Gynecol Surg (2005) 2: 173–177
DOI 10.1007/s10397-005-0097-5

ORIGINAL ARTICLE

Liselotte Mettler · Thoralf Schollmeyer
Nimish R. Shelat · Walter Jonat

Update on laparoscopic myomectomy

Received: 16 November 2004 / Accepted: 25 February 2005 / Published online: 8 July 2005

Abstract Our aim was to analyze the indications and factors influencing laparoscopic myomectomy and its outcome. A retrospective analysis was done of 178 patients who underwent laparoscopic myomectomy at the Department of Obstetrics and Gynaecology, University Hospitals Schleswig Holstein, Campus Kiel, Germany, between 2000 and 2003. A detailed history was taken of all patients with uterine fibroids measuring $<3->10$ cm in diameter. Thirty-seven patients were pretreated with gonadotropin-releasing hormone analogues. Of the 178 patients with myomas, 24% had pedunculated-subserous fibroids, 76% had intramural myomas, and none had diffuse myomatosis. The mean operating time for laparoscopic myomectomy was 90 min, and mean hospital stay was 2 ± 0.5 days. The only complications encountered were in two patients with a small hematoma in the abdominal wall. No late complications were found. Seven of 178 cases required a second laparoscopic myomectomy. A pregnancy rate of over 55% was achieved in the infertility cases, with a 30% cesarean section rate. Postoperative recovery and resumption to normal life were quicker compared with laparotomy with low morbidity. Overall, laparoscopic myomectomies were performed for the following indications: pelvic mass (29%), metrorrhagia (17%), pelvic pain (14%), and infertility (40%). Laparoscopic myomectomy is the technique of choice for pedunculated-subserosal and intramural fibroids in properly selected cases. It requires a skilled endoscopic surgical unit and an efficient team and results in a very low morbidity. Submucous fibroids and diffuse myomatosis were not evaluated in this study.

Keywords Laparoscopy · Myomectomy · Surgical technique · Infertility outcome

L. Mettler (✉) · T. Schollmeyer · W. Jonat
Department of Obstetrics and Gynecology,
University Hospitals Schleswig-Holstein,
Campus Kiel, Michaelisstrasse 16,
24105 Kiel, Germany
E-mail: endo-office@email.uni-kiel.de
Tel.: +49-431-5972086
Fax: +49-431-5972116

N. R. Shelat
Gujarat Institute of Reproductive Medicine and Research,
Shreenandan Hospital, Athwa Lines,
Surat, 395001, India

Introduction

What is the current status of laparoscopic myomectomy? The objective of our indepth evaluation of this procedure was to establish the role of laparoscopic myomectomy in modern fibroid surgery.

In Germany, 25–30% of women are diagnosed with uterine myomas. These are the most common benign solid tumors of the female genital tract, with an increased incidence in the later years of a woman's reproductive life [1]. Though frequently asymptomatic, uterine myomas may cause menorrhagia, metrorrhagia, infertility, and pain. Whereas abdominal myomectomy results in limited morbidity, similar to that with hysterectomy [2], laparoscopic myomectomy has resulted in remarkable advantages for the patient in medical, social, and economic terms, with less postoperative pain and shorter recovery time [3]. Semm and Mettler published their first findings on laparoscopic myomectomy in 1980 [4]. Today, larger intramural myomas are also enucleated by this technique [5–10]. No major complications have been found at our institution, and laparoscopic myomectomy is the first-step treatment for uterine fibroids.

Materials and methods

In a retrospective review of 178 patients who underwent laparoscopic myomectomy at the Department of Obstetrics and Gynaecology, Campus Kiel, from 2000 to 2003, the indications and surgical techniques were evaluated, taking into consideration the benefits and

limitations of laparoscopic myomectomy. For the evaluation of pregnancy outcome, a period of at least 1 year after surgery was used.

Preoperative management

Careful patient selection decreases the likelihood of inappropriate performance of laparoscopic myomectomy and avoids the conversion to open surgery [11–13]. Patient selection was based on the following criteria: pain and pressure symptoms, myomas deterrent to a desired pregnancy, and referral for the removal of a growing, enlarged myoma.

