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Review Article

MANAGEMENT OF SUBMUCOUS MYOMAS WITH LAPAROSCOPIC MYOMECTOMY

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ABSTRACT

Myomas are very common problem encountered in the department of gynecology in hospital. The condition is also a big challenge for endocrinologists and for the department of infertility. The symptoms of myomas range from heavy menstrual bleeding or recurrent abortion to infertility. The human uterus comprises 3 basic layers, the endometrium, the myometrium, and the visceral peritoneum or serosa. On the basis of their relationship to the uterine wall at the time of diagnosis, myomas are referred to as submucous, intramural, or subserosal. Variety of approaches for it management are available, from pharmaceutical agents to surgical intervention. The surgical approach could be hysterectomy or myomectomy. Identification of the ideal approach requires the clinician to be intimately familiar with a given patient's history, including her desires with respect to fertility, as well as an appropriately detailed evaluation of the uterus with any one or a combination of number of imaging techniques, including hysteroscopy. Laparoscopy is a good approach in the surgical approach of myomas as it causes less surgical time, less pain, may be less blood loss and less hospital stay after the surgery. The procedure provides an acceptable and perhaps a preferable, alternative to abdominal myomectomy for women with symptomatic fibroids who desire to preserve uterus and is an excellant alternative to those women who have infertility due to fibroids. In this review, we will evaluate the safety, efficacy and scope of laparoscopic myomectomy as treatment for submucosal myomas.

Keywords: laparoscopy, myomectomy, treatment for submucosal myomas

INTRODUCTION

Leiomyoma and myoma are synonymous terms describing monoclonal tumors arising from the muscular layer of the uterus. Uterine myomas are the most commonly occurring tumors of female reproductive tract. It affects 20 to 50% of all women of reproductive age, with higher incidence during later year of reproductive life [1]. The prevalence of uterine leiomyomas was found to be as high as 70-80% at age 50 years. Age, race and geographical distribution have also been found to play important role in the incidence of myomas. In United States, it is seen in almost 40% in white patients and more than 60% in women of African ancestry in the same age group[2].These fibroids are often asymptomatic [3] and may not require any specific management. The most frequently encountered symptom of myoma is abnormal uterine bleeding[3], 30% of whom suffers from menorrhagia [4].The mechanism of fibroid-associated menorrhagia is not well understood but variety of hypothesis such as vascular defect, submucosal tumor and impaired endometrial homeostasis has been proposed [5][6]. Pelvic pain, pelvic pressure, bowel dysfunction and bladder dysfunction are other associated features of myomas [7]. It is one of the most common causes of hysterectomy throughout the world. Leiomyomas results into 39% of approximately 600000 hysterectomies performed each year in United States [8] and about 70% of all hysterectomies performed each year in Canada is for menorrhagia and fibroids [9].

The development of hysteroscopically-directed surgical techniques provides the opportunity to remove such myomas transcervically in a minimally invasive fashion. It is clear that this approach is not appropriate for all patients, making evaluation and selection extremely important features of clinical care. Selected individuals with submucous myomas may be appropriate for a range of medical interventions, as well as a spectrum of hysteroscopic, laparoscopic, or laparotomically directed (those performed via laparotomy) procedures.

Anatomically, the human uterus comprises 3 basic layers, the endometrium, the myometrium, and the visceral peritoneum or serosa. On the basis of their relationship to the uterine wall at the time of diagnosis, myomas are referred to as submucous, intramural, or subserosal. On the basis of their topography, histochemistry, and response to gonadal steroids, it is more than likely that submucous myomas originate in the junctional zone (JZ) of the myometrium. It has been observed that JZ thickness changes throughout the menstrual cycle in conjunction with endometrial thickness, and JZ myocytes show cyclic changes in estrogen and progesterone receptors mimicking those of menstruation. Furthermore, the expression of estrogen and progesterone receptors is significantly higher in submucous myomas compared with subserosal myomas [10].

Myomas have been known to impair fertility by several mechanisms including the creation of an abnormal site for placental implantation and growth resulting in infertility, an increased risk of spontaneous

abortions, preterm labor and delivery [11]. The conception rate is approximately 53%–70% after myomectomy for submucus myomas, and 58%–65% after myomectomy with intramural or subserosal leiomyomas [12].

