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INTRODUCTION

“Role of Uterine Artery Embolization in the Management of Symptomatic Uterine Fibroids”

According to the World Health Organization (WHO), uterine fibroids, also known as leiomyomas, are benign smooth muscle tumors of the uterus that arise from the myometrium and are among the most common tumors affecting women of reproductive age.

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] Therefore, the present study aims to assess the outcomes of uterine artery embolization in the management of symptomatic uterine fibroids in patients presenting to a tertiary care hospital.

Epidemiology

Global Epidemiology

Uterine fibroids are the most common benign tumors of the female reproductive

tract worldwide. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Globally, uterine fibroids contribute significantly to healthcare burden due to increased outpatient visits, hospital admissions, and surgical interventions [10].

Indian Epidemiology

In India, uterine fibroids are a common gynecological condition among women of reproductive age. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] With improved access to imaging and minimally invasive procedures, alternative treatment options such as uterine artery embolization are gradually being adopted in tertiary care centers across the country [8].

AIMS AND OBJECTIVES

AIMS AND OBJECTIVES

Aim:

[REDACTED]

Objectives:

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

REVIEW OF LITERATURE

REVIEW OF LITERATURE

Uterine Fibroids (Leiomyoma)

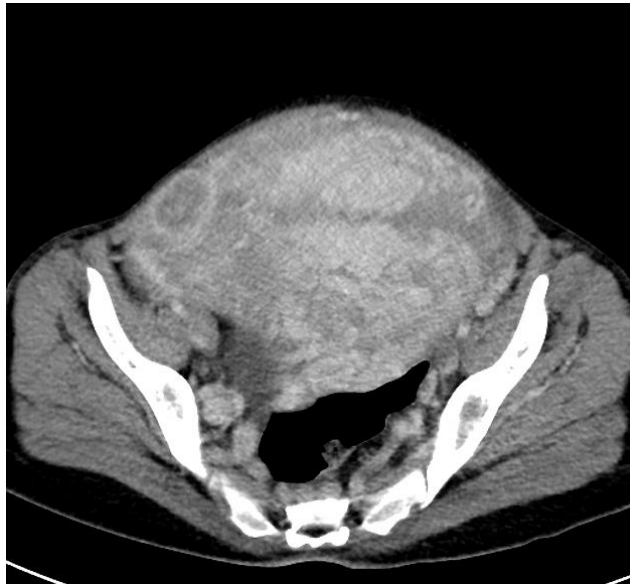


Figure 1: Uterine Fibroids (Leiomyoma) Imaging

Uterine fibroids, also called leiomyomas, are benign tumors that arise from the smooth muscle cells of the uterine myometrium. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

- Hormone-responsive behavior, common in premenopausal women

Historical Background

Uterine fibroids have been recognized in medical descriptions for centuries because of their association with uterine enlargement and abnormal bleeding. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

- Minimally invasive therapies emerged with imaging guidance

Anatomy of the Uterus

Gross Anatomy of the Uterus

The uterus is a hollow, pear-shaped muscular organ located in the female pelvis between the urinary bladder anteriorly and the rectum posteriorly. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

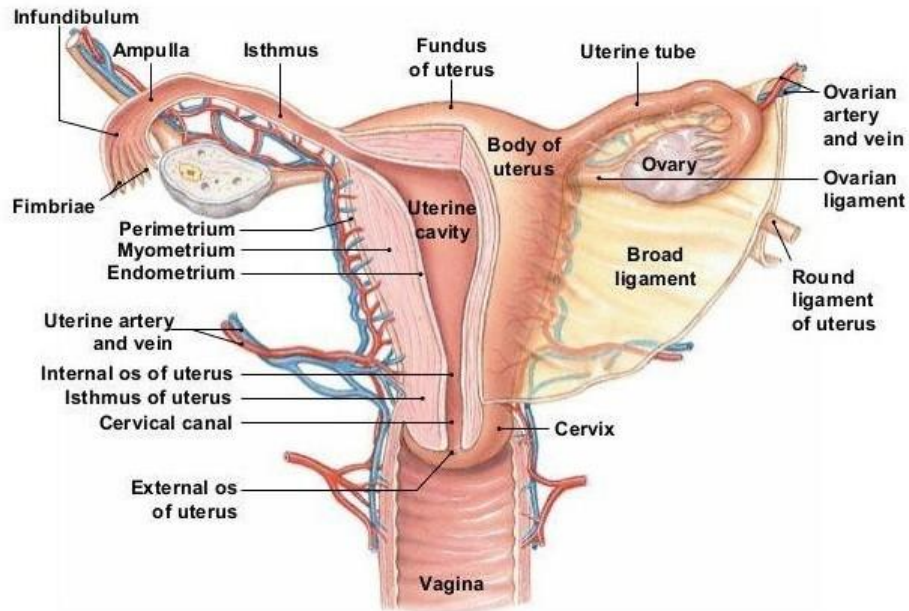


Figure 2: Gross Anatomy of Uterus

- Location: midline pelvis between bladder and rectum

- Clinical relevance: fibroid-related distortion affects access and imaging

Layers of the Uterine Wall

The uterine wall is composed of three principal layers that function together in menstruation, implantation, and pregnancy.

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

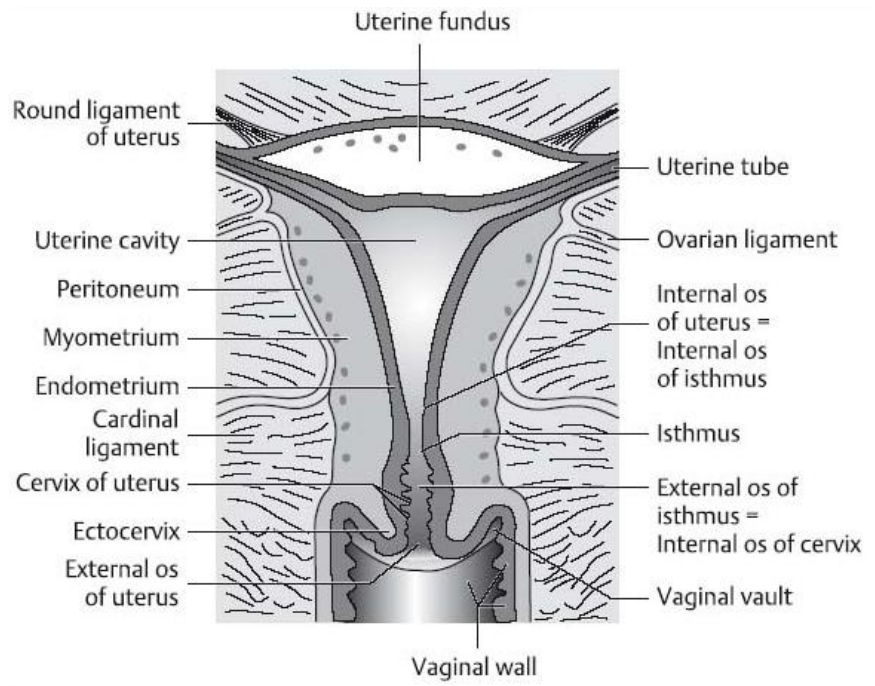


Figure 3: Layers of Uterine Wall

Layer	Composition	Key clinical relevance
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]

Blood Supply of the Uterus

The uterus has a robust arterial supply designed to support cyclical endometrial changes and potential pregnancy. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]. For uterine artery

embolization, this vascular architecture is fundamental because embolic agents are delivered to reduce fibroid perfusion while maintaining acceptable perfusion to normal uterine tissue through controlled occlusion and collateral balance [21].

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Uterine Arterial Anatomy Relevant to Embolization

Uterine artery embolization depends on precise understanding of uterine arterial origin, course, branching, and variations. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]. The close relationship of the uterine artery to the ureter and cervicovaginal branches also informs selective catheter positioning to avoid unintended ischemia [23].

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

- [REDACTED]

Collateral Circulation of the Uterus

The uterus has extensive collateral circulation, which is clinically beneficial for maintaining tissue viability but can influence embolization outcomes. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]. Conversely, prominent uterine-ovarian anastomoses can increase the risk of embolic passage to ovarian circulation, potentially affecting ovarian reserve. Therefore, recognizing collaterals on pre-procedure MRI and intra-procedure angiography is essential for planning and for balancing efficacy with safety [24].

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Pelvic Vascular Anatomy Relevant to Interventional Radiology

Pelvic embolization procedures require a systematic understanding of the internal iliac arterial tree and its variations. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]. Detailed vascular knowledge supports safe access, selective embolization, and avoidance of non-target territories such as the bladder, vagina, rectum, and ovaries [23].

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Pathophysiology of Uterine Fibroids

The exact etiology of uterine fibroids is not completely understood, but current evidence suggests that their development results from a complex interaction of hormonal, genetic, and environmental factors. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED].

Pathogenesis

Bar Index	Relative Length (approximate)
1	100%
2	95%
3	75%
4	90%
5	85%

As fibroids grow, they stimulate the formation of new blood vessels and recruit surrounding connective tissue components [22].

[22]. Understanding the mechanisms involved in fibroid development is important for interpreting imaging findings and predicting response to embolization therapy [23].

