A prospective, randomized study comparing laparoscopic ovarian cystectomy versus fenestration and coagulation in patients with endometriomas

Saeed Alborzi, M.D., Mozhdeh Momtahan, M.D.,
Mohammad Ebrahim Parsanezhad, M.D., Sedigheh Dehbashi, M.D.,
Jaleh Zolghadri, M.D., and Soroosh Alborzi

Division of Infertility and Endoscopy, Department of Obstetrics and Gynecology, School of Medicine, Shiraz University of Medical Sciences, Shiraz, Iran

Objective: To determine the difference between two laparoscopic methods for the management of endometriomas with regard to recurrence of signs and symptoms and pregnancy rate.

Design: Prospective, randomized clinical trial.

Setting: Infertility and gynecologic endoscopy units of two medical university hospitals.

Patient(s): One hundred patients with endometriomas who had either infertility or pelvic pain.

Intervention(s): Patients were randomly divided into two groups; one group underwent cystectomy (group 1), and fenestration and coagulation were performed for the other (group 2).

Main Outcome Measure(s): A comparison of recurrence of signs and symptoms of endometriomas and pregnancy rates in two groups.

Result(s): Fifty-two patients were studied in group 1 and 48 in group 2. The recurrence of symptoms, such as pelvic pain and dysmenorrhea, was 15.8% in group 1 and 56.7% in group 2 after 2 years. The rate of reoperation was 5.8% in group 1 and 22.9% in group 2 and these differences were statistically significant. The cumulative pregnancy rate was significantly higher in group 1 (59.4%) than in group 2 (23.3%) at 1-year follow-up.

Conclusion(s): Laparoscopic cystectomy of endometriomas is a better choice than fenestration and coagulation because the former technique leads to a lower recurrence of signs and symptoms and a lower rate of reoperation and a higher cumulative pregnancy rate than the latter. (Fertil Steril® 2004;82:1633–7. ©2004 by American Society for Reproductive Medicine.)

Key Words: Endometrioma, endometriosis, cystectomy, fenestration and coagulation, cumulative pregnancy rate

Endometriosis is an enigmatic disorder that is frequently underdiagnosed and inadequately treated (1). Endometriotic cysts are among the most common ovarian cysts encountered at surgery (2). Several studies have shown that the treatment of ovarian endometriomas by laparoscopy is as effective as or even more effective than treatment by laparatomy (3). In particular, minimal and mild endometriosis, which accounts for most peritoneal lesions according to the revised American Fertility Society (AFS) classification (4), can be easily eliminated at endoscopy. The moderate forms of endometriosis, which include unilateral endometriomas and bilateral small ovarian cysts with limited adhesions, can be successfully treated by laparoscopy (5). However, the best laparoscopic technique for the management of ovarian endometriomas has yet to be determined (6).

In general, endometriomas are removed by excising the cyst wall. However, it has been consistently demonstrated that simple cyst aspiration is associated with an unacceptably high lesion recurrence rate (or possibly persis-

tence) (7–10). Therefore, some investigators prefer to drain endometriomas followed by ablasion of the cyst wall using a laser or electrocoagulation (11, 12). A few articles have been published that evaluate and compare cystectomy of endometriomas vs. fenestration and coagulation (13), but only one was a true prospective, randomized study (14).

In our prospective study, we assessed and compared the recurrence rate of ovarian endometriomas and their symptoms, such as pelvic pain and dysmenorrhea, after fenestration and coagulation or cystectomy and reoperation rates for both of these methods. We also evaluated the pregnancy rate of infertile patients after performing each procedure.

MATERIALS AND METHODS

From March 1998 to December 2001, patients who underwent laparoscopy for endometriomas ≥3 cm participated in this study at two university hospitals. This study was approved by the Shiraz University of Medical Sciences Institutional Review Board. Patients who had previously undergone surgical treatment of endometriosis or who had received estrogen-suppressing drugs, such as oral contraceptive pills, danazole, or decapeptyl, in the last 6 months were excluded from the study.

Operative laparoscopies were performed under general anesthesia by video control. All patients who underwent laparoscopy were randomly chosen by computerized randomization. Randomization was done before surgery. Patients were aware of the two methods of surgery, but they and the surgeon did not know which one was better. All patients gave informed consent. All operations were performed by the first author.

