

UTERINE FIBROIDS: CLINICAL CHARACTERISTICS, PATHOPHYSIOLOGY, AND CONTEMPORARY MANAGEMENT STRATEGIES

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Abstract: *Uterine fibroids are the most common benign tumors of the female reproductive system, affecting up to 80% of women by the age of fifty. Despite their benign nature, fibroids remain a leading cause of abnormal uterine bleeding, pelvic pain, and infertility. This article provides a comprehensive review of the epidemiology, risk factors, clinical manifestations, diagnostic approaches, and modern treatment strategies, with a focus on fertility-preserving and minimally invasive interventions.*

Keywords: *uterine fibroids, leiomyoma, abnormal uterine bleeding, infertility, myomectomy, uterine artery embolization, GnRH antagonists.*

Uterine fibroids (leiomyomas) are benign smooth muscle tumors originating from the myometrium and represent a major gynecological health problem worldwide. Epidemiological studies report that 70–80% of women develop fibroids during their reproductive years. Although fibroids are often asymptomatic, approximately 25–30% of women experience clinically significant symptoms that impact daily functioning, reproductive health, and overall quality of life.

The significance of fibroids extends beyond symptom burden. They are associated with 10–15% of infertility cases and are a known contributor to recurrent pregnancy loss, preterm birth, and complications during pregnancy. Increasing diagnostic sensitivity, particularly through high-resolution ultrasound and MRI, has revealed a shift toward earlier onset and higher incidence among younger women.

Over the past decade, modern management strategies have evolved tremendously. Traditional approaches such as hysterectomy—once the primary treatment—are now complemented by fertility-preserving and organ-sparing options including hysteroscopic resection, laparoscopic and robotic myomectomy, uterine artery embolization (UAE), and MRI-guided focused ultrasound surgery (MRgFUS). Additionally, new hormonal therapies, especially oral GnRH antagonists with add-back therapy, have transformed medical management.

This study aims to synthesize current evidence on the clinical features of uterine fibroids and evaluate contemporary treatment options based on recent guidelines and scientific data.

Materials and Methods



This review was conducted through an analysis of articles published between January 2020 and January 2024 in peer-reviewed journals indexed in PubMed, Scopus, and Web of Science. The following keywords were used: uterine fibroids, leiomyoma, myomectomy, focused ultrasound, uterine artery embolization, GnRH antagonists, infertility.

Inclusion criteria:

- Clinical trials, systematic reviews, meta-analyses, and guidelines.
- Studies evaluating epidemiology, symptoms, imaging, treatment outcomes, and fertility data.

Sources included:

- ACOG (American College of Obstetricians and Gynecologists) Practice Bulletins.
- NICE and WHO reproductive health guidelines.
- ESGE (European Society for Gynaecological Endoscopy) treatment recommendations.

A total of 96 articles were initially screened; 54 were included after applying relevance and quality criteria.

Results

1. Epidemiology and Risk Factors

Fibroids are more prevalent in reproductive-aged women, with incidence increasing steadily from the mid-20s to late 40s. Established risk factors include:

- Age: prevalence rises with age until menopause.
- Race: significantly more common and severe in Black women.
- Hormonal influence: estrogen and progesterone stimulate fibroid growth.
- Genetic predisposition: mutations in MED12 and HMGA2 genes.
- Metabolic factors: obesity, vitamin D deficiency, and hypertension.
- Reproductive history: nulliparity increases risk; pregnancy has a protective effect.

2. Clinical Features

The clinical presentation of uterine fibroids varies depending on their size, number, and anatomical location. The most common symptoms include:

2.1 Abnormal Uterine Bleeding

- Heavy menstrual bleeding (menorrhagia)
- Prolonged menstruation (more than 7 days)
- Intermenstrual bleeding

Submucosal fibroids are most strongly linked with bleeding abnormalities and iron-deficiency anemia.