Hormonal Influence in Fibroid Growth

Hormonal factors play a central role in the growth and maintenance of uterine fibroids. [24]

[24] [25] [26] [27] [28] [29] [30] [31] [32] [33] [34] [35] [36] [37] [38] [39] [40] [41] [42] [43] [44] [45] [46] [47] [48] [49] [50] [51] [52] [53] [54] [55] [56] [57] [58] [59] [60] [61] [62] [63] [64] [65] [66] [67] [68] [69] [70] [71] [72] [73] [74] [75] [76] [77] [78] [79] [80] [81] [82] [83] [84] [85] [86] [87] [88] [89] [90] [91] [92] [93] [94] [95] [96] [97] [98] [99] [100]

[101] [102] [103] [104] [105] [106] [107] [108] [109] [110] [111] [112] [113] [114] [115] [116] [117] [118] [119] [120] [121] [122] [123] [124] [125] [126] [127] [128] [129] [130] [131] [132] [133] [134] [135] [136] [137] [138] [139] [140] [141] [142] [143] [144] [145] [146] [147] [148] [149] [150] [151] [152] [153] [154] [155] [156] [157] [158] [159] [160] [161] [162] [163] [164] [165] [166] [167] [168] [169] [170] [171] [172] [173] [174] [175] [176] [177] [178] [179] [180] [181] [182] [183] [184] [185] [186] [187] [188] [189] [190] [191] [192] [193] [194] [195] [196] [197] [198] [199] [200]

[201] [202] [203] [204] [205] [206] [207] [208] [209] [210] [211] [212] [213] [214] [215] [216] [217] [218] [219] [220] [221] [222] [223] [224] [225] [226] [227] [228] [229] [230] [231] [232] [233] [234] [235] [236] [237] [238] [239] [240] [241] [242] [243] [244] [245] [246] [247] [248] [249] [250] [251] [252] [253] [254] [255] [256] [257] [258] [259] [260] [261] [262] [263] [264] [265] [266] [267] [268] [269] [270] [271] [272] [273] [274] [275] [276] [277] [278] [279] [280] [281] [282] [283] [284] [285] [286] [287] [288] [289] [290] [291] [292] [293] [294] [295] [296] [297] [298] [299] [300]

Genetic and Molecular Factors

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Growth factors and extracellular matrix components play an important role in the development and enlargement of uterine fibroids. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

The extracellular matrix acts not only as structural support but also as a signaling environment that influences cell behavior. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Classification of Uterine Fibroids

Classification Based on Location

Uterine fibroids are commonly classified according to their anatomical location within the uterus. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Submucosal fibroids are often associated with abnormal uterine bleeding and infertility because they distort the uterine cavity.

FIGO Classification of Fibroids

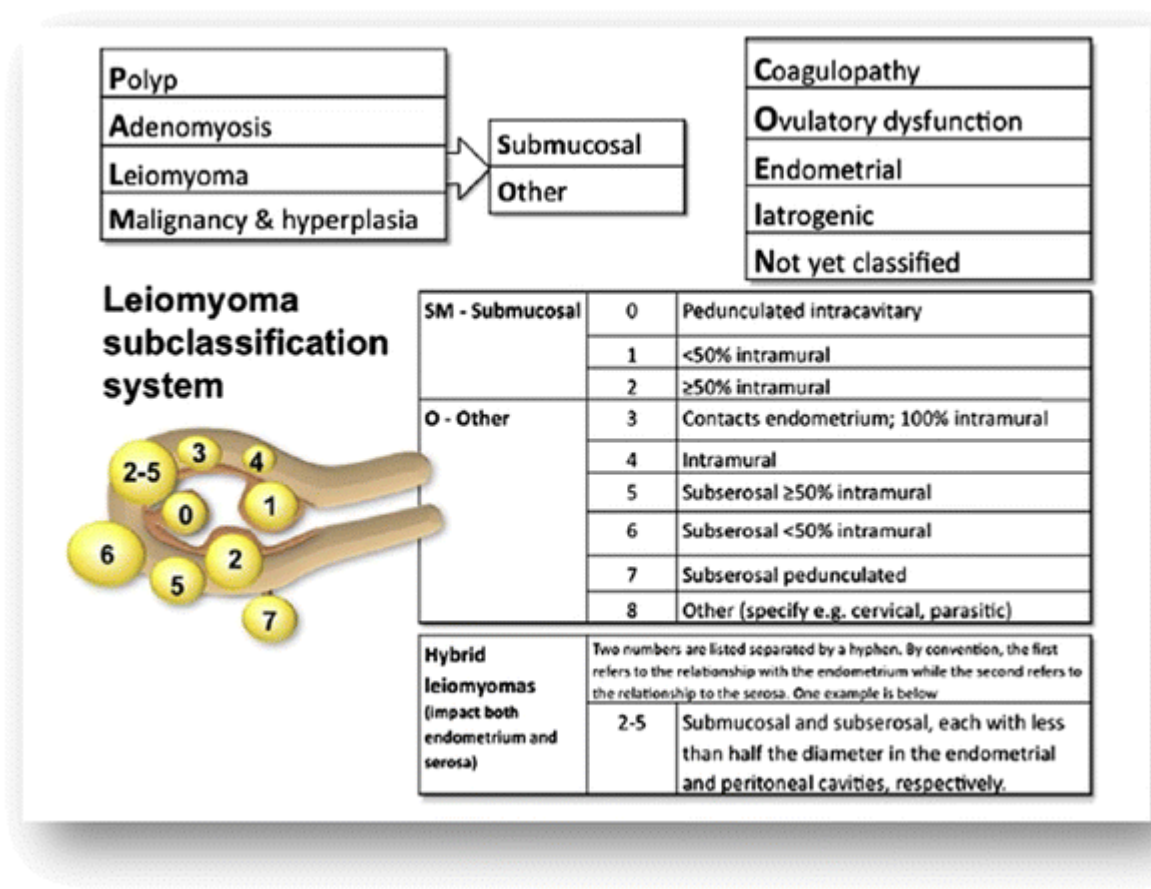


Figure 4: FIGO Classification of Fibroids

The FIGO classification includes several categories that describe the degree of intramural extension of fibroids and their relationship with the uterine cavity.



- Type 8 includes fibroids located in other regions such as the cervix

FIGO type	Location description	Clinical relevance
1	Submucosal, protruding into the cavity	High risk of miscarriage and infertility
2	Submucosal, not protruding	High risk of miscarriage and infertility
3	Intramural, anterior wall	High risk of miscarriage and infertility
4	Intramural, posterior wall	High risk of miscarriage and infertility
5	Intramural, central	High risk of miscarriage and infertility
6	Subserosal, anterior wall	High risk of miscarriage and infertility
7	Subserosal, posterior wall	High risk of miscarriage and infertility

Morphological Classification

Morphological classification of uterine fibroids is based on their physical structure, growth pattern, and relationship to surrounding uterine tissues.

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

- Pedunculated fibroids are attached to the uterus by a narrow stalk

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Degenerative Changes in Fibroids

Degenerative changes in uterine fibroids occur when the tumor outgrows its blood supply. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Several types of degenerative changes may occur in uterine fibroids:

- Hyaline degeneration is the most common form and involves replacement of smooth muscle cells with connective tissue

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Age is one of the most important risk factors associated with the development of uterine fibroids. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

- Tendency to regress after menopause

Genetic Predisposition

Genetic predisposition plays an important role in the development of uterine fibroids. Studies have shown that women with a family history of fibroids are more likely to develop the condition compared with those without such history [38]. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

- Increased susceptibility observed in some populations

Hormonal Factors

Hormonal factors are strongly associated with the growth and development of uterine fibroids. [REDACTED]

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

- Tumor regression commonly occurs after menopause

Lifestyle and Environmental Factors

Lifestyle and environmental influences are also considered important risk factors for uterine fibroid development. [REDACTED]

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Reproductive Factors

Reproductive history is another important determinant in the risk of developing uterine fibroids. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Clinical Presentation of Symptomatic Fibroids

Heavy Menstrual Bleeding (Menorrhagia)

Heavy menstrual bleeding is one of the most frequent symptoms experienced by women with uterine fibroids. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Dysmenorrhea

Dysmenorrhea refers to painful menstruation and is a common complaint among women with symptomatic uterine fibroids. [REDACTED]

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

Pelvic Pain

Pelvic pain is another important symptom associated with uterine fibroids. The pain may be chronic or intermittent and is usually localized to the lower abdomen or pelvis. [REDACTED]

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

[REDACTED]

Pressure Symptoms

Large uterine fibroids can produce pressure symptoms by compressing adjacent pelvic organs. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Infertility and Reproductive Issues

Uterine fibroids may contribute to infertility and other reproductive complications in women of reproductive age. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Impact on Quality of Life

Symptomatic uterine fibroids can significantly affect the overall quality of life of affected women. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Complications of Uterine Fibroids

Anemia due to Chronic Blood Loss

Anemia is one of the most frequent complications associated with symptomatic uterine fibroids. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

- Reduced physical endurance and work capacity

Degenerative Changes

Degenerative changes occur when a fibroid grows large enough that its blood supply becomes insufficient to sustain the entire tumor mass. [REDACTED]

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Infertility and Pregnancy Complications

Uterine fibroids may lead to infertility and a variety of complications during pregnancy. [REDACTED]

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

- Complications during pregnancy such as preterm labor

Mass Effect on Adjacent Organs

Large uterine fibroids may produce complications due to compression of adjacent pelvic and abdominal organs. [REDACTED]

[REDACTED]
[REDACTED]
[REDACTED]

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

- Rarely ureteral obstruction resulting in urinary tract complications

Diagnostic Evaluation of Uterine Fibroids

Clinical Examination

Clinical examination plays an essential role in the initial evaluation of patients suspected of having uterine fibroids [REDACTED]

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

- Family and medical history related to gynecological disorders

Laboratory Investigations

Laboratory investigations provide supportive information during the evaluation of uterine fibroids and help assess complications associated with the condition.

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

- Screening for infection when pelvic inflammatory disease is suspected

Imaging Modalities in Fibroid Evaluation

Imaging plays a crucial role in the diagnosis and management of uterine fibroids. Radiological evaluation allows accurate identification of fibroid size, number, location, and vascular characteristics [34].

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

- Assists in treatment planning and follow-up evaluation

Ultrasonography (USG)

Ultrasonography is the most commonly used imaging modality for the initial evaluation of uterine fibroids.

-
-
-
-

- Useful for monitoring fibroid growth over time

Ultrasound can also detect secondary changes such as degeneration, calcification, or distortion of the uterine cavity.

