Laparoscopic and Percutaneous Techniques for the Myolysis of Uterine Fibroids

Policy Number: 4.01.19  Last Review: 9/2019

Policy
Blue Cross and Blue Shield of Kansas City (Blue KC) will not provide coverage for Laparoscopic and Percutaneous Techniques for the Myolysis of Uterine Fibroids. This is considered investigational.

When Policy Topic is covered
n/a

When Policy Topic is not covered
Laparoscopic and percutaneous techniques of myolysis as a treatment of uterine fibroids are considered investigational.

Description of Procedure or Service

<table>
<thead>
<tr>
<th>Populations</th>
<th>Interventions</th>
<th>Comparators</th>
<th>Outcomes</th>
</tr>
</thead>
</table>
| Individuals:  
  • With symptomatic uterine fibroids | Interventions of interest are:  
  • Radiofrequency volumetric thermal ablation | Comparators of interest are:  
  • Medical management  
  • Uterine artery embolization  
  • Myomectomy  
  • Hysterectomy | Relevant outcomes include:  
  • Symptoms  
  • Quality of life  
  • Treatment-related morbidity |

| Individuals:  
  • With symptomatic uterine fibroids | Interventions of interest are:  
  • Laser and bipolar needles | Comparators of interest are:  
  • Medical management  
  • Uterine artery embolization  
  • Myomectomy  
  • Hysterectomy | Relevant outcomes include:  
  • Symptoms  
  • Quality of life  
  • Treatment-related morbidity |

| Individuals:  
  • With symptomatic uterine fibroids | Interventions of interest are:  
  • Cryomyolysis | Comparators of interest are:  
  • Medical management | Relevant outcomes include:  
  • Symptoms  
  • Quality of life  
  • Treatment-related morbidity |
A variety of minimally invasive treatments, alternatives to surgery, have been proposed for treatment of uterine fibroids. Among these approaches are laparoscopic and percutaneous techniques to induce myolysis, which includes Nd:YAG lasers, bipolar electrodes, supercooled cryoprobes, and ultrasonographically guided radiofrequency ablation (RFA).

For individuals who have uterine fibroids who receive 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 study’s primary outcome, length of hospitalization. A number of secondary outcomes were reported at 12 and 24 months and there were no significant between-group differences on any of these. There were methodological limitations to this study 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 can be made. Additional high-quality RCTs are needed to determine the effect of RFVTA on long-term health outcomes. Moreover, future studies should have a greater focus 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 utilized 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. There were a small number of case series and 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.

**Background**

**Uterine Fibroids**

Uterine fibroids are among the most common conditions affecting women in their reproductive years; symptoms include menorrhagia, pelvic pressure, or pain.

**Treatment**

Surgery, including hysterectomy and various myomectomy procedures, is considered the criterion standard for symptom resolution. However, there is the potential for surgical complications and, in the case of a hysterectomy, the uterus is not preserved. In addition, multiple myomectomy may be associated with longer operating time, postoperative febrile morbidity, and development of pelvic adhesions. There has been long-standing research interest in developing minimally invasive alternatives for treating uterine fibroids, including procedures that retain the uterus and permit future childbearing. Treatment options include uterine artery embolization (see evidence review 4.01.11) and the transcutaneous magnetic resonance imaging-guided focused ultrasound therapy (see evidence review 7.01.109). Various techniques to induce myolysis have also been studied including Nd:YAG lasers, bipolar electrodes, cryomyolysis, and radiofrequency ablation. With these techniques, an energy source is used to create areas of necrosis within uterine fibroids, reducing their volume and thus relieving symptoms. Early methods involved multiple insertions of probes into the fibroid, 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. Newer systems using radiofrequency energy do not require 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 guidance have also been reported.

**Regulatory Status**

In 2012, the Acessa™ System (Acessa Health, formerly Halt Medical) was cleared for marketing by the U.S. Food and Drug Administration (FDA) through the 510(k) process for percutaneous laparoscopic coagulation and ablation of soft tissue and treatment of symptomatic uterine fibroids under laparoscopic ultrasound guidance (K121858). The technology was previously approved in 2010, at which time it was called the Halt 2000GI™ Electrosurgical Radiofrequency Ablation System. In 2014, the ultrasound guidance system received marketing clearance from FDA (K132744). FDA product code: GEI.
Cryoablation is a surgical procedure that uses previously approved and available cryoablation systems; and as a surgical procedure, it is not subject to regulation by FDA. Other products addressed in this review (eg, Nd:YAG lasers, bipolar electrodes) have long-standing FDA approval, and there are no products specifically approved for treatment of uterine fibroids.

