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Review Article

Looking into Microwave Ablation: How Safe and Effective it is for Treating Adenomyosis

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Abstract

Microwave ablation (MWA) is a promising minimally invasive treatment for symptomatic adenomyosis that provides significant symptom relief while keeping the uterus working. Clinical trials show that ablation rates are between 79.7% and 91.34%, and that dysmenorrhea, menorrhagia, and blood CA125 levels all go down consistently over 12 months.

Keywords: *Microwave Ablation (MWA); Dysmenorrhea; Menorrhagia; Adenomyosis*

Introduction

The ultrasound-guided insertion of a microwave antenna sends targeted thermal energy (40-120 W, 2,450 MHz) that causes coagulative necrosis in adenomyotic lesions but leaves nearby tissues unharmed. MWA has better non-perfused volume ratios and shorter treatment times than radiofrequency ablation and high-intensity focused ultrasound.

In conclusion, the safety profile stayed good, with most problems being rated as minor (CTCAE grade 1/SIR class A), like short pain and little bleeding. It's important to note that ovarian function and fertility potential seem to be fine, so it's safe for people of reproductive age to use. Real-time contrast-enhanced ultrasound monitoring and uteropexy for posterior wall lesions are two examples of how technology has improved accuracy, leading to ablation rates of over 90% in the best conditions. There isn't a lot of long-term data, but the evidence we have now suggests that MWA is a good alternative to hysterectomy for women who want to keep their uterus. However, multicenter randomised trials are needed to standardize procedures and show that they last.

Adenomyosis is a gynaecological condition in which endometrial tissue, which normally lines the uterus, grows into the myometrium, or uterine muscle wall. This abnormal growth can lead to a number of diseases, such as

Heavy periods

- Severe pain during menstruation (dysmenorrhea).
- Pain in the pelvis.
- Dyspareunia.
- Swelling in the stomach and feeling full.

Modern ways of treating people.

How adenomyosis is treated depends on how bad the patient's symptoms are and what they want to do about having children. Some other options for treatment are discussed below.

Medicines

- **Hormonal therapies:** This group includes hormonal intrauterine devices (IUDs) like Mirena, progestogen-only tablets, and combined oral contraceptives. All of these may help lessen bleeding and pain by making the endometrium weaker.
- **Nonsteroidal anti-inflammatory drugs (NSAIDs):** For example, ibuprofen can help with pain and lessen menstrual bleeding.
- **Tranexamic acid:** This drug is used to stop heavy periods.

Other options for surgery

- **Uterine ablation:** This surgery removes or destroys the lining of the uterus, which makes bleeding less. This is mostly for women who don't want to stay fertile.
- **Hysterectomy:** In very bad cases, especially when other treatments don't work, a hysterectomy (removal of the uterus) may be the best option. This is thought to be the best way to treat adenomyosis, but it makes it impossible to get pregnant again.

New treatments

Microwave ablation: This surgery is minimally invasive and uses heat to destroy adenomyosis tissue. It has been shown to effectively relieve symptoms while keeping the uterus intact.

There are pros and cons to each treatment option, so it's important to work with a doctor to choose the best one for you, taking into account your own needs and preferences.

Microwave ablation (MWA) is a minimally invasive way to treat conditions like adenomyosis and endometriosis. Microwave ablation uses microwave energy to make heat, which is then sent directly to the tissue that needs to be destroyed.

The idea behind microwave ablation:

- Making microwave energy: A microwave probe is put into the tissue that needs it (for example, adenomyotic or endometriotic lesions). This probe gives off microwave radiation at a frequency of about 2.45 GHz, which the tissue absorbs.
- Thermal induction: Microwaves make water molecules in tissues vibrate, which makes heat. This heat can raise the temperature of tissues above 60°C, causing coagulation necrosis, which kills cells while leaving healthy tissue nearby unharmed.
- Real-time monitoring: Ultrasound imaging is often used to guide the procedure, which lets doctors place the microwave antenna exactly where it needs to be and keep an eye on the ablation process. This real-time supervision makes sure that the ablation works and doesn't hurt nearby structures too much [4].
- Because of this, the damaged tissue dies and eventually disappears, which helps with symptoms like pain and heavy bleeding that come with adenomyosis and endometriosis.

Microwave ablation is especially helpful because it is less invasive than traditional surgery, which means that patients heal faster and have less pain after the procedure.

