IJCMBS
THE INTERNATIONAL JOURNAL OF
CURRENT MEDICAL AND BIOLOGICAL SCIENCES

e-ISSN: 2791-8815

Original Article

Perioperative And Postoperative Comparison of Groups with Uterine Artery and Ovarian Artery Ligation and Groups without Artery Ligation in Laparoscopic Myomectomy

Laparoskopik Myomektomide Uterin Arter Ve Overyan Arter Ligasyonu Yapılanlarla Arter Ligasyonu Yapılmayan Grupların Perioperatif ve Postoperatif Karşılaştırılması

Muhammet Serhat YILDIZ[1*], Osman AŞICIOĞLU[2], Osman TEMİZKAN[3]

[1]Özel Alanya Anadolu Hastanesi
[2]Sağlık Bilimleri üniversitesi Dr. Sami Ulus Kadın Doğum ve Çocuk Hastalıkları Eğitim ve Araştırma Hastanesi
[3]Özel klinik

Corresponding author:

Dr. Muhammet Serhat YILDIZ

Adress:

Özel Alanya Anadolu Hastanesi, Kadın Hastalıkları ve Doğum Kliniği Alanya/Antalya

email: m.serhatyildiz@hotmail.com

Received: 27.01.l2022

Accepted: 07.02.2022

Cited as: Muhammet Serhat YILDIZ , Osman AŞICIOĞLU , Osman TEMİZKAN. Perioperative And Postoperative Comparison of Groups with Uterine Artery and Ovarian Artery Ligation and Groups without Artery Ligation in Laparoscopic Myomectomy IJCMBS 2022;2(1):15-21

doi.org/10.5281/zenodo.6054111

Abstract

Background: In this prospective study, we aimed to compare the intraoperative complication rates, operation time, preoperative-postoperative AMH and hemoglobin values, and the length of hospital stay for the patients undergoing elective laparoscopic myomectomy made or not made with uterine artery and ovarian artery ligation. ***Methods:*** In this prospective clinical study, 32 patients undergoing elective laparoscopic myomectomy were divided in two groups as ligated and non-ligated. Primer outcome was determined according to different preoperative-postoperative haemoglobin to determine blood loss in patients. Seconder outcomes were determined as intraoperative complication rates, operation time, preoperative-postoperative AMH and the length of hospital stay. **Results*:*** Similar demographic characteristics were found for both groups (ligated and non-ligated). Additionally, myoma localization, age (39±5 vs 41.2±3.8), preop haemoglobin (12.7±0.9 vs 12.6 ±1.3), preop and postop AMH (1.9 ±2.2 and 2 ±2.1 vs 1.1 ±1.7 and 1.1 ±1.3) and operation time (69 ±17 vs 75.3 ± 19) were similar, while postoperative haemoglobin values (10.4±1.1 vs 11.4±1.3) were significantly higher for ligated group than non-ligated when compared. **Conclusions:** It was observed that the loss of perioperative and postoperative hemoglobin value is decreased by ligation of uterine and ovarian arteries during and after the laparoscopic myomectomy without causing any important change of the operation time and AMH values.

