Cukurova Medical Journal
ÇUKUROVA ÜNİVERSİTESİ TIP FAKÜLTESİ

Cukurova Med J 2020;45(2):482-487
DOI: 10.17826/cumj.635204

ARAŞTIRMA / RESEARCH

The effect of hemostasis by electrocoagulation versus suture on endometrioma recurrence and pregnancy rates after laparoscopic cystectomy in endometriomas

Laparoskopik endometrioma kistektomi cerrahilerinde elektrokoagülasyon veya sütür tekniği ile sağlanan hemostazın rekürrens ve gebelik sağlama oranına etkisi

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Cukurova Medical Journal 2020;45(2):482-487

Abstract

Purpose: The aim of this study was to assess the effect of hemostasis by electrocoagulation versus suture on endometrioma recurrence and pregnancy rates after laparoscopic cystectomy in uni/bilateral endometriomas.

Materials and Methods: Forty-six primary infertile patients wishing to conceive without any assisted reproductive treatments, between 18 and 42 years, with uni/bilateral endometriomas were retrospectively analyzed. Laparoscopic cystectomies were performed by the stripping method. Ovarian hemostasis was obtained either by suturing (n = 23) or by bipolar electrocoagulation (n = 22). Cyst recurrence was evaluated by postoperative ultrasound scan. Pregnancy was confirmed by serum Beta-human choronic gonadotropin (B-hCG) levels if the patient presented with menstrual delay.

Results: The mean of age of the patients was 31.62±6.55 years old. There was no significant difference between study groups regarding age, body mass index (BMI), preoperative endometrioma size, or pre/post-operative hemoglobin/hematocrite (Hb/Htc) levels. The recurrence rate was higher in the electrocoagulation group than the suturing group; however, the difference was not statistically significant. The spontaneous pregnancy rates were also similar between study groups. There was no significant difference between study groups considering unilaterality or bilaterality of endometriomas.

Conclusion: Our preliminary data show that an operation on ovarian endometriomas-either electrocoagulation or suturing-may not affect endometrioma recurrence or spontaneous pregnancy rate.

Keywords:. Endometriosis, haemostasis, cystectomy, recurrence.

Öz

Amaç: Bu çalışmanın amacı, tek veya bilateral endometriomalarda laparoskopik kistektomi sonrası elektrokoagülasyon veya sütür tekniği uygulaması ile sağlanan hemostazın, endometrioma rekürrensi ve spontan gebelik oranlarına etkisinin değerlendirilmesidir.

Gereç ve Yöntem: 18-42 yaş aralığında herhangi bir yardımcı üreme tedavisi desteği almayan 46 primer infertil hasta retrospektif olarak analiz edildi. Laparoskopik kistektomi operasyonu, sıyırma tekniği ile uygulandı. Over doku kanaması sütür (n=23) veya bipolar elektrokoagülasyon (n=22) ile kontrol edildi. Kist rekürrensi postoperatif olarak ultrason eşliğinde değerlendirildi. Spontan gebelik adet gecikmesi sonrası kan Beta- insan koryonik gonadotropin (B-hCG) seviyesi bakılarak saptandı.

Bulgular: Ortalama yaş 31.62±6.55 olarak saptandı. Gruplar arasında istatistiksel olarak yaş, vücut kitle indeksi (BMI), preopertaif endometrioma büyüklüğü, pre/postoperatif hemoglobin (hb) ve hemotokrit (Hct) değeri ile anlamlı bir fark saptanmadı. Sütür grubunda rekürrens oranı fazla çıksa da istatistiksel olarak anlamlı bulunmadı. Spontan gebelik oranı her iki grupta benzer saptandı. Çalışma gruplarında endometrioma lateralitesinde istatistiksel olarak bir fark saptanmadı.

Sonuç: Bu çalışma, Endometrioma cerrahisi sonrası uygulanan elektrokoagülasyon veya sütür tekniğinin endometrioma rekürrensi ve spontan gebelik oranlarına farklı etkisinin olmadığını göstermiştir.

