

## Original Article

# Comparison of laparoscopic ablation versus excision for superficial endometriosis-associated pain

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**Abstract:** Background: The objective of the present study is to assess and compare the efficacy of laparoscopic excision and ablation methods in patients diagnosed with endometriosis. Methods: This randomized clinical trial was conducted from 2019 to 2021 in Isfahan, involving 60 women presenting with chronic pelvic pain suggestive of endometriosis. The patients were randomly assigned to either the excision group or the ablation group for the removal of endometriosis lesions. Therapeutic procedures were performed, and patients were monitored through regular visits and assessed using the visual analogue scale (VAS) to evaluate their symptoms six months after the surgeries. Additionally, the presence of dysmenorrhea, non-cyclic pain, dyspareunia, and dyschezia among the patients was measured and compared. Results: Following the surgical procedures, all patients experienced a decrease in the intensity of dysmenorrhea, non-menstrual pain, dyschezia, and dyspareunia ( $P < 0.001$  for all variables). Specifically, the ablation group exhibited significantly lower intensity of dyspareunia compared to the excision group ( $P < 0.001$ ), while no other significant differences were observed between the two groups. Conclusion: The findings indicate no significant differences between the two surgical groups in terms of dysmenorrhea, non-menstrual pain, and dyschezia. Both groups demonstrated a significant reduction in pain following the surgical procedures. However, patients in the ablation group experienced significantly lower intensity of dyspareunia.

**Keywords:** Endometriosis, ablation, excision, VAS, chronic pelvic pain

### Introduction

Endometriosis is characterized by the abnormal growth of endometrial tissue outside the uterine cavity, which can be influenced by hormonal stimulation from the ovaries [1]. This condition is prevalent among women and is considered one of the most common diseases [2]. The cellular origin of endometriosis remains a topic of debate, and there is currently no widely accepted consensus [3]. The pelvic region, including the ovaries, is the most frequent site of endometriosis occurrence [4, 5].

Accurate evaluation of the location, quantity, size, and severity of endometriosis involvement necessitates meticulous laparoscopic assessment [6]. Although the diagnosis of endometriosis can be based on medical history, pelvic examination, and imaging techniques [7], lapa-

roscopy is considered the gold standard for identifying endometriosis lesions, particularly in stage I and II [8, 9].

The diagnostic criteria for endometriosis typically involve a combination of medical history, pelvic examination, and imaging studies. However, the only definitive way to diagnose endometriosis is through diagnostic laparoscopy, which allows direct visualization and confirmation of endometriotic lesions. The American Society for Reproductive Medicine (ASRM) has established a classification system called the Revised American Society for Reproductive Medicine (rASRM) staging system, which categorizes endometriosis based on the location, extent, and severity of lesions observed during laparoscopy. This staging system ranges from stage I (minimal) to stage IV (severe) and helps guide treatment decisions [7, 8].

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Laparoscopic treatment options for endometriosis encompass a range of procedures, such as laparoscopic cystectomy, cyst drainage with cauterization, and sclerotherapy of ovarian cysts [10]. Additionally, the ablation method can also be utilized for the removal of these lesions [11, 12]. However, a definitive preferred method for eliminating endometriosis lesions has not yet been established [13]. Indications for operation treatment for endometriosis include severe pain, infertility, large endometriomas, and failed medical management [12].

The alleviation of pain is a significant concern for patients with endometriosis, with the disappearance of pain often regarded as a sign of improvement. Currently, there are no specific recommended follow-up procedures for patients with superficial endometriosis. Consequently, pain assessments using clinical criteria, including the Visual Analogue Scale (VAS), hold great importance [14, 15]. Superficial endometriosis refers to the presence of endometrial tissue growth on the surface of organs or tissues outside the uterus, such as the peritoneum or pelvic organs. Studies have been performed on the effect of different methods in reducing pain caused by endometriosis [16-18]. However, contrasting results have been reported, with one study suggesting that patients may derive greater benefit from excision treatments [19]. These conflicting findings highlight the paradoxical nature of outcomes associated with different therapeutic approaches.

Therefore, the objective of the present study is to assess and compare the effectiveness of laparoscopic excision and ablation methods in managing pain associated with superficial endometriosis.

