Al-Azhar International Medical Journal

Volume 3 | Issue 8 Article 10

8-1-2022

The effect of bipolar electro-coagulation during ovarian cystectomy versus suture on ovarian reserve

Yassin Rady
Obstetrics and Gynecology, Damanhour National Medical Institute. Egypt, yassinmrn@gmail.com

Abdelmenam zakaria
Department of Obstetrics and Gynecology, Faculty of Medicine, Al-Azhar University, Egypt, abdelmenamzakaria91@yahoo.com

Ahmed saeed
Obstetrics & Gynaecology, Faculty of Medicine – Al-Azhar University,Cairo,Egypt, drcasper84@yahoo.com

How to Cite This Article

Rady, Yassin; zakaria, Abdelmenam; and saeed, Ahmed (2022) "The effect of bipolar electro-coagulation during ovarian cystectomy versus suture on ovarian reserve," *Al-Azhar International Medical Journal*: Vol. 3: Iss. 8, Article 10.
DOI: https://doi.org/10.21608/aimj.2022.120308.1834

OPEN AIMJ ORIGINAL ARTICLE

The Effect of Bipolar Electro-Coagulation During Ovarian Cystectomy Versus Suture on Ovarian Reserve

Obstetrics & Gynecology

Yassin Mohammed Yassin Rady [1,*] M.B.B.Ch, Abd El-Moneim Mohammed Zakaria [2] MD and Ahmed Mohammed saeed [2] MD.

**Corresponding Author:*
Yassin Mohammed Yassin Rady
yassinmrn@gmail.com

Received *for publication February 13, 2022;* ***Accepted*** *August 31, 2022;* ***Published online*** *August 31, 2022.*

doi: *10.21608/aimj.2022.120308.1834*

Citation: *Yassin M. , Abd El-Moneim M. and Ahmed M. The Effect of Bipolar Electro-Coagulation During Ovarian Cystectomy Versus Suture on Ovarian Reserve. AIMJ. 2022; Vol.3-Issue8 : 55-60.*

[1]Resident of Obstetrics and Gynecology Department, Damanhour National Medical Institute, Egypt.

[2]Obstetrics and Gynecology Department, Faculty of Medicine, Al-Azhar University Cairo, Egypt.

ABSTRACT

Background: Small incisions, reduced pain, lower wound rates of infection, faster ambulation, and faster recovery are all benefits of laparoscopic ovarian cystectomy. Nevertheless, there are concerns regarding ovarian reserve in connection to the operative and hemostatic procedures utilized during the procedure.

Aim of the work: To see how bipolar electrocoagulation and suture affected ovarian reserve following ovarian cystectomy.

Patients and methods: Prospective observational randomized study included a sample of 50 women with ovarian cyst. Patients were randomly assigned to one of two groups: sutures (25 patients) or bipolar electro-coagulation (25 patients). All patients underwent ovarian cystectomy.

Results: At three months following surgery, there has been no statistically significant difference in FSH levels between the suture group and the bipolar electro-coagulation group. While the suture group's mean FSH value was statistically lower than the bipolar electro-coagulation group's at 6 months after surgery. At 3 and 6 months after surgery, there has been no statistically significant difference in AMH between the suture group and the bipolar electro-coagulation group. At 3 and 6 months following surgery, there has been no statistically significant difference in antral follicle count (AFC) between the suture group and the bipolar electro-coagulation group. Mean value of AMH was statistically higher at day 3 of menstrual cycle than at 3and 6 months after the surgery among bipolar electro-coagulation group.

Conclusion: FSH increased more in the bipolar electro cauterization group 6 months after surgery than in the homeostatic suturing group, possibly indicating more ovarian reserve loss in the former.

