



Laparoscopic and Transvaginal Ultrasound Guided Aspiration Cytology of Ovarian Cysts

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Abstract

Objective: To compare and evaluate the effectiveness of laparoscopy and transvaginal ultrasound guided aspiration of ovarian cysts.

Materials and Methods: One hundred and twenty-five patients diagnosed to have an ovarian cyst ≥ 5 cm in diameter which persisted for more than three months between 01.01.1999 and 01.01.2001 were included in the analysis. Ninety cases with simple cysts having Ca-125 level < 35 U/ml underwent laparoscopy guided cyst aspiration followed by excision (Group I) while thirty-five cases with simple cysts with Ca-125 level < 35 U/ml underwent transvaginal ultrasound guided cyst aspiration (Group II). All patients were followed up via transvaginal ultrasound every three months for twelve months. Recurrences were treated via laparoscopic excision.

Results: The mean age of the patients were 33.2 ± 9.2 . All patients in Group I had benign cytology and postoperative pathological examination revealed serous cyst in 60 cases (66%), mucinous cyst in 12 cases (13%) and follicular cyst in 18 cases (20%). One (1%) recurrence occurred in Group I and was benign in nature. All patients in Group II had benign cytology. In Group II three recurrences (8%) were identified and postoperative pathology revealed borderline serous carcinoma in one case (3%) while the other two (5%) were benign in nature. Recurrences were significantly more frequent in Group II ($p=0.04$).

Conclusion: Laparoscopy guided and transvaginal ultrasound guided aspiration of ovarian cysts do not differ in effectiveness in terms of getting sufficient material for cytology. Transvaginal ultrasound guided aspiration and cytological evaluation is a valuable and precise tool for patients who have operative risks, however its efficiency in diagnosing borderline malignant tumors should be evaluated with further studies.

Key words: aspiration, cytology, ovarian cyst, laparoscopy, ultrasound

Özet

Laparoskopik ve Transvajinal Ultrasonografik Over Kist Aspirasyon Sitolojisi

Amaç: Over kistlerinin laparoskopik ve transvajinal ultrason rehberliğinde aspire edilmesinin etkinlik açısından karşılaştırılması ve değerlendirilmesi.

Materyal ve Metot: 01.01.1999 ve 01.01.2001 tarihleri arasında 3 aydan daha uzun süre persiste olan ve 5 cm ve daha büyük çaplı kisti olan 125 hasta çalışmaya dahil edildi. Basit kisti ve Ca-125 seviyesi < 35 U/ml olan 90 hastaya laparoskopik kist aspirasyonu ve eksizyonu (Grup I), basit kisti ve Ca-125 seviyesi < 35 U/ml olan 35 hastaya da transvajinal ultrason rehberliğinde kist aspirasyonu (Grup II) yapıldı. Tüm hastalar 12 ay boyunca her üç ayda bir transvajinal ultrason ile izlendi. Rekürrensler laparoskopik eksizyon ile tedavi edildi.

Sonuçlar: Ortalama hasta yaşı 33.2 ± 9.2 idi. Grup I'deki tüm aspiratlar sitolojik değerlendirme sonucunda benign olarak rapor edildi, postoperatif patolojik inceleme sonucunda 60 vakada (%66) seröz kist, 12 vakada (%13) müsinöz kist ve 18 vakada (%20) folliküler kist saptandı. Grup I'de 1 (%1) rekürrens saptandı ve benign olarak rapor edildi. Grup II'deki tüm aspiratlar sitolojik değerlendirme sonucunda benign olarak rapor edildi. Grup II'de 3 (%8) rekürrens saptandı ve postoperatif patolojik inceleme sonucunda 1 (%3) vaka borderline seröz over karsinomu ve 2 (%5) vaka benign olarak rapor edildi. Rekürrensler Grup II'de anlamlı olarak daha sık saptandı ($p=0.04$).

