

Uterine fibroids

Treatment of Symptomatic Fibroids with Transcervical Ultrasound-guided Radiofrequency Ablation

Indication, procedure, results, and complications—2020 expert consensus. Part 2: Transcervical Radiofrequency Ablation (TRFA)—Methods, indications, results, and comparison with other therapies

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■ In a consensus meeting on the treatment of symptomatic fibroids with transcervical ultrasound-guided radiofrequency ablation (TRFA), experts established recommendations on the indication and on pre- and postoperative management, and they discussed results, complications, and other potential indications for the procedure. Their intent is to have the procedure integrated into the current overall concept of the treatment of symptomatic uterine fibroids. On June 17, 2020, experts and users of the method from three German-speaking countries created this consensus paper, intended as a guide for clinical practice.

Part 1 of this article (FRAUENARZT 2/2021, P. 88–93) centered on the prevalence, classification, diagnosis, and established therapies in uterine fibroids. This issue focuses on TRFA: methods, indications, results, and comparison with other therapies.

Transcervical radiofrequency ablation (TRFA)

Method and technology

Intrauterine radiofrequency ablation is performed by gynecologists. The instrument's probe (a miniaturized ultrasound transducer) is inserted transvaginally (4, 20, 42).

After the fibroid is reliably classified preoperatively by sonography and the patient receives detailed information, the procedure is usually performed under sedation (4, 42, 35).

The device uses high-frequency technology with an integrated ultrasound transducer. Ablation is continuously adjustable. The diameter of the instrument is 8.3 mm. The penetration depth is less than 12 cm. There is a 90-degree field of view (Fig. 1).

Graphical navigation is used to image the fibroid. Then, ablation is performed, during which the green safety zone ensures that no thermal effect occurs in the surrounding structures and organs outside of the ablation area. This is

especially important for transmural fibroids, which are also located near the bladder or intestines (Fig. 2).

The procedure allows for optimization of the ablated volume in the targeted fibroid. Multiple passes of energized needles through the serosa are avoided. No manual measurements are taken; everything is done graphically. Ablations are scalable to 5 cm x 4 cm. Depending on the size of the target fibroid, ablation lasts between 1.5 and 7 minutes; the time is determined automatically by the generator. Power modulation is less than 150 W and is done using a HF generator to maintain a temperature of about 105 °C at the tip of the electrode (4, 42). In German-speaking countries, the treatment is currently performed as an outpatient or inpatient procedure under general anesthesia.

Thermal coagulative necrosis does not occur, and the method does not lead to postembolization syndrome. This system is FDA cleared and CE marked. The surgeon needs to have good knowledge of vaginal sonography, and needs to be confident in all other endoscopic surgical procedures to be able to combine them intraoperatively when needed.

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Transcervical radiofrequency ablation—system technology

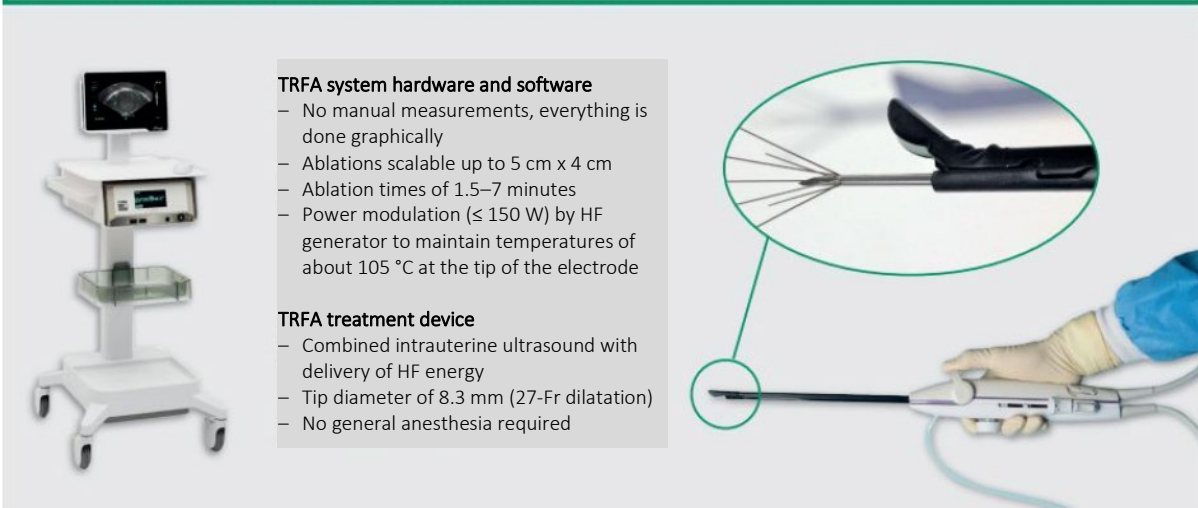


Fig. 1: The Sonata system consists of an ultrasound imaging console, a high-frequency generator, software that controls target guidance and the delivery of therapeutic energy, and a treatment device.

