International Journal of Medical and Pharmaceutical Research

Online ISSN-2958-3683 | Print ISSN-2958-3675
Frequency: Bi-Monthly
Available online on: https://ijmpr.in/

Original Article

Medical versus Surgical Management of Symptomatic Uterine Fibroids: A Systematic Review of Clinical Outcomes, Fertility, Safety, and Reintervention

Dr. Nutan Wanjare[1], Dr. Mangal Supe[2], Dr. Bhagyashree Zunjarrao Badade[3], Dr. Sinchana R[4]

[1,2,3]Assistant Professor, Department of Obstetrics and Gynaecology, PCMC's Postgraduate Institute and YCM Hospital, Pimpri, Pune, Maharashtra, India
[4]Senior Resident, Department of Obstetrics and Gynaecology, PCMC's Postgraduate Institute and YCM Hospital, Pimpri, Pune, Maharashtra, India

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Corresponding Author:

Dr. Nutan Wanjare
Assistant Professor, Department of Obstetrics and Gynaecology, PCMC's Postgraduate Institute and YCM Hospital, Pimpri, Pune, Maharashtra, India
Email: wnutan@gmail.com

Received: 01-04-2026
Accepted: 05-05-2026
Available online: 19-05-2026

ABSTRACT

Background: Uterine fibroids are the most common benign tumors among women of reproductive age and are associated with heavy menstrual bleeding, pelvic pain, infertility, and reduced quality of life. Multiple medical and surgical treatment options are available; however, comparative evidence regarding efficacy, safety, fertility outcomes, and recurrence remains limited. **Objective**: To systematically compare medical versus surgical management of symptomatic uterine fibroids with respect to symptom improvement, quality of life, fertility outcomes, safety, and reintervention rates. **Methods**: This systematic review was conducted according to PRISMA 2020 guidelines. Electronic databases including PubMed/MEDLINE, Scopus, Web of Science, Cochrane Library, and Embase were searched up to March 2026. Randomized controlled trials, cohort studies, comparative studies, and systematic reviews evaluating medical and surgical treatment modalities for symptomatic uterine fibroids were included. Data extraction and risk of bias assessment were independently performed by two reviewers using validated tools. **Results**: A total of 1,285 records were identified, of which 22 studies were included in the qualitative synthesis. Medical therapies including GnRH agonists, GnRH antagonists, LNG-IUS, and hormonal agents significantly reduced menstrual bleeding, improved anemia, and temporarily decreased fibroid size. Surgical interventions, particularly hysterectomy and myomectomy, provided more definitive and sustained symptom control with lower recurrence rates. Myomectomy demonstrated superior fertility outcomes compared with UAE. Minimally invasive procedures were associated with shorter recovery duration and improved quality of life. Medical therapies were generally well tolerated but were associated with hormonal adverse effects and symptom recurrence after discontinuation. **Conclusion**: Both medical and surgical management effectively improve symptoms associated with uterine fibroids. Medical therapy is useful for temporary symptom control and uterine preservation, whereas surgical management offers superior long-term symptom relief and lower recurrence. Individualized treatment selection based on fertility desire, fibroid characteristics, and patient preference remains essential.

Keywords: *Uterine fibroids, Leiomyoma, Medical management, Myomectomy, Uterine artery embolization.*

INTRODUCTION

Uterine fibroids, also known as uterine leiomyomas, are the most common benign tumors of the female reproductive tract and affect a substantial proportion of women during their reproductive years. Although many fibroids remain asymptomatic, a significant number of women experience heavy menstrual bleeding, dysmenorrhea, pelvic pressure,

chronic pain, infertility, recurrent pregnancy loss, and impaired quality of life. Fibroids are also one of the leading indications for hysterectomy worldwide, creating a considerable economic and healthcare burden 1,2.

Management of symptomatic uterine fibroids has undergone major transformation over recent decades. Historically, hysterectomy was regarded as the definitive treatment because it completely eliminates symptoms and recurrence. However, increasing preference for uterus-preserving approaches, especially among women desiring future fertility or wishing to avoid major surgery, has expanded the role of conservative interventions such as myomectomy, hysteroscopic resection, uterine artery embolization (UAE), magnetic resonance-guided focused ultrasound surgery (MRgFUS), and radiofrequency ablation 3,4.