Keywords: *Bipolar electro; Coagulation; Ovarian cystectomy; Suture; Ovarian reserve.*

Disclosure: *The authors have no financial interest to declare in relation to the content of this article. The Article Processing Charge was paid for by the authors.*
Authorship: *All authors have a substantial contribution to the article.*

INTRODUCTION

A fluid-filled sac that originates inside the ovaries is known as an ovarian cyst. It occurs in nearly all reproductive-age women, as well as 18% of postmenopausal women. Laparoscopy has already been a core component in the therapy of benign masses over the last twenty years, and it is now deemed the "gold standard" for the removal of benign ovarian cysts. Small incisions, decreased pain, reduced wound-infection rates, fast mobility, and short time for recovery all are benefits of laparoscopic ovarian cystectomy versus laparotomy; nonetheless, there are questions regarding ovarian reserve in association to cystectomy surgical and hemostatic procedures. [1]

The inoculation of the cyst wall is accompanied either by bipolar electrocoagulation or simple suturing of the remnant ovarian tissue to achieve appropriate hemostasis in ovarian cystectomy. Previous research has revealed that surgical intervention with ovarian cysts, particularly endometriomas, can reduce ovarian reserve. Although there are few publications on the effect of hemostatic electrocoagulation compared to suturing on ovarian function in child bearing period female with non-malignant ovarian cysts. [2]

Because electrocoagulation is a safe and dependable procedure, it is widely employed during laparoscopic surgery. Electrocoagulation for hemostasis following laparoscopic ovarian cystectomy may result in increased loss of normal ovarian tissue. As a result, many medical institutes have utilized alternate ways

to limit ovarian tissue hemorrhage after cystectomy, such as hemostatic sealants. [3]

Serum levels of FSH, AMH, LH, estradiol, LH/FSH ratio, inhibin B, and sonographic parameters, including average ovarian diameter, ovarian volume, AFC, and PSV of the ovarian artery, have all been suggested as non-invasive indicators to assess ovarian reserve. The most sensitive of these indicators appear to be AMH and AFC. [4]

It is unknown if the detrimental impact of cyst removal on ovarian reserve is caused by the use of bipolar electrocoagulation, which could possibly harm the ovarian follicles, or if it is caused by the unintentional removal of healthy ovarian tissue after benign cyst removal. [5]

Endometriomas and non-malignant adnexal lesions are commonly treated with laparoscopic surgery. It is superior because of its small incisions, reduced pain, lower wound rates of infection, faster ambulation, and rapid healing. Nevertheless, there are worries regarding the ovarian reserve following ovarian cystectomy due to the surgical approach used. There has been a decrease in ovarian reserve and a higher incidence of failure of the ovary following the laparoscopic removal of endometriomas in patients with infertility..[6]

Only a few cases have been studied to determine the effect of coagulation vs suturing on ovarian reserve in child-bearing period females with non-malignant ovarian cysts.[7]

The goal of this research was to determine if there was a difference in ovarian reserve following ovarian cystectomy between bipolar electrocoagulation and suture haemostasis.

PATIENTS AND METHODS

An observational randomized prospective study including 50 women with ovarian cysts has been undertaken at the Obstetrics and Gynecology department, Al-Hussein University Hospital, and Damanhour National Medical Institute. Patients were randomly assigned to one of two groups: sutures (25 patients) or bipolar electro-coagulation (25 patients). All patients had an ovarian cystectomy. Prior to participating in our study, we obtained informed consent from the patients.

Inclusion criteria:

Woman who fulfilled to the following criteria were included in the study:

The study involved patients between the ages of 18 and 40 who had been diagnosed with persistent benign ovarian cysts larger than 5 cm and were scheduled to have laparoscopic surgery after other therapies had failed. All of the ladies who were enrolled were in good enough health to undergo the surgery. For all women who have had persistent ovarian cysts for more than three months.

Exclusion criteria:

Patients who had ovarian surgery subsequently were not included in the research. Women having a very low or high BMI, irregular menstrual cycles, endocrine disorders, a prior history of gynecologic surgery, a family history of early ovarian failure, or infertility were also removed from the research.

Ethical consideration:

The ethics committee of AL Azhar University's Faculty of Medicine approved the study protocol. Every patient who participated in the study gave their verbal and written consent.