Indications and contraindications

The indication for TRFA treatment is in symptomatic uterine fibroids (bleeding and pain). This method is indicated for fibroids of FIGO type 1 to 6, whereas the benefits are well proven especially for FIGO type 2, 3, and 4 fibroids (Fig. 3 on P. XXX). For type 1 fibroids, size is the determining factor as to whether hysteroscopic fibroid resection is to be preferred, and sometimes both methods can also be combined. For FIGO type 5 and 6 fibroids, the extent to which laparoscopic fibroid enucleation will be advantageous needs to be decided. This must be discussed individually with each patient. For

FIGO type 2, 3, 4, and 2–5 fibroids, TRFA has benefits compared to all other therapy options.

Contraindications are in current pregnancies, active infections, known or suspected gynecological malignancies, or premalignant diseases like atypical hyperplasia, as well as an indwelling IUD (42).

Results of the method

A number of clinical studies on this method have already been performed and published. The FAST-EU trial, in which 50 patients were treated at 7 centers in Europe and Mexico, showed reduced menstrual bleeding after

3 months in 90% of patients. After 12 months, surgical intervention did not become necessary in 92% of patients. The median decrease in menstrual bleeding was 72%, the average reduction in fibroid volume 67% (10).

Another study, which was published in 2019, is the Pivotal trial (14, 28). In this prospective longitudinal multicenter study, 147 patients were treated with a follow-up period of up to 36 months. Overall, 442 fibroids were ablated, 3 fibroids per patient on average. In this study, the procedure lasted an average of 46 minutes, and the length of stay for the patients was 2.5 hours on average. After 2 days, all patients were able to resume their normal activities. The rate of surgical reinterventions for the treatment of severe menstrual bleeding due to therapy failure was 5.5% after 2 years. Reduction in blood loss after 12 months was achieved by 95% of patients. The PBAC score (a parameter used to measure

No manual measurements needed with SMART Guide

- The algorithms used to display SMART Guide were developed and validated based on > 1,900 clinical and bench tests, including direct uterine serosal temperature measurements.
- Tissue outside of the thermal safety border is safe from the effects of treatment.