Key words: Laparoscopy, myomectomy, artery ligation

Öz

Amaç: Bu prospective çalışmada, elektif laparoskopik myomektomi yapılanlarda uterin arter ve overyan arter ligasyonu yapılan ve yapılmayan hastaların intraoperatif komplikasyon oranları, operasyon süresi, preoperatif-postoperatif AMH ve hemoglobin değerleri ile hastanede kalış sürelerini karşılaştırmayı amaçladık. **Gereç ve Yöntem:** Bu prospektif klinik çalışmada elektif laparoskopik myomektomi yapılan 32 hasta uterin ve ovaryan arter ligasyonu yapılan ve yapılmayan olarak iki gruba ayrıldı. Primer sonuç, hastalarda kan kaybını belirlemek için preoperatif-postoperatif hemoglobine göre belirlendi. İkincil sonuçlar ise intraoperatif komplikasyon oranları, operasyon süresi, preoperatif-postoperatif AMH ve hastanede kalış süresi olarak belirlendi. **Bulgular:** Her iki grup için (ligasyon yapılan ve yapılmayan) benzer demografik özellikler bulundu. Ayrıca myom lokalizasyonu, yaş (39±5 vs 41,2±3.8), preop hemoglobin (12.7±0.9 vs 12.6 ±1.3), preop ve postop AMH (1.9 ±2.2 ve 2 ±2.1 vs 1.1 ±1.7 ve 1.1 ±1.3) ve operasyon süresi (69 ±17 vs 75.3 ± 19) benzer iken, postoperatif hemoglobin değerleri (10.4±1) (11.4±1.3) karşılaştırıldığında, bağlı grup için bağlanmayan gruba göre anlamlı olarak daha yüksekti.

Sonuç: Laparoskopik myomektomi sırasında ve sonrasında uterin ve over arterlerinin ligasyonu ile operasyon süresi ve AMH değerlerinde önemli bir değişikliğe neden olmadan perioperatif ve postoperatif hemoglobin değer kaybının azaldığı gözlendi.

Anahtar kelimeler: Laparoskopi, myomektomi, arter ligasyonu

Introduction

Uterine leiomyomas are the most common pelvic tumor in women (1,2). The reported incidence in reproductive women is 20-25% (3). The rate of diagnosis of these tumors increases with advancing age in the reproductive years (4,5). Rate appears to decrease in postmenopausal women (5). Leiomyoma is the cause of one-third of patients admitted to the gynecology clinic (6). On the other hand, histopathological examination of the uterus revealed that the prevalence of leiomyoma rose above 70% (7). This finding indicates that many women with leiomyomas are asymptomatic. Leiomyomas are clinically important pathologies because they are the most common cause of abnormal uterine bleeding and hysterectomies (8). Leiomyomas can be detected during routine pelvic examinations. Camer and Patel they give the rate of leiomyoma as 74% in premenopausal women and 84% in postmenopausal women in serial sections. Only 20-50% of cases have symptoms directly attributed to leiomyomas (3,9,10). The incidence and severity of symptoms are directly proportional to the size, number and localization of the leiomyoma.

Leiomyoma often causes symptoms of abnormal uterine bleeding, reproductive dysfunction, infertility, spontaneous abortion, pain and compression. Transvaginal USG is the first step in most cases with suspected leiomyoma. It is an adequate diagnostic method. However, USG can be found in some highly enlarged uteruses. may be insufficient, however, with MRI (magnetic resonance imaging) uterus and leiomyoma volume can be measured with full accuracy, as well as ovarian anatomy and It is also possible to distinguish leiomyomas from adenomyosis with full accuracy. Asymptomatic leiomyomas can be followed, when they are symptomatic, the treatment method is determined by looking at the patient's age, fertility status, desire to protect the uterus, the size of the myoma, the location of the myoma, the severity of the patient's symptoms, and whether he has been treated before. (8,17). Most of the leiomyomas are asymptomatic and grow slowly. Small and medium-sized and asymptomatic leiomyomas can be followed by pelvic examination and TV-USG performed every 6-12 months.

