



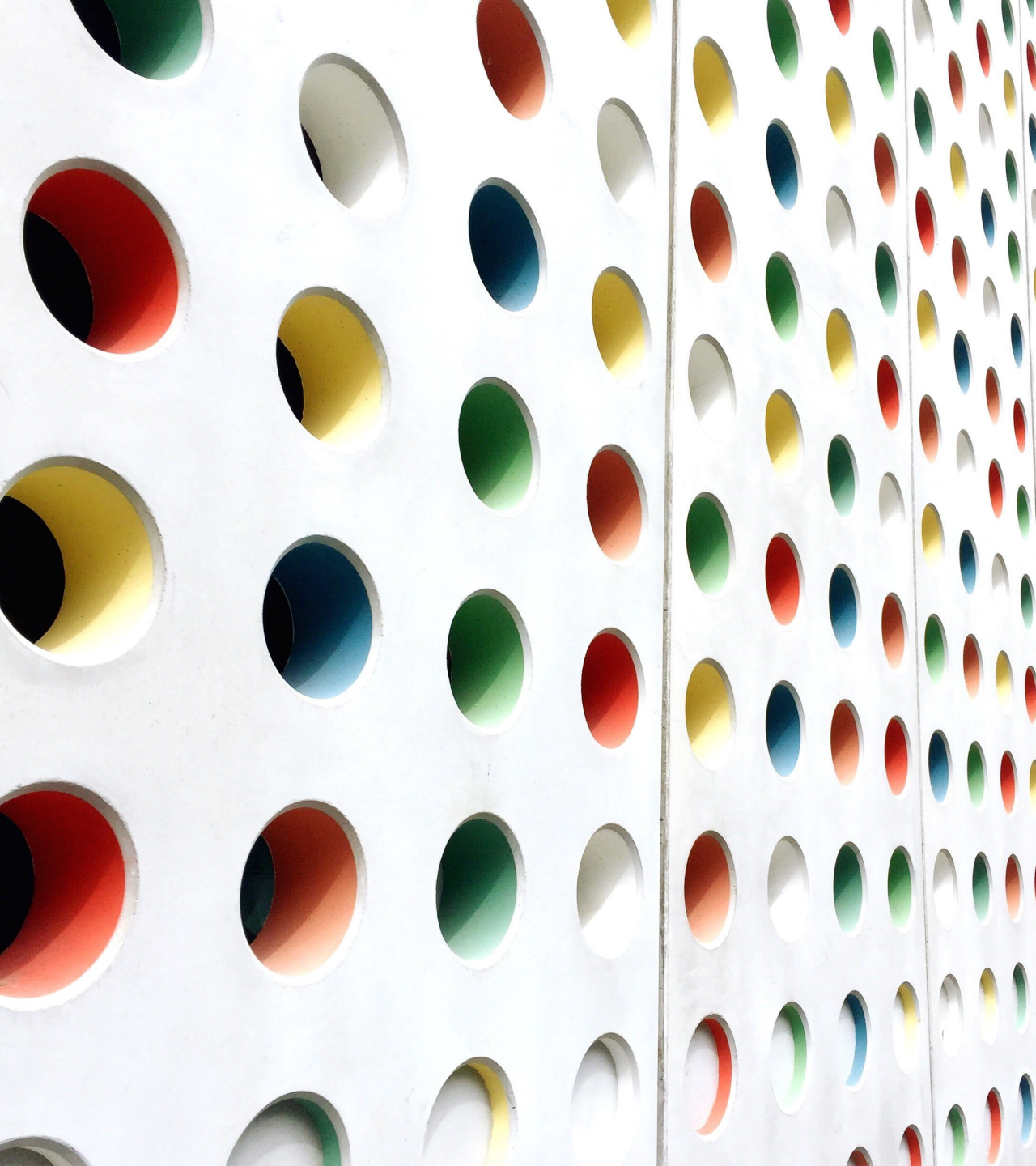
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دکتر فریبا رمضانعلی

جراح و متخصص زنان و زایمان، فلوشیپ ناباروری
استادیار، عضو هیئت علمی پژوهشگاه رویان



Surgical approach to uterine myoma in patients with infertility

**DR FARIBA RAMEZANALI, MD
FELLOWSHIP OF INFERTILITY
ROYAN INSTITUTE**

Introduction

Fibroids represent the leading cause of hysterectomy in the United States, with a cumulative incidence of **70% in women of reproductive age**.

Fibroids can cause abnormal **uterine bleeding** and **bulk symptoms**, including **pelvic pressure** and **urinary frequency**.