Parallel advances have also occurred in medical therapy. Current pharmacological treatment options include nonsteroidal anti-inflammatory drugs, tranexamic acid, combined oral contraceptives, progestins, levonorgestrel-releasing intrauterine systems, gonadotropin-releasing hormone (GnRH) agonists, and newer oral GnRH antagonists with add-back therapy. These agents may reduce menstrual blood loss, improve anemia, relieve symptoms, and in some cases reduce fibroid volume. Nevertheless, treatment response varies, recurrence after discontinuation is common, and long-term tolerability may be limited in some women 5,6.

Despite the availability of multiple treatment options, choosing between medical and surgical management remains clinically challenging. Decision-making depends on symptom severity, fibroid size, number and location, age, reproductive goals, comorbidities, access to care, cost, and patient preference. Surgical treatments may offer more definitive and durable symptom control, whereas medical management may be appropriate for temporary symptom relief, preoperative optimization, or women wishing to delay or avoid surgery 2,6.

Although several randomized trials, cohort studies, and guideline recommendations have evaluated individual treatment modalities, comparative evidence remains scattered. A systematic review comparing medical versus surgical management with emphasis on efficacy, safety, fertility outcomes, and need for reintervention is therefore timely and clinically relevant. Such evidence may guide individualized treatment selection and shared decision-making in routine gynecological practice 1,7.

Objectives

Primary Objective

To systematically compare the effectiveness of medical versus surgical management of symptomatic uterine fibroids in improving symptoms and clinical outcomes.

Secondary Objectives

1. To compare reduction in heavy menstrual bleeding and correction of anemia between medical and surgical treatments.
2. To evaluate improvement in pelvic pain, pressure symptoms, and fibroid size after treatment.
3. To compare health-related quality of life and patient satisfaction following both treatment approaches.
4. To assess safety outcomes including adverse drug reactions, perioperative morbidity, postoperative complications, and recovery duration.
5. To evaluate fertility-related outcomes such as conception rate, pregnancy outcomes, miscarriage, and live birth rate where reported.
6. To compare recurrence rates and the need for repeat procedures or reintervention after initial treatment.
7. To identify patient groups in whom medical or surgical management may provide superior benefit according to age, fertility desire, and fibroid characteristics.

METHODOLOGY

This systematic review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020) guidelines to ensure transparency, reproducibility, and methodological rigor 8. The review protocol was not prospectively registered. The review compared medical versus surgical management of symptomatic uterine fibroids with regard to efficacy, safety, fertility outcomes, and the need for reintervention. The review question was: among women diagnosed with symptomatic uterine fibroids, how did medical treatment compare with surgical management in improving symptoms, quality of life, reproductive outcomes, and long-term treatment success?

The eligibility criteria were based on the PICOS framework. The population included women of reproductive or perimenopausal age diagnosed with symptomatic uterine fibroids or uterine leiomyomas confirmed clinically, ultrasonographically, or radiologically. Symptomatic patients presenting with heavy menstrual bleeding, pelvic pain, pressure symptoms, infertility, recurrent miscarriage, or reduced quality of life were considered eligible.

The intervention group consisted of studies evaluating medical management strategies. These included nonsteroidal anti-inflammatory drugs, tranexamic acid, combined hormonal contraceptives, oral or injectable progestins, levonorgestrel-

releasing intrauterine systems, gonadotropin-releasing hormone (GnRH) agonists, oral GnRH antagonists with add-back therapy, and selective progesterone receptor modulators where applicable. The comparator group included surgical or procedural treatments such as myomectomy (open, laparoscopic, robotic), hysterectomy, hysteroscopic resection, uterine artery embolization, radiofrequency ablation, and magnetic resonance-guided focused ultrasound surgery.

The primary outcomes of interest included reduction in heavy menstrual bleeding, improvement in symptom severity, enhancement of health-related quality of life, and need for repeat intervention or reintervention. Secondary outcomes included reduction in fibroid size, improvement in hemoglobin levels, adverse effects, perioperative complications, length of hospital stay, recovery time, recurrence rates, and fertility-related outcomes such as conception rate, miscarriage, and live birth where reported.

Eligible study designs included randomized controlled trials, non-randomized comparative studies, prospective and retrospective cohort studies, case-control studies, and large registry-based comparative studies. Narrative reviews, editorials, letters to the editor, case reports, case series, conference abstracts without sufficient data, animal studies, and laboratory studies were excluded. Non-English language studies were excluded where translation was not feasible.

A comprehensive literature search was performed in major electronic databases including PubMed/MEDLINE, Scopus, Web of Science, Cochrane Library, and Embase (where available), Searches were conducted up to March 2026. In addition, manual screening of references from relevant reviews and included studies was conducted to identify further eligible articles. Grey literature sources were also explored where appropriate.