Surgery is the main step in the treatment of leiomyoma. Hysterectomy while it is a definitive procedure, different techniques such as myomectomy, endometrial ablation, uterine artery embolization (UAE), magnetic resonance focused ultrasonography (MRgFUS) and myolysis are alternative methods. Abnormal uterine bleeding, compression symptoms, ıf there is infertility, recurrent pregnancy loss, surgical treatment is applied. The most common form of treatment for symptomatic leiomyoma worldwide is hysterectomy (18,19). Myomectomy can be performed in cases of fertility desire, desire to protect the uterus, leiomyoma secondary infertility, recurrent pregnancy loss, pedicled subserous or submucous leiomyoma, submucous leiomyoma with menorrhagia, rapidly growing leiomyoma. In myomectomies, the incidence of febrile morbidity decreases following surgery (19,20). One of the biggest risks in myomectomies is blood loss. By placing a tourniquet on the uterine arteries or using local vasopressin, blood loss can be minimized and therefore less blood transfusion is required (19.21). The risk of blood transfusion during or immediately following myomectomy has been calculated as approximately 15% (8). However, intraoperative blood loss was found in both hysterectomy and myomectomy groups; It should not be overlooked that it correlates with the size of the uterus, the duration of the surgery, and the number of leiomyomas removed in the myomectomy group (21). Following myomectomy, symptoms including menorrhagia and pelvic pressure were found to regress at a rate of 81%. The disadvantage of this procedure is a greater risk of developing leiomyomas from new clones of abnormal myocytes. Until recently, the traditional approach to myomectomies was laparotomy. However, today this situation tends to change in favor of laparoscopic intervention. The first laparoscopic myomectomy was reported in 1979 by Semm K (22). The biggest obstacle in laparoscopic myomectomies is the difficulty of suturing the uterus. In addition, it should not be forgotten that the long operation time increases the risk of pulmonary and thromboembolic complications.

Among the difficulties of laparoscopic myomectomy; bleeding, difficulty in closing the defect, difficulty in intraoperative technique, and difficulty in removing the fibroid from the abdomen. Advantages of laparoscopic myomectomy; less blood loss, less hospital stay, less adhesion, cosmetic scar advantage, less postoperative

morbidity, less operative trauma. After the 1980s, laparoscopy quickly gained a place in surgical practice due to its advantages over conventional open surgery in terms of less postoperative pain, better cosmetic results, and a shorter and uncomplicated recovery. There is a significant suppression of the immune system in the postoperative period in proportion to the size of the surgical procedure (24). Since less tissue dissection is performed during laparoscopic surgery, the neuroendocrine and metabolic responses of the organism to stress and immune suppression in the postoperative period remain at a lower level (25). As a result, the severity of the response to stress and the decrease in the need for analgesics allow for a quicker and uncomplicated recovery and thus an earlier return to daily life.

Anti-Mulerian Hormone (AMH): AMH is produced in Sertoli cells in the testis in men and granulosa cells in the ovary in women (26). Serum AMH levels in women are lower than in men. When the menstrual cycle starts after puberty, the circulating AMH level gradually decreases and cannot be detected at menopause (27). Basic studies have shown that AMH is effective in follicular hormone production. Studies in animals have shown that AMH increases aromatase activity and decreases the number of LH receptors stimulated by FSH in granulosa cells. It reduces testosterone production in theca cells. AMH indicates a primordial follicle pool and has been shown to be released from preantral and early antral follicles by <8 mm during follicular growth. Has a regulatory effect on ovarian activity

Materials and Methods

This study was conducted with the approval of the ethics committee of Şişli Hamidiye Training and Research Hospital, on 30/06/2015, with issue number 456.

This study is an invasive, randomized, controlled prospective study involving 32 patients who underwent laparoscopic myomectomy at Şişli Hamidiye Etfal Training and Research Hospital, Gynecology and Obstetrics Clinic between 23.03.2014 and 20.07.2016. A total of 32 female patients, 16 of whom were clipped uterine and ovarian arteries, and 16 of whom were not clipped, were included in the study. Patients aged between 16 and 45 years, with subserous or intramural uterine subserous or intramural less than 10 cm, uterine bleeding and/or pelvic pain and/or infertility symptoms were included in the study.

In our study, in patients who underwent laparoscopic myomectomy, ovarian and uterine arteries were clipped and not clipped; Preoperative and postoperative hemoglobin values, preoperative and postoperative Anti-Müllerian Hormone values, hospital stay of the patients in the groups, perioperative postoperative complications and operation times were compared.

