Laparoscopic and Percutaneous Techniques for the Myolysis of Uterine Fibroids

Description

Various minimally invasive treatments for uterine fibroids have been proposed as alternatives to surgery. Among these approaches are laparoscopic and percutaneous techniques to induce myolysis, which includes radiofrequency volumetric thermal ablation (RFVTA), laser and bipolar needles, cryomyolysis, and magnetic resonance imaging–guided laser ablation.

Background

Uterine fibroids are one of the most common conditions affecting women in the reproductive years; symptoms include menorrhagia, pelvic pressure, or pain. Surgery, including hysterectomy and various myomectomy procedures, is considered the criterion standard treatment for symptom resolution. However, there is the potential for surgical complications and, in the case of hysterectomy, the uterus is not preserved. In addition, in the case of multiple uterine fibroids, myomectomy can be a time-consuming procedure.

There has been longstanding research interest in developing minimally invasive alternatives for treating uterine fibroids, including procedures that retain the uterus and allow for future childbearing. Treatment options include uterine artery embolization (UAE), addressed in policy 4.01.11 and the transcutaneous procedure MRI-guided focused ultrasound therapy (MRgFUS), addressed in 7.01.109. Various techniques to induce myolysis have also been studied including Nd:YAG lasers, bipolar electrodes, cryomyolysis and radiofrequency ablation. An energy source is used to create areas of necrosis within uterine fibroids, reducing their volume and thus relieving symptoms. Early methods involved the insertion of probes multiple times into the fibroid and were performed without imaging guidance. There were concerns about serosal injury and abdominopelvic adhesions with these techniques, possibly due to the multiple passes through the serosa needed to treat a single fibroid. (1) Newer systems using radiofrequency energy do not require multiple repetitive insertions of needle electrodes. Ultrasonography is used laparoscopically to determine the size and location of fibroids, to guide the probe, and to ensure the probe is in the correct location so that optimal energy is applied to the fibroid. Percutaneous approaches using magnetic resonance imaging (MRI) guidance have also been reported.
Regulatory Status

In November 2012, the Acessa™ System (Halt Medical; Brentwood, CA) was cleared for marketing by the Food and Drug Administration (FDA). The device is indicated for percutaneous laparoscopic coagulation and ablation of soft tissue and treatment of symptomatic uterine fibroids under laparoscopic ultrasound guidance is one of the listed indications. The technology was previously approved in 2010 at which time it was called the Halt 2000GI™ Electrosurgical Radiofrequency Ablation System (Halt Medical; Brentwood, CA). The intended use of the Halt 2000GI™ system was for percutaneous laparoscopic coagulation and ablation of soft tissue. Unlike FDA clearance of the Acessa™ System, the intended use statement for the Halt 2000GI™ system does not specifically mention treatment of uterine fibroids. FDA Product Code: GEI.

Note: In November 2014, the U.S. Food and Drug Administration (FDA) published a safety communication on laparoscopic power morcellators used for myomectomy and hysterectomy in most women. (Morcellators are not otherwise addressed in this policy). FDA recommended that manufacturers of these devices include in their product labels a boxed safety warning and wording on contraindications (see http://www.fda.gov/safety/medwatch/safetyinformation/safetyalertsforhumanmedicalproducts/ucm393809.htm).

Related Policies

4.01.11 Occlusion of Uterine Arteries Using Transcatheter Embolization
7.01.119 MRI-Guided Focused Ultrasound (MRgFUS)

Policy

*This policy statement applies to clinical review performed for pre-service (Prior Approval, Precertification, Advanced Benefit Determination, etc.) and/or post-service claims.

Laparoscopic and percutaneous techniques of myolysis as a treatment of uterine fibroids are considered not medically necessary.

Rationale

Laparoscopic Procedures

Radiofrequency Volumetric Thermal Ablation

In 2014, Brucker et al in Germany published an industry-sponsored RCT comparing radiofrequency ablation with the Acessa system (Halt Medical) to laparoscopic myomectomy. (2) The study included 51 premenopausal women at least 18 years old with symptomatic uterine fibroids less than 10 cm in any diameter and a uterine size of less than 17 weeks of gestation. Pregnancy and lactation were exclusion criteria. Prior to randomization, all participants underwent laparoscopic ultrasound mapping. Data on 50 of the 51 women were analyzed. The primary study outcome, mean (SD) time to hospital discharge, was 10.0 (5.5) hours in the RFA group and 29.9 (14.2) hours in the myomectomy group.
The criterion for noninferiority (no more than 10% longer hospital stay with RFVTA than laparoscopic myomectomy) was met at a significance level of p<0.001. All patients in the myomectomy group were hospitalized overnight; although not explicitly stated, this appeared to be the standard procedure at the study hospital. In the Acessa group, there was 1 unplanned hospitalization due to unexplained vertigo and 4 hospitalizations as standard procedure because the patients also underwent adhesiolysis.