Management of Myoma:

Treatment depends upon the need of women presenting with uterine fibroids and the symptoms. Low dose oral contraceptives doesn't cause fibroid to grow. Gonadotrophin-releasing hormone (GnRH) agonist are expected to shrink fibroids by upto 50% within 3 months of therapy [13][14]. Tranexamic acid may reduce menorrhagia associated with fibroids [15] and danazol helps in reduction of fibroid size by 20-25% [16]. The only indication of hysterectomy in a woman with completely asymptomatic fibroids are rapidly enlarging fibroids or, after menopause, when enlarging fibroids raise concerns of leiomyosarcoma even though it is very rare[17][18][19]. In women who have completed childbearing, hysterectomy is indicated as a permanent solution for leiomyomas causing substantial bleeding, pelvic pressure, or anemia[20]. Laparotomic myomectomy allows preservation of uterus but there is high risk of blood loss and greater operative time than hysterectomy and also 15% recurrence rate. But there is less risk of ureteric injury. 10% of women undergoing myomectomy with eventually require hysterectomy within 5 to 10 years [21]. Laparoscopic myomectomy is another option with advantages like less hospital stay, minimal blood loss and less discomfort to the patients.

Submucous myoma:

Submucous leiomyomas are adjacent to the endometrium and symptoms like high menstrual bleeding, infertility and recurrent abortions are its features. Categorization of submucous leiomyomas can be useful when considering therapeutic options, including the surgical approach. The most widely used system categorizes the leiomyomas into three subtypes according to the lesion's diameter that is within the myometrium (table 1) [22].

(European Society of Gynecological Endoscopy (ESGE) : Classification of submucous myomas
Type 0 Entirely within endometrial cavity No myometrial extension (pedunculated)
Type 1 <50% myometrial extension (sessile) <90 degree angle of myoma surface to uterine wall
Type 2 > or equal to 50% myometrial extension (sessile) > or equal to 90 degree angle of myoma surface to uterine wall

Table 1

In a study of 108 women, fertility rates after treatment at a mean of 41 months were 49%, 36%, and 33% in type 0, 1, and 2 lesions, respectively [23]. It seems clear that a classification system for leiomyomas that allows categorization of submucous lesions is useful from both a clinical and research perspective.

Malignancy is a rare outcome of myomas. The incidence of uterine sarcoma in women undergoing hysterectomy for presumed uterine leiomyomas is 0.23% to 0.49%, although in women in the sixth decade it may rise above 1% of hysterectomy specimens [24][25]. There are no data on malignancy specific to submucous leiomyomas. In a large, single-site, retrospective study of hysteroscopic findings in 4054 women experiencing AUB, and from of all age groups, submucous leiomyomas were found in 7.5% [26]. In the metaanalysis of Pritts et al [27], there were significantly higher spontaneous abortion rates in women with submucous myomas. 2 small studies reported 53% and 43% spontaneous abortion rates in a total of 30 patients with submucous myomas [28]. The mechanisms whereby submucous myomas impair pregnancy outcomes are unknown. Histologically, the endometrium overlying submucous myomas [29] [30] and opposite the myoma [30] shows glandular atrophy, which may impair implantation and nourishment of the developing embryo.

Laparoscopic Momectomy:

Laparoscopic myomectomy has been performed since Semm and colleagues described the procedure in late 1970s [31][32][33][34]. Laparoscopic myomectomy is a less invasive approach, selected by the surgeon to remove myomas. But it is necessary that the surgeons have the skills not only to remove myomas safely, but also to repair the myometrial defect in a fashion similar to that when laparotomic mymectomy is

performed. Some surgeons may choose to facilitate the laparoscopic process using microprocessor assisted (''robotic'') techniques that preserve the advantages of the minimally invasive approach [35][36].

The first randomized controlled trial, performed on 20 patient, published in 1996 by Mais et al. [37] compared open and laparoscopic myomectomy and found less pain, shorter hospitalization, and shorter recovery with laparoscopic surgery. Ninety percent of patients were discharged by day 3 in the laparoscopy group, compared to 10% in the open group ($P< 0.05$), and 90% reported complete recovery in the laparoscopic group compared to only 5% in the open group ($P< 0.05$). There were no major complications in either group.