Detailed history and examination

Vaginal sonography was performed to diagnose the number, size, and location of myomas. Thirty-seven patients were pretreated with 3.75 mg leuprolide acetate, a gonadotropin-releasing hormone (GnRH) analogue, for 3 months prior to surgery to shrink the size of the myoma. This facilitated enucleation with less blood loss. Six weeks were allowed to pass after the last dose of 3.75 mg leuprolide before surgery [14–16], as the effects of GnRH analogues may obscure the surface of the capsule and make enucleation of the myoma difficult. Estrogen stimulation over 10–20 days does not stimulate fibroid growth but produces a clearer finding of the myoma capsule. The slight vascular increase allows an easier fibroid enucleation.

Portal mapping for surgical endoscopy

Four routes are used for laparoscopic myomectomy: one 10-mm umbilical incision for the laparoscope and one 10-mm left higher suprapubic incision as well as two 5-mm lateral lower suprapubic incisions for operating ports. The 10-mm left higher suprapubic port is often changed to 15—20 mm for introducing the morcellator at the end of the procedure.

Myoma resection or enucleation technique

In pedunculated myomas, the pedicle was coagulated with bipolar forceps and cut with laparoscopic scissors or cut after placement of loops or staplers. No sutures were required. In cases of suspected subserous and intramural myomas, chromopertubation was applied via a cervical cannula not only to check tubal patency but also to facilitate the direct recognition of an inadvertently opened uterine cavity. After the uterine wall was injected with 10–20 ml of a 0.05% vasopressin derivative, a vertical incision was made with bipolar forceps at the convex point of the uterus at the elevated area of the underlying myoma and away from the adnexa. An incision was made up to the pseudocapsule. Myoma enucleation was performed within the capsular plane using two pairs of grasping forceps, often under traction with a 10-mm myoma screw. Hemostasis was performed with bipolar forceps. The enucleated area of the uterus and the bed of the myoma were sutured along a seromuscular plane (edge-to-edge) using one layer of separate poly dioxanon suture (PDS-O) stitches with extracorporeal knots, leaving less than 3-mm suture pedicles. If the uterine cavity was opened during fibroid enucleation, 2–3 deep muscular sutures were applied with a round CT-1 needle. Extraction of the myomas followed via the suprapubic route, with morcellation using an electric morcellator, followed by a laparoscopic check and careful peritoneal cleansing and hemostasis. To prevent adhesions, 500 ml of Ringer's lactate was left in the abdomen.

Results

The indications for laparoscopic myomectomy were based on the following symptoms and signs: pelvic mass (29%), metrorrhagia (17%), pelvic pain (14%), and infertility (40%) (Fig. 1).

Outcome of surgery

The following five criteria were evaluated in a questionnaire sent to all patients 10–40 months after surgical treatment: (1) complications—immediate or late, (2) need for next, repeat, or subsequent second-look surgery, (3) relief of symptoms, (4) fertility outcome, and (5) resumption of normal life.

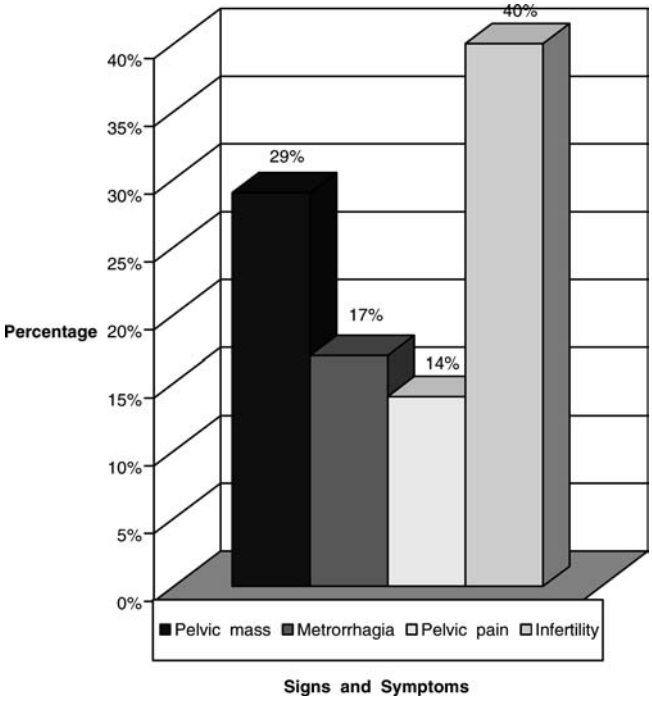

Fig. 1 Signs and symptoms of myomas

Types of myomas

In laparoscopic myomectomy, the type of myomas treated were as follows: pedunculated-subserous 24%, intramural 76%, and diffuse myomatosis 0% (Fig. 2).