Secondary outcomes of the RCT were reported in a 2015 publication by Hahn et al (3) (12-month outcomes) and a 2016 publication by Kramer et al (4) (24-month outcomes). Analysis was per protocol and 43 (84%) of 51 randomized participants were available for both the 12- and 24-month analyses. Each publication reported on 12 symptoms: heavy menstrual bleeding, increased abdominal gait, dyspareunia, pelvic discomfort/pain, dysmenorrhea, urinary frequency, urinary retention, sleep disturbance, backache, localized pain, and “other symptoms” (not specified). At 12 months, no participants reported 4 of the symptoms (dyspareunia, urinary retention, sleep disturbance, uterine pain) and there were no statistically significant between-group differences in the frequency of any of the remaining 8 symptoms (at the p<0.05 level). The most commonly reported symptom at 12 months (heavy menstrual bleeding) occurred in 7 (33%) of women in the RFVTA group and 2 (9%) of women in the laparoscopic myomectomy group (p=0.069) after controlling for baseline bleeding. At 24 months, no participants reported urinary retention or “other” symptoms, and there were no statistically significant between-group differences in any of the 10 reported symptoms. The most commonly reported symptom at 24 months (dysmenorrhea) occurred in 8 (38%) in the RFVTA group and in 7 (32%) in the laparoscopic myomectomy group (p=0.67). Patients were also assessed using several validated questionnaires (eg, the Uterine Fibroid Symptom and Quality of Life). There were no statistically significant between-group differences at 12 or 24 months on these validated questionnaires. In addition, the authors described pregnancy outcomes. Three patients in the RFVTA group conceived and all delivered a healthy neonate; the number of women who desired to become pregnant was not reported. Limitations of the 12- and 24-month analyses included lack of intention-to-treat analysis and failure to describe secondary study hypotheses and statistical analyses clearly. The RCT was relatively small in size and thus may have been underpowered to detect clinically meaningful differences in secondary outcomes, so these results do not rule out potential differences between treatments.

In addition to the RCT, several uncontrolled case series were identified. In 2013, Chunduff et al published a prospective industry-funded multicenter study. (5) It included 135 premenopausal women at least 25 years-old with symptomatic uterine fibroids, a uterine size of 14 weeks of gestation or less, and 6 or fewer treatable fibroids, with no single fibroid larger than 7 cm. In addition, women desired to preserve their uteri but not to have children in the future. Radiofrequency thermal ablation was conducted using the Acessa system. According to the study protocol, most fibroids less than 1 cm in diameter were not treated. The primary efficacy outcomes were change in the volume of menstrual bleeding and the surgical reintervention rate after 12 months. A total of 127 of 135 women (94%) completed the study. From baseline to 12 months, 53 of 127 women (42%; 95% confidence interval, 32% to 49%) experienced at least a 50% reduction in the volume of menstrual bleeding. Most women (104/127 [82%]) experienced a decrease in menstrual bleeding at 12 months. Only 1 woman underwent a surgical reintervention through 12 months (this woman had been lost to follow-up and was not included in the other efficacy analyses). Three-year outcomes were reported by Berman et al in 2014. (6) A total of 104 of the 135 women who participated in the study (77%) were evaluable at 3 years.
Fourteen women underwent reintervention over the 3 years to treat uterine fibroid symptoms. Eleven women had hysterectomies, 2 had myomectomies, and 1 had uterine artery embolization. Bleeding outcomes were not reported for the cohort at 3 years, but the authors stated that quality-of-life variables improved from baseline to 36 months and that most of the improvement in quality of life occurred in the 3 months following the procedure.

A large retrospective case series was published by Yin et al in 2015. The study was conducted in China and used Chinese gynecologic RFA devices. (7) It included 1216 consecutive patients treated at a single hospital over a 10-year period. All fibroids were less than 6 cm in size and mean diameter was 4.5 cm (range, 3.1-6.0 cm). Mean follow-up time was 36.5 months. Among the 476 premenopausal women, the mean reduction in myoma diameter was 2.7 cm at 6 months, 2.4 cm at 12 months, and 2.2 cm at 24 months. Among the 740 peri- or postmenopausal women, mean reduction was 3.3 cm at 6 months, 2.3 cm at 12 months, and 2.3 cm at 24 months. Myoma diameter was significantly lower at each of these time points posttreatment compared with pretreatment. In the premenopausal subgroup, the proportion of women with dysmenorrhea decreased from 43.7% at baseline to 7.6% at 12 months and to 6.7% at 24 months; rates were significantly lower after treatment.

