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Review Article

Minimally Invasive Approaches to Myoma Management

Julian A. Gingold, MD, PhD, Ndeye-Aicha Gueye, MD, and Tommaso Falcone, MD

From the Obstetrics, Gynecology and Women's Health Institute, Cleveland Clinic Foundation, Cleveland, Ohio (all authors).

ABSTRACT Patients affected by the presence of leiomyomas may incur a substantial physical, emotional, social, and financial toll as well as losses in their quality of life. Although many myomas are not amenable to medical therapy or hysteroscopic resection, many others are amenable to minimally invasive surgical approaches. In patients who prefer to retain their fertility, laparoscopic myomectomy should be considered the intervention of choice. In this review, we expand on the surgical techniques of both conventional laparoscopic and robotic-assisted myomectomies. We discuss port placement, enucleation of myomas, tissue extraction, minimization of blood loss, adhesion prevention, and the technique for closure of uterine incisions. Finally, we discuss the available data supporting the use of these 2 approaches as the preferred, safe, and effective fertility-sparing surgical option. We also briefly discuss the emerging technologies of uterine artery embolization, ultrasound surgery, and radiofrequency ablation. Journal of Minimally Invasive Gynecology (2018) 25, 237–250 © 2017 AAGL. All rights reserved.

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Uterine myomas are the most common benign gynecologic tumor [1] and occupy a significant position in gynecologic practice; 70% to 80% of reproductive-age women have uterine myomas although they are symptomatic in only 20% to 40% of women over 35 years old [2]. Women with symptomatic leiomyomas may present with abnormal uterine bleeding and associated anemia; pelvic pain or pressure; urinary symptoms [3,4]; and, more rarely, a number of adverse reproductive outcomes including recurrent pregnancy loss, preterm delivery, placental abruption, malpresentation, and growth restriction [5]. Nearly half of affected patients ultimately undergo cesarean delivery [6]. Therefore, patients affected by the presence of leiomyomas may incur a substantial physical, emotional, social, and financial toll as well as losses in their quality of life.

Although recent developments in the use of hormonal agents including selective progesterone receptor modulators as well as the traditional gonadotropin-releasing hormone agonists and hormonal contraceptives have improved medical management of myomas, many symptomatic patients ultimately require surgical management or fail medical therapies. In these cases, there are a multitude of surgical options (e.g., hysteroscopy, conventional laparoscopy, robotic-assisted laparoscopy, open myomectomy, and hysterectomy) and procedural alternatives (e.g., uterine artery embolization [UAE], magnetic resonance–guided focused ultrasound surgery [MRgFUS], and radiofrequency volumetric thermal ablation [RFA]) that are available to patients.

In the United States, an estimated 30 000 myomectomies are performed every year for symptomatic leiomyomas [7] compared with approximately 200 000 hysterectomies for the same indication [8,9]. In this review, we will focus on the minimally invasive surgical approach to myomectomy. We will expand on the surgical techniques of both laparoscopic and robotic-assisted myomectomies and describe the available data supporting the use of these 2 approaches as the preferred, safe, and effective fertility-sparing surgical option. We will finally briefly review the procedural alternatives and their role in the management of symptomatic leiomyomas.

Indications and Contraindications for Minimally Invasive Myomectomy

The primary indication for laparoscopic myomectomy (including both conventional as well as robotic-assisted approaches) is symptom management, most often abnormal uterine bleeding or bulk symptoms [10]. Evidence from

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Corresponding author: Tommaso Falcone, MD, Obstetrics, Gynecology and Women's Health Institute, Cleveland Clinic Foundation, 9500 Euclid Avenue, Desk A81, Cleveland, OH 44195.
E-mail: falcont@ccf.org

