# Novel Technique of Laparoscopic Removal of Ovarian Endometrioma

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## Introduction

Endometriomas are cystic formations of ovarian endometriosis requiring surgery in 35% of cases [1]. Laparoscopic stripping is the choice treatment and is better than fenestration and coagulation because of less pain, low recurrence rate and better spontaneous pregnancy [2]. Cystectomy of ovarian endometriomas improves spontaneous pregnancy rates and reduces pain. In addition, it may improve the response to *invitro* fertilization (IVF) [3]. Drawbacks of surgery include decreasing ovarian reserve, postoperative adhesions and incomplete removal of the disease. These adhesions can be explained by the leakage of the melted chocolate material, which is a combination of pooled menstrual blood, inflammatory enzymes, and endometriosis tissues produced from an endometrioma, fusing organs together by forming a layer of "sticky" glue-like tissue [4].

## Aim of the Study

We aim to evaluate a new technique of chocolate material aspiration during laparoscopic ovarian cystectomy to decrease post-operative pain and adhesions and to keep ovarian reserve.

## Materials And Methods

The present study was conducted in El Shatby hospital (faculty of medicine - Alexandria University) after approval of Alexandria Faculty Ethical Committee for the whole procedure including the second look laparoscopy. Patients were recruited from gynaecology clinic in the period from August 2018 to January 2020. All participants provided an informed written consent after explaining the aim of the study, the procedure & the potential hazards.

## Inclusion Criteria Included

Age from 20 to 35 years, endometriosis-related clinical manifestations (infertility, pelvic pain or pelvic mass), unilateral & unilocular endometrioma (≥5cm), rapidly growing endometrioma despite previous medical or hormonal treatment. Good ovarian reserve (anti- mullerian hormone (AMH) (АМГ) > 1ng/ml & antral follicular count (AFC) > 4).

## Exclusion criteria were

Recurrent & bilateral cases, patients who were unfit for surgery due to chronic diseases (e.g. cardiac disease or diabetes) or had any contraindication for laparoscopic surgery (excessive anterior abdominal wall scarring). Patients with past history of myomectomy or previous endometriosis surgery were also excluded.

## Sample Size

According to the research context and including the researcher's objectives and proposed analyses, the following formula was used to calculate the required sample size in this study;

$$n = \frac{Z^2 P(1-P)}{d^2}$$

Where n is the sample size, Z is the statistic corresponding to level of confidence, P is expected prevalence, and d is precision (corresponding to effect size). The level of confidence was 95%. By using this equation the sample size was 20 cases in each group (i.e. 40 cases in the two groups). All participants were subjected to full history taking followed by complete physical examination & laboratory investigations (AMH & routine preoperative investigations).

a) Serum AMH was assayed by ELISA (enzyme linked immunosorbent assay) technique, using AMH Gen II ELISA kits (Beckman Coulter, Inc., USA.) (Expected Values: 0.9–9.5ng/ml).

b) A transvaginal ultrasound (TVUS) was done using a 7.5 MHz vaginal probe of the Medison R7 ultrasound unit (Samsung Medison, Korea) in the early follicular phase of the menstrual cycle (Days 3-6) using the largest cross-sectional sagittal view of the ovary to confirm the presence and assess the size and side of the endometrioma (ovarian cyst with homogeneous low-level ground

glass echogenicity of the cystic fluid) & to assess the AFC (antral follicular count of follicles from 2 to 10mm) in both the affected and healthy ovary.

Laparoscopy was performed during late proliferative phase of the cycle under general anesthesia in the dorsal lithotomy position where a one 10 mm subumbilical trocar was inserted for the scope and two 5 mm trocars for laparoscopy instruments. Careful inspection of pelvic and peritoneal cavity followed by peritoneal washings and staging of endometriosis. Adhesiolysis was done for release and mobilization of the ovaries from the surrounding structures. Endometriotic vesicles if found, were coagulated by bipolar currency.

### During the procedure cases were divided into two groups

Group A (cyst aspiration group); the cyst was handled and approximated to the anterior abdominal wall till they touch each other, then it was pierced by a laparoscopy aspiration needle which was introduced in the midline 2 cm above the symphysis pubis after evacuating the urinary bladder. This was followed by injection of Ringer's solution through the same needle to wash the cyst cavity then the needle was withdrawn and the ovary was incised and the cyst wall was stripped from the healthy surrounding normal ovarian tissue and cortex. Hemostasis was achieved by a 35-W current bipolar electrocoagulation on the cyst bed.

