Recurrence of Endometrioma Following Conservative Ovarian Endometrioma Cystectomy: Laparoscopy versus Laparotomy

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Objective: *To investigate the recurrence rate and disease-free interval between laparoscopy versus laparotomy for the conservative surgery of endometrioma.*

Material and Method: *A retrospective cohort study was conducted. The medical records of reproductive women who underwent conservative ovarian cystectomy surgery (laparoscopy or laparotomy) for endometrioma at Thammasat University Hospital were retrieved. The patients were followed through 24 months to evaluate the recurrence of endometrioma. Propensity scoring was used to adjust for confounding by indication and confounding by contraindication. Model for competing time to event was used in analysis.*

Results: *One hundred and twenty-eight and 114 patients were enrolled in laparoscopy and laparotomy groups, respectively. Mean age and body weight in laparotomy group were statistically higher than those in the other group were. Mean height and body mass index were, however, not statistically different in either groups. In addition, the stage of disease and bilaterality in both groups were comparable. Diameter of endometrioma in laparotomy group was significantly larger than that in laparoscopy group (7.0±2.5 vs. 6.2±1.8 cm, respectively; p = 0.004). After adjusting for propensity scoring, the endometrioma recurrence rate was significantly higher in laparoscopy group as compared to laparotomy group (27.3% vs. 14.9%, respectively; p = 0.02). However, the cumulative rate of pregnancy after surgery was not statistically different (4.7% vs. 4.4%, respectively; p = 1.0).*

Conclusion: *The present study has demonstrated that the surgical technique has a strong impact on the recurrence or disease-free interval. Laparoscopy might not eradicate the disease pathology as effectively as open laparotomy in some situations, such as in cases with complexity of disease.*

Keywords: *Recurrence of endometrioma, Ovarian cystectomy, Laparoscopy, Laparotomy*

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Endometriosis is a common gynecologic condition. It is a complex, benign and chronic disease. Ovarian endometriosis or endometrioma, is one of the most common manifestations among reproductive women with endometriosis. European Society of Human Reproduction and Embryology (ESHRE) recommends that histology should be obtained to exclude malignancy when the diameter of ovarian endometriosis is more than 3 cm[1]. Among types of endometriosis-linked ovarian cancer, endometrioid and clear-cell are the commonest[2,3].

Although definite treatment of endometriosis is a hysterectomy with removal of the both ovaries, conservative surgery is preferred as the treatment of endometriosis and ovarian cyst when fertility still needs to be preserved. However, one of most concerned issues after conservative surgery is the recurrence of endometrioma. In general, the recurrence rate for endometriosis is 20-30.4% in the first two years after

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surgery[4].

To date, most surgical procedures have been performed by laparoscopy, which offers more short-term advantages than laparotomy does. In some circumstances, it could have limitations in the operative field and might increase the complication rate. Moreover, when the disease is complex, there are reports that the operation might not eradicate all the disease pathology.

Nowadays, laparotomy surgery is still warranted in some situations, such as the places with low resources, no expertise, difficulty to operate cases and also when the availability of the endoscopy is not easy to access. The present study's objective was to compare the recurrence rates of endometrioma by laparoscopy to laparotomy.

Material and Method

Research design was a retrospective cohort study. The study was approved by the ethic committees of Faculty of Medicine at Thammasat University and of Thammasat University Hospital. The data from medical records of reproductive women, aged 18-45 years who underwent ovarian endometrioma cystectomy either laparoscopy or laparotomy approach the Department of Obstetrics and Gynecology, Thammasat University Hospital during October 2005-December 2012, were retrieved. The pathological diagnosis of excised ovarian tissue was confirmed as endometrioma. Findings of malignant ovarian diseases were excluded. The recurrence of ovarian endometrioma was defined as having typical cysts, as detected by transvaginal ultrasonography, of more than 2 cm in diameter within two years of surgery. The recurrence was diagnosed only when the cyst had not disappeared following several consecutive menstrual cycles when it was impossible to distinguish the cyst from a transient corpus luteum cyst or an intraovarian hematoma[5].