It is clear that fibroids can **adversely affect** reproductive outcomes. These adverse effects include both impaired fertility and adverse obstetric outcomes.

Many studies have confirmed the negative impact of fibroids on obstetric outcomes including increased risk of **preterm labor** and delivery, **placenta previa**, **intrauterine growth retardation**, in-creased rate of **cesarean section**, and **postpartum hemorrhage**.

Their impact on fertility, however, remains less clear.

[Chelsea N. Fortin Journal of Gynecology Obstetrics and Human Reproduction 48 \(2019\)](#)

When examining this issue, **two questions need to be answered.**

Firstly, whether myomectomy leads to an improvement in fertility outcomes?

secondly, if there is a beneficial effect what would be the ideal surgical approach?

Level of the evidence and grading system

Level I

Systematic review of randomized controlled trials (RCTs), RCTs

Level II

Systematic review of a combination of RCTs, controlled trials without randomization, and cohort studies, Controlled trials without randomization, Cohort studies, Case-control studies

Level III

Descriptive studies, case series, case reports, letters, nonsystematic reviews, opinions based on clinical experience, and reports of expert committees.

strength of the recommendations

Grade A: There is **good evidence** to support the recommendations, either for or against.

Grade B: There is **fair evidence** to support the recommendations, either for or against.

Grade C: There is **insufficient evidence** to support the recommendations, either for or against.

A review of literature

Non-hysteroscopic myomectomy and fertility outcomes: a systematic review

Megan Orlando MD , Swapna Kollikonda MD , Loren Hackett , Rosanne Kho MD ,

The Journal of Minimally Invasive Gynecology (2020)

The initial search identified **2163 studies**, of which **51 met inclusion criteria**. These consisted of **11 studies focused** on factors associated with conception or pregnancy outcomes after myomectomy, **10 studies** that examined route of non hysteroscopic myomectomy, and **30 related** to intraoperative techniques and findings.

One of the initial challenges of myomectomy involves **patient selection** to determine which patients will benefit the most from surgery.

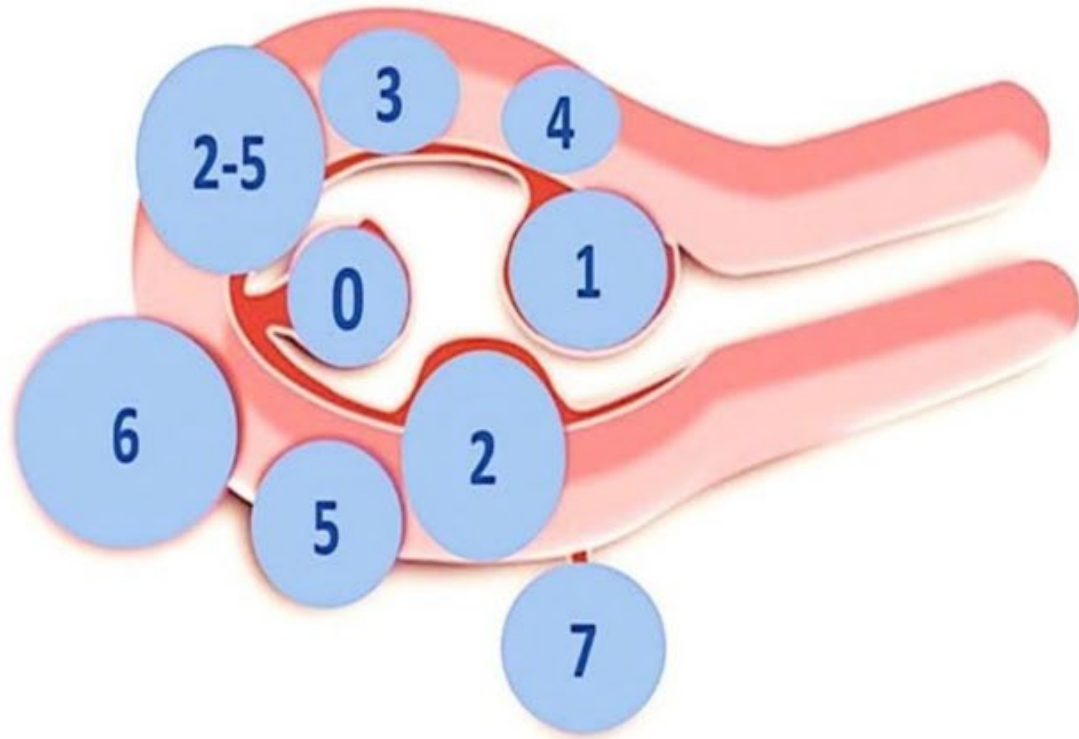
It is important to note that the current literature is limited by inconsistent use of FIGO type, location, and size to characterize fibroids and propose candidates for surgical intervention

We emphasize the importance of **accurate preoperative assessment** to facilitate a minimally invasive approach.

