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Laparoscopic myomectomy for symptomatic uterine myomas

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Objective: To evaluate the safety, efficacy, and techniques of laparoscopic myomectomy as treatment for symptomatic uterine myomas.
Design: Medline literature review and cross-reference of published data.
Results: Results from randomized trials and clinical series have shown that laparoscopic myomectomy provides the advantages of shorter hospitalization, faster recovery, fewer adhesions, and less blood loss than abdominal myomectomy when performed by skilled surgeons. Improvements in surgical instruments and techniques allows for safe removal and multilayer myometrial repair of multiple large intramural myomas. Randomized trials support the use of absorbable adhesion barriers to reduce adhesions, but there is no apparent benefit of presurgical use of GnRH agonists. Pregnancy outcomes have been good, and the risk of uterine rupture is very low when the myometrium is repaired appropriately.
Conclusion(s): Advances in surgical instruments and techniques are expanding the role of laparoscopic myomectomy in well-selected individuals. Meticulous repair of the myometrium is essential for women considering pregnancy after laparoscopic myomectomy to minimize the risk of uterine rupture. Laparoscopic myomectomy is an appropriate alternative to abdominal myomectomy, hysterectomy, and uterine artery embolization for some women. (Fertil Steril® 2005;83:1–23. ©2005 by American Society for Reproductive Medicine.)

Key Words: Laparoscopy, endoscopy, uterine myomas, leiomyoma, hysterectomy, myomectomy, adhesions, menometorrhagia, clinical studies, infertility, pregnancy

It is well recognized that uterine leiomyomas may cause menorrhagia, dysmenorrhea, and pelvic pressure. The impact of uterine leiomyomas on reproduction is more controversial and the benefit of myomectomy for these patients is not clear. Leiomyomas may impair fertility through several mechanisms including distortion of the uterine cavity, obstruction of the tubal ostia, and alterations in the endometrium affecting embryo implantation and growth. However, because the incidence of uterine leiomyomas increases with age, fertility declines with age, and many women with fibroids conceive spontaneously, it is difficult to assess the direct impact of leiomyomas on fertility. Therefore, myomectomy is indicated only after a complete evaluation of other potential factors for infertility (1).

A recent comprehensive review of the literature (23 studies) on leiomyomas and reproduction reported an overall conception rate of 57% after myomectomy among prospective studies (2). Among women with otherwise unexplained infertility, the conception rate was 61% after myomectomy.

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Fibroids that distort the endometrial cavity may 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 (3). The conception rate is approximately 53%–70% after myomectomy for submucus myomas, and 58%–65% after myomectomy with intramural or subserosal leiomyomas (2). Unfortunately, information on duration of infertility, surgical technique, number and size of leiomyomas, or the increase in pregnancy rate after myomectomy is limited.

MYOMAS AND ASSISTED REPRODUCTION

Information from studies in IVF cycles controlling for other fertility factors is helpful in evaluating the direct impact of leiomyomas on fertility. Submucosal leiomyomas significantly decrease IVF pregnancy rates (4, 5). Hysteroscopic resection of submucus leiomyomas resulted in a significantly higher pregnancy rate compared to controls with a normal uterine cavity (48% vs. 26%) (6). There appears to be a significant impact on fertility when fibroids distort the uterine cavity, and surgery may be warranted. Fortunately, in many cases, surgery may be performed by hysteroscopy,

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which provides a less invasive method for leiomyoma treatment.

The effect of medium and large intramural myomas on fertility is less clear. A retrospective study showed that IVF live birth rates were not improved by myomectomy, as IVF "ongoing" pregnancy rates were 16.9% after myomectomy (n = 47), 20.8% with fibroids diagnosed but not removed (n = 11), and 19% in "nonfibroid" controls (5). However, there was a 50% spontaneous abortion rate with fibroids compared to 34% after myomectomy in this study, possibly suggesting compromised pregnancy outcome in the presence of fibroids.

The impact on fertility of fibroids that do not deform the uterine cavity is also uncertain. The presence of subserosal or intramural leiomyomas without distortion of the endometrial cavity did not impact live birth rates in one study of 46 patients undergoing IVF when compared to controls; however, the impact of leiomyoma size was not evaluated (7). Ramzy et al. (8) also found that myomas, 73% of which were subserosal, had no effect on conception in 39 women.

