

## ETIOLOGY, PATHOGENESIS, AND TREATMENT METHODS OF UTERINE LEIOMYOMA

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### ARTICLE INFO

### ABSTRACT:

#### ARTICLE HISTORY:

Received: 11.06.2025

Revised: 12.06.2025

Accepted: 13.06.2025

#### KEYWORDS:

Leiomyoma, uterine  
tumor, hormonal  
imbalance, myomectomy,  
embolization,  
reproductive health.

Uterine leiomyoma is the most common benign tumor in women, originating from the smooth muscle tissue of the uterus. This article explores the etiology, pathogenesis, clinical manifestations, diagnostic methods, as well as current conservative and surgical treatment options. Special attention is given to the impact on reproductive health and modern therapeutic strategies.

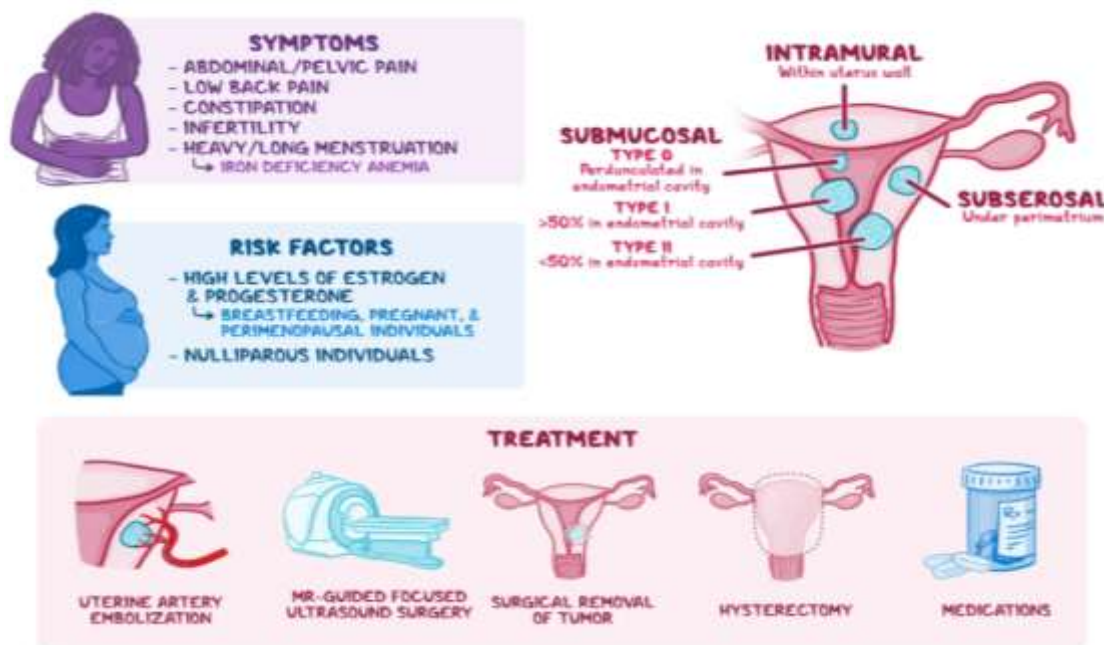
**INTRODUCTION.** Uterine leiomyomas, or fibroids, represent a major public health problem. It is believed that these tumors develop in the majority of American women and become symptomatic in one-third of these women. They are the most frequent indication for hysterectomy in the United States. Although the initiator or initiators of fibroids are unknown, several predisposing factors have been identified, including age (late reproductive years), African-American ethnicity, nulliparity, and obesity. Nonrandom cytogenetic abnormalities have been found in about 40% of tumors examined. Estrogen and progesterone are recognized as promoters of tumor growth, and the potential role of environmental estrogens has only recently been explored. Growth factors with mitogenic activity, such as transforming growth factor- $\beta$ , basic fibroblast growth factor, epidermal growth factor, and insulin-like growth factor-I, are elevated in

fibroids and may be the effectors of estrogen and progesterone promotion. These data offer clues to the etiology and pathogenesis of this common condition, which we have analyzed and summarized in this review. Uterine leiomyoma (fibromyoma) is one of the most prevalent tumors in women of reproductive age. It often presents with menstrual irregularities, pelvic pain, and infertility. While the exact etiology remains unclear, hormonal and genetic factors play a key role. Accurate assessment of the clinical course and selection of an individualized treatment approach are essential for effective management.

#### Main Body

**1. Etiology.** The exact etiology of uterine leiomyoma remains unclear, but several contributing factors have been identified. These include:

- **Hormonal influences**, particularly estrogen and progesterone, which stimulate the growth of fibroids.
- **Genetic predisposition**, with increased risk observed in women with a family history of fibroids.
- **Race**, as studies show higher prevalence and severity in African-American women.
- **Environmental and lifestyle factors**, such as obesity, early menarche, and dietary habits.



