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Case Report

Successful treatment of large adenomyosis with transcervical radiofrequency ablation in a high-risk patient: A case report and short review ☆,☆☆

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ABSTRACT

Adenomyosis is a prevalent gynecological condition that affects women of reproductive age, and its treatment can present significant challenges. Conventional surgical approaches are traumatic to the uterine tissue, necessitating the development of alternative methods. We herein describe the successful treatment of a large diffuse adenomyosis on the back wall of the uterus in a high-risk patient with severe symptoms and fertility desire, using transcervical intrauterine ultrasound-guided radiofrequency ablation. The treatment significantly reduced uterine and adenomyosis volumes and improved the symptoms. This method is a minimally invasive uterine-preserving option and serves as a promising therapeutic alternative to conventional procedures, such as hysterectomy and tissue excision, for treating adenomyosis.

Introduction

Adenomyosis, a prevalent gynecological condition that affects women of reproductive age, was first described by the German pathologist Carl von Rokitansky in 1860 [1]. According to its definition by Bird in 1972, adenomyosis occurs when the endometrium invades the myometrium, leaving behind non-neoplastic endometrial glands and stroma surrounded by a hypertrophic and hyperplastic myometrium [1]. Previously, adenomyosis was diagnosed through histopathological examination following a hysterectomy or adenomyomectomy, with prevalence rates ranging widely from 8.8% to 61.5% [1]. However, the recent development of imaging tools, such as transvaginal sonography and magnetic resonance imaging (MRI), enable diagnosis without surgical interventions [2].

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Adenomyosis can be classified into 2 forms: focal and diffuse [3]. Distinguishing focal adenomyoses from fibroids is challenging. In such cases (using transvaginal sonography and MRI), the following criteria can be helpful: unlike fibroids, adenomyoses lack distinct margins, due to the absence of pseudocapsules and other demarcations, and may contain small cysts that strongly suggest adenomyosis [2]. On Doppler imaging, vessels cross the focal adenomyosis, whereas fibroids typically demonstrate a peripheral flow [2]. Although 30% of women with adenomyosis are asymptomatic, the majority develop symptoms, such as heavy bleeding, severe dysmenorrhea, chronic pelvic pain, bladder and bowel pressure, due to an enlarged uterus and impaired fertility [4]. Treatment options for adenomyosis are limited. Although medical therapy can be used to treat symptoms caused by adenomyosis [5], its effectiveness and feasibility is uncertain [6]. In cases where the patient desires fertility or the treatment is inappropriate and they experience severe adverse side effects, a surgical approach is necessary [6]. Laparoscopic or open abdominal surgery is the most common surgical approach. For managing adenomyosis, conservative uterus-sparing surgical methods such as Osada Plastic have been developed, which involve the excision of adenomyotic tissue [6]. However, these require excellent surgical proficiency and come with heightened perioperative risks and morbidity, including the potential for uterine rupture during pregnancy [6,7]. Therefore, new surgical methods are currently being attempted for treating adenomyosis [7,8]. Transcervical intrauterine ultrasound-guided radiofrequency ablation (RFA) is a focal volumetric image-guided RFA procedure [8]. In a single integrated device, the system combines intrauterine sonography with RF energy delivery. The system provides real-time visualization of fibroids with graphical imaging, demonstrating the location of the ablation, and a thermal safety border beyond which there is no material thermal effect. Depending upon the ablation size, the ablation duration typically ranges from 1 minute to 7 minutes [8]. This system is approved by the Food and Drug Administration (FDA) and is Conformite Europeenne (CE)-marked for the treatment of uterine fibroids [8]. A small case series has previously reported transcervical adenomyosis ablation (TAA) using the Sonata System [9].

