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Current trends in treatment of uterine fibroids. A Perspective Review of Recent Literature

Kinga Bylica

Student of medicine at the Faculty of Medical Sciences of the Silesian Medical University in Katowice-Ligota, Silesia, Poland ul. Medyków 18 40-752 Katowice https://orcid.org/0009-0000-8884-7799

bylicakinga77@gmail.com

Corresponding author:

Kinga Bylica

Student of medicine at the Faculty of Medical Sciences of the Silesian Medical University in Katowice-Ligota, Silesia, Poland ul. Medyków 18 40-752 Katowice https://orcid.org/0009-0000-8884-7799

bylicakinga77@gmail.com

Łukasz Dylewicz

Doctor of Medicine, Szpital Murcki Sp. z o.o., Sokołowskiego 2, 40-749 Katowice, Poland

https://orcid.org/0009-0007-4929-1063

lukas.dylewicz@gmail.com

Joanna Brzoza

Doctor of Medicine, Leszek Giec Upper-Silesian Medical Centre of the Medical University of Silesia in Katowice, Ziołowa 45-47, 40-635 Katowice, Poland.

https://orcid.org/0009-0003-1076-5461

jbrzozaaa@gmail.com

Jakub Rudzki

Doctor of Medicine, Andrzej Mielęcki Independent Public Clinical Hospital in Katowice, Francuska 20/24, 40-027 Katowice, Poland

https://orcid.org/0000-0003-3936-5683

jkrudzki2@gmail.com

Wojciech Warmuz

Doctor of Dental Medicine, Independent Author, Kościuszki 17b, 34-130 Kalwaria Zebrzydowska, Poland

https://orcid.org/0009-0001-2182-4100

warwo@onet.pl

Ewa Wystalska

Student of medicine at the Faculty of Medical Sciences of the Silesian Medical University in Katowice-Ligota, Silesia, Poland ul. Medyków 18 40-752 Katowice

https://orcid.org/0009-0003-1197-9189

ewa.wystalska1@gmail.com

Kacper Solarz

Doctor of Medicine, Leszek Giec Upper-Silesian Medical Centre of the Medical University of Silesia in Katowice, Ziołowa 45-47, 40-635 Katowice, Poland.

https://orcid.org/0009-0000-7393-6529

kacpersolarz@gmail.com

Natalia Czołpińska

Student of medicine at the Faculty of Medical Sciences of the Silesian Medical University in Katowice-Ligota, Silesia, Poland ul. Medyków 18 40-752 Katowice

https://orcid.org/0009-0007-9351-9723

S88500@365.sum.edu.pl

Zuzanna Kata

Doctor of Dental Medicine, Independent Author, Piotra Skargi 6, 40-086. Katowice, Poland

https://orcid.org/0009-0008-5792-5561

zuzannakata2@gmail.com

Jakub Andrzejewicz

Doctor of Medicine, Health Care Complex in Dąbrowa Tarnowska (ZOZ DT), Szpitalna 1, 33-200 Dąbrowa Tarnowska, Poland

ORCID: https://orcid.org/0009-0006-3420-5268

E-mail: andrzejewiczjakub@gmail.com

ABSTRACT

INTRODUCTION

Uterine fibroids, or leiomyomas, are the most prevalent benign tumors in the female reproductive tract, affecting up to 70–80% of women by age 50. These tumors, which are composed of smooth muscle and connective tissue, often arise during the reproductive years and are influenced by a combination of genetic and hormonal factors. While many fibroids are asymptomatic, a significant number of women experience debilitating symptoms such as heavy menstrual bleeding, pelvic pressure, pain, and infertility, necessitating the need for effective treatment options. Historically, hysterectomy was the primary treatment; however, the desire for fertility preservation and advancements in medical technology have led to the emergence of minimally invasive and non-surgical treatment alternatives, including myomectomy, uterine artery embolization (UAE), and pharmacological therapies. Each treatment modality presents unique benefits and risks and should be tailored to individual patient factors, such as fibroid characteristics and reproductive goals. Despite the evolution of treatment options, awareness remains limited among patients, underscoring the need for enhanced patient education and shared decision-making in fibroid management. This review synthesizes current literature on the efficacy of various treatment strategies for uterine fibroids, highlighting the importance of personalized, evidence-based approaches to improve clinical outcomes and quality of life for women affected by this condition.