Another study found a significant decrease in IVF live birth rates in women less than 40 years old with intramural leiomyomas (49% vs. 58%) (9). However, the investigators did not support routine myomectomy for these patients. A regression analysis was performed to assess the impact of leiomyoma size on implantation, including patients with multiple myomas but no correlation was found. However, this study included primarily patients with small leiomyomas (mean diameter, 2.0 cm) (9).

In contrast to these reports, some studies have shown that intramural myomas reduce IVF success. Stovall et al. (10) evaluated 91 matched IVF cycles in women with subserosal or intramural leiomyomas and found a decreased pregnancy rate of 37% compared to controls 53%. Ninety-five percent of the fibroids in this study were intramural, and size ranged from 8 to 54 mm, with mean diameter 29 mm. Implantation rates were 13.8% with fibroids, significantly lower ($P<.05$) than the 19.7% implantation rate without fibroids. In another study, women with intramural myomas had significantly lower pregnancy rates with intramural myomas compared to women without fibroids (16% vs. 34%, $P<.05$) (4). Implantation rates were 6.4% with intramural fibroids, compared to 15.8% in the control group ($P<.005$), although the total fibroid diameter was only 24 mm. Finally, a recent study by Oliveira et al. (11) evaluated the contribution of intramural leiomyoma size on pregnancy rates and found that the pregnancy rate was significantly decreased only when intramural leiomyomas were 4 cm or larger. Intramural leiomyomas larger than 7 cm were not evaluated routinely as this group recommends removal of larger leiomyomas before IVF.

Marchionni et al. (12) retrospectively evaluated the reproductive performance in 72 women before and after abdominal myomectomy of intramural or subserosal myomas. Seventy-five percent achieved a live birth after surgery, significantly improved compared to the preoperative rate of 31%. They correctly pointed out the limitations of this analysis in a retrospective study. Women aged 30 years or younger had the highest pregnancy rates, as did those with only one myoma resected. The size and location of myomas did not affect the prognosis in this study.

MYOMAS AND OBSTETRICAL OUTCOMES

Obstetrical outcomes are compromised by uterine fibroids, according to a population-based retrospective study by Sheiner et al. (13). Compared to controls, women with uterine myomas during pregnancy had a 3.5-fold increase in the incidence of intrauterine growth restriction (6.8% vs. 1.9%), a 4-fold increase in placental abruption (2.8% vs. 0.7%), a 5-fold increase in the incidence of transverse lie or breech presentation (16.9% vs. 2.4%), a 5-fold increase in the cesarean section rate (57.7% vs. 10.8%), a 70% increase in premature rupture of membranes (9.6% vs. 5.5%), and were three times more likely to receive transfusion (4.2% vs. 1.4%). All of these outcomes were significant ($P<.001$). Adjusting for maternal age, parity, gestational age, and malpresentation, pregnancies in the myoma group still had a 6.7-fold risk of cesarean section (95% confidence interval [CI] 5.5–8.1, $P<.01$), 2.5-fold increase of placental abruption (95% CI 1.6–4.2, $P<.001$), and a 40% increase in preterm deliveries compared to pregnancies without uterine fibroids (95% CI 1.1–1.7, $P = .009$). The size and location of the myomas were not described in this study, but other studies have shown that fibroids adjacent to the placenta increase the risk of bleeding and premature rupture of membranes (14). It would appear that myomectomy could be justified in some circumstances to reduce the risk of adverse pregnancy outcomes in some patients.

Further studies stratifying patients by leiomyoma number, size, and location will clarify the contribution of leiomyoma size on fertility. The majority of the evidence appears to support an impairment of fertility with intramural leiomyomas, particularly in larger leiomyomas. It is important to clarify this issue, as myomectomy for intramural fibroids has a risk of morbidity and adhesion formation, and surgery should not be considered unless the benefits outweigh the risks.

In spite of the limited data, myoma size, location, and number are key factors when discussing the outcomes after myomectomy, and these are considered separately in this discussion. Unfortunately, these factors are not separable for an individual patient, and the surgeon must weigh the cumulative impact of all three factors when deciding how and when to perform a myomectomy.

LAPAROSCOPIC MYOMECTOMY

Although laparoscopic myomectomy has been performed since Semm and colleagues described the procedure in late 1970s (15–18), the role of laparoscopic myomectomy as a treatment option for symptomatic uterine fibroids has been questioned. Many fibroids that can be easily removed lapa-