

The experience of our Clinic in laparoscopy for adnexal masses and the correlation between ultrasound findings and pathological results

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Abstract

Introduction: An adnexal mass (mass of the ovary, Fallopian tube, or surrounding connective tissues) is a common gynecological problem. Ovarian pathology can occur at any time from fetal life to menopause. Sonography is a clinically important imaging modality for assessing whether an adnexal mass is likely benign or possibly malignant. Most ovarian surgeries are for benign disease and can be performed laparoscopically. **Patients, Materials and Methods:** We retrospectively evaluated all the patients from our Clinic who underwent laparoscopy for adnexal tumors in the last three years. We were studying the correlation of the preoperative ultrasound examination and the pathological result for each case. **Results:** In this study, there were included 71 patients who underwent a laparoscopic intervention for adnexal tumors. The average age was 33 years old (range 18 and 60 years old). The ultrasound findings were ovarian endometriosis in 23.9% of cases, left ovarian cysts (22.5%) and right ovarian tumors (18.3%), and the lowest percentage was of left ovarian tumors (8.5%). Regarding the histopathological examination, we found the following results: ovarian endometriosis (32.4%), ovarian functional cysts (15.5%), serous ovarian cysts (15.5%), salpingitis (12.7%), ovarian myoma (7%), papillary serous ovarian cysts (4.2%), ovarian teratoma cysts (9.9%), one case (1.4%) of ovarian carcinoma and one case (1.4%) of borderline serous tumor. In this study, we observed that it was a strong correlation between the ultrasound finding and the pathological result for adnexal tumors ($p < 0.001$). **Conclusions:** The laparoscopy was performed in our Clinic for adnexal masses with benign characters in ultrasound examination. The histopathological examination confirmed the diagnosis, being only one case of ovarian carcinoma in this study.

Keywords: adnexal mass, Fallopian tube, ovarian tumor, malignancy, borderline tumor.

Introduction

A tumor of the ovary, Fallopian tube, or surrounding connective tissues represents an adnexal mass and is a common gynecological problem. It is proved that females of all ages, from fetuses to the elderly, may develop an adnexal mass [1].

The aim of our study was to assess the aspect of adnexal masses by ultrasound prior to surgery in order to decide for a minimal invasive method (laparoscopy) and to evaluate the ultrasound correlation with the laparoscopic and pathological results. A good correlation may provide a reliable tool in favor of the benign aspect of tumors.

Pelvic ultrasound is the first line method for evaluation of malignancy in an adnexal mass. The cost is reduced compared with other investigations. The main advantages are reproducibility, standardization and reduced costs compared with other investigations [2]. Those advantages can recommend the investigation to be used as screening for ovarian tumor detection. In a study which included women aged 25 to 40 years, the prevalence of an adnexal lesion on ultrasound examination was 7.8%, with 6.6%

ovarian cysts among them [3]. In another series, transvaginal ultrasonography was performed on asymptomatic postmenopausal women as routine gynecological check-up and 2.5% had a simple unilocular adnexal cyst [4]. After ultrasound, the magnetic resonance imaging (MRI) represents the next best imaging way to characterize an adnexal mass [5].

The aim of our study was to identify the aspect of adnexal masses in ultrasound and correlate them with laparoscopic and pathological results.

Patients, Materials and Methods

We retrospectively evaluated all the patients who underwent laparoscopy for adnexal tumors from January 2012 to December 2014, in Department of Obstetrics and Gynecology, "Bucur" Maternity, "St. John" Clinical Hospital, Bucharest, Romania. Our study included 71 women that accomplished the inclusion criteria of the study. All the patients underwent a clinical and ultrasound examination. We performed a transvaginal ultrasound examination for all the patients. The observed ultrasound aspects

were the following: localization, size, aspect and vascularization of the tumor. We performed an ultrasound examination on different machines Voluson™ E6, E8, Medison. The indications for laparoscopy intervention were made considering the ultrasound aspect of the tumor, age, fertility preservation, associated diseases and patients wish. The laparoscopic intervention was realized using Verres or Hasson open access. We checked the correlation between the preoperative ultrasound examination and the pathological result for each case. The tissues resulted from laparoscopy were formalin-fixed and paraffin-embedded within the Department of Pathological Anatomy from our Unit – “Bucur” Maternity, Bucharest. For the routine staining, Hematoxylin–Eosin (HE) was performed on 3 µm thick sections from 10% formalin-fixed paraffin-embedded tissues and all specimens were examined and photographed on a Leica DM750 microscope. The laparoscopic surgical team varied. For statistical procedure, we used SPSS software and we performed Student's *t*-test and Pearson's correlation. The score considered with statistical relevance was $p < 0.005$. The informed consent was obtained from each patient.