In 2000, Seracchioli et al. [38] reported a randomized controlled trial of 65 abdominal and 66 laparoscopic myomectomies in infertile women with at least one fibroid of 5 cm or larger and found less febrile morbidity and anemia postoperatively with laparoscopy. Cases with more than three myomas more than 5 cm or with a uterine size above the umbilicus were excluded. Three women required transfusion after abdominal myomectomy, but none were transfused after laparoscopy. The surgical time was slightly lower with abdominal myomectomy (89 _+ 27 vs. 100 _+ 38 minutes), but the difference was not significant. Three laparoscopic cases were converted to abdominal procedures due to difficulties of hemostasis or difficulties in suturing.

Rossetti et al. [39] reported long-term follow-up of 81 patients randomized to abdominal or laparoscopic myomectomy plus 84 nonrandomized patients and found similar recurrence rates, 23% and 27%, respectively, between the laparoscopic and abdominal myomectomy. Two laparoscopies were converted to open procedures: one due to anesthesia problems and one due to the size and number of myomas.

Silva et al. [40] performed a case-control study of 25 laparoscopic myomectomy and 51 abdominal myomectomy procedures. Of the 25 in the laparoscopy group, 20 were laparoscopy assisted. Hospital stay was significantly shorter with laparoscopy compared to laparotomy (30.5 vs. 65.0 hours, $P<0.001$, as was duration of postoperative narcotics use (14.8 vs. 24 hours, $P<0.001$). However, surgical time was longer in the laparoscopy group (222.5 vs. 180 minutes, P_.001) compared to the open group. There was no difference in blood loss.

Stringer et al. [41] performed a retrospective case-control study comparing 49 laparoscopic myomectomies and 49 consecutive abdominal myomectomies. Surgical time for laparoscopic myomectomy was almost double compared to open procedures (264 vs. 133 minutes, $P<0.001$). Mean blood loss was also higher for laparoscopic myomectomies (340 vs. 110 mL, $P<0.001$). Benefits included a considerably shorter

hospitalization with laparoscopic myomectomy (0.6 vs. 5.6 days, $P<0.001$). There were 17 complications in the abdominal myomectomy group compared to 5 in the laparoscopic group, a significant increase ($P=0.007$).

There are no prospective randomized controlled trials comparing adhesion formation after laparoscopic and abdominal myomectomy. Adhesions form was found in more than 90% of abdominal myomectomies [42]. The incidence is highest (94%) with posterior incisions, and lower (56%) with fundal or anterior uterine incisions [43][44].

One case-control series compared 16 abdominal myomectomies with laparoscopic myomectomy and found fewer adhesions and significantly reduced adhesion scores with laparoscopic myomectomy [45]. In the study by Stringer et al. [41] women undergoing subsequent surgery had fewer adhesions with laparoscopic myomectomy and higher adhesion rates with abdominal myomectomy. Dubuisson et al. [46] performed second-look laparoscopy in 45 women after laparoscopic myomectomy and assessed 72 myomectomy sites. Adhesions were found in 36% of patients and at 17% of each myomectomy site. The adhesion rate was highest with posterior incisions, but the rate of adhesion formation was only 33% at this site. Malzoni et al. [47] described second-look laparoscopy in 18 women after laparoscopic myomectomy and found adhesions in 33% of patients. The mean myoma diameter in this study was 7.8 cm.

Bulletti et al. [48] retrospectively compared pregnancy outcomes in three groups of infertile women: (1) women with uterine fibroids and no surgery, (2)] laparoscopic myomectomy, and (3) unexplained infertility. Delivery rates were significantly higher with laparoscopic myomectomy (42%) compared to untreated women with fibroids (11%) and women with unexplained infertility (25%).

Ribeiro et al. [49] retrospectively studied pregnancy outcomes in 28 infertile women who had at least one uterine myoma of more than 5 cm diameter resected by laparoscopy. The postoperative pregnancy rate was 65%. Seventy-eight percent of these delivered viable term infants, 43% delivered vaginally and 57% delivered by cesarean section. Twentytwo percent of pregnancies ended in spontaneous abortion. There were no complications related to myomectomy in any of these pregnancies.

Landi et al. [50] evaluated pregnancy outcomes in 359 women after laparoscopic myomectomy for various indications. Seventy-two women conceived after surgery. Of these, 17% ended in first trimester spontaneous abortion, and there was one case each of ectopic pregnancy, molar pregnancy, and elective termination. The remaining pregnancies were delivered at term, 54% delivered vaginally and 46% delivered by cesarean section.

