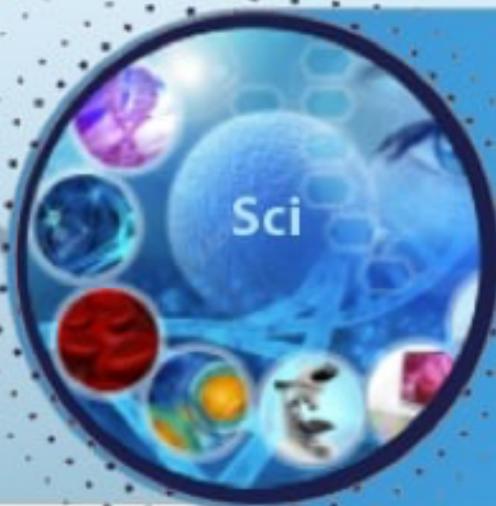
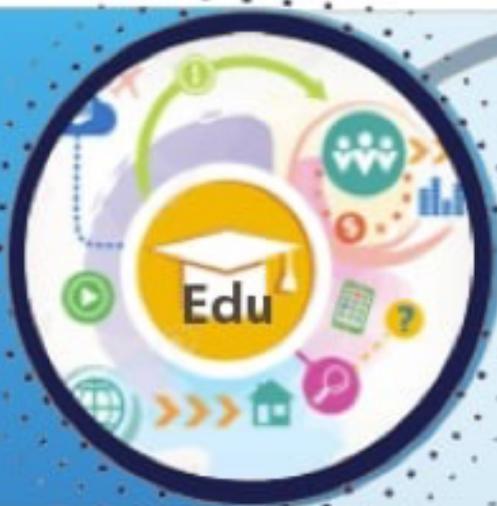




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# Comparative Analysis of the Effectiveness of Various Laparoscopic Operations in the Treatment of Infertility in Women due to Polycystic Ovary Syndrome

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## ABSTRACT

**Background.** Polycystic ovary syndrome (PCOS) is one of the most common endocrine disorders in women of reproductive age. The aim of the study is to conduct a comparative analysis of the effectiveness of various types of laparoscopic interventions in the treatment of women with infertility caused by polycystic ovary syndrome.

**Materials.** The study involved 100 women who underwent laparoscopic surgery for infertility caused by polycystic ovary syndrome. Of these, 50 (group I) women underwent laparoscopic ovarian decortication surgery, and 50 (group II) women underwent laparoscopic ovarian cauterization.

**Results.** The average age of the patients was  $25.8 \pm 0.98$  years. Among them, 59.3% had primary infertility, and 40.7% had secondary infertility. The average duration of infertility ranged from 2 to 6 years. Laparoscopic decortication of both ovaries was performed in 50 women (50.0%) with a size of  $12.5 \pm 0.51$  cm<sup>3</sup>, and in 50 women (50.0%) with a size of  $10.2 \pm 0.42$  cm<sup>3</sup> or less, ovarian cauterization was performed ( $p < 0.01$ ).

**Conclusion.** The use of laparoscopy in the treatment of infertility in women due to polycystic ovary syndrome is considered an effective method of reproductive surgery leading to the restoration of the menstrual cycle and restoration of reproductive function. According to our study, the use of laparoscopy led to the restoration of menstrual function in 90% of women, the onset of uterine pregnancy in 86.3% of women who underwent ovarian decortication surgery, and in 85.4% of women who underwent ovarian cauterization surgery.

**Keywords:** Polycystic ovary syndrome, infertility, laparoscopy, ovarian cauterization, ovarian decortication

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## INTRODUCTION

**P**olycystic ovary syndrome (PCOS) is one of the most common endocrine pathologies among women of reproductive age [1-5].

It is characterized by hormonal disorders, abnormal menstrual cycles, hyperandrogenism and cystic ovarian changes [6-11].

As a result of these changes, women with polycystic ovary syndrome often face infertility problems [12-15].

The treatment of infertility caused by polycystic ovary syndrome is a complex task in the field of reproductive medicine [16-20].

There are several methods of treating PCOS, including drug therapy and surgical interventions [21-25].

Laparoscopic operations, such as decortication of the ovaries and cauterization of the ovaries, are one of the important surgical methods for the treatment of polycystic ovary syndrome [26-31].

