



Laboratory Predictors of Pregnancy Rates after Laparoscopic Cystectomy in Patients with Infertility

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Abstract

In order to achieve pregnancy the natural way in some cases of infertility the laparoscopy treatment required. Laparoscopy is a golden standard method of treating patients with infertility. Our goal was to evaluate main laboratory predictors of achieving pregnancy after laparoscopy in 54 patients with endometriosis of the ovary or recurrent functional cysts of the ovary failing to conceive for the first time within a year of regular sexual activity. We excluded women with blocked Fallopian tubes and those who have urgent or chronic metabolic disorders, as well as with a body mass index (BMI) > 25 kg/m².

Sperm samples for analysis was obtained from partners of women undergoing laparoscopy and was assessed manually under a microscope in accordance with the WHO criteria of 2010 after 3-5 days of sexual and alcohol abstinence. Couples with morphologically normal sperm without decrease of progressive motility were enrolled in this study. All patients were compatible by age, parity and duration of infertility. We divided them into two groups with endometriomas in first one and with functional cysts of the ovary in the second group. Levels of CA-125 and anti-Mullerian hormone (AMH) ng/ml were determined 1 month before and after laparoscopy in an approved laboratory. The presence of pregnancy was determined by means of ultrasound performed in the sixth week of its duration. As a result of laparoscopic treatment 42,58% of patients achieved pregnancy. This percent was significantly lower in the group with endometriomas vs group of patients with functional cysts (7 patients (35% of the group) vs. 16 patients (47,05%), $p < 0.007$ respectfully). A postoperative AMH level, we consider as more accurate prognostic tool for predicting results of infertility treatment with laparoscopy in women both with ovarian cysts and endometriosis.

Key words: endometriosis, cysts of the ovary, infertility, AMH level, pregnancy level.

INTRODUCTION

Human reproduction disorders affect a growing number of couples in our society. [1,2,3] Management of infertile couples in some cases requires laparoscopy. It gives a physician possibility to remove adhesions, endometrial lesions and ovarian cysts, evaluate tubes function with minimally invasive technique. [3] Success level of this method in achieving pregnancy depends basically on evaluation of the partner's reproductive potential.

The age of both partners of infertile couples, female ovarian reserve and Fallopian tubes proper function, although male sperm parameters are the main predictors of achieving pregnancy. Correct assessment of the chance of getting pregnant gives the opportunity to choose the appropriate method of treatment, so as not to lead to unnecessary waste of reproduction time. [3]

Endometriosis as well as large functional cysts of one or both ovaries in women of reproductive age may lead to infertility. Ovarian reserve reflects the quantity and quality of remaining follicles and may suffer from laparoscopic treatment of ovarian cysts [2,3]. Over the past decade, the serum anti-Mullerian hormone (AMH) level has been used as a quantitative marker of ovarian reserve and widely applied in routine clinical practice hence its measurement is not depends on the day of the menstrual cycle. [3,4] Outside the infertility treatment AMH level is

used to assess the post-operative level of the ovary damage resulting from cystectomy or chemotherapy. [3]

Laparoscopic cystectomy is the gold standard of treating endometriosis. Patients with ovarian cysts over

3 cm in diameter resistant to previous conservative treatment should also undergo laparoscopy. [3,4]. Evidence suggests that it results in a lower recurrence rate and higher spontaneous pregnancy rate than other types of treatment [4]. However, several studies have demonstrated the decrease of ovarian reserve in terms of serum AMH levels after laparoscopic cystectomy. The accidental loss of ovarian cortex and the damage caused by electrocautery have been proposed as possible causes for this decrease. [4]

There is an opinion that AMH level decreases straight after laparoscopic cystectomy. [3,4] On our best knowledge, there is a limited amount of post-operative middle-time and long-time follow up data on the influence of laparoscopic treatment of the large ovarian cyst on ovarian reserve. [4]

In this respect the main goal of this study was to evaluate the effect of laparoscopic treatment of endometriosis and large functional cysts of the ovary on chance to get pregnant naturally in women with previous case of infertility and compare the prognostic value of some laboratory criteria's in predicting pregnancy rate.