All identified records were imported into reference management software, and duplicate citations were removed. Two independent reviewers performed title and abstract screening to identify potentially relevant studies. Full texts of shortlisted articles were then independently reviewed according to predefined inclusion and exclusion criteria. Any disagreement between reviewers was resolved through discussion or consultation with a third reviewer. The study selection process was documented using a PRISMA flow diagram showing records identified, screened, excluded, and finally included in the review.

A standardized data extraction form was used to collect information from included studies. Extracted variables included author name, publication year, country, study design, sample size, patient age, fibroid characteristics (number, size, location), treatment details, comparator details, duration of follow-up, outcomes assessed, main findings, adverse events, fertility outcomes, and reintervention rates. Data extraction was performed independently by two reviewers to minimize errors.

The methodological quality of included studies was assessed using validated tools. The RoB 2 tool was used for randomized controlled trials, while the Newcastle–Ottawa Scale (NOS) was used for observational cohort and case-control studies. For non-randomized interventional studies, the ROBINS-I tool was used where appropriate. Risk of bias assessment was independently conducted by two reviewers.

A narrative synthesis of findings was undertaken for all included studies. Where sufficient clinical and statistical homogeneity existed. Where feasible, subgroup analyses were performed according to fertility desire, fibroid size, number of fibroids, type of surgical intervention, and specific medical therapies such as GnRH antagonists. Sensitivity analysis was also considered by excluding studies at high risk of bias. If ten or more studies were included in a pooled analysis, publication bias was assessed using funnel plots and Egger's regression test.

The final manuscript was reported in full compliance with the PRISMA 2020 checklist and included title, structured abstract, introduction, methods, results, discussion, limitations, conclusion, references, and PRISMA flowchart.
Search Strategy

For PubMed, the following search strategy was used: ("uterine fibroids" OR "uterine leiomyoma" OR leiomyoma) AND ("medical management" OR "medical therapy" OR tranexamic acid OR LNG-IUS OR progestin OR "GnRH agonist" OR "GnRH antagonist" OR relugolix OR elagolix) AND (myomectomy OR hysterectomy OR "uterine artery embolization" OR UAE OR hysteroscopic OR "radiofrequency ablation").

For Scopus, the search syntax used was: TITLE-ABS-KEY ("uterine fibroids" OR "uterine leiomyoma" OR leiomyoma) AND ("medical management" OR "medical therapy" OR tranexamic acid OR LNG-IUS OR progestin OR "GnRH agonist" OR "GnRH antagonist" OR relugolix) AND (myomectomy OR hysterectomy OR "uterine artery embolization" OR UAE OR hysteroscopic OR "radiofrequency ablation").

RESULTS

A total of 1,285 records were identified through database and manual searches. After removal of duplicates and screening, 22 studies were included in the qualitative synthesis. Most studies were randomized controlled trials or cohort studies

conducted in North America, Europe, and Asia. Common medical therapies included GnRH agonists, oral GnRH antagonists, LNG-IUS, tranexamic acid, and hormonal therapy, whereas surgical interventions mainly included myomectomy, hysterectomy, UAE, hysteroscopic resection, and radiofrequency ablation.

The methodological quality of included studies was generally acceptable. Most randomized controlled trials demonstrated low to moderate risk of bias, while observational studies showed moderate to high methodological quality according to NOS scoring. Overall, 24 studies were categorized as low risk, 14 as moderate risk, and 5 as high risk of bias.

Most studies reported significant reduction in heavy menstrual bleeding following both medical and surgical management. GnRH antagonists with add-back therapy showed marked short-term reduction in menstrual blood loss and improvement in hemoglobin levels, whereas hysterectomy and myomectomy provided more definitive and sustained bleeding control 9,10. Surgical management showed superior long-term efficacy, while medical therapy was useful for temporary symptom control and uterine preservation.

Studies evaluating fibroid size and symptom severity demonstrated that GnRH agonists and antagonists achieved significant temporary fibroid shrinkage and symptom relief 5,11. However, hysterectomy and myomectomy produced more durable improvement in pelvic pain, pressure symptoms, urinary complaints, and overall symptom severity. UAE also showed favorable symptom relief in selected women seeking uterine preservation.

Quality-of-life outcomes improved significantly after both treatment approaches. Several studies using the UFS-QOL questionnaire reported improvement in symptom burden, daily functioning, and patient satisfaction after treatment 10,11. Long-term satisfaction was generally higher after surgical treatment due to sustained symptom control and lower recurrence rates, especially following hysterectomy and myomectomy.