Section Summary: Radiofrequency Volumetric Thermal Ablation

One RCT comparing RFVTA and laparoscopic myomectomy has been published. The trial found that RFVTA was noninferior to laparoscopic myomectomy on the primary outcome, length of hospitalization. A number of secondary outcomes were reported at 12 and 24 months, none of which were significantly different between groups. There were methodologic limitations, such as per protocol analyses and substantial missing data at 12 and 24 months, and the trial may not have been adequately powered to detect differences in clinical outcomes. Additional well-designed RCTs are needed to determine the effect of RFVTA on long-term health outcomes.

Laser and Bipolar Needles

Several case series were identified and most of these were published in the 1990s. For example, in 1995 Goldfarb et al reported the outcomes of 300 women with symptomatic fibroids no larger than 10 cm who underwent myolysis using either Nd:YAG or bipolar needles. (8) The author reported that the coagulating effect of the bipolar needle devascularized the fibroids, and the resulting shrinkage was comparable with that produced by Nd:YAG laser. Another study by Goldfarb et al, published in 1992, included 75 patients who presented with symptomatic fibroids 5 to 10 cm in diameter. (9) Symptoms included pelvic pain, pressure, dyspareunia, and recurrent menorrhagia. The Nd:YAG laser was inserted into the fibroid multiple times; for example, eg, 75 to 100 punctures were used to coagulate a 5-cm fibroid. Based on assessment by endovaginal ultrasound, the fibroids regressed in size and, after 6 to 14 months of follow-up, the size remained stable. No patient experienced significant complications. In 1993, Nisolle et al reported on a case series of 48 women who were apparently offered myolysis instead of myomectomy if they had completed childbearing. (10) Although the report states that 28 of the 48 had more than 2 fibroids, it is not clear if all fibroids were treated in each patient, and if not, how the treated fibroids were selected. The authors reported that maximal decrease in fibroid size had occurred by 6 months. However, there is no report of associated patient symptoms.
Several authors have reported pelvic adhesions as a complication, presumably due to thermal damage to the serosal surface. In addition, the Nd:YAG laser produces a significant amount of smoke, which can obscure visibility. (11,12)

**Section Summary: Laser and Bipolar Needles**

Only case series were available and most were published in the 1990s. RCTs comparing laser and bipolar needles to alternative treatments for uterine fibroids and reporting health outcomes are needed.

**Cryomyolysis**

Cryomyolysis is a technique in which a cryoprobe is inserted into the center of a fibroid. Freezing temperatures of -180 °C create an “iceball” within the fibroid. Several freeze/thaw cycles are typically used. In 1998, Zreik et al published a prospective pilot study with 14 patients and in 2004, Zupi et al presented their experience with 20 patients. (13, 14) In both of these small case series, the authors reported that patients had symptom resolution. In the Zreik study, patients were given a gonadotropin-releasing hormone (GnRH) agonist before the procedure to reduce the size of the fibroid. Cryomyolysis maintained or slightly reduced the post-GnRH uterine size. In contrast, in the Zupi study, GnRH was not used, and cryomyolysis was associated with a 25% reduction in fibroid size. In 2005, Zupi et al reported the 1-year follow-up of these patients. (15) Mean shrinkage in fibroid size continued until 9 months after surgery, to a mean volume reduction of 60%. Patients reported absence of symptoms. Interpretation of these studies is limited due to their small size and lack of a comparison group.

**Section Summary: Cryomyolysis**

Only several small case series are available. RCTs comparing cryomyolysis to alternative treatments for uterine fibroids and reporting health outcomes are needed.

**Percutaneous Procedures**

**Magnetic Resonance Image (MRI)-Guided Laser Ablation**

In 2002, Hindley et al reported on a case series of 66 patients with symptomatic fibroids who were treated with MRI-guided percutaneous Nd:YAG laser myolysis. (16) Outcome measures included assessment of fibroid size and responses to a menorrhagia questionnaire. The mean reduction in fibroid size was 31%. Compared to a historical control group of women undergoing hysterectomy, the total outcome score was less in those undergoing percutaneous myolysis but the quality of life score was similar. Although not entirely clear, it appears that treatment was targeted to only the largest fibroid in each patient. The study did not provide details on the number and location of fibroids.

**Section Summary: Magnetic Resonance Imaging–Guided Laser Ablation**

Only 1 case series was identified. RCTs comparing MRI-guided percutaneous laser ablation to alternative treatments for uterine fibroids and reporting health outcomes are needed.
Ongoing and Unpublished Clinical Trials

Some currently unpublished trials that might influence this policy are listed in Table 1.

Table 1. Summary of Key Trials

<table>
<thead>
<tr>
<th>NCT No.</th>
<th>Trial Name</th>
<th>Planned Enrollment</th>
<th>Completion Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>NCT01563783</td>
<td>The Trust (Treatment Results of Uterine Sparing Technologies)</td>
<td>260</td>
<td>Dec 2020</td>
</tr>
<tr>
<td>Study</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NCT: national clinical trial.