The average diameter of the myomas excised laparoscopically was 4 ± 2.1 cm (range 1–10 cm), with 57% having a diameter >4 cm. A drain to observe possible intraabdominal bleeding was placed in 168 laparoscopic myomectomy cases and removed after 24 h. No patient required a blood transfusion.

The mean operating time for laparoscopic myomectomy was 90 min (range 25–215 min). The mean length of hospitalization for laparoscopic myomectomy was 2 ± 0.5 days (range 2–6 days). In Germany at the time the study was carried out, the hospital was paid by insurance companies according to the number of days the patient was hospitalized and not according to the procedure performed. This resulted in longer hospital stays. This practice is now changing.

Patient outcomes

Immediate complications/late complications

Two patients had hematoma formation within the abdominal wall. In one patient the epigastric artery was stitched immediately, and in the second patient four hours after a growing hematoma was found in the left abdominal wall. No late complications, such as bleeding, urinary tract infections, or bowel lesions, occurred.

Multiple fibroids and need for subsequent surgery

Six to eight weeks later, a second-look laparoscopy with myomectomy was suggested for seven of the 178 patients who had undergone laparoscopic myomectomy. The individual surgeon decided in each case to operate in two sessions. No conversions to laparotomy occurred. In our department, patients with larger fibroids undergo a mini-laparotomy/fibroidectomy directly. As seen in Figs. 4 and 5, the majority of patients had only one myoma, either pedunculated-subserous or intramural (Figs. 4, 5).

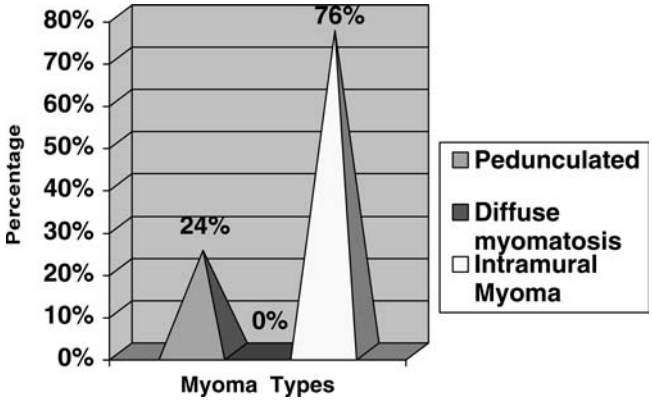

Fig. 2 Types of myomas according to the type of surgery

Relief of symptoms

To date, of the 178 patients, only two had further surgery for complaints associated with bleeding abnormalities and the need for hysterectomy.

Fertility outcome

The nulliparous women had the highest number of myomas, and the least were found in women who were para >3 (Fig. 3). When the criteria of selection were strictly adhered to and there was no other associated infertility, laparoscopic myomectomy increased implantation rates [17, 18].

Over a period of 10 months to 4 years postlaparoscopic myomectomy, a 55% pregnancy rate was achieved. The cesarean section rate was 30%.

Laparoscopic myomectomy allows a safe vaginal delivery [19, 20] compared with uterine artery embolization (UAE), which is associated with a low risk of preterm delivery and malpresentation [21]. Other possible problems of embolization result from necrosis of myoma [22], which can lead to a prolonged inpatient stay for high-dose analgesia, ovarian failure and infertility, or endometrial failure and atrophy. Due to lack of histopathology after uterine artery embolization, there is a risk of undiagnosed malignancy. Because the rate of sarcoma development is 0.5% and we do not have a long-term follow-up of the endocrine consequences of UAE, the latter remains a nonstandardized procedure that may require further invasive treatment.

Patients who have undergone laparoscopic or laparotomic myomectomy and become pregnant should inform their gynecologists in case a cesarian section should be necessary.

Postoperative resumption of normal life

Patients treated by laparoscopic myomectomy returned to work within 4–6 days after the initial surgery.