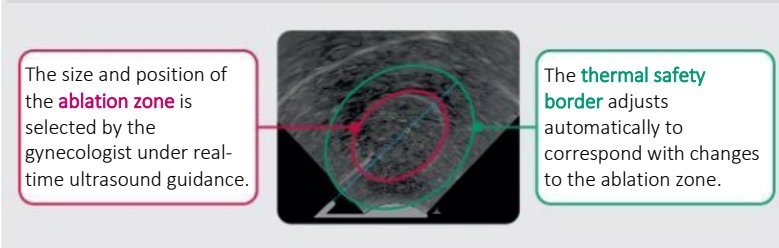


Fig. 2

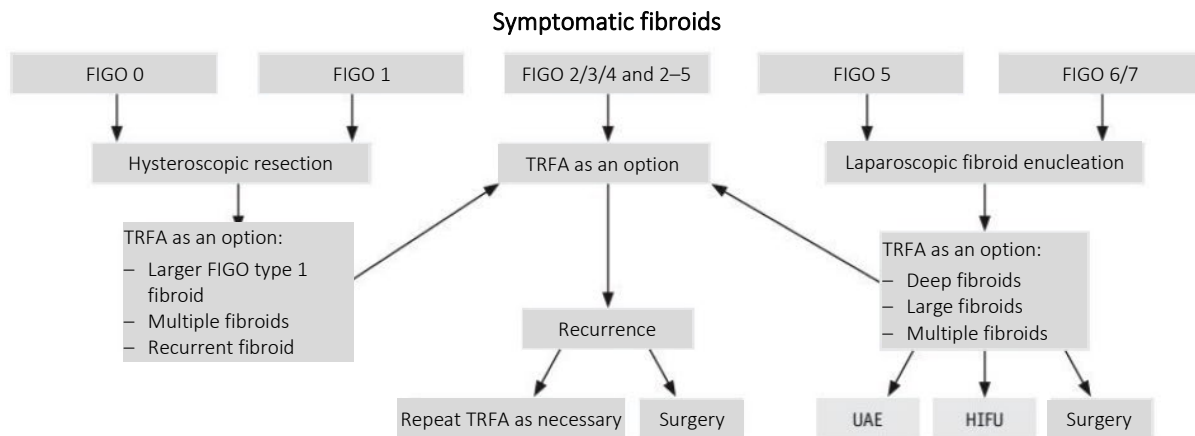


Fig. 3: Decision algorithm for using TRFA in symptomatic fibroids

menstrual blood loss) decreased by more than 50% after 12 months (Fig. 4) (14, 28). On the following day, 50% of patients resumed their normal activities. In the study, 50% of patients were treated with general anesthesia and 50% received sedoanalgesia. Of the patients, 98% found the procedure tolerable and 96% were satisfied with the overall treatment success.

Furthermore, the first data of a 5-year longitudinal study have now been published (21). All 17 patients saw an improvement in symptoms and quality of life. No reinterventions were performed in the first 3.5 years. The reintervention rate after 5 years was 11.8% (21).

From 2014 to 2019, 100 patients were treated in the Cologne

Weyertal Evangelical Hospital (EVK). For a fibroid size of 30 mm to 80 mm, 94% of patients achieved an improvement in symptoms, of which 57% were completely free of symptoms (4, 37) (Tab. 1).

The OPEN study investigated another interesting question (8). It examined specifically the incidence of intrauterine adhesions following TRFA treatment. In this prospective multicenter study, hysteroscopy was performed before and 6 weeks after TRFA treatment. In 34 patients, interpretable images were available from the baseline and control hysteroscopy (8). Absolutely no postoperative adhesions were identified.

All studies showed a significant reduction in the intensity of

menstrual bleeding and a low incidence of surgical reinterventions due to hypermenorrhea after 12 to 60 months. All patients tolerated the treatment well, and they were quickly able to resume their normal activities. With a follow-up period of up to 5 years, a significant and durable improvement in fibroid-related symptoms and a higher quality of life were demonstrated. High patient satisfaction and willingness to recommend the treatment were also identified. The method is well suited even in patients with risk factors (such as heart diseases) (34).

Postoperative management and complications

The warning information for the method should be followed, including, for example, the existing contraindications in patients with hip implants.

A follow-up examination after 3 months is recommended to assess the success of therapy. The main focus should be placed on the reduction in clinical symptoms (bleeding and pain). If vaginal sonography is performed and the

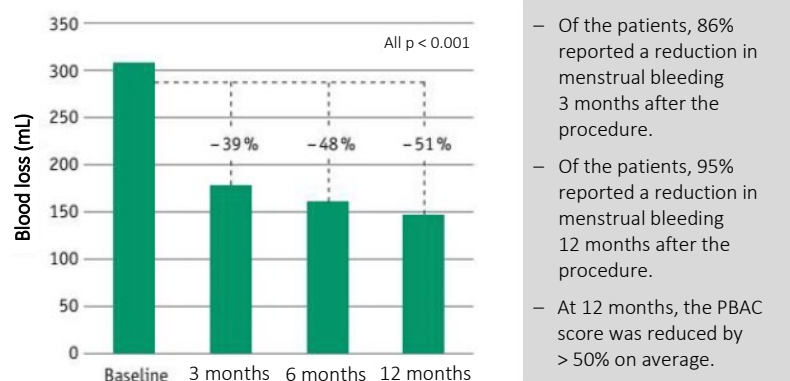


Fig. 4: Significant reduction in average menstrual blood loss (recorded using the PBAC score) after 12 months (14)

Summary of the results of TRFA						
Author (year)	Study (reference)	Patients (n)	Follow-up	Reintervention rate	Reduction in bleeding	Patient satisfaction
Brölmann (2016)	FAST (10)	50	12 months	8%	54%	88%
Chudnoff (2019)	Pivotal (14)	147	12 months	1%	95%	97%
Miller (2019)	Pivotal (28)	125	24 months	6%	88%	94%
Garza-Leal (2019)	Vitality (21)	17	60 months	11.8%	–	–
Bends (2020)	EVK Weyertal (4, 37)	100	12–60 months	10%	94%	90%

Tab. 1

fibroid does not shrink, this is not immediately relevant. If an improvement in symptoms has not occurred at the 6-month clinical follow-up, the treatment must be regarded as therapy failure.

