



# OVARIAN RESERVE AFTER SURGERY OF ENDOMETRIOSIS CYSTS

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**Keywords:** endometrioma, cyst, ovary, reserve, laparoscopy

**Abstract:** Ovarian endometrioma is a common problem in gynaecological pathology, especially in female infertility surgery. Adequate surgical treatment of endometriomas has long been debated and continues to be a controversial topic.(1) The aim of the paper is to evaluate the impact of laparoscopic surgical treatment of endometriomas on the ovarian reserve. The inclusion criteria were patients of reproductive age, symptomatic (infertility, pain), primary unilateral or bilateral endometriomas, the size of the endometriomas to be between 3 cm and 8 cm. The mean diameter of the endometriomas was 4.5 cm. There was a decrease of 0,65 ng/ml in the level of Anti Mulerian Hormone (AMH) at 6 months after surgery compared to the initial values. There was also a 1.4 IU / ml increase in Folliculo-Stimulator Hormone (FSH) levels 6 months after surgery compared to pre-surgery values. Cystectomy is preferable to drainage or stripping and laser coagulation because it has the lowest frequency of recurrence.

## INTRODUCTION

Primordial follicles at rest determine a woman's reproductive potential. Primordial follicles can develop into primary follicles, antral and ovulatory follicles. The main factor that affects the ovarian reserve is age. Genetic factors, chemotherapy, radiation exposure, smoking and ovarian surgery are thought to play an important role in reducing ovarian reserve.(2) Certain features of ovarian cysts (cyst present bilaterally, large cysts) are associated with a greater decrease in ovarian reserve.(2)

Ovarian endometriomas are a common problem in gynaecology pathology, especially in female infertility surgery. Adequate surgical treatment of endometriotic ovarian cysts has long been debated and continues to be a controversial topic.(1)

Laparoscopic surgery has significantly reduced the risks of surgery and the risks of recurrence, but these continue to be a matter of interest. The main factors involved in the recurrence of endometriomas are residual endometriosis tissue that multiplies locally, microscopic endometriotic tissue not detected during surgery, “de novo” lesions.(3)

Decreased ovarian reserve and recurrence of lesions are a known complication of endometriomas surgery.(1)

Although studies in the literature show that endometriomas have a detrimental effect on the surrounding ovarian cortex as well as on its physiological functioning, its presence does not significantly alter its clinical impact.(4)

One of the dilemmas of surgical treatment of endometriomas is the intervention of surgery to completely eradicate endometriosis tissue at the cost of significantly decreasing the ovarian reserve or surgery limited to preserving ovarian function and assuming recurrences.(5)

Another factor that influences the postoperative ovarian reserve is the experience of the surgeon performing the laparoscopy, the expertise being inversely proportional to the

destruction of the remaining ovarian tissue and implicitly the preservation of the healthy ovary.(6)

*Surgical techniques used in the treatment of endometrioma*

The surgical techniques for treating endometriotic cysts are different - with advantages and disadvantages for each.

These techniques include bipolar coagulation cystectomy, CO2 laser coagulation cystectomy, stripping and coagulation, and simple capsule coagulation drainage.

Bipolar coagulation cystectomy has very good efficiency in reducing pain, dysmenorrhea and menstrual disorders, lower recurrence rate and reduced need for iterative surgery. However, this has the disadvantage that in 2.4% of cases, bilateral cystectomy may be associated with ovarian failure.(7)

On the other hand, cystectomy and coagulation with LASER CO2 has the advantage of being faster and offers easy haemostasis. However, the use of this technique results in a higher rate of recurrence of cysts at 12 months compared to coagulation cystectomy. At 60 months, the recurrence rate of cysts is equal to other techniques.(8)

In terms of stripping and coagulation, the recurrence rate of cysts is like other techniques, the operating time is shorter, haemostasis is efficient, and the excision of the cyst is much more efficient compared to other techniques. Usually, this technique is used in the treatment of large cysts.(9,10)

Bipolar drainage and coagulation are technically easy to perform and provides good haemostasis. However, the recurrence rate is much higher than after cystectomy. Also, this method is less effective in reducing pelvic pain and dysmenorrhea compared to cystectomy.(11) In fact, all these techniques cause a thermal damage to the tissue that causes a decrease in ovarian reserve.

