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Syllabus

Debate 638

Myomectomy on Trial: Mini-Laparotomy vs. Minimally Invasive. The Verdict Is Still Out

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Debate-638: Myomectomy on Trial: Mini-laparotomy vs. Minimally Invasive. The Verdict Is Still Out

Chair: Angela Chaudhari
Faculty: Antonio Gargiulo, Andrea Tinelli

Course Description

The optimal surgical approach to myomectomy remains one of the most debated topics in gynecologic surgery. While minimally invasive techniques continue to advance, mini-laparotomy remains an important option for selected patients with complex pathology. In this engaging debate, our internationally recognized experts will present the evidence, challenge prevailing paradigms, and defend their preferred surgical approaches. Through discussion of patient selection, surgical complexity, perioperative outcomes, reproductive outcomes, and technical considerations, participants will gain a balanced, evidence-based perspective to guide clinical decision-making. This interactive session will encourage audience participation as attendees weigh the evidence and decide whether the verdict has truly been reached.

Learning Objectives: *At the end of this course, the participant will be able to:* 1) Compare the current evidence regarding minimally invasive and mini-laparotomy myomectomy, including surgical outcomes, perioperative morbidity, and reproductive outcomes; 2) Evaluate patient- and disease-specific factors that influence the selection of the most appropriate surgical approach for myomectomy; and 3) Incorporate expert technical strategies and evidence-based decision-making into surgical planning to optimize patient outcomes while minimizing complications.

Course Outline

2:00 pm	Welcome, Introduction and Course Overview	A. Chaudhari
2:05 pm	Pro Open	A. Tinelli
2:25 pm	Pro MIGS	A. Gargiulo
2:45 pm	Discussion Questions & Answers	All faculty
3:00 pm	Adjourn	

ADA Statement: In accordance with the Americans with Disabilities Act (ADA), please contact CMEsupport@aagl.org should you require any special assistance.

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Asterisk (*) denotes no financial relationships with ACCME-defined ineligible companies to disclose.

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The following members of AAGL have been involved in the educational planning and/or review of this course (listed in alphabetical order by last name).

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Angela Chaudhari, MD - Consultant: Tag/Dream Medical, Johnson & Johnson; Speakers Bureau: Johnson & Johnson

FACULTY DISCLOSURES

The following faculty have agreed to support their presentations and clinical recommendations with the best available evidence from the medical literature (in alphabetical order by last name).

Andrea Tinelli, MD, Prof, PhD*
Antonio Gargiulo, MD*

MITIGATION OF RELEVANT FINANCIAL RELATIONSHIPS

All relevant financial relationships have been mitigated.

Drs. Lee, Lemos, Mikhail, and Chaudhari's planning decisions, as part of the Scientific Program Committee (SPC), were peer reviewed by other planners on the SPC who had disclosed no financial relationships with ineligible companies, and found to be fair, balanced, and free of commercial bias. Dr. Moawad's financial relationships ended 12/2024, thus mitigating them. For most of his AAGL Professional Education Committee service, Dr. Mourad had no financial relationships to disclose. He recently disclosed a new relationship as a Proctor for Intuitive Surgical. Since then, he has not participated in activities involving control or influence over accredited educational content; therefore, no additional mitigation was necessary.

OPEN VS MINIMALLY INVASIVE MYOMECTOMY: PRO OPEN

ANDREA TINELLI
MD, Prof, PhD

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I have no actual or potential conflict of interest, including commercial or financial relationship, regarding this presentation.

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- Open myomectomy refers to the **surgical removal of fibroids via a laparotomy**.
- The procedure was **first performed in 1840** and was the "**only uterus preserving surgical option for the treatment of symptomatic fibroids**" **until the late 20th century**, when laparoscopic and hysteroscopic techniques were developed.
- Myomectomy by **Laparotomy** is chosen in specific scenarios, such as **huge fibroids, multiple fibroids** or **cesarean myomectomy**, as well as for **women who specifically request this approach**.



Saridogan E. Surgical treatment of fibroids in heavy menstrual bleeding. Womens Health (Lond). 2016;12:53-62.

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CHOICE OF MYOMECTOMY TECHNIQUES

- The **choice** between open and laparoscopic surgery **involves multiple factors**, including **patient characteristics** (**size, number of myomas, previous surgeries, BMI**) and **surgeon related factors** (**experience, morcellation capability**).
- It was "**often**" **postulated** that **OPEN SURGERY may** potentially **offer better palpation** and **complete resection of fibroids**, with lower fibroids' recurrence.
- **OPEN SURGERY** did **not necessarily provide better protection against cavity opening** or enable **better identification** and **removal of myomas**.
- But **FIBROIDS' SIZE** and **NUMBER** can **influence the choice of surgical approach**, and can also be **strong factors affecting operative outcomes** (independent of the surgical approach).

Sano R, Suzuki S, Shiota M. Laparoscopic Myomectomy for the Removal of Large Uterine Myomas. Surg J (N Y). 2019 Sep 11;6(Suppl 1):S44-S49.

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OPEN MYOMECTOMY

- LAPAROTOMY remains the **conventional approach for complex myomectomies**, often due to limited laparoscopic expertise and concerns over complications.
- ABDOMINAL MYOMECTOMY is **typically chosen** under specific circumstances, including scenarios **where fibroids are notably large or numerous, deeply embedded within the uterine wall**, when the **uterus is enlarged** due to fibroids, or when a patient has a **history of multiple abdominal surgeries or significant scar tissue**.

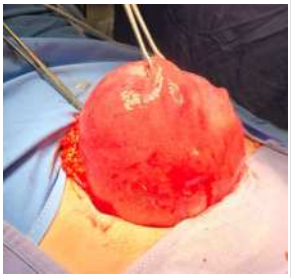


Leanza V, Gulino FA, Leanza G, Zarbo G. Surgical removal of multiple mesenteric fibroids (Kg 4,500) by abdominal spread of previous laparoscopic uterine myomectomy. G Chir. 2015 Jan-Feb;36(1):32-5.

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THE PROBLEMS OF MYOMECTOMY in LPS

- The **biggest barrier to widespread implementation of laparoscopic myomectomy is** the **lack of experience** and **skill in enucleating and extracting myomas, and in performing multilayer suture**.
- To solve this problem, it is necessary **to select proper patients**.
- LPS myomectomy is a technically challenging surgery requiring advanced **MIS skills such as suturing** and **extraction**.