The sample size was calculated based the determination for survival-time event. Recurrent rate in two years was 30.4%[5]. Power was set at 80%, and significance level at $p<0.05$ (two-sided). By calculation, the total number of women required was 288. Demographic data of patients, namely age, height, weight, BMI and clinical characteristics; revised American Society of Reproductive Medicine (rASRM) score; operation type; size of ovarian cyst; bilaterality; duration of surgery and complications were recorded. For data and statistic analysis, descriptive statistics was used to describe study subjects' characteristics, count with percentages for categorical variables and mean with standard deviation for continuous variables. Fisher's exact test and independent t-test were used for comparing categorical variables and continuous variables, respectively.

As a retrospective study, the two contrast groups were not assigned to treatments at random. Confounding by indication and confounding by contraindication for the two treatment modalities were likely to interfere with the true association between treatments and recurrence of endometrioma. A propensity score analysis was therefore used to handle this problem. The propensity score was estimated as a surrogate of the likelihood or the probability of being assigned to each treatment arm. It was calculated in the form of logit as a function of factors most likely to influence the likelihood of being assigned to each treatment arm (age, body weight, height, body mass index, disease stage, bilaterality, and size of endometrioma). The calculated propensity was then used as a covariate to control for confounding by indication and confounding by contraindication in the final model.

The effect of each treatment on the recurrence of endometrioma was analyzed by time-to-event, considering pregnancy during the follow-up time as a competing risk and presented with competing risk adjusted failure curves.

Results

Two hundred ninety-four women underwent endometrioma ovarian cystectomy during the studied period. Only 242 records had complete data to analyze. As shown in Table 1, 114 and 128 medical records were in the laparotomy and laparoscopy groups, respectively. The mean age and body weight of laparotomy patients were significant higher than those of the laparoscopy group (33.9$\pm$5.9 years vs. 30.9$\pm$5.4 years, respectively, $p<0.001$; 53.7$\pm$7.9 kg vs. 51.6$\pm$6.3 kg, respectively, $p = 0.02$). However, the mean of height and BMI (body mass index) were not statistically different. In addition, the stage of disease and bilaterality in both groups were comparable. All of the patients were in the advanced stage of disease; about one-third of which was in stage IV. Diameter of endometrioma in the laparotomy group was significantly larger than that in the laparoscopy group (7.0$\pm$2.5 cm vs. 6.2$\pm$1.8 cm, respectively; $p = 0.004$).

The operative time of both groups was not different. Furthermore, the proportions as percentages of pre and post-operative treatment were comparable. The recurrence rate of disease in the laparotomy group

was about one half lower than that in the laparoscopic patients (14.9% vs. 27.3%, respectively; p = 0.02). However, the cumulative rate of pregnancy after surgery was not different (4.4% vs. 4.7%, respectively; p = 1.0).

The recurrence of disease and competing-risks regression were analyzed in the form of survival curve. The cumulative incidences of both groups were presented in Fig. 1. The recurrent incidence of laparoscopic group began higher than that of the other 12 months of conservative surgery follow-up.

Discussion

Laparoscopic surgery for endometrioma has been reported in a bunch of literature as the standard operative technique[6]. Compared to the open laparotomy, laparoscopic approach has much better short-term health benefits, such as rapid recovery, less pain, and early return to work[7]. However, open laparotomy technique still has role and been used in many circumstances.

Comparing baseline demographic data between both groups, the laparoscopic patients were younger and had less body weight than the other. In addition, the diameter of endometrioma seemed to be smaller. Despite stage of disease, bilaterality and duration of surgery were not different. This could be explained by the preference of surgeons. In leaner and younger patients whose operations are likely to be easier, the way to explore the pelvic pathology tends to be laparoscopic approach. This fact results in bias and confounding by indication, which is an important limitation of the present study. Hence, we used the

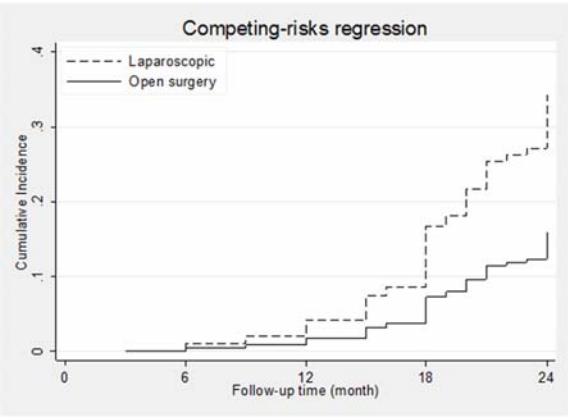

Fig. 1 Survival curve of recurrent endometrioma between the laparotomy and laparoscopic groups by competing risks regression analysis.