Results

In this study, there were included 71 patients who underwent a laparoscopic intervention for adnexal tumor, between 2012–2014, in our Clinic. The average age was 33 years old (range between 18 and 60 years old). Each patient had an ultrasound evaluation before surgery. There were different investigators but we did not report if there were any differences between an experienced or beginner clinician. We present the results about the ultrasound image, the type of intervention that was performed in laparoscopy and the pathological results. For a good accuracy, we had the same pathologist for all cases included in the study.

First of all, we summarized the preoperative diagnosis. It was established according to the patient's symptoms, clinical features and ultrasound images. In this way, we had a majority of ovarian endometriosis (26.8%) followed by left ovarian cysts (21.1%), right ovarian tumors (16.9%) and the minority were left ovarian tumors (9.9%).

Regarding the surgical intervention, there was performed exploratory laparoscopy in all cases. The conversion in laparotomy was realized in four (5.6%) cases of 71 patients. In all other cases, we had: ovarian cystectomy, unilateral or bilateral adnexectomy or salpingectomy. The majority were ovarian cystectomies (63.4%). The ultrasound findings were ovarian endometriosis in 23.9% cases, left ovarian cysts (22.5%) and right ovarian tumors (18.3%) and the lowest percentage is for left ovarian tumors (8.5%).

The complexity of the results was the pathology. Thus, we had the following results: ovarian endometriosis (32.4%), ovarian functional cysts (15.5%), serous ovarian cysts (15.5%), salpingitis (12.7%), ovarian myoma (7%), papillary serous ovarian cysts (4.2%), dermoid ovarian cysts (9.9%), one case (1.4%) of ovarian carcinoma and one case (1.4%) of borderline serous tumor.

In this study, we can observe that there was a strong correlation between the ultrasound finding and the preoperative diagnosis ($p = 0.001$, using the Pearson's correlation). The diagnosis was correlated with the inter-

vention ($p = 0.007$, using the Pearson's correlation). The most relevant aspect of that research is that using the Student's *t*-test we found that the ultrasound finding is correlated with the pathological result for adnexal tumors in our Clinic ($p < 0.001$).

The histopathological examinations played an essential part in the positive and differential diagnosis of adnexal lesions, especially when the results of the imagistic studies were not conclusive enough. These examinations allowed a clear differential diagnosis between benign and malignant lesions and establishing an accurate treatment, especially after surgery. Within the benign lesions, there may be performed a differentiation between a borderline ovary tumor and ovarian endometriosis (or other malignant lesions), lesions that clinically and imagistically are difficult to differentiate (Figures 1–3). Within the malignant lesions, the histopathological examination allowed the establishment of the histopathological diagnosis of tumor and its aggressiveness (Figure 4), allowing the establishment of the treatment measures and a prognosis for every case.

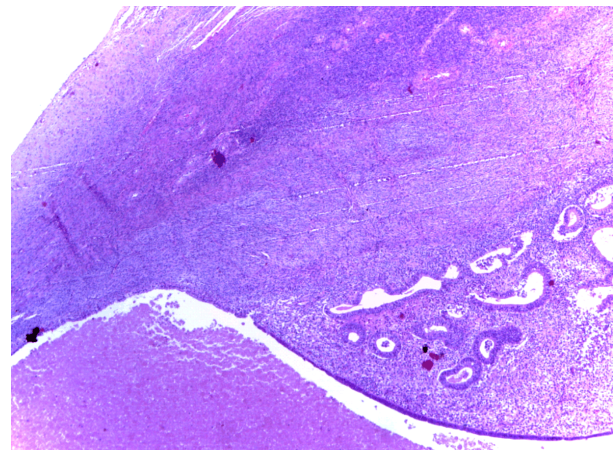


Figure 1 – Ovarian endometriosis: endometrial glands surrounded by a sleeve of endometrial stroma with proliferative aspect, cystic degeneration, granulation tissue and diffusely xanthomatous infiltrated cells. HE staining, ×40.

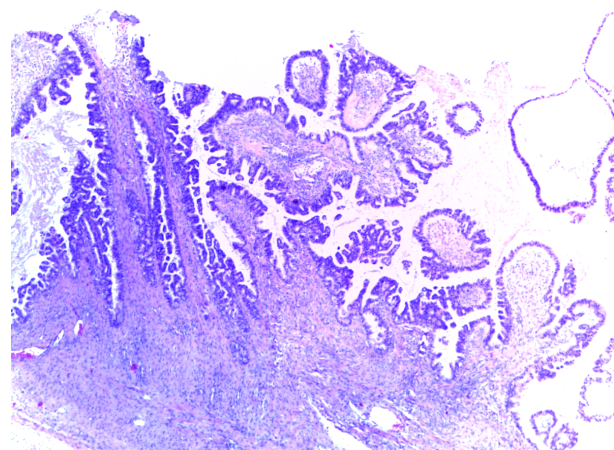


Figure 2 – Borderline serous tumor TSB1: atypical epithelial proliferation characterized by the presence of branching papillae with hierarchical, stratified epithelium areas with mild atypia – rare mitoses. Neoplastic cell clusters in areas that represent cystic seemingly detached epithelial buds, tangential sectioned, some looking like rosette and diffuse lymphoplasmocytic infiltrate. HE staining, ×40.