Vargas MV, et al. Feasibility, safety, and prediction of complications for minimally invasive myomectomy in women with large and numerous myomata. J Minim Invasive Gynecol. 2017 Feb;24(2):315-322.

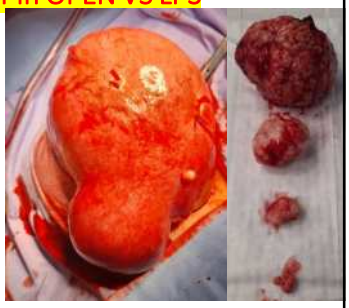
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MYOMECTOMY in OPEN VS LPS

- **Surgeons**, even those skilled in endoscopic procedures, **may opt for** an **OPEN APPROACH** (including a **mini-laparotomic incision**) **due to** considerations such as **ONCOLOGICAL RISK, PROCEDURAL TIME,** and **OVERALL SURGICAL IMPACT**.
- In any case, the **most widely recognized CONTRAINDICATIONS TO LAPAROSCOPY ARE**: multiple fibroids, **more than three fibroids measuring > 7 cm, uterine volume > 20 gestational weeks, single fibroid > 15 cm**, women who have completed their reproductive cycle and desire hysterectomy, any medical condition contraindicating **prolonged anesthesia for laparoscopic surgery**.



Dubuisson JB, O'Leary T, Feki A, Bouquet DE Jolinière J, Dubuisson J. Laparoscopic myomectomy. Minerva Ginecol. 2016 Jun;68(3):345-51

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WHY MYOMECTOMY in OPEN



- National guidelines, including those from the UK's National Institute for Health and Care Excellence (**NICE**), **suggest a 10 cm diameter as the upper limit for laparoscopic myomectomy**.
  https://www.nice.org.uk/guidance/ipg703/evidence/overview-final-pdf-92045846 53. Accessed 1 May 2024.
- The **MAIN FACTORS** limiting the applicability of laparoscopic myomectomy are **ADEQUATE VISUALIZATION DURING THE PROCEDURE, EFFECTIVE MANAGEMENT OF INTRAOPERATIVE BLEEDING** and **POTENTIAL COMPLICATIONS (that may arise during the removal of the myoma from the body)**.
- Fibroids can range in size from a few millimeters to several centimeters, and **AS THEIR VOLUME INCREASES, LAPAROSCOPIC VISUALIZATION MAY BE LIMITED**. A careful preoperative assessment of the size, number and location of fibroids is crucial.
- Although some older series have suggested size or number-based limits for laparoscopic myomectomy, **there is no universally accepted cutoff value in the current literature**.
- The **literature also reports** that **EXPERIENCED SURGEONS can safely REMOVE MYOMAS UP TO 20 CM IN SIZE LAPAROSCOPICALLY**.

Jia X, Liu H. Single-port laparoscopic removal of a very large myoma weighting 2500g is feasible and safe: A case report. Asian J Surg. 2024 Sep;47(9):3938-3939.

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MYOMECTOMY: OPERATIVE TIME

- Operative times were **LONGER with ROBOTIC SURGERY compared to both laparotomy** and **laparoscopy**, a finding consistently reported in the literature. **Docking** and **preparation time account for part of this difference**.

Lawrie TA, Liu H, Lu D, Dowswell T, Song H, Wang L, Shi G. Robot-assisted surgery in gynaecology. Cochrane Database Syst Rev. 2019 Apr 15;4(4):CD011422.

- The **DURATION OF THE OPERATION IS AFFECTED BY** various factors such as **ANESTHESIA**, the **OPERATION OF THE MEDICAL STAFF**, and the **PROFICIENCY OF THE SURGEONS**.

Traylor J,et al. Factors that Influence Applicants Pursuing a Fellowship in Minimally Invasive Gynecologic Surgery. J Minim Invasive Gynecol. 2020 Jul-Aug;27(5):1070-1075.

- A **longer mean operative time** of approximately **40 minutes** is **by MIS** myomectomies. When stratified by operative time, **longer MIS myomectomies generally** had **lower odds of morbidity** when **compared with more expeditiously completed abdominal myomectomies**.

Vargas MV, et al. Association of operative time with outcomes in minimally invasive and abdominal myomectomy. Fertil Steril. 2019 Jun;111(6):1252-1258.e1

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MYOMECTOMY: OPERATIVE TIME

- Griffin and colleagues' comparison demonstrating a **longer operative time with robotic assisted MIS myomectomy** (261.1 vs. 124.8 minutes; P<.001) **but quicker recovery, shorter length of stay,** and **faster return to work, than with an open approach**.

Griffin L, et al. Postoperative outcomes after robotic versus abdominal myomectomy. JSLS. 2013 Jul-Sep;17(3):407-13.

- Barakat et al. also showed that both **robotic** and **traditional laparoscopy had longer surgical times** (181 and 155 minutes, respectively) **compared with abdominal myomectomy** (126 minutes) but **decreased recovery time and blood loss**.

Barakat EE, et al. Robotic-assisted, laparoscopic, and abdominal myomectomy: a comparison of surgical outcomes. Obstet Gynecol. 2011 Feb;117(2 Pt 1):256-266.



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MYOMECTOMY: POST-OPERATIVE OUTCOME

- **Pain control was also better with robotic surgery** compared to laparotomy, as reflected by **lower morphine consumption** (10% vs 24%), consistent with prior studies reporting reduced analgesic requirements and faster recovery after robotic myomectomy.

Carbonnel M, et al. Economic evaluation of robot-assisted, conventional laparoscopic, and open myomectomy: a 10-year single-center retrospective study. J Robot Surg. 2025 Nov 13;20(1):12.



- **Robotic surgery was associated with shorter hospital stay compared to laparotomy** (3.7 vs 5.0 days), which partially offsets higher operating room and instrumentation costs.

Lawrie TA, etal. Robot-assisted surgery in gynaecology. Cochrane Database Syst Rev. 2019 Apr 15;4(4):CD011422.

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OPEN MYOMECTOMY: COMPLICATIONS

- In a case series of patients requiring **OPEN MYOMECTOMY** with uterine size of 16 weeks or larger, the **overall major complication rate was 30%** including major bleeding requiring **blood transfusion** (24.5%), **visceral organ injury** (2.0%), **return to surgery** (3.5%), **readmission** (2.0%) and **hysterectomy** (1.0%).