METHODS

The methods implemented in this perspective review aimed to provide a comprehensive synthesis of treatment modalities for symptomatic uterine fibroids, focusing on surgical

techniques, pharmacological interventions, and non-invasive approaches. The literature search was meticulously conducted across three prominent databases: PubMed, Scopus, and Google Scholar, utilizing specific keywords such as "uterine fibroids," "treatment," "myomectomy," "hysterectomy," "uterine artery embolization," and "pharmacotherapy." The time frame for included studies spanned from 2020, to 2026, ensuring that the findings reflect the most recent advancements and strategies in the field. No studies are excluded from the review.

AIM OF THE STUDY

This perspective review summarizes recent literature on current treatment options and trends, focusing on myomectomy, hysterectomy, embolization, and non-invasive techniques of uterine fibroids.

CONCLUSION

The management of uterine fibroids has significantly advanced, focusing on individualized, patient-centered care that prioritizes fertility preservation and quality of life. Myomectomy, particularly via laparoscopic and robotic-assisted techniques, remains the preferred surgical intervention for women wishing to maintain reproductive capability, offering favorable outcomes and minimal recovery times. Hysterectomy is reserved for those with severe symptoms who have completed childbearing, given its irreversible nature. Non-surgical alternatives such as Uterine Artery Embolization (UAE) and High-Intensity Focused Ultrasound (HIFU) provide effective options for symptom relief while sparing the uterus. However, their impact on future fertility requires careful consideration during the counseling process. Emerging medical therapies, including gonadotropin-releasing hormone (GnRH) antagonists and selective progesterone receptor modulators (SPRMs), expand the non-invasive treatment landscape, catering to those averse to surgical interventions.

Despite these advancements, challenges such as recurrence rates and the safety profiles of new medications remain. There is a critical need for continued research on long-term outcomes and standardized treatment protocols. Ultimately, an integrated, multidisciplinary approach is essential to optimize outcomes for women with uterine fibroids, ensuring informed and personalized care.

KEYWORDS: "uterine fibroids," "myomectomy," "hysterectomy," "uterine artery embolization."

INTRODUCTION AND BACKGROUND

Uterine fibroids, or leiomyomas, are the most prevalent benign tumors of the female reproductive tract, affecting up to 70–80% of women by the age of 50 [1,2]. These tumors, composed of smooth muscle cells and connective tissue, often develop during the reproductive years and are influenced by hormonal and genetic factors. While many fibroids remain asymptomatic, a significant proportion of women experience symptoms such as heavy menstrual bleeding, pelvic pressure, pain, and infertility [3,4]. These symptoms not only impair quality of life but also lead to a high demand for effective and individualized treatment options.

Historically, management strategies were largely surgical, with hysterectomy being the most definitive treatment. However, the desire to preserve fertility, reduce recovery times, and minimize surgical complications has driven substantial progress in the development and refinement of both minimally invasive surgical and non-surgical options [5,6,7]. Treatment decisions are now increasingly tailored, considering factors such as fibroid size, location, number, symptom severity, and reproductive goals [1,8].

Among the surgical options, myomectomy remains the preferred uterus-preserving approach for women desiring future fertility. Myomectomy can be performed via abdominal, laparoscopic, robotic-assisted, or hysteroscopic techniques, each with specific indications and benefits [8,9,10]. Minimally invasive methods—particularly laparoscopic and hysteroscopic myomectomy—are associated with less postoperative pain, reduced hospital stays, and faster recovery compared to open surgery [11,12]. Nevertheless, challenges remain, including longer operative times and the controversial use of morcellation, which may pose risks of spreading undiagnosed malignancies [13,14]. Hysterectomy, involving the complete removal of the uterus, remains a definitive solution for symptomatic fibroids in women who no longer wish to preserve fertility. Advancements in laparoscopic and robotic techniques have improved safety and recovery outcomes, yet the irreversible nature of this approach requires careful patient counseling [15]. Non-surgical treatments have gained increasing attention. Uterine artery embolization (UAE) is a widely used, minimally invasive technique that occludes the fibroid’s blood supply, leading to ischemia and shrinkage. UAE has shown comparable outcomes to surgery in symptom relief with the added benefit of reduced recovery times, although concerns remain regarding fertility preservation [16,17,18]. Another promising non-invasive therapy is

magnetic resonance-guided focused ultrasound surgery (MRgFUS), which thermally ablates fibroid tissue and has been associated with significant symptom relief and low complication rates [19,20,21].