Feature	Ultrasound finding	Diagnostic relevance



Figure 5: Ultrasound Imaging of Uterine Fibroids

Doppler Ultrasound

Doppler ultrasound is an important extension of conventional ultrasonography that allows evaluation of blood flow within the uterus and fibroid tissue. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

- Helps monitor vascular changes after treatment

Doppler findings are particularly valuable in interventional radiology because uterine artery embolization targets the arterial blood supply to fibroids. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Doppler parameter	Finding	Clinical importance

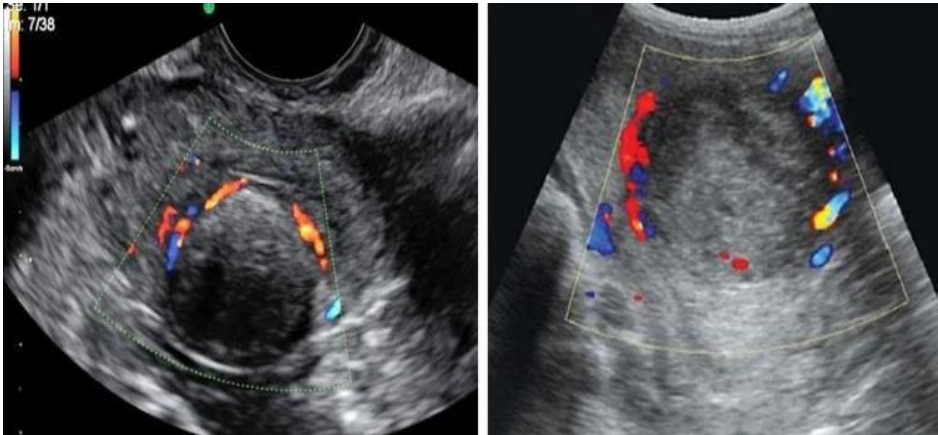


Figure 6: Doppler Ultrasound of Uterine Fibroid Lesions Showing Perilesal Vascularization Commonly Seen in Uterine Fibroids

Magnetic Resonance Imaging (MRI)

Magnetic resonance imaging is considered the most accurate imaging modality for detailed evaluation of uterine fibroids.

[REDACTED]

[REDACTED]

- Valuable for post-treatment follow-up

MRI is frequently used before uterine artery embolization to evaluate fibroid vascularity and determine the presence of additional pelvic pathology. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

MRI feature	Description	Diagnostic value
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]

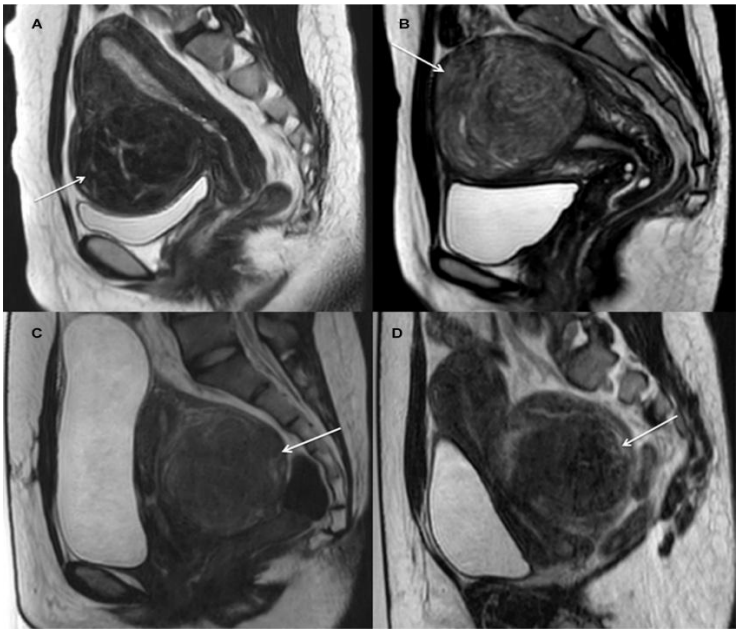


Figure 7: Magnetic Resonance Imaging (MRI) of Uterine Fibroid Lesions

Computed Tomography (CT) – Limited Role

Computed tomography has a relatively limited role in the evaluation of uterine fibroids compared with ultrasound and magnetic resonance imaging.

- Helpful in assessing complications involving surrounding organs

Although CT is not the preferred modality for fibroid assessment, it can provide valuable information when other abdominal pathologies are being investigated.

CT feature	Appearance	Clinical significance

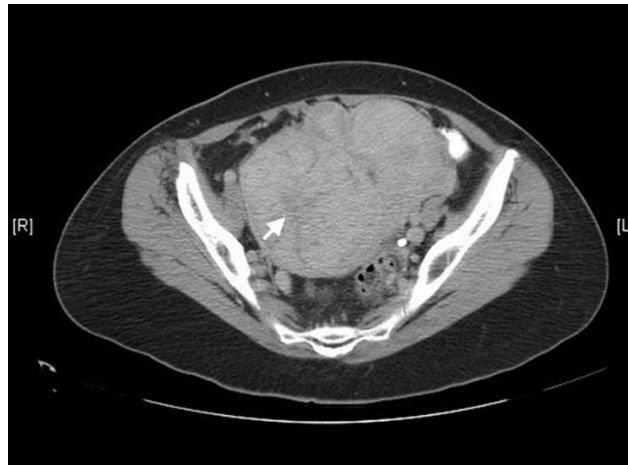


Figure 8: Computed Tomography Scan of Abdomen and Pelvis Showing Uterine Fibroid with Areas of Degeneration (Note the Arrow Showing Irregular Central Necrosis).

Imaging Characteristics of Fibroids

Ultrasound Features of Fibroids

Ultrasonography is widely used for identifying the structural characteristics of uterine fibroids and remains the primary imaging technique for initial evaluation. Fibroids usually appear as well circumscribed masses arising from the uterine wall [50].

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

- [REDACTED]

- Calcification may appear as echogenic foci with shadowing

Ultrasound also helps identify secondary features such as degeneration, cystic areas, or internal heterogeneity. [REDACTED]

[REDACTED]

Ultrasound feature	Appearance	Diagnostic significance
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]

MRI Characteristics of Fibroids

Magnetic resonance imaging provides highly detailed information about uterine fibroids because of its superior soft tissue contrast. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

- Accurate evaluation of relationship with endometrial cavity

MRI is also useful in identifying degenerative changes such as cystic degeneration, hemorrhage, or calcification. [REDACTED]

[REDACTED]

[REDACTED]

MRI feature	Imaging appearance	Clinical importance

MRI Classification Based on Signal Intensity

MRI signal intensity characteristics help classify uterine fibroids according to their internal composition and vascular activity.

- Heterogeneous signal may suggest cystic or myxoid degeneration

Fibroids with low signal intensity on T2 weighted images are generally more fibrous and less vascular, whereas those with higher signal intensity may have greater vascularity and cellular activity.

MRI signal pattern	Tissue characteristic	Clinical relevance

Role of Imaging in Treatment Planning

Imaging plays a central role in planning treatment for uterine fibroids. Accurate visualization of fibroid size, number, location, and vascular supply is essential for selecting the most appropriate management strategy [55].

- Assists in selecting appropriate treatment approach

For interventional procedures such as uterine artery embolization, imaging is particularly important. Magnetic resonance imaging and Doppler ultrasound help identify the vascular anatomy supplying the fibroids and guide the procedure.

Imaging role	Purpose	Clinical value
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]

Management of Uterine Fibroids

Conservative Management

Conservative management refers to the non-interventional approach used in patients with uterine fibroids who have mild symptoms or are asymptomatic. Many fibroids remain stable in size and do not cause significant clinical problems. [REDACTED]

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

- Avoidance of unnecessary invasive procedures

Patients who are approaching menopause may particularly benefit from conservative management because fibroids often regress after hormonal activity decreases. [REDACTED]

[REDACTED]
[REDACTED]
[REDACTED]

Conservative approach	Purpose	Clinical benefit

Medical Management

Medical management of uterine fibroids aims to control symptoms and reduce fibroid growth through pharmacological therapy.

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- Temporary symptom relief before definitive treatment

Medical therapy can significantly reduce symptoms such as heavy menstrual bleeding and pelvic discomfort

Medical therapy	Mechanism	Clinical effect
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]

Hormonal Therapy

Hormonal therapy is commonly used to manage symptoms associated with uterine fibroids, particularly heavy menstrual bleeding. [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

- Suitable for patients with mild to moderate symptoms

Hormonal therapy does not directly remove fibroids but helps control symptoms that result from hormonal stimulation of the uterus. [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

Hormonal treatment	Action	Clinical benefit
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]

GnRH Agonists

Gonadotropin releasing hormone agonists are medications that suppress ovarian hormone production by acting on the hypothalamic pituitary axis. [REDACTED]

[REDACTED]
[REDACTED]
[REDACTED]

- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]

- Often used before surgical procedures

GnRH agonists are particularly useful as preoperative therapy because they can reduce fibroid volume and decrease uterine size, making surgical procedures easier [REDACTED]

[REDACTED]
[REDACTED]
[REDACTED]

Medication	Mechanism	Treatment effect

Selective Progesterone Receptor Modulators

Selective progesterone receptor modulators represent another class of medications used in the treatment of uterine fibroids.

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- Non surgical treatment option

These medications have been shown to produce significant improvement in symptoms such as heavy menstrual bleeding and pelvic discomfort.

Drug category	Mechanism	Clinical effect

Surgical Management

Surgical management is often considered when uterine fibroids cause severe symptoms or when other treatment methods are ineffective.

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- Requires careful preoperative evaluation

Surgical treatment provides definitive relief in many cases, particularly when the entire uterus is removed.

Surgical approach	Description	Clinical purpose
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]

Myomectomy

Myomectomy is a surgical procedure that involves the removal of fibroids while preserving the uterus. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

- Requires postoperative monitoring

Although myomectomy can provide relief from symptoms, there is a possibility of recurrence because the uterus remains intact. [REDACTED]

[REDACTED]

[REDACTED]

Surgical technique	Indication	Benefit
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]

Hysterectomy

Hysterectomy is the surgical removal of the uterus and represents the definitive treatment for uterine fibroids. [REDACTED]

[REDACTED]
[REDACTED]
[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

- Eliminates risk of recurrence

Although hysterectomy effectively resolves fibroid related symptoms, it is a major surgical procedure and involves a longer recovery period compared with minimally invasive options. [REDACTED]

[REDACTED]
[REDACTED]

Type of hysterectomy	Description	Clinical significance

Minimally Invasive Treatment Options

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- Suitable for selected patients with symptomatic fibroids

These techniques provide effective symptom relief with shorter recovery times.