  Giannini A, et al. The great debate: surgical outcomes of laparoscopic versus laparotomic myomectomy—a meta-analysis to critically evaluate current evidence and look over the horizon. Eur J Obstet Gynecol Reprod Biol. 2024;297:50–8.
- Postoperative **risks** include **pelvic abscess formation**, development of a **paralytic ileus**, **bowel obstruction** and **thrombosis**.
- **In the long term, adhesion formation is a common occurrence** after open myomectomy that may cause chronic pain, bowel dysfunction and subfertility.
- The RISK FACTORS FOR MAJOR COMPLICATIONS **were uterine size of 20 weeks or larger, removal of 10 or more fibroids** and **operations requiring a midline incision**. Both hysterectomies were in patients undergoing a repeat myomectomy and all other major complications were substantially more common in this group compared to primary open myomectomy.

Tanos V, et al. Laparoscopic myomectomy complications: META analysis on RCTs and review of large cohort studies. Eur J Obstet Gynecol Reprod Biol. 2023 Aug;287:109-118.

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OPEN MYOMECTOMY: COMPLICATIONS

- **Intraoperatively**, **BLEEDING** was the most common complication and was **double to quadruple the likelihood with OM** compared to RALM or LM.
- Consequently, the **need for a BLOOD TRANSFUSION was highest among the OM group, followed by LM, then RALM**.
- Other **rare complications like BOWEL INJURY were also associated with OM**.
- **Postoperatively**, **BLOOD TRANSFUSION** was the **most common complication** with all surgical approaches, **especially OM**, with one-fifth of the patients requiring it.
- **ILEUS** and **FEVER were more likely complications of OM**, while shortness of breath, chest pain, infection, incisional hematoma, and hypoxia were less common.
- **Emergency department visits for abdominal pain were more likely with LM**, while **hemorrhage requiring reoperation** and **incisional bleeding were** more likely with **RALM**.

Wright JD, et al. Robotically assisted vs laparoscopic hysterectomy among women with benign gynecologic disease. JAMA. 2013 Feb 20;309(7):689-98.

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3 MYOMECTOMIES: COMPLICATIONS

- Conventional laparoscopic myomectomy (LM), robotic-assisted laparoscopic myomectomy (RALM), and open myomectomy (OM) were compared in 2025.
- Concerning **intraoperative** or **postoperative complications**, **the OM was more likely to be associated with complications**, which was also true for other studies.

  Wang T, et al. Robotic-assisted vs. laparoscopic and abdominal myomectomy for treatment of uterine fibroids: a meta-analysis. Minim Invasive Ther Allied Technol. 2018 Oct;27(5):249-264.
- Authors compared RALM and LPS myomectomies, and **no significant difference was found between the two in comparison groups**.
- **Minimally invasive surgery** has the **advantage of less blood loss**, **less need for blood transfusion** and **less hospital stay**.
- Additionally, long-term outcomes still need to be clarified including pain control, fertility and pregnancy rates postoperatively, as well as possible recurrence rates.

Iavazzo C, et al. Robotic assisted vs laparoscopic and/or open myomectomy: systematic review and meta-analysis of the clinical evidence. Arch Gynecol Obstet. 2016 Jul;294(1):5-17.

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MYOMECTOMY: PERINATAL COMPLICATIONS

- A **retrospective study compared** the **pregnancy-related complications after** laparoscopic and laparotomic uterine myomectomy, on 415 women who received **laparoscopic (n = 340) or open (n = 75) myomectomies** in one center.
- **54 and 12 pregnancies occurred** in laparoscopic and open myomectomy group, respectively.
- The **major obstetric outcomes were similar** between two groups.
- There was **no ectopic pregnancy** or **preterm birth**.
- There were **2 cases of obstetric complication in LPS group only**; one experienced neonatal death and postpartum hemorrhage due to placental abruption and the other underwent subtotal hysterectomy due to uterine dehiscence identified during Cesarean section.
- **Uterine rupture or dehiscence after LPS myomectomy occurred in 3.7% (2/54) which led to unfavorable outcome**.
- Appropriate selection of patients and secure suture techniques appears to be important for laparotomic myomectomy in reproductive-aged women.

Kim MS, et al. Obstetric outcomes after uterine myomectomy: Laparoscopic versus laparotomic approach. Obstet Gynecol Sci. 2013 Nov;56(6):375-81. .

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MYOMECTOMY: PERINATAL COMPLICATIONS

- Authors evaluated the **risk of perinatal complications in subsequent pregnancies after different types of myomectomies**: **open, LPS or by hysteroscopy**.
- They **investigated whether the time interval from myomectomy to subsequent pregnancy (TIMP)** is a **risk factor for perinatal complications**.
- 140, 305, and 97 patients underwent open, laparoscopic, and hysteroscopic myomectomy.
- The **proportion of placenta accreta spectrum (PAS) was** the **highest in** the **hysteroscopic group** (5.2%), followed by the control (1.8%), open (1.4%), and laparoscopic (1.3%) groups. After adjustment, there was no association between PAS and hysteroscopic myomectomy (adjusted odds ratio, 1.86; 95% confidence interval, 0.75–4.63).
- **Uterine rupture after myomectomy was observed only in the LPS surgery group (1.0%)**; this difference among the four groups was statistically significant (Fisher's exact test, $P = 0.001$), although a robust adjusted analysis was not feasible due to the low incidence rate.
- **The proportion of gestational hypertension/preeclampsia was the highest in the hysteroscopic group (17.5%)**; however, a similar trend was observed as for PAS (adjusted odds ratio, 1.30; 95% confidence interval, 0.74–2.27).
- The **incidences of placenta previa** and **placental abruption DID NOT DIFFER significantly** among the groups.
- The **TIMP was the shortest after hysteroscopic myomectomy**, **followed by LPS and open myomectomy**.

Furukawa M, et al. Perinatal complications and time to subsequent pregnancy after open, laparoscopic, and hysteroscopic myomectomy: a retrospective cohort study. BMC Pregnancy Childbirth. 2026 Jan 2;26(1):115.

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MYOMECTOMY: STUDIES' BIAS

- Most **studies were RETROSPECTIVE**, and **no RCTs examined the differences between surgical approaches**.
- **Variability** in the results could be **attributed to many reasons**, as **possible DIFFERENCES IN SURGEONS' EXPERTISE**, highlighting the importance of starting the training of new surgeons on robotic surgery earlier to have a better experience.
- One of the **limitations of the LPS approach was** the **inability to palpate the uterus during the intervention**, which can **result in persistence of intramural fibroids**.

