Laparoscopic Management of Adnexal Masses Suspicious at Ultrasound

MICHEL CANIS, MD, JEAN LUC POULY, MD, ARNAUD WATTIEZ, MD,

GERARD MAGE, MD, HUBERT MANHES, MD, AND MAURICE ANTOINE BRUHAT, MD

Objective: To evaluate the laparoscopic management of adnexal masses suspicious at ultrasound.

Methods: In a prospective study, adnexal masses suspicious at ultrasound were managed by laparoscopy. Indications for laparotomy included general contraindications to laparoscopy, obviously disseminated ovarian cancer, and technically impossible laparoscopic treatment. After laparoscopic diagnosis, frozen sections were used to confirm a diagnosis of malignancy. Treatment was performed by laparoscopy whenever feasible.

Results: Over a 3-year period, 247 of the 599 adnexal masses (41.2%) treated in our department were suspicious or solid at ultrasound. Seventeen patients were evaluated by laparotomy and 230 by laparoscopy. Overall, 204 women (82.6%) were treated by laparoscopy, including seven of the 37 malignant tumors (18.9%) and 197 of the 210 benign masses (93.8%). One case of tumor dissemination occurred after a laparoscopic adnexectomy and morcellation of a grade 1 immature teratoma.

Conclusion: Laparoscopic diagnosis of adnexal masses suspicious at ultrasound avoids many laparotomies for the treatment of benign masses and allows an improved inspection of the upper abdomen. The laparoscopic treatment of adnexal masses suspicious at surgery should be evaluated further in carefully designed prospective studies. (Obstet Gynecol 1997;89:679–83. © 1997 by The American College of Obstetricians and Gynecologists.)

Laparoscopic surgery is commonly used in the management of adnexal cystic masses that appear benign on ultrasound.[1,2] However, because of the high false-positive rate of the ultrasonographic diagnosis of malignancy,[3] many benign adnexal masses are treated by laparotomy. The management of adnexal masses suspicious at ultrasound is controversial. Some authors recently proposed laparoscopic management,[4,5] whereas others reserve laparoscopy for carefully selected masses.[2] In our experience, laparoscopic diagnosis of malig-

nancy was reliable.[1] Therefore, in January 1992 we changed our management protocol to try to avoid the laparotomies brought about by ultrasonographic and laparoscopic false-positive diagnoses of malignancy.

We report our experience during a 3-year period in the management of adnexal masses suspicious at ultrasound.

Materials and Methods

Between January 1992 and December 1994, 599 patients were treated in our department for adnexal masses. The preoperative evaluation was reported previously.[1] Patients whose adnexal mass was discovered first at surgery (41 cases, 6.8%) were excluded. In our experience and in a report by Shalev et al,[2] the incidence of malignancy was 1.0% or less in entirely cystic and in selected septated masses (fewer than three septa or septa less than 3 mm). Therefore, all such masses were considered nonsuspicious and were excluded from this study (311 cases, 51.9%; including one low malignant potential tumor and one cancer, 0.6%). The 247 patients (41.3%) remaining were managed as follows. Those with clinically obvious stage III and stage IV ovarian cancer or with very large (more than 12 cm) and mainly solid masses, in addition to those with contraindications to laparoscopy, were evaluated by vertical midline laparotomy. The others were informed about immediate surgical staging and vertical midline laparotomy but were offered laparoscopy with peritoneal fluid sampling and peritoneal washings obtained first for cytologic examination, followed by scrutiny of the ovaries, the pelvis, and the entire peritoneal cavity.[1]

In postmenopausal women, both ovaries were removed and extracted with an endobag; then the cyst fluid and the internal cyst wall were inspected. The uterine cavity was checked routinely by hysteroscopy. A hysterectomy was performed only when necessary to treat associated uterine disease. In premenopausal women, puncture placement was decided according to

Table 1. Ultrasonographic Findings

Ultrasonographic finding	All cases (no.)	Benign masses		Malignant tumors		Patients having laparotomy (no.)
		No.	Diameter (mm)*	No.	Diameter (mm)*	
Solid	23 (9.3%)	20 (86.9%)	51 ± 28	3 (13.0%)	98 ± 52	1 (4.4%)
Mixed	71 (28.7%)	58 (81.7%)	56 ± 35	13 (18.3%)	92 ± 36	11 (15.5%)
Mixed with calcified area	10 (4.0%)	9 (90.0%)	67 ± 33	1 (10.0%)	110	0
Vegetations	58 (23.5%)	44 (75.8%)	63 ± 33	14 (24.1%)	77 ± 29	2 (3.5%)
Thick cyst wall ≥3 mm	5 (2.0%)	4 (80.0%)	57 ± 41	1 (20.0%)	100	0
Thick septa ≥3 mm	20 (8.1%)	16 (80.0%)	86 ± 59	4 (20.0%)	110 ± 63	1 (5.0%)
Multiple septa (>3)†	41 (16.6%)	41 (100.0%)	74 ± 38	0		2 (4.9%)
Multicystic‡	18 (7.3%)	18 (100.0%)	42 ± 17	0		0
Ascites	1 (0.4%)	0		1 (100.0%)	95	0