**Rationale**

This evidence review was created in July 2004 and has been updated regularly with searches of the MEDLINE database until it was archived in December 2009. In July 2013, the review returned to active status. The most recent literature update was performed through June 4, 2018.

Evidence reviews assess the clinical evidence to determine whether the use of a technology improves the net health outcome. Broadly defined, health outcomes are length of life, quality of life, and ability to function including benefits and harms. Every clinical condition has specific outcomes that are important to patients and to managing the course of that condition. Validated outcome measures are necessary to ascertain whether a condition improves or worsens; and whether the magnitude of that change is clinically significant. The net health outcome is a balance of benefits and harms.

To assess whether the evidence is sufficient to draw conclusions about the net health outcome of a technology, 2 domains are examined: the relevance and the quality and credibility. To be relevant, studies must represent one or more intended clinical use of the technology in the intended population and compare an effective and appropriate alternative at a comparable intensity. For some conditions, the alternative will be supportive care or surveillance. The quality and credibility of the evidence depend on study design and conduct, minimizing bias and confounding that can generate incorrect findings. The randomized controlled trial (RCT) is preferred to assess efficacy; however, in some circumstances, nonrandomized studies may be adequate. RCTs are rarely large enough or long enough to capture less common adverse events and long-term effects. Other types of studies can be used for these purposes and to assess generalizability to broader clinical populations and settings of clinical practice.

**Radiofrequency Volumetric Thermal Ablation**

**Clinical Context and Therapy Purpose**

The purpose of radiofrequency volumetric thermal ablation (RFVTA) in women who have uterine fibroids is to provide a treatment option that is an alternative to or an improvement on existing therapies.

The question addressed in this evidence review is: Does the use of RFVTA improve the net health outcome in women with uterine fibroids?

The following PICOTS were used to select literature to inform this review.
Patients
The relevant population of interest is women with symptomatic uterine fibroids.

Interventions
The therapy being considered is RFVTA.

Comparators
The following therapies and practices are currently being used to make decisions about managing uterine fibroids: medical management, uterine artery embolization (UAE), myomectomy, and hysterectomy.

Outcomes
The outcomes of interest are, complications, postoperative pain and recovery time, symptom resolution, need for reintervention, and health-related quality of life.

Timing
Immediate follow-up would be a week for postoperative pain and recovery; and 3 to 5 years of follow-up would be needed to monitor for fibroid recurrence and retreatment.

Setting
RFVTA is administered is an inpatient or ambulatory surgery setting with treatment by a gynecologic surgeon.

Systematic Reviews
A systematic review and meta-analysis by Sandberg et al (2018) evaluated the risk of reintervention for hysterectomy and quality of life after uterine-sparing interventions for fibroids (see Tables 1 and 2). Risk of reintervention at 12 months was 0.3% for RFVTA compared with 3.6% for UAE and 1.1% for myomectomy. Symptom severity and quality of life scores were similar for the 3 treatments. Only 1 RFVTA study was identified on reintervention risk at 36 months; none was identified on reintervention risk at 60 months.

Table 1. Characteristics of Systematic Reviews on RFVTA

<table>
<thead>
<tr>
<th>Study</th>
<th>Dates</th>
<th>Trials</th>
<th>Participants</th>
<th>N</th>
<th>Design</th>
<th>Duration, mo</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sandberg et al (2018)</td>
<td>2006-2016</td>
<td>45</td>
<td>Women with symptomatic uterine fibroids undergoing myomectomy, UAE, or RFVTA</td>
<td>17,789</td>
<td>Studies evaluating reintervention for hysterectomy and quality of life with consecutive enrollment and follow-up of ≥12 mo</td>
<td>11.2-34.7</td>
</tr>
</tbody>
</table>

RFVTA: radiofrequency volumetric thermal ablation; UAE: uterine artery embolization.
### Table 2. Results of Systematic Reviews on RFVTA