Patients should be informed that for a short time in the first 3 months, an intensity in bleeding and discharge can occur. The success of treatment cannot be assessed until after 3 months at the earliest, and continued improvement in clinical symptoms is definitely to be expected.

Device-related, serious unexpected events did not occur in any of the studies. During the Pivotal study, 1 patient had a deep vein thromboembolism 15 days after the procedure. Another patient in the study was hospitalized due to vaginal discharge with a slightly elevated temperature and cramps 28 days after the procedure and was treated with antibiotics. Microbiology testing did not show any infection (28). In individual cases, the spontaneous expulsion of fibroids and demarcation to nascent fibroids were reported (2).

TRFA in patients who want to have children

Prospective controlled studies on fertility and the course of pregnancy after TRFA are not available at this time. The following

recommendations are based, therefore, on the personal experiences of the expert group. Pregnancy planning can start 3 months after TRFA treatment, after an ultrasound follow-up has been performed. Advantages of TRFA compared to surgical treatment are the preservation of uterine-wall continuity and the protection of the endometrium. Pregnancy that occurs immediately within the first 3 months after TRFA treatment is not an indication for the termination of pregnancy.

So far, 25 pregnancies have been recorded following TRFA treatments. There are 11 full-term births and 9 patients currently pregnant. Three patients had a spontaneous abortion, and 2 had an abortion. There were also reports of spontaneous deliveries (2), whereas the majority of patients delivered by Cesarean section (8 of 11). Therefore, a final recommendation on pregnancy after TRFA cannot be made at this time.

Integration of the procedure of transcervical high-frequency ablation into fibroid treatment

Comparison to hysterectomy

Compared to hysterectomy, this procedure has several advantages (organ preservation, low intra- and postoperative risk, shorter

operative time, and very rapid convalescence). Especially in light of the currently persistently high hysterectomy rate in German-speaking countries, TRFA could be an alternative option for many women (31). One US study compared costs between TRFA and hysterectomy. The overall costs for TRFA were only at about one-third compared to hysterectomy. The same was true for the cost comparison with fibroid enucleation (13).

Comparison with organ-preserving surgical methods

The TRFA procedure is also an alternative for fibroids that are difficult to access using organ-preserving surgical treatments or that are associated with higher complication rates (37) (Tab. 2 on P. XXX). In patients with elevated risks during laparoscopy (morbid obesity or multiple prior surgeries), TRFA is advantageous. Compared to hysteroscopic fibroid resection, TRFA has a lower risk of the development of adhesions, while otherwise adhesions can be expected at a rate of 10% (19, 35). This applies to fibroids of FIGO type 2 to 4, and in some circumstances, also to FIGO type 1 and 5 fibroids. TRFA is particularly well suited for patients with bleeding disorders because it results in a significant reduction in bleeding intensity as an objective measurement. Also, due to the

Comparison of TRFA with organ-preserving surgical treatments		
	Surgical treatment	TRFA
Operative time	Longer	Shorter
Rate of complications	Higher	Very low
Blood loss	More	No
Postoperative pain	More	Less
Postoperative intrauterine adhesions	Up to 10%	None
Disruption in uterine-wall continuity	Possible	No
Convalescence time	Longer	Shorter
Reintervention rate	10–30%	< 10%
DRG reimbursements	Covered	Material costs not covered

Tab. 2

reduction in fibroid volume, which is up to 67%, a reduction in pain symptoms occurs, resulting in a proven improvement in quality of life (4, 14, 28).

Comparison with interventional radiology treatment methods (UAE, HIFU)

The procedure has a lower complication rate than other nonsurgical methods, including uterine artery embolization (UAE). Unlike UAE, TRFA does not have a negative effect on ovarian function or lead to amenorrhea.