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randomized controlled trials for fertility benefit from myomectomy by any route remains inconclusive [11,12]. Myomas are implicated as the sole cause of infertility in only 3% of cases, with most of this burden from submucosal lesions, which are typically best accessed through a hysteroscopic approach [13]. The limited evidence from case series supports myomectomy for submucosal myomas to improve the pregnancy rate [12]. Subserosal myomas have no impact on fertility [12]. The role of myomectomy for intramural lesions is less clear. A meta-analysis of observational studies from in vitro fertilization patients with or without non–cavity-distorting intramural myomas identified a decreased live birth (relative ratio [RR] = 0.79; 95% confidence interval [CI], 0.70–0.88; $p < .0001$) and pregnancy rate (RR = 0.85; 95% CI, 0.77–0.94; $p = .002$) among those with intramural myomas [14]. However, a review of myomectomy for intramural myomas failed to identify significant improvements in pregnancy or the live birth rate [12] but acknowledged the limitations from the underlying studies entailing abdominal myomectomy [15,16]. One randomized controlled trial also observed an improved pregnancy rate with treatment of either submucosal or submucosal-intramural myomas but not exclusively intramural myomas [17]. Unfortunately, this trial did not specifically distinguish between treatment by laparotomy with hysteroscopy and laparotomy alone. In short, laparoscopic myomectomy should be primarily considered for women with myoma-related symptoms who do not desire hysterectomy and is ideal for patients who wish to preserve their fertility [18] although it may be considered for the indication of fertility in appropriately counseled patients.

Laparoscopic myomectomy should be considered the intervention of choice for all myomas not amenable to medical therapy or hysteroscopic resection (Fig. 1). Medical management may be considered to have failed if the patient does not respond or cannot tolerate the side effects of the therapy. Prescribing guidelines recommend limiting medical therapy with gonadotropin-releasing hormone agonists to no more than 3 to 6 months [19–21]. Hysteroscopic resection is appropriate for all myomas under 3 cm with a >50% intracavitary component (Fédération Internationale de Gynécologie et d'Obstétrique 0 or 1 classification) [22]. Hysteroscopic success with myomas greater than 3 cm in size or with a reduced intracavitary component is dependent on the skill of the surgeon.

Laparoscopic myomectomy for myomas >10 cm in size or ≥4 in number is feasible although above this size and number the surgery is more challenging and laparotomy is frequently appropriate [10]. Cases of laparoscopic myomectomy have been reported for myomas >20 cm in size [23]. Myomectomy should be performed with caution in patients with suspected gynecologic malignancy and is contraindicated in the case of known malignancy.

Surgical Technique for Laparoscopic Myomectomy

Laparoscopic myomectomy encompasses a wide array of specific surgical techniques. Conventional laparoscopic myomectomy entails performing the entire surgery laparoscopically, from enucleating the myomas to closing the myometrial defects and extracting the myomas, without the creation of any additional larger incisions. Variations of this technique may incorporate additional abdominal incisions or use robotic assistance (Fig. 2).

Laparoscopic entry is guided by the patient's previous surgical history as well as preoperative imaging and a clinical examination to optimize access to the planned surgical field. For many patients with an uncomplicated surgical history and a relatively small myoma, umbilical entry may be appropriate. In patients with an extensive past abdominal surgical history, uterine size near or at the umbilicus, or a history of scarring or laparotomy, left upper quadrant entry at Palmer's point offers an improved safety margin [24]. To maximize

Fig. 1

A uterus 10 weeks in size with a 6-cm posterior leiomyoma, an optimal case for laparoscopic myomectomy.

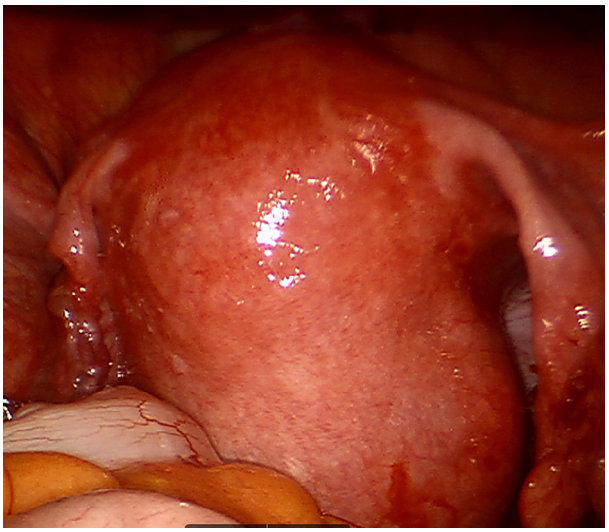

Fig. 2

Port placement including a suprapubic self-retaining retractor.