<table>
<thead>
<tr>
<th>Study</th>
<th>Reintervention Risk (95% CI), %</th>
<th>Symptom Severity Score at 12 mo (95% CI), %</th>
<th>QOL at 12 mo (95% CI), %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>At 12 Months</td>
<td>At 36 Months</td>
<td>At 60 Months</td>
</tr>
<tr>
<td>Sandberg et al (2018)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total studies</td>
<td>40</td>
<td>8</td>
<td>27</td>
</tr>
<tr>
<td>Myomectomy</td>
<td>1.1 (0.0 to 3.7)</td>
<td>1.2 (0.0 to 5.2)</td>
<td>12.2 (5.2 to 21.2)</td>
</tr>
<tr>
<td>UAE</td>
<td>3.6 (2.4 to 4.9)</td>
<td>7.4 (0.9 to 10.7)</td>
<td>14.4 (9.8 to 19.6)</td>
</tr>
<tr>
<td>RFVTA</td>
<td>0.3 (0.0 to 1.6)</td>
<td>10.4 (1 study)</td>
<td>Unknown</td>
</tr>
</tbody>
</table>

CI: confidence interval; QOL: quality of life; RFVTA: radiofrequency volumetric thermal ablation; UAE: uterine artery embolization.

### Randomized Controlled Trials

One RCT evaluating RFVTA was included in the Sandberg et al (2018) systematic review, with Tables 3 and 4 describing trial characteristics and results.

### Table 3. Summary of Key Randomized Controlled Trial Characteristics for RFVTA

<table>
<thead>
<tr>
<th>Study</th>
<th>Countries</th>
<th>Sites</th>
<th>Dates</th>
<th>Participants&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Interventions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brucker et al (2014)</td>
<td>Germany</td>
<td>1</td>
<td>2012-2013</td>
<td>· ≥18 y &lt;br&gt; · Menstruating &lt;br&gt; · Symptomatic uterine fibroids &lt;br&gt; &lt;10 cm &lt;br&gt; · Uterine size &lt;br&gt; &lt;16 gestational wk &lt;br&gt; · Desire</td>
<td>RFVTA=26, LM=25</td>
</tr>
</tbody>
</table>
LM: laparoscopic myomectomy; RFVTA: radiofrequency volumetric thermal ablation.

* Key eligibility criteria.

### Table 4. Summary of Key Randomized Controlled Trial Outcomes for RFVTA

<table>
<thead>
<tr>
<th>Study</th>
<th>Primary Outcome</th>
<th>Secondary Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hospital LOS (SD), h&lt;sup&gt;a&lt;/sup&gt;</td>
<td>Mean SSS</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12 mo</td>
</tr>
<tr>
<td>Brucker et al (2014)&lt;sup&gt;a&lt;/sup&gt;; Kramer et al (2016)&lt;sup&gt;a&lt;/sup&gt;</td>
<td>50</td>
<td>43&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>RFVTA</td>
<td>10.0 (5.5)</td>
<td>24.7</td>
</tr>
<tr>
<td>Laparoscopic myomectomy</td>
<td>29.9 (14.2)</td>
<td>26</td>
</tr>
<tr>
<td>p</td>
<td>&lt;0.001&lt;sup&gt;b&lt;/sup&gt;</td>
<td><em>NS</em></td>
</tr>
</tbody>
</table>

HRQOL: health-related quality of life; LOS: length of stay; RFVTA: radiofrequency volumetric thermal ablation; SSS: Symptom Severity Score.

<sup>a</sup> Analyses at 12 and 24 months were per protocol and included 84% of randomized participants.

<sup>b</sup> Met criteria for noninferiority: hospital LOS after RFVTA no more than 10% longer than after laparoscopic myomectomy.

<sup>c</sup> Exact between-group p values were not reported.

In the Brucker et al (2014) trial, 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 RFVTA (Acessa) group, there was an 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 by Hahn et al (2015)<sup>a</sup> (12-month outcomes) and by Kramer et al (2016)<sup>a</sup> (12-month and 24-month outcomes). In addition to summary symptom and quality of life measures displayed in Table 2, the publications reported on 11 symptoms: heavy menstrual bleeding, increased abdominal girth, dyspareunia, pelvic discomfort/pain, dysmenorrhea, urinary frequency, urinary