The technique was done by one subumblical incision and two or three lower abdominal incisions. Instrumentation included 5-mm scissors and graspers. Hemostasis was achieved with bipolar coagulation, and irrigation was performed with 5% dextrose solution. Lysis of adhesions was performed by sharp dissection to fully mobilize the ovaries. All areas of superficial active endometriosis involving the other ovary or the pelvic peritoneum were fulgurated.

In group 1, the inner lining of the cysts was dissected from the ovary by two atraumatic grasping forceps that were pulled in opposite directions, and the inner linings were sent for histologic examination. In group 2, a 1.5×1.5 cm biopsy was performed and sent for histologic examination followed by bipolar coagulation of the inner lining.

Endometriosis was classified according to the revised AFS classification (4). Before surgery, each patient was asked to record the presence and severity of pelvic pain on a 10-cm linear analogue scale (15). A score of 1–4 was considered mild pain and was not included in this study because of similarities between pain due to endometriosis and non-endometriotic pain in this score range. A score of 5–7

indicated moderate pain, and 8–10, severe pain. Both of these ranges were included in this study.

There were no intra- or postoperative complications, and all patients were discharged the day after surgery in both groups. All patients who had tried to conceive without success for at least 1 year and who had no other obvious causes of infertility (anovulation, male factor, and anatomic factors) were considered as infertile in this study.

After the operation, none of the patients were excluded from the study, and the dropout rate was zero. Patients were followed up at 3, 6, 9, 12, 18, and 24 months after surgery. At each visit, a gynecological examination and transvaginal ultrasound were performed. The occurrence of a pregnancy was recorded by the presence of an intrauterine gestational sac on ultrasound. During 1 year after operation, the infertile patients did not use any medication for infertility.

When pregnancy did not occur spontaneously in 12 months after the operation, we considered it a failure and another modality, such as intrauterine insemination or IVF, was performed for the patients. Therefore, the pregnancy rate was evaluated until 1 year after surgery but recurrence of pain and cyst formation as well as reoperation were compared with the two groups throughout the 24 months after operation. The criteria for reoperation were based on disease recurrence and was evaluated by the first author.

Disease recurrence was documented by the presence of a persistent round-shaped, thick-walled cyst >3 cm, which was filled with low echogenic fluid on ultrasound. All of the 14 patients who underwent reoperation had at least one endometrioma >3 cm in the ovaries. At each visit the symptoms were evaluated again. The histologic reports of the patients were checked and confirmed endometriomas in all cases.

Statistical evaluation was performed using SPSS 11.5 (SPSS, Chicago, IL). Appropriate statistical tests were used for comparison, including Fisher's exact test, χ^2 test, and two sample t-tests.

RESULTS

We studied 52 patients with endometriomas in the cystectomy group (group 1) and 48 in the fenestration and coagulation group (group 2). The numbers were not the same in the two groups because of the number of patients who completed the follow-up period. The clinical characteristics of both groups are shown in Table 1. The data were not statistically different except for the size of the cysts and the revised AFS score in stage IV dysmenorrheic patients, but not in the total or infertile patients, which were significantly higher in the cystectomy group than in the fenestration and coagulation group. These occurred accidentally.

After 1-year follow-up, the differences among recurrence of a cyst, recurrence of symptoms (pain, dysmenorrhea), and re-

Clinical characteristics of 100 patients with endometriomas.

Variables	Group 1, cystectomy (n = 52)	Group 2, fenestration and coagulation (n = 48)	P
Mean (± SD) age (y)	28.4 ± 5.8	28.5 ± 5.5	~.86
No. of patients with infertility (%)	32 (61.5)	30 (62.5)	~.92
No. of patients with dysmenorrhea (%)	37 (71.2)	30 (62.5)	~.36
Median rAFS score (range)			
In all patients	32 (16–133)	27 (16–136)	
In infertile patients	42.5 (16–124)	24 (16–68)	
In patients with dysmenorrhea and pain	41 (16–133)	25 (16–136)	
No. of patients with indicated rAFS stage (%)			
Stage III	29 (55.8)	33 (68.8)	~.26
Stage IV	23 (44.2)	15 (31.3)	~.054
Stage III (infertile patients)	20 (62.5)	20 (66.7)	~.90
Stage IV (infertile patients)	12 (37.5)	10 (33.3)	~.98
Mean diameter of cyst (range) (cm)	5.06 (3–10)	4.06 (3–6)	~.052
Mean diameter of cyst in infertile patients (range) (cm)	4.47 (3–8)	3.83 (3–6)	~.021
Mean diameter of cyst in patients with dysmenorrhea and pelvic pain (range) (cm)	5.38 (3–10)	4.27 (3–6)	<.001
No. of patients with indicated cyst diameter (%)			
≤4 cm	23 (44.2)	27 (56.3)	~.32
>4 cm	29 (55.8)	23 (43.8)	