Case presentation

We present the case of a 42-year-old woman with fertility desire, who was admitted to our department with a uterine fibroid. The patient had congenital brain vascular disease (arteriovenous malformation) that required her to undergo 2 brain surgeries, and 10 years postsurgery she experienced a stroke. Previously, she had undergone 2 miscarriages. The patient complained of severe dysmenorrhea (Visual Analog Scale [VAS] score, 7/10), severe hypermenorrhea, and increased bladder pressure due to an enlarged uterus. Dysmenorrhea necessitated using many nonsteroidal anti-inflammatory drugs (NSAIDs) daily during menstruation. Because of severe menstruation, she had to use pads and tampons simultaneously and change them hourly. Transvaginal ultrasonography revealed diffuse adenomyosis in the back wall instead of a fibroid or an enlarged uterus. For a more precise diagnosis, we performed MRI (Fig. 1). The uterus size and volume were 12.2 × 9.7 × 10.1 cm and 625.5 cm³, respectively. We detected a large diffuse adenomyosis in the back wall of the uterus. The estimated size and volume were determined to be 9.6 × 9.4 × 7.9 cm and 373 cm³, respectively. Owing to congenital brain vascular disease and the desire for fertility, we ruled out hormone therapy. We presented the patient with various options, including Osada Plastic and transcervical intrauterine ultrasound-guided ablation, and explained that although Osada Plastic was an established method, this technique is traumatic to the uterus and would require a laparotomy for better tissue evaluation, whereas RFA is a much easier, less invasive, and less traumatic technique for the uterus. We informed the patient regarding our experience with RFA for focal adenomyosis and the scarcity of pregnancy data after treatment. The patient took several months to decide and ultimately opted for RFA. We planned simultaneous hysteroscopy and RFA to evaluate the endometrium and uterine cavity. Hysteroscopy findings were unremarkable. Eventually, we performed RFA without any complications. We dilated the cervix to a Hegar size 8.5 and easily inserted the device into the uterus. Integrated ultrasound probe and intrauterine sonography facilitated the identification of adenomyotic tissue (Fig. 2). This safety zone allowed for safe ablation (Fig. 2). In total, 4 ablations were required during the procedure (Table 1). The entire procedure, including the hysteroscopy and RFA, lasted for approximately 40 min, with pure ablation lasting 18 min. On the first postoperative day, the patient reported slight discomfort and swelling in the lower abdomen. She was in good health and had no fever. The follow-up was conducted as follows: 1. Phone contact after 3 months, 2. Personal contact and MRI after 6 months, and 3. Personal contact after 12 months. The patient reported persistent discomfort and swelling in the lower abdomen

Fig. 1 – Preoperative MRI with T1 sequence. Anteflexed enlarged uterus of 12,2 x 9,7 x 10,1 cm. The suspected diagnosis of a 9.6 x 9.4 x 7.9 cm large, focal adenomyosis of the posterior uterine wall with multiple hemorrhagic foci has been confirmed.

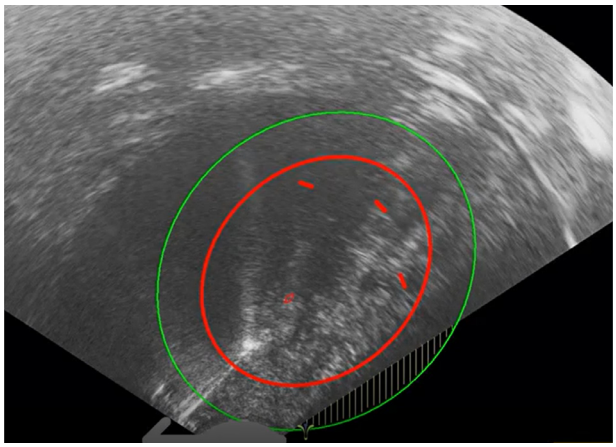

Fig. 2 – Intraoperative intrauterine sonography and ablation with the transcervical ultrasound-guided radiofrequency system.

Table 1 – Ablation parameters.