However, despite the widespread use of laparoscopic operations, there is a need to conduct a comparative analysis of the effectiveness of various methods of surgical intervention in the treatment of infertility in women with polycystic ovary syndrome.

Such an analysis will determine the most effective method and, possibly, improve the results of treatment. In this regard, a comparative analysis of the effectiveness of various types of laparoscopic interventions in the treatment of infertility in women caused by polycystic ovary syndrome is an urgent study [32-35].

It will allow to determine which of the available methods of surgical treatment can be the most effective and safe for patients with this diagnosis.

The aim of the study is to conduct a comparative analysis of the effectiveness of various types of laparoscopic interventions in the treatment of women with infertility caused by polycystic ovary syndrome.

## MATERIALS AND METHODS

**T**he study involved 100 women who underwent laparoscopic surgery for infertility caused by polycystic ovary syndrome.

Of these, 50 (group I) women underwent laparoscopic ovarian decortication surgery, and 50 (group II) women underwent laparoscopic ovarian cauterization.

All patients were operated in the gynecology department of the obstetric complex # 9 in Tashkent for 2021-2023.

The average age of the patients was  $25.8 \pm 0.98$  years. Among the patients, 59.3% had primary infertility, and 40.7% had secondary infertility.

The duration of infertility was from 2 to 6 years. All patients underwent a comprehensive examination, which included clinical and laboratory, hormonal, transvaginal ultrasound scanning, laparoscopy, and hysteroscopy. Endosurgical treatment of patients with infertility was carried out by two methods: laparoscopic decortication of the ovaries and cauterization of the ovaries.

Laparoscopic operations were performed according to a generally accepted technique using Karl Storz equipment. To evaluate the effectiveness of various methods of laparoscopic interventions, the following indicators were used: the frequency of restoration of menstrual function and the frequency of uterine pregnancy. The data obtained were processed using the statistical software package «Statistika 6.0».

## RESULTS

**A**s a result of the study, infertility associated with ovulation disorder - polycystic ovary syndrome - was revealed in all 100 women. In PCOS, 2 types of laparoscopic surgery were mainly used: electrocauterization (50 patients) and decortication of the ovaries (50 patients).

Laparoscopic cauterization of polycystic ovaries was performed using a monopolar needle electrode. The decortication of the ovaries was carried out in the following way: the ovary was seized by toothed forceps for the free pole and, depending on its volume, incisions were made 5-8 mm long, 6-8 in each ovary.

The long-term results of endosurgical operations were evaluated by the method of conducting a prospective study of women: the restoration of menstrual function and the onset of uterine pregnancy were considered.

Restoration of menstrual function occurred in 90 women (90%). The assessment of the restoration of menstrual function was carried out based on data on the presence of two-phase rectal temperature, folliculometry using ultrasound and fertility restoration in women suffering from infertility due to PCOS.

In 80.0% of patients, already in the first days after surgery, a menstrual-like reaction was observed, which is considered a positive endometrial response to endocrine rearrangement due to surgical intervention on the ovaries.

In addition, we evaluated the results of surgical treatment of 100 patients with PCOS, depending on the type of surgery.

The total number of cases of uterine pregnancy was 86.3% in women who underwent ovarian decortication

surgery and 85.4% in women who underwent ovarian cauterization surgery.

Laparoscopy demonstrates high efficiency in the treatment of PCOS. This is due to the safety of minimally invasive endoscopic intervention, minimal drug load in the form of painkillers and transfusions, the shortest duration of hospitalization, rapid recovery, and cosmetic effect, which brings satisfaction to patients. Our data confirm that the use of laparoscopy contributes to the complete diagnosis of the causes of infertility and their correction using minimally invasive methods, which increases the frequency of pregnancy in women.

When choosing laparoscopic treatment for women with polycystic ovarian syndrome (PCOS), we took into account the size of the ovaries: in 50 women (50%), the size of the ovaries was  $12.5 \pm 0.51 \text{ cm}^3$ , and in 50 (50%) –  $10.2 \pm 0.42 \text{ cm}^3$ .

Laparoscopic decortication of both ovaries was performed in 50% of women with a size of  $12.5 \pm 0.51 \text{ cm}^3$ , and in 50% of women with a size of  $10.2 \pm 0.42 \text{ cm}^3$  or less, ovarian cauterization was performed ( $p < 0.01$ ).

