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

Vlăduț Săsăran¹, Codruța Maria Alexa Bad², Daniel Mureșan³, Lucian Pușcași¹

¹Department of Obstetrics and Gynecology, “George Emil Palade” University of Medicine, Pharmacy, Sciences and Technology Târgu Mureș, ²Department of Obstetrics and Gynecology, County Hospital Târgu Mureș, Târgu Mureș, ³Department of Obstetrics and Gynecology, “Iuliu Hațeganu” 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.

Guerriero et al distinguished by ultrasound (US) 2 forms of echostructure: 1) an homogenous, hypoechogetic, 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 cases with 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
Applying the rules made by the International Ovarian Tumor Analyses (IOTA) for endometrioma diagnosis, the results obtained are as good as the subjective examination performed by an expert.

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), ftybrothecoma (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. 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...
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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.
Papillary projections and malignancy or other types of tumours

We found only 3 cases with papillary projections from 76 ovarian suspicious primary endometriomas. 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
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 echogenic, 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 a unilocular, anechogenic 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

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