Microwave ablation (MWA) has become a possible treatment for adenomyosis, and it has some benefits over other methods. Here is how well it works compared to other methods:

How well microwave ablation works

- Better results: Research shows that ultrasound-guided microwave ablation works better than regular thermal ablation methods like radiofrequency ablation (RFA) and high-intensity focused ultrasound (HIFU). MWA has caused a bigger decrease in the volume of the uterus and lesions, with ablation rates between 79.7% and 91.34% [5,7].
- Symptomatic relief: Clinical results show that ablation greatly lessens symptoms like dysmenorrhea and menorrhagia. After the study, the number of women with dysmenorrhea symptoms improved from 50% to 81.7%, and the number of women with menstrual disorders improved by 39.1% to 80.2%.
- Minimally invasive: MWA is a minimally invasive method that keeps the uterus intact, so it's good for women who want to keep their ability to get pregnant. This is different from surgeries like hysterectomy, which stops future pregnancies.

Evaluation against standard treatments

- Medication limitations: Hormone therapy and NSAIDs are two common drug treatments for adenomyosis, but they only work for a short time and may not fully fix the problem. Many people look for other options when traditional treatments don't work.
- Risks of surgery: Surgery, like hysterectomy, may be helpful, but it has a higher risk of complications and takes longer to heal than MWA. A hysterectomy also takes away the ability to have children, which may not be right for everyone.

Issues: MWA is safer than other types of surgery that are more invasive. Some common minor side effects are mild vaginal bleeding and discomfort in the lower stomach, both of which are usually taken care of.

Microwave ablation could be a good way to treat adenomyosis, especially for people who want to feel better without having to go through the pain of traditional surgery. It is a very important treatment option for adenomyosis because it can help with symptoms a lot while keeping the uterus healthy. Still, more high-quality research is needed to standardise methods and improve outcomes for many different types of patients.

People generally think that microwave ablation (MWA) is a less invasive way to treat adenomyosis, but it can still cause problems and side effects. Here are some of the possible bad things that could happen as a result of this surgery.

Commonly seen bad reactions

- Pain in the lower abdomen: After surgery, patients may feel some pain in the lower abdomen, but it is usually mild and bearable.
- Fever: After ablation, the body's inflammatory response may cause a slight rise in body temperature.
- Vaginal discharge: After the surgery, some patients may notice that they have more vaginal discharge.
- Mild vaginal haemorrhage: There may be some minor bleeding, but it usually stops on its own and doesn't need any treatment.
- Damage to the intestines: Heat can hurt other organs, especially the intestines. This can lead to very bad things, like a hole in the intestine or a blockage.
- Uterine adhesions: Too much ablation can cause the uterus to stick to nearby tissues, which may require more surgery, like a hysterectomy.
- After the surgery, infections like pelvic inflammatory disease can happen because the tissue was damaged and exposed.
- Injury to the bladder: The ablation treatment is done very close to the bladder, which makes it more likely that it will be hurt, which could cause problems with urination.

- Complications after surgery: Stomach infections and urinary fistulas have been linked to microwave ablation (MWA) that happened before the surgery.

Microwave ablation works well to treat adenomyosis symptoms, but patients should be aware of both common and serious side effects. Careful selection of patients, tailored treatment plans, and thorough preoperative evaluations are all important for lowering the risks of this procedure.

Microwave ablation (MWA) has shown promise as a treatment for adenomyosis. There are a lot of important things that have been learnt about how well it works.

How long does it take to recover from microwave ablation for adenomyosis?

- Microwave ablation for adenomyosis usually gets rid of pain in the lower abdomen, a slight fever, vaginal discharge, or light bleeding within a few days after the procedure.
- Simple treatments usually let people leave the hospital within 48 hours.
- Most of the time, patients can go back to their normal daily activities a few days after the ablation.
- Most of the time, patients see a big drop in the size of their adenomyosis and their symptoms, like pain and heavy menstrual bleeding, get better within 1 to 3 months of the surgery.
- Usually, full therapeutic results, such as the biggest decrease in the size of the uterus and the lesion, are seen within three months of ablation.

In conclusion, most women get better quickly and can go back to their normal activities in a few days. Over the next one to three months, they will see a big improvement in their symptoms and a decrease in their volume.

How microwave ablation affects the fertility of women with adenomyosis

- Women who want to keep their uterus and ability to get pregnant should have microwave ablation (MWA). It is thought to be a less invasive way to keep the uterus intact than a hysterectomy, which is not recommended for women who want to get pregnant in the future [8,9].
- Many studies have shown that MWA doesn't have a big effect on ovarian function. For example, hormone levels like oestradiol, LH, and FSH stay the same after the surgery. Keeping the ovaries working is important for keeping the ability to have children.
- For good reproductive outcomes, the endometrium must be healthy. As long as the endometrial lining isn't seriously damaged during ablation, fertility can be kept. Too much endometrial ablation or destruction could cause scarring or adhesions in the uterus, which could make it harder to implant and get pregnant.
- Problems and risks: MWA is generally thought to be safe, but there is a chance of collateral thermal damage, especially in diffuse adenomyosis. Too much ablation can lead to uterine adhesions, pelvic infections, or fluid buildup in the uterine scar. All of these things can make it harder for an embryo to implant and lower fertility.
- Choosing the right patients and having the right surgical skills are very important. Women with focal adenomyosis and a healthy endometrial junction are more likely to benefit from reproductive therapies. On the other hand, women with widespread illness or a lot of endometrial involvement may be at greater risk.