Anahtar kelimeler: Endometriozis, hemostaz, kistektomi, rekürrens

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Geliş tarihi/Received: 21.10.2019 Kabul tarihi/Accepted: 13.02.2020 Çevrimiçi yayın/Published online: 17.05.2020

INTRODUCTION

Endometriosis, a complicated disease, is most commonly found on the ovaries and presents with pelvic pain and infertility[1].

Laparoscopic cystectomy is the gold standard surgical method of ovarian endometrioma. As patients with endometriosis cannot benefit from medical therapy, laparoscopic stripping has been introduced as the method of choice for the cystectomy of endometrioma[2,3]. Nevertheless, this procedure affects ovarian reserves. Today, the protection of the ovarian reserve during surgery of a primary infertile patient has become a very important issue. Moreover, decreased ovarian reserves due to the surgical removal of a part of the healthy ovarian tissue, together with the endometrioma wall leading to the risk of premature ovarian failure, is considered a major concern after surgery[4,5].

Laparoscopic bipolar coagulation, suturing techniques, and plasma and laser energy are the main hemostatic procedures after stripping endometriotic cysts. However, the ovarian hemostasis achieved by these methods could result in damage to the ovarian reserve[6,7]. Bipolar coagulation can precipitate in thermal devastation of healthy ovarian tissue, while a hemostatic suture may result in mechanical damage to normal ovarian follicles. In the literature, a study compared bipolar coagulation and laparoscopic suture of the ovary in 46 patients with unilateral endometriomas, suggesting that patients undergoing laparascopic suturing of the ovary have lower postoperative follicle-stimulating hormone (FSH) levels when compared with patients undergoing bipolar coagulation of the ovary[8]. In contrast, Song et al. showed that hemostasis by bipolar coagulation after stripping the endometrioma during a cystectomy reduces ovarian reserves more than suturing does, as determined by serial Anti-Mullerian Hormone (AMH) levels[9]. The exact impact on the ovarian reserve of distinct type of hemostasis procedures after endometrioma surgery is yet to be clarified[10].

In addition, recurrence of endometrioma is a major problem. The mechanism of recurrence and the effect of bipolar coagulation and suturing after cystectomy on recurrence rates remain questions in the literature[11]. Therefore, the aim of this study was to evaluate and compare ovarian reserve, recurrence, and pregnancy rates in women who had experienced endometriotic cystectomy by different laparoscopic techniques.

MATERIALS AND METHODS

This was a retrospective study of 45 patients who underwent laparoscopic cystectomy for endometriotic cysts between July 2015 and July 2017 at a tertiary referral center, Bakirkoy Dr. Sadi Konuk Training and Research Hospital, Istanbul, Turkey. Ethical approval was obtained from our hospital's local ethics committee (Approval number: 2020/40). All patients gave written consent for their data to be collected retrospectively. The 23 patients who underwent a cystectomy with hemostasis by bipolar electrocoagulation were compared with 22 patients who underwent cystectomy with suturing to stop bleeding from the ovarian cyst bed.

The inclusion criteria were as follows: age 18–42 years, post-operative hystopathologic confirmation of endometrioma, and primary infertile patients who wanted to conceive without any assisted reproductive treatment and maintained pelvic pain and clinical follow-up for two years. The exclusion criteria included a history of oral contraceptive use or intake of other hormonal agents for the past three cycles, known endocrine diseases (polycystic ovary syndrome, Cushing syndrome, hyperprolactinemia, thyroid dysfunctions), prior ovarian surgery, and a hystopathology of malignancy and borderline tumors. Patients were requested for follow-up every three months for the first year and then annually for two years.

Age, body mass index (BMI), endometrioma size, and duration of hospitalization were recorded as the baseline characteristics of patients. In addition, the pre- and postoperative hemoglobin (Hb), hematocrite (Hct) and AMH levels were analyzed in this study. The AMH measurements were evaluated in the same laboratory using AMH test with automated AMH assay on the Cobas-E electrochemiluminescence immune-assay platform (Roche Diagnostic GmbH, Penzberg, Germany). Basal serum AMH values are submitted in concentrations of ng/ml. the assay range for AMH was 0.01-23 ng/ml and intra-assay and inter-assay coefficients of variations were 2.8% and 3.5%, retrospectively. A sample of blood (5 mL) was taken on menstruation day three before operation and three months after operation in all patients. The hormone

levels were specified via a proper enzyme-linked immunsorbent assay kit.