* Mean ± SD.
† More than three septa inside a cyst.
‡ Several cysts in the same ovary.

the clinical, ultrasonographic, and laparoscopic data. A puncture with an endocystic examination was performed as described previously[1] in masses considered as low suspicious (eg, a small solitary vegetation),[6] whereas adnexectomy without puncture was performed in masses that were highly suspicious at ultrasound (eg, large vegetations with numerous vessels and a low resistance index). Small teratomas (less than 5 cm) were treated by cystectomy without puncture, whereas larger ones were punctured with a 5-mm trocar.[1]

At surgery, masses were classified as benign, malignant, or suspicious using signs of malignancy reported previously.[1] Masses suspicious at surgery were removed by adnexectomy and sent for frozen section, except for selected masses diagnosed in patients less than 40 years old, which were evaluated by biopsy and frozen section to avoid unnecessary adnexectomies. Malignant and borderline tumors were staged immediately if the diagnosis was confirmed by frozen section. Lymph node sampling was not performed routinely in borderline tumors.[7] A restaging procedure was planned within 3 weeks of laparoscopy when the diagnosis was confirmed only by permanent sections. Staging was accomplished by laparoscopy if possible. Masses not suspicious at surgery were all removed entirely and sent for pathologic examination.

Patients treated for malignant tumors were followed routinely in our department. For the other patients, postoperative complications and follow-up data were obtained from the medical records reviewed in 1996 and by mail. Statistical analysis was performed using Fisher exact test, analysis of variance, and Student t test where appropriate.

Results

The ultrasonographic findings are presented in Table 1. The surgical management was begun by laparotomy in 17 cases (6.8%), including eight obvious stage III or IV ovarian cancers, seven large and mainly solid masses, and two general contraindications to laparoscopy. The mean (± SD) age, diameter of the mass, and the incidence of malignant tumors were, respectively, 61.5 ± 17.3 years, 118.1 ± 45.9 mm, and 70.6% (12 cases) in the laparotomy group, and 40.3 ± 13.9 years ($P < .001$), 63.5 ± 33.4 mm ($P < .05$), and 10.9% (25 cases) ($P < .001$) in the laparoscopy group. Among the 230 patients managed by laparoscopy (Table 2), 59 were at least 50 years old (11 malignant tumors), 63 had adnexal masses of at least 8 cm (14 malignant tumors), and 49

Table 2. Pathologic Diagnosis of 230 Patients Initially Managed by Laparoscopy

Pathologic diagnosis*	Managed by laparoscopy	Treatment by laparotomy
Normal adnexa	2 (0.8%)	0
Adhesions with a peritoneal cyst	6 (2.6%)	0
Hydrosalpinges	7 (3.0%)	0
Myoma	3 (1.3%)	1 (33.3%)
Abscess	5 (2.2%)	1 (20.0%)
Adenomyoma	1 (0.4%)	0
Hematocele	1 (0.4%)	0
Calcified ovary	1 (0.4%)	0
Functional ovarian cyst	26 (11.3%)	1 (3.8%)
Endometrioma	33 (14.4%)	1 (3.0%)
Teratoma	48 (20.9%)	2 (4.2%)
Serous cyst	30 (13.0%)	0
Mucinous cyst	25 (10.9%)	1 (4.0%)
Other benign ovarian masses†	9 (3.9%)	1 (11.1%)
Benign paraovarian cyst	8 (3.4%)	0
Low malignant potential tumor	10 (4.3%)	4 (40.0%)
Cancer	15 (6.5%)	14‡ (93.3%)
Total	230	26 (11.3%)

* Permanent sections.†
† Includes fibrothecoma.
‡ Two laparotomies were performed several weeks after the surgical treatment.