Ablation zone	Ablation time
4.1 × 3.4 cm	5 min 24 sec
3.3 × 2.4 cm	3 min 36 sec
3.5 × 2.7 cm	4 min 6 sec
3.8 × 3.1 cm	4 min 48 sec

during the first 3–4 weeks. After 3 months, she had significantly reduced dysmenorrhea and hypermenorrhea. After 6 months, the dysmenorrhea disappeared completely, and there was no need for analgesics. During menstruation, the patient used either pads or tampons (not simultaneously) and changed them every 4 hours. MRI revealed a significant reduction in the size of the uterus and adenomyosis (Table 2, Fig. 3). The patient was extremely satisfied with the outcome and reported a significantly improved quality of life. At the last visit, she announced that she no longer desired fertility.

Discussion

Adenomyosis affects 70% of patients with endometriosis, with the symptoms often becoming severe due to the progressive nature of the disease [4]. Medical therapy (such as combined oral contraceptives [COC], gonadotropin-releasing hormone antagonists/agonists, progestin-only pills, and levonorgestrel

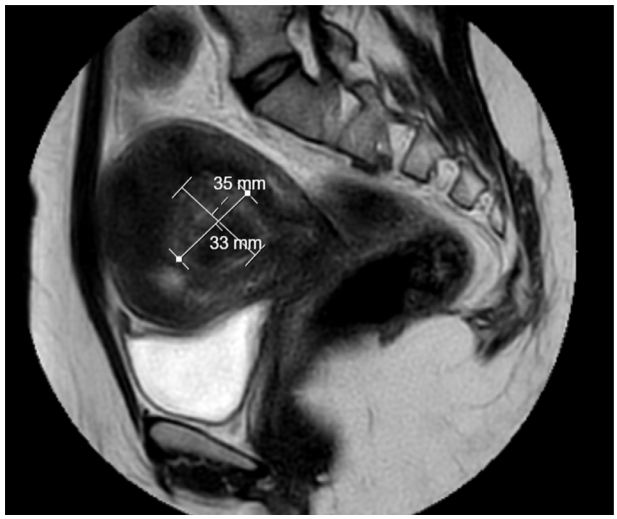

Fig. 3 – Postoperative MRI with T1 sequence after 6 months The uterus is shrinking in size over time. Current size is 8.5 x 7 x 8.6 cm. The treated adenomyosis or its residue likely corresponds to a rounded structure measuring 3.5 x 3.3 x 3.4 cm.

intrauterine devices) may be useful for treating adenomyosis in patients who do not desire fertility [5]. However, if patients desire to become pregnant, wish to avoid hormone therapy, or in cases where hormone therapy is contraindicated (particularly COC), as in the present case, treatment can become very challenging. In such cases, a surgical approach may be required [6]. Many patients desire a uterine-preserving treatment option instead of a hysterectomy, although a hysterectomy is curative. For several years, the only possible uterine-sparing surgical approach was excision (mostly via a laparotomy) of the sick tissue [6]. However, this technique demands excellent surgical skills. During the procedure, uterine reconstruction and hemostasis can lead to increased bleeding and prolonged surgical time [10]. Moreover, because adenomyosis is characterized by a lack of clear demarcation between the affected and healthy tissues, excision may result in incomplete or overly extensive removal [10]. Furthermore, it is important to emphasize the risk of uterine rupture during pregnancy following surgery [7]. These factors have prompted the exploration of new surgical approaches for adenomyosis treatment [10].

The 2 main alternative methods to hysterectomy and excision of the affected uterine tissue are uterine artery embolization (UAE) and hyperthermic approaches. However, UAE is limited to patients with a fertility desire [11]. The most commonly

Table 2 – Preoperative and postoperative MRI measurements.

	Preoperative		Postoperative		Reduction %
	Size (cm)	Volume (cm^3)	Size (cm)	Volume (cm^3)	
Uterus	12.2 × 9.7 × 10.1	625.5	8.5 × 7 × 8.6	267.8	-57.2%
Adenomyosis	9.6 × 9.4 × 7.9	373	3.5 × 3.3 × 3.4	20.5	-94.5%