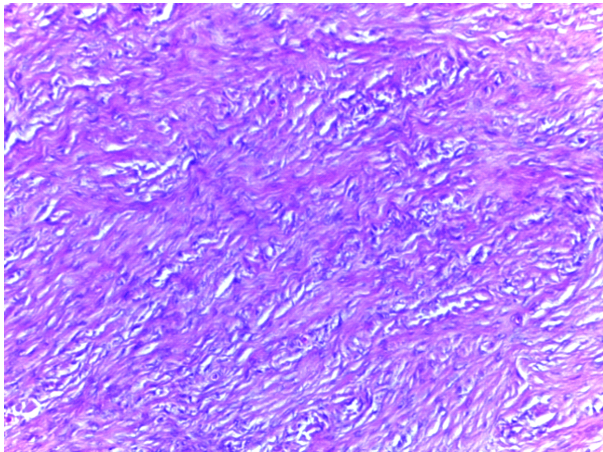


Figure 3 – Ovarian fibroma with the fascicular pattern of growth. HE staining, $\times 100$.

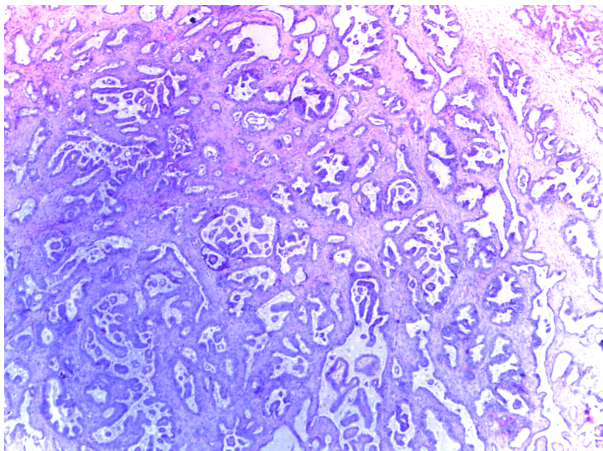


Figure 4 – Low-grade ovarian serous carcinoma with micropapillary architecture: small papillae with no fibrovascular ax and other papillae with very thin fibrovascular ax. Micropapillae and solid cell nests are surrounded by open spaces in the form of psammomatous cleft body without necrosis. HE staining, $\times 40$.

Discussion

The majority of ovarian neoplasms may be found in ultrasound examination with a typical and highly predictive aspect. A minority of adnexal masses has non-specific ultrasound findings and in this situation, the diagnosis by ultrasound is difficult. The expertise of the ultrasonographer influences the likelihood of an accurate diagnosis [6]. A multicenter study reported that 90% of extrauterine masses were classified in a proper way by the ultrasonographer as benign or malignant, but 10% were unclassifiable by their ultrasound findings [7]. Unclassifiable masses were myomas, papillary cystadenofibromas, *struma ovarii* or borderline tumors. In our study, we had just one case of ovarian carcinoma and one borderline tumor although the solid aspect of the ultrasound scan suggested ovarian solid tumor without elements of malignancy. In such cases (solid tumors), it is better to avoid tumor spillage or morcellation in the peritoneal cavity in order to avoid malignant cell spread. Both cases were pathological surprises and were followed by an immunohistochemical evaluation.

The majority of adnexal masses included in the present research had benign ultrasound characteristics. They had all the characteristics suggestive for a benign mass. They are simple cysts characterized by anechoic fluid inside the cyst cavity, thin walls, and distal acoustic enhancement. They are unlikely to be malignant. In premenopausal women, simple cysts less than 30 mm represent normal follicles [8]. In rare cases, women with ultrasound diagnosis of simple cyst turned out to be malignant upon examination by the pathologist. For these situations, areas of nodularity noted grossly on histologically could not be identified on ultrasound. This is probably more likely with larger masses and, in the quoted report, all cases of ovarian cancer associated with simple cysts in ultrasound occurred in large cysts greater than 7.5 cm in diameter [9]. Another benign characteristic is the homogeneous low to medium echoes in a cystic mass. This ultrasound finding in the absence of a solid component is suggestive for an endometrioma [10]. Fishnet or reticular pattern of internal echoes is another characteristic described as a network of curvilinear or thin linear echoes, described as a reticular or fishnet pattern is strongly suggestive of a hemorrhagic cyst [11]. Multiple risk scoring systems have been proposed to differentiate between benign and malignant adnexal masses [12].