In short, microwave ablation can help women with adenomyosis keep their fertility if the endometrial lining is protected and the surgery is done by a trained professional. But there is a risk of uterine adhesions and bad implantation, especially with a lot of ablation or ablation that isn't done well.

How well microwave ablation works

- Ablation rates: The ablation rates for microwave treatment of adenomyosis range from 79.7% to 91.34%, showing that the procedure is highly effective in destroying the targeted tissue.
- Symptom improvement: Clinical studies have shown that MWA greatly improves symptoms:
- Dysmenorrhea: Treatment cuts the number of people who have painful periods by 50% to 81.7%. Many patients feel better within three months of ablation [6].
- Menstrual disorders: The technique works to manage heavy menstrual bleeding and its effects, with improvement rates ranging from 40% to 80.2%.
- Overall quality of life: A lot of patients say that their quality of life has gotten a lot better, including less pain and other symptoms related to adenomyosis.
- Reduction of uterine volume: Studies show that MWA greatly reduces the size of the uterus. The volume of the uterus dropped by 55.2% to 64.9% over the course of the 12-month follow-up.

Microwave ablation is thought to be a good way to treat symptomatic adenomyosis because it works well to relieve symptoms and shrink the uterus. It is a good option for people who want to avoid traditional surgery because it is minimally invasive and has a high success rate.

Patients who have microwave ablation (MWA) for adenomyosis usually see results within a few weeks, but the full effects may take longer. Here are some big problems with the timing of seeing results:

- Initial improvement: Many patients say that their symptoms start to get better within 3 to 6 weeks of starting treatment. For example, they report less pain and bleeding.
- Ongoing improvement: The symptoms may get better for a few months. Research shows that dysmenorrhea and irregular periods are much less common, and many patients say they feel much better by the three-month follow-up.
- Long-term outcomes: At follow-up visits 6 to 12 months after ablation, doctors usually look at a wide range of outcomes, like how much the uterus shrank and how long the symptoms went away.

Some benefits may be seen right away after treatment, but it's normal for people to get better over the course of several months as their bodies heal and the effects of the ablation wear off.

Microwave ablation (MWA) can be used with other treatments to get better results, especially when MWA alone isn't enough to treat the problem. There isn't much research on combining MWA with other treatments for adenomyosis, but studies in related fields suggest that combining treatments could be helpful.

Possible combinations with microwave ablation

1. Endocrine therapy: Using microwave ablation (MWA) along with hormonal treatments like progestins or gonadotropin-releasing hormone (GnRH) agonists may help lower adenomyotic lesions before ablation and make it easier to manage symptoms. Hormonal treatment might also help with symptoms that stay after ablation.
2. Radiation therapy: In oncology, microwave ablation (MWA) has been successfully combined with intensity-modulated radiation therapy (IMRT) for locally advanced cancers. This combination has produced results that are as good as or better than radiation therapy alone, while also reducing concerns like damage caused by radiation. If radiation therapy is used to ease symptoms of adenomyosis, this principle may also apply.

3. Surgical procedures: Microwave ablation (MWA) is often used with surgical decompression and stabilising treatments like pedicle screw fixation to help patients with spinal metastases feel better and improve the structure of their spine. When someone has adenomyosis, using microwave ablation along with less invasive methods like laparoscopic excision may work better together.
4. Other ways to do thermal ablation: Microwave ablation (MWA) can be used with other thermal ablation methods like radiofrequency ablation (RFA) [3] and high-intensity focused ultrasound (HIFU). Combining RFA and MWA in the treatment of liver cancer improves local control and lowers the risk of recurrence. These combinations might make ablation work better for adenomyosis.
5. Systematic treatments: Microwave ablation (MWA) is often used with systemic treatment to improve the prognosis and target any remaining cancer in people with metastatic cancer. Systemic anti-inflammatory or hormonal therapy may help MWA by lowering inflammation and restoring hormone balance, even though they are not directly related to adenomyosis.

Benefits of using more than one method

- Better symptom relief: Combining therapies can help with many aspects of the disease, which leads to better overall symptom management.
- Better lesion reduction: Treatments before MWA, like hormone therapy, can help reduce lesions, which makes MWA work better.
- Fewer returns: Using MWA with other treatments may lower the risk of symptoms coming back or not being completely ablated.

There isn't a lot of data on combining MWA with other treatments for adenomyosis, but research from other fields suggests that these kinds of strategies might lead to better results. More research is needed to find combination therapies that work for people with adenomyosis.

To write an essay about microwave ablation (MWA) for adenomyosis, list the main points and stress how important this treatment method is [10].