Table 3. Frozen-Section and Permanent-Section Diagnosis

Frozen section	N	Permanent section		
		Benign	Borderline	Cancer
Benign	35	34		1
Suspicious*	4	2		2
Borderline	10	1	8	1
Cancer	13		2	11
Total	62	37	10	15

* Probably but not certainly malignant.

had serum CA 125 levels greater than 35 U/mL (14 malignant tumors). In two cases (0.9%), the pelvis was normal, although two preoperative ultrasonographic examinations had indicated a solid or heterogeneous mass.

At surgery, 62 of the 230 masses, including all of the cancers and low malignant potential tumors (25 cases, 40.3%), were diagnosed macroscopically as suspicious or malignant. Twelve of the 15 invasive cancers and five of the ten low malignant potential tumors were diagnosed as suspicious without puncture because of either external vegetations or a highly suspicious ultrasonographic appearance.[1] For these 62 patients, the specimens for frozen section were a biopsy of the cyst wall in nine cases or the adnexa in 53 cases (85.5%). The results of frozen sections are presented in Table 3.

Among 179 patients operated on for benign ovarian or paraovarian tumors, 173 (97.6%) were treated by laparoscopy, including 86 less than 40 years old, of whom 73 were treated conservatively (84.5%). All of the patients treated by laparoscopy had uneventful immediate and long-term postoperative courses, except for one who had an unexplained pleurisy which resolved spontaneously. Among 37 benign masses that were suspicious at laparoscopy, 34 were treated by laparoscopy (91.9%) and three by laparotomy because of the large diameter of a mainly solid tumor. Seven of 17 patients less than 40 years old were treated by ovarian cystectomy after negative frozen sections of a small solitary vegetation. The benign masses diagnosed as suspicious or borderline on frozen section (Table 3) were treated by adnexectomy.

Of the ten low malignant potential tumors, three were treated by unilateral salpingo-oophorectomy and seven by hysterectomy, bilateral salpingo-oophorectomy, and omentectomy. Para-aortic node dissection was performed in three cases that were considered intraoperatively as invasive cancer from the results of frozen section (two cases) or from the macroscopic appearance (one case). Four patients were treated by laparotomy and six by laparoscopy. None of these patients had chemotherapy. One was lost to follow-up 1

month after the treatment; all the others are alive with no evidence of disease 14–36 months after the surgical treatment (mean duration of follow-up 27.1 ± 8.3 months).

Among 15 invasive cancers (five stage I, two stage II, eight stage III or IV), 12 were treated by immediate vertical midline laparotomy. Because frozen sections were negative, three cases of stage I ovarian cancer treated by laparoscopic adnexectomy were restaged after permanent sections 3 weeks later; two restaging procedures were performed by laparoscopy and one by laparotomy. The stage of the tumor was changed in a 23-year-old patient operated on for a mainly solid ovarian mass 12 cm in diameter. At laparoscopy, there were no extraovarian signs of malignancy but, because calcified tissue was found in a small biopsy specimen, a teratoma was diagnosed on frozen section. After a unilateral adnexectomy, the tumor was morcellated and extracted through a 4-cm abdominal incision. A grade I immature teratoma was diagnosed on permanent sections. Three weeks later, a stage IV peritoneal gliosis with mature and immature implants was found.[8] After 12 months of chemotherapy, a total hysterectomy, a contralateral adnexectomy, an omentectomy, and the excision of a 5-cm abdominal-wall tumor were performed by laparotomy to remove benign implants. Thus, only one invasive ovarian cancer was treated by laparoscopy. The five patients treated for a stage I ovarian carcinoma are all alive and have no evidence of disease 18–38 months after the diagnosis. A second patient received chemotherapy after laparotomy for a 15-cm small-cell ovarian carcinoma.

Overall, 204 of the 247 patients (82.6%) included in the present study were treated by laparoscopy, including seven of 37 malignant tumors (18.9%) and 197 of 210 benign masses (93.8%).

Discussion

Among 599 masses, 247 (41.3%) were suspicious at ultrasound, of which 210 (85%) proved to be benign. Because most benign masses can be treated by laparoscopy (93.8%), many laparotomies can be avoided by using laparoscopy to manage adnexal masses that are suspicious at ultrasound. Moreover, evaluation of the upper abdomen is better with the magnification of the laparoscope, which allows the diagnosis of less than 1-mm peritoneal metastases, thus improving the staging of malignant tumors.[9] However, a gynecologic oncologist should be available immediately to treat an ovarian cancer.

