass echogenicity and a maximal diameter of more than 8 cm. This serous papillary cystadenoma was mistaken with an endometrioma; b) the other ovary can be visualised in the left part of the image.

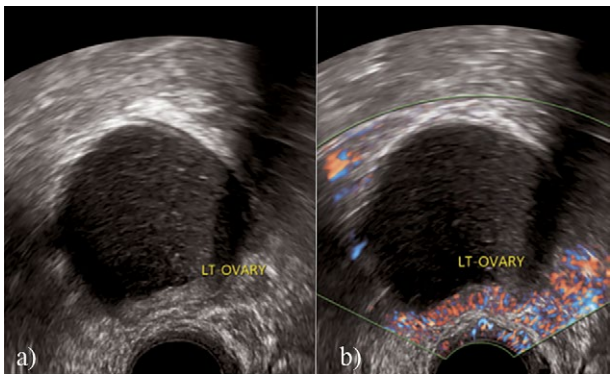

Fig 10. Borderline tumor: a) homogeneous unilocular tumour of the left ovary LT with ground glass echogenicity and a small solid tissue between 5 and 7 o'clock; b) the solid part of the tumor with color Doppler score of 2, the rest of the capsule without blood flow.

Papillary projections and malignancy or other types of tumours

We found only 3 cases with papillary projections from 76 ovarian suspicious primary endometrioma. The only case of recurrent endometrioma with a solid component was finally confirmed as a malignoma (fig 11). The likelihood of a malignoma diagnosis in cases of a cyst which is presumed to be a benign endometrioma is lower than 1% [1,2], as in other localisations of endometriomas, such as the abdominal wall [14]. Kim et al conducted a meta-analysis which evaluated the transformation of ovarian endometrioma into ovarian cancer and increased the relative risk to 1.265 (95% CI, 1.214–1.318) [15]. Papillary projections were identified in 2 from 8 cases (25%) of non-confirmed endometriomas, and 1 from 68 cases (1.47%) in the confirmed endometriomas in our patients.

Colour Doppler score

As the majority of endometrioma are avascular tumors, Doppler interrogation has no contribution for the differential diagnosis with teratomas, luteal haemorrhagic cysts, cystadenomas or fibrothecomas. However, color Doppler examination is mandatory in endometrioma with solid ovarian tissue or papillary projections. Testa et al underline this necessity in their study, in which 14 of 15 cases of ovarian endometrioma with malignant transformations were hypovascularized [1]. In our experience, borderline tumours (3 cases) and ovarian adenocarcinoma evidenced a 1 or 2 colour Doppler score.

During pregnancy decidualization occurs, with the possible development of papillary projections with high vascularization. We had one patient with recurrent endometrioma and pregnancy in which we found only the

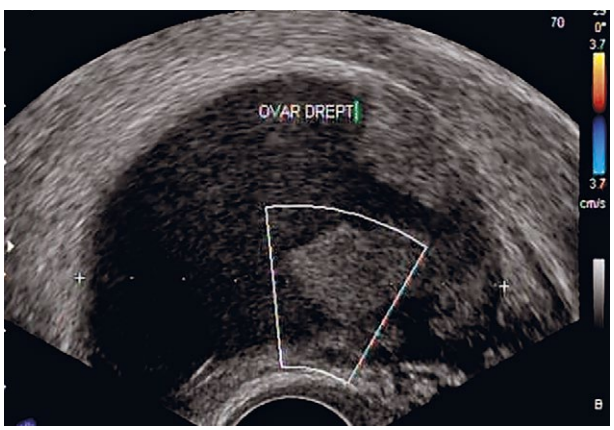

Fig 11. Recurrent ovarian tumour after primary surgery of endometrioma. The solid part does not present color Doppler flow on the velocity scale of 3.7 cm/sec. This unilocular, partial solid tumor with a diameter of 8 cm was confirmed as adenocarcinoma after morphopathological examination.

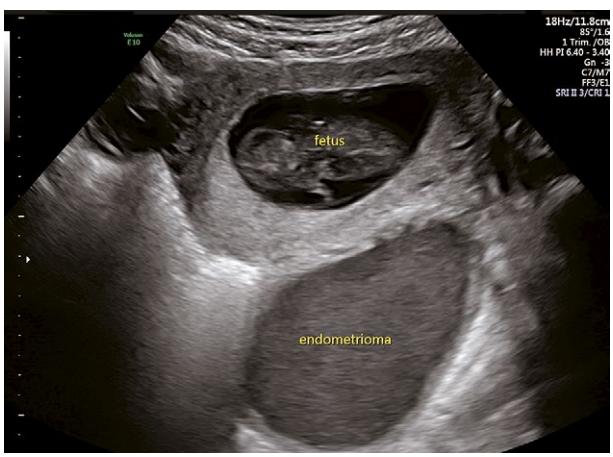

Fig 12. Retrouterine, recurrent endometrioma associated with pregnancy. The unilocular cyst, with relatively tiny capsule and classic appearance of ground glass echogenicity can be visualised in the inferior part of the image.

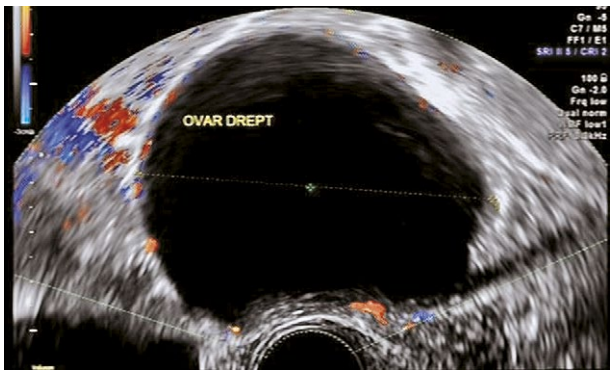

Fig 13. Endometrioma, diagnosed after 3 years of menopause, with anechogenic echostructure. The unilocular cyst, with a diameter of more than 7 cm, has a very tiny capsule with color Doppler score 1.