Preoperative or intraoperative **hysteroscopy** can identify submucous myomas and fibroids that distort the endometrial cavity.

Fibroid mapping though ultrasound or magnetic resonance imaging also allow for improved surgical planning and intraoperative decision-making to remove fibroids likely to have the greatest impact on fertility.

LEIOMYOMA SUBCLASSIFICATION SYSTEM



	0	Peduncolated intracavitary
SM –Submucous	1	<50% intramural
	2	≥50% intramural
	3	Contacts endometrium; 100% intramural
O-Other	4	Intramural
	5	Subserous ≥50% intramural
	6	Subserous <50% intramural
	7	Subserous pedunculated
	8	Other (specify e.g. cervical, parasitic)
	Hybrid (Contact both the endometrium and the serosal layer)	2-5

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- There is **fair evidence** that patients with **cavity-distorting intramural myomas**, which may include **FIGO types 2, 3, 4, 5, and 2-5** **benefit more from myomectomy** than patients with myomas that do not distort the endometrial cavity, as evidenced by **increased postoperative spontaneous conception rates** (Level B).

There is **fair evidence** that myomectomy is associated with **increased pregnancy rates** among patients **undergoing IVF** compared to **leaving fibroids in situ** (Level B).

Most experts recommend waiting at **least 12 weeks or three months** after surgery before attempting conception to allow time to regain myometrial stability.

The decision to undergo myomectomy for fertility purposes must be **weighed against age-related fertility declines**, among other individual considerations and preferences.

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- There is good evidence that **younger age** at the time of myomectomy is associated with successful postoperative conception (Level A).
 - Females with age > 35 years were 0.31 times less likely to get pregnant after surgery than those ages 20-25 years [AOR = 0.31 (95% CI: 0.29-0.54)]. [Meseret Jeldu Hindawi International Journal of Reproductive Medicine 2021](#)
 - There is fair evidence that **current fibroids** or a **history of myomectomy** is associated with increased risk of **preterm delivery** (Level B)

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- There is **insufficient evidence** to conclude whether **route of non-hysteroscopic myomectomy** impacts postoperative pregnancy rates (Level C).
 - There is **fair evidence** that route of surgery does not affect likelihood of successful **vaginal delivery** among patients who attempt vaginal birth (Level B).
 - There is **insufficient evidence** to conclude that **GnRH agonist therapy** affects pregnancy rates after myomectomy (Level C).
 - There is **fair evidence** that **uterine artery occlusion** during myomectomy is not associated with decreased postoperative pregnancy rates compared to myomectomy alone (Level B).

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- There is **fair evidence** that **uterine artery embolization** is associated with **decreased** post procedure markers of ovarian reserve (**AMH and antral follicle count**) compared to myomectomy (Level B).
 - There is **poor evidence** that myomectomy leads to **decreased miscarriage rates** (Level C).
 - There is **limited evidence** that **lower fibroid number** is associated with increased pregnancy rates and maintenance of pregnancy following myomectomy (Level B).
 - There is **fair evidence** that fertility is higher following **secondary myomectomy** among patients who are **younger** and have **fewer fibroids** (Level B).

It is beyond doubt that myomectomy in itself, being **a major invasive procedure**, runs the risk of damage to uterine myometrium, and endometrium as well as of producing scar tissue within the pelvic cavity.

Postoperative adhesions are a well-known complication of myomectomy

Mettler L, Obstet Gynecol Int. (2012)

Stewart EA, Nat Rev Dis Primers. (2016)

Postoperative adhesions, as documented by **second look laparoscopy**, are present in 51.1% of patients after laparoscopic myomectomy and 89.6% after laparotomy, but the impact of such adhesions on pregnancy rates is unknown.

[Dubuisso JB, a current view. Hum Reprod Update 2000](#)

Laparoscopic myomectomy is associated with a longer operative time and requires advanced endoscopic skills.

Laparoscopic removal of large **myomas (>8 cm)** increases the risk of hemorrhage, the risk of conversion to laparotomy, and operative time.