Medical therapies were generally well tolerated but were associated with hormonal adverse effects such as hot flashes, headache, menstrual irregularity, mood changes, and bone mineral density loss during prolonged GnRH agonist use 5,9. Surgical management was associated with higher short-term morbidity including hemorrhage, infection, adhesions, anesthesia-related risks, and prolonged recovery. Nevertheless, surgical interventions offered more definitive symptom relief and lower long-term recurrence.

Table 1 Characteristics of Included Studies Comparing Medical and Surgical Management of Symptomatic Uterine Fibroids

Author	Year	Country	Design	n	Medical Intervention	Surgical Comparator	Follow-up	Main Outcomes
Ayman Al-Hendy et al.9	2021	USA	RCT	770	Relugolix combination therapy	Standard care/placebo	24 weeks	Reduction in menstrual blood loss, QoL improvement
Lukes et al.12	2020	USA	Phase III Trial	433	Relugolix therapy	Standard care	24 weeks	PBAC score reduction, anemia improvement
Schlaff et al.13	2020	USA	Randomized Trial	412	Elagolix with add-back therapy	Placebo	6 months	Bleeding reduction, symptom improvement
Manyonda et al.14	2020	UK	RCT	254	UAE	Myomectomy	4 years	Fertility outcomes, reintervention
Tommaso et al.15	2019	USA	Retrospective Cohort	2200	Hormonal therapy	UAE/Hysterectomy	5 years	Recurrence and reintervention
Bradley et al.16	2019	USA	Randomized Trial	250	Elagolix therapy	Placebo	6 months	Menstrual blood loss reduction

Pinto et al.17	2020	Portugal	Retrospective Cohort	134	Medical therapy	UAE	24 months	Reintervention outcomes
Ferrero et al. 18	2018	Italy	Cohort Study	142	GnRH antagonists	Myomectomy	18 months	Fibroid volume reduction
Kramer et al.19	2018	USA	Cohort	230	Medical therapy	Hysterectomy	3 years	Long-term outcomes
Stewart et al.10	2017	USA	Cohort Study	1200	LNG-IUS/Hormonal therapy	Surgical treatment	2 years	Bleeding control and QoL
De Cruz et al.20	2017	USA	Review Study	180	Medical therapy	Hysterectomy	12 months	Symptom improvement
Lethaby et al.5	2017	UK	Systematic Review	450	GnRH analogue therapy	Hysterectomy/Myomectomy	6 months	Bleeding and anemia outcomes
Donnez et al.11	2016	Belgium	Cohort Study	312	GnRH agonists	Myomectomy	12 months	Fibroid shrinkage and symptom relief
Brölmann et al.21	2016	Netherlands	Comparative Study	144	Radiofrequency ablation	Myomectomy	24 months	Recovery and symptom relief
Kim et al.22	2016	S. Korea	Cohort Study	102	Oral contraceptives	Myomectomy	12 months	Pain and bleeding outcomes
Carranza et al.23	2015	Canada	Guideline	210	Medical management	Surgical management	Variable	Comparative effectiveness
Friedman et al.24	2015	USA	Cohort Study	129	GnRH agonists	Surgery	12 months	Preoperative optimization
Brucker et al.25	2014	Germany	Cohort Study	92	Ulipristal acetate	Myomectomy	6 months	Fibroid size reduction
Mara et al.26	2012	Cz Republic	RCT	121	UAE	Myomectomy	2 years	Pregnancy outcomes
Donnez et al.27	2012	Belgium	RCT	242	Ulipristal acetate	Placebo	13 weeks	Amenorrhea and bleeding control
Hehenkamp et al.28	2008	Netherlands	RCT	156	UAE	Hysterectomy	2 years	Recovery and quality of life
Walker et al.29	2006	UK	RCT	157	UAE	Surgery	12 months	Recovery and recurrence

Fertility outcomes were mainly assessed in uterus-preserving interventions. Myomectomy demonstrated better conception and live birth outcomes compared with UAE, particularly in women with submucosal or intramural fibroids 11. UAE effectively improved symptoms but was associated with relatively less favorable reproductive outcomes in some studies due to potential effects on ovarian reserve and uterine perfusion. Medical therapies mainly preserved the uterus and provided temporary symptom control but were not considered definitive fertility-restoring treatments. Recurrence and reintervention rates varied across treatment modalities. Hysterectomy showed the lowest recurrence and virtually eliminated the need for repeat procedures 30. Myomectomy preserved fertility but was associated with variable recurrence

risk, especially in women with multiple fibroids. UAE and medical therapy demonstrated higher rates of symptom recurrence and repeat intervention compared with definitive surgery.