Additionally, pharmacological treatment are playing an increasingly prominent role in fibroid management. Gonadotropin-releasing hormone (GnRH) agonists, selective progesterone receptor modulators (SPRMs), and newer agents such as ulipristal acetate (UPA) offer non-surgical alternatives for symptom control and pre-surgical fibroid shrinkage [22,23,24]. UPA, in particular, has demonstrated efficacy in reducing fibroid size and controlling bleeding, while preserving fertility in many cases [25,26,27].

Despite these advancements, many women remain unaware of the full range of available treatments, with studies reporting a common misconception that hysterectomy is the only solution [28]. Thus, patient education and shared decision-making are critical in the modern approach to fibroid management.

This review aims to synthesize the current literature on treatment trends for uterine fibroids, including surgical, minimally invasive, non-invasive, and pharmacologic options. By providing a comprehensive overview, this article underscores the importance of individualized, evidence-based care in improving outcomes and quality of life for women with uterine fibroids.

MATERIALS AND METHODS

This perspective review synthesizes current treatment modalities for uterine fibroids based on the latest literature available from 2020 to 2025. The focus was directed toward identifying, categorizing, and evaluating various treatment methods employed for managing symptomatic uterine fibroids, with a particular emphasis on surgical techniques, pharmacological interventions, and non-invasive approaches. The selection process for included studies involved a comprehensive search through PubMed, Scopus, and Google Scholar using keywords such as "uterine fibroids," "treatment," "myomectomy," "hysterectomy," "uterine artery embolization," and "pharmacotherapy" from 01.01.2020 to 15.08.2025.

In assessing surgical interventions, studies addressing myomectomy techniques—including abdominal, laparoscopic, and hysteroscopic approaches—were evaluated for their effectiveness and associated complications [29,30]. Additionally, the utility of hysterectomy as a definitive

treatment for larger fibroids was explored, including emerging approaches such as robotic-assisted hysterectomy [30,31].

Pharmacological approaches, particularly hormonal therapies and their influence on fibroid size and symptoms, were synthesized from recent trials detailing medication regimens involving GnRH agonists and other hormonal modulators [32]. Acchiardo et al. detail the effects of a treatment regimen involving Relugolix, a GnRH antagonist. This medication functions by inhibiting gonadotropin-releasing hormone, consequently reducing the production of estrogen and progesterone, hormones that are critical to fibroid growth. The authors reported significant reductions in menstrual bleeding while preserving bone mineral density among women treated for uterine fibroids [33]. Additionally, Afaq et al. emphasizes the benefits of using ulipristal acetate, an anti-progesterone, which has demonstrated effectiveness in controlling fibroid-related bleeding without augmenting the risk of thrombosis. Their review suggests that ulipristal acetate can significantly decrease uterine volume, providing substantial symptom relief [34]. Such findings align well with the evidence presented by Zhang et al., illustrating a consistent outcome regarding the positive influence of hormonal therapies on fibroid size and symptoms.

Furthermore, the review discussed non-invasive methods, particularly focusing on Uterine Artery Embolization (UAE) and focused ultrasound (FUS) therapy, examining emerging evidence regarding their efficacy and safety profiles [35,36].

For the purpose of systematic comparison, the findings from studies highlighting cost-effectiveness and treatment preferences among patients were also discussed [37,38]. The impact of demographic factors—such as socioeconomic status and patient awareness regarding fibroid management options—was also considered to contextualize treatment choices [38,39]. Relevant clinical guidelines and best practice recommendations provided by authoritative organizations in gynecologic surgery were incorporated to enhance the methodological rigor of treatment assessments [29].

Each section of the review is supported by comprehensive data analysis and clinical outcome assessment wherever available. The gathered literature was subjected to critical appraisal, focusing on study design, sample sizes, methodologies, and outcomes to ensure a balanced interpretation and synthesis of current treatment strategies for uterine fibroids.

RESULTS

This comprehensive review synthesizes recent advancements in the treatment of uterine fibroids, highlighting the evolving roles of surgical, minimally invasive, interventional radiologic, and medical therapies. The analysis emphasizes efficacy, safety, fertility preservation, quality of life, and recurrence, providing an up-to-date perspective on optimal management strategies.