Seracchioli and colleagues [51) studied pregnancy outcomes in 34 women with fibroids penetrating

the uterine cavity treated with laparoscopic myomectomy. Of the 23 women who attempted pregnancy, 39% conceived within 1 year, and 78% of these delivered at term without complications. There were no cases of uterine rupture.

DiGregorio et al. [52] described laparoscopic myomectomy in a series of 148 infertile women with one or more myomas 3 cm or larger. Forty-four percent of these women conceived, including 11 who conceived with in vitro fertilization. The delivery rate was 86%. No cases of uterine rupture or dehiscence was observed.

One of the major concerns about laparoscopic myomectomy in a woman of reproductive age is the risk of uterine rupture during pregnancy or labor due to insufficient closure or healing of a laparoscopic myomectomy incision. There are several case reports of uterine rupture after laparoscopic myomectomy [53-60]. However, when laparoscopic myomectomy is performed by experienced surgeons, uterine rupture or dehiscence is a very infrequent complication after laparoscopic myomectomy.Uterine rupture appears to be a rare occurrence in large clinical series. Based on the clinical trials and case series, it would appear that the risk of uterine rupture during pregnancy is no higher than 1% when the myometrial incision is appropriately repaired [61].

Tinelli et al [62], studied 335 laparoscopic intracapsular myomectomies which included two groups. Group I included 195 patients with myoma; group II, 140 patients with multiple myomas, 4-9 cm in diameter. No differences ($P>0.05$) between groups were observed with respect to the following: intraoperative blood loss (98 ± 4.7 mL of group I versus 106 ± 6.8 mL of group II), catheter inside pelvis for postsurgical drainage (40% versus 36.4% women), analgesic administration for the first 24 hours (41.5% versus 40% patients), postoperative fever after 24 hours (11.2% versus 9.2% women), postoperative therapeutic antibiotics administration (8.2% versus 6.4% patients), and hospitalization and postoperative ultrasound (US) intramyometrial hematoma detection (6.6% versus 5.7% of group II). The only surgical statistical difference ($P<0.05$) was in the mean total laparoscopic time (60 ± 7.2 minutes for group I versus 97 ± 8.9 minutes for group II). They concluded that intracapsular laparoscopic myomectomies, performed in the same session on a single or on multiple fibroids, seem to preserve myometrial integrity and allow the restoration of uterine scar, with few early and late surgical complications.

You Y et al [63] after studying 673 women who received subserosal and intramural intracapsular myomectomy, concluded that by preserving the fibroid pseudocapsule and myometrial integrity, laparoscopic intracapsular myomectomy will not cause any complication and ensure good fertility and reproductive outcome.

CONCLUSION

Overall, these studies consistently show an overall low complication rate with laparoscopic myomectomy. Surgical times may be longer than with open procedures, but the recovery time is shorter. The time taken by the laparascopic myomectomy differs from surgeons to surgeons and it clearly reflects that the time required for laparoscopic myomectomy depends upon the experience of surgeons. Blood loss during the surgery also varies from one study to another. It is clear that the operative blood loss also depends on the experience of surgeon and laparoscopic myomectomy may be associated with less blood loss as compared to abdominal bloos loss if it is performed by experienced surgeon. The procedure provides an acceptable and perhaps a preferable, alternative to abdominal myomectomy for women with symptomatic fibroids who desire to preserve uterus and is an excellent alternative to those women who have infertility due to fibroids. It has a clear benefit of rapid recovery, as compared to abdominal myomectomy. Pregnancy rate is good after the laparoscopic myomectomy and the risk of uterine rupture during pregnancy is minimal.