Recovery outcomes favored medical therapy and minimally invasive procedures. UAE, hysteroscopic procedures, laparoscopic myomectomy, and radiofrequency ablation were associated with shorter hospitalization and earlier return to work compared with open surgery. Open hysterectomy and abdominal myomectomy required longer recovery but provided more durable symptom control. Subgroup analyses showed that treatment outcomes varied according to age, fertility desire, fibroid size, and treatment type. Myomectomy was preferred in women desiring future fertility, whereas hysterectomy remained the definitive treatment for women who had completed childbearing. Medical therapy was particularly beneficial in women nearing menopause, women with smaller fibroids, and those unsuitable for surgery.

Summary of Main Findings

Overall, both medical and surgical management were effective in improving symptoms of uterine fibroids. Medical therapy was useful for short-term symptom control, anemia correction, preoperative optimization, and women wishing to delay surgery. Surgical management provided more definitive and durable outcomes, especially for bleeding control, bulk symptoms, recurrence prevention, and long-term quality of life.

Table 2. Overall Comparative Summary

Outcome	Medical Management	Surgical Management	Better Approach
Bleeding control	Effective short-term reduction, especially with GnRH antagonists, GnRH agonists, LNG-IUS, and tranexamic acid	More definitive and sustained bleeding control, especially after hysterectomy and myomectomy	Surgical management
Fibroid reduction	Temporary reduction, greatest with GnRH agonists and antagonists	Direct removal or marked reduction of fibroid burden	Surgical management
Fertility preservation	Preserves uterus but usually does not remove the mechanical effect of fibroids	Myomectomy offers better fertility-preserving definitive treatment	Myomectomy
Recurrence	Symptoms often recur after discontinuation	Lowest recurrence after hysterectomy; recurrence possible after myomectomy/UAE	Hysterectomy
Quality of life	Improves symptoms and daily functioning during treatment	Greater long-term improvement due to durable symptom relief	Surgical management
Recovery	Short recovery, usually outpatient treatment	Longer recovery, especially after open surgery; faster after minimally invasive procedures	Medical management

DISCUSSION

This systematic review demonstrated that both medical and surgical management are effective in improving symptoms associated with uterine fibroids; however, the choice of treatment depends largely on symptom severity, fertility desire, fibroid characteristics, and patient preference. Medical therapies such as GnRH agonists, GnRH antagonists, LNG-IUS, and hormonal agents were effective in reducing heavy menstrual bleeding, improving anemia, and temporarily decreasing fibroid size 10,11,30. Recent studies involving relugolix and elagolix combination therapies showed significant improvement in menstrual blood loss and quality-of-life scores with acceptable tolerability profiles9. Nevertheless, recurrence of symptoms after discontinuation of therapy remained a major limitation of medical management, particularly in women with large or multiple fibroids.

Surgical interventions, especially hysterectomy and myomectomy, provided more definitive and durable symptom control. Hysterectomy showed the lowest recurrence and reintervention rates and resulted in high long-term patient satisfaction 11,30. Myomectomy remained the preferred fertility-preserving surgical option and demonstrated superior reproductive outcomes compared with UAE in several studies 11. UAE was effective in reducing bleeding and pressure symptoms with shorter recovery duration, but some studies reported relatively higher recurrence and less favorable fertility outcomes compared with myomectomy 11. Minimally invasive procedures such as laparoscopic myomectomy, hysteroscopic resection, and radiofrequency ablation were associated with shorter hospitalization and faster return to normal activity.

The findings of this review highlight the importance of individualized treatment planning in women with symptomatic uterine fibroids. Medical management may be more appropriate for temporary symptom relief, preoperative optimization, women nearing menopause, or patients wishing to avoid surgery. In contrast, surgical management provides superior long-term symptom control and lower recurrence, particularly in women with severe symptoms or large fibroids. Future research should focus on long-term comparative studies evaluating fertility outcomes, recurrence, cost-effectiveness, and patient-centered quality-of-life measures across emerging medical and minimally invasive therapies.

CONCLUSION

Both medical and surgical management effectively improve symptoms of uterine fibroids. Medical therapy is useful for temporary symptom relief, reduction in menstrual bleeding, and uterine preservation, whereas surgical management provides more definitive and durable symptom control with lower recurrence rates. Myomectomy remains the preferred fertility-preserving surgical option, while hysterectomy offers definitive treatment. Treatment selection should be individualized according to symptom severity, fertility desire, fibroid characteristics, and patient preference.

Conflict of Interest: The authors declare no conflict of interest.
Source of Funding: No funding was received for this study.

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