Tartışma: Over kistlerinin laparoskopik ya da transvajinal ultrason rehberliğinde aspire edilmesinin sitolojik değerlendirme için yeterli materyal sağlama açısından etkinliği benzerdir. Over kistlerinin transvajinal ultrason rehberliğinde aspirasyonu ve aspiratın sitolojik değerlendirilmesi operatif riski olan hastalar için değerli bir yöntem olmakla birlikte bu yöntemin borderline malign tümörleri saptamadaki etkinliği ileri çalışmalarla değerlendirilmelidir.

Anahtar sözcükler: aspirasyon, sitoloji, over kisti, laparoskopik, ultrason

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Introduction

The frequency of ovarian cysts detected in women without symptoms has increased as a result of the increased use of ultrasonography and computed tomographic scanning to evaluate the abdomen and the pelvis (29). Until early 1990s, persistent clear ovarian cysts were removed by laparotomy or aspirated via laparoscopy (5,16,22). Laparoscopic fenestration of the cyst wall has also been suggested in order to obtain tissue samples, ensuring the histology of the layers as well as to enable permanent drainage (18).

Aspiration guided by ultrasound is less invasive, well-tolerated and also applicable in patients who are at risk for anesthesia or operation (27). Investigators have advocated the aspiration of ovarian cysts to manage and diagnose ovarian cysts that appear benign by ultrasonographic criteria (10).

The indications for fine needle aspiration (FNA) cytology of ovarian cysts are controversial. Some authors claimed that the procedure is never justified since leakage of the contents of a malignant cyst may lead to up-staging of a previously resectable ovarian neoplasm (8,34). Others claimed that FNA of the ovarian cyst has a useful role to play in the evaluation of persistent, small ovarian lesions in the premenopausal woman who wishes to preserve fertility (7,33). Indeed many of these patients have cyclic disturbances associated with dysfunctional follicular cysts and are precisely the group to benefit from this diagnostic and therapeutic procedure. Ovarian aspirates from some dysfunctional cysts may contain cells suspicious for malignancy (32). Accordingly, the cytologic appearances of the full range of both benign and malignant ovarian lesions must be recognized by cytologists practising in this field (26). The critical issues in the use of this approach are the diagnostic accuracy of ovarian cyst fluid cytologic evaluation and the recurrence rates following the procedure.

We present our results of cyst aspiration guided by transvaginal ultrasound and by laparoscopic approach in the pre- and postmenopausal patients to evaluate and compare the diagnostic, therapeutic and curative effects of either procedure

Materials and Methods

One hundred and twenty-five women diagnosed to have an ovarian cyst ≥ 5 cm in diameter which had persisted for more than three months between 01.01.1999 and 01.01.2001 were included in the study. Ninety cases with simple cysts having Ca-125 level <35 U/ml underwent laparoscopy guided cyst aspiration followed by excision (Group I), while thirty-five cases with simple cysts having Ca-125 level <35 U/ml with Body Mass Index (BMI) >30 kg/m² or having uncontrolled diabetes mellitus, hypertension or a chronic obstructive lung (COLD) disease underwent transvaginal ultrasound guided cyst aspiration (Group II).

All cases underwent pelvic examination followed by evaluation of the cyst by transvaginal ultrasound and Doppler study. Measured Doppler ultrasonography resistance index for all cysts were >0.6 . Presence of solid areas within the cyst, echoes or septations within the cyst cavity were our exclusion criteria for both groups. Venous blood samples were taken from all patients for measurement of Ca-125 level during the preoperative period.

Laparoscopic intervention with four punctures was performed under general anesthesia. After visualization of the internal genitalia, the intact cyst was aspirated via the laparoscopic needle followed by the excision of the capsule. The aspirates and the excised cyst walls were sent to the Pathology Department for cytological and histological analysis. The patients were discharged on the second postoperative day without any complications.