**2. Pathogenesis.** Uterine leiomyomas originate from a single smooth muscle cell in the myometrium, which undergoes somatic mutation and clonal expansion. Key mechanisms include:

- Overexpression of estrogen and progesterone receptors in fibroid tissue,
- Alterations in growth factors (e.g., transforming growth factor-beta),

- Increased extracellular matrix (ECM) production,
- Abnormal angiogenesis and reduced apoptosis.

These processes collectively lead to the formation of firm, well-circumscribed tumors within the uterine wall.

**3. Clinical Manifestations.** Leiomyomas may be asymptomatic or present with:

- Heavy or prolonged menstrual bleeding (menorrhagia),
- Pelvic pain or pressure,
- Urinary frequency or retention,
- Constipation,
- Infertility or recurrent pregnancy loss.

Symptoms depend on the size, number, and location of the fibroids (submucosal, intramural, or subserosal).

**4. Diagnostic Approaches. Diagnosis typically involves:**

- **Pelvic ultrasound:** first-line imaging to detect and measure fibroids,
- **Magnetic Resonance Imaging (MRI):** provides detailed assessment in complex cases,
- **Hysteroscopy or sonohysterography:** useful for evaluating submucosal fibroids,
- **Laboratory tests:** to assess anemia due to blood loss.

**5. Treatment Options**

*a) Conservative (Medical) Management*

- **Hormonal therapy:** GnRH agonists, oral contraceptives, selective progesterone receptor modulators (e.g., ulipristal acetate),
- **Non-hormonal therapy:** tranexamic acid, NSAIDs,
- These methods can reduce symptoms but do not eliminate fibroids.

*b) Minimally Invasive Procedures*

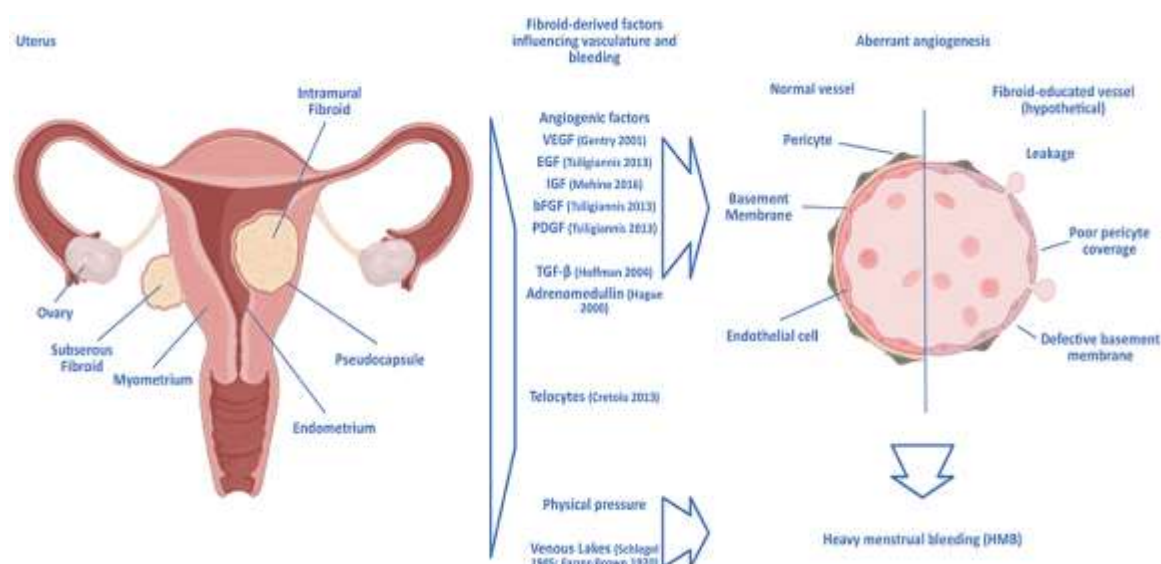
- **Uterine artery embolization (UAE):** blocks blood supply to fibroids, causing shrinkage,
- **MRI-guided focused ultrasound surgery (FUS):** non-invasive thermal ablation.

*c) Surgical Treatment*

- **Myomectomy:** removal of fibroids while preserving the uterus, recommended for women desiring future fertility,
- **Hysterectomy:** complete removal of the uterus, definitive treatment for women who have completed childbearing.

The choice of treatment depends on age, symptoms, reproductive plans, and fibroid characteristics.





**Conclusion.** Uterine leiomyoma is a common benign tumor with multifactorial etiology and variable clinical presentation. Timely diagnosis and an individualized treatment approach are essential to manage symptoms and preserve reproductive health. Advances in minimally invasive therapies have expanded treatment options, offering effective alternatives to hysterectomy.

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