### Methods and material

#### *Study design*

This randomized clinical trial was conducted from 2019 to 2021 at Beheshti and Al-Zahra hospitals, affiliated with Isfahan University of Medical Sciences. The study included women with chronic pelvic pain suspected to be associated with endometriosis who were eligible for laparoscopic treatments. The study protocol received approval from the Research Committee of Isfahan University of Medical Sciences, and the Ethics Committee confirmed its compliance (Ethics code: IR.MUI.MED.REC.1398.732). The study is also registered in the

Iranian Registry of Clinical Trials (IRCT) under the code IRCT20200518047489N1.

#### *Inclusion and exclusion criteria*

The inclusion criteria for this study were as follows: women aged between 18 and 45 years, experiencing chronic pelvic pain for a minimum of 6 months, normal findings on ultrasound imaging of the abdomen, pelvis, uterus, and ovaries, being suitable candidates for laparoscopic treatments, and providing written informed consent to participate. The exclusion criteria comprised recent use of hormonal therapy, including oral contraception pills (OCP) or progestins, within the past 3 months, presence of diabetes or hypertension, absence of definitive endometriosis findings, and stage III and IV endometriosis detected during laparoscopy. The diagnosis of endometriosis was confirmed during the treatment phase, and patients without endometriosis were subsequently excluded from the study.

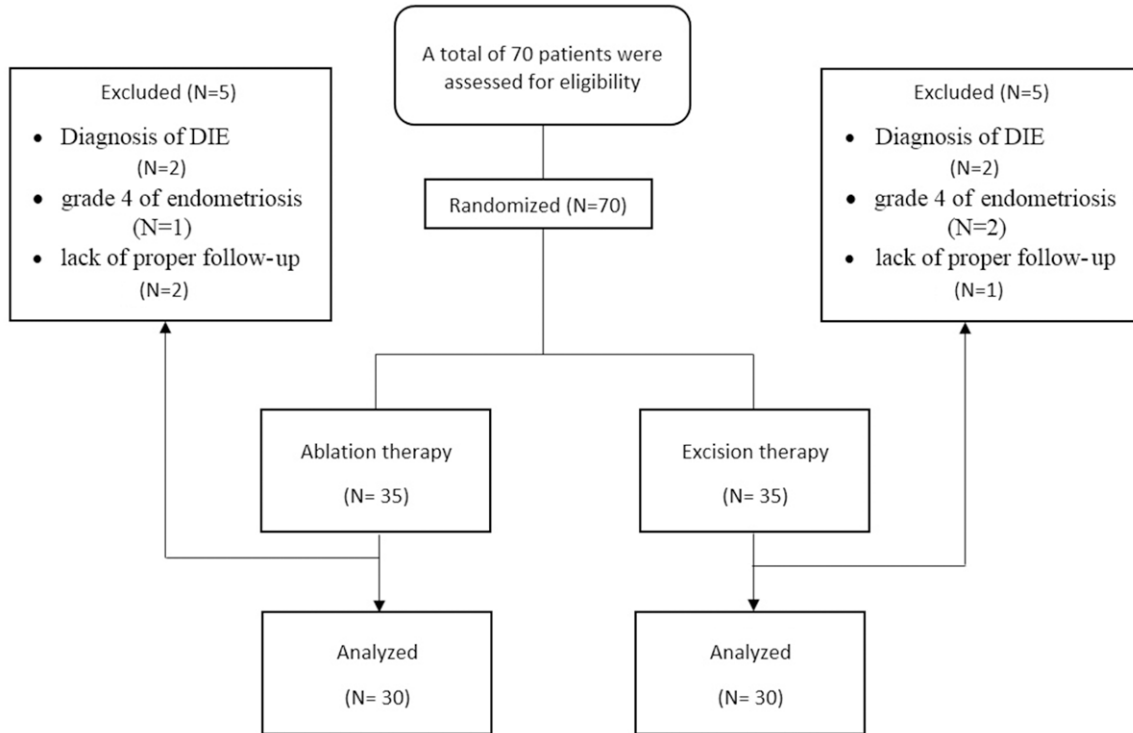
#### *Patient's data collection*

A total of 60 patients suspected to have grade 1 and 2 endometriosis and eligible for laparoscopic treatments were included in the study. The patients were enrolled sequentially, and their demographic information was recorded using a checklist after obtaining their informed consent to participate in the study. The purpose and procedures of the study were thoroughly explained to the patients. Pain intensity data were collected using the Visual Analogue Scale (VAS) for menstrual cycles, non-menstrual days, dyschezia, and dyspareunia. The VAS scores ranged from 0 (indicating the least pain) to 10 (representing the most severe pain). It involves a horizontal line labeled with numerical values (0-10) where patients mark a point to indicate their pain level, with 0 being no pain and 10 being the worst imaginable pain.