REFERENCES

1. Sami Walid M, Heaton RL. The role of laparoscopic myomectomy in the management of uterine fibroids. Curr Opin Obstet Gynecol 2011; 23:273–277.
2. Day Baird D, Dunson DB, Hill MC, Cousins D, Schectman JM. High cumulative incidence of uterine leiomyoma in black and white women: ultrasound evidence. Am J Obstet Gynecol. 2003;188: 100–107 (P).
3. Buttram VC, Reiter RC. Uterine leiomyomata: etiology, symptomatology and management. Fertil Steril 1981;36:433–45.
4. Lumsden MA,Wallace EM. Clinical presentation of uterine fibroids. Baillieres Clin Obstet Gynaecol 1998;12:177–95.
5. Anderson J. Factors in fibroid growth. Baillieres Clin Obstet Gynaecol 1998;12(2):225–8.
6. Dubuisson JB, Chapron C, Fauconnier A, Kreiker G. Laparoscopic myomectomy and myolysis. Curr Opin Obstet Gynecol 1997;9(4):233–8.
7. Garcia CR. Management of the symptomatic fibroid in women older than 40 years of age: hysterectomy or myomectomy? Obstet Gynecol Clin North Am 1993;20(2):337–47.
8. Whiteman MK, Hillis SD, Jamieson DJ, et al. Inpatient hysterectomy surveillance in the United States, 2000–2004. Am J Obstet Gynecol. 2008;198:34 e1–e7 (II-2).
9. Vilos GA, Lefebvre G, Graves GR. Guidelines for the management of abnormal uterine bleeding. SOGC Clinical Practice Guidelines,No. 106, August 2001. J Obstet Gynaecol Can 2001;23(8):704–9.
10. Marugo M, Centonze M, Bernasconi D, Fazzuoli L, Berta S, Giordano G. Estrogen and progesterone receptors in uterine leiomyomas. Acta Obstet Gynecol Scand. 1989;68:731–735 (N/A).
11. Hurst BS, Rock JA. Uterine leiomyomata and recurrent pregnancy loss. Infertil Reprod Med Clin N Am

1991;2:75–90.

12. Vercellini P, De Giorgi O, Aimi G, Panazza S, Uglietti A, Crosignani PG. Abdominal myomectomy for infertility: a comprehensive review. Hum Reprod 1998;13:873–9.
13. Vercellini P, Crosignani PG, Mangioni C, Ferrari A, De Giorgi O. Treatment with a gonadotrophin releasing hormone agonist before hysterectomy for leiomyomas: results of a multicentre, randomized controlled trial. Br J Obstet Gynaecol 1998;105(11):1148–54.
14. Friedman AJ, Hoffman DI, Comite F, Browneller RW, Miller JD, for the Leuprolide Study Group.Treatment of leiomyomata uteri with leuprolide acetate depot: a double-blind, placebo-controlled, multicenter study. Obstet Gynecol 1991;77:720–5.
15. Lakhani KP, Marsh MS, Purcell W, Hardiman P. Uterine artery blood flow parameters in women with dysfunctional uterine bleeding and uterine fibroids: the effects of tranexamic acid. Ultrasound Obstet Gynecol 1998;11(4):23–8.
16. American College of Obstetricians and Gynecologists. Surgical alternatives to hysterectomy in the management of leiomyomas. ACOG Prac Bull (May) 2000;16:1–8.
17. Reiter RC,Wagner PL, Gambone JC. Routine hysterectomy for large asymptomatic uterine leiomyomata: a reappraisal. Obstet Gynecol 1992;79(4):481–4.
18. Weber AM, Mitchinson AR, Gidwani GP, Mascha E,Walters MD. Uterine myomas and factors associated with hysterectomy in premenopausal women. Am J Obstet Gynecol 1997;176:1213–9.
19. Friedman AJ, Haas ST. Should uterine size be an indication for surgical intervention in women with myomas? Am J Obstet Gynecol 1993;168:751–6.
20. Bachmann GA. Hysterectomy. A critical review. J Reprod Med 1990;35:839–62.
21. Garcia CR. Management of the symptomatic fibroid in women older than 40 years of age: hysterectomy or myomectomy? Obstet Gynecol Clin North Am 1993;20(2):337–47.
22. Wamsteker K, Emanuel MH, de Kruif JH. Transcervical hysteroscopic resection of submucous fibroids for abnormal uterine bleeding: results regarding the degree of intramural extension. Obstet Gynecol. 1993; 82:736–740 (II-2).
23. Vercellini P, Zaina B, Yaylayan L, Pisacreta A, De Giorgi O, Crosignani PG. Hysteroscopic myomectomy: long-term effects on menstrual pattern and fertility.ObstetGynecol. 1999;94:341–347 (II-2).
24. Parker WH, Fu YS, Berek JS. Uterine sarcoma in patients operated on for presumed leiomyoma and rapidly growing leiomyoma. Obstet Gynecol. 1994;83:414–418 (P).
25. Leibsohn S, d'Ablaing G, Mishell DR Jr, Schlaerth JB. Leiomyosarcoma in a series of hysterectomies performed for presumed uterine leiomyomas. Am J Obstet Gynecol. 1990;162:968–974, discussion74-76. (P).
26. Lasmar RB, Dias R, Barrozo PR, Oliveira MA, Coutinho Eda S, da Rosa DB. Prevalence of hysteroscopic findings and histologic diagnoses in patients with abnormal uterine bleeding. Fertil Steril. 2008;89: 1803–1807 (P).