For uterine artery ligation, the uterine artery was dissected by opening the peritoneum by approximately 2 cm with the help of bipolar scissors and clipped over the ureter from the point where the angle between the external iliac artery and the internal iliac artery coincided with the umbilical artery, and clipped with the number 5 clip. In the ovarian artery ligation, after the ovary was lifted towards the anterior abdominal wall with the help of an atraumatic grasper, the ureteral reflex was observed and clipped with the number 5 clip over the infundibulopelvic ligament.

After the myomectomy procedure and suturing, the clips were removed from where they were.

Criteria for exclusion from the laparoscopic myomectomy study

- Over 45 years old or under 16 years old
- Having fibroids larger than 10 cm
- With multiple myomas in the uterus
- with submycose myoma
- Refusal to work

A detailed anamnesis was obtained from all patients included in the study. General gynecological examination and gynecological ultrasonography were performed. Smears were taken from those who did not have a smear test in the last 1 year. In addition, informed consent was obtained from each patient.

Complete blood count was requested on the 1st day preoperatively and postoperatively from all patients included in the study.

All of the patients included in the study were called preoperatively and after the 20th postoperative day. Anti Müllerian Hormone was requested.

The data were collected and statistical analyzes were made using the SPSS 18.0 for windows software program from the computer environment. While evaluating the study data, descriptive statistical methods (mean, median, standard deviation) as well as the Mann-Whitney U test were used to compare quantitative data. It was accepted when there was statistical significance ($p<0.05$).

Results

In our study, the results of the preoperative, perioperative and postoperative results in women aged 16-45 years who came to our clinic with treatment-resistant menometrorrhagia and/or pelvic pain and/or infertility complaints between 2014 and 2016 were evaluated in patients who underwent uterine artery and ovarian artery ligation in laparoscopic myomectomy and those who did not. comparison has been made.

As shown in Table 1, when the location of myoma in the uterus was examined in the preoperative examinations of the patients, 8 patients (50%) with myoma in the anterior uterus, 4 patients (25%) with the uterus in the fundus, and 4 patients (25%) with the uterus posterior. In the case group, 6 patients (37.5%) with myoma in the anterior uterus, 5 patients (31.2%) with the uterus in the fundus, and 5 patients (31.2%) with the uterus posterior. In the comparison, there was no significant difference between the groups in terms of localization of myoma, since the p value was above 0.05.

Among the groups; Age, preop hgb, postop hgb, preop AMH, postop AMH, myoma size and parity were compared. Group numbers, means, standard deviations and p values of the compared parameters are shown in Table 2. In the age distribution between those who underwent uterine and ovarian artery ligation and those who did not have arterial ligation, the age of the ligated group was 41.2 ± 3.8 years, while the age of the non-ligamented group was 39 ± 5 years, and there was a significant difference between the ages, since the p value was greater than 0.05. not detected.

In terms of preoperative hemoglobin results between those who underwent uterine and ovarian artery ligation and those who did not have arterial ligation, the preoperative hemoglobin value of the ligated group was 12.6 ± 1.3, while the preoperative hemoglobin value of the group without ligation was 12.7 ± 0.9. There was no significant difference between the hemoglobin results as $p> 0.05$.

In terms of postoperative hemoglobin results between those who underwent uterine and ovarian artery ligation and those who did not have arterial ligation, the postoperative hemoglobin value of the ligated group was 11.4 ± 1.3, while the postoperative hemoglobin value of the group without ligation was 10.4 ± 1.1. A significant difference was found between the hemoglobin results as $p<0.05$.

In terms of preoperative Anti-Müllerian Hormone results between the groups who underwent uterine and ovarian artery ligation and those who did not have arterial ligation, the preoperative Anti-Müllerian Hormone value of the ligated group was 1.1 ± 1.7, while the preoperative Anti-Müllerian Hormone value of the non-ligation group was 1.9 ± It was determined as 2.2 and there was no significant difference between the preoperative Anti-Müllerian Hormone results as $p>0.05$.