1. Surgical Treatments: Myomectomy and Hysterectomy

Myomectomy remains the cornerstone for women seeking fertility preservation. It is performed via various approaches—abdominal (AM), laparoscopic (LM), hysteroscopic, and robotic-assisted myomectomy (RAM). Minimally invasive techniques, particularly LM and RAM, demonstrate superior recovery profiles including reduced intraoperative blood loss, shorter hospital stays, and fewer complications compared to AM [40,41,42]. RAM offers enhanced precision for complex fibroids but its higher cost limits widespread use [43,44]. Recurrence rates across techniques are similar if complete resection is achieved but are slightly higher in patients with multiple fibroids [45,46]. Fertility outcomes post-LM and RAM are favorable, with high rates of successful pregnancies and live births [47,48]. The main disadvantages include perioperative mortality and risk of recurrence [49].

Hysterectomy, while definitive and guaranteeing fibroid eradication with negligible recurrence, is associated with irreversible fertility loss and potential long-term hormonal effects, especially when performed premenopausally [50,51]. It remains an option primarily for women with severe symptoms and no fertility desire [52].

2. Minimally Invasive and Interventional Radiologic Treatments

Uterine Artery Embolization (UAE) has become a uterus-sparing alternative for symptomatic fibroids, achieving fibroid volume reductions of 30–60% and symptom relief rates exceeding 90% within months [1,53]. UAE is outpatient, involves lower complication rates, and allows rapid recovery [3,54]. However, fertility outcomes remain less favorable compared to myomectomy, with concerns about reduced uterine perfusion and obstetric complications necessitating individualized counseling [55,56,57].

High-Intensity Focused Ultrasound (HIFU) presents a fully non-invasive, fertility-sparing option employing ultrasound waves to thermally ablate fibroids [58,59]. It offers substantial symptom control, shorter recovery times, and minimal complications, though its applicability is limited by fibroid size, location, and operator expertise [10,50]. Long-term efficacy data remain limited, and standardized treatment protocols are needed [3,60].

3. Emerging Medical Therapies

Hormonal therapies, especially gonadotropin-releasing hormone (GnRH) agonists and antagonists, have traditionally been used for preoperative fibroid shrinkage or symptom control. Recently, oral selective progesterone receptor modulators (SPRMs) such as ulipristal acetate (UPA) and GnRH antagonists like relugolix have shown promise [1,61]. UPA effectively reduces fibroid size (21–36%) and controls bleeding with fewer menopausal side effects compared to GnRH analogs [62,63]. However, rare cases of hepatotoxicity warrant cautious use and monitoring [23,64]. These agents provide important non-invasive options for women wishing to avoid surgery or preserve fertility.

4. Quality of Life, Fertility, and Recurrence

All treatment modalities contribute to significant improvements in health-related quality of life (HRQoL), with laparoscopic and robotic techniques showing the fastest recovery and highest patient satisfaction [46]. Fertility preservation is optimized with LM and RAM, whereas abdominal myomectomy and embolization pose higher reproductive risks [43,65]. Recurrence rates of 10–20% persist across treatments, emphasizing the importance of surgical completeness and tailored long-term management [25,66,67].

5. Complications and Surgical Outcomes

Minimally invasive myomectomies (LM, RAM) have lower complication rates (2–10%) compared to mini-laparotomy myomectomy (10–15%), with most adverse events being minor and self-limited [68]. RAM, while more precise, may involve longer operative times but enhances ergonomics and patient satisfaction [69]. Medical therapy with UPA is generally well tolerated during short courses [63].

DISCUSSION

In examining the current trends in treating uterine fibroids, it is imperative to evaluate the effectiveness of the various approaches, particularly surgical interventions such as myomectomy, hysterectomy, and advances in minimally invasive techniques like uterine artery embolization (UAE) and high-intensity focused ultrasound (HIFU). These strategies exhibit distinct differences in recovery profiles, recurrence rates, fertility outcomes, and overall patient satisfaction.

Surgical interventions, particularly myomectomy, continue to play a pivotal role in uterine fibroid management, especially for women desiring fertility preservation. Myomectomy can be performed via laparoscopic, robotic-assisted, or abdominal approaches. Recent literature emphasizes that laparoscopic myomectomy (LM) is superior to traditional abdominal myomectomy (AM) due to its minimally invasive nature, resulting in less blood loss, shorter recovery times, and lower complication rates [70,71] . For instance, a study showed that laparoscopic continuous seromuscular suturing techniques during this procedure yield similar or improved outcomes compared to conventional methods [71]. While the recurrence rates for myomectomy range from 10% to 20%, as emphasized in recent meta-analyses, the efficacy in preserving fertility remains a significant advantage over hysterectomy, which, although definitive in eliminating fibroids, results in irreversible fertility loss [45,47].