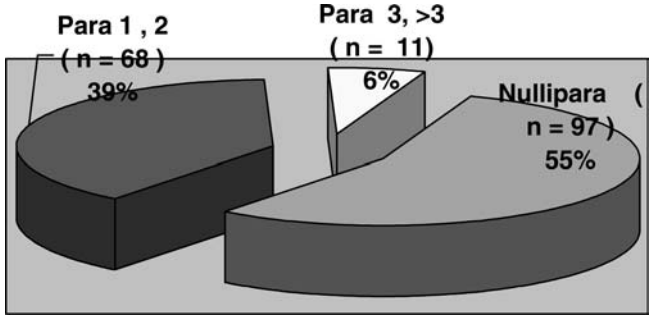

Fig. 3 Incidence of myomas related to parity in laparoscopic myomectomies

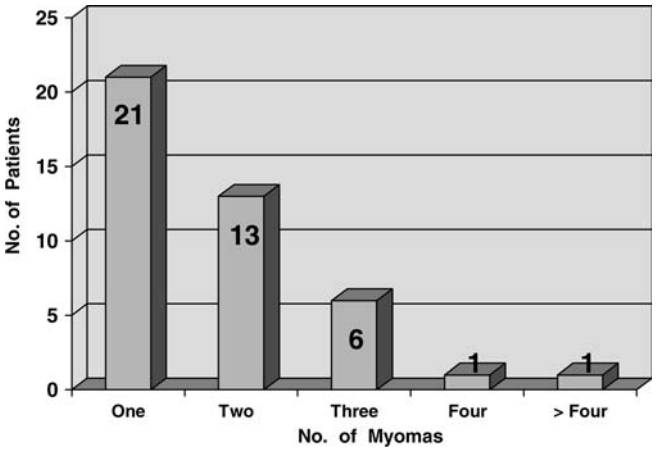

Fig. 4 Number of pedunculated-subserous myomas ($n = 42$) in laparoscopic myomectomy

Discussion

With the introduction of GnRH analogues, medical treatment has become feasible for uterine myomas, which are common in women of reproductive age. This treatment is capable of inducing a reduction in the original size of the myoma (up to 50%) by reducing circulating estrogen levels over a 12-week period. However, after cessation of therapy, the myomas can return to their original size in 3 months [23]. Therefore, preoperative assessment is vital for the determination of procedure according to size, number, and location of the myomas. Our results have been confirmed by other studies [5–10], which substantiate the role of laparoscopic myomectomy with remission of symptoms and low complications in pedunculated-subserous and intramural fibroids. Submucous fibroids were not evaluated in this study.

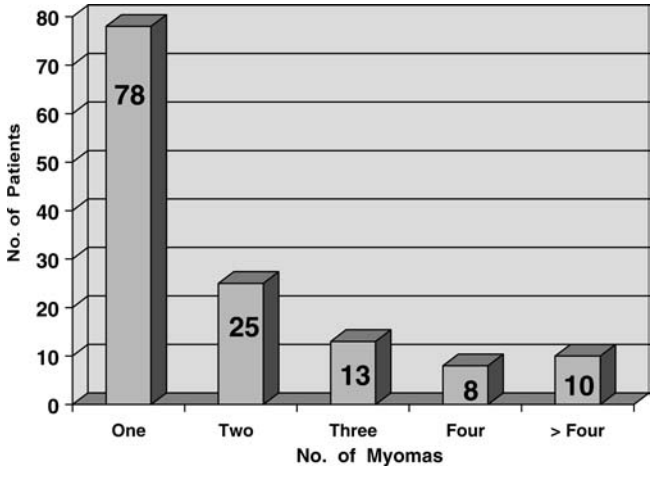

Fig. 5 Number of intramural myomas ($n = 134$) in laparoscopic myomectomy

Closure of the myometrium is the most vital foundation of a well-executed laparoscopic myomectomy. We avoid the extensive use of electrocautery because tissue necrosis could cause defective scarring and increase the risk of uterine rupture during a subsequent pregnancy. Inadequate laparoscopic suturing is not the only factor involved in rupture of the uterine wall after myomectomy. Normally, when the endometrial cavity has not been opened, closure is completed in a single layer. However, if the uterine cavity has been opened, additional suturing is performed in the deepest layer to close the cavity and strengthen the uterine wall. The use of a vasopressin derivative in a dilution of 1:100 as a vasoconstrictor agent has proven to be safe for hemostasis [24, 25].

Concerning blood loss, our results compare well with Campo et al.'s study in which 22 cases of laparoscopic myomectomy also did not require blood transfusions [26].

Risk of adhesion formation and fibroid recurrence

Laparoscopic myomectomy has a considerably lower risk of postoperative adhesions [27] than does open laparotomy, which has a risk of approximately 80–100% [28, 29]. The cumulative fibroid recurrence risk is said to be 12.7% at 2 years and 16.7% at 5 years [30]. Predictive factors for recurrence are number of myomas and nulliparity. Patients who have undergone laparoscopic surgery suffer less physical stress [31], less postoperative pain and fever, and fewer postoperative complications, such as paralytic ileus [18], than patients who have undergone laparotomy.