Treatment method	Technique	Clinical benefit
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]

MRI Guided Focused Ultrasound Surgery

MRI guided focused ultrasound surgery is a non invasive treatment that uses high intensity ultrasound waves to destroy fibroid tissue. [REDACTED]

[REDACTED]
[REDACTED]
[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

- Minimal recovery time

During the procedure, MRI images provide real time monitoring of tissue temperature and treatment response. [REDACTED]

[REDACTED]
[REDACTED]

Feature	Description	Benefit

Radiofrequency Ablation

Radiofrequency ablation is a minimally invasive procedure that uses thermal energy to destroy fibroid tissue.

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- Short recovery period

The ablated fibroid tissue gradually shrinks as the body absorbs the treated tissue.

Feature	Description	Clinical benefit

Uterine Artery Embolization

Uterine artery embolization is a minimally invasive interventional radiology procedure used to treat symptomatic uterine fibroids.

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- Minimally invasive alternative to surgery

After embolization, the fibroids undergo infarction and progressively decrease in size.

Procedure step	Description	Clinical outcome

Uterine Artery Embolization (UAE)

Historical Development of UAE

Uterine artery embolization is a minimally invasive interventional radiology procedure developed as an alternative treatment for symptomatic uterine fibroids.

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- Expansion as a minimally invasive alternative to surgery

With improvements in catheter technology and imaging guidance, uterine artery embolization became widely accepted as a treatment option for symptomatic fibroids.

Development stage	Description	Clinical importance

Principle and Mechanism of UAE

The fundamental principle of uterine artery embolization is the interruption of blood flow to uterine fibroids.

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- Gradual reduction in fibroid size

The surrounding normal uterine tissue generally maintains adequate perfusion through collateral circulation, allowing preservation of uterine function.

Mechanism step	Process	Result

Indications for UAE

Uterine artery embolization is indicated in patients with symptomatic uterine fibroids who seek relief from symptoms while preserving the uterus.

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- Patients seeking non surgical treatment options

The decision to perform uterine artery embolization depends on careful clinical evaluation and imaging assessment.

Indication	Clinical situation	Expected benefit

Patient Selection Criteria

Appropriate patient selection is essential for achieving successful outcomes with uterine artery embolization.

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- Patient preference for minimally invasive treatment

Preprocedural imaging plays an important role in patient selection by identifying fibroid size, number, and vascular characteristics.

Selection factor	Requirement	Clinical significance

Contraindications for UAE

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- Severe renal impairment

Other conditions may require careful evaluation before proceeding with embolization.

Contraindication	Reason	Clinical implication
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]

Pre-Procedural Evaluation for UAE

Clinical Assessment

Clinical assessment before uterine artery embolization is essential to confirm that symptoms are attributable to fibroids and to evaluate suitability for an interventional procedure. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

- Baseline vitals and focused pelvic examination

Clinical assessment also includes reviewing laboratory results to ensure adequate hemoglobin levels and safe renal function for contrast use. [REDACTED]

[REDACTED]

Clinical component	What is assessed	Why it matters for UAE

Imaging Assessment before Embolization

Imaging assessment is a cornerstone of pre-procedural evaluation because it confirms fibroid diagnosis, maps lesion distribution, and identifies factors that influence embolization feasibility.

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- Screening for non-fibroid pelvic pathology that affects management

[REDACTED]

Imaging aim	What is evaluated	Relevance to UAE planning
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]

Role of MRI in Pre-procedural Planning

MRI provides comprehensive pre-procedural information that is particularly valuable in patients with multiple fibroids, large uterine size, or inconclusive ultrasound evaluation.

[REDACTED]

- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]

- Identification of concurrent uterine pathology relevant to outcomes

[REDACTED]

MRI parameter	What it shows	UAE planning value
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]

Preparation of the Patient

Patient preparation before uterine artery embolization ensures procedural safety, minimizes complications, and improves comfort during recovery. [REDACTED]

[REDACTED]

- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]

- Planning analgesia, antiemetics, and post-procedure monitoring

[REDACTED]

Preparation step	What is done	Purpose
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]

13. Technique of Uterine Artery Embolization

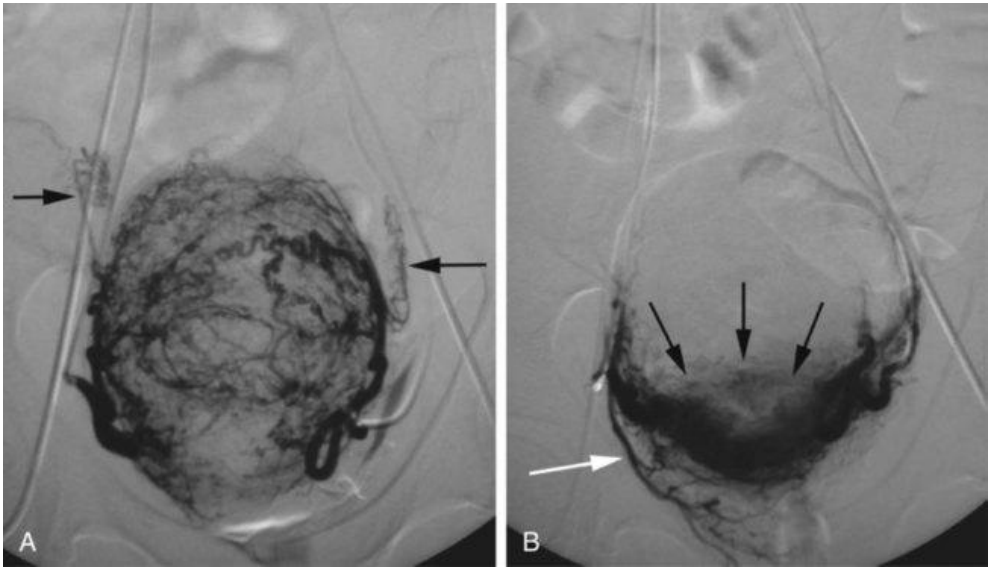


Figure 9: Uterine Artery Embolization

Vascular Access Techniques

Vascular access is the first technical step in uterine artery embolization and determines catheter stability, procedural ergonomics, and access-site safety. [REDACTED]

[Redacted text block]

[Redacted text block]

- [Redacted list item]
- [Redacted list item]
- [Redacted list item]
- [Redacted list item]

- Access-site hemostasis planning after procedure completion

[Redacted text block]

Access method	Key features	Practical consideration
[Redacted]	[Redacted]	[Redacted]
[Redacted]	[Redacted]	[Redacted]
[Redacted]	[Redacted]	[Redacted]
[Redacted]	[Redacted]	[Redacted]
[Redacted]	[Redacted]	[Redacted]

13.2 Catheterization of Uterine Artery

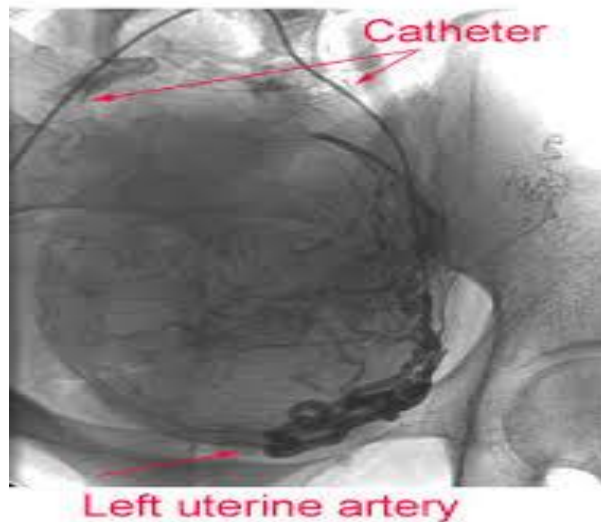


Figure 10: Catheterization of Uterine Artery

Catheterization of the uterine artery requires systematic navigation through the iliac arterial tree and careful recognition of uterine artery origin and variants. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

- Continuous monitoring for vasospasm and non-target flow

Accurate catheter placement is essential for effective embolization and reduces the risk of non-target embolization. [REDACTED]

Step	Action	Purpose

Embolic Agents Used in UAE

Embolic agents are selected to occlude the arterial supply of fibroids while allowing preservation of normal uterine perfusion through collateral balance.

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- Slow injection technique to reduce reflux and non-target embolization

[REDACTED]

Embolic agent type	Typical characteristic	Procedural relevance
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]

Fluoroscopic and Angiographic Guidance

Fluoroscopic and angiographic guidance form the imaging foundation of uterine artery embolization. [REDACTED]

- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]

- Repeat angiography to confirm treatment effect bilaterally

[REDACTED]

Imaging step	What is evaluated	Why it matters
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]

Endpoint of Embolization

The endpoint of embolization defines when adequate devascularization has been achieved while minimizing the risk of excessive non-target ischemia. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

- Bilateral achievement of endpoint for completeness

[REDACTED]
[REDACTED]
[REDACTED]

Endpoint indicator	Angiographic appearance	Clinical implication
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]

Post-Procedural Care and Follow-up

Immediate Post-Procedure Management

Immediate care after uterine artery embolization focuses on monitoring the patient, managing pain, and ensuring stabilization following the interventional procedure. [REDACTED]

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

- Monitoring for nausea, vomiting, or fever

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Post procedure aspect	Monitoring focus	Clinical purpose
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]

Post-Embolization Syndrome

Post-embolization syndrome is a common clinical response following uterine artery embolization and results from ischemic changes in fibroid tissue after interruption of its blood supply. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

- Temporary inflammatory response

[REDACTED]

Symptom	Cause	Clinical significance
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]

Follow-up Imaging

Follow up imaging is an essential component of evaluating the effectiveness of uterine artery embolization. [REDACTED]

- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]

- Comparison with baseline pre-procedure imaging

[REDACTED]

Imaging modality	Purpose	Evaluation outcome
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]

Assessment of Fibroid Volume Reduction

Assessment of fibroid volume reduction is an important indicator of treatment success following uterine artery embolization. [REDACTED]

[REDACTED]

- Correlation with improvement in symptoms

[REDACTED]

Assessment parameter	Measurement method	Clinical significance
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]

Symptom Relief

Symptom relief is one of the primary outcomes evaluated after uterine artery embolization in patients with symptomatic uterine fibroids. [REDACTED]

[REDACTED]

- Improved tolerance of daily activities

[REDACTED]

[REDACTED]

Symptom	Change after UAE	Clinical outcome
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]

Reduction in Fibroid Size and Volume

Reduction in fibroid size and volume is an important measurable outcome following uterine artery embolization. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

- Correlation with clinical improvement

Volume reduction typically occurs gradually during the months following the procedure. Many patients demonstrate significant shrinkage of fibroids within the first six months. [REDACTED]

[REDACTED]

[REDACTED]

Measurement parameter	Method	Outcome indicator
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]

Improvement in Quality of Life

Improvement in quality of life is a key outcome following uterine artery embolization for symptomatic fibroids. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]

- Increased overall well being

Quality of life improvement is often assessed through patient reported outcomes and clinical evaluation during follow up visits. [REDACTED]

[REDACTED]

Quality of life aspect	Symptom improvement	Result

Long-Term Outcomes

Long term outcomes of uterine artery embolization are evaluated by monitoring symptom control, fibroid size reduction, and the need for additional treatment over time.