*Morphopathology of burned tissue*

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In 1953, Jackson described lesions resulting from dermal thermal damage to tissues as having 3 histological areas. He described 3 concentric areas depending on the viability of the tissue. From the central area of the lesion to the peripheral area these areas are the coagulation area, the stasis area, and the hyperaemia area.

The coagulation area is characterized by the irreversible loss of the affected tissue, with the appearance of the necrosis area and the coagulation and denaturation of the constituent proteins.

Around the coagulation area, there is a stasis area both in depth and as a surface. In this area of stasis, the cells are partially damaged, initially viable. Circulation is progressively compromised, which can lead to interruption of blood flow resulting in irreversible cell damage. At the periphery of the stasis zone both in depth and on the surface is the hyperaemia zone. This area is characterized by marked vasodilation, increased sanguine flow and minimal cell damage. In this area, the tissues return to normal if they are not traumatically or infectiously affected.(12)

### AIM

The aim of the paper is to evaluate the impact of laparoscopic surgical treatment of endometriomas on the ovarian reserve during 2019-2020 in the Obstetrics and Gynaecology Clinic of Sibiu County Emergency Hospital, Romania.

### MATERIALS AND METHODS

The study included patients hospitalized in the Obstetrics and Gynaecology Department of Sibiu County Emergency Clinical Hospital between January 2019 and December 2020. Of these, only patients between the ages of 20 and 43 were included in the study. The inclusion criteria were patients of reproductive age, symptomatic (infertility, pain), primary unilateral or bilateral endometriomas, the size of the endometriomas to be between 3 cm and 8 cm. The patients included in the study underwent laparoscopic surgery, with removal of the cyst capsule and haemostasis by superficial bipolar coagulation.

The exclusion criteria were patients older than 43 years, patients with ultrasound signs of adenomyosis, patients who had a history of hysterectomy or salpingectomy, patients with thyroid pathology, patients diagnosed with deep infiltrating endometriosis at pre-operative work-up.

The data were extracted from the clinic database as well as from the patient observation sheets. From the observation sheets of the patients there were extracted data related to the degree of parity, body mass index, size of endometriotic ovarian cysts, unilateral or bilateral character of ovarian endometriotic cysts

For the evaluated parameters we calculated the average of the parameter. To obtain these values we used the standard calculation formula.

Ovarian reserve was assessed by dosing AMH and FSH before and after surgery at 6 months.

### RESULTS

Between January 2019 and December 2020, 960 patients aged between 20 and 43 with gynecological pathology were hospitalized in the Gynaecology Department of the County Clinical Hospital in Sibiu. Patients admitted with ectopic pregnancy and first trimester pregnancies were excluded from the study. Of these, only 1.56% of patients met the inclusion criteria in the study.

Of the patients enrolled in the study 73% were never pregnant.

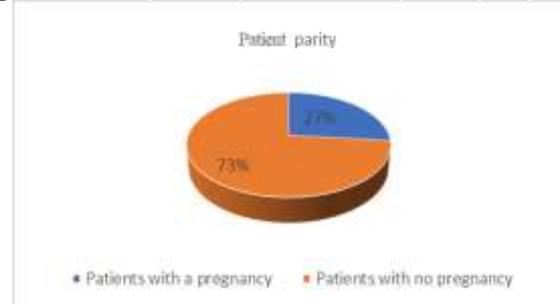
27% of patients had a birth in their personal

physiological history. The mean age of the patients was 31.5 years. The average body mass index was 23.5. The mean diameter of the endometriomas was 4.5 cm.