Transvaginal ultrasound guided cyst aspiration was performed in our hospital after cleaning the vaginal walls with 10% iodine solution. A 17 Gauge needle 30 cm in length was inserted through the posterior vaginal fornix into the pouch of Douglas and the cyst was aspirated. Complete disappearance of the cyst on the ultrasound scanner was defined as 'complete aspiration'. In our series we had no partial or failed aspirations. All aspirates were sent for cytological analysis and there were no mucinous or bloody aspirates. Patients were discharged one or two hours after the procedure.

Follow-up examination period was 12 months and included transvaginal ultrasound with special attention to the ovaries every three months.

Results

The demographic variables of the patients are displayed in Table I. The mean age of the patients were 33.2 ± 9.2 years and the mean age and body mass index (BMI) values between the two groups differed significantly ($p=0.008$, $p=0.001$). Two groups did not differ in terms of gravidity and parity. Fourteen patients (15%) in Group I and four patients (11%) in Group II were postmenopausal, but this difference was not statistically significant ($p=0.5$). The most commonly used contraceptive method was IUD, the other methods were condom, coitus interruptus and oral contraceptive pills with respect to their frequencies (Table I).

Characteristics of clinical presentation and ultrasound findings are presented in Table II. Abdominal pain, irregular vaginal bleeding and abdominal mass were the most common complaints in both groups. In 17% of the 125 patients, diagnosis of an ovarian cyst was an incidental finding during ultrasound examination.

In Group I, eight (8.8%) patients had bilateral cysts. The cyst diameter was 7.1 ± 2.4 cm in Group I and 6.3 ± 3.1 cm in Group II. Mean cyst diameter did not differ significantly between the groups ($p=0.1$). Twenty-three premenopausal

**Table 1. Demographic variables**

Variable	Group I (n=90)	Group II (n=35)	P
Age (years)	47±5.9	44±4.7	0.008
BMI (kg/m²)	28±1.4	30±1.5	<0.001
Gravidity	2.8±0.9	2.9±0.8	0.5
Parity	2.1±0.3	2±0.6	0.2
Menopausal	14 (15%)	4 (11%)	0.5
Current Family Planning Method			
IUD	34 (37%)	12 (34%)	0.7
Condom	21 (23%)	6 (17%)	0.4
Oral Contraceptives	7 (7%)	3 (8%)	0.8
Coitus Interruptus	12 (13%)	8 (22%)	0.2
None	16 (17%)	6 (17%)	1.0
Systemic Disease			
Diabetes Mellitus	1 (1%)	13 (37%)	<0.001
Hypertention	8 (8.8%)	22 (62.8%)	<0.001
Chronic Obstructive Lung Disease	1 (1%)	8 (22.8%)	<0.001

Table 2. Clinical presentation and ultrasound findings

Variables	Group I (n=90)	Group II (n=35)	P
Clinical Presentation			
Abdominal pain	43 (47%)	13 (37%)	0.3
Irregular vaginal bleeding	27 (30%)	15 (42%)	0.2
Abdominal mass	9 (10%)	5 (14%)	0.5
Incidental	15 (16%)	7 (20%)	0.5
Ultrasound Findings			
Endometrial thickness	4.5±1.8	5.1±2.0	0.1
Myoma uteri	13 (14%)	5 (14%)	1.0
Bilateral cysts	8 (8.8%)	-	0.07
Cyst diameter (cm)	7.1±2.4	6.3±3.1	0.1
Treatment with oral contraceptive pills	23 (25%)	21 (60%)	<0.001

patients (25%) in Group I and 21 premenopausal patients (60%) in Group II had three months treatment with oral contraceptive pills (p=0.001).

All patients in Group I had benign cytology and postoperative histological examination revealed serous cyst in 60 cases (66%), mucinous cyst in 12 cases (13%) and follicular cyst in 18 cases (20%). In group I there was one recurrence (1.1%) established during the follow-up period with benign ultrasonographic criteria, which was treated by laparoscopic excision and the histologic examination revealed a serous cyst.