In terms of postoperative Anti-Müllerian Hormone results between those who underwent uterine and ovarian artery ligation and those who did not have arterial ligation, the postoperative Anti-Müllerian Hormone value of the ligated group was 1.1 ± 1.3, while the postoperative Anti-Müllerian Hormone value of the non-ligation group was 2 ± 2 It was determined as ,1, and there was no significant difference between postoperative Anti-Müllerian Hormone results as $p>0.05$.

In the distribution of myoma size between those who underwent uterine and ovarian artery ligation and those who did not have arterial ligation, the size of myoma in the ligated group was 5.3 ± 0.7 cm, while the size of myoma

in the group without ligation was determined as 5.8 ± 1.2, and it was found to be between fibroid sizes. Since p>0.05, no significant difference was detected.

The operation time and hospital stay were compared between the case and control groups. The operation time of the control group was 69 ± 17 minutes, and the operation time of the case group was 75.3 ± 19 minutes, and there was no significant difference between the groups in terms of operation time. In the Table 3, the hospital stay of the control group was 2.3 ± 0.6 days, and the hospitalization period of the case group was 2.3 ± 0.6 days, and no significant difference was observed between the groups in terms of hospital stay.

Table 1. Comparison of the location of myoma

Location of myoma	Control	With artery ligation	P
Anterior, (%)	8 (50)	6 (37.5)	0.776
Fundus, (%)	4(25)	5 (31.2)	
Posterior, (%)	4(25)	5 (31.2)	

Table 2. The parameters we compared in our study

Variables		Mean±SD	P
Age	Control	39 ± 5	0.163
	With artery ligation	41.2 ± 3.8	0.164
Pre-op hgb	Control	12.7 ± 0.9	0.965
	with artery ligation	12.6 ± 1.3	0.965
Post-op hgb	Control	10.4 ± 1.1	0.032
	with artery ligation	11.4 ± 1.3	0.033
Pre-op AMH	Control	1.9 ± 1.2	0.572
	with artery ligation	1.1 ± 1.7	0.574
Post-op AMH	Control	2 ± 1.1	0.478
	with artery ligation	1.1 ± 1.3	0.512
Myoma size	Control	5.8 ± 1.2	0.227
	with artery ligation	5.3 ± 0.7	0.229
Parite	Control	1 ± 0.73	0.629
	with artery ligation	1.1 ± 0.71	0.629

Table 3. Previous operations of patients who underwent laparoscopic myomectomy

Operation	Control	with artery ligation	P
None (%)	13(81.2)	12(75)	0.83
C/S (%)	2 (12.5)	2(12.5)	
Myomectomy (%)	1(6.2)	2(12.5)	

Discussion

Laparoscopic surgery provides many advantages such as reduced postoperative pain. shorter hospitalization and better cosmetic results. Laparoscopic myomectomy may be a better alternative to the abdominal approach in selected patients. In addition. laparoscopic myomectomy may be associated with complications such as bleeding and other organ injuries and increased recurrence rates. In order to reduce these risks. bilateral uterine artery and ovarian artery ligation procedure is on the agenda before myomectomy.

Bae JH et al. performed laparoscopic myomectomy with uterine artery ligation alone in a group of 90 patients in 2011. and compared the postoperative results and short-term recurrence of the two groups to evaluate the efficacy of uterine artery ligation. As a result of the developments and advances in preoperative medications. surgical technique. experience and laparoscopic surgical instruments. the operation time was shortened. complications were minimized. and perioperative blood loss was reduced in cases without uterine artery ligation. There was no significant difference in postoperative hemoglobin values. Preoperative use of GnRH reduces myoma size. facilitates myomectomy and reduces blood loss during laparoscopic myomectomy.