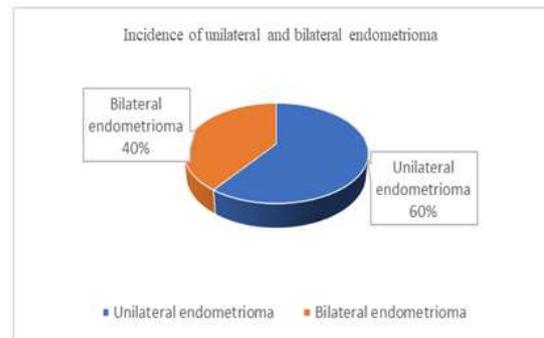
**Table no. 1. Results of somatometric data of the patients and endometrioma size**

Mean age of the patients	31.5 years
Average body mass index	23.5
The mean diameter of the endometriomas	4.5 cm

**Figure no. 1 Graphical representation of patient parity**



**Figure no. 2 Incidence of unilateral and bilateral endometrioma**



The mean age of the patients was 31.5 years.

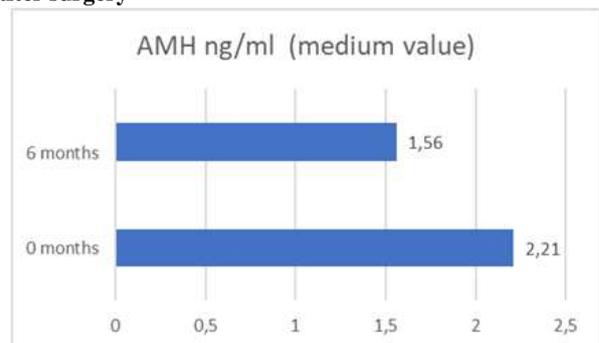
Regarding the ovarian reserve, there was a decrease of 0,65 ng/ml in the level of AMH at 6 months after surgery compared to the initial values.

There was also a 1.4 IU / ml increase in FSH levels 6 months after surgery compared to pre-surgery values.

**Table no. 2. Ovarian reserve results**

Parameter	Initial	6 months after surgery	The difference
AMH (medium value)	2.21 ng/ml	1.56 ng/ml	Down 0.65 ng/ml
FSH (medium value)	8.4 UI/ml	9.8 UI/ml	Up 1.4 UI/ml

**Figure no. 3. The value of the initial AMH and 6 months after surgery**



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**Figure no. 4. The value of the initial FSH and 6 months after surgery**



### DISCUSSIONS

The presence of endometrioma causes initial damage to ovarian tissue. The results of the study show a decrease in ovarian reserve following laparoscopic cystectomy. This is primarily due to the reduction of healthy ovarian tissue by sacrificing it during resection of the cystic capsule, as well as due to the need to obtain haemostasis by electrocoagulation. All these factors contribute to the deterioration of the ovarian cortex with the absence of vascularity which translates into decreased ovarian reserve.

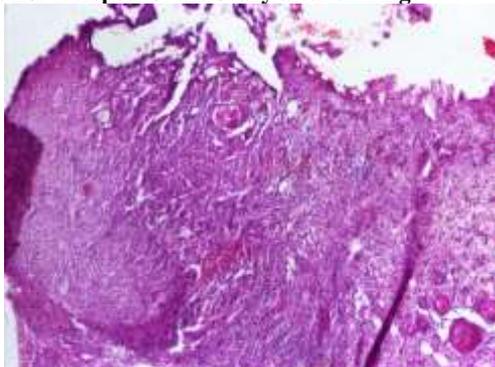
When performing haemostasis by bipolar coagulation, a heat transfer occurs to the ovarian tissue. Taking this into account, it goes without saying that the severity of the lesions on the ovarian cortex is directly proportional to the thermal gradient and the time of action. At the time of haemostasis, healthy ovarian tissue containing ovarian follicles is inevitably affected. This obviously translates into decreased ovarian reserve.