The consent contained:

The study's objective should be explained in a simple way that is understandable to the general public.

No harmful manoeuvre's will be performed or used.

All data will be kept confidential and will not be shared outside of the study without permission.

At any time, the researcher's phone number and all possible communication methods were identified for explanation.

All participants were announced by the result of study.

Participants had the right to quit the research at any moment for any reason, and were subsequently excluded from it.

Personal history, obstetric history, menstrual history, current history (urinary symptoms and gynecological symptoms), previous history, and the abdomen and pelvis examination were all taken.

Obstetric history included gravidity, parity, time, type and site of previous delivery, number of children, abortion (regarding gestational age, possible cause, treatment received, method of termination, any complication happened in the post abortive period and time of last abortion).

Investigations was done to all patient includes routine investigations (complete blood count, coagulation profile, virology screening, blood group, Rh. group) and ultrasounds scan to assess the ovarian cyst.

On the third day of menstruation, blood specimens were taken from every subject for analysis of serum FSH and AMH. Ovarian antral follicle counts on day three of menstruation, three and six months following surgery for the affected ovary. For the US examination, a 5–6 MHz transvaginal transducer was employed.

Two surgeons conducted laparoscopic ovarian cystectomy on all subjects. All of the participants have been operated on in a supine posture with their legs extended and their arms tucked alongside their bodies in a 25° Trendelenburg position. A Veress needle was used to establish pneumoperitoneum, and a 10-mm optic trocar was introduced through the abdomen. The intraabdominal CO2 pressure has been adjusted between 13 and 15 mmHg. Two ancillary trocars have been placed in the lower abdomen quadrants on the left and right. The ovaries have been exposed after the abdomen and pelvis have been explored. With traction and counter-traction by atraumatic graspers, the cyst wall has been unroofed

and the cyst has been enucleated intact. Micro scissors have been employed when necessary. Hemostasis has been acquired by bipolar coagulation in 25 cases by using 35–40 W current bipolar coagulation with every site's exposure time limited to 1 second and by intra-corporeal sutures (2/0 Polyglactin) in 25 cases by knot tying. Endobag has been used to retrieve cysts.

Data has been obtained, coded, revised, and entered into IBM SPSS version 20 (Statistical Package for Social Science). The qualitative data has been represented as numbers and percentages, whereas the quantitative data has been represented as mean, standard deviations, and ranges, with a parametric distribution. $P < 0.05$: Significant (S)

RESULTS

		Suture group	Bipolar electro-coagulation group	t.test	P. value
Age	**Mean ± SD**	**29.08± 2.17**	**28.92± 2.25**	**.255**	**.800**

Table 1: Comparison of the Suture and the Bipolar Electro-coagulation groups concerning age. There has been no statistically significant difference between the Suture and bipolar electro-coagulation groups regarding age.

		Suture group	Bipolar electro-coagulation group	t.test	P. value
FSH	Mean ± SD	5.31± 1.03	4.88± .917	1.538	**.131**
AMH at day 3 of menstrual cycle	Mean ± SD	2.95± 1.09	3.08± 1.10	-.393-	**.696**
antral follicle count at day 3 of monthly period	**Mean ± SD**	**4.84± 1.72**	**4.84± 1.86**	**.000**	**1.00**

Table 2: Comparison of Suture and bipolar electro-coagulation groups concerning FSH and AMH, FSH and AMH and the count of antral follicles on the third day of the monthly period. There has been no statistically significant difference between Suture and bipolar electro-coagulation groups regarding FSH and AMH, FSH and AMH, and the count of antral follicles on the third day of the monthly period.

		Suture group	Bipolar electro-coagulation group	t.test	P. value
FSH at 3 months after the surgery	Mean ± SD	5.66± 1.04	5.55± 1.02	.368	**.714**
AMH at 3 months after the surgery	Mean ± SD	2.72± 1.09	2.63± 1.07	.289	**.774**
antral follicle count at 3 months after the surgery	**Mean ± SD**	**5.80± 2.29**	**5.60± 2.34**	**.305**	**.762**

Table 3: Comparison of suture and bipolar electro-coagulation groups concerning FSH, AMH, and count of antral follicles at 3 months following the surgery. At 3 months following the surgery, there was no statistically significant difference between the Suture and bipolar electro-coagulation groups regarding FSH, AMH, and the count of antral follicles.