In the study of Rakesh Sinha et al. in 2011 in which they performed laparoscopic myomectomy with only uterine artery ligation. they concluded that bilateral ligation of the uterine arteries from the point of origin from the internal iliac artery reduces the blood loss that may occur during the surgical procedure. It has also been shown to reduce recurrence rates by necrosis of very small fibroids.

In our study. in order to evaluate the effectiveness of arterial ligation. those who had bilateral uterine and ovarian artery ligation and those who did not have ligation were compared as 2 groups. perioperatively and postoperatively. Arterial ligation was found to be beneficial in providing intraoperative hemostasis. Thus. the need for postoperative blood transfusion decreased as the postoperative hemogram values of the patients did not decrease significantly.

It was shown that there was no significant difference between the Anti-Müllerian Hormone results. which were evaluated to evaluate preoperative and postoperative ovarian reserve. between those who underwent uterine and ovarian artery ligation and those who did not. This shows that Laparoscopic myomectomy with uterine and ovarian artery ligation has no negative effect on ovarian reserve in patients with fibroids with infertility.

There was no significant difference between those who underwent uterine and ovarian artery ligation and those who did not undergo uterine and ovarian artery ligation in terms of operation times.

When the length of hospital stay was compared. no significant difference was observed between those who underwent uterine and ovarian artery ligation and those who did not. There is no data on temporary artery ligation in the current literature.nSince our study was prospective. the number of patients was relatively limited. Studies with large samples are needed to contribute more to the literature.

Conclusion

In conclusion. this study showed that uterine and ovarian artery ligation performed during laparoscopic myomectomy reduces the need for perioperative and postoperative blood transfusion.

Laparoscopic myomectomy with uterine and ovarian artery ligation has no negative effect on ovarian reserve in patients with fibroids with infertility. according to the Anti-Müllerian Hormone results evaluated to evaluate ovarian reserve.

Ethical Approval: *This study was conducted with the permission number 456 of Şişli Hamidiye etfal training and research hospital Local Ethics Committee (date: 30/06/2015).*

Author Contributions: *Concept:* O.T. *Literature Review:* M.S.Y *Design :* O.T. *Data acquisition:* M.S.Y *Analysis and interpretation: O.A Writing manuscript:* M.S.Y *Critical revision of manuscript:* O.A.

Conflict of Interest: *The authors have no conflicts of interest to declare.*

Financial Disclosure: *Authors declared no financial support.*

References

1. Baird DD. Dunson DB. Hill MC. et al. High cumulative incidence of uterine leiomyoma in black and white women: ultrasound evidence. Am J Obstet Gynecol. 2003;188(1):100-7
2. Serden SP. Brooks PG. Treatment of abnormal uterine bleeding with the gynecologic resectoscope. J Reprod Med. 1991; 36(10):697-9.
3. Buttram VC Jr. Reiter RC. Uterine leiomyomata: etiology. symptomatology and management. Fertil Steril. 1981; 36(4):433-45

4. Wilcox LS. Konin LM. Pokras R. et all. Hysterectomy in the United States. 1988-1990. Obstet Gynecol. 1994;83(4):549 -55

5. Marshall LM. Spiegelman D. Barbieri RL. et al. Variation in the incidence of uterine leiomyoma among premenopausal women by age and race. Obstet Gynecol. 1997; 90(6):967 -73

6. Cramer SF. Patel A. The frequency of uterine leiomyomas. Am J Clin Pathol. 1990;94(4):435 -8

7. Rock AJ. Jones WH. Te Linde's Operative Gynecology 10th ed. Philadelphia: Wiliams & Wilkins Lippincott. 2012

8. Ayhan A. Beksaç MS. Demir N. et al. Üreme Endokrinolojisi & İnfertilite ve Jinekolojik Onkoloji. 2. Baskı. Ankara:Medical Network. 2006