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- Preservation of uterine structure

Although most patients benefit from lasting symptom relief, some may experience recurrence of symptoms or development of new fibroids.

Long term parameter	Observation	Clinical significance
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]

Complications of Uterine Artery Embolization

Post-Embolization Syndrome

Post-embolization syndrome is the most frequently encountered clinical response following uterine artery embolization. [REDACTED]

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

- Temporary inflammatory reaction following embolization

Management typically includes analgesics, anti-inflammatory medications, hydration, and rest. [REDACTED]

[REDACTED]

Clinical feature	Cause	Outcome

Infection and Sepsis

Infection is an uncommon but potentially serious complication of uterine artery embolization.

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- Systemic symptoms indicating severe infection

In most cases, mild infections can be managed with appropriate antibiotic therapy.

Infection feature	Clinical presentation	Management approach

Non-Target Embolization

Non-target embolization occurs when embolic particles unintentionally enter arteries supplying structures other than the fibroids.

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- Possible pelvic organ dysfunction

Preventing non-target embolization requires careful catheter placement, slow injection of embolic particles, and continuous fluoroscopic monitoring during the procedure.

Affected structure	Mechanism	Possible consequence

Ovarian Dysfunction

Ovarian dysfunction is a potential complication of uterine artery embolization that may occur when embolic particles affect the blood supply to the ovaries.

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- Greater risk in women nearing menopause

In many patients, ovarian dysfunction is temporary and menstrual function returns after recovery.

Ovarian effect	Cause	Clinical implication

Rare Complications

Although uterine artery embolization is generally considered safe, rare complications may occur in some patients.

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- Severe pelvic infection or uterine necrosis

Careful procedural technique, proper patient selection, and thorough pre-procedure evaluation help minimize the likelihood of these complications.

Rare complication	Cause	Management
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]

Advantages and Limitations of Uterine Artery Embolization

Advantages of UAE

Uterine artery embolization has become an important minimally invasive treatment option for symptomatic uterine fibroids. [REDACTED]

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

- Effective reduction of fibroid related symptoms

The procedure also allows treatment of multiple fibroids simultaneously because the embolization targets the arterial supply rather than individual lesions. [REDACTED]

[REDACTED]

Advantage	Description	Clinical benefit

Limitations of UAE

Despite its benefits, uterine artery embolization also has certain limitations that must be considered when selecting treatment options for patients with fibroids.

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- Potential complications related to embolization procedure

Another limitation is that some patients may require additional treatment if symptoms persist or if fibroids continue to grow.

Limitation	Explanation	Clinical implication

Patient Satisfaction

Patient satisfaction is an important outcome measure when evaluating the effectiveness of uterine artery embolization.

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- Improved overall quality of life

Patient satisfaction also depends on appropriate counseling before the procedure.

[REDACTED]

[REDACTED]

Satisfaction factor	Patient experience	Outcome
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]

Comparison of UAE with Other Treatment Modalities

UAE vs Myomectomy

[REDACTED]

treatment options used for the management of symptomatic uterine fibroids.

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

- Both procedures aim to relieve fibroid related symptoms

Myomectomy provides immediate removal of fibroids but involves surgical risks and longer recovery. [REDACTED]

[REDACTED]

Treatment method	Key feature	Clinical consideration

UAE vs Hysterectomy

Hysterectomy is considered the definitive surgical treatment for uterine fibroids because it involves removal of the entire uterus, eliminating the possibility of fibroid recurrence.

- Choice of treatment depends on patient preference and clinical factors

Although hysterectomy provides permanent resolution of fibroids, it requires major surgery and a longer recovery period.

Treatment option	Procedure type	Clinical outcome

UAE vs Medical Therapy

Medical therapy and uterine artery embolization represent two different approaches to the management of uterine fibroids.

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- Treatment choice depends on severity of symptoms

Hormonal medications such as gonadotropin releasing hormone agonists or selective progesterone receptor modulators may reduce fibroid size temporarily, but symptoms may return once treatment is discontinued.

Treatment method	Mechanism	Clinical effect
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]

Research Studies

[REDACTED] 2025) presented a comprehensive review highlighting uterine artery embolization (UAE) as an increasingly important minimally invasive treatment for symptomatic uterine fibroids. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

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[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] (2025) published procedural guidelines from the Japanese Society of Interventional Radiology regarding uterine artery embolization for symptomatic uterine myomas. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

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[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] (2025) provided an updated overview of uterine fibroid embolization, focusing on the indications, technique, outcomes, and complications of the procedure. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] (2025) explored the use of machine learning techniques to predict clinical outcomes and symptom relief after uterine fibroid embolization using MRI-based imaging features. The [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] (2024) conducted a systematic review and meta-analysis comparing uterine artery embolization with myomectomy for the treatment of symptomatic uterine fibroids. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] (2024) conducted a prospective study evaluating the impact of uterine artery embolization on ovarian function and pregnancy outcomes in women treated for symptomatic uterine fibroids. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED].

[REDACTED] (2023) presented a narrative review examining the epidemiology, clinical presentation, and management of uterine fibroids, with particular emphasis on uterine artery embolization. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

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[REDACTED] (2023) evaluated the technical success and safety of transradial uterine artery embolization for the treatment of symptomatic uterine fibroids in a single-center study. [REDACTED]

[REDACTED]

[REDACTED]

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[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] (2022) investigated the outcomes of unilateral uterine artery embolization as a treatment option for symptomatic uterine fibroids. [REDACTED]

[REDACTED]

[REDACTED] (2021) focused on the management of post-embolization syndrome, a common complication following uterine fibroid embolization. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] (2013) conducted a study evaluating the long-term clinical outcomes of uterine artery embolization for the treatment of symptomatic uterine fibroids. [REDACTED]

[REDACTED]

[REDACTED] (2011) examined the role of magnetic resonance imaging before and after uterine fibroid embolization to improve patient selection and treatment outcomes. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]. (2008) presented an overview of uterine artery embolization in the management of symptomatic uterine fibroids with particular emphasis on complications and post-procedural follow-up. [REDACTED]

[REDACTED]

[REDACTED] (2008) described uterine artery embolization as a safe, effective, and minimally invasive treatment option for symptomatic uterine fibroids. [REDACTED]

[REDACTED]

[REDACTED] (2007) reviewed the use of uterine artery embolization as a treatment for symptomatic uterine fibroids and highlighted its role as an alternative to surgical management. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

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[REDACTED] (2006) discussed the clinical management of patients undergoing uterine artery embolization for symptomatic uterine fibroids. [REDACTED]

[REDACTED]

[REDACTED]

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[REDACTED]

[REDACTED]

[REDACTED] (2005) reviewed the evolving role of uterine fibroid embolization in the treatment of symptomatic uterine fibroids and discussed future directions for the procedure. [REDACTED]

[REDACTED] improve

[REDACTED]

[REDACTED]

[REDACTED]

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[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] (2004) developed quality improvement guidelines for uterine artery embolization in the treatment of symptomatic uterine leiomyomas. [REDACTED]

[REDACTED]

[REDACTED] (2004) investigated patient satisfaction and disease-specific quality of life following uterine artery embolization for the treatment of symptomatic uterine fibroids. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] (2004) reviewed the state of the art in uterine artery embolization as a treatment for symptomatic uterine fibroids. [REDACTED]

[REDACTED]

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[REDACTED]

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[REDACTED]

[REDACTED] (2001) investigated fibroid calcification following uterine artery embolization and described its ultrasonographic appearance and pathological basis. [REDACTED]

[REDACTED]

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[REDACTED]

[REDACTED]

[REDACTED]

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[REDACTED]

[REDACTED]

[REDACTED]

MATERIALS AND METHODS

MATERIALS AND METHODS

Study Setting: [REDACTED]
[REDACTED]
[REDACTED]

Selection Criteria:

Inclusion Criteria:

Device Type	Percentage of Respondents
Smartphone	95%
Tablet	35%
Smartwatch	15%
Smart TV	25%

Exclusion Criteria:

Bar Index	Relative Length (approximate)
1	15
2	10
3	100
4	85
5	70
6	40
7	100
8	5
9	30
10	35
11	30
12	25
13	100
14	95
15	10

Of some controversy:

[REDACTED]
[REDACTED]

Study Design: [REDACTED].