		Suture group	Bipolar electro-coagulation group	t.test	P. value
FSH at 6 months after the surgery	Mean ± SD	5.68± 1.05	6.77± 1.24	-3.328-	**.002**
AMH at 6 months after the surgery	Mean ± SD	2.71± 1.09	2.60± 1.06	.358	**.722**
antral follicle count at 6 months after the surgery	**Mean ± SD**	**6.48± 2.66**	**6.48± 2.27**	**.000**	**1.000**

Table 4: Comparison between Suture and bipolar electro-coagulation groups regarding FSH, AMH, and count of antral follicles at 6 months following the surgery. The mean value of FSH at 6 months following the surgery was statistically lower in the suture group compared to the bipolar electro-coagulation group (5.68; 6.77), P=0.002. There have been no statistically significant differences between the suture group and the bipolar electro-coagulation group regarding AMH and the count of antral follicles at 6 months following the surgery.

	Suture group	t.test	P. value
	Mean ± SD		
FSH at day 3 of menstrual cycle	5.31± 1.03	-16.582	**.000**
FSH at 3 months after the surgery	5.66± 1.04		
FSH at day 3 of menstrual cycle	5.31± 1.03	-16.804	**.000**
FSH at 6 months after the surgery	5.68± 1.05		
FSH at 3 months after the surgery	5.66± 1.04	-3.630	**.001**
FSH at 6 months after the surgery	**5.68± 1.05**		

Table 5: shows the relationship between FSH on day 3 of the menstrual cycle and FSH 3 and 6 months after surgery, as well as FSH 3 months postsurgical and FSH 6 months postsurgical in the Suture group. The mean value of FSH at day 3 of the monthly cycle was statistically lower than FSH at 3 months after the surgery among the Suture group (5.31; 5.66) P=0.000. Mean value of FSH at day 3 of menstrual cycle was statistically lower than FSH at 6 months after the surgery among Suture group (5.31; 5.68) P=0.000. Mean value of FSH at 3 months was statistically lower than FSH at 6 months after the surgery among Suture group (5.66; 5.68) P=0.001.

	Suture group	t.test	P. value
	Mean ± SD		
AMH at day 3 of menstrual cycle	2.95± 1.09	39.294	**.000**
AMH at 3 months after the surgery	2.72± 1.09		
AMH at day 3 of menstrual cycle	2.95± 1.09	35.925	**.000**
AMH at 6 months after the surgery	2.71± 1.09		
AMH at 3 months after the surgery	2.72± 1.09	3.418	**.002**
AMH at 6 months after the surgery	**2.71± 1.09**		

Table 6: shows the relationship between AMH on day 3 of the menstrual cycle and (AMH 3 months postsurgical, AMH 6 months postsurgical, and AMH 6 months postsurgical) in the Suture group. Mean value of AMH at day 3 of menstrual cycle was statistically higher than AMH at 3 months after the surgery among Suture group (2.95; 2.72) P=0.000. Mean value of AMH at day 3 of menstrual cycle was statistically higher than AMH at 6 months after the surgery among Suture group (2.95; 2.71) P=0.000. Between 3 and 6 months postsurgical, there had been a statistically significant difference in AMH in the Suture group.