9. Gartner lP. Hiatt JL. Color Text Book of Histology. Baltimore: Saunders Company;1997. p 390-8.

10. Lacey CG. Benign disorders of the uterine corpus. In: Pernoll ML (ed.) Current Obstetric & Gynecologic Diagnosis & Treatment (7th ed.) New Jersey. Appleton and Lange. 1991;732-45

11. Stovall DW. Clinical symptomatology of uterine leiomyomas. Clin Obstet. Gynecol. 2001;44(2):364-71

12. Marshall LM. Spiegelman D. Goldman MB. et al. A prospective study of reproductive factors and oral contaceptive use in relation to the risk of uterine leiomyomata. Fertil Steril. 1998;70(3):432-9

13. Lacey CG. Benign disorders of the uterine corpus. In: Pernoll ML (ed.) Current Obstetric & Gynecologic Diagnosis & Treatment (7th ed.) New Jersey. Appleton and Lange. 1991;732-45

14. Marshall LM. Spiegelman D. Manson JE. et al. Risk of uterine leiomyomata among premenopausal women in relation to body size and cigarette smoking. Epidemiology. 1998; 9(5):511-7

15. Stovall DW. Clinical symptomatology of uterine leiomyomas. Clin Obstet Gynecol. 2001;44(2):364-71

16. Zawin M. McCarthy S. Scoutt LM. et al. High field MRI and U/S evaluation of the pelvis in women with leiomyomas. Magn Reson Imaging Clin N Am. 1990;8(4):371 -6

17. American College of Obstetricians and Gynecologists. Alternatives to Hysterectomy in the Management of Leiomyomas. ACOG Practice Bulletin No. 96. Obstet Gynecol 2008; 112: 201

18. Guarnaccia MM. Rein MS. Traditional surgical approaches to uterine fibroids: Abdominal myomectomy and hysterectomy. Clin Obstet Gynecol. 2001; 44(2):385-400

19. Iverson RE Jr. Chelmow D. Strohbehn K. et al. Relative morbidty of abdominal hysterectomy and myomectomy for management of uterine leiomyomas. Obstet Gynecol. 1996;88(3):415 -9

20. LaMorte AI. Lalwani S. Diamond MP. Morbidity associated with abdominal myomectomy. Obstet Gynecol. 1993; 82(6):897-900

21. Ecker JL. Foster JT. Friedman AJ. Abdominal hysterectomy or abdominal myomectomy for symtomatic leiomyoma: A comparison of preoperatif demography and postoperatif morbidity. J Gynecol Surg. 1995; 11:11-7

22. Mais V. Ajossa S. Guerriero S. et al. Laparoscopic versus abdominal myomectomy; A prospective randomized trial to evaluate benefits in early outcome. Am J Obstet Gynecol. 1996;174(2):654-8

23. Miller CE. Myomectomy. Obstet Gynecol Clin North Am. 2000; 27(2):407-20

24. Lennard TWJ. Shenton BK. Borzotta A. Et al. The influence of surgical operations on components of the human immune system. Br. J. Surg. 1985; 72(10):771-6.

25. Karayiannakis AJ. Marki GG. Mantzioka A.. Karousos D.. Karatzas G. Systemicstres response after laparoscopic or open cholecystectomy. Br. J. Surg. 1997; 84(4):467-71.

26. Picon R. Action of the fetal testis on the development in vitro of the Müllerian ducts in the rat. Arch Anat Microse Morphol Exp 1969; 58(1): 1-19.

27. Teixeria J. Maheswaran S. Donahoe PK. Müllerian inhibiting substance: an instructivedevelopmental hormone with diagnostic and possible therapeutic applications. Endocr Rev 2001; 22(5): 657-74.

28. van Rooij IAJ. Broekmans FJM. te Velde ER. et al. Serum anti-Müllerian hormone levels: a novel measure of ovarian reserve. Hum Reprod 2002; 17(12): 3065-71