

Uterine fibroids: A comprehensive overview of pathophysiology, diagnosis and management.

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Introduction

Uterine fibroids, also known as leiomyomas or myomas, are benign smooth muscle tumors of the uterus. They represent the most common pelvic tumor in women, particularly during the reproductive years. This article provides a detailed overview of the pathophysiology, clinical presentation, diagnosis and management strategies of uterine fibroids. The complexities of their impact on fertility and pregnancy, as well as the latest advancements in treatment, are discussed.

Uterine fibroids affect a significant proportion of women, with a prevalence that increases with age up to the onset of menopause. Despite being benign, they can cause a range of symptoms that impact quality of life, including heavy menstrual bleeding, pelvic pain and reproductive issues. Understanding the etiology, pathophysiology and current management options is essential for optimizing patient outcomes.

Pathophysiology

Uterine fibroids are monoclonal tumors originating from the smooth muscle cells of the myometrium. Their growth is influenced by hormonal factors, particularly estrogen and progesterone, which explains their prevalence during reproductive years and regression post-menopause.

Genetic factors: Genetic mutations, particularly in the MED12 gene, have been implicated in the development of fibroids.

Hormonal influences: Estrogen and progesterone promote fibroid growth by increasing the expression of growth factors and extracellular matrix components.

Growth factors: Fibroblast Growth Factor (FGF), Transforming Growth Factor-Beta (TGF- β), and Insulin-like Growth Factor (IGF) are involved in fibroid pathogenesis.

Extracellular matrix: An increased deposition of extracellular matrix proteins, such as collagen, contributes to the rigidity and growth of fibroids.

Clinical presentation

The clinical manifestations of uterine fibroids are highly variable and depend on their size, number and location within the uterus.

Menstrual disturbances: Heavy menstrual bleeding (menorrhagia) is the most common symptom, often leading to anemia.

Pelvic pain and pressure: Large fibroids can cause a sensation of pelvic fullness, pain and pressure on adjacent organs such as the bladder and bowel.

Reproductive issues: Fibroids can interfere with fertility and pregnancy, causing recurrent miscarriages, preterm labor and complications during delivery.

Diagnosis

The diagnosis of uterine fibroids involves a combination of clinical evaluation, imaging studies and sometimes histopathological examination.

Clinical examination: Bimanual pelvic examination can reveal an enlarged, irregularly shaped uterus.

Ultrasound: Transvaginal ultrasound is the first-line imaging modality for fibroid detection.

Magnetic Resonance Imaging (MRI): Provides detailed information on the size, location and number of fibroids.

Histopathology: Biopsy or surgical specimen analysis is occasionally necessary to differentiate fibroids from malignant uterine tumors.

Management

The management of uterine fibroids is individualized based on the patient's symptoms, age, desire for fertility preservation and overall health.

Watchful waiting: Asymptomatic fibroids or those causing minimal symptoms may be managed conservatively with regular monitoring.

Hormonal therapies: Gonadotropin-Releasing Hormone (GnRH) agonists, oral contraceptives and progesterone receptor modulators can reduce fibroid size and control symptoms.

Non-hormonal options: Tranexamic acid and Non-Steroidal Anti-Inflammatory Drugs (NSAIDs) can help manage heavy menstrual bleeding.

Myomectomy: Surgical removal of fibroids, preserving the uterus, is preferred for women wishing to retain fertility.

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Hysterectomy: Complete removal of the uterus is a definitive treatment for fibroids, recommended for women who have completed childbearing or have severe symptoms unresponsive to other treatments.

Minimally invasive procedures: Laparoscopic and robotic-assisted myomectomy and hysterectomy offer reduced recovery times and fewer complications.

Uterine Artery Embolization (UAE): A minimally invasive procedure that reduces fibroid size by blocking their blood supply.

Magnetic Resonance-Guided Focused Ultrasound Surgery (MRgFUS): Uses focused ultrasound waves to thermally ablate fibroids.

Impact on fertility and pregnancy

Uterine fibroids can complicate fertility and pregnancy, necessitating careful management in women desiring to conceive.

Fertility: Fibroids can distort the uterine cavity, obstruct fallopian tubes and alter the endometrium, impairing implantation and increasing miscarriage risk.

Pregnancy complications: Fibroids are associated with an increased risk of preterm labor, placental abruption, fetal growth restriction and cesarean delivery.

Conclusion

Uterine fibroids are a prevalent condition with significant clinical implications for women's health. A comprehensive understanding of their pathophysiology, clinical presentation, and management options is crucial for providing optimal care. Advances in research and treatment hold promise for more effective and personalized approaches to managing this common gynecological condition.

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