	Suture group	t.test	P. value
	Mean ± SD		
AFC on day 3 of menstrual cycle	4.84± 1.72	-4.370	**.000**
AFC at 3 months after the surgery	5.80± 2.29		
AFC on day 3 of menstrual cycle	4.84± 1.72	-5.938	**.000**
AFC at 6 months after the surgery	6.48± 2.66		
AFC at 3 months after the surgery	5.80± 2.29	-3.778	**.001**
AFC at 6 months after the surgery	**6.48± 2.66**		

Table 7: shows the relationship between antral follicle count on day 3 of the monthly cycle and (antral follicle count at 3 months and antral follicle count at 6 months postsurgical) and antral follicle count at 3 months postsurgical and antral follicle count at 6 months after the surgery in the Suture group. In the suture group, the mean value of the count of antral follicles on day 3 of the monthly cycle was statistically lower than the mean value of the count of antral follicles at 3 months postsurgical (4.84; 5.80) P=0.000. In the suture group, the mean value of the count of antral follicles on day 3 of the monthly cycle was statistically lower than the mean value of the count of antral follicles at 6 months postsurgical (4.84; 6.48) P=0.000. In the suture group, the mean value of the count of antral follicles at 3 months was statistically lower than the mean value of the count of antral follicles at 6 months postoperative (5.80; 6.48) P=0.001.

	Bipolar electro-coagulation group	t.test	P. value
	Mean ± SD		
FSH at day 3 of menstrual cycle	4.88± .917	-21.645	**.000**
FSH at 3 months after the surgery	5.55± 1.02		
FSH at day 3 of menstrual cycle	4.88± .917	-17.902	**.000**
FSH at 6 months after the surgery	6.77± 1.24		
FSH at 3 months after the surgery	5.55± 1.02	-13.205	**.000**
FSH at 6 months after the surgery	**6.77± 1.24**		

Table 8: shows the relationship between FSH on day 3 of the menstrual cycle and (FSH at 3 months, 6 months postsurgical) and FSH at 3 months postsurgical and FSH at 6 months postsurgical in bipolar electro-coagulation group. The mean value of FSH at day 3 of the monthly cycle was statistically lower than FSH at 3 months after the surgery among the Suture group (4.88; 5.55) P=0.000. Mean value of FSH at day 3 of menstrual cycle was statistically lower than FSH at 6 months after the surgery among Suture group (4.88; 6.77) P=0.000. Mean value of FSH at 3 months after the surgery was statistically lower than FSH at 6 months after the surgery among Suture group (5.55; 6.77) P=0.000.

	Bipolar electro-coagulation group	t.test	P. value
	Mean ± SD		
AMH at day 3 of menstrual cycle	3.08± 1.10	11.136	**.000**
AMH at 3 months after the surgery	2.63± 1.07		
AMH at day 3 of menstrual cycle	3.08± 1.10	9.899	**.000**
AMH at 6 months after the surgery	2.60± 1.06		
AMH at 3 months after the surgery	2.63± 1.07	1.205	**.240**
AMH at 6 months after the surgery	**2.60± 1.06**		

Table 9: shows the relationship between AMH on day 3 of the menstrual cycle and (AMH at 3 months and 6 months postsurgical) and AMH at 3 months and 6 months postsurgical in the bipolar electro-coagulation group. Mean value of AMH at day 3 of menstrual cycle was statistically higher than AMH at 3 months after the surgery among Bipolar electro-coagulation group (3.08; 2.63) P=0.000. Mean value of AMH at day 3 of menstrual cycle was statistically higher than AMH at 6 months after the surgery among Bipolar electro-coagulation group (3.08; 2.60) P=0.000. In the bipolar electro-coagulation group, there was no statistically significant difference in AMH at 3 months and AMH at 6 months postsurgical.

	Bipolar electro-coagulation group	t.test	P. value
	Mean ± SD		
AFC on day 3 of menstrual cycle	4.84± 1.86	-3.612	**.001**
AFC at 3 months after the surgery	5.60± 2.34		
AFC on day 3 of menstrual cycle	4.84± 1.86	-9.037	**.000**
AFC at 6 months after the surgery	6.48± 2.27		
AFC at 3 months after the surgery	5.60± 2.34	-4.993	**.000**
AFC at 6 months after the surgery	**6.48± 2.27**		