The definition of recurrence of endometrioma as an ultrasonographic presence of an ovarian endometriotic cyst with round shaped cystic mass with a minimum diameter of 2 cm with thick walls, regular margins, homogenous low echogenic fluid content with scattered internal echoes, and without papillary proliferations and/or pelvic pain was accepted as recurrence of endometriosis[12]. The pregnancy was confirmed by serum Beta-human chorionic gonadotropin (B-hCG) levels if the patient presented with menstrual delay.

Laparoscopic procedures

All laparoscopic procedures were achieved by the same team from the referral center. Laparoscopy was done under general anesthesia. Laparoscopic cystectomy was performed through subumbilical incision and two lower abdominal incisions using 5 mm grasping forceps and scissors. Pneumoperitoneum was obtained via Veress needle (Ethicon Endo-surgery Inc., USA) insertion. In all cases, CO_2 was used with 13-15 mmHg intrabdominal pressure. Excision of endometriotic cysts was achieved by stripping the cyst wall from the surrounding normal tissue. After the removal of the cyst, the bleeding ovarian bed was rinsed with saline. In the bipolar coagulation group, hemostasis was achieved by 25 W current applied bipolar forceps (Karl Storz, Tuttlingen, Germany) on the sites of bleeding internal ovarian surface. In the suture group, hemostasis was performed with intracorporeal knots using 2.0 polyglican absorbable sutures (Vicyrl; Ethicon Inc., New Jersey, USA) to close the ovarian parenchyma.

Statistical analysis

Data analysis was performed with SPSS (version 20.0; SPSS Inc., Chicago, IL, USA). All data were presented as mean-±standard deviation. A one-sample Kolmogorov-Smirnov test was performed to analyze the distribution of clinical and surgical outcomes. Student's t-test was used for the comparison of parametric variables, and a Mann-Whitney U test and chi-square test were used to compare the nonparametric variables. For all calculations, a p-value of <0.05 was considered to be statistically significant.

RESULTS

Among 62 patients, 45 eligible cases were included into the study groups. Seventeen patients were excluded from the study because eight patients were treated with postoperative assisted reproductive techniques, six patients were lost to follow-up, and three patients had additional endocrine diseases. The baseline characteristics are shown in Table 1. The mean of age of patients was 31.62±6.55 years old. There was no significant difference between bipolar electrocoagulation and suture groups regarding age, BMI, preoperative endometrioma size, duration of hospitalization, and pre-/post-operative Hb/ Hct levels. Additionally, there was no difference between the groups regarding the laterality of the lesions.

Comparisons of preoperative and postoperative serum hormone levels are also presented in Table 1. There was no statistically significant difference in the serum AMH levels measured preoperatively between the two groups. At three months after surgery, serum AMH concentrations in the bipolar coagulation and suture group decline to 1.11±0.6 and 1.25±0.5, respectively. The decrease level of AMH in bipolar group was 0.43±0.2 versus 0.39±0.2 in the suture group. While small differences in the decrease of AMH levels were observed in both groups, no significant differences were found.

Comparisons of bipolar coagulation and suture groups regarding endometrioma recurrence and spontaneous pregnancy rates are given in Table 2. The recurrence rates of endometrioma were bipolar coagulation group 17.4% and suture group 4.5%, respectively. However, there was no important difference with the recurrence rate between both groups.

When we analyzed spontaneous pregnancy rate for two years after surgery, the results were bipolar coagulation group 13% and suture group 18.2%. In addition, this analysis showed no marked difference between two groups.