Things that affect microwave ablation for adenomyosis.

Characteristics of the lesion:

- The size, location, and type of adenomyosis (diffuse or localised) have a big effect on how well ablation works. Diffuse adenomyosis reacts better than isolated lesions, particularly those located outside the myometrium, which may be less suitable for effective ablation.
- The number of ablation needles and the amount of energy delivered depend on the size of the lesion. Larger lesions may need more needles or longer ablation times.

Planning for ablation and the methods used

- Imaging before the procedure (MRI and ultrasound) is very important for finding the lesion, making the path for the antenna to go in, and figuring out how many ablation fields are needed.
- Try to get a high non-perfused volume (NPV) ratio that covers the whole lesion but doesn't hurt healthy tissue too much.
- The "moving-shot" method and real-time ultrasound guidance make sure that the lesions are accurately targeted and monitored during the ablation process.
- To get the best results from ablation, change the output power (40-120 W) and length of time based on the type of lesion.

Choosing patients

- Patients who had healthy endometrial junctions, no major pelvic adhesions, or deep endometriosis nodules had a better chance of success.
- To avoid damaging the endometrial lining, it is very important to prepare properly for reproductive procedures.

Experience of the operator

- You need to know a lot about technology to handle complicated pelvic adhesions and make sure the antennas are installed correctly.

Biological and clinical factors

- Baseline CA125 levels can help predict short-term results, but higher levels may mean the disease is worse and has worse effects.
- The age, BMI, and other health problems of patients may affect their long-term success and recurrence rates.

Safety steps

- Using a safety barrier while planning cuts down on heat damage to nearby organs.
- Monitoring during surgery lowers the risk of complications and makes sure that the entire lesion is covered.

In summary, microwave ablation works for adenomyosis only if the right patients and lesions are chosen, the procedure is planned carefully, the operator has experience, and the technical parameters are tailored to improve lesion coverage while keeping the uterus and endometrium healthy.

Conclusion

Microwave ablation is a promising minimally invasive treatment for symptomatic adenomyosis that has many advantages over older methods. It is a safe and effective alternative to surgery because it can accurately target lesions with ultrasound guidance, cause tissue necrosis quickly, and cause little damage to surrounding tissue. Clinical trials have shown that many patients have high ablation rates, get a lot of relief from their symptoms, and have a better quality of life within a few months of treatment. But there are still problems with treating diffuse adenomyosis without causing the problems that come with severe ablation.

MWA is a big step forward in the treatment of adenomyosis, but more research is needed to improve procedures, get the best results, and make sure that protocols are always followed. Microwave ablation could become a key part of treatment as doctors learn more and more about it and more data becomes available.

Bibliography

1. Zhang S., *et al*. "Ultrasound-guided percutaneous microwave ablation of adenomyosis: a narrative review". *Annals of Palliative Medicine* 10.11 (2021): 12003-12011.
2. Liu L., *et al*. "Image-guided thermal ablation in the management of symptomatic adenomyosis: a systematic review and meta-analysis". *Journal of Hyperthermia* 38.1 (2021): 948-962.
3. Athanasiou A., *et al*. "Advances in adenomyosis treatment: high-intensity focused ultrasound, percutaneous microwave therapy, and radiofrequency ablation". *Journal of Clinical Medicine* 13.19 (2024): 5828.
4. Lin Y., *et al*. "The link between sonographic classification and the success of microwave ablation for adenomyosis". *Quantitative Imaging in Medicine and Surgery* 14.12 (2024): 8644-8657.

5. Zhang HL., *et al*. "Efficacy and safety of percutaneous microwave ablation for adenomyosis in the posterior uterine wall". *The British Journal of Radiology* 96.1151 (2023): 20211301.

6. Deng E., *et al*. "Efficacy and safety of ultrasound-guided percutaneous microwave ablation in patients with symptomatic adenomyosis". *Zhongliu Yingxiangxue* 32.2 (2023): 182-188.

7. Zhang J., *et al*. "Ultrasound-guided percutaneous microwave ablation for adenomyosis with abnormal uterine bleeding: clinical outcome and associated factors". *International Journal of Hyperthermia* 40.1 (2023): 2249274.

8. Zhang H., *et al*. "Ultrasound-guided microwave ablation for symptomatic adenomyosis: More areas of concern for more uniform and promising outcomes". *Journal of Interventional Medicine* 5.3 (2022): 122-126.

9. Zhang Q., *et al*. "An updated review of thermal ablation technology for uterine fibroids and adenomyosis: focusing on protecting fertility". *International Journal of Women's Health* 16 (2024): 1551-1563.

10. "Adenomyosis treatment that doesn't require surgery". In: Reports on Current Obstetrics and Gynaecology. The 2024 compilation has a full section on PMWA that talks about its uses, technology, effectiveness, and side effects.

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