Table 10: shows the relationship between antral follicle count on day 3 of the monthly cycle and (antral follicle count 3 months and 6 months after surgery) and antral follicle count 6 months after surgery in bipolar electro-coagulation group. The mean value of AFC at day 3 of the menstrual cycle was statistically lower than the AFC at 3 months after the surgery among the bipolar electro-coagulation group (4.84; 5.60) P=0.001. The mean value of the antral follicle count on day 3 of the menstrual cycle was statistically lower than the AFC at 6 months after the surgery among the bipolar electro-coagulation group (4.84; 6.48), P = 0.000. The mean value of AFC at 3 months after the surgery was statistically lower than the AFC at 6 months after the surgery among the bipolar electro-coagulation group (5.60; 6.48) P=0.000.

DISCUSSION

The current study showed no statistically significant difference in FSH between the suture group and the bipolar electro-coagulation group three months postoperative. While the average value of FSH at 6 months postsurgical was statistically lower among the suture group than the bipolar electro-coagulation group (5.68; 6.77) P=0.002.

This is consistent with the findings of Ibrahim et al. [3], who observed that FSH increased higher in the bipolar electro cauterization group 3 and 6 months postsurgical compared to the homeostatic-suturing group, possibly that indicating a greater loss of reserve of the ovary in the bipolar electro cauterization group.

This is consistent with Zaitoun et al. [8], who found a statistically significant rise in mean FSH value with bilateral-cystectomy at post-operative follow-up after 6 month and 1 month with unilateral-ovarian cystectomy follow-up when evaluating the bipolar group versus suture group.

This study showed no statistically significant difference in AMH between the suture group and the bipolar electro-coagulation group at 3 and 6 months postoperative.

This contradicts the findings of Ibrahim et al. [3], who discovered that differences in AMH levels are the most relevant predictor of ovarian reserve variation since AMH values are the only repeatable test that is unaffected by cyclic rhythms of the body. At 6 months postoperative, the mean difference in the homeostatic-suturing group was (0.25) 0.36% compared to (0.49) 0.28% in the group used electro cauterization for hemostasis (p 0.001).

Takashima et al. [12] reported no significant differences in the mean AMH value pre and post operation in either group. The suture group's mean AMH level reduced from 3.48 ± 0.91 presurgically to 2.88 ± 0.83 postsurgically, although this decrease was not statistically significant (P > 0.05).

This study showed no statistically significant difference in antral follicle count (AFC) between the suture group and the bipolar electro-coagulation group at 3 and 6 months postoperative.

This contradicts Ibrahim et al. [3], who observed that at 3 months postoperatively, AFC was enhanced or stable, with no further rise at 6-month follow-up in

either group. Furthermore, AFC grew higher in suturing group, indicating that the suturing approach had minimal effects on the patient's ovarian reserves.

This contradicts the findings of Coric et al., [13], who discovered that sutured ovaries had a significantly greater median AFC than electro coagulated ovaries.

This contradicts Sahin et al. [11], who observed that throughout the study's follow-up period, the levels of AFC in the electro cauterization group were significantly lower than in the homeostatic-suture group; nonetheless, AFC did not deteriorate in any group. As a result, bipolar electrocoagulation had a deleterious impact on the AFC. A number of investigations, including Li et al. [9] and the previously stated studies, have validated this observation at 3, 6, and 12 months.

This study showed that, Mean value of AMH was statistically higher at day 3 of menstrual cycle than at 3and 6 months after the surgery among bipolar electro-coagulation group.

This is consistent with Song et al. [14], who used anti-Müllerian hormone (AMH) value to evaluate the impact of operation on ovarian reserve in all patients before ,3 and 6 months after surgery. At both 3 and 6 month follow-up, the suture group had a lesser mean increase in baseline FSH than the bipolar electrocoagulation group.