  Jansen LJ, et al. Perioperative Outcomes of Myomectomy for Extreme Myoma Burden: Comparison of Surgical Approaches. J Minim Invasive Gynecol. 2019 Sep-Oct;26(6):1095-1103.
- This **limitation** could be **overcome by** performing an **intraoperative vaginal ultrasound or AI evaluation** to confirm the presence of any intramural fibroids prior to completing the surgery.

Frascà C, et al. The Role of Pelvic Ultrasound in Preoperative Evaluation for Laparoscopic Myomectomy. J Minim Invasive Gynecol. 2018 May-Jun;25(4):679-683

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MYOMECTOMY: COSTS

- In **Europe**, there are **44 national** (or state) **healthcare systems**, **one for each nation**. Each country is completely autonomous in managing its own healthcare.
- **Beveridge Model** (NHS-National Health Service): Healthcare is public, funded through general taxation, and guarantees universal access, either free or with a co-payment. This model includes **Italy**, the United Kingdom, Spain, and the Scandinavian countries (such as Sweden and Norway).
- **Bismarck Model** (Social Insurance): Healthcare is funded through mandatory contributions from employers and employees, managed by non-profit mutual funds. Established in Germany, it is also used in France, Belgium, and Austria.
- **Semashko/Mixed Model**: Models with strong state centralization (inherited from the Soviet era) or systems that integrate mandatory state-managed insurance with a large network of private providers. It is typical of Eastern European countries, such as Poland and the Czech Republic.

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MYOMECTOMY: COSTS

- **1 hour of operating room time in Italy averages between € 1,200 - 2,000**, but **can range from € 420-2,500 depending on** the **clinic** and the **complexity of its organizational structure**.
- **A day of hospital stay in Italy averages between € 400 and 700** for medical and surgical departments.
- In some large Hospital facilities in Italy, **costs can exceed 1,000 € per day**.
- In **private clinics in Italy, prices range from 1,000 to 10,000 €**.
- The **reimbursement rate from the Italian state** for the myomectomy procedure (DRG code: 359) **averages around €3,027**.
- Consequently, data are likely conservative and underestimate the true incremental cost of surgery (**more disposable or complex instruments are used, the higher the raw costs**).
- Hence, LM and OM are common worldwide surgical treatments, yet the effects and costs of LM and AM remain unclear.

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MYOMECTOMY: COSTS

- The **DIFFERENCE is largely driven by LONGER OPERATIVE TIMES** and **HIGH INSTRUMENT COSTS**, despite savings from **SHORTER HOSPITALIZATION** and **FEWER COMPLICATIONS**.
- Long-term outcomes such as fertility, pregnancy safety, and uterine rupture risk after RALM were not assessed in this study.
- The **ECONOMIC EVALUATION DID NOT INCLUDE** the **purchase cost of specific consumables, such as anti-adhesion barriers, sutures,** or **hemostatic agents**, which may have led to a slight underestimation of total costs.
- Furthermore, **some costs were estimated at a global level rather than recorded per patient**, which precluded any formal statistical comparison of costs between groups.
- Third, **indirect** and **societal costs** (work leave, quality of life, fertility outcomes, uterine rupture risk in pregnancy) **were not assessed**, although they may influence the overall cost-effectiveness of the procedure.

Chen R, et al. The effects and costs of laparoscopic versus abdominal myomectomy in patients with uterine fibroids: a systematic review and meta-analysis. BMC Surg. 2020 Mar 20;20(1):55.

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MYOMECTOMY: COSTS

- Cost **structures** and **tariff systems VARY MARKEDLY ACROSS COUNTRIES**, which limits direct extrapolation of our economic conclusions.
- In the **USA**, mean additional costs of robotic myomectomy have been estimated between **$ 2,000 - 3,500** compared with conventional LPS.
- In the **U.K.** and **France**, the **incremental difference appears smaller**, due to centralized purchasing and public reimbursement models.

Barbash GI, Glied SA. New technology and health care costs--the case of robot-assisted surgery. N Engl J Med. 2010 Aug 19;363(8):701-4.
Turchetti G, Palla I, Pierotti F, Cuschieri A. Economic evaluation of da Vinci-assisted robotic surgery: a systematic review. Surg Endosc. 2012 Mar;26(3):598-606.
Raft J, Millet F, Meistelman C. Example of cost calculations for an operating room and a post-anaesthesia care unit. Anaesth Crit Care Pain Med. 2015 Aug;34(4):211-5.

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LPS MYOMECTOMY: ↑COSTS

- The results of a metanalysis have revealed that **LPS can significantly reduce** the **blood loss,** the **duration of postoperative ileus** and the **length of hospital stay compared to OM**, but **it's also associated with longer duration of operation** and **higher medical cost**.

Chen R, et al. The effects and costs of laparoscopic versus abdominal myomectomy in patients with uterine fibroids: a systematic review and meta-analysis. BMC Surg. 2020 Mar 20;20(1):55.

- A study included mentioned cost differences, noting that **RALM** and **LM were HIGHER IN COST than OM** and **this is perhaps DUE TO THE INSTRUMENTS USED** and **REQUIRING HIGHER SURGICAL EXPERTISE** (observed in Pundir et al's study).



Pundir J, et al. Robotic-assisted laparoscopic vs abdominal and l aparoscopic myomectomy: systematic review and meta-analysis. J Minim Invasive Gynecol. 2013 May-Jun;20(3):335-45.

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THE PROBLEM OF UNESPECTED LEIOMYOSARCOMA AFTER MYOMECTOMY

The absolute risk of unexpected malignancy in women with fibroids is low, but the difficulty in preoperative diagnosis remains a challenge.

- Several retrospective analyses have shown that **in the case of a postoperative diagnosis of uterine sarcoma, INTRA-ABDOMINAL MORCELLATION MEANS A WORSE PROGNOSIS for the affected patients.**



Park JY, et al. The impact of tumor morcellation during surgery on the prognosis of patients with apparently early uterine leiomyosarcoma. Gynecol Oncol. 2011 Aug;122(2):255-9.

Reichert VMC, et al. Accidental Morcellation of Uterine Leiomyosarcoma Influences Relapse Free Survival but Does Not Negatively Influence Overall Survival. J Clin Med. 2023 Jan 11;12(2):591

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MYOMECTOMY: THE PROBLEM OF LEIOMYOSARCOMA

- A summarized analysis of the frequency of **accidentally operated uterine sarcomas** in 10 international studies with *n* = 8753 operations showed a **frequency** of **0.24**.