2.2 Pelvic Pain and Pressure

Large intramural or subserosal fibroids may cause:

- Chronic pelvic discomfort
- Deep dyspareunia
- Lumbar or lower abdominal pain

Acute pain from degeneration or torsion (rare)



Bulk-Related Symptoms

Urinary frequency or retention (bladder compression)

Constipation (rectal compression)

Visible abdominal distension in massive fibroids

Reproductive Dysfunction

Fibroids may:

Distort the endometrial cavity

Alter uterine contractility

Affect implantation

They contribute to:

Infertility: 10–15%

Recurrent miscarriage

Preterm labor

Malpresentation and obstructed labor

Diagnosis

Imaging is fundamental in evaluating fibroids:

Transvaginal Ultrasound

First-line modality

Sensitivity: 90–99% for intramural and subserosal fibroids

Allows mapping, size measurement, and vascular assessment

Gold standard for complex cases

Essential for preoperative planning and MRgFUS eligibility

Distinguishes fibroids from adenomyosis

Hysteroscopy

Diagnostic and therapeutic tool for submucosal fibroids

Allows direct visualization of cavity distortion

Modern Treatment Approaches

Management must be individualized based on age, symptoms, fibroid characteristics, comorbidities, and reproductive plans.

Medical Therapy

GnRH Agonists

Cause hypoestrogenic state → shrinkage up to 35–65%

Used preoperatively to correct anemia and reduce fibroid volume

Side effects: hot flashes, bone loss (long-term use limited)

GnRH Antagonists (elagolix, relugolix)

Rapid suppression of gonadotropins

Effective long-term with add-back therapy

FDA-approved for heavy bleeding due to fibroids

Selective Progesterone Receptor Modulators (SPRMs)

(e.g., ulipristal acetate – restricted in many countries due to liver risk)

Reduce bleeding and volume

Useful short-term in selected patients



Other Agents

Progestins, combined oral contraceptives: control bleeding but do not shrink fibroids

Tranexamic acid: effective for menorrhagia

NSAIDs: reduce dysmenorrhea symptoms

Minimally Invasive and Interventional Procedures

Uterine Artery Embolization (UAE)

Minimally invasive, short recovery

Reduces fibroid volume up to 50–60%

Not recommended for women planning near-term pregnancy due to possible decreased ovarian reserve

MRI-Guided Focused Ultrasound Surgery (MRgFUS)

Non-invasive thermal ablation

Outpatient procedure

Best for a limited number of accessible fibroids

Faster recovery but long-term fertility data limited

Hysteroscopic Myomectomy

Gold standard for submucosal fibroids

Significantly improves bleeding and fertility outcomes

Day-surgery procedure

Surgical Treatment

Laparoscopic or Robotic Myomectomy

Preferred for women desiring pregnancy

Lower adhesion formation compared to laparotomy

Fibroid recurrence occurs in 15–30% of cases

Hysterectomy

Definitive treatment

Recommended for severe symptoms in women with completed fertility

Approaches include vaginal, laparoscopic, and abdominal

Discussion

Advances in medical and surgical technologies have significantly improved the management of uterine fibroids. Minimally invasive procedures such as UAE, MRgFUS, and laparoscopic myomectomy reduce postoperative morbidity and recovery time. Emerging pharmacologic options, especially oral GnRH antagonists, represent a major step forward, providing effective symptom control with fewer side effects.

Despite progress, challenges remain:

Recurrence after myomectomy

Limited access to advanced imaging and MRgFUS in low-resource settings

The need for long-term safety data on new hormonal therapies

The complex relationship between fibroids and infertility

Future directions include:

Targeted molecular therapies based on genetic profiling

Improved imaging-based predictive models



Development of fertility-optimized treatment algorithms

CONCLUSION

Uterine fibroids continue to be a leading cause of gynecological morbidity and reproductive challenges. Advances in diagnostic imaging and minimally invasive interventions have transformed management strategies, allowing clinicians to tailor treatment to individual patient needs. An evidence-based, patient-centered approach—balancing symptom control, fertility goals, and safety—remains essential.

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