Table 1. Characteristics of reproductive-aged endometriosis women

Characteristics	Laparotomy (n = 114)	Laparoscopy (n = 128)	p-value
Age (year)*	33.9±5.9	30.9±5.4	<0.001
Body weight (kg)*	53.7±7.9	51.6±6.3	0.020
Height (cm)*	157.6±5.7	157.4±5.3	0.730
Stage of disease/rASRM score**			0.780
III	75 (65.8)	87 (68)	
IV	39 (34.2)	41 (32)	
Bilateral**	12 (10.5)	13 (10.2)	1.000
Size of ovarian cyst (cm)*	7.0±2.5	6.2±1.8	0.004
Duration of surgery (minute)*	71.6±33.4	69.8±32.8	0.680
Pre-operative hormonal treatment**	6 (5.3)	7 (5.5)	1.000
Post-operative hormonal treatment**	35 (30.7)	36 (28.1)	0.674
Last status			
No disease/loss**	92 (80.7)	87 (68)	<0.001
Disease recurrence**	17 (14.9)	35 (27.3)	0.020
Pregnancy**	5 (4.4)	6 (4.7)	1.000
Follow time (month)*	19.3±5.7	19.0±5.6	0.730

rASRM = revised American Society of Reproductive Medicine
* Mean ± standard deviation, ** Number (%)

propensity score to correct this bias. With the propensity scoring, the distribution of baseline covariates was similar between the compared groups. In the present study, the logistic regression model was used.

After 1 year of conservative surgery, the recurrence rates were still comparable. The difference in the rate of recurrence, however, was substantially high at 18 and 24 months after operation. The laparotomy group had a significantly lower recurrence rate than the laparoscopy group. This finding was similar to previous reports[4,8] that the recurrent rate was increased by an average of 10-15% each year. The important clinical risk factors of recurrence, such as higher diameter of endometrioma, advanced stage and presence of pelvic adhesion should always be considered[9-11].

The present study defined the criteria of the recurrent case based on transvaginal ultrasonogram. The diagnosis of recurrence was made only when a typical imaging of cyst was seen at the diameter larger than 2 cm. Tandoi et al and Sesti et al had defined the recurred case by clinical recurrence of pain[8,9]. However, we disagreed to use the pain criteria because the presenting symptoms of the patients in the study were not only pain symptom but also infertility and pelvic mass. The explanations of high recurrent rate in the present report must be described. Firstly, we included the recurred cyst of both sides, previous affected side or unaffected side. In addition, other investigators had defined recurred cases by larger size. Secondly, the recruited patients had high rASRM score and advanced stage. Thirdly, we enrolled operative cases of all gynecologists in our center who had a variety of surgical skills. Lastly, transvaginal ultrasonography itself, which was the means of diagnosis of endometrioma in the present study, was an imaging study. The final diagnosis must be the histo-pathological confirmation.

Open laparotomy technique could be the better way than laproscopy to eradicate pathology in some situations[12,13]. Most surgeons feel more comfortable excising the cyst wall completely, eradicating all residual disease and using the suturing technique when they do exploratory laparotomy. In other words, the laparoscopic approach has been suboptimal in many circumstances. This mainly and directly relies on the skill and experience of laparoscopists. The short-term benefits of laparoscopy have to outweigh the long-term adverse effect-the possibility of higher recurrence.

Conclusion

The present study has demonstrated that surgical technique has a strong impact on the recurrence or disease-free survival. Laparoscopy might not eradicate the disease pathology like open laparotomy does in some situations, such as cases with complexity of disease.

Potential conflicts of interests

None.

