The effectiveness of microwave endometrial ablation combined with hysteroscopic transcervical resection in treating submucous uterine myomas: A retrospective study

Toshiyuki Kakinuma (✉ tokakinuma@gmail.com)

International University of Health and Welfare Hospital

Kaoru Kakinuma

International University of Health and Welfare Hospital Department of Ophthalmology: Kokusai Iryo
Fukushi Daigaku Mita Byoin Ganka

Ayano Shimizu

International University of Health and Welfare Hospital

Ayaka Kaneko

International University of Health and Welfare Hospital

Masataka Kagimoto

International University of Health and Welfare Hospital

Takafumi Okusa

International University of Health and Welfare Hospital

Eri Suizu

International University of Health and Welfare Hospital

Koyomi Saito

International University of Health and Welfare Hospital

Yoshio Matsuda

International University of Health and Welfare Hospital

Kaoru Yanagida

International University of Health and Welfare Hospital

Nobuhiro Takeshima

International University of Health and Welfare Hospital

Michitaka Ohwada

International University of Health and Welfare Hospital

Keywords: submucous uterine myoma, microwave endometrial ablation, transcervical resection, hypermenorrhea, dysmenorrhea

Posted Date: July 22nd, 2021

DOI: <https://doi.org/10.21203/rs.3.rs-705761/v1>

License: © ⓘ This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

Abstract

Background

Submucous uterine myomas can be effectively and safely treated using microwave endometrial ablation (MEA). However, recurrence is common and requires additional treatment. This study investigated the efficacy of MEA combined with transcervical resection (TCR).

Methods

This retrospective study included 32 women who underwent MEA in addition to TCR for submucous uterine myomas at the International University of Medicine and Welfare Hospital between January 2016 and June 2020. All patients were followed up for ≥ 6 months after the procedure.

Results

The 32 women had a mean age of 45.2 ± 4.3 years. The myomas had a mean major diameter of 26.3 ± 12.3 mm and a protrusion degree of $51.3 \pm 11.3\%$. The patients reported very severe hypermenorrhea/dysmenorrhea (10/10 points on the visual analogue scale) before the procedure. After the procedure, the hypermenorrhea scores decreased to 1.2 ± 1.3 and 0.9 ± 1.3 after 3 and 6 months, respectively (both $p < 0.001$). The dysmenorrhea scores also decreased to 1.3 ± 1.8 and 1.3 ± 1.8 after 3 and 6 months, respectively (both $p < 0.001$). Circulating hemoglobin concentrations improved significantly from 8.7 ± 1.9 g/dL to 13.5 ± 1.1 g/dL ($p < 0.001$). The mean follow-up duration was 33.8 ± 16.8 months and 10 women (31.3%) developed amenorrhea during this period, although none experienced recurrence of hypermenorrhea. No surgical complications were observed. The patients reported being highly satisfied with the ability of the combined treatment to relieve hypermenorrhea (mean visual analogue scale score: 9.5 ± 0.8).

Conclusion

Reducing the size of uterine fibroids via a combination of MEA and TCR can safely and effectively treat hypermenorrhea in patients with submucous myomas. Furthermore, the procedure's effectiveness is complemented by the patients' high satisfaction level.

Plain English Summary

The combination of MEA and TCR may safely, reliably, and effectively reduce the size of uterine fibroids and, thus, treat hypermenorrhea caused by submucous myomas.

Background

Hypermenorrhea is characterized by excessive menstrual bleeding that can cause severe anemia and interfere with everyday life. This condition can restrict women's social activities and decrease their quality of life. Microwave endometrial ablation (MEA) using a 2.45-GHz energy source, is a minimally invasive alternative to conventional hysterectomy for treating hypermenorrhea that is resistant to conservative treatment, triggered by systemic disease or medications, or caused by uterine myomas and fibrosis.^{1,2} The popularity of MEA continues to increase worldwide, including in Japan where it has been covered by the national health insurance program since April 2012. This procedure has been performed at the International School of Medicine and Welfare Hospital since January 2016 and a previous report has demonstrated that it is reliable and effective in treating hypermenorrhea-induced anemia.³ Although MEA can safely and effectively treat submucous myomas, some patients may still experience recurrent hypermenorrhea after the procedure and may require additional treatment.⁴ Therefore, this study evaluated whether a combination of MEA and transcervical resection (TCR) was effective in treating submucous uterine myomas by reducing the size of uterine fibroids in patients with hypermenorrhea, thereby decreasing the possibility of recurrence and additional treatment.