Halaska MJ, et al; ESGO Council. European Society of Gynecological Oncology Statement on Fibroid and Uterine Morcellation. Int J Gynecol Cancer. 2017 Jan;27(1):189-192.

- The frequency of leiomyosarcoma is reported differently in the literature and ranges between 1/204 and 1/7400 (**0.49–0.014**%).

Beckmann MW, et al. Surgical Methods for the Treatment of Uterine Fibroids - Risk of Uterine Sarcoma and Problems of Morcellation: Position Paper of the DGGG. Geburtshilfe Frauenheilkd. 2015 Feb;75(2):148-164.

- A meta-analysis of *n* = 10,120 patients from 9 studies showed a comparable frequency of accidentally operated uterine sarcomas of **0.29**.

Brohl AS, et al. Age-stratified risk of unexpected uterine sarcoma following surgery for presumed benign leiomyoma. Oncologist. 2015 Apr;20(4):433-9.

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MYOMECTOMY: THE PROBLEM OF FIBROID EXTRACTION FROM PELVIS

- A comprehensive counseling of the patient, stating that **THERE IS CURRENTLY NO LEVEL I EVIDENCE THAT ENDOBAG MORCELLATION CAN REDUCE THE RISK OF SPILLAGE OF ANY POTENTIAL OCCULT SARCOMA**, must be clearly conducted.
- The actual **mechanical morcellation** of a fibroid inside a containment bag typically takes **10 to 20 minutes**.
- However, the **total time** required for the entire in-bag morcellation process spans about **20 to 30 minutes** when accounting for preparation, insertion, and bag removal.
- In-bag morcellation of a fibroid usually lasts 15 to 45 minutes.
- This phase varies depending on the size, number, and consistency of the fibroid.
- The **total time for a laparoscopic myomectomy is between 60 and 180 minutes**.

Anapolski, M., Schellenberger, A., Alkatout, I. et al. Preclinical safety testing and initial experience of a morcellation bag with four sealable ports. Sci Rep 2021; 11, 20882.

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MYOMECTOMY: THE PROBLEM OF FIBROID EXTRACTION FROM PELVIS

- Concerning **TRANSVAGINAL EXTRACTION** of the surgical specimen after LM, a large case series demonstrated a **significant increase in operative time**, **intraoperative blood loss** and **hospital stay** with increasing weight of removed fibroid.

Laganà AS, et al. Outcomes of In-bag Transvaginal Extraction in a Series of 692 Laparoscopic Myomectomies: Results from a Large Retrospective Analysis. J Minim Invasive Gynecol. 2022 Dec;29(12):1331-1338.

- **Bag insertion & setup:** 5 to 10 minutes (positioning the bag in the abdomen and placing the fibroid inside).
- **Active morcellation:** 10 to 20 minutes (cutting the fibroid into smaller pieces using a motorized device).
- **Bag removal & final check:** 5 to 7 minutes (extracting the bag and ensuring there are no leaks or tears).

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OPEN MYOMECTOMY: THE ADVANTAGE OF REGIONAL ANESTHESIA

- The **regional anesthesia techniques** like **epidural**, **spinal**, or **combined spinal-epidural (CSE)** are viable options for an open myomectomy.
- While general anesthesia is the most common approach, **regional blocks can be used alone or combined with sedation** (**to keep awake, comfortable, and pain-free during the procedure**).
- The costs of epidural, spinal, and combined spinal-epidural (CSE) anesthesia depends primarily on whether the procedure is for labor/delivery, chronic pain, or major surgery.
- In the USA, out-of-pocket costs typically range from $ 500 to 4000 depending on the facility and your insurance coverage.
- ***Spinal anesthesia is 9.93% less expensive than general anesthesia***.

Morris MT, et al. An Analysis of the Cost-Effectiveness of Spinal Versus General Anesthesia for Lumbar Spine Surgery in Various Hospital Settings. Global Spine J. 2019 Jun;9(4):368-374.

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OPEN MYOMECTOMY: THE ADVANTAGE OF REGIONAL ANESTHESIA

- **LPS myomectomy** is **typically performed under general anesthesia**.
- However, regional anesthesia (such as spinal, epidural, or combined spinal-epidural) can be used in specialized cases or combined with light sedation.

Sinha M, Chiplonkar S. Anesthesia concerns in laparoscopic myomectomy. J Gynecol Endosc Surg. 2011 Jan;2(1):18-20.

- The **regional anesthesia less common for standard laparoscopy due to discomfort from gas pressure** and **breathing changes in tilted positions**.
- Regional anesthesia is sometimes chosen for high-risk patients or specialized gasless laparoscopic approaches.

Hwang JH, Kim BW. Comparison of General Anesthesia and Combined Spinal and Epidural Anesthesia for Gasless Laparoscopic Surgery in Gynecology. JSLS. 2022 Apr-Jun;26(2):e2022.00004.

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MYOMECTOMY: THE ADVANTEAGE OF REGIONAL ANESTHESIA

- Many anesthesiologists and surgeons opt for regional techniques for open myomectomies because they can offer clinical advantages, including:
- **Reduced Blood Loss:** Regional anesthesia can help lower the risk of significant perioperative blood loss compared to general anesthesia.
- **Decreased Transfusion Needs:** By minimizing blood loss, the likelihood of needing an allogeneic blood transfusion is reduced.
- **Faster Recovery:** Avoiding general anesthesia often means less nausea, faster bowel function recovery, and quicker post-operative mobilization.
- **Awake vs. Sedated:** While regional techniques numb lower half, patient can choose to remain completely awake or receive light to moderate sedation (Monitored Anesthesia Care) to doze comfortably during the operation.
- **Suitability:** The best choice of anesthesia depends on the size and number of the fibroids, the expected duration of the surgery, your medical history, and your personal preferences.

Asudo FD, Abdullahi HI. Choice of Anaesthesia for Huge Fibroid Surgeries: How Appropriate? EAS J. Anesthesiol Crit Care 2021; 3(6), 131-138.

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Laparoscopy, although a MIS technique, **carries specific anesthesiological cognitive risks** (due to Trendelenburg position, CO2 pneumoperitoneum).

The **longer the procedure**, the **greater the intra** and **post-operative anesthesiological risks**.