Concomitant pathology of the fallopian tubes was revealed in 26 patients, 26.0%, who underwent laparoscopic surgery for polycystic ovary syndrome. Information on the structure of concomitant diseases detected during laparoscopic operations is presented in Table 1.

**Table 1**  
The structure of concomitant pathology revealed during laparoscopic operations for polycystic ovary syndrome, n/%

Name	Group I, (n=50)		Group II, (n=50)		Total (n=100)	
	abs	%	abs	%	abs	%
Adhesions in the area of fimbriae (n=15)	6	12,0±0,02	9	18,0±0,12	15	15,0±10,1
Obstruction of pipes in the ampullary department (n=8)	3	6,0±0,01	5	10,0±0,02	8	8,0±0,04
Adhesive process of II – III degree, (n=3)	2	4,0±0,12	1	2,0±0,02	3	3,0±0,14

Of 26 (26.0%) patients with concomitant pathology, 15 (15.0±10.1%) had adhesions in the fimbrial region, 8 (8.0±0.04%) had a violation of the patency of the ampullary part of the fallopian tube, and in 3 cases (3.0±0.14%) the adhesive process of II-III degree.

Thus, in 15.0±10.1 of these patients, salpingo-oovariofimbriolysis was performed, in 8.0±0.04 - salpingostomy, in 3±0.14 - laparoscopic adhesiolysis.

All women who underwent laparoscopic surgery for PCOS underwent chromotubation at the end of the operation to check the restoration of patency of the fallopian tubes.

**Table 2**  
The volume of endosurgical surgery for combined pathology with benign structural changes of the ovaries, n /%

Name	Group I, (n= 50 )		Group II, (n= 50 )		Total	
	abs	%	abs	%	abs	%
Adhesions in the area of fimbriae (n=15)	6	12,0±0,02	9	18,0±0,12	15	15,0±10,1
Obstruction of pipes in the ampullary department (n=8)	3	6,0±0,01	5	10,0±0,02	8	8,0±0,04
Adhesive process of II – III degree, (n=3)	2	4,0±0,12	1	2,0±0,02	3	3,0±0,14

There was no significant difference ( $p > 0.05$ ) between the comparison groups in terms of blood loss and duration of laparoscopic surgery. There were no complications during laparoscopic surgery. Laparoscopic surgery was completed by thorough washing of the abdominal cavity with 0.9% NaCl solution using an aquapurator. On the 2nd day of laparoscopic surgery, 91 (91.0%) patients had menstrual bleeding as a positive endometrial reaction to laparoscopic surgery performed on the ovaries.

We conducted a comparative assessment of the duration of surgery depending on the type and volume of laparoscopic surgery. The duration of laparoscopic surgery averaged  $32.1 \pm 28.76$  minutes, from 20 to 40 minutes.

The average duration of the operation in group I was  $32.29 \pm 29.12$  minutes, in group II -  $34.26 \pm 27.15$  minutes. In the presence of concomitant pathology of the fallopian tubes and uterine cavity, the duration of laparoscopic surgery ranged from 35 minutes to 40 minutes, on average  $40.1 \pm 28.76$  minutes. We did not see any significant differences when comparing the duration of the operation depending on the type and volume of laparoscopic surgery ( $p > 0.005$ ).

In addition, we also analyzed the number of patient bed days. In 74 (74.0%) patients, the hospital stay was 1 day, in 26 (26.0%) patients — up to 2 days.

The average bed-day, when analyzing the average length of stay of patients in one bed, was  $1.33 \pm 2.61$  days. The average length of stay in bed in patients who underwent laparoscopic surgery was  $1.16 \pm 2.27$  days ( $p > 0.05$ ).

Laparoscopic operations were performed in 74.0%, spinal anaesthesia in combination with intravenous anaesthesia and endotracheal anaesthesia - in 26.0%. Intravenous anaesthesia in combination with spinal anaesthesia was more often used in laparoscopic operations in 54.5% of group I patients and 40.1% of group II patients.

The long-term results of laparoscopic surgery for polycystic ovary syndrome were evaluated by conduct-

ing a prospective study in women: the severity of menstrual function restoration and the severity of pregnancies were evaluated. Restoration of menstrual function was observed in 90.0% of women, and restoration of menstrual function was assessed according to two-phase rectal temperature, folliculometry in Ultrasound diagnostics and detection of signs of ovulation.