Table 1. Comparison of electrocoagulation and suture groups regarding patients' characteristics and pre/postoperative laboratory measurements

Variables	Electrocoagulation (n: 23)	Suture (n: 22)	P value
	Mean ±SD	Mean ±SD	
Age (years)	33.09± 6.35	30.09± 6.55	0.13
BMI (kg/m2)	25.86± 2.07	25.86± 2.66	0.82
Endometrioma size (mm)	52.17± 15.94	62.27± 21.53	0.09
Duration of hospitalization (day)	2.17± 0.49	2.41± 0.51	0.12
Preop Hb (g/dL)	11.52± 1.67	11.27± 1.83	0.66
Preop Hct (%)	35.13± 3.55	36.41± 4.98	0.17
Postop Hb (g/dL)	10.21± 1.31	10± 1.54	0.68
Postop Hct (%)	31.78± 3.11	32.68± 3.81	0.36
DecreaseHb (g/dL)	1.3± 1.06	1.27± 0.95	0.76
Decrease Hct (%)	3.34± 2.63	3.72± 3.21	0.63
Preop AMH (ng/ml)	1.53±0.9	1.65±0.7	0.56
Postop AMH (ng/ml)	1.11±0.6	1.25±0.5	0.41
Decrease AMH (ng/ml)	0.43±0.2	0.39±0.2	0.71
Unilaterality (n,%)	12 (52.2%)	13 (55%)	0.43
Bilaterality (n,%)	11 (47.8%)	9 (45%)	

Results are given in means ± standart deviation. Student's t-test and Mann–Whitney U-test were used for statistical analysis. A P-value of < 0.05 was considered significant for all bold values. *BMI* Body mass index, *Hb* Hemoglobine, *Hct* Hematocrite, *AMH* Anti Mullerian Hormone.

Table 2. Comparison of electrocoagulation and suture groups regarding endometrioma recurrence and spontaneous pregnancy rates

Variables		Electrocoagulation (n: 23)	Suture (n: 22)	P value
Endometrioma recurrence (n,%)	Yes	4 (17.4%)	1 (4.5%)	0.34
	No	19 (82.6%)	21 (95.4%)	
Pregnancy (n,%)	Yes	3 (13%)	4 (18.2%)	0.69
	No	20 (87%)	18 (81.8 %)	

Results are given in means ± standart deviation. Student's t-test and Mann–Whitney U-test were used for statistical analysis. A P-value of < 0.05 was considered significant for all bold values.

DISCUSSION

Laparoscopic cystectomy for endometrioma is an important issue in the area of reproductive medicine. This operation seems to be a favorite modality for many surgeons with such reported benefits as lower recurrence rate and better response to ovarian stimulation[13]. In the literature, factors influencing ovarian reserve include cyst size, recurrences, bilateral case, surgery technique, surgeon skill, and hemostasis method[14,15]. Distinct probable mechanisms have been investigated after endometrioma surgery for low ovarian reserve. The most common side effect of cystectomy is damage to healthy tissue; therefore, an application of new techniques with lower adverse effects on ovarian reserve is a current concern[16].

Our research is parallel to the study of Takashima et al., which analyzed the effect of bipolar coagulation and suturing on ovarian reserve by AMH levels and decrease rate of AMH in two groups[17]. Another study reported that the same ovarian reserve was determined in patients treated by bipolar coagulation and those treated by suturing after laparoscopic cystectomy of bilateral endometriomas[15].

Several studies have focused on that issue. However, in a systematic review and meta-analysis, Ata et al. showed that bipolar electrocoagulation has a more negative impact on the ovarian reserve than do alternative methods[18]. Also, Song et al. support the claim that laparoscopic suturing is less prejudicial to ovarian reserve decline than the use of bipolar energy[9]. In addition, Sugita et al. analyzed AMH levels at one month and one year after cystectomy for endometrioma, showing that ovarian reserve decreased just after surgery, albeit recovering within one year[19]. Uncu et al. demonstrated that the presence of endometriomas is associated with decreased ovarian reserve, and the surgical excision

of endometriomas leads to a further decrease[20].