The mechanisms that cause brain damage are:

1. **inflammation from surgical trauma**
2. **oxidative stress with free radical production**
3. **cerebral hypoxia with cognitive impairment**

To **reduce the risk of cognitive impairment**, it is **necessary to**:

1. **minimize the duration of the procedure**
2. **use less severe anesthesia (regional preferred)**
3. **manage post-operative pain**



MYOMECTOMY: THE POSSIBLE PROBLEM OF COGNITIVE DISORDERS



REVIEW ARTICLE

WILEY

Postoperative cognitive disorders and delirium in gynecologic surgery: Which surgery and anesthetic techniques to use to reduce the risk?

Giovanni Pecorella[2] | Filippo De Rosa[2] | Martina Licchelli[2] | Gaetano Panese[2] | José Tony Carugno[3] | Andrea Morciano[2] | Andrea Tinelli[2]

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MYOMECTOMY: THE PROBLEM OF FIBROIDS' RECURRENCE

- Fibroid **recurrence rates** appear similar between LPS and open myomectomy.

Jin C, et al. Laparoscopic versus open myomectomy--a meta-analysis of randomized controlled trials. Eur J Obstet Gynecol Reprod Biol. 2009 Jul;145(1):14-21.
www.nice.org.uk/guidance/ipg703/evidence/overview-final-pdf-9204584 653. Accessed 1 May 2024

- According to Shiota et al., **recurrence risk** is ↑ in patients with fibroids ≥ 10 cm, multiple fibroids, and in women ≥ 35 years.

Shiota M, et al. Recurrence of uterine Myoma after laparoscopic myomectomy: what are the risk factors? Gynecol Minim Invasive Ther. 2012;1(1):34–6.

- Studies have established that the **recurrence rates** for patients are 167% higher in LSP than for those who undergo OM, with a cumulative 5-year recurrence rate of 57.3%–62.1% for the LPS group, and 15.4%–62% for the OM group.

Cezar C, et al. Laparoscopy or laparotomy as the way of entrance in myoma enucleation. Arch Gynecol Obstet. 2017 Oct;296(4):709-720.

32

LPS MYOMECTOMY: THE PROBLEM OF ↑ FIBROIDS' RECURRENCE

- Kotani et al reported their retrospective investigation of myoma recurrence by comparing LPS and OM. **LPS yielded a higher recurrence rate than OM, likely a result of manual myoma removal in OM**, which is a more exhaustive extraction of smaller myoma masses than performed in LM.

Kotani Y, et al. Recurrence of uterine myoma after myomectomy: Open myomectomy versus laparoscopic myomectomy. J Obstet Gynaecol Res. 2018 Feb;44(2):298-302.

- In another study, Yoo et al stated that the **recurrence rate of fibroids appeared to be higher with LPS relative to open myomectomy**.

Yoo EH, et al. Predictors of leiomyoma recurrence after laparoscopic myomectomy. J Minim Invasive Gynecol. 2007 Nov-Dec;14(6):690-7.

33

MYOMECTOMY: THE PROBLEM OF FERTILITY AFTER MYOMECTOMY

- Numerous studies have indicated that the **cumulative pregnancy rate** and **cumulative live birth rate** are **similar** between women treated by **LPS and those treated with OM**.

Malzoni M, et al. Laparoscopy versus minilaparotomy in women with symptomatic uterine myomas: short-term and fertility results. Fertil Steril. 2010 May 1;93(7):2368-73.
Palomba S, et al. A multicenter randomized, controlled study comparing laparoscopic versus minilaparotomic myomectomy: reproductive outcomes. Fertil Steril. 2007;88:933-41.

- Other studies that found that patients who underwent **LPS had a higher pregnancy rate than those who underwent OM**, possibly due to a reduced occurrence of postoperative adhesions.

Kundu S, et al. Morbidity, fertility and pregnancy outcomes after myoma enucleation by laparoscopy versus laparotomy. Arch Gynecol Obstet. 2018 Apr;297(4):969-976.

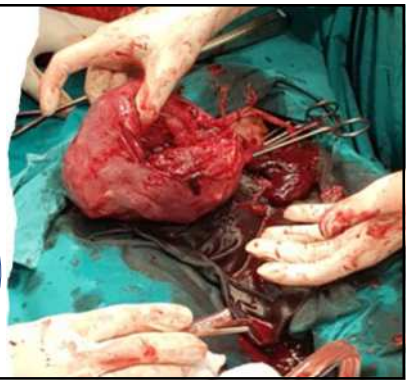
- It has been reported that incidence of **intra-abdominal adhesions** is significantly **lower following LPS than after laparotomy**.

Gutt CN, et al. Fewer adhesions induced by laparoscopic surgery? Surg Endosc 2004;18:898-906.

34



HOW TO DELIVERY AFTER MYOMECTOMY !?



35

MYOMECTOMY: THE PROBLEM OF DELIVERY AFTER MYOMECTOMY

- The **OM group had a higher rate of cesarean section** recommendations versus the laparoscopy group, likely attributable to larger and more numerous myomas in this group which aligns with existing literature.

Catanese A, et al. Factors influencing surgical outcomes of laparoscopic myomectomy. A propensity score matched analysis. Prz Menopauzalny 2022; 21(3):149–156.
Ordás P, et al. Comparison of surgical and obstetric outcomes in women with uterine leiomyomas after laparoscopic vs abdominal myomectomy: a single-center cohort study. Front Surg. 2022;9:997078..

- A metanalysis demonstrated that **OM is associated with a higher rate of elective caesareans** (p = 0.001), which contrasts with other results and those of previous studies. The authors attributed the higher rate in the LM group to the surgeon's concerns that **LPS myomectomy has a higher risk of rupture during subsequent pregnancies and labor compared with the open technique**.

Claeys J, et al. The risk of uterine rupture after myomectomy: a systematic review of the literature and metaanalysis. Gynecol Surg. 2014;11(3):197–206.

- Gambacorti-Passerini et al. and Claeys et al. showed **similar results, with a vaginal delivery rate of 91.5% for the patients admitted for TOLAM, 93% after LPS and 88% after OM**, with no statistically significant difference between the two surgical approaches.

Gambacorti-Passerini ZM, et al. Vaginal birth after prior myomectomy. Eur J Obstet Gynecol Reprod Biol. 2018 Dec;231:198-203. doi: 10.1016/j.ejogrb.2018.10.007.