Unlike traditional high-focused transabdominal ultrasound ablation (operative time of 3–4 h), TRFA is much shorter (operative time of 10–46 min) and can be performed by gynecologists (4, 27, 37). It is also suitable for fibroids that are difficult to access with

high-intensity focused ultrasound (HIFU) treatment because they are on the posterior wall, for example. TRFA can be performed even in patients who have had prior surgeries. Also, several fibroids can be treated at the same time. TRFA can also be performed in combination with other procedures in the same session, particularly with hysteroscopic fibroid resection, and such is practiced. The rate of complications is less than that for all interventional radiology and organ-preserving surgical procedures (Tab. 3) (41).

Other developments

Prospective randomized studies comparing TRFA with organ-preserving surgical methods are being planned. Other studies on the advantages of the method also for FIGO type 1 fibroids (compared

to hysteroscopic resection) and for FIGO type 5–6 fibroids (compared to laparoscopic enucleation) are needed. Studies on the effect on pregnancy and the delivery mode, especially after the treatment of intramural fibroids, are also needed. The option of using the method in extensive focal adenomyosis needs to be examined soon in prospective studies.

Summary

Transcervical radiofrequency ablation can now be recommended as a method based on long years of experience and available studies. Patients need to be informed of this option (Fig. 7). Advantages of the procedure are a faster intervention with a low complication rate and rapid convalescence in patients. TRFA can be combined with other surgical procedures. The success rate in regard to the reduction in bleeding disorders and to an improvement in quality of life is high in the long term. The reintervention rate is relatively low at about 10%, but longitudinal data are still limited here. A definitive statement in regard to fertility cannot be made at this time, but the avoidance of intrauterine adhesions compared to hysteroscopic fibroid resection as well as the preservation of the uterine wall compared to laparoscopic fibroid enucleation speak for its use in patients who want to have children. There have already been reports of a small number of successful pregnancies following the TRFA procedure (3, 37).

Possible disadvantages of the method are the necessity for special training for users (learning curve of about 10 to 20 interventions) and only partial coverage of costs for the single-use instrument through DRG N25.Z

Comparison of TRFA with interventional radiology treatment			
	Uterine artery embolization	High-intensity focused ultrasound	TRFA
Length of surgery	60 min–2 hr	2–4 hr	10–46 min
Complication rate (literature surveys)	15%	6%	1%
Reintervention rate (literature survey)	25%	50%	10–20%
Ability to have children	No	Yes	Yes

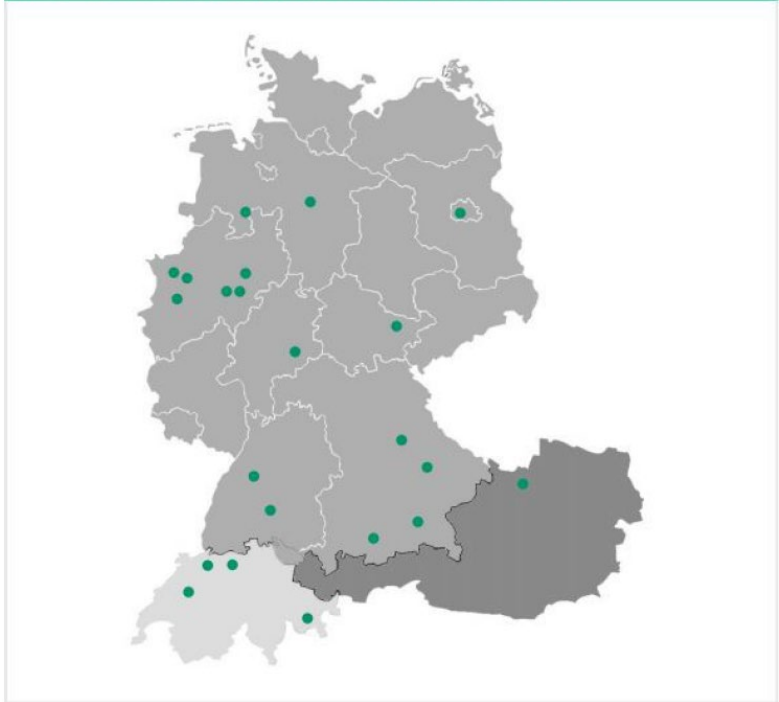
Tab. 3

(fibroid enucleation). An outpatient procedure is, at least in Germany, not possible at the current time. Other longitudinal data (5-year data) are needed, and information on the effect of the procedure on subsequent fertility is still limited.