Materials And Methods

Study design

The retrospective study protocol was approved by the ethics committee of the International University of Health and Welfare Hospital (20-B-399, date: May 7, 2020). All the patients provided written informed consent prior to the procedure. Patients were considered eligible if they underwent a MEA in addition to TCR for submucous uterine myomas after a primary complaint of hypermenorrhea between January 2016 and June 2020. All the patients were followed up for ≥ 6 months, and their medical records were reviewed to evaluate their outcomes.

Procedures

All the participants underwent cervical and endometrial cytological evaluations, as well as histological evaluations, if necessary, to exclude cases of uterine malignancies. In addition, magnetic resonance imaging and hysteroscopy were performed to evaluate the size and location of the myomas, as well as the degree of protrusion into the uterine cavity. Cervical dilatation was performed on the day before surgery using a cervical dilator (Lamicel; Japan Medtronic Co. Ltd., Tokyo, Japan).

The procedure was initiated under general anesthesia in the lithotomy position. The TCR procedure was performed before the MEA using a hystero-resectoscope (26-Fr outer sheath; Olympus Corp.), and D-sorbitol (3%) was used as the irrigation solution. Resected tissue specimens underwent histopathological examinations in all the cases. The MEA was then performed under transabdominal ultrasound guidance using the Microtaze AFM-712 unit (Alfresa Pharma Corp., Osaka) and a Sounding Applicator (CSA-40CBL-1006200C; Alfresa Pharma Corp.) (Fig. 1). The 2.45 GHz microwave Microtaze device was set to an output power of 70 W for 50-second cycles according to the guidelines.⁵ Prior to terminating the MEA, the

uterine cavity was evaluated using a hysteroscope to confirm that ablative necrosis at the endometrium did not extend to the internal orifice or endocervix.

Study variables

The variables included operation time, number of ablation cycles, length of hospital stay, and visual analog scale (VAS) scores for hypermenorrhea, dysmenorrhea, and treatment satisfaction at 3 and 6 months after the procedure. In addition, we evaluated the postoperative incidence of amenorrhea, changes in hemoglobin (Hb) concentrations, and MEA-related complications.

Statistical analysis

Numerical data were reported as mean $\pm$ standard deviation (range). Statistical analysis consisted of single-factor ANOVA and parametric multiple comparisons. P values < 0.05 were considered statistically significant.

Results

A total of 34 women underwent a combination of MEA and TCR during the study period. Two patients were excluded from the study as their histopathological tests identified uterine malignancies (uterine sarcoma and endometrial cancer). The patients' characteristics are shown in Table 1. The 32 eligible women (6 nulliparous, 26 multiparous) had a mean age of 45.2 ± 4.3 years (range: 36–52 years). The cases included 10 cases of single myoma (only submucosal fibroids) and 22 cases of multiple myomas (submucosal and intramuscular fibroids) with a mean major axis diameter of 26.3 ± 12.3 mm and a mean protrusion degree of $51.3 \pm 11.3\%$. According to the FIGO classification of submucosal fibroids, 6 cases presented with Type 1 and 26 cases presented with Type 2 fibroids.