Other approaches of laparoscopic myomectomy

Today, laparoscopic myomectomy has found its application in easy and complex procedures. To complete the update on laparoscopic myomectomy, we would like to mention the following approaches:

(1) LAVM, laparoscopically-assisted vaginal myomectomy [32], to avoid morcellation of the fibroid.
(2) LAM, laparoscopically-assisted myomectomy, for removing myomas between 4 and l0 cm in size.
(3) LUM, laparoscopic ultraminilaparotomic myomectomy [33].
(4) LUEM, laparoscopic ultraminilaparotomic embolized myomectomy [33].
LUM and LUEM permit laparoscopic removal of myomas greater than 14 cm in size.
(5) LUGM, laparoscopic ultrasonically-guided myomectomy, using the laparoscopic ultrasound transducer. This approach is applied in cases of deeply embedded intramural myomas that may lie hidden in an otherwise uniformly enlarged uterus [34].

Conclusion

A skilled endoscopic unit, with over 20 years of experience, has proven beyond doubt that laparoscopic myomectomy is here to stay. Over the last 50 years, skills, dexterity, technology, endoscopic imaging, and ultrasound have resulted in shorter operating times, shorter hospital stays for patients, faster patient recovery, and less blood loss [6, 7, 35, 36]. Furthermore, the fertility and obstetric outcome after laparoscopic myomectomy [37] is more favorable than that achieved after laparotomy. Laparoscopic myomectomy has justified its global application in the field of gynecological surgery. Advances have shown that there is no limit to the size of myomata that can be removed laparoscopically with reasonable safety and accuracy by a skilled endoscopic surgeon.