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CONCLUSIONS

When Laparotomy is Preferred: Open surgery might be deemed necessary for very large (>10 cm), numerous (e.g., >10), or difficult-to-reach fibroids.

Open Myomectomy is traditionally used for larger/more complex fibroids for:

- **Costs:** The instrumental costs of open myomectomy are much lower due to the use of a few, widespread, reusable instruments (sterilizable many times), the use of regional anesthesiological techniques, and the reduced operating time compared to laparoscopy.
- **Operating Time:** Laparotomy (open) can have **shorter operating times even by mini laparotomy**, while laparoscopic surgery can take longer, especially if there are many or very large fibroids.
- **No morcellation:** During open myomectomy, the fibroids are manually enucleated directly from the abdomen without morcellation problems (with the risk of spreading and spilling of the hypothetical leiomyosarcoma).
- **Regional anesthesia:** Regional anesthesia performed during laparotomy significantly reduces intra- and post-operative anesthetic risks (cognitive disturbances, reducing blood loss, decreasing transfusion needs, resulting in faster recovery, and avoiding discomfort from gas pressure and breathing changes in tilted positions).
- **Fibroid recurrence:** Laparotomy (open) has been shown to have a lower recurrence rate than laparoscopy in many studies (probably due to manual palpation of intramural fibroids).

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HOW TO PERFORM OPEN MYOMECTOMY?

- Using **INTRACAPSULAR myomectomy technique** (always SPARING MYOMA PSEUDOCAPSULE).
- Using **Küstner laparotomy**, a transverse lower abdominal surgical entry ***combining a transverse skin cut with a vertical opening of the deep layers*** (which allows for ample space during the abdominal opening, for cases of very large fibroids).
- Using **Combined spinal-epidural (CSE) anesthesia**, that mixes spinal and epidural numbing methods (to give fast pain relief with the option to keep the area numb for a long time).
- Using a **limited number of reusable surgical instruments**, such as cold-blade scissors, Klemmer and Pean forceps, and cold-blade and electric scalpels (to further reduce operating room costs).

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The gynecologist has a wide range of surgical access options (5) available and must ALWAYS choose the best surgical approach for the patient's specific condition, ensuring the woman's benefit and a favorable outcome.

MYOMECTOMY

HYSTEROSCOPY

LAPAROSCOPY or ROBOTICS

LAPAROTOMY

VAGINALLY



ALWAYS FEASIBLE

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Thank you



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Myomectomy on Trial: Mini-laparotomy vs. Minimally Invasive. The Verdict Is Still Out. PRO MIGS.

AAGL 2026 · 55th Global Congress on MIGS ·

Antonio Gargiulo, MD - Boston, USA

1

The operation is on trial—not the incision

Myomectomy is reconstructive uterine surgery.

The test: preserve surgical quality while reducing patient burden.

Source: ESGE, 2024

2

A myomectomy has FIVE obligations

1. Remove the fibroids that need removing.
2. Control bleeding and preserve healthy myometrium.
3. Reconstruct a functional uterus.
4. Minimize complications and postoperative burden.
5. Respect future reproductive goals.

Source: ESGE, 2024

3

Define the comparator—or the debate is meaningless

PURE mini-laparotomy: direct enucleation and repair through a small incision.	**Laparoscopy / robotics:** endoscopic enucleation and repair.	**Hybrid:** endoscopic surgery + mini-incision extraction.

Source: Palomba et al., 2007 (short-term); Cochrane, 2014

4

How much evidence is genuinely head-to-head?

2014 Cochrane: 4 randomized comparisons with mini-laparotomy.

2024 systematic review: 9 studies; 1,723 patients.

Different techniques, eras, eligibility criteria, and study designs.

Source: Tsiampa et al., 2024; Palomba et al., 2007 (short-term); Palomba et al., 2007 (reproductive); Cochrane, 2014; Sesti et al., 2008

5

Blood loss: a meaningful signal, not a universal law

- Palomba randomized trial: less measured bleeding and hemoglobin decline with laparoscopy.
- Tsiampa review: lower pooled blood loss with laparoscopy.
- A smaller blood loss does not establish fewer transfusions.

Source: Tsiampa et al., 2024; Palomba et al., 2007 (short-term); Wen et al., 2018

6

What does the patient actually feel?

- Postoperative analgesic use favored laparoscopy in key randomized studies.
- Early pain scores and analgesic consumption are not identical outcomes.
- Recovery must be measured, not assumed from incision length.

Source: Palomba et al., 2007 (short-term); Alessandri et al., 2006; Cochrane, 2014



7

Less postoperative burden: the strongest pooled finding

Postoperative fever: OR 0.46 (95% CI 0.23–0.92).

4 direct mini-laparotomy comparisons; 464 women.

Historical trials also report shorter hospital stays.

Source: Cochrane, 2014



8

A concession: direct access can be faster

Mini-laparotomy shortens enucleation and suturing in selected cases.

Pooled operating time: laparoscopy +12.24 minutes.

95% CI +8.30 to +16.18; 2 trials, 226 patients.

Source: Palomba et al., 2007 (short-term); Cochrane, 2014



9

These trials did not study every uterus we operate on

- Many randomized cohorts excluded numerous or very large fibroids.
- Cicinelli: at most 3 fibroids, each ≤7 cm.
- Evidence outside eligibility boundaries requires its own justification.

Source: Cicinelli et al., 2009; Cochrane, 2014



10

The operation begins with a fibroid map

- Number · size · FIGO location · depth.
- Relationship to cavity, uterine vessels, tubes and ureters.
- Ultrasound first; MRI when mapping is inadequate or complexity warrants it.

Source: ESGE, 2024



11

Location—not diameter alone—can defeat access

- Posterior, isthmic, cervical and intraligamentary lesions change exposure.
- Vascular proximity and depth change risk.
- No one diameter cutoff defines every surgeon's safe boundary.

Source: Palomba et al., 2007 (short-term); ESGE, 2024



12

Reconstruction—not extraction—is the decisive act

- Respect the enucleation plane and healthy myometrium.
- Limit unnecessary thermal injury; control bleeding.
- Obliterate dead space; restore layered architecture.

Source: ESGE, 2024; Palomba et al., 2007 (short-term)

13

Robotics: a technical argument, not a randomized verdict

Articulated instruments and 3D vision can facilitate demanding suturing.

2025 single-center series: 260 robotic cases; no conversions reported.

Only 24 patients had ≥5 fibroids; no pure-mini control arm.