Table 1
Patients' characteristics

Characteristics	Values
	Mean $\pm$ SD (n = 32)
Age (years)	45.2 $\pm$ 4.3
Pregnancy history (cases)	
Primigravida	6
Multigravida	26
Submucosal uterine fibroid	
Major diameters (mm)	26.3 $\pm$ 12.3
Protrusion degree (%)	51.3 $\pm$ 11.3
Multiple uterine fibroids (case)	22

The mean procedure duration was 45.5 $\pm$ 21.0 min (range: 19–110 min) and involved 7.0 $\pm$ 1.3 ablation cycles (range: 5–11 cycles). The mean postoperative hospital stay was 2.5 $\pm$ 0.5 days (range: 2–3 days). The patients reported having very severe hypermenorrhea and dysmenorrhea at 10 months before the procedure, based on average VAS scores of 10/10 for both items. However, the hypermenorrhea scores significantly decreased to 1.2 $\pm$ 1.3 (range: 0–5) at 3 months after the procedure and 0.9 $\pm$ 1.3 (range: 0–5) at 6 months after the procedure (both $p < 0.001$) (Fig. 2). Similarly, the dysmenorrhea scores significantly decreased to 1.3 $\pm$ 1.8 (range: 0–7) after 3 months and 1.3 $\pm$ 1.8 (range 0–5) after 6 months (both $p < 0.001$) (Fig. 3). Figure 4 shows that the circulating Hb concentrations improved significantly from 8.7 $\pm$ 1.9 g/dL (range: 5.1–12.5 g/dL) preoperatively to 13.5 $\pm$ 1.1 g/dL (range: 11.3–15.2 g/dL) postoperatively ($p < 0.001$). No surgical complications were observed.

The patients reported being highly satisfied with the procedure's ability to relieve hypermenorrhea, based on a mean VAS score of 9.5 $\pm$ 0.8 (range: 7–10) for satisfaction. The mean follow-up duration was 33.8 $\pm$ 16.8 months (range: 6–60 months). During follow-up, amenorrhea was reported by 10 patients (31.3%), and there were no instances of hypermenorrhea recurrence.

Discussion

Previous studies have indicated that MEA is an alternative to hysterectomy for patients requiring treatment for hypermenorrhea caused by submucous myomas.^{1–3} This procedure has gained popularity in Japan, where it has been covered by the national health insurance program since 2012. Although MEA can safely and effectively treat submucous myomas, some patients may experience recurrent hypermenorrhea after the procedure and require additional treatment. This is believed to be caused by endometrial regeneration over time as the uterine cavity expands because of post-procedural fibroid

growth. The present study evaluated the efficacy and safety of the combination of MEA and TCR under hysteroscopic guidance for women with submucous myomas. The patients experienced dramatic improvements in their hypermenorrhea symptoms and a significant increase in their circulating Hb concentrations. Furthermore, none of the women experienced recurrence of hypermenorrhea during the follow-up period.

Submucous myomas deform the uterine cavity, which can complicate the endometrial ablation process, depending on the shape of the microwave applicator. A resectoscope can be used for pre-ablation excision to improve the outcomes of MEA by smoothing the irregular inner surface, although it is important to be aware of potential issues regarding the scope of fibroid resection during this step. Problems are unlikely in patients who have a sufficiently thick residual myometrium, even if the submucous myoma is completely removed, although excessive thinning is possible if complete myoma resection is attempted. Thus, the Japanese clinical practice guidelines indicate that MEA requires a myometrial thickness of ≥ 10 mm, which is intended to prevent damage to the surrounding organs.⁵ Therefore, the scope of the TCR must be limited to partial resection before MEA if there is a risk of excessively thinning the uterine musculature. We reviewed the patients' TCR procedures and noted that only 6 patients underwent partial resection, although these patients experienced no recurrence and reported the same improvements in their clinical symptoms (vs. patients who underwent complete resection). The efficacy of the combined procedures can be attributed to the reduction in the fibroid mass and the use of a hysteroscope after the MEA to evaluate the uterine cavity and perform cauterization for sites with inadequate ablation.