Group B (traditional laparoscopic ovarian cystectomy); Usual operation for laparoscopic ovarian cystectomy was done, stripping the cyst wall by normal saline hydro- dissection where normal saline was injected between the cyst wall and the ovarian cortex. The cyst wall was incised pouring the chocolate material in most of the cases. Repeated suction – irrigation was done till the field became clear then the cyst wall was stripped by traction- counter traction technique over the edges of the cyst wall with two atraumatic graspers. Finally, the pelvic cavity was irrigated again with saline.

Operation time was considered, cyst wall was sent for histological assessment. None of the operated ovaries were sutured. Post- operatively patients were followed up for post- operative symptoms as vomiting. All patients were discharged the following day. Patients were given monophasic contraceptive pills (Gynera, Bayer) for six months post- operatively during which they were asked to report pain. After six months; serum AMH, serum FSH, AFC were measured and a second look laparoscopy for recurrence, adhesions and re- staging was done. Second look laparoscopy was done by different laparoscopists according to hospital schedules. They were blind to the first procedure and their findings for every patient were recorded in laparoscopy unit records.

The primary outcome was; reported pain evaluated by the number of diclofenac sodium 100 mg ampoules. and the occurrence of post- operative adhesions by second look laparoscopy 6 months later. We used the scoring system of the Adhesion Scoring Group published (1995) based on severity of adhesions and their extension;

Severity: (0, none; 1, filmy, avascular; 2, dense and/or vascular; 3, cohesive)

Extension: (0, none; 1£ 25%; 2, 26-50%; 3, >50%;4)

The secondary outcome was ovarian reserve (assessed by serum AMH, serum FSH & day 2 AFC) and recurrence of endometriomas reassessed 6 months following laparoscopy (Figure 1-2).
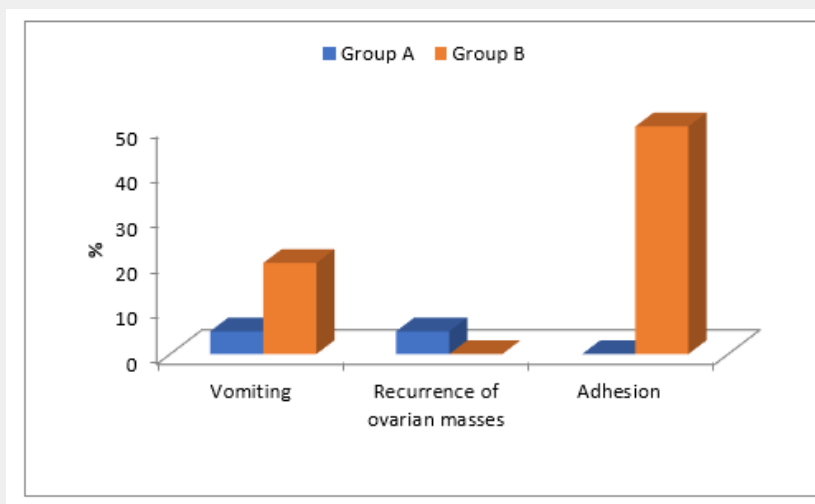


**Figure 1:** Comparison between the two studied groups regarding post operative complication.
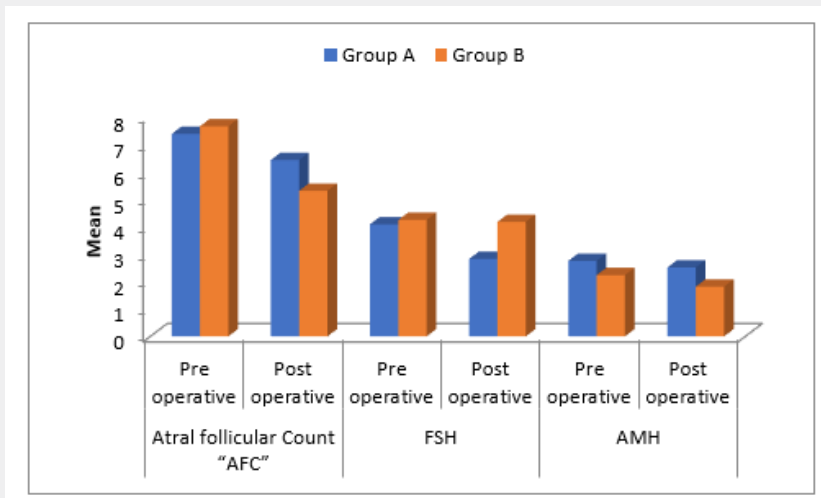
**Figure 2:** Comparison between pre and post operative measurements in the two studied groups.