Minimally invasive procedures like UAE and HIFU present alternative avenues that further enrich therapeutic options for symptomatic fibroids. UAE provides a uterus-sparing option with high satisfaction rates and low complication profiles, achieving significant symptom relief; however, its fertility outcomes are less favorable, raising concerns about reduced uterine perfusion and associated obstetric complications [45]. On the other hand, HIFU has shown promising results as a non-invasive treatment option that minimizes tissue trauma, enabling quicker recoveries with sustained symptom relief in a notable percentage of patients. However, HIFU's applicability is highly dependent on fibroid characteristics, limiting its universal applicability [45,72]

Emerging medical therapies such as selective progesterone receptor modulators (SPRMs) also reflect advancements in treatment paradigms, providing effective shrinkage of fibroids with fewer adverse effects compared to traditional hormonal therapies, specifically GnRH agonists

[73]. These non-surgical options have gained acceptance among women wishing to avoid surgical interventions while still managing symptoms effectively. Individualized counseling becomes paramount as these treatments carry varying implications for fertility and recurrence, necessitating comprehensive pre-treatment discussions [74].

Ultimately, a holistic assessment of treatment modalities highlights the advancements in managing uterine fibroids. Techniques such as laparoscopic myomectomy are increasingly validated for their safety and efficacy, particularly for women desiring to maintain reproductive potential [47,71,75]. UAE and HIFU, while not offering the same fertility-preserving benefits, represent significant progress for women preferring minimally invasive therapies devoid of major surgical interventions. Ongoing research and long-term studies are essential to consolidate data on recurrence and quality of life outcomes, which remain critical determinants in guiding treatment strategies for uterine fibroids.

CONCLUSIONS

The management of uterine fibroids has undergone significant transformation over the past decade, driven by advances in surgical technology, interventional radiology, and medical therapeutics. Contemporary approaches prioritize fertility preservation, improved quality of life, and minimally invasive solutions, allowing clinicians to tailor interventions to each patient's clinical needs and reproductive goals.

Myomectomy, particularly via laparoscopic and robotic-assisted techniques, remains the mainstay for women wishing to maintain fertility, offering excellent reproductive outcomes and favorable recovery profiles. Hysterectomy, while definitive, is best reserved for those with severe or refractory symptoms who have completed childbearing.

Uterine artery embolization and high-intensity focused ultrasound represent valuable alternatives for patients seeking uterus-sparing, non-surgical options, though careful patient selection and counseling are essential—especially in the context of family planning. Emerging medical therapies, including GnRH antagonists and SPRM, expand the armamentarium for symptom control and fibroid size reduction, particularly in patients unsuitable for or averse to invasive procedures.

Despite these advancements, challenges remain. Recurrence rates, fertility implications of non-surgical interventions, cost barriers to robotic surgery, and concerns around medication safety (e.g., hepatotoxicity with ulipristal acetate) underscore the need for continued innovation and rigorous comparative research. Long-term outcomes and standardized treatment pathways must be further explored through large-scale, prospective trials.

Ultimately, a multidisciplinary, patient-centered approach—encompassing gynecology, reproductive endocrinology, interventional radiology, and patient education—is essential for optimizing outcomes and ensuring informed, individualized care for women with uterine fibroids.

AUTHOR CONTRIBUTIONS

Conceptualization: Kinga Bylica , Zuzanna Kata

Methodology: Joanna Brzoza, Łukasz Dylewicz , Jakub Rudzki,

Software: Łukasz Dylewicz, Wojciech Warmuz, Natalia Czołpińska

Check: Joanna Brzoza, Wojciech Warmuz, Zuzanna Kata

Formal analysis: Łukasz Dylewicz, Natalia Czołpińska

Investigation: Kinga Bylica , Jakub Rudzki, Natalia Czołpińska

Resources: Kinga Bylica, Kacper Solarz, Zuzanna Kata

Data curation: Kinga Bylica, Ewa Wystalska, Jakub Andrzejewicz

Writing - rough preparation: Kinga Bylica, Wojciech Warmuz

Writing - review and editing: Jakub Rudzki, Ewa Wystalska

Visualization: Kinga Bylica, Ewa Wystalska, Natalia Czołpińska

Supervision: Joanna Brzoza, Kinga Bylica, Kacper Solarz, Jakub Andrzejewicz

Project administration: Joanna Brzoza, Kinga Bylica, Kacper Solarz, jakub Andrzejewicz

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