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operation rate were not statistically significant between the cystectomy and fenestration and coagulation groups (Table 2).

However, the recurrence of symptoms (pain, dysmenorrhea) ($P<.001$) and the reoperation rate ($P<.003$) were significantly lower in the cystectomy group than in the fenestration and coagulation group after 2 years (Table 3).

There were 19 pregnancies among 32 infertile patients in group 1 (59.4%) and 7 pregnancies among 30 infertile patients in group 2 (23.3%) after 1 year of follow-up (Fig. 1), which is statistically significant ($P<.009$). No infertility medications or procedures were used for infertile patients until 1 year after surgery.

DISCUSSION

To find the best technique for treatment of endometriomas, we searched MEDLINE from January 1980 to November 2003. As Vercellini et al. (13) have also mentioned, very few articles have been published about the comparison of cyst excision vs. drainage and coagulation. Two of these articles discussed the recurrence of endometriomas (3, 11), and two others evaluated both the above factor and the postoperative conception rate (12, 14). Just one article is a prospective, randomized controlled trial study (14).

In our prospective, randomized trial, the pain recurrence was lower in the cystectomy group (15.8%) than in the fenestration and coagulation group (56.7%) ($P<.001$); in addition, patients remained asymptomatic longer in the first group. This is similar to Beretta et al.'s study (14), in which the cystectomy group had a lower recurrence rate of deep dyspareunia, dysmenorrhea, and nonmenstrual pelvic pain in 24 months than the fenestration and coagulation group.

Fayez and Vogel (11) evaluated four different methods for the treatment of endometriomas: complete excision of the cyst, stripping of the lining, CO_2 laser ablation of the lining,

Recurrence of signs and symptoms of endometriomas and rate of reoperation after 1 year.

	Cystectomy	Fenestration and coagulation	P
Recurrence of cyst (%)	3/52 (5.8)	9/48 (18.8)	~.09
Recurrence of symptoms (%)	2/38 (5.3)	6/30 (20)	~.13
Reoperation (%)	1/52 (1.9)	4/48 (8.3)	~.19

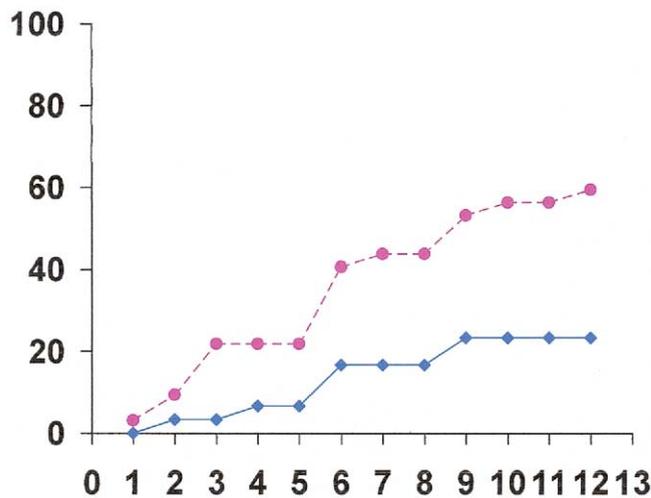*Alborzi. Endometriomas: cystectomy or coagulation. Fertil Steril 2004.*

Recurrence of signs and symptoms of endometriomas and rate of reoperation after 2 years.