All patients in Group II had benign cytology. There were three recurrences (8.5%) in Group II and this was significantly higher than group I (p=0.04). One of the recurrence was a borderline serous carcinoma in a premenopausal patient which had a simple unilocular cystic appearance during the ultrasonography examination. This

diagnosis was considered on a frozen section analysis of the laparoscopically excised cyst wall, after which a total abdominal hysterectomy, bilateral salpingoophorectomy and staging by retroperitoneal lymph node dissection was done by laparotomy at the same operative session. The patient was diagnosed to have Stage IC borderline serous carcinoma of the ovary after histologic examination of the operation material. Histologic examination revealed serous cyst in the remaining two recurrences which were excised via laparoscopy. Cytological examination of the cyst fluid aspirates revealed no cell in 5 (5%) patients in Group I and one patient (2.8%) in Group II (p=0.5). No malignant cells were diagnosed in the remaining aspirates of either group.

Discussion

Discovery of an asymptomatic ovarian cyst more than 5 cm in diameter can present a diagnostic dilemma for the clinician. In premenopausal women, many ovarian cysts less



than 5 cm in size are functional cysts that spontaneously resolve. Ovarian cysts of any diameter in perimenopausal and menopausal women create more concern because of the increased incidence of ovarian cancer in this group. Unfortunately, no 'one test' or combination of tests has been shown to accurately predict ovarian histologic findings. Serum tumor markers, transvaginal ultrasound, computed tomographic scanning and ultrasonic doppler studies all have their limitations. As a result of this, women who have an ovarian cyst may be subjected to surgery to obtain a histologic diagnosis. On the other side, aspiration of these ovarian cysts would seem to offer the potential to decrease the need for surgical intervention in these women (29). When both the vaginal ultrasonography and vascular flow criteria indicate benign characteristics, there seems to be no need for very aggressive management as proposed by Barber (2). Simple puncture and aspiration followed by cytologic examination of the obtained fluid can be sufficient, thus making it possible to significantly reduce the number of laparotomies over 70% (3).

Sonographically guided aspiration of ovarian cysts has been proposed as a useful alternative to surgery in selected patients. The procedure is safe, well-tolerated and can be performed on an outpatient basis (9,13,17). Transabdominal as well as transvaginal route has been reported to be reliable and effective (10).

The selection of patients for aspiration of ovarian cysts has to follow a very careful vaginal ultrasound examination. According to Ron El et al. (27), only sonographically clear cysts may be selected for aspiration and when they did so, they had only one case with heavily blood-stained fluid. De Crespigny et al. (7), aspirated cysts with speckled echoes, which explains why 28 cases out of 100 in their series were heavily stained with blood. In only nine of these 28 cases, a complete aspiration was possible. Therefore the authors themselves came to the conclusion that speckled echoes seen in the ultrasound should be considered a relative contraindication to cyst puncture.

Our study differs from many other studies in the literature (7,10,20,21,24) that we used strict criteria during the patient selection and only unilocular clear cysts were aspirated under ultrasound guidance.

There is evidence that a recurrence rate of 20 to 30% of punctured cyst occurs at any age (3). When this happens during the reproductive years and if vaginal and vascular ultrasonographic criteria for benign cysts are met, repeated punctures can be performed (3). However when the cyst reappears in postmenopausal women, a more aggressive operation, laparoscopy or laparotomy, should be performed (3). In women with ovarian cyst, the most important problem is the misdiagnosis of an ovarian cancer. Our data is in contrast with the conclusion of Bonilla-Musoles et al. (3). Most of the authors reported that the sonographic findings and the characteristics of the collected fluid are the most

important predictive factors of the nature of the cyst. When the size is less than 5 cm and the cyst is unilocular, the possibility of a cancer is very low (1,11,19,22).