The study was conducted by making a prospective analysis of patients treated for the inability to obtain

offspring in 2015-2016 at gynecological department of the Samara State Regional Hospital named after V. D. Seredavin. 219 patients received laparoscopic treatment for infertility. Exclusion criteria were blocked Fallopian tubes, body mass index over 25 and other have urgent or chronic metabolic disorders. 2 patients with dermoid cysts of the ovary were excluded because it is a rare condition. Sperm samples for analysis was obtained from partners of women undergoing laparoscopy and was assessed manually under a microscope in accordance with the WHO criteria of 2010 after 3-5 days of sexual and alcohol abstinence. Couples with morphologically normal sperm without decrease of progressive motility were enrolled in this study. The stage of endometriosis was classified in four stages by means of the existing staging classification proposed by L. V. Adamyan and others in 2013.

In this study, we enrolled 54 patients compatible by age, parity and duration of infertility with planned laparoscopy treatment of the ovarian cysts. They were classified into 2 groups, the "endometriomas" group and the "large functional cyst" group, according to pre-operative ultrasound examination of the pelvis. The table shows their clinical characteristics, including data on the operation and the serum AMH and CA-125 levels. Intraoperative findings as follows: uni- and bilateral cyst of the ovaries, endometriomas of the ovaries, endometriosis of the peritoneum, adhesions. The presence of pregnancy if occurred was determined by means of ultrasound performed in the sixth week of its duration within a 6 month period after surgery.

The results were statistically analyzed using computer software. All values are presented as the mean, median, minimum and maximum values, standard deviation. In terms of qualitative characteristics, the

Fisher's direct test was used to detect the existence of differences between the compared groups. Checking the normal distribution of variables between groups was performed by using the means of the Mann-Whitney non-parametric test. To evaluate the significance of changes in AMH and CA-125 before and after laparoscopy, Student's *t*-test was used for dependent samples. Determinants of getting pregnant were performed using logistic regression. The level of significance was established at $p < 0.05$, indicating the existence of statistically significant differences or relationships.

Group characteristics are presented in chart 1. Pre-operatively larger cyst diameter in patients of group 1 was significantly higher than in group 2 (6.3 ± 2.2 cm vs 5.4 ± 1.9 cm respectively ($p < 0.203$). CA-125 level was also remarkably higher in the first group but not at the level to suspect malignancy.

As a result of laparoscopic treatment 42,58% of patients achieved pregnancy. This percent was significantly lower in the group with endometriomas vs group of patients with functional cysts (6 patients (30% of group) vs. 16 patients (47,05% of group), $p < 0.007$ respectively). A postoperative AMH level, we consider as more accurate prognostic criteria for achieving pregnancy the natural way after surgery.

In terms of appropriate patients selection and assessment of reproductive potential our study shows the legitimacy of the laparoscopic treatment of endometriosis and functional cysts of the ovaries in patients with problems in obtaining offspring. However, environmental factors also should be taken into account: it is known that food insecticides and pesticides may provoke ovary cysts [5]; some of them may act at very low doses [6].

The characteristic	Total amount of cases n = 54	Group 1 endometriosis n = 20	Group 2 Functional cysts n = 34	P
Age (years)	27 ± 4.3	27.5 ± 5.1	27.0 ± 4.4	0.711
Preoperative				
Cyst diameter 1 (cm)	6.2 ± 2.1	5.4 ± 1.9	6.3 ± 2.2	0.203
Cyst diameter 2 (cm)	3.3 ± 1.4	3.4 ± 1.1	3.2 ± 1.7	0.692
CA125 [IU/ml]	49.6 [20.0, 79.8]	54.8 [32.6, 85.1]	19.8 [9.6, 25.1]	0.246
Intraoperative				
Unilateral/bilateral process [n (%)]	33 (60) / 21 (40)	10 (71) / 4 (29)	28 (72) / 11 (28)	0.009
AMH levels [ng/ml]				
Preoperative	2.73 [1.49, 5.57]	1.92 [0.50, 6.92]	2.98 [1.63, 5.27]	0.552
1 month post-operative	1.53 [0.49, 3.19]	0.59 [0.15, 2.40]	1.99 [0.75, 3.20]	0.049
Total Amount of pregnancies achieved	23 (42, 59 % of total surgeries)	6 (30% of group)	16 (47,05% of group)	0.007

Note: Cyst size 1 represents the mean diameter of larger cysts, both bi- or unilateral. Cyst size 2 represents the mean diameter of the smaller cyst in patients with bilateral cysts. The values are presented as the mean ± standard deviation or median.

Chart 1. Group characteristics

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