#### *Patient's grouping*

Following randomization, the 60 patients were divided into two groups, with each group consisting of 30 patients. The first group underwent laparoscopic treatments with excision of the endometriosis lesions, while the second group underwent ablation of these lesions. The excision method involved cutting the peritoneum involved in endometriosis using scissors and bipolar cautery after dissection of the ureter if necessary. On the other hand, the abla-

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**Figure 1.** The CONSORT flow chart of the patients.

tion method included ureter dissection if required, followed by the use of bipolar cautery for ablating the endometriosis implants.

### *Post-operative assessments*

After the therapeutic procedures, patients were monitored using the Visual Analogue Scale (VAS) criteria and regular visits to assess their symptoms six months post-surgery. As previously mentioned, VAS is currently considered the most effective follow-up method for patients with endometriosis, as there is a lack of suitable imaging techniques in this regard. The study also evaluated the recurrence rate of endometriosis, the presence of pain beyond menstruation, dyschezia, and dyspareunia among the patients. These factors were measured and compared between the two groups to assess their differences. The recurrence rate of endometriosis was measured through follow-up evaluations, typically through clinical assessments, imaging studies, and patient-reported symptoms. Pain other than menstruation, dyschezia (painful bowel movements), and dyspareunia (painful sexual intercourse) was evaluated through patient interviews, symptom questionnaires, and physical examinations. The presence, severity, and frequency of these

symptoms are documented to assess the recurrence or persistence of endometriosis-related pain and associated symptoms.

### *Statistical analysis*

The obtained data were entered into the Statistical Package for Social Sciences (SPSS) version 24. We used Independent t-test and paired-t test to compare data between different time lines and also different groups.  $P$ -value  $< 0.05$  was considered as significance threshold.

## **Results**

### *Study population*

In this study, a total of 70 patients diagnosed with endometriosis were initially included and randomized into two groups, with each group consisting of 35 patients. However, during the course of the study, 10 patients were excluded for various reasons, including the diagnosis of deep infiltrating endometriosis (DIE), grade 4 endometriosis, and insufficient follow-up. Consequently, the data from 60 patients were analyzed for the study. The flowchart illustrating the CONSORT diagram for the study can be found in **Figure 1**.

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**Table 1.** Comparison of age, height and weight in two groups

Group		Number	Mean	Std. Deviation	p-value*
Age	Ablation	30	34.17	2.42	0.631
	Excision	30	33.8	3.37	
BMI	Ablation	30	22.84	0.58	0.173
	Excision	30	23.1	0.79	
Gravidity	Ablation	30	1.87	0.17	0.241
	Excision	30	1.92	0.26	

\*Independent t-test.

**Table 2.** Comparison of dysmenorrhea and non-menstrual pain and dyspareunia in different measuring times

Group		Before		After		P1
		Mean	SD	Mean	SD	
Dysmenorrhea	Ablation	8.43	1.13	3.63	1.03	P < 0.001
	Excision	8.73	1.11	3.6	1.1	P < 0.001
P2					0.904	
Non-menstrual pain (VAS)	Ablation	8.73	1.081	3.9	0.96	P < 0.001
	Excision	8.2	1.04	3.47	1.13	P < 0.001
P2					0.116	
Dyschesia	Ablation	7.95	1.02	2.8	0.93	P < 0.001
	Excision	7.82	1.07	2.6	1.03	P < 0.001
P2					0.157	
Dyspareunia	Ablation	8.53	1.224	2.17	0.91	P < 0.001
	Excision	8.83	0.986	4.53	1.22	P < 0.001
P2					P < 0.001	

SD: Standard deviation, P1: Between "Before" and "After", P2: Between 2 group.