The differential diagnosis is done with pedunculated fibroids, which appear as heterogeneous, hypoechoic, solid masses. They are usually confused with an ovarian mass if the ipsilateral ovary is not seen and/or if there is cystic change within the fibroid. Generally, the pedicle is difficult to be identified. We use Doppler to detect a bridging vascular pedicle. The magnetic resonance is a feasible method for the diagnosis of adnexal masses [13].

The best correlation between ultrasound and laparoscopic and pathological examination was for anechoic fluid filled cyst represented by serous cysts and functional cysts. Although endometriosis cysts are typically described in ultrasound as “ground glass”, the rate of the endometrioma exceeded an initial evaluation probably due to its confusion with hemorrhagic cysts.

In this study, the diagnosis of hydrosalpinx was established twice by the ultrasound findings. Hydrosalpinx is tubular in shape in most cases and may have nodules or septations in its wall [14]. The endosalpingeal are the ones that may create nodules folds, which may determine a cause for ovarian malignancy if one does not recognize the extraovarian location of the mass. The septation is not a real one, is incomplete and is just due to the wall of the tube folded in it. These incomplete or partial septations are suggestive for a hydrosalpinx, but can be seen with other lesions [15]. Another differential diagnosis is the one with peritoneal inclusion cysts. They represent uncommon mesothelial lesions that appear as septated, cystic masses that surround the ovary, usually in women with pelvic adhesions. They are also called multicystic inclusion cysts [16]. One should look carefully for a normal ovary when presented with a septated cystic adnexal mass, otherwise it may be confused with an ovarian neoplasm. Paraovarian cysts are common and they appear as simple cysts adjacent to the ovary. Para-

ovarian cystadenomas are not so common. The small nodule like a cystic extraovarian mass is representative for it [17].

The expected management should be used if the etiology of the mass is benign and there are no other indications for surgery or surveillance. No further follow-up is needed.

If the suspicion of malignancy is low but it has not been completely excluded, it is recommended the continued surveillance. It includes serial pelvic ultrasounds and/or measurement of serum tumor markers.

Surgery is performed if malignancy is suspected, the mass is symptomatic or other risks are associated with the mass (torsion, infection). Regarding the technique for ovarian masses, an oophorectomy or ovarian cystectomy may be performed but for other adnexal masses, the mass may be biopsied or resected [18].

For benign adnexal tumor, the most likely surgery that can be performed is laparoscopy. The major advantages to laparoscopy over laparotomy are reductions in recovery time, cost, hospitalization and adhesion formation. It is important in women in whom fertility is an issue. Limited data studies also showed less febrile morbidity and a lower frequency of urinary tract infection, postoperative pain and postoperative complications with laparoscopy [19]. If the mass is malignant, the potential for cancer cells spreading represents the disadvantage of laparoscopic oophorectomy or cystectomy. Unfortunately, neither preoperative clinical and ultrasound evaluation nor the laparoscopic aspect of the ovary can reliably predict which masses are malignant. A survey by the *American Association of Gynecologic Laparoscopists* reported unsuspected ovarian cancer was found in only 0.04% of 13 739 cases of laparoscopic ovarian cyst surgery [20]. The main concern regarding possible malignant cell peritoneal spread or implantation at the site of trocars can be overcome if some precautions are respected. Although the ultrasound was negative for malignancy, we always performed extraction and morcellation of tumors inside a protective bag. Despite morcellation of tumors in some cases (teratoma) the anatomical specimens were adequate for histological examination and there were no false negative results as far as we know.

One of the study limits consists of not including MRI as an adjuvant tool for preoperative evaluation.

It could be useful to compare the results of the study with the ones obtained after ultrasound-open surgery correlation, which can include also malignant or more borderline tumors.

✉ Conclusions

Our study confirms that laparoscopy is feasible and should be performed for ovarian masses whenever the preoperative ultrasound examination is not an indicator for suspect malignancy. The main concern regarding possible malignant cell peritoneal spread or implantation at the site of trocars can be overcome if some precautions are respected. Although the ultrasound was negative for malignancy, we always performed extraction and mor-

cellation of tumors inside a protective bag. Despite morcellation of tumors in some cases (teratoma) the anatomical specimens were adequate for histological examination and there were no false negative results as far as we know.

Conflict of interests

The authors declare that they have no conflict of interests.

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Received: October 20, 2015

Accepted: December 18, 2016