used hyperthermic methods are high-intensity focused ultrasound (HIFU), percutaneous microwave ablation (PMWA), and RFA [10]. In a recent review, all 3 methods were considered effective treatment options for adenomyosis, with a significant improvement in symptom severity scores, including heavy menstrual bleeding and dysmenorrhea rates [12]. All groups showed >80% improvement in dysmenorrhea: RFA, 89.2%; PMWA, 89.7%; and HIFU, 84.2% [12]. In this review, compared to the HIFU group, the PMWA and RFA groups demonstrated a greater reduction in mean uterine (33.6% vs 46.8% and 44%) and adenomyosis volumes (45.1% vs 74.9% and 61.3%) as reported previously [12]. In the present case, the reduction in uterine and adenomyosis volumes was even greater at 57.2% and 94.5%, respectively. Notably, the average ablation time for RFA was significantly shorter than that of HIFU and not significantly longer than that of PMWA (31.93 minutes, 92.18 minutes, and 24.15 minutes, respectively). Furthermore, the rate of minor adverse events was significantly lower in the RFA group than that in the HIFU and PMWA groups (3.6%, 39.0%, and 51.3%, respectively).

Another recent review concluded that RFA provided pain relief similar to that provided by conventional uterus-sparing surgeries [10]. Nam et al.[13] used transcervical RFA in 81 patients with adenomyosis and fertility desire, of whom 91% (74) had been diagnosed with infertility. Treatment was performed using a monopolar Cool-tip RFA system with transabdominal ultrasound guidance. The authors reported a total of 39 pregnancies in 29 patients, resulting in 24 deliveries in 22 patients. Of the 59 patients who attempted natural conception, 25 achieved 34 pregnancies, indicating a clinical pregnancy rate of 42.7%. Four out of 22 attempted *in vitro* fertilization (IVF), achieving 5 pregnancies. The overall clinical pregnancy rate was 35.8%; 23 patients did not actively try to conceive or discontinued attempts at conception, resulting in an overall pregnancy success rate of 50%. Fifteen patients underwent a cesarean section and 9 patients had a vaginal delivery. No uterine ruptures were observed. Patients with adenomyosis have a 2.5% postoperative risk of uterine adhesions after performing RFA [14].

In the present case, we performed a transcervical RFA using the Sonata® System. We have previously published pilot results using this system in patients with focal adenomyosis. We observed symptom improvement in 83% of the cases, and no major complications occurred [9]. This system offers the following significant advantages over other RFA techniques [8]: 1. Transcervical insertion of the device eliminates the need for an abdominal or vaginal incision. 2. The device incorporates an ultrasound probe at its top, allowing for continuous demonstration. 3. A graphic demonstration of ablation and the safety zones enable a more precise ablation of the affected uterus tissue and guarantee procedural safety. 4. Seven electrodes introduced into the tissue achieved greater volumetric ablation than that of a single needle. 5. The system automatically measures the duration of ablation, making it easier to perform and eliminating the need for personal evaluation of the ablated tissue during surgery. We previously reported that even high-risk patients can safely use this system [15].

There is a distinction between RFA for uterine fibroids and that for adenomyosis. Fibroids typically do not infiltrate healthy uterine tissue, and after RFA is performed on the fibroids, the uterine tissue remains "untouched." Conversely, adenomyosis penetrates the uterine tissue, necessitating ablation of the uterine wall. This can cause more abdominal discomfort, lower abdominal pain, fever, swelling, and vaginal discharge in the first few weeks post-treatment.

Conclusion

RFA appears to be an effective approach for treating adenomyosis. However, limited data is available and further prospective studies are needed. As aforementioned, the transcervical intrauterine ultrasound-guided RFA system is a minimally invasive uterine-preserving option and may serve as a promising therapeutic alternative to conventional procedures, such as hysterectomy and tissue excision, for treating adenomyosis.

Author contribution

Elvin Piriyev and Thomas Römer: manuscript writing, data management, data analysis, project development, administration, and patient care.

Ethical Approval

This retrospective case report was approved by the Ethics Committee of North Rhine Westphalia (protocol number 116/2024). All patient data were anonymized for the purpose of reporting.

Patient consent

All patient data were anonymized for the purposes of reporting. The patient gave a consent.

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