### Statistical Analysis

The Data was collected and entered into the personal computer. Statistical analysis was done using Statistical Package for Social Sciences (SPSS/version 21) software. Arithmetic mean, standard deviation, for categorized parameters chai square test was used while for numerical data t-test was used to compare the two groups. The level of significance was 0.05.

### Result

**Table 1:** comparison between the two studied groups regarding demographic data.

|  | Group A "Cases" | Group B "control" | P value |
|---|---|---|---|
| Age Range Mean±S.D. | 21.0-37.0 28.37±4.80 | 22.0-34.0 28.35±3.20 | 0.91 |
| BMI Range Mean±S.D. | 17.0-34.0 24.21±4.77 | 16.0-35.0 23.0±5.18 | 0.453 |
| Operative time Range Mean±S.D. | 30.0-75.0 47.47±11.74 | 55.0-125.0 79.75±19.70 | 0.0001* |

There were no statistical differences in demographic characteristics of the two groups (Table 1) Intra- operatively, no sutures were done to achieve hemostasis and none of the patients developed complications after surgery. The operation time was less in group A ranging from 30 minutes to 75 minutes [Mean (47.47±11.74)] in comparison to 55.0-125.0 minutes in group B with a mean of 79.75±19.70 which was statistically significant (p= 0.0001*) (Table1).

Post- operatively, vomiting occurred only in one patient in group A compared to four patients in group B which was not statistically significant. (p= 0.187) (Table 2). During the follow up, pain was reported in group A by two patients only and it was relieved after one to three ampoules of Declofenac sodium 100 mg I.M compared to six cases in group B where one to four ampoules were used which was statistically significant (p= 0.004*) (Table 3).

A second look laparoscopy was done six months later calculated from every patient's first look laparoscopy. This second look revealed recurrence of endometrioma only in one case in group A compared to no recurrence in group B which was not statistically significant but post- operative adhesions were only found in group B (five cases) which was statistically significant (p=0.047) (Table 3).

**Table 2:** Comparison between the two studied groups regarding post operative symptoms (Vomiting).

|  | Group A "Cases" | Group B "control" | P Value |
|---|---|---|---|
| Vomiting | 1 (5.0%) | 4 (20.0%) | 0.187 |

**Table 3:** Comparison between the two studied groups regarding post operative complication.

|  | Group A "Cases" | Group B "control" | P value |
|---|---|---|---|
| Post operative pain (VAS) Range Mean+S.D. | 1.0-3.0 1.53±0.77 | 1.0-4.0 2.35±0.88 | 0.004* |
| Recurrence of ovarian masses | 1 (5.0%) | 0 (0.0%) | 0.487 |
| Adhesion | 0 (0.0%) | 5 (50.0%) | 0.047* |

Regarding pre- operative and post- operative AFC; no statistical significance was found between the two groups but within the same group AFC dropped from 4- 12 pre- operatively to 3- 9 post- operatively in group A which was statistically significant. (p= 0.026) and in Group B, it dropped from 5- 11 to 2- 8 which was also statistically significant. (p= 0.031) (Table 4).