[David L. Olive, M.D. Semin Reprod Med 2011](#)

Adhesion post myomectomy

Abdominal vs. laparoscopic myomectomy

Rate of adhesion in **abdominal myomectomy** has been estimated to vary between 28.1% and 81%.

A similar incidence has been reported after **laparoscopic myomectomy**, ranging from 22.6% to 88% .

The recent introduction of insufflators, which deliver warmed and humidified gas, could help minimize post-surgical adhesion development

[Corona R, Verguts J, Am J Obstet Gynecol. \(2011\)](#)

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- There are **no direct comparisons** between the application of **different adhesion barrier** substances during abdominal myomectomy.
 - There is **fair evidence** that the use of **a collagen membrane** with polyethylene glycol and glycerol as an adhesion barrier during myomectomy is associated with **improved postoperative pregnancy rates** (Level B).
 - There is **limited evidence** that the use of gel containing auto-crosslinked **hyaluronic acid** as an adhesion barrier during myomectomy is associated with improved postoperative pregnancy rates (Level B).

Adhesion-reduction steps during myomectomy

Perform diligent hemostasis but ensure diligent use of cautery

Reduce risk of infection

Limit use of sutures and choose fine nonreactive sutures

Reduce duration of surgery

Avoid foreign bodies—such as materials with loose fibers

Reduce drying of tissues (limit heat and light)

In laparotomic surgery

Minimal use of dry towels or sponges

Use starch- and latex-free gloves

In laparoscopic surgery

Use frequent irrigation and aspiration

Reduce pressure and duration of pneumoperitoneum

Location and fibroid size as cofactor of adhesions development

Reduction of fertility is minimal following fundal and anterior incisions compared to **posterior** incisions

A significant association between **incision length >5 cm** and adhesion development.

[Trew G, Pistofidis G, Hum Reprod. \(2011\)](#)

Hysteroscopic Myomectomy

GnRH agonists:

Reduce preoperative anemia and decrease the size of submucous myomas.

Preoperative treatment with GnRH agonist may also **reduce surgical time, bleeding, and the volume of distension fluid required.**

GnRH agonist should not be used unless the largest diameter of the myoma is within the uterine cavity.

Preoperative intravaginal misoprostol improves cervical dilation and reduces the risk of cervical laceration.

A randomized trial by Donnez et al. – comparing UPA (Ulipristal) with GnRH-a, failed to show significant differences in fibroid volume reduction after 3 months of pretreatment between the two groups

Donnez J, N Engl J Med. (2012)

Revolutionizing Hysteroscopic Tissue Removal Using the MyoSure System

The MyoSure hysteroscopic tissue removal system can be a safe and effective treatment for endometrial and cervical polyps, Fibroids, RPOC and endometrial samples for histopathological assessment, even in women with an intact hymen.

Hysteroscopic morcellation involves the use of a blade and a suction tube to **simultaneously excise and remove** tissue as well as **clear a bloody field**, thereby improving visibility and **reducing the risk of perforations**. In addition, hysteroscopic morcellation requires **less cervical dilation** and less anesthesia which improves patient satisfaction and reduces procedure.

Charles E. Miller, Feb 2017

Electrosurgical resection with monopolar or bipolar has been associated with cervical dilatation to 10 mm and rare risk of hyponatremia related to non-saline distension media utilized with the monopolar resectoscope.

complications associated with excess absorption of some distension media, risk of thermal damage to healthy endometrium leading to synechiae, risk of perforation and visual field limitation from intrauterine chips.

Charles E. Miller, Feb 2017

Methods of Conservative Surgery

Myolysis

Myolysis refers to the technique where an attempt is made to disrupt or abolish the blood supply to the fibroid and cause shrinkage using **radiofrequency electricity**, supercooled **cryoprobes**, or **focused ultrasound**.

The procedure is rarely performed and **not recommended** for women who wish to get pregnant because there is a **significant risk of uterine rupture**.

Arcangeli S, Pasqualette MM. Obstet Gynecol 1997

Vilos GA, Daly LJ, Tse BM. J Am Assoc Gynecol Laparosc

1998

UNANSWERED QUESTIONS

- What is the impact of leiomyomas on fecundability?
- Does the degree of cavity distortion impact the benefit of myomectomy? Better assessment of the cavity in clinical trials is needed.
- What is the true impact of intramural fibroids with no submucosal component on reproductive outcomes?
- What is the value of myomectomy on ART outcomes?

Implications for research

1. Priority should be given to studies comparing **myomectomy to no intervention**
2. Studies should classify outcomes by the **size and type of fibroid**
3. Inclusion of patients in future studies with only **unexplained infertility**