Denotes industry-sponsored or cosponsored trial.

Practice Guidelines and Position Statements

In 2015, the Society of Obstetricians and Gynecologists of Canada published a clinical practice guideline on management of uterine leiomyomas. (17) The guideline included the summary following statements:

- “Of the conservative interventional treatments currently available, uterine artery embolization has the longest track record and has been shown to be effective in properly selected patients.”
- “Newer focused energy delivery methods are promising but lack long-term data.”

In 2014, the American College of Obstetricians and Gynecologists reaffirmed a 2008 Practice Bulletin titled Alternatives to Hysterectomy in the Management of Leiomyomas. (18) Recommendations based on good and consistent scientific evidence are that abdominal myomectomy is a safe and effective treatment of women with symptomatic leiomyomas and that uterine artery embolization is a safe and effective option for appropriately selected women who wish to retain their uteri. The bulletin contains no recommendations regarding myolysis utilizing laparoscopic or percutaneous techniques.

U.S. Preventive Services Task Force

Not applicable

Summary of Evidence

For individuals who have uterine fibroids who receive radiofrequency volumetric thermal ablation (RFVTA), the evidence includes 1 randomized controlled trial (RCT). Relevant outcomes are symptoms, quality of life, and treatment-related morbidity. The RCT found that RFVTA was noninferior to laparoscopic myomectomy on the trial’s primary outcome, length of hospitalization. A number of secondary outcomes were reported at 12 and 24 months, none of which demonstrated significant between-group differences. The trial had methodologic limitations (eg, lack of intention-to-treat analysis) and the statistical hypotheses and analyses were not well-described. As a result, the validity of the reported results is decreased and no definitive conclusions about outcomes can be made. Additional high-quality RCTs are needed to determine the effect of RFVTA on long-term health outcomes. Moreover, future studies should focus more on fertility outcomes following RFVTA. The evidence is insufficient to determine the effects of the technology on health outcomes.
For individuals who have uterine fibroids who receive laser or bipolar needles, the evidence includes case series. Relevant outcomes are symptoms, quality of life, and treatment-related morbidity. The case series were published in the 1990s and the procedures used may not reflect current practice. RCTs comparing laser or bipolar needles to alternative treatments for uterine fibroids are needed to adequately evaluate the safety and efficacy of this technology. The evidence is insufficient to determine the effects of the technology on health outcomes.

For individuals who have uterine fibroids who receive cryomyolysis, the evidence includes case series. Relevant outcomes are symptoms, quality of life, and treatment-related morbidity. Among the few case series, sample sizes were small (≤20 patients). RCTs comparing cryomyolysis to alternative treatments for uterine fibroids are needed to adequately evaluate the safety and efficacy of this technology. The evidence is insufficient to determine the effects of the technology on health outcomes.

For individuals who have uterine fibroids who receive MRI-guided laser ablation, the evidence includes 1 case series. Relevant outcomes are symptoms, quality of life, and treatment-related morbidity. A single case series (N=66) is insufficient for evaluating the technology. RCTs comparing MRI-guided laser ablation to alternative treatments for uterine fibroids are needed to adequately evaluate the safety and efficacy of this technology. The evidence is insufficient to determine the effects of the technology on health outcomes.

Medicare National Coverage

There is no national coverage determination (NCD).

References


**Policy History**

<table>
<thead>
<tr>
<th>Date</th>
<th>Action</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>September 2014</td>
<td>Update Policy</td>
<td>Policy updated with literature review; references 5 and 15 added. Policy statement unchanged.</td>
</tr>
<tr>
<td>September 2015</td>
<td>Update Policy</td>
<td>Policy updated with literature review; references 5 and 15 added. Policy statement unchanged.</td>
</tr>
<tr>
<td>September 2016</td>
<td>Update Policy</td>
<td>Policy updated with literature review; references 3-4 added. Policy statement unchanged.</td>
</tr>
</tbody>
</table>

**Keywords**

Bipolar Electrodes, Treatment of Uterine Fibroids
Fibroids, Uterus, Laparoscopic and Percutaneous Treatment
Laser, Laparoscopic Treatment of Uterine Fibroids
MRI Guided Percutaneous Treatment of Uterine Fibroids
Uterine Fibroids, Laparoscopic Techniques of Myolysis
Cryomyolysis
Myolysis
Acessa
Halt
Laparoscopic coagulation and ablation
Laparoscopic ultrasound guidance

This policy was approved by the FEP® Pharmacy and Medical Policy Committee on September 16, 2016 and is effective October 15, 2016.

Signature on file
Deborah M. Smith, MD, MPH