	Cystectomy	Fenestration and coagulation	P
Recurrence of cyst (%)	9/52 (17.3)	15/48 (31.3)	.16
Recurrence of symptoms (%)	6/38 (15.8)	17/30 (56.7)	.001
Reoperation (%)	3/52 (5.8)	11/48 (22.9)	.003

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FIGURE 1

Cumulative pregnancy rate according to the type of surgery performed after 1 year. Vertical axis: cumulative pregnancy rate (%); horizontal axis: no. of months after the operation. Cystectomy is shown by the *circle-dashed line*, and fenestration and coagulation are shown by the *diamond-solid line*.

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and drainage of the cyst. It was not explained in their study whether there was any difference between the complete removal and excision of the cyst and the stripping of the lining. They also used danazol in their patients for 8 months after the operation, which would interfere with the result. It can be concluded that there was no statistically significant difference in the recurrence of endometriosis in these four groups in their study, although they did not discuss the recurrence rate of endometriomas.

In our study, symptom recurrence after 1 year in the cystectomy group was lower than in the fenestration and coagulation group. However, this difference was statistically insignificant. One possible explanation is that endometriosis is a chronic disease and that most of its recurrences happen over a long time period.

In our study, the size of the cysts in the cystectomy group was bigger than in the fenestration and coagulation group, and this difference was statistically significant. However, the recurrence of symptoms in the cystectomy group, in spite of bigger cysts, was lower, which shows that the cystectomy is a better option.

The second observation in this study is that the recurrence of the cysts in the fenestration and coagulation group was higher (31.3%) compared with the cystectomy group (17.3%) after 2 years, but these values are not statistically significant (*P*<.16).

Hemmings et al. (12) showed that there was no statistically significant difference in recurrence rate among the three groups who underwent fenestration and coagulation, laparoscopic cystectomy, and cystectomy by laparatomy. Our results are similar to Beretta et al.'s (14), who showed that there is no statistically significant difference in the rate of disease recurrence between cystectomy (6.2%) and drainage and coagulation of endometriomas (18.8%).

In our study, we used ultrasound to detect the recurrence of cysts. Alcazar et al. (16) demonstrated that transvaginal ultrasound had an 88% accuracy rate in the diagnosis of endometriomas.

The third finding in our study is the reoperation rate, which is significantly lower in the cystectomy group than in the fenestration and coagulation group. This is similar to Saleh and Tulandi (3), who reported that the cumulative probability of reoperation was significantly lower after excision than after fenestration. They concluded that during fenestration, the cyst wall was left in situ and ablasion did not seem to destroy the tissue adequately.

The most important advantage obtained with cystectomy of endometriomas is the pregnancy rate, which was significantly higher in the cystectomy group than in the fenestration and coagulation group after 1 year. More than half of the patients who underwent cystectomy conceived in 1 year after the operation (59.4%). This is comparable to the pregnancy rate that was reported by Beretta et al. (66.7%) (14), Adamson et al. (62%) (17), and Bateman et al. (42.8%) (18) after laparoscopic cystectomy of endometriomas. On the other hand, Hemmings et al. (12) reported that the average time to the first conception was significantly shorter in the fenestration and coagulation group than in the cystectomy group either by laparoscopy or laparatomy. But in Hemmings et al.'s study (12), which was retrospective, the number of patients in the fenestration and coagulation group was much higher than in the laparoscopic cystectomy group (80 vs. 23), and they did not mention the medications and methods used for the treatment of infertility after surgery.

One of the theoretical advantages of the cystectomy of endometriomas compared with fenestration and coagulation could be that the diagnosis of ovarian lesions, like endometrioid cancer, is more accurate in this technique, although we found no malignancy in all of the histological samples obtained during cystectomy or fenestration and coagulation or in the follow-up of these patients during the 24 months after the operation.

Some investigators showed that cystectomy can cause reduced follicular response in controlled ovarian hyperstimulation cycles (19); however, others could not find follicles in the histologic specimens of excised tissue after cystectomy (3) and suggested that postcystectomy ovarian response to gonadotropins was comparable to the contralateral ovary (2). More data are needed to definitely prove this issue.

In conclusion, we found that laparoscopic ovarian cystectomy was associated with better outcomes in pregnancy rates and the relief of pain than fenestration and coagulation of endometriomas and had a lower rate of reoperation even in larger cysts. As a result, we recommend that cystectomy of the endometriomas is a better option than fenestration and coagulation, especially in patients with infertility and pelvic pain.

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