References

1. Buttram VC, Rector RC (1981) Uterine leiomyomata: etiology, symptomatology and management. Fertil Steril 36:433–445
2. La Morte Al, Lalwani S, Diamond MP (1993) Morbidity associated with abdominal myomectomy. Obstet Gynecol 82:897–9003
3. Di Gregario A, Maccario S, Raspollini M (2002) The role of laparoscopic myomectomy in women of reproductive age. Reprod Biomed Line 4 (Suppl 3):55–58
4. Semm K, Mettler L (1980) Technical progress in pelvic surgery via operative laparoscopy. Am J Obstet Gynecol 138:121–126
5. Dubuisson JB, Chapron C (1992) Myomectomy per Coelioscopique Technique, Indications et resultats. Chirurgie endoscopique 4:12–15
6. Daniell IF, Gurley LD (1991) Laparoscopic treatment of clinically significant symptomatic uterine fibroids. J Gynecol Surg 7:37–40
7. Hasson H, Totman C, Rana N, Sistos F et al (1992) Laparoscopic myomectomy. Obstet Gynecol 80:884–888
8. Mettler L, Semm K (1992) Pelviscopic uterine surgery. Surg Endosc 6:23–31
9. Mettler L, Semm K, Luttges JE, Panandikar D (1993) Pelviskopische intrafasciale Hysterektomie ohne Kolpotomie (CISH). Gynäcol Prax 17:509–526
10. Mettler L, Schollmeyer T, Lehmann-Willenbrock E, Dowaji J, Zavala A (2004) Treatment of myomas by laparoscopic and laparotomic myomectomy and laparoscopic hysterectomy. J Soc Minim Invasive Ther 13(1):1–7
11. Parker WH, Rodi LA (1994) Patient selection for laparoscopic myomectomy. Am Assoc Gynecol Laparosc 2(1):23–26
12. Campo S, Garcea N (1999) Laparoscopic myomectomy in premenopausal women with and without preoperative treatment using gonadotropin releasing hormone analogues. Hum Reprod 14:44–48
13. Semm K (1991) Hysterektomie per laparatomiam oder per pelviscopiam Ein neuer weg ohne Kolpotornie durch CASH. Geburtsh Frauenheilk 51:996–1003
14. Friedman A, Hoffman Dl, Cornite F, Browneller RW, et al (1991) Treatment of leiomyomata uteri with leuprolide acetate depot A double blind placebo controlled multicentre study. Obstet Gynecol 77:720–725
15. Mettler L, Alwarez-Rodas E, Semm K (1995) Myomectomy by laparoscopy: a Report of 482 cases. Gynecol Endosc 4:259–264
16. Verkauf BS (1992) Myomectomy for fertility enhancement and preservation. Fertil Steril 58:1–15
17. Dubuisson JB, Chapron C, Fauconnier A, Babaki-Fard K (2001) Laparoscopic myomectomy fertility results. Ann NY Acad Sci 943:269–275
18. Dubuisson JB, Fauconnier A, Chapron C, Kreiker G, Norgaard C (2000) Reproductive outcome after laparoscopic myomectomy in infertile women. Reprod Med 45(1):23–30
19. Landi S, Fiaccavento A, Zaccoletti R, Barbieri F, Syed R, Minelli L (2003) Pregnancy outcomes and deliveries after laparoscopic myomectomy. Am Assoc Gynecol Laparosc 10(2):177–181
20. Malzoni M, Rotond M, Perone C, Labiola D, Ammaturo F, Izzo A, Panariello S, Reich H (2003) Fertility after laparoscopic myomectomy of large uterine myomas: operative technique and preliminary results. Eur J Gynecol Oncol 24(1):79–82
21. Goldberg J, Pereira L, Bergella V, Diamond J, Dara E, Scinara P, Seracchioli R (2004) Pregnancy outcomes after treatment for fibromyomata. Uterine embolisation versus laparoscopic myomectomy Am J Obstet Gynecol 191(1):18–21
22. Stubner A, Schauf B, Dude S, Kurek R, Gall C, Claussen C, Neis K, Wallweiner B, Aydeniz B (2004) Embolisation of uterine arteries or laparoscopic uterine artery ligation as a possible treatment of uterine leiomyoma. Gynecol Surg 1:69–76
23. Verkauf BS (1992) Myomectomy for fertility enhancement and preservation. Fertil Steril 58:1–15
24. Dubuisson JB, Chavet X, Chapron C, Morice P (1995) Uterine rupture during pregnancy after laparoscopic myomectomy. Hum Reprod 10:1475–1477
25. Semrn K, Mettler L (1988) Local infiltration of Ornithine 8-Vasopressin (POR 8) as a vasoconstrictive agent in surgical pelviscopy. Endoscopy 20:298–304
26. Campo S, Campo V, Gambadauro P (2003) Reproductive outcome before and after laparoscopic or abdominal myomectomy for subserous or intramural myomas. Eur J Obstet Gynecol Reprod Biol 110(2):215–219
27. Nezhat C, Metzger MD, Nezhat F, Luciano A (1990) Adhesion formation following reproductive surgery by video laseroscopy. Fertil Steril 53:1008–1011
28. Tulandi T, Murray C, Guvaluick M (1993) Adhesion formation and reproductive outcome after myomectomy and second look laparoscopy. Obstet Gynecol 82:213–215
29. Starks GC (1988) C02 Laser myomectomy in an infertile population. J Reprod Med 33:184–186
30. Doridot V, Dubuisson JB, Chapron C, Fauconnier A, Babaki-Fard K (2001) Recurrence of leiomyomata after laparoscopic myomectomy. Am Assoc Gynecol Laparosc 8(4):495–500
31. Nezhat C Nezhat F, Bess O, Nezhat CH et al (1994) Laparoscopic assisted myomectomy. A report of a new technique in 57 cases. Int J Fertil 39:39–44
32. Chin HY, Lee CL, Yen CF, Wang CJ, Soong YK (2004) Laparoscopically assisted vaginal myomectomy through an anterior approach. J Laparoendosc Adv Surg Tech A 14(3):135–138
33. Signorelle PG (2002) Laparoscopic ultraminilaparotomic myomectomy (LUM), laparoscopic ultraminilaparotomic embolised myomectomy (LUEM) surgical techniques. Clin Exp Obstet Gynecol 29(4):277–280
34. Lin PC, Thyer A, Soules MR (2004) lntraoperative ultrasound during a laparoscopic myomectomy. Fertil Steril 81(6):1671–1674
35. Seinera P, Aristo R, Decko A, Farina C et al (1997) Laparoscopic myomectomy: indications, surgical techniques and complications. Hum Reprod 12:1927–1930
36. Park KH, Chung JE, Kim YT (1999) Endoscopic management of uterine myoma. Yonsei Med 40:583–588
37. Serrachioli Rossi S, Goroni F, Rossi E et al (2000) Fertility and obstetric outcome after laparoscopic myomectomy of large myomata: a randomised comparison of abdominal myomectomy. Hum Reprod 15:2663–2668