**Table 4:** Comparison between pre and post operative measurements in the two studied groups.

|  | Group A "Cases" | Group B "control" | P value |
|---|---|---|---|
| **Antral Follicular Count "AFC"** |  |  |  |
| Pre operative Range Mean±S.D. | 4.00-12.00 7.37±2.06 | 5.00-11.00 7.65±1.63 | 0.638 |
| Post operative Range Mean±S.D. | 3.00-9.00 6.42±1.80 | 2.00-8.00 5.30±1.66 | 0.731 |
| P value | 0.026* | 0.031* |  |
| **FSH** |  |  |  |
| Pre operative Range Mean±S.D. | 2.50-6.00 4.08±1.24 | 2.20-7.80 4.24±1.46 | 0.06 |
| Post operative Range Mean±S.D. | 1.90-5.00 2.82±0.83 | 1.90-7.00 4.17±1.56 | 0.05* |
| P value | 0.001* | 0.214 |  |
| **AMH** |  |  |  |
| Pre operative Range Mean±S.D. | 1.50-5.10 2.75±0.94 | 1.00-4.10 2.23±0.71 | 0.002* |
| Post operative Range Mean±S.D. | 0.80-5.00 2.51±1.20 | 0.80-4.00 1.81±0.82 | 0.04* |
| P value | 0.241 | 0.025* |  |

The level of preoperative basal FSH was nearly similar in the 2 groups (1.9- 7 mIU/ml in group A, 1.9- 5 mIU/ml in group B). Post – operative FSH significantly increased in group B (p= 0.001*) but not in group A (p = 0.214). (Table 4). Serum AMH pre-operatively was statistically significant between the two groups (p= 0.002*) and also post- operatively where (p= 0.024). Post- operatively, only group B showed statistically significant drop in serum AMH compared to its pre- operative levels. (p= 0.025*) (Table 4).

## Disscusion

Multiple surgical techniques were used to treat endometriomas but cyst rupture with spillage of its contents into the pelvic cavity is common [6,7]. The assumption that copious irrigation and suction of the pelvis reduces adhesion formation has no supportive evidence in literature. In 1991, a group of researchers looked for adhesions and peritoneal implants of endometriosis after laparoscopic treatment. They found that most new implants and adhesions on second-look laparoscopy were on the pelvic floor as a result of "chocolate-like material that could not be aspirated." [7].

In another study using rabbit model where endometrioma fluid was injected intra- peritonealy, researchers hypothesized that the group without copious lavage of endometrioma fluid (group 1) would have the highest mean clinical adhesion scores. To the contrary, the other group with copious normal saline lavage of endometrioma fluid (group 2) had significantly more clinical adhesions [8]. These results were entirely unexpected as saline lavage has been previously shown to decrease peritoneal adhesion formation in both animal and human studies [9-12]. Their explanation was that the saline lavage itself served to spread endometrioma fluid more effectively in the abdominal cavity, thereby increasing the distribution of tissue contact and the chance for adhesions compared to local spill. Another explanation is that the process of lavage mechanically irritates the peritoneal cavity and thereby causes adhesions by local tissue damage by the suction instrument. The study raised the concern that present surgical techniques in the treatment of endometriomas causes increased peritoneal adhesion formation. Our technique of cyst aspiration had a significant decrease of post- operative pain and adhesions which could positively affect patient's well- being and fertility. We did not perform ovarian suspension because we wanted to evaluate our technique without the help of any procedure proved to reduce pain and adhesions, yet we need to compare our technique to ovarian suspension in further studies.

Further investigation of the abdominal and peritoneal adhesive effects of endometrioma fluid are needed to assure that the present surgical management of endometriomas in humans is optimal. As regards ovarian reserve, according to the data from different studies, all laparoscopic techniques lead to reduction in ovarian volume, ovarian reserve and AFC [13-16]. In our study; serum AMH decreased after the procedure but the drop was not statistically significant.

As regards recurrence, the use of post- operative hormonal therapy was recommended by many researchers based on the assumption that endometriomas appear to develop from ovarian follicles and corpora lutea [17], inhibition of ovulation with oral contraceptives (OCs) or progestins should decrease the risk of cyst recurrence [18]. In a meta-analysis of comparative studies, the pooled OR of post-operative endometrioma recurrence was 0.12 (95% CI: 0.05–0.29) in long-term OC users compared with never OC users [19]. In RCTs and systematic reviews, no significant differences were detected between cyclic and continuous OC use in terms of cyst recurrence rate [18, 20-22].

Accordingly, prevention of recurrence is recommended particularly in patients wishing a conception in the future, unless OCs and progestins are contraindicated or not tolerated. The use of OCs for long periods of time after surgery to reduce lesion and pain recurrences is suggested also by international guidelines [23-26].

## Data Availability

The data used to support the findings of this study are currently under embargo while the research findings are commercialized. Requests for data 12 months after publication of this article, will be considered by the corresponding author.

## Acknowledgment

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