### Comparisons between groups

The data of 60 patients who were candidates for laparoscopic treatment of endometriosis, with a mean age of  $33.98 \pm 2.92$  years, were analyzed. The analysis and comparison of age, BMI, and gravidity between the two groups revealed no significant differences ( $P > 0.05$  for all variables). These findings are presented in **Table 1**. Additionally, there were no significant differences between the two groups in terms of the types of treatments administered.

### Pain assessments

The study also assessed data related to dysmenorrhea, non-menstrual pain, and dyspareunia at various time points. According to the data, the intensity of dysmenorrhea, non-menstrual pain, dyschezia, and dyspareunia decreased in all patients following the surgical procedures ( $P < 0.001$  for all variables). Specifically, the intensity of dyspareunia was significantly

lower in the ablation group compared to the excision group after the surgeries ( $P < 0.001$ ). However, no other significant differences were observed between the two groups in relation to these variables (**Table 2**).

### Discussion

Surgical treatments for endometriosis performed via laparoscopy are considered to be highly effective. These treatments involve the use of ablation or excision therapies to address endometriosis lesions, and previous studies have indicated the effectiveness of both methods in reducing symptoms in patients. However, the comparison between these two techniques to determine which one is more effective has not been definitively established.

In this study, we aimed to compare the outcomes between two groups of patients undergoing ablation and excision treatments for endometriosis using the endoscopic technique.

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Our analysis revealed that the intensity of dysmenorrhea, non-menstrual pain, dyschezia, and dyspareunia decreased in all patients following the surgical procedures. Notably, the intensity of dyspareunia was significantly lower in the ablation group compared to the excision group. These findings suggest that ablation therapy may be more effective in reducing dyspareunia compared to the excision technique.

However, we showed significant pain reduction in both surgical groups and believe that both techniques are highly effective. Brown and Farquhar assessed the effectiveness of endoscopic treatments in endometriosis and showed that laparoscopic ablation or excision are associated with significant pain reduction during menstrual period or non-cyclic pain. It was also indicated that ablation method could be associated with better therapeutic results but these differences may not be observed in all aspects of patient's symptoms [20]. These data are suggestive of the higher effectiveness of ablation therapy compared to excision technique [21]. Our findings are consistent with previous research that highlights the effectiveness of both laparoscopic methods for treating endometriosis [22]. According to our study results, patients who underwent ablation therapies experienced lower intensities of dyspareunia within a 6-month period. These findings align with previous studies that suggest the effectiveness of both methods, particularly ablation therapies.

Both ablation and excision methods have shown significant results in treating endometriosis in women. However, our study, along with previous reports, suggests that ablation treatments may lead to more significant individual changes. While some researchers argue that these differences may not be clinically significant, we believe that ablation therapies should be considered in most cases.

It is important to note that there are studies reporting paradoxical results. For instance, a study by Healey et al. in 2014 compared the reduction of pain after laparoscopy for ablation or excision of endometriosis. The findings showed a reduction in pain scores in both treatment groups over a 5-year follow-up period. It was mentioned that excision may be more effective than ablation in certain specific areas, such as deep dyspareunia [23]. We acknowl-

edge that differences in study design and duration may contribute to variations in the findings. In our study, we evaluated patients over a 6-month period, whereas the study by Healey et al. spanned 5 years.

Another relevant study conducted by Pundir et al. involved a randomized clinical trial with 335 women in the United Kingdom. Their findings indicated that at the 12-month mark following surgery, symptoms of dysmenorrhea, dyschezia, and chronic pelvic pain associated with endometriosis showed significantly greater improvement with laparoscopic excision compared to ablation. However, it is worth noting that the ablation group still demonstrated significant pain reduction. These discrepancies in findings highlight the complexity of treating endometriosis and the potential influence of various factors such as patient characteristics, disease severity, and surgical techniques. Further research is warranted to elucidate the optimal approach for managing endometriosis-associated pain [24, 25]. Based on our results, no significant differences could be observed between groups except for reduction in dyspareunia that was more in the ablation group. It is supposed that thermal spread and following destructing effect on deeper layers due to ablation might be the reason of priority of ablation versus excision on dyspareunia [26]. The results of our study supported the use of ablation technique in patients with endometriosis and we demonstrated that although both procedures are effective but patients in the ablation group had lower intensity of dyspareunia [27].

