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# Effect of Two Laparoscopic Techniques for Treatment of Ovarian Endometrioma on Ovarian Reserve

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## ABSTRACT

**Introduction:** Operative laparoscopy is the most common used technique for treatment of patients with ovarian endometriomas, because of many positive effects in comparison with laparotomy. There are many laparoscopic techniques, but most used are cystectomy and puncture with endocoagulation (ablation) of the cyst's capsule. The **aim** of this study was to evaluate the effect of two laparoscopic techniques for treatment of ovarian endometriomas on ovarian reserve. We used two ultrasonographic markers for ovarian reserve: ovarian volume and antral follicle count (AFC). **Materials and Methods:** Sixty patients in reproductive age (18-42 years) were treated for a chronic pelvic pain or infertility in a tertiary hospital (University Clinic for Gynecology and Obstetrics in Skopje, R. Macedonia). The study was prospective and two laparoscopic techniques were used. All patients were with confirmed ultrasound diagnosis for ovarian endometriomas with diameter between 3 and 8 cm. Complete cystectomy was done in 30 patients (group A) and puncture with endocoagulation was done in other 30 patients (group B). Ovarian reserve was analyzed before surgery and was controlled one and three months after laparoscopic surgery. **Results:** In group A (operated with cystectomy) ovarian volume was  $53.46 \pm 29.97 \text{ cm}^3$  before surgery, which fell to  $13.06 \pm 7.34 \text{ cm}^3$  after one month, and  $13.28 \pm 7.17 \text{ cm}^3$  after three months. Statistical analysis showed a significant reduction in ovarian volume one and three months after surgery ( $p \leq 0.01$ ). In group B (operated with puncture and endocoagulation) the ovarian volume was  $58.34 \pm 37.99 \text{ cm}^3$  before surgery, which fell to  $18.96 \pm 7.90 \text{ cm}^3$  one month and  $17.38 \pm 6.86 \text{ cm}^3$  three months after surgery. In both groups there was a significant reduction in ovarian volume one and three months postoperatively ( $p \leq 0.01$ ). In the first group AFC was  $3.03 \pm 1.27$  before surgery,  $4.8 \pm 1.30$  one month after surgery and  $6.23 \pm 1.57$  after three months. Statistical analysis showed a significant increase in AFC after laparoscopic cystectomy ( $p \leq 0.01$ ). In the second group AFC was  $3.07 \pm 1.05$  before surgery,  $5.33 \pm 1.60$  after one month and  $7.0 \pm 1.62$  after three months. The comparison of AFC showed high statistically significant difference ( $p \leq 0.001$ ), e.g. increase of AFC after one and three months in comparison with AFC before surgery. **Conclusions:** Ovarian reserve decreases after laparoscopic surgery using both laparoscopic techniques. But, this decrease was more frequent using cystectomy in comparison with ablation of the endometriotic cyst.

**Key words:** endometrioma ovari, laparoscopic surgery, ovarian reserve.

## 1. INTRODUCTION

Endometriomas are benign cysts of ovaries found in 17% to 44% of patients with endometriosis (1). Chronic pelvic pain or infertility are main indications for operative treatment of these patients. The laparoscopic approach is favored over laparotomy because of the advantages of minimal tissue damage, faster recovery and shorter hospital stay. The most used techniques are cystectomy and puncture with endocoagulation (ablation) of the pseudocapsule of endometrioma.

According to the data from different studies, both laparoscopic techniques lead to reduction in ovarian volume and AFC as ultrasonographic markers for ovarian reserve. Several reports comparing cystectomy with puncture and endocoagulation have demonstrated that ablation was associated with a higher recurrence rate and lower cumulative pregnancy rate (2, 3, 4, 5, 6, 7).

It was our aim to compare the effect of two laparoscopic techniques (cystectomy versus ablation) on ovarian reserve. To accomplish the aim we used two ultrasono-

graphic markers for ovarian reserve (ovarian volume and AFC).