The levonorgestrel-releasing intrauterine system (LNG-IUS) is another minimally invasive treatment for hypermenorrhea. This system provides promising outcomes, based on a > 50% reduction in menstrual flow (vs. the preoperative volume) experienced by 84.8% of patients and amenorrhea only occurring in approximately 20% of patients.⁶ Based on our findings, the MEA procedure appears to be more effective than the LNG-IUS, although a direct comparison is precluded because we only used subjective VAS ratings to evaluate menstrual flow. Nevertheless, from a long-term perspective, the effects of MEA may be more stable, as only 21% of patients who undergo MEA require another treatment for recurrent hypermenorrhea, while re-treatment is required for 42% of patients who receive the LNG-IUS.^{6,7} Furthermore, the LNG-IUS could potentially slip out of place in a uterine cavity that has been deformed by the presence of submucous myomas. Therefore, we suggest that the combination MEA and TCR is a more effective treatment option for hypermenorrhea caused by submucous uterine myomas.

The concurrent use of a resectoscope with MEA permits a histopathological characterization of the lesion, which is not possible if MEA is performed alone. We have also previously reported that abnormal findings were observed in endometrial specimens that were collected via endometrial total curettage during MEA, despite these patients having initially negative results for uterine malignancy from cytodiagnostic and histological screening before the MEA.⁸ The present study also identified 2 patients with uterine malignancy, which was confirmed based on the histopathological findings from specimens that were excised during the combination of TCR and MEA, despite the preoperative diagnosis being

hypermenorrhea caused by submucous uterine myoma. Similarly, histopathological examinations of the TCR specimens can be useful for identifying uterine malignancies.

It is important to consider the safety of MEA, as complications include heat injury to the pelvic organs, fluid retention in the uterus (because of cervical stenosis or the ablated endometrium), hematometra, pelvic inflammation (e.g., endometritis because of ascending infection), and pyometra.⁹ However, we did not detect any of these complications, which may be related to the use of a resectoscope to evaluate the endometrial lining immediately after MEA. This step allowed for the maximum removal of the necrotic tissue left over by ablation, and we believe that it can improve the safety of MEA by reducing the rate of complications.

Although MEA is not indicated for treating dysmenorrhea and was not originally expected to alleviate its symptoms, some studies demonstrate its effectiveness in treating this condition.^{10,11} Our patients reported improvements in dysmenorrhea as soon as their first menses after MEA. We speculate that this was a secondary effect of improvements in hypermenorrhea, as reductions in menstrual volume were accompanied by less severe dysmenorrhea. Thus, MEA might be effective for reducing dysmenorrhea that is associated with hypermenorrhea caused by uterine myomas.

Our patients were highly satisfied with the MEA, based on an average VAS score of 9.5 ± 0.89 out of 10 points. Furthermore, most patients continued menstruating, although amenorrhea was reported by 10 patients (31.3%). Thus, we reckon that women with hypermenorrhea may desire a reduction, but not necessarily complete elimination, of menstrual flow while preserving their uterine function. The safety and efficacy of MEA in combination with TCR may also contribute to the patients' satisfaction.

Further studies are needed to consider various issues related to whether a combination of MEA and TCR can effectively treat hypermenorrhea secondary to uterine myomas. For example, hypermenorrhea outcomes should be considered in cases where the fibroids do not protrude into the uterine cavity. Furthermore, long-term follow-up is needed to clarify the hypermenorrhea recurrence rate and time to recurrence. Moreover, screening criteria are needed to identify women who are especially susceptible to hypermenorrhea recurrence. Finally, these studies could also consider novel ablation techniques.

In summary, the combination of MEA and TCR may safely and effectively reduce the size of uterine fibroids and, thus, treat hypermenorrhea caused by submucous myomas.

Abbreviations

Hemoglobin, Hb; levonorgestrel-releasing intrauterine system, LNG-IUS; microwave endometrial ablation, MEA; transcervical resection, TCR.

Declarations

Ethics approval and consent to participate: This study was approved by the ethics committee of the International University of Health and Welfare Hospital (20-B-399, date: May 7, 2020).