Time Frame / Duration: [REDACTED]

Methodology: [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

Sample Size Calculation:

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

Statistical Analysis: [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

RESULTS

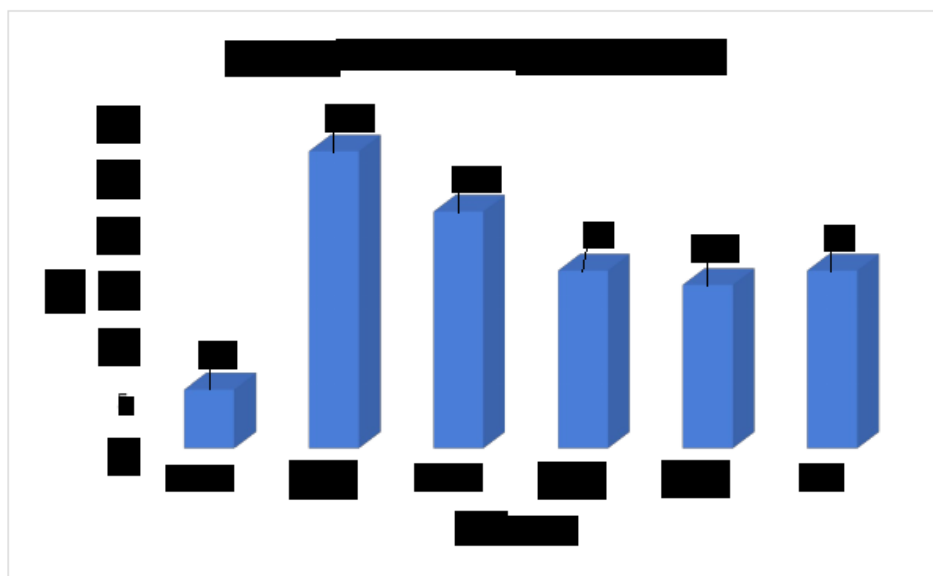
RESULTS

Demographic Profile

Table 1: Age-wise Distribution of Study Population

Age group (years)	n	%
18-24	1	1
25-34	1	1
35-44	1	1
45-54	1	1
55-64	1	1
65-74	1	1
75-84	1	1
85+	1	1

Graph 1. Age-wise Distribution of Study Population



[REDACTED]

[REDACTED]

Table 2: Distribution of Study Population According to Parity

Parity	n	%
Nulliparous	■	■
Primiparous	■	■
Multiparous	■	■

Graph 2. Distribution of Study Population According to Parity

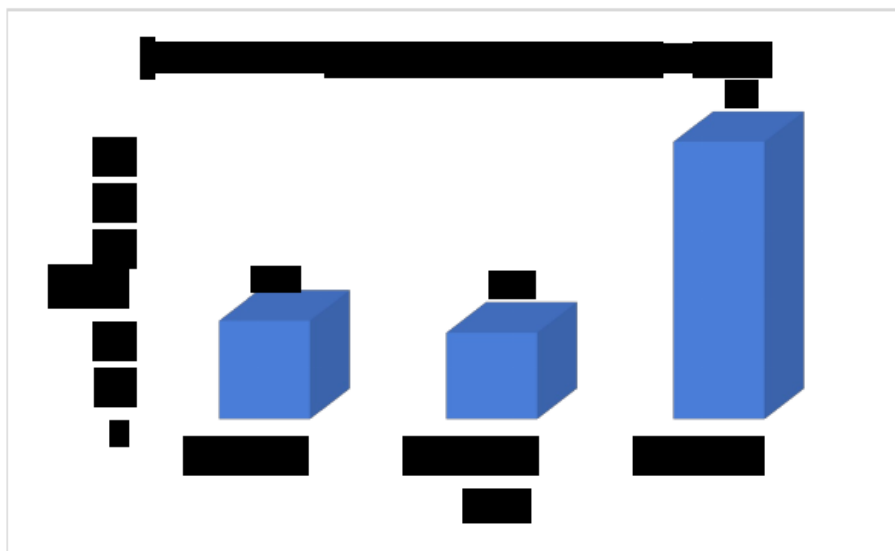


Table 3: Distribution of Study Population According to Symptoms

Symptom	n	%
Heavy menstrual bleeding	■	■
Dysmenorrhea	■	■
Pelvic pain	■	■
Pressure symptoms	■	■
Urinary symptoms	■	■

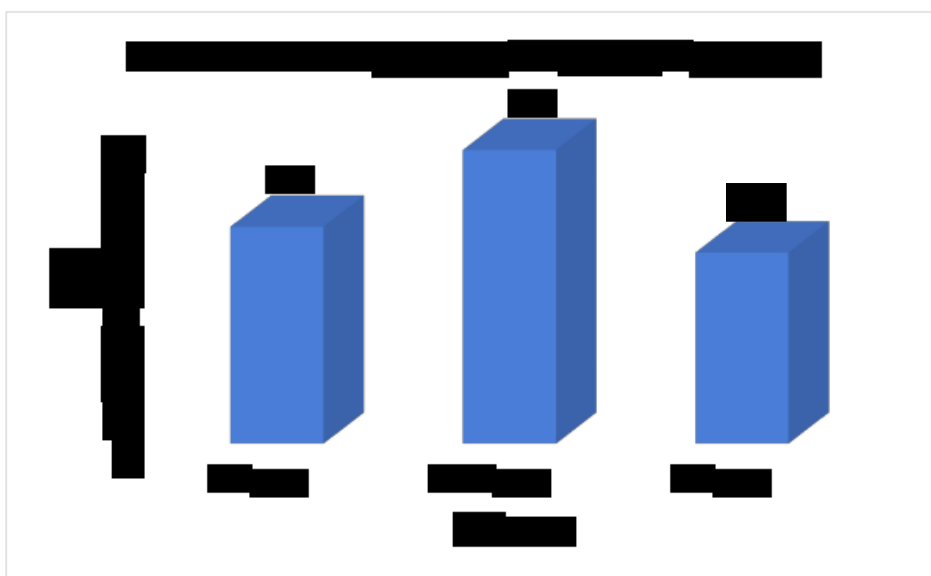
Graph 3. Distribution of Study Population According to Symptoms



Table 4: Association Between Age Group and Severity of Symptoms

Age group	Severe symptoms	%	Test	χ^2	df	p-value
<35 years	21	████	██████████	████	1	████
35–45 years	20	████				
>45 years	6	████				

Graph 4. Association Between Age Group and Severity of Symptoms



██

██

██

██

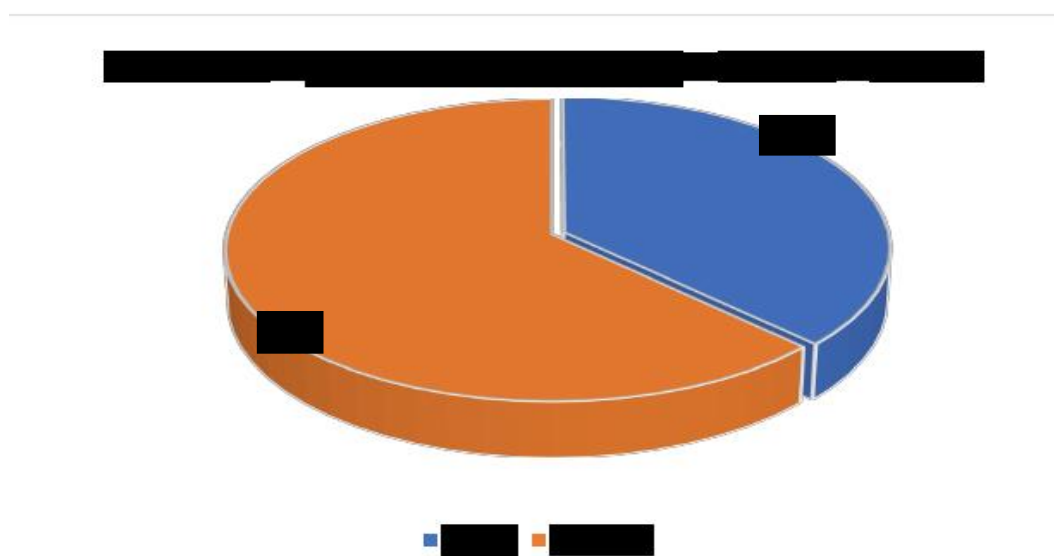
██

Radiological Profile

Table 5: Distribution of Study Population According to Number of Fibroids

Number of fibroids	n	%
Single	■	■
Multiple	■	■

Graph 5. Distribution of Study Population According to Number of Fibroids



In the present study, the majority of patients had multiple fibroids, comprising ■ cases (■%). Patients with a single fibroid accounted for ■ cases (■%).

Table 6: Distribution of Study Population According to Location of Fibroids

Location	n	%
Intramural	■	■
Mixed (intramural + others)	■	■

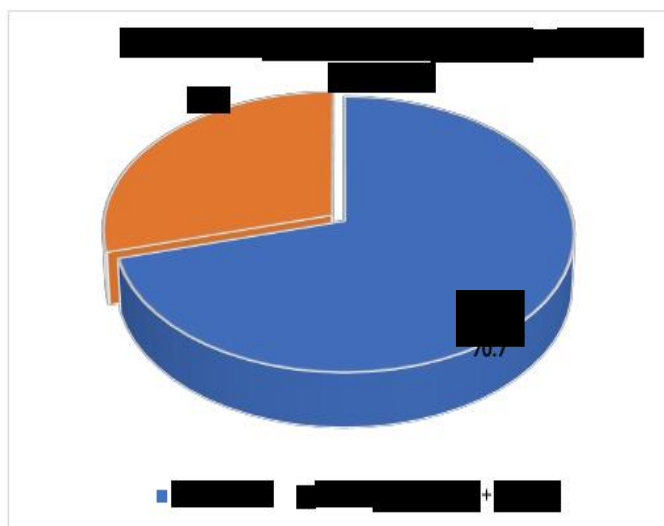
Graph 6. Distribution of Study Population According to Location of Fibroids

Table 7: Distribution of Fibroid Size Parameters

Parameter	Mean $\pm$ SD	Median	IQR
Diameter (cm)			
Volume (cm ³)			

Table 8: Comparison of Mean Fibroid Diameter According to Number of Fibroids

Category	Mean diameter (cm)	Test	t	df	p-value
Single	6.1 ± 1.6	[REDACTED]	[REDACTED]	[REDACTED]	0.062
Multiple	6.8 ± 1.9				

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Procedural Profile

Table 9: Procedural Characteristics of Uterine Artery Embolization

Parameter	n	%	Mean $\pm$ SD
Bilateral UAE	■	■	
Unilateral UAE	■	■	
Technical success	■	■	
Procedure time (min)	■	■	■
Hospital stay (days)	■	■	■