## 2. MATERIAL AND METHODS

In a prospective study 60 women in reproductive age (20-42) with ultrasonographic finding of ovarian endometriomas underwent laparoscopic surgery at the University Clinic for Gynecology and Obstetrics in Skopje, R. Macedonia in the period between 01.01.2013 and 31.12.2014. Patients were divided into two groups. The first group (group A) with 30 patients were operated with cystectomy (extirpation of the pseudocapsule of cysts using two atraumatic grasping forceps and then minimal bipolar coagulation for hemostasis). The second group (group B) with 30 patients were operated with puncture, biopsy of the pseudocapsule and endocoagulation with energy of 30W. Histopathological examination confirmed diagnosis of endometrioma ovari in all cases. The study was approved by the Ethics Committee of the Medical Faculty in Skopje. Patients included in the study signed a written inform consent before surgery.

Ultrasonographic examination was done in all patients in proliferative phase of menstrual cycle before surgery, one and three months after surgery. Ovarian volume was calculated using the Prolate ellipsoid formula. AFC was determined as a total number of follicles with diameter smaller than 10 mm (8). Ultrasonographic examination was made by the Ge Voluson E8 with a 7.5 MHz vaginal probe and 4-8.5 MHz transabdominal probe.

Exclusion criteria were: polycystic ovarian syndrome, obesity (BMI>35 kg/m<sup>2</sup>), endocrine disorders, patients with previous surgery because of adnexal pathology.

### 2.1. Statistical analysis

For analysis of quantitative data we used mean value and standard deviation. A paired Student's t-test was used to determine differences between markers for ovarian reserve. A p-value ≤0.05 was considered as statistically significant. The statistical package SPSS, version12, was used in this analysis.

## 3. RESULTS

The mean age in group A was 30.83±5.32 years and in group B 30.57±5.59 years. Diameter of endometriomas in the first group (group A) was 3.99±0.65 cm. The ovari-

Variable		X ± SD	X <sub>1</sub> -X <sub>2</sub>	X <sub>2</sub> -X <sub>3</sub>	X <sub>1</sub> X <sub>3</sub>
Ovarian Volume (ml)	Before surgery X <sub>1</sub>	53.46 ± 29.97	t <sub>1</sub> = 7.60 p ≤ 0.01		t <sub>3</sub> = -0.28 n.s.
	One month after surgery X <sub>2</sub>	13.06 ± 7.34		t <sub>2</sub> = 7.46 p ≤ 0.01	
	Three months after surgery X <sub>3</sub>	13.28 ± 7.17			
AFC	Before surgery X <sub>1</sub>	3.03 ± 1.27	t <sub>1</sub> = -11.27 p ≤ 0.01		t <sub>3</sub> = -10.79 p ≤ 0.01
	One month after surgery X <sub>2</sub>	4.8 ± 1.30		t <sub>2</sub> = -18.95 p ≤ 0.01	
	Three months after surgery X <sub>3</sub>	6.23 ± 1.57			

**Table 1. Ovarian volume and AFC follow up in group "A"**

Variable		X ± SD	X <sub>1</sub> -X <sub>2</sub>	X <sub>2</sub> -X <sub>3</sub>	X <sub>1</sub> X <sub>3</sub>
Ovarian Volume (ml)	Before surgery X <sub>1</sub>	58.34 ± 37.99	t <sub>1</sub> = 6.26 p ≤ 0.01		t <sub>3</sub> = 2.96 p ≤ 0.01
	One month after surgery X <sub>2</sub>	18.96 ± 7.90		t <sub>2</sub> = -6.43 p ≤ 0.01	
	Three months after surgery X <sub>3</sub>	17.38 ± 6.86			
AFC	Before surgery X <sub>1</sub>	3.07 ± 1.05	t <sub>1</sub> = -8.79 p ≤ 0.01		t <sub>3</sub> = -10.81 p ≤ 0.01
	One month after surgery X <sub>2</sub>	5.33 ± 1.60		t <sub>2</sub> = -14.30 p ≤ 0.01	
	Three months after surgery X <sub>3</sub>	7.00 ± 1.62			

**Table 2. Ovarian volume and AFC follow up in group "B"**

an volume in group A with cystectomy was 53.46±29.97 cm<sup>3</sup> before surgery, which fell to 13.06±7.34 cm<sup>3</sup> after one month and 13.28±7.17 cm<sup>3</sup> after three months. In the second group (group B) diameter of endometriomas was 4.03±0.77 cm. The ovarian volume in group B was 58.34±37.99 cm<sup>3</sup> before surgery, which fell to 18.96±7.90 cm<sup>3</sup> one month after surgery and 17.38±6.86 cm<sup>3</sup> at three months follow-up.