The treatment performance of several techniques have been reported for ovarian cysts larger than 5 cm. The recurrence rate was observed to be 4% after laparoscopic excision (20), 11-84% after laparoscopic cyst aspiration (20,22) and 10-60.7% after ultrasound guided aspirations (3,6,10,23,25,26). Although recurrence rate is significantly higher in ultrasound guided cyst aspiration group, it should be noted that operative intervention was avoided in 91.5% of the cases. What should be expected from the cytologic examination of the aspirated fluid? It must be kept in mind that adequate cellular material is not always obtained, nor is there always a correlation between cytologic and histopathologic results (14). Cytologic analysis is possible in only approximately 70% of cases of benign cysts after spinning down the aspirated fluid. Distention of the cyst can cause degeneration of the existing cells. The puncture itself can lead to contamination (25). The different grades of cellular differentiation can be a problem (30). Furthermore it is possible for the puncture to be made into a benign portion of a malignant tumor.

Literature data concerning the role of cytologic study after FNA are still controversial. Larsen and co-workers demonstrated malignant cells in 15 of 17 patients with primary ovarian cancer (31). On the other hand, Diernaes and colleagues (9) concluded that cytologic findings obtained through FNA should not be used in decisions on the management of ovarian cysts as they missed five of seven malignancies on the basis of cytologic examination of the fluid, and one benign cyst was judged to be malignant.

Granberg et al. (14) compared transvaginal sonographic criteria, cytologic findings and corresponding histopathologic results and concluded that cytologic evaluation of a cystic ovarian tumor does not significantly increase accuracy in diagnosing malignancy over that obtained with vaginal sonography.

Unsatisfactory cytologic results or inadequate material (fluid filled with blood cells or scanty mucus) after aspiration of ovarian cysts were reported to range between 20 and 56% (3,10,21,24). The highest percentages of inadequate material were reported after aspirations of unselected patient populations with septations and endometriotic cysts (10,24). Also in unselected patient populations overall sensitivity of ovarian aspiration cytological evaluation ranged between 25 and 75% (10,12,15,23) and the specificity ranged between 90 and 100% (10,15,24). Although our data is not available for calculating sensitivity and specificity, the rate of inadequate material (2.8-5%) was lower than corresponding values reported in the literature.

Several factors may explain this poor correlation. First, ovarian cyst fluid may have an inadequate number of cells



to accurately assess. Second, malignant cells in an ovary may not be uniformly distributed in the ovary. Third, clinicians have an unrealistic impression that interpreting ovarian cytologic evidence is similar to analyzing cytologic findings from other organs. In our study, laparoscopic aspiration group had 100% correlation with the histological examination. On the other hand, a borderline serous carcinoma of the ovary in ultrasound guided aspiration group was reported to have benign cytology. Whether this result is due to the technique of aspiration or due to the type of malignancy has to be clarified with further studies.

The low rate of recurrence observed in our study in the TVUSG guided cyst aspiration group, as opposed to most literature reports, is an encouraging data for this procedure as an alternative to surgery. In the group of patients with benign clinical, laboratory and ultrasonographic criteria and after 2-3 attempts at cystic suppression with oral contraceptive pills, transvaginal ultrasound guided cyst aspiration can be as effective as surgery, with less complications and more tolerance on the patient side, avoiding the risks of anesthesia and surgery-related sequelae that might adversely affect the future fertility of young women.

The high correlation of cytologic results we report in our study is another encouraging factor for aspiration of cysts, however, cytologic examination missed a borderline serous carcinoma of the ovary in the TVUSG guided aspiration group, which was detected as a recurrence after the procedure. Whether this delay significantly effect the survival of this patient remains to be determined.

In conclusion, aspiration of ovarian cysts, either laparoscopically or guided by transvaginal ultrasound, might be a valuable therapeutic choice in selected patients. The most important drawback of this procedure for routine use is the possibility of underdiagnosing several malignant tumors.

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