27. PrittsEA, ParkerWH, OliveDL. Fibroids and infertility: an updated systematic review of the evidence. Fertil Steril. 2009;91:1215–1223 (SR).
28. Klatsky PC, Tran ND, Caughey AB, Fujimoto VY. Fibroids and reproductive outcomes: a systematic literature review from conception to delivery. Am J Obstet Gynecol. 2008;198:357–366 (SR).
29. Deligdish L, Loewenthal M. Endometrial changes associated with myomata of the uterus. J Clin Pathol. 1970;23:676–680 (L).
30. Maguire M, Segars JH. Benign uterine disease: leiomyomata and benign polyps. In: Aplin JD, Fazleabas AT, Glasser SR, Giudice LC, editors. The endometrium: molecular, cellular and clinical perspectives. 2nd ed. London: Informa Health Care; 2008 (R).
31. Semm K. Pelviscopic surgery in gynecology. Geburtshilfe Frauenheilkunde 1977;37:909 –20
32. Semm K. Tissue-puncher and loop-ligation—new aids for surgicaltherapeutic pelviscopy (laparoscopy)–endoscopic intraabdominal surgery. Endoscopy 1978;10:119 –24.
33. Semm K. New methods of pelviscopy (gynecologic laparoscopy) for myomectomy, ovariectomy, tubectomy and adnectomy. Endoscopy 1979;11:85–93.
34. Semm K, Mettler L. Technical progress in pelvic surgery via operative laparoscopy. Am J Obstet Gynecol 1980;138:121–7.
35. Nezhat C, Lavie O, Hsu S, Watson J, Barnett O, Lemyre M. Roboticassisted laparoscopic myomectomy compared with standard laparoscopic myomectomyda retrospective matched control study. Fertil Steril. 2009;91:556–559 (II-2).
36. Bedient CE, Magrina JF, Noble BN, Kho RM. Comparison of robotic and laparoscopic myomectomy. Am J Obstet Gynecol. 2009;201: 566.e1–566.e5 (III).
37. Mais V, Ajossa S, Guerriero S, Mascia M, Solla E, Melis GB. Laparoscopic versus abdominal myomectomy: a prospective, randomized trial to evaluate benefits in early outcome. Am J Obstet Gynecol 1996;175:654–8.
38. Seracchioli R, Rossi S, Govoni F, et al. Fertility and obstetric outcome after laparoscopic myomectomy of large myomata: a randomized comparison with abdominal myomectomy. Hum Reprod 2000;15: 2663–8.
39. Rossetti A, Sizzi O, Soranna L, Cucinelli F, Mancuso S, Lanzone A. Long-term results of laparoscopic myomectomy: recurrence rate in comparison with abdominal myomectomy. Hum Reprod 2001;16: 770–4.
40. Silva BA, Falcone T, Bradley L, et al. Case-controlled study of laparoscopic versus abdominal myomectomy. J Laparoendoscopic Adv Surg Techniques 2000;10:191–7.
41. Stringer NH, Walker JC, Meyer PM. Comparison of 49 laparoscopic myomectomies with 49 open myomectomies. J Am Assoc Gynecol Laparosc 1997;4:457– 64.
42. The Myomectomy Adhesion Multicenter Study Group. An expanded polytetrafluoroethylene barrier (Gore-Tex Surgical Membrane) reduces post-myomectomy adhesion formation. Fertil Steril 1995;63:

491–3.