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การกลับเป็นซ้ำของภาวะถุงน้ำเอนโดเมทริโอมา ภายหลังการผ่าตัดเลาะถุงน้ำรังไข่แบบอนุรักษ์ โดยการส่องกล้องเปรียบเทียบกับการผ่าตัดเปิดหน้าท้อง

ชำนาญ แท่นประเสริฐกุล, ชยันตร์ธร ปทุมานนท์, สกล มนูสุข, คมสันติ์ สุวรรณฤกษ์, จรินทร์ทิพย์ สมประสิทธิ์, โอภาส เศรษฐบุตร, ธีระพร วุฒยวณิช

วัตถุประสงค์: *เพื่อศึกษาอัตราการกลับเป็นซ้ำของภาวะถุงน้ำเอนโดเมทริโอมาและระยะเวลาโรคสงบภายหลังการผ่าตัดแบบอนุรักษ์ โดยการส่องกล้องเปรียบเทียบกับการผ่าตัดเปิดหน้าท้อง*

วัสดุและวิธีการ: *เป็นการศึกษาย้อนหลังแบบติดตามกลุ่มผู้ป่วยโดยรวบรวมข้อมูลจากแฟ้มประวัติและบันทึกการผ่าตัด ผู้ป่วยที่ได้รับการวินิจฉัยเป็นภาวะถุงน้ำเอนโดเมทริโอมาที่ได้รับการผ่าตัดแบบอนุรักษ์โดยการส่องกล้องหรือผ่าตัดเปิดหน้าท้อง ที่โรงพยาบาลธรรมศาสตร์เฉลิมพระเกียรติ โดยติดตามหลังผ่าตัดเป็นเวลา 24 เดือนเพื่อประเมินการกลับเป็นซ้ำของถุงน้ำเอนโดเมทริโอมาการวิเคราะห์ใช้คะแนน propensity เพื่อปรับปัจจัยที่เกิดจากข้อบ่งชี้ของการรักษาด้วยวิธีทั้งสอง และวิเคราะห์ด้วย competing time to event*

ผลการศึกษา: *รวบรวมข้อมูลได้เป็นกลุ่มที่ได้รับการผ่าตัดโดยการส่องกล้อง 128 ราย และผ่าตัดเปิดหน้าท้อง 114 รายตามลำดับพบว่าอายุและน้ำหนักเฉลี่ยในกลุ่มผ่าตัดเปิดหน้าท้องสูงกว่าอย่างมีนัยสำคัญแต่ส่วนสูงและดัชนีมวลกายของทั้งสองกลุ่ม ไม่มีความแตกต่างกันรวมทั้งไม่พบความแตกต่างของระยะของโรค และการเป็นทั้งสองข้าง อย่างไรก็ตามพบว่าขนาดเฉลี่ยของถุงน้ำในกลุ่มที่ได้รับการผ่าตัดเปิดหน้าท้องมากกว่า กลุ่มที่ได้รับการผ่าตัดโดยการส่องกล้องอย่างมีนัยสำคัญทางสถิติ (7.0±2.5 และ 6.2±1.8 เซนติเมตร, ตามลำดับ; p = 0.004) เมื่อเปรียบเทียบการกลับเป็นซ้ำของภาวะถุงน้ำเอนโดเมทริโอมาหลังการปรับปัจจัยรบกวนโดยใช้คะแนน propensity พบว่าอัตราการกลับเป็นซ้ำสูงกว่าในกลุ่มที่ผ่าตัดผ่านกล้อง เมื่อเปรียบเทียบกับกลุ่มที่ผ่าตัดเปิดหน้าท้องอย่างมีนัยสำคัญทางสถิติ (ร้อยละ 27.3 และ 14.91 ตามลำดับ; p = 0.02) อย่างไรก็ตามพบว่าอัตราการตั้งครรภ์ สะสมโดยรวมไม่แตกต่างกัน (ร้อยละ 4.7 และ 4.4 ตามลำดับ; p = 1.0)*

สรุป: *ผลการศึกษาบ่งชี้ว่าเทคนิคการผ่าตัดเป็นปัจจัยสำคัญที่มีผลต่อการกลับเป็นซ้ำของภาวะถุงน้ำเอนโดเมทริโอมา การผ่าตัดแบบอนุรักษ์โดยการส่องกล้องอาจไม่สามารถขจัดรอยโรคได้ดีเท่าการผ่าตัดแบบเปิดหน้าท้องในบางกรณี โดยเฉพาะในรายที่มีระยะของโรคสูงหรือพยาธิสภาพของโรคซับซ้อน*