The recurrence risk of endometriomas may be increased due to incomplete eradication of the endometriotic lesions at the time of primary surgery, and a majority of recurrent lesions have been found in the same location[21]. Thus, the importance of primary surgery of endometriosis, excellent surgical technique, and the experience of the endometrioma surgeon are vital due to the pathologic recurrent tissue's enlargement capability. The effect on hemostasis by bipolar coagulation and suturing on endometrioma recurrence is an important gap in the knowledge. A few studies have investigated this issue, and Ferrero et al. have showed that the rate of endometrioma recurrence was not affected by hemostasis with bipolar coagulation or suturing[15]. In addition, our study demonstrated the recurrence rate was higher in the bipolar coagulation group than in the suturing group, albeit not statistically important.

Although an investigation of the relationship with the AMH levels with pregnancy rates after surgery was not our main objective, no crucial difference was analyzed between groups. The 24th month cumulative pregnancy rates sighted in this study were 13% in bipolar coagulation group and 18.2% in the suture group. In addition, a study supported that suturing, as compared to bipolar coagulation for hemostasis after laparoscopic stripping of endometrioma, represented greater damage on the quantitive ovarian reserve, even though the pregnancy rate was not significantly affected[17]. Our pregnancy rates were lower than some studies by other authors after laparoscopic cystectomy of endometriomas, which are higher than 50%[22,23]. However, this study includes only primary infertile patients who conceived without any assisted reproductive treatments.

Ovarian reserve plays an important act in attaining pregnancy following any surgical or medical treatment in sterile patients. AMH level has been considered a reliable and useful marker of ovarian reserve, more so than the level of inhibin-B, estradiol (E2), FSH, and luteinizing hormone (LH) on cycle day 3[24]. We analyzed AMH levels after three months of surgery, showing that laparoscopic cystectomy can reduce ovarian reserve with both two hemostasis methods, but there was no crucial difference between bipolar coagulation and suture groups.

This study had some limitations. Firstly, the study was not a randomized, controlled study, despite the possible occurrence of some biases. Second, our result did not include other ovarian reserve markers, such as serum inhibin B and FSH level, ultrasonographic measurement of ovarian volume, and antral follicle count. Moreover, we used AMH levels, accepted as the most reliable and feasible marker for the assessment of ovarian reserve. Finally, it will be necessary to analyze investigations on a large research sample to verify what factors develop after surgery.

In conclusion, our study confirms that laparoscopic cystectomy causes a decrease in ovarian reserve independent from the method used for maintaining hemostasis on the ovarian tissue. The proper use of bipolar electrocoagulation does not have an important destructive effect on ovarian reserve.

Yazar Katkıları: Çalışma konsepti/Tasarımı: ŞY, CK; Veri toplama: ŞY; Veri analizi ve yorumlama: ME, LY; Yazı taslağı: ŞY; İçeriğin eleştirel incelenmesi: ME, LY; Son onay ve sorumluluk: ŞY, CK, İA, ME, LY; Teknik ve malzeme desteği: LY, İA; Süpervizyon: CK, ME, LY; Fon sağlama (mevcut ise): yok.
Etik Onay: Etik onay Bakırköy Dr. Sadi Konuk Eğitim ve Araştırma Hastanesi yerel etik komitesinden alınmıştır. (Onay numarası: 2020/40)
Hakem Değerlendirmesi: Dış bağımsız.
Çıkar Çatışması: Yazarlar çıkar çatışması beyan etmemişlerdir.
Finansal Destek: Yazarlar finansal destek beyan etmemişlerdir.

Author Contributions: Concept/Design : ŞY, CK; Data acquisition: ŞY; Data analysis and interpretation: ME, LY; Drafting manuscript: ŞY; Critical revision of manuscript: ME, LY; Final approval and accountability: ŞY, CK, İA, ME, LY; Technical or material support: LY, İA; Supervision: CK, ME, LY; Securing funding (if available): n/a.
Ethical Approval: Ethical approval was obtained from Bakirkoy Dr. Sadi Konuk Training and Research Hospital local ethics committee (Approval number: 2020/40).
Peer-review: Externally peer-reviewed.
Conflict of Interest: Authors declared no conflict of interest.
Financial Disclosure: Authors declared no financial support

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