Source: et al., 2025; ESGE, 2024 Sinha

14

The palpation objection is real

- Direct palpation can detect small intramural nodules.
- Preoperative mapping and laparoscopic ultrasound may mitigate—but not erase—the difference.
- The objective is appropriate clearance, not an unvalidated count.

Source: ESGE, 2024

15

A beautifully closed uterus is not yet a validated scar

- Closure technique and thermal injury matter biologically.
- Comparative scar strength is inadequately measured.
- No established route-specific reduction in uterine rupture.

Source: Cochrane, 2020; ESGE, 2024; Cochrane, 2014

16

Fertility: the hardest endpoint—and the weakest evidence

No established cumulative live-birth superiority by access route.

Cochrane live birth: OR 0.80 (95% CI 0.42–1.50).

That estimate combines laparotomy AND mini-laparotomy comparators.

Source: Palomba et al., 2007 (reproductive); Cochrane, 2020

17

Adhesions and recurrence: plausible mechanisms, limited proof

- Adhesions depend on site, tissue injury, hemostasis and repair.
- Pure-mini recurrence comparison is imprecise.
- Do not infer fertility benefit from presumed fewer adhesions.

Source: Cochrane, 2014; ESGE, 2024

18

Morcellation: the objection we must answer precisely

- Separate enucleation and repair from specimen extraction.
- Contained power morcellation only when appropriate and permitted.
- Mini-incision extraction or en bloc removal may be preferable in selected patients.

Source: FDA, 2020; FDA, 2026



19

Cost depends on whose bill—and which time horizon

Operating-room cost ≠ total episode-of-care value.

Alessandri 2006: €2,250 laparoscopy vs €1,975 mini-laparotomy.

Modern robotic comparative cost-effectiveness is unresolved.

Source: Alessandri et al., 2006; Edge & Kutteh, 2025 (abstract)



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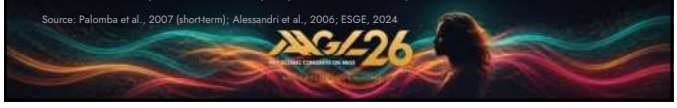
The strongest mini-laparotomy case deserves an answer

Palpation · rapid manual enucleation · familiar suturing.

Simple extraction · equipment access · possible cost savings.

All valid—in the patient where they improve the whole operation.

Source: Palomba et al., 2007 (short-term); Alessandri et al., 2006; ESGE, 2024



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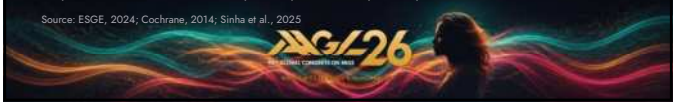
Two patients. Two anatomy-specific decisions.

Case A: limited accessible intramural disease → favor expert MIGS.

Case B: extensive, deeply distributed fibroids → individualize approach.

Map · reconstruct · extract · respect expertise and patient preference.

Source: ESGE, 2024; Cochrane, 2014; Sinha et al., 2025



22

The verdict: minimize burden. Preserve the operation.

MIGS: demonstrated early advantages in selected patients.

Mini-laparotomy: genuine technical advantages in selected anatomy.

Neither route has proved long-term reproductive superiority.

Choose the approach that best preserves reconstructive quality.

Source: Tsiampa et al., 2024; Palomba et al., 2007 (short-term); Cochrane, 2014; Cochrane, 2020; ESGE, 2024



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CULTURAL AND LINGUISTIC COMPETENCY & IMPLICIT BIAS

The California Medical Association (CMA) outlines standards for Cultural Linguistic Competency and Implicit Bias in CME. The goal of the standards is to support the role of accredited CME in advancing diversity, health equity, and inclusion in healthcare. These standards are relevant to ACCME-accredited, CMA-accredited, and jointly accredited providers located in California. AAGL is ACCME-accredited and headquartered in California.

CMA developed the standards in response to California legislation (Business and Professions (B&P) Code Section 2190.1), which directs CMA to draft a set of standards for the inclusion of cultural and linguistic competency (CLC) and implicit bias (IB) in accredited CME.

The standards are intended to support CME providers in meeting the expectations of the legislation. CME provider organizations physically located in California and accredited by CMA CME or ACCME, as well as jointly accredited providers whose target audience includes physicians, are expected to meet these expectations which began on January 1, 2022. AAGL has been proactively adopting processes that meet and often exceed the required expectations of the legislation.

CMA CME offers a variety of resources and tools to help providers meet the standards and successfully incorporate CLC & IB into their CME activities, including FAQ, definitions, a planning worksheet, and best practices. These resources are available on the CLC and IB standards page on the CMA website.

Important Definitions:

Cultural and Linguistic Competency (CLC) – The ability and readiness of health care providers and organizations to humbly and respectfully demonstrate, effectively communicate, and tailor delivery of care to patients with diverse values, beliefs, identities and behaviors, in order to meet social, cultural and linguistic needs as they relate to patient health.

Implicit Bias (IB) – The attitudes, stereotypes and feelings, either positive or negative, that affect our understanding, actions and decisions without conscious knowledge or control. Implicit bias is a universal phenomenon. When negative, implicit bias often contributes to unequal treatment and disparities in diagnosis, treatment decisions, levels of care and health care outcomes of people based on race, ethnicity, gender identity, sexual orientation, age, disability and other characteristics.

Diversity – Having many different forms, types or ideas; showing variety. Demographic diversity can mean a group composed of people of different genders, races/ethnicities, cultures, religions, physical abilities, sexual orientations or preferences, ages, etc.

Direct links to AB1195 (CLC), AB241 (IB), and the B&P Code 2190.1:

Bill Text – AB-1195 Continuing education: cultural and linguistic competency.
Bill Text – AB-241 Implicit bias: continuing education: requirements.
Business and Professions (B&P) Code Section 2190.1

CLC & IB Online Resources:

Diversity-Wheel-as-used-at-Johns-Hopkins-University-12.png (850×839) (researchgate.net)
Implicit Bias, Microaggressions, and Stereotypes Resources | NEA
Act, Communicating, Implicit Bias (racialequitytools.org)
https://www.contemporaryobgyn.net/view/overcoming-racism-and-unconscious-bias-in-ob-gyn
https://pubmed.ncbi.nlm.nih.gov/34016820/
https://hr.ucdavis.edu/departments/learning/certificate/implicit-bias
https://pmc.ncbi.nlm.nih.gov/articles/PMC7011228/