Consent for publication: All patients provided oral and written informed consent prior to the undergoing the procedure.

Availability of data and materials: The datasets supporting the conclusions of this article are included within the article and its additional files.

Competing interests: The authors declare that they have no competing interests.

Funding: Not applicable.

Authors' contributions: TK developed and drafted the manuscript. All authors designed the data collection instruments, collected data, and carried out the initial analyses. All authors read and approved the final manuscript to be published and agreed to be accountable for all aspects of the work.

Acknowledgments: Not applicable.

References

1. Sharp NC, Cronin N, Feldberg I, Evans M, Hodgson D, Ellis S. Microwaves for menorrhagia: A new fast technique for endometrial ablation. *Lancet*. 1995;346:1003–4.
2. Hodgson DA, Feldberg IB, Sharp N, Cronin N, Evans M, Hirschowitz L. Microwave endometrial ablation: Development, clinical trials and outcomes at three years. *Br J Obstet Gynaecol*. 1999;106:684–94.
3. Kakinuma T, Ushimaru S, Kagimoto M, Kaneko A, Fujimoto Y, Ito T, et al. Microwave endometrial ablation at a frequency of 2.45 GHz is effective for the treatment of hypermenorrhea: A clinical investigation at our hospital. *J Microwave Surg*. 2019;37:1–5.
4. Nakamura K, Nakayama K, Sanuki K, Minamoto T, Ishibashi T, Sato E, et al. Long-term outcomes of microwave endometrial ablation for treatment of patients with menorrhagia: A retrospective cohort study. *Oncol Lett*. 2017;14:7783–90.
5. Kanaoka Y, Ishikawa N, Asakawa Y, Nakayama K. Practice guidelines of MEA. 2012. <https://www.alfresa-pharma.co.jp/microtaze/MEAguideline2012.pdf>. Accessed 28 Dec 2020. (In Japanese).
6. Hurskainen R, Teperi J, Rissanen P, Aalto AM, Grenman S, Kivelä A, et al. Clinical outcomes and costs with the levonorgestrel-releasing intrauterine system or hysterectomy for treatment of menorrhagia: Randomized trial 5-year follow-up. *JAMA*. 2004;291:1456–63.
7. Longinotti MK, Jacobson GF, Hung YY, Learman LA. Probability of hysterectomy after endometrial ablation. *Obstet Gynecol*. 2008;112:1214–20.

8. Kakinuma T, Kakinuma K, Tanaka H, Ohwada M. Considerations for performing microwave endometrial ablation (MEA) – three cases with abnormal test results of endometrial tissue discovered by chance when performing MEA. *Int J Hyperthermia*. 2020;37:749–52.
9. Das S, Kirwan J, Drakeley AJ, Kingsland CR. Pelvic abscess following microwave endometrial ablation. *BJOG*. 2005;112:118–9.
10. Ishikawa M, Katayama K, Yoshida H, Hirahara F. Therapeutic outcomes and postoperative courses in microwave endometrial ablation for menorrhagia. *J Microwave Surg*. 2012;30:253–7.
11. Nakayama K, Ishibashi T, Ishikawa M, Katagiri A, Katagiri H, Iida K, et al. Microwave endometrial ablation at a frequency of 2.45 GHz for menorrhagia: analysis of treatment results at a single facility. *J Obstet Gynaecol Res*. 2014;40:224–9.

Figures

Figure 1

Figure 2

Changes in the visual analog scale score for hypermenorrhea after microwave endometrial ablation (MEA). Values are expressed as the mean and standard deviation (error bars). * $P < 0.01$ relative to the result before surgery.

Figure 3

Changes in the visual analog scale score for dysmenorrhea after microwave endometrial ablation (MEA). Values are expressed as the mean and standard deviation (error bars). * $P < 0.01$ relative to the result before surgery.

Figure 4

Comparing blood hemoglobin (Hb) concentrations before and after microwave endometrial ablation (MEA).

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [STROBEchecklist.doc](#)