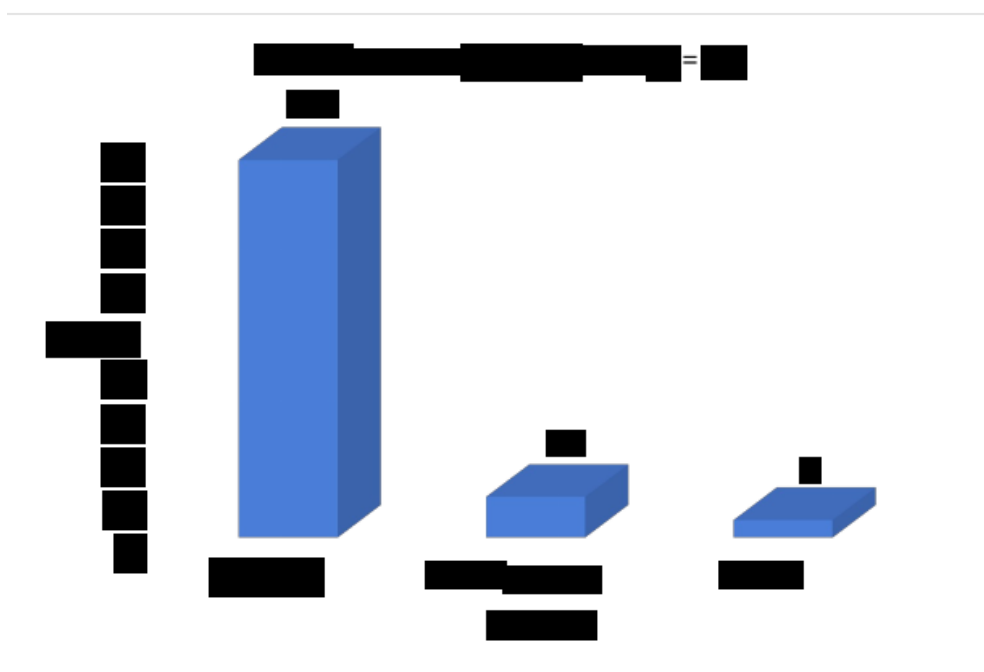
In the present study, bilateral uterine artery embolization (UAE) was performed in ■ patients (■%), while unilateral UAE was performed in ■ patients (■%). Technical success was achieved in ■ cases (■%). The mean procedure time was ■ $\pm$ ■ minutes, and the mean duration of hospital stay was ■ $\pm$ ■ days.

Aim: To study immediate and long-term outcomes of UAE

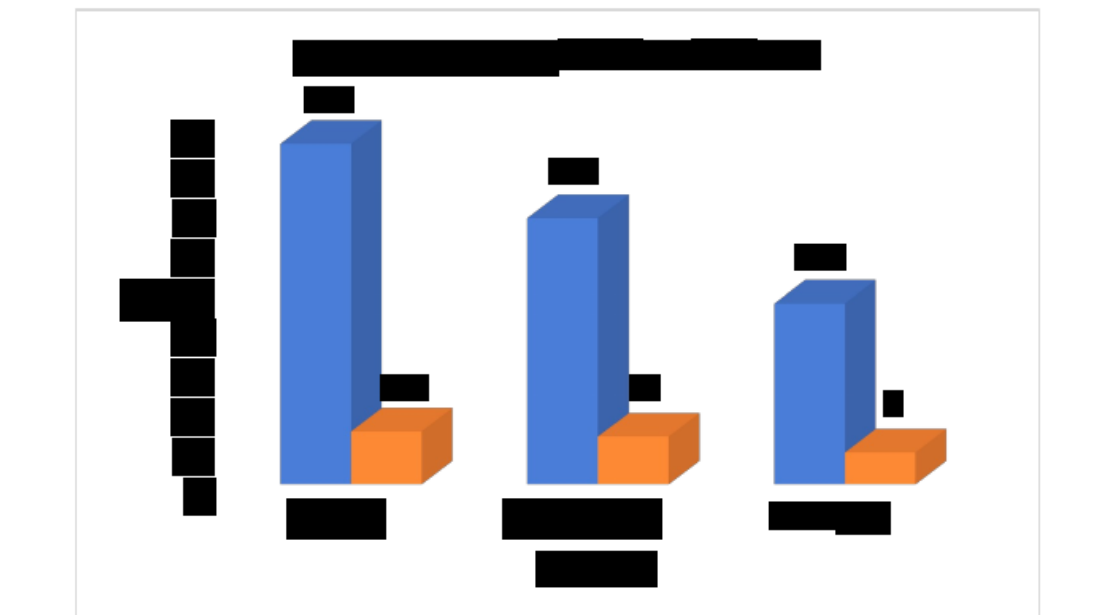
Table 10: Treatment Outcomes Following Uterine Artery Embolization

Outcome	n	%
Successful	11	88.5
Partial response	1	7.7
Failure	1	7.7

Graph 7. Treatment Outcomes Following Uterine Artery Embolization



Symptom	Baseline		6 months		Test	p-value
	n	%	n	%		
Bleeding	1	100	1	100	Mann-Whitney U test	0.000
Menorrhagia	1	100	1	100		
Pelvic pain	1	100	1	100		



[REDACTED]

Table 12: Comparison of Fibroid Volume at Baseline and 6 Months

Time	Mean $\pm$ SD	Median	IQR	Test	t	df	p-value
Baseline							
6 months							

To evaluate fibroid reduction

Table 13: Comparison of Fibroid Diameter at Baseline and 6 Months

Time	Mean $\pm$ SD	Median	IQR	Test	t	df	p-value
Baseline							
6 months							

Table 14: Comparison of Fibroid Volume at Baseline and 6 Months

Time	Mean $\pm$ SD	Median	IQR	Test	t	df	p-value
Baseline							
6 months							

[illegible]

Table 16: Comparison of Mean Percentage Reduction in Fibroid Volume According to Age Group

Age group	Mean reduction (%)	Test	F	df	p-value
<35 years					
35–45 years					
>45 years					

Complication	n	%
Pain	10	100
Fever	1	10
Nausea	10	100
Amenorrhea	1	10
Hematoma	1	10
Infection	1	10

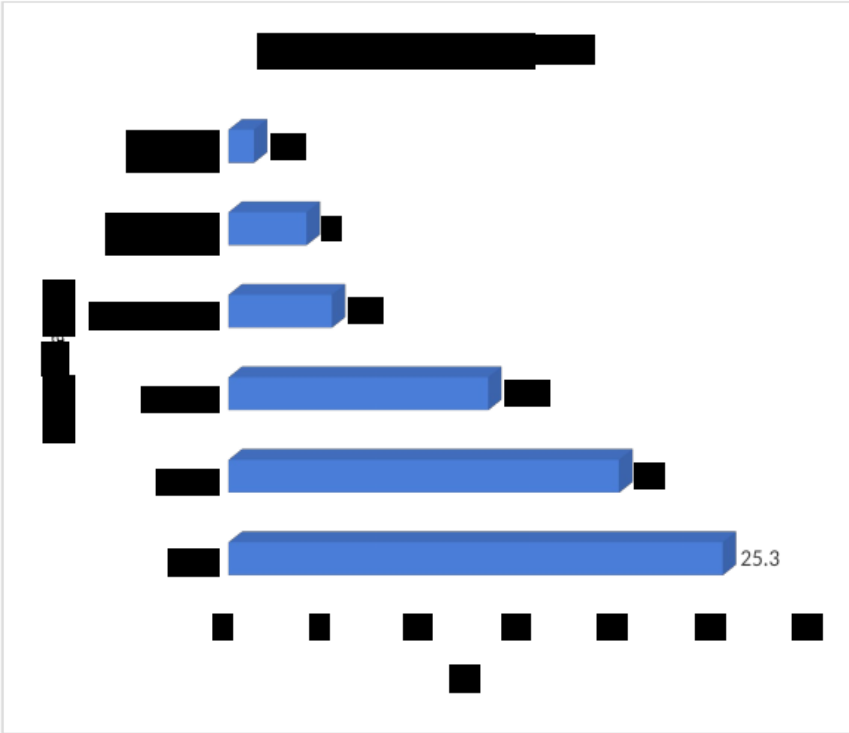


Table 18: Distribution of Complication Severity Following Uterine Artery Embolization

Severity	n	%
None	1	100
Minor	1	100
Major	1	100

Graph 11. Distribution of Complication Severity Following Uterine Artery Embolization

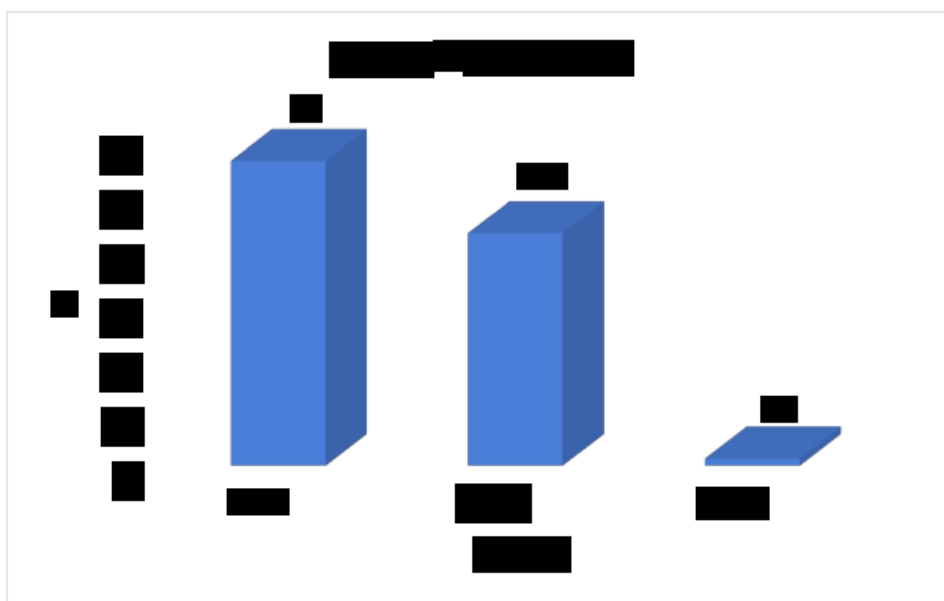
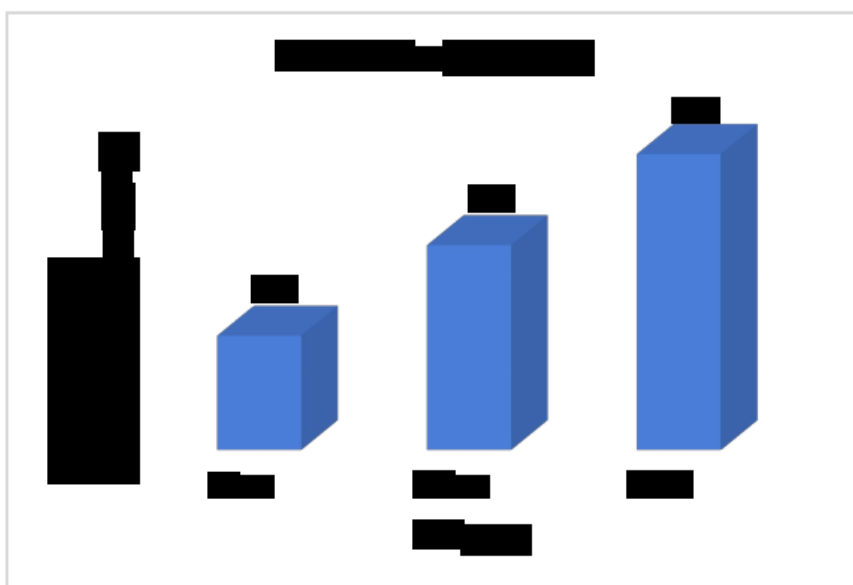