The findings of the present study highlight the challenges involved in selecting the optimal laparoscopic technique for women with endometriosis. Surgeons should take into consideration the individual characteristics of each patient and prioritize their specific needs. It is important to acknowledge the limitations of the current study, which include a restricted study population and a limited duration of follow-up. Additionally, the evaluation of the effects of surgery on the Visual Analogue Scale (VAS) score alone was limited by the use of hormonal therapy, such as oral contraceptive pills (OCP) or Dienogest, following surgery to prevent the recurrence of endometriosis. Therefore, we recognize the need for further research involving larger populations and longer follow-up periods



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to better determine the most appropriate surgical method for the treatment of endometriosis. Such studies would provide a more comprehensive understanding of the effectiveness and outcomes associated with different surgical techniques, leading to improved decision-making in clinical practice.

### Conclusion

The results of our study revealed no significant differences between the two surgical groups regarding dysmenorrhea, non-menstrual pain, and dyschezia. Both the ablation and excision treatments were effective in reducing pain in all patients. However, there was a significantly lower intensity of dyspareunia in the ablation group. These findings align with the majority of previous studies, highlighting the efficacy of both ablation and excision treatments for endometriosis. Based on these results, we recommend that surgeons consider the individual characteristics of each patient when selecting the most appropriate therapeutic option. Factors such as disease severity, patient preferences, and specific symptoms should be taken into account to tailor the treatment approach to the needs of the individual. This personalized approach can help optimize treatment outcomes and improve the quality of life for women with endometriosis.

### Disclosure of conflict of interest

None.

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### References

- [1] Johnson NP, Hummelshoj L, Adamson GD, Kockstein J, Taylor HS, Abrao MS, Bush D, Kiesel L, Tamimi R, Sharpe-Timms KL, Rombauts L and Giudice LC; World Endometriosis Society Sao Paulo Consortium. World Endometriosis Society consensus on the classification of endometriosis. *Hum Reprod* 2017; 32: 315-324.
- [2] Agarwal SK, Chapron C, Giudice LC, Laufer MR, Leyland N, Missmer SA, Singh SS and Taylor HS. Clinical diagnosis of endometriosis: a call to action. *Am J Obstet Gynecol* 2019; 220: 354.e1-354.e12.
- [3] Parasar P, Ozcan P and Terry KL. Endometriosis: epidemiology, diagnosis and clinical management. *Curr Obstet Gynecol* 2017; 6: 34-41.
- [4] Wang Y, Nicholes K and Shih IM. The origin and pathogenesis of endometriosis. *Annu Rev Pathol* 2020; 15: 71-95.
- [5] Falcone T and Flyckt R. Clinical management of endometriosis. *Obstet Gynecol* 2018; 131: 557-571.
- [6] Soto E, Luu TH, Liu X, Magrina JF, Wasson MN, Einarsson JI, Cohen SL and Falcone T. Laparoscopy vs. robotic surgery for endometriosis (LAROSE): a multicenter, randomized, controlled trial. *Fertil Steril* 2017; 107: 996-1002, e3.
- [7] Movahedi M, Ebrahimian M, Saeedy M and Tavosi N. Comparative study of transcutaneous electrical nerve stimulation, the aromatherapy of Lavandula and physiologic delivery without medication on the neonatal and maternal outcome of patients. *Int J Physiol Pathophysiol Pharmacol* 2022; 14: 206.
- [8] Yang Y, Zhu W, Chen S, Zhang G, Chen M and Zhuang Y. Laparoscopic surgery combined with GnRH agonist in endometriosis. *J Coll Physicians Surg Pak* 2019; 29: 313-316.
- [9] Rafiee Zadeh A, Ghadimi K, Mohammadi B, Hatamian H, Naghibi SN and Danaeiniya A. Effects of estrogen and progesterone on different immune cells related to multiple sclerosis. *Caspian J Neurol Sci* 2018; 4: 83-90.
- [10] Clark NV, Dmello M, Griffith KC, Gu X, Ajao MO, Cohen SL and Einarsson JI. Laparoscopic treatment of endometriosis and predictors of major complications: a retrospective cohort study. *Acta Obstet Gynecol Scand* 2020; 99: 317-323.
- [11] Boroujeni MS, Azizian M, Bahrami M, Kheradmand A, Tavosi N, Rostamiyan Z, Forouharnejad K, Ahmadian S, Naamipouran I and Kiaei M. Immunoglobulin transmission to infants born to mothers with COVID-19. *Int J Physiol Pathophysiol Pharmacol* 2022; 14: 267.
- [12] Zadeh AR, Eghbal AF, Mirghazanfari SM, Ghasemzadeh MR, Nassireslami E and Donyavi V. Nigella sativa extract in the treatment of depression and serum brain-derived neurotrophic factor (BDNF) levels. *J Res Med Sci* 2022; 27: 28.
- [13] Horne AW, Daniels J, Hummelshoj L, Cox E and Cooper K. Surgical removal of superficial peritoneal endometriosis for managing women with chronic pelvic pain: time for a rethink? *BJOG* 2019; 126: 1414-1416.
- [14] Chaichian S, Kabir A, Mehdizadehkashi A, Rahmani K, Moghimi M and Moazzami B. Comparing the efficacy of surgery and medical therapy for pain management in endometriosis: a systematic review and meta-analysis. *Pain Physician* 2017; 20: 185-195.