In addition, depending on the type of laparoscopic surgery used, we evaluated the long-term results of endosurgical treatment in 100 patients who underwent surgery, pregnancy occurred in 86.0% of patients and amounted to 85.8% - 85.6%, respectively, in the groups. As can be seen, the results after the operation of decortication of the ovaries and cauterization of the ovaries were the same.

Thus, the laparoscopy method is highly effective in the treatment of PCOS. This is due to the advantage of laparoscopic surgery, fewer days of hospital stay, the use of fewer medications, less invasive cosmetic effect and faster recovery. According to our data, the use of laparoscopy in the treatment of infertility associated with PCOS increases the likelihood of pregnancy, considering it an effective method of diagnosing concomitant pathologies of the uterus and eliminating these pathologies.

## DISCUSSION

**P**olycystic Ovary syndrome (PCOS) is a common endocrine disorder that affects women of reproductive age [1-3].

This syndrome got its name because of the characteristic feature when the ovaries become enlarged and contain many small, liquid cysts (polycystic). PCOS is one of the most common endocrine disorders in women of reproductive age [5-7].

It can lead to various hormonal disorders and infertility, which makes it a serious problem for women's health.

Currently, the role of laparoscopic operations in the treatment of PCOS patients is increasing. Laparoscopic surgery also helps to identify and eliminate infertility associated with polycystic ovary syndrome, as well as concomitant diseases associated with PCOS, and in these cases surgical interventions are an effective way to restore a woman's reproductive function.

Thus, the use of laparoscopic surgical methods in cases of ineffectiveness of conservative therapy in the treatment of women with infertility associated with PCOS allows for measures aimed at restoring the menstrual cycle and reproductive functions in the diagnosis of the causes of infertility associated with PCOS. We

would like to emphasize that the problem of infertility associated with polycystic ovary syndrome can be solved only with an integrated approach. Thus, the results of our study proved the high efficiency of laparoscopic operations in restoring reproductive function in women with infertility associated with polycystic ovary syndrome.

The use of laparoscopy in the treatment of infertile women with polycystic ovary syndrome is considered an effective method of reproductive surgery, leading to the restoration of the menstrual cycle in 90.0% and the restoration of reproductive activity in 85.5%. In our study, we conducted a comparative analysis of two laparoscopic operations - decortication and cauterization of the ovaries. Our results showed that the effectiveness of both methods is high, but the decortication of the ovaries showed slightly higher success rates (86.3%) compared to the cauterization of the ovaries (85.4%).

An important aspect of the analysis was the duration of infertility in patients. Considering that the average duration of infertility ranged from 2 to 6 years, it was interesting to find out which method is more effective in such cases. The results showed that both methods were effective, regardless of the duration of infertility for both patients with primary and secondary infertility. This confirms the wide range of applicability of laparoscopic operations in polycystic ovary syndrome. Our results are of practical importance, as they can help doctors and patients make more informed decisions regarding the choice of surgical intervention in the treatment of infertility.

In conclusion, our study confirms that both decortication and cauterization of the ovaries are effective methods of treating infertility in women with polycystic ovary syndrome. However, our data show that decortication may be slightly more effective in this patient population. Doctors and patients can use these results when making treatment decisions, but it is important to consider the individual characteristics of each patient and consult with medical specialists to choose the optimal treatment plan.

## CONCLUSION

**T**he use of laparoscopy in the treatment of infertility in women due to polycystic ovary syndrome is considered an effective method of reproductive surgery leading to the restoration of the menstrual cycle and restoration of reproductive function. According to our study, the use of laparoscopy led to the restoration of menstrual function in 90% of women, the onset of uterine pregnancy in 86.3% of

women who underwent ovarian decortication surgery, and in 85.4% of women who underwent ovarian cauterization surgery.

**Ethics approval and consent to participate** - All patients gave written informed consent to participate in the study.

**Consent for publication** - The study is valid, and recognition by the organization is not required. The author agrees to open publication.

**Availability of data and material** - Available.

**Competing interests** - No.

**Financing** - No financial support has been provided for this work.

**Conflict of interest** - authors declares that there is no conflict of interest.

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**AYOLLARDA TUXUMDONLAR POLIKISTOZ  
SINDROMI BILAN BOG'LIQ BEPUSHTLIKNI  
DAVOLASHDA TURLI LAPAROSKOPIK JAR-  
ROXLIK AMALIYOTLARI SAMARADORLIGINI  
QIYOSIY TAHLILI**

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**ABSTRAKT**

**Dolzarbliqi.** Tadqiqotning maqsadi tuxumdonlar polikistoz sindromi bilan bog'liq bepusht ayollarni davolashda har xil turdagi laparoskopik jarroxlik amaliyotlari samaradorligini qiyosiy tahlil qilishdan iborat.