CONCLUSION

FSH increased more in the bipolar electro cauterization group six months after surgery than in the homeostatic suturing group, suggesting that the former group has lost more ovarian reserve.
Conflict of interest : none

REFERENCES

1. Brun JL, Fritel X, Aubard Y, et al. Management of presumed benign ovarian tumors: Updated French guidelines. *Eur J Obstet Gynecol Reprod Biol*. 2014;183:52.
2. Celik HG, Dogan E, Okyay E, et al. Effect of laparoscopic excision of endometriomas on ovarian reserve: Serial changes in the serum antiMüllerian hormone levels. *Fertil Steril* 2012;97:1472.
3. Ibrahim, Z. M., Ghoneim, H. M., Kishk, E. A., Abbas, A. M., Greash, M. A., & Atwa, K. A. (2020). Bipolar Electrocoagulation Versus Intracorporeal Hemostatic Suturing for Laparoscopic Ovarian Cystectomy: Prospective Cohort Study on Effects. *Journal of Gynecologic Surgery*. 2019; doi:10.1089/gyn..0027
4. Vural B, Cakiroglu Y, Vural F, Filiz S. Hormonal and functional biomarkers in ovarian response. *Arch Gynecol Obstet*. 2014; 289 (06) 1355-61 .
5. Alborzi S, Foroughinia L, Kumar PV, Asadi N, Alborzi S. A comparison of histopathologic findings of ovarian tissue inadvertently excised with endometrioma and other kinds of benign ovarian cyst [sic] in patients undergoing laparoscopy versus laparotomy. *Fertil Steril*. 2009;92:2004.
6. Mohamed ML, Nouh AA, El-Behery MM, Mansour SA. Effect on ovarian reserve of laparoscopic bipolar electrocoagulation versus laparotomic hemostatic sutures during unilateral ovarian cystectomy. *Int J Gynaecol Obstet.* 2011;114:69-72.
7. Özgönen H, Erdemoglu E, Günyeli I, Güney M, Mungan T. Comparison of the effects of laparoscopic bipolar electrocoagulation and intracorporeal suture application to ovarian reserve in benign ovarian cysts. *Arch Gynecol Obstet*. 2013; 287 (04) 729-32
8. Zaitoun, M., Shallal, Y., Alanwar, A., Ammar, I. Comparative Study Between Laparoscopic And Open Ovarian Cystectomy On Ovarian Reserve. *Zagazig University Medical Journal*. 2013; 19(4), 1-9.
9. Li CZ, Wei DY, Wang F, Wang HQ, Yang CR. Impact on ovarian reserve function by different homostasis methods during laparoscopic cystectomy in treatment of ovarian endometrioma [in Chinese]. *Zhonghua Fu Chan Ke Za Zhi*. 2013;48:11.
10. Ferrero S, Venturini PL, Gillott DJ, Remorgida V, Leone Roberti Maggiore U. Hemostasis by bipolar coagulation versus suture after surgical stripping of bilateral ovarian endometriomas: a randomized controlled trial. *J Minim Invasive Gynecol.* 2012;19:722-30.
11. Sahin C, Akdemir A, Ergenoglu AM, et al. Which should be the preferred technique during laparoscopic ovarian cystectomy? Hemostatic sutures or bipolar electrocoagulation? A randomized controlled prospective study of long-term ovarian reserve. *Reprod Sci*. 2017;24:393.
12. Takashima A, Takeshita N, Otaka K, Kinoshita T. Effects of bipolar electrocoagulation versus suture after laparoscopic excision of ovarian endometrioma on the ovarian reserve and outcome of in vitro fertilization. *J Obstet Gynaecol Res*. 2013;39:1246-52.
13. Coric M, Barisic D, Pavicic D, Karadza M, Banovic M. Electrocoagulation versus suture after laparoscopic stripping of ovarian endometriomas assessed by antral follicle count: Pre- liminary results of randomized clinical trial. *Arch Gynecol Obstet.* 2011; 283: 373–8.
14. Song T, Kim WY, Lee KW, Kim KH. Effect on ovarian reserve of hemostasis by bipolar coagulation versus suture during laparoendoscopic single-site cystectomy for ovarian endometriomas. *J Minim Invasive Gynecol.* 2015; 22(3):415-20.