From the results of the multivariate analysis of patients with stage I ovarian cancer operated on by laparotomy, we know that if the tumor is removed

immediately, the intraoperative rupture or puncture has no bearing on the prognosis.[10-12] In contrast, we know that when the tumor is not removed immediately, a laparoscopic puncture or biopsy may worsen the prognosis.[13-15] Therefore, an accurate surgical diagnosis is the key to adequate and immediate surgical treatment. All 25 malignant tumors in this study were diagnosed as suspicious or malignant at surgery, confirming that when used cautiously, the laparoscopic diagnosis of malignancy is reliable.[1] However, we have only incidental clinical data on the prognosis of stage I malignant tumors removed immediately after a laparoscopic puncture. Moreover, abdominal-wall wound metastasis in rats was more frequent after laparoscopic laceration of an intraperitoneal tumor than after the same procedure by laparotomy.[16] Kruitwagen et al[17] suggested that abdominal-wall metastasis induced by a previous laparoscopy correlated with a shorter survival time, but this difference was not significant in a multivariate analysis. Abdominal-wall metastasis occurred only in stage III or IV cases with ascites, suggesting that the prognosis was probably related more to the biology of the tumor than to the previous diagnostic procedure.[18] Thus, the diagnostic step of the laparoscopic management appears safe because it allows immediate surgical treatment.

In the surgical management of suspicious adnexal masses, frozen sections are essential to avoid unnecessary or delayed staging. However, frozen-section diagnosis has some limitations.[19,20] To avoid the consequences of the false-negative diagnoses induced by inadequate sampling,[19,20] frozen sections should not be used to decide treatment of the adnexa, which should be removed whenever macroscopically suspicious. The only exceptions to this rule are adnexal masses with a small solitary vegetation in patients less than 40 years old. In such cases, sampling is easy and reliable, and the incidence of malignancy is low.[6] Using this approach, oophorectomy was avoided in 41.2% of the 17 patients less than 40 years old whose mass was suspicious at surgery.

When managing suspicious adnexal masses, the problem is to choose a simple and safe limit for the laparoscopic approach. By treating laparoscopically masses that were suspicious at surgery, whenever feasible and whatever the pathologic diagnosis, we avoided 41 laparotomies. However, one case of tumor dissemination occurred after unprotected, intraperitoneal morcellation of a large immature teratoma diagnosed as benign at frozen section. Morcellation of a solid tumor is different from puncture of a cystic mass, and it should be considered contraindicated in the treatment of ovarian tumors. During the time of this study, another case of peritoneal dissemination occurred after laparoscopic treatment of a 5-cm solid tumor with external vegetations but without any visible peritoneal metastasis. This tumor was diagnosed in a 33-year-old woman undergoing surgery for infertility. After a laparoscopic adnexectomy, the tumor was extracted in a sac without morcellation. Frozen-section diagnosis was uncertain,[19] but a grade 1 invasive serous cystadenocarcinoma was diagnosed at permanent sections. Three weeks later, laparoscopic restaging showed numerous peritoneal metastases of less than 1 mm in the posterior cul-de-sac. A laparotomy and classic treatment were performed. The peritoneal cytology was negative before the adnexectomy, yet was positive at restaging. We do not know whether dissemination was a consequence of the laparoscopic approach. However, the delayed staging does not appear critical because the tumor was removed entirely and careful peritoneal lavage was performed during the initial procedure. Delayed staging after a unilateral adnexectomy is used commonly by gynecologic oncologists at laparotomy.[11]

The laparoscopic treatment of ovarian cancer has not been evaluated properly. There are only few clinical results[4] and conflicting conclusions from animal studies.[16,21] Therefore, laparoscopic treatment of ovarian cancer should still be considered experimental[15] and should be used only in controlled clinical trials.[4,16] Given the reliability of laparoscopic diagnosis, we propose the following: laparoscopy for the diagnosis of masses suspicious at ultrasound and, after careful evaluation of the upper abdomen, laparotomy for all masses suspicious at surgery, which will then be treated according to the results of frozen sections. Using this management, 62 of the 230 patients (26.9%), including all the malignant tumors and 37 of 205 benign masses (18.4%), would have been treated by laparotomy. During this study, only 59 of 502 benign ovarian or paraovarian cysts operated on in our department were suspicious at surgery (12.1%), whereas 179 of these benign masses were suspicious at ultrasound (35.6%).

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Address reprint requests to:
Maurice Antoine Bruhat, MD
Department of Obstetrics, Gynecology, and Reproductive
  Medicine
Polyclinique de l'Hotel Dieu
13 Bd Charles de Gaulle
63033 Clermont-Ferrand
France