Consensus statements

1. Transcervical high-frequency ablation in the hands of a gynecologist is an alternative treatment option. This method is indicated in patients with symptomatic uterine fibroids (suspected bleeding disorders). It is preferred in FIGO type 2, 3, 4, and 2–5 fibroids and all fibroids that are difficult to access using surgical treatment.
2. Intrauterine radiofrequency ablation of fibroids directly controlled by ultrasonography is a rapid targeted procedure to treat symptomatic fibroids. Results of studies up to 2 years show higher effectiveness with more than a 90% improvement in symptoms and a significant increase in quality of life. The operative time is considerably reduced compared to all other procedures, as is the time to convalescence (1–2 days).
3. Patients need to be informed that increased bleeding and discharge can occur directly after surgery. Treatment success cannot be evaluated until at least after 3 months and needs to focus on the improvement in clinical symptoms, not the reduction in fibroid volume.
4. The method’s complication rate is extremely low. With targeted use, the method has, therefore, significant advantages over surgical methods. Exceptions are FIGO type 0, 1, 6, and 7 fibroids

Users in Germany, Austria, and Switzerland



Germany

- Cologne-Weyertal Evangelical Hospital, Prof. Römer/Dr. Piriyeve (since 2014)
- Marien Hospital Schwerte, Dr. Hartmann (since 2015)
- Erlangen University Hospital, PD Dr. Hildebrandt/PD Dr. Burghaus (since 2016)
- Wesel Evangelical Hospital, Dr. Uhl (since 2016)
- Jena University Hospital, Prof. Runnebaum/Dr. Shtian (since 2016)
- Kempten Hospital, Dr. Felberbaum/Dr. Brössner (since 2016)
- Böblingen Hospital, Prof. Renner (since 2016)
- Marien Hospital in Witten, Prof. Schiermeier/Dr. Dagres (since 2017)
- Josephs-Hospital Warendorf, Dr. Pschadka/Dr. Engelhardt (since 2017)
- Hannover Medical School (MHH), Prof. Hillemanns/Prof. Hertel (since 2017)
- University Medical Center Mannheim, Prof. Sütterlin/Prof. Tuschy/Prof. Berlit (since 2017)
- Sana Hospital Duisburg, Prof. Schmidt/Dr. Schwödiauer (since 2018)
- St. Elisabeth Hospital Damme, Dr. Holthaus (since 2019)
- Marburg Giessen University Hospital, Prof. Meinhold-Heerlein/Dr. Reising (since 2019)
- Munich Clinic Schwabing, Dr. Neumann (since 2019)
- Caritas Hospital St. Josef in Regensburg, Prof. Ignatov (since 2020)
- Vivantes Humboldt Hospital, Prof. Halwani/Dr. Kotanidis (since 2020)
- Mathilden Hospital Herford, Dr. Wojdat (since 2021)

Austria

- Kepler University Hospital Linz, Prof. Oppelt (since 2017)

Switzerland

- Upper Engadin Hospital Samedan, Dr. Christoffel (since 2017)
- Bern University Hospital, Prof. Mueller (since 2018)
- Baden Cantonal Hospital, Prof. Heubner (since 2018)
- City Hospital Triemli Zurich, Dr. Passweg (since 2019)

Tab. 5

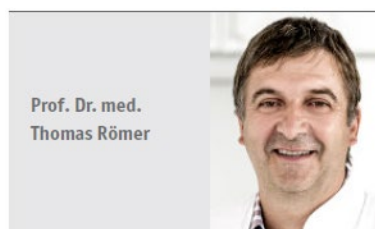
that are easily accessible by hysteroscopic or laparoscopic surgery.

5. The method has a lower reintervention rate compared to organ-preserving surgical methods and interventional radiology therapies (UAE, HIFU).
6. Following TRFA, patients should wait 3 months before becoming pregnant. Successful pregnancies, including those with subsequent spontaneous deliveries, are known. A final assessment in regard to fertility and the course of pregnancy cannot be made at this time.
7. The method can be quickly learned by gynecologists trained in vaginal sonography and endoscopy.
8. Another therapeutic option for the future is the treatment of focal adenomyosis with TRFA.
9. Transcervical radiofrequency ablation of fibroids is an efficient method with a low complication rate for patients with symptomatic fibroid-associated bleeding disorders and pain and should, therefore, be offered to more patients. A number of centers in the 3 German-speaking countries already offer the procedure (Fig. 5 on P. XXX).

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References

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Conflict of interest

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