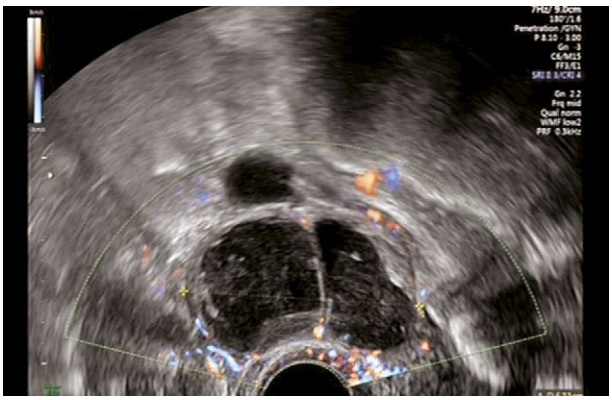

Fig 14. Bilocular, climacteric endometrioma, with inhomogeneous structure and with color Doppler score of 2 inside the capsule.

growth of the cyst volume, without other US changes (fig 12).

The premenopausal and postmenopausal features of endometrioma

The postmenopausal endometrioma become multilocular, with arousal of solid components and loss of the "ground glass" character, thus becoming more echogenous, whereas the papillary projections are more common in the opinion of Guerriero et al in a non-longitudinal study [16]. In postmenopause, in benign situations, a decrease in the echogenicity and an increase in the inhomogeneity of endometriomas were reported [11].

Our 34 patients with recurrent endometriomas were supervised longitudinally, with an average of 44.27 months after therapy and we found no association between the age of the premenopausal patient and echostructure. We had 3 patients who underwent surgery in postmenopause, 2 with an unilocular, anechogenous cyst and one with a multilocular cyst, color Doppler score 1 or 2 and without papillary projections (fig 13 and fig 14).

Conclusions

The US difference between primary and recurrent endometrioma is related to the presence of healthy ovarian tissue in the periphery of the primary endometrioma. The presence of papillary projections or a solid echostructure increase the chances for malignancy. Postmenopause modifies the US characteristics of endometrioma.

Conflict of interest: none

References

1. Testa AC, Timmerman D, Van Holsbeke C, et al. Ovarian cancer arising in endometrioid cysts: ultrasound findings. Ultrasound Obstet Gynecol 2011;38:99-106.
2. Muzii L, Di Tucci C, Di Feliciantonio M, et al. Management of Endometriomas. Semin Reprod Med 2017;35:25-30.
3. Shaltout MF, Elsheikhah A, Maged AM, et al. A randomized controlled trial of a new technique for laparoscopic management of ovarian endometriosis preventing recurrence and keeping ovarian reserve. J Ovarian Res 2019;12:66.
4. Guerriero S, Ajossa S, Mais V, Risalvato A, Lai MP, Melis GB. The diagnosis of endometriomas using colour Doppler energy imaging. Hum Reprod 1998;13:1691-1695.
5. Ferrero S, Scala C, Racca A, et al. Second surgery for recurrent unilateral endometriomas and impact on ovarian reserve: a case-control study. Fertil Steril 2015;103:1236-1243.
6. Van Holsbeke C, Van Calster B, Guerriero S, et al. Endometriomas: their ultrasound characteristics. Ultrasound Obstet Gynecol 2010;35:730-740.
7. Ameye L, Timmerman D, Valentin L, et al. Clinically oriented three-step strategy for assessment of adnexal pathology. Ultrasound Obstet Gynecol 2012;40:582-591.
8. Hillaby K, Aslam N, Salim R, Lawrence A, Raju KS, Jurkovic D. The value of detection of normal ovarian tissue (the 'ovarian crescent sign') in the differential diagnosis of adnexal masses. Ultrasound Obstet Gynecol 2004;23:63-67.
9. Kushtagi P, Kulkarni KK. Significance of the "ovarian crescent sign" in the evaluation of adnexal masses. Singapore Med J 2008;49:1017-1020.
10. Muzii L, Achilli C, Lecce F, et al. Second surgery for recurrent endometriomas is more harmful to healthy ovarian tissue and ovarian reserve than first surgery. Fertil Steril. 2015;103:738-743.
11. Van Holsbeke C, Van Calster B, Guerriero S, et al. Imaging in gynaecology: How good are we in identifying endometriomas? Facts Views Vis Obgyn 2009;1:7-17.
12. Valentin L. Pattern recognition of pelvic masses by gray-scale ultrasound imaging: the contribution of Doppler ultrasound. Ultrasound Obstet Gynecol 1999;14:338-347.
13. Sokalska A, Timmerman D, Testa AC, et al. Diagnostic accuracy of transvaginal ultrasound examination for assign-

ing a specific diagnosis to adnexal masses. Ultrasound Obstet Gynecol 2009;34:462-470.
14. Grigore M, Socolov D, Pavaleanu I, Scripcariu I, Grigore AM, Micu R. Abdominal wall endometriosis: an update in clinical, imagistic features, and management options. Med Ultrason 2017;19:430-437.
15. Kim HS, Kim TH, Chung HH, Song YS. Risk and prognosis of ovarian cancer in women with endometriosis: a meta-analysis. Br J Cancer 2014;110:1878-1890.
16. Guerriero S, Van Calster B, Somigliana E, et al. Age-related differences in the sonographic characteristics of endometriomas. Hum Reprod 2016;31:1723-1731.