T-test for differences of paired samples before surgery and one month after surgery in the first group showed a statistically significant reduction in ovarian volume (t<sub>1</sub> = 7.6; p ≤ 0.01). There was a statistically significant reduction in ovarian volume after three months in comparison with the ovarian volume before surgery (t<sub>2</sub> = 7.46; p ≤ 0.01). Statistical analysis showed no differences in ovarian volume one and three months after surgery (t<sub>3</sub> = 0.28; p > 0.05 (n.s.)).

For the second group of 30 patients operated laparoscopically with puncture and endocoagulation t-test of paired samples showed statistically significant reduction in ovarian volume one month after surgery (t<sub>1</sub> = 6.26; p ≤ 0.01). Also, there was a reduction in ovarian volume after three months in comparison with volume before surgery (t<sub>2</sub> = 6.43; p ≤ 0.01). There was statistically significant difference in ovarian volume after three months in comparison with ovarian volume after one month (t<sub>3</sub> = 2.96; p ≤ 0.01). These results are presented in Table 1.

Concerning fertility capacity AFC was evaluated in both groups. In the first group AFC before surgery was 3.03±1.27, with small increase one month after surgery (4.8±1.30), and 6.23±1.57 after three months.

There were statistically significant differences between AFC before surgery and after one month (t<sub>1</sub> = -11.27; p ≤ 0.01), with an increase after one month. Statistical analysis showed an increase in AFC after three months in comparison with AFC before surgery (t<sub>2</sub> = -18.95; p ≤ 0.01). The difference was statistically significant in AFC between one and three months after surgery (t<sub>3</sub> = -10.79; p ≤ 0.01), with an increase in AFC three months after surgery.

In the second group AFC before surgery was 3.07±1.05, with an increase after one month (5.33±1.60) and an increase after three months (7.0±1.62). For the second group there was statistically significant difference with an increase of AFC after one month in comparison with AFC before surgery (t<sub>1</sub> = -8.79; p ≤ 0.01). There was a significant

increase of AFC three months after surgery compared to the results before surgery ( $t_2 = -14.3$ ;  $p \leq 0.01$ ). There was also statistically significant increase in AFC after three months in comparison with AFC after one month ( $t_3 = -10.81$ ;  $p \leq 0.01$ ). These results are presented in Table 2.

The difference in ovarian volume in both groups before surgery and one month after surgery was not significant. Student's *t*-test showed no significant difference in the reduction of ovarian volume in both groups three months after surgery.

Concerning AFC before surgery no differences were found in both groups one month after the operation. In group B there was a statistically significant increase in AFC after three months in comparison with group A ( $t = 2.12$ ;  $p \leq 0.01$ ).

#### 4. DISCUSSION

For years, there has been a debate between gynecologists which is the best laparoscopic technique for operation of patients with ovarian endometriomas. Two commonly used techniques, cystectomy versus puncture and endocoagulation, were compared.

A Cochrane review comparing excision to drainage and electrocoagulation of the cyst wall showed an increase in spontaneous pregnancy rates in women with subfertility with excision of the cyst with an odds ratio OR = 5.21; 95% (CI: 2.04–13.29). In addition, there was a decreased rate of recurrence and no difference in response to gonadotropin stimulation (9).

In this study we evaluated the effect of two different laparoscopic techniques for treatment of ovarian endometriomas on ovarian reserve, using two ultrasonographic markers: ovarian volume and AFC. We have found a significant reduction in ovarian volume one and three months after surgery in both groups. These results are similar with those presented by Salem A. Hesham et al. (10). They also found reduction in ovarian volume after laparoscopic surgery, especially six months after surgery. We have found an increase in AFC in both groups of patients, but it was more frequent in the group operated by puncture et endocoagulation. In the study of Dimitrios Tsolakidis et al. examining the effect of laparoscopic cystectomy and three-stage management on AFC, an increase in AFC in the second group in comparison with the first group was found, and this result was similar to our results (11).

In the study by Celik et al. the AFC increased six weeks and six months postoperatively (12).

The limitation of our study is the small number of examined patients. Also, it is necessary to follow these patients for a longer period. Our opinion is that such investigation will give a more precise answer to the question which technique is better concerning the ovarian reserve.

**CONFLICT OF INTEREST: NONE DECLARED.**

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