Reduction of ovarian reserve after surgery is inevitable regardless of the method used. Ovarian cystectomy is unanimously accepted when symptoms are present, but surgical treatment performed with the sole purpose of improving the reproductive prognosis is debatable given that data from the literature support the fact that ovarian reserve is diminished after surgery.

The data published in the literature show that electrocoagulation may result in a variable degree of tissue destruction dependent on the power used. (13),

A study conducted in Obstetrics and Gynecology clinic in 2021 shows that ovarian lesions grow slowly over time. The study included 6 premenopausal patients who underwent total hysterectomy with bilateral adnexectomy for uterine pathology, but with healthy ovaries. Monopolar coagulation at a depth of 8 mm was used. For each pair of ovaries, a power of 30.60, 90 watts was applied consecutively to one ovary for 4 seconds, and for the other ovary a power of 30 watts with the increase of the duration of action from 4 seconds to 6 seconds, and then 8 seconds.

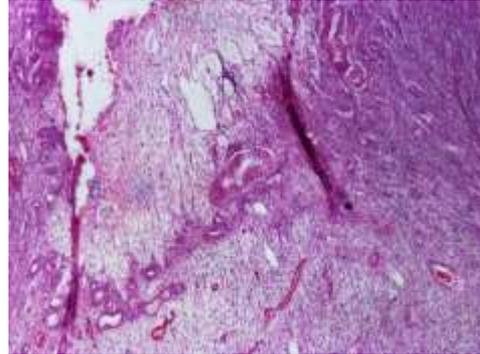
**Figure no. 5. Aspect of the ovary after drilling**



The conclusions of the study at that time were that when the same power is used, the ovarian lesions grow slowly over time. Tissue damage is more extensive at a higher power when the duration of action is the same reason why low power is preferable.

The number of drilling points must be calculated according to the device settings.(14)

**Figure no. 6 Aspect of the ovary after drilling - in both pictures there are clearly emphasized the central area of the lesion with irreversible tissue destruction and the peripheral area - the coagulation area with irreversible damages, the stasis area, and the hyperaemia area with gradient reducing in tissue destruction and possible return to normal tissue**



In 2019, Jung Liang et al published a study on the thermal effect of electrocoagulation on tissues. The study was performed on goat mesenteric vessels and describes the pathological aspects of the thermally damaged tissue.

First, in the mesenteric vessels, the occurrence of acute coagulation necrosis was observed. At the level of the outer layer of the lesion, carbonization or solidification was observed with the loss of the normal morphology of the cells. The solidification area showed cell elongation, cell membrane damage, uneven cytoplasm, broken nuclei, and fragmented nuclear material. Chromatin fused with the cytoplasm, and the epithelial tissue remained intact.(15)

In this paper 3 areas of the thermally damaged tissue are described as in the case of dermal burns described by Jackson in 1953. This is justified by the fact that electrocoagulation is basically, a burning lesion. The basic idea is that when we talk about tissue thermal damage, a much larger area of tissue is affected than what is seen.

Publications in the literature present comparative analysis studies between different surgical techniques used in the treatment of endometrioma. But these publications show that surgical treatment of endometrioma, regardless of the technique used, causes a decrease in ovarian reserve after surgery.(16,17,18,19,20)

The results of a prospective study conducted by Chang-Zhong Li et al in 2009, which included 191 patients show that using electrocoagulation after laparoscopic cystectomy is associated with decreased ovarian reserve.(21)

The question, still not answered is if we should surgically treat asymptomatic endometrioma in infertile women knowing that the ovarian reserve decreases after surgery and for which of these patients the cost-benefit ratio is favourable.

The decrease in the ovarian reserve is certainly the consequence of the fact that the tissues which surrounds the intended place of electrocoagulation are at risk of thermal injury.(18)

### CONCLUSIONS

Surgical treatment of endometriosis is followed by reduction of the ovarian reserve regardless of the technique

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used. Cystectomy is preferable to drainage or stripping and laser coagulation because it has the lowest frequency of recurrence. Coagulation should not be extensive to minimize the destructive effects on the ovarian parenchyma.

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