Table 19: Association Between Fibroid Size Group and Occurrence of Complications

Size group	Complication		Test	χ^2	df	p-value
	n	%				
<5 cm	1	100	Fisher's exact test	0.000	1	0.000
5–8 cm	1	100				
>8 cm	1	100				

Graph 12. Association Between Fibroid Size Group and Occurrence of Complications



The association between fibroid size group and occurrence of complications was statistically significant (p = 0.000). The chi-square test result was 0.000, and the degrees of freedom were 1. The p-value was 0.000.

DISCUSSION

DISCUSSION

The present study was conducted to evaluate the immediate and medium-term outcomes of uterine artery embolization (UAE) in the management of symptomatic uterine fibroids [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Age-wise Distribution of Study Population

In the present study, [REDACTED] women with symptomatic uterine fibroids underwent uterine artery embolization. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Distribution of Study Population According to Parity

In the present study, multiparous women formed the majority of patients undergoing uterine artery embolization for symptomatic fibroid, comprising █ patients (█%). Nulliparous women accounted for █ patients (█%), while primiparous women constituted █ patients (█%). █

[REDACTED]

█ evaluated women undergoing uterine artery embolization for symptomatic fibroids and provided comprehensive analyses of clinical and radiological outcomes; however, these studies did not report

[illegible]

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99

[REDACTED]

and pressure symptoms were common across reproductive-age women, indicating that symptom severity is not restricted to a single age category [11,43].

Distribution of Study Population According to Number of Fibroids

In the present study, multiple fibroids were more common than single fibroids.

[REDACTED]

studied [REDACTED] premenopausal women with symptomatic intramural fibroids and assessed dominant fibroid volume before and after UAE, which is relevant to radiological fibroid burden assessment [91].

Distribution of Study Population According to Location of Fibroids

In the present study, intramural fibroids were the predominant location,

[REDACTED]

[REDACTED] emphasized the importance of accurately documenting fibroid location on ultrasonography before treatment planning and reported intramural fibroids as the most frequently encountered subtype during standardized ultrasound assessment [74].

Distribution of Fibroid Size Parameters

In the present study, the mean fibroid diameter was [REDACTED] $\pm$ [REDACTED] cm, with a median

[REDACTED]

[REDACTED]

[REDACTED] reported that MRI provides reliable assessment of fibroid size and volume before and after uterine artery embolization, allowing objective evaluation of treatment response during follow-up [8].

Comparison of Mean Fibroid Diameter According to Number of Fibroids

In the present study, the mean fibroid diameter was [REDACTED] ± [REDACTED] cm among patients

[REDACTED]

[REDACTED]

Procedural Characteristics of Uterine Artery Embolization

In the present study, bilateral uterine artery embolization was performed in [REDACTED]

[REDACTED]

[REDACTED]. The present findings are comparable with Lumart et al. [REDACTED] who evaluated transradial UAE for symptomatic fibroids and reported high technical success with a favorable [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] similarly reported successful UAE in symptomatic fibroid patients, confirming the feasibility of the procedure as a uterus-preserving alternative [90].

Treatment Outcomes Following Uterine Artery Embolization

In the present study, a successful treatment outcome following uterine artery [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED], Lumart et al. (2023) demonstrated excellent technical and clinical success with transradial uterine artery embolization, with the majority of patients experiencing successful treatment without major adverse outcomes [77].

Comparison of Symptoms at Baseline and 12 Months Follow-up

In the present study, uterine artery embolization resulted in significant

[REDACTED]

[REDACTED]

[REDACTED] More recently, Janghorbani et al. (2025) reported that most women experienced substantial symptom relief following uterine artery embolization, with clinical improvement closely correlating with post-procedural imaging findings and reduction in fibroid burden [93].

Comparison of Fibroid Volume at Baseline and 12 Months

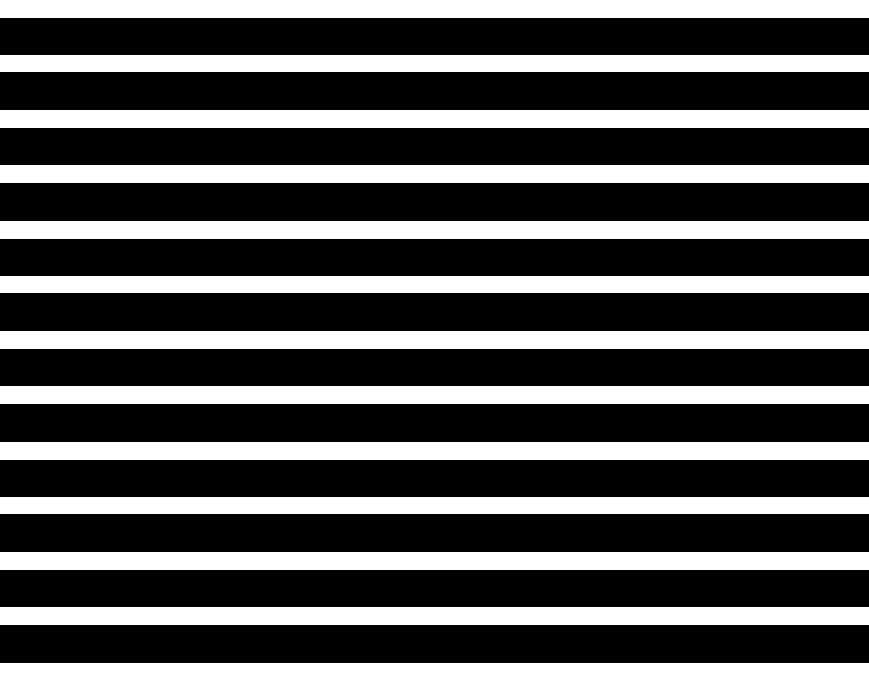
In the present study, the mean fibroid volume decreased significantly from [REDACTED]

[REDACTED]

Janghorbani et al. (2025) reported that post-embolization reduction in fibroid volume strongly correlated with successful clinical outcomes and symptom relief, further supporting volumetric assessment as a reliable indicator of treatment efficacy [93].

██████████ reported sustained reduction in fibroid size and continued clinical improvement during long-term follow-up after uterine artery embolization, ██████████
██████████
██████████
██████████
██████████

Distribution of Patients According to Percentage Reduction in Fibroid Volume at 12 Months



[REDACTED]

[REDACTED] Lumart et al. (2023) and Wang et al. (2024) reported favorable safety profiles after transradial and distal radial UAE, with low access-site morbidity, comparable to the low hematoma rate of [REDACTED]% observed in the present study[77,78] .

Distribution of Complications According to Severity

In the present study, [REDACTED] patients ([REDACTED]%) experienced no complications following uterine artery embolization, while [REDACTED] patients ([REDACTED]%) developed minor complications, and only [REDACTED] patient ([REDACTED]%) experienced a major complication. [REDACTED]

[REDACTED]

embolization and that its severity may be related to the degree of fibroid ischemia after successful embolization [86].

Strengths of the Study

1. The study specifically evaluated the immediate and 12-month outcomes of uterine artery embolization (UAE) in women with symptomatic uterine fibroids, providing comprehensive assessment of treatment efficacy.

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Limitations of the Study

1. The study was conducted at a single tertiary care center, which may limit the generalizability of the findings to other healthcare settings.

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

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[REDACTED]

[REDACTED]

[REDACTED]

CONCLUSION

CONCLUSION

The present study evaluated the immediate and six-month outcomes of uterine artery embolization (UAE) in 75 women with symptomatic uterine fibroids.

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

SUMMARY

SUMMARY

The present study was undertaken to evaluate the immediate and six-month outcomes of uterine artery embolization (UAE) in the management of symptomatic uterine fibroids. A total of 75 women with symptomatic fibroids underwent UAE and were evaluated clinically and radiologically. [REDACTED]

[REDACTED]

[REDACTED]

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BIBLIOGRAPHY

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- [REDACTED]
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- [REDACTED]
- [REDACTED]
104. Farris M, Bastianelli C, Rosato E, Brosens I, Benagiano G. Uterine fibroids: an update on current and emerging medical treatment options. *Ther Clin Risk Manag.* 2019;15:157-178.

ANNEXURES

ANNEXURES-I

ANNEXURES-II

ANNEXURES-III.
LIST OF ABBREVIATIONS

- UAE- Uterine Artery Embolization
- USG- Ultrasonography
- MRI- Magnetic Resonance Imaging
- IQR- Interquartile Range
- cm- Centimetre
- cm²- Square Centimetre
- cm³- Cubic Centimetre
- min- Minutes
- df- Degrees of Freedom
- χ^2 - Chi-square Test
- ANOVA- Analysis of Variance
- p- Probability Value
- SD- Standard Deviation
- n- Number of Patients (Sample Size)
- %- Percentage
- HMB – Heavy Menstrual Bleeding
- QoL – Quality of Life
- UFE – Uterine Fibroid Embolization
- DSA – Digital Subtraction Angiography
- CT – Computed Tomography
- IV – Intravenous
- OPD – Outpatient Department
- IEC – Institutional Ethics Committee

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