43. Tulandi T, Murray C, Guralnick M. Adhesion formation and reproductive outcome after myomectomy and second-look laparoscopy. Obstet Gynecol 1993;82:213–5.
44. Diamond MP. Reduction of adhesions after uterine myomectomy by Seprafilm membrane (HAL-F): a blinded, prospective, randomized, multicenter clinical study. Fertil Steril 1996;66:904 –10.
45. Bulletti C, Polli V, Negrini V, Giacomucci E, Flamigni C. Adhesion formation after laparoscopic myomectomy. J Am Assoc Gynecol Laparosc 1996;3:533– 6.
46. Dubuisson JB, Fauconnier A, Chapron C, Kreiker G, Norgaard C. Second look after laparoscopic myomectomy. Hum Reprod 1998;13:2102–6.
47. Malzoni M, Rotond M, Perone C, et al. Fertility after laparoscopic myomectomy of large uterine myomas: operative technique and preliminary results. Eur J Gynaecol Oncol 2003;24:79–82.
48. Bulletti C, DeZiegler D, Polli V, Flamigni C. The role of leiomyomas in infertility. J Am Assoc Gynecol Laparosc 1999;6:441–5.
49. Ribeiro SC, Reich H, Rosenberg J, Guglielminetti E, Vidali A. Laparoscopic myomectomy and pregnancy outcomes in infertile patients. Fertil Steril 1999;71:571– 4.
50. Landi S, Fiaccavento A, Zaccoletti R, Barbieri F, Syed R, Minelli L. Pregnancy outcomes and deliveries after laparoscopic myomectomy. J Am Assoc Gynecol Laparosc 2003;10:177– 81.
51. Seracchioli R, Colombo FM, Bagnoli A, Govoni F, Missiroli S, Venturoli S. Laparoscopic myomectomy for fibroids penetrating the uterine cavity: is it a safe procedure? Br J Obstet Gynaecol 2003;110: 236–40.
52. DiGregorio A, Maccario S, Raspollini M. The role of laparoscopic myomectomy in women of reproductive age. Reprod Biomed Online 2002;4:55– 8.
53. Mecke H, Wallas F, Brocker A, Gertz HP. Pelviscopic myoma enucleation: technique, limits, complications. Geburt Frauen 1995;55: 374–9.
54. Dubuisson JB, Chavet X, Chapron C, Gregorakis SS, Morice P. Uterine rupture during pregnancy after laparoscopic myomectomy. Hum Reprod 1995;10:1475–7.
55. Harris WJ. Uterine dehiscence following laparoscopic myomectomy. Obstet Gynecol 1992;80:545– 6.
56. Friedmann W, Maier RF, Luttkus A, Schafer AP, Dudenhausen JW. Uterine rupture after laparoscopic myomectomy. Acta Obstet Gynecol Scand 1996;75:683– 4.
57. Pelosi MA 3rd, Pelosi MA. Spontaneous uterine rupture at thirty-three weeks subsequent to previous superficial laparoscopic myomectomy. Am J Obstet Gynecol 1997;177:1547–9.
58. Nkemayim DC, Hammadeh ME, Hippach M, Mink D, Schmidt W. Uterine rupture in pregnancy subsequent to previous laparoscopic electromyolysis. Case report and review of the literature. Arch Gynecol Obstet 2000;264:154–6.
59. Hasbargen U, Summerer-Moustaki M, Hillemanns P, Scheidler J, Kimmig R, Hepp H. Uterine dehiscence in a nullipara, diagnosed by MRI, following use of unipolar electrocautery during laparoscopic myomectomy: case report. Hum Reprod 2002;17:2180 –2.

60. Lieng M, Istre O, Langebrekke A. Uterine rupture after laparoscopic myomectomy. J Am Assoc Gynecol Laparosc 2004;11:92–3.
61. Dubuisson JB, Chapron C, Chavet X, Gregorakis SS. Fertility after laparoscopic myomectomy of large intramural myomas: preliminary results. Hum Reprod 1996;11:518 –22.
62. Tinelli A[1], Malvasi A, Hudelist G, Cavallotti C, Tsin DA, Schollmeyer T, Bojahr B, Mettler L. Laparoscopic intracapsular myomectomy: comparison of single versus multiple fibroids removal. An institutional experience. J Laparoendosc Adv Surg Tech A. 2010 Oct;20(8):705-11. doi: 10.1089/lap.2010.0082.
63. You Y[1], Meng Y, Li L, Peng H, Fan W, Li Y. Prognosis and reproductive outcome of laparoscopic intracapsular myomectomy. Nan Fang Yi Ke Da Xue Xue Bao. 2013 Aug;33(8):1185-8.ss