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- [15] Saroukhani A, Rafiee Zadeh A and Ahmadi SM. Incidence of steal syndrome following arteriovenous fistula and arteriovenous graft. *Int J Burns Trauma* 2022; 12: 121-126.
- [16] Muzii L and Panici PB. Combined technique of excision and ablation for the surgical treatment of ovarian endometriomas: the way forward? *Reprod Biomed Online* 2010; 20: 300-302.
- [17] Burks C, Lee M, DeSarno M, Findley J and Flyckt R. Excision versus ablation for management of minimal to mild endometriosis: a systematic review and meta-analysis. *J Minim Invasive Gynecol* 2021; 28: 587-597.
- [18] Berkes E, Bokor A and Rigó J Jr. Current treatment of endometriosis with laparoscopic surgery. *Orv Hetil* 2010; 151: 1137-1144.
- [19] Yeung P Jr, Tu F, Bajzak K, Lamvu G, Guzovsky O, Agnelli R, Peavey M, Winer W, Albee R and Sinervo K. A pilot feasibility multicenter study of patients after excision of endometriosis. *JSLs* 2013; 17: 88-94.
- [20] Brown J and Farquhar C. An overview of treatments for endometriosis. *JAMA* 2015; 313: 296-297.
- [21] Misra G, Sim J, El-Gizawy Z, Watts K, Jerreat S, Coia T, Ritchie J and O'Brien S. Laparoscopic ablation or excision with helium thermal coagulator versus electrodiathermy for the treatment of mild-to-moderate endometriosis: randomised controlled trial. *BJOG* 2020; 127: 1528-1535.
- [22] Riley KA, Benton AS, Deimling TA, Kunselman AR and Harkins GJ. Surgical excision versus ablation for superficial endometriosis-associated pain: a randomized controlled trial. *J Minim Invasive Gynecol* 2019; 26: 71-77.
- [23] Healey M, Cheng C and Kaur H. To excise or ablate endometriosis? A prospective randomized double-blinded trial after 5-year follow-up. *J Minim Invasive Gynecol* 2014; 21: 999-1004.
- [24] Pundir J, Omanwa K, Kooor E, Pundir V, Lancaster G and Barton-Smith P. Laparoscopic excision versus ablation for endometriosis-associated pain: an updated systematic review and meta-analysis. *J Minim Invasive Gynecol* 2017; 24: 747-756.
- [25] Healey M, Ang WC and Cheng C. Surgical treatment of endometriosis: a prospective randomized double-blinded trial comparing excision and ablation. *Fertil Steril* 2010; 94: 2536-2540.
- [26] Yeung PP Jr, Shwayder J and Pasic RP. Laparoscopic management of endometriosis: comprehensive review of best evidence. *J Minim Invasive Gynecol* 2009; 16: 269-281.
- [27] Jacobson TZ, Duffy JM, Barlow D, Farquhar C, Koninckx PR and Olive D. Laparoscopic surgery for subfertility associated with endometriosis. *Cochrane Database Syst Rev* 2002; CD001398.