**Materiallar.** Tadqiqotda tuxumdonlar polikistoz sindromi bilan bog'liq bepushtlik sababli laparoskopik jarroxlik amaliyotini o'tkazgan 100 nafar ayollar ishtirok etdi. Ulardan 50 nafar (I-guruh) ayollar laparoskopik tuxumdonlar dekortikatsiyasi jarroxlik amaliyoti o'tkazgan, 50 nafar (II-guruh) ayol laparoskopik tuxumdonlar kauterizatsiyasi jarroxlik amaliyotini o'tkazgan.

**Natijalar.** Bemorlarning o'rtacha yoshi  $25,8 \pm 0,98$  yoshni tashkil etdi. Ular orasida 59,3% birlamchi bepushtlik, 40,7% ikkilamchi bepushtlik bilan kasallangan. Bepushtlikning o'rtacha davomiyligi 2 yildan 6 yilgacha bo'lgan. Ikkala tuxumdonning laparoskopik dekortikatsiyasi 50 nafar ayolda (50,0%)  $12,5 \pm 0,51 \text{ sm}^3$ , 50 ayolda (50,0%)  $10,2 \pm 0,42 \text{ sm}^3$  yoki undan kam bo'lgan tuxumdon kauterizatsiyasi jarroxlik amaliyotlari amalga oshirildi ( $p < 0,01$ ).

**Xulosa.** Laparoskopiyadan foydalanish ayollarning 90% hayz ko'rish funksiyasini tiklashga, tuxumdonlar dekortikatsiyasi jarroxlik amaliyoti qo'llanilgan ayollarning 86,3% va tuxumdonlarni kauterizatsiya jarroxlik amaliyotini o'tkazgan ayollarning 85,4% homilador bo'lishligiga olib keldi.

**Kalit so'zlar:** tuxumdonlar polikistoz sindromi, bepushtlik, laparoskopiya, tuxumdonlar kauterizatsiyasi, tuxumdonlar dekortikatsiyasi

**СРАВНИТЕЛЬНЫЙ АНАЛИЗ ЭФФЕКТИВНОСТИ  
РАЗЛИЧНЫХ ЛАПАРОСКОПИЧЕСКИХ  
ОПЕРАЦИЙ ПРИ ЛЕЧЕНИИ БЕСПЛОДИЯ У  
ЖЕНЩИН, ОБУСЛОВЛЕННОГО СИНДРОМОМ  
ПОЛИКИСТОЗНЫХ ЯИЧНИКОВ**

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**АБСТРАКТ**

**Актуальность.** Цель исследования провести сравнительный анализ эффективности различных видов лапароскопических вмешательств, при лечении женщин с бесплодием, обусловленным синдромом поликистозных яичников.

**Материал и методы.** В исследовании приняли участие 100 женщин, перенесших лапароскопические операции по поводу бесплодия, обусловленного синдромом поликистозных яичников. Из них 50 (I-группа) женщин перенесли лапароскопическую операцию декортикации яичников, а 50 (II группа) - лапароскопическую kautеризацию яичников.

**Результаты.** Средний возраст пациенток составил  $25,8 \pm 0,98$  года. Среди них 59,3% имели первичное бесплодие, а 40,7% - вторичное. Средняя продолжительность бесплодия составляла от 2 до 6 лет. У 50 женщин (50,0%) с размером  $12,5 \pm 0,51 \text{ см}^3$  провели лапароскопическую декортикацию обоих яичников, а у 50 женщин (50,0%) с размерами  $10,2 \pm 0,42 \text{ см}^3$  и менее провели kautеризацию яичников ( $p < 0,01$ ).

**Заключение.** По данным нашего исследования, применение лапароскопии привело к восстановлению менструальной функции у 90% женщин, наступления маточной беременности у 86,3% женщин, перенесших операцию декортикации яичников, и у 85,4% женщин, перенесших операцию kautеризации яичников.

**Ключевые слова:** синдром поликистозных яичников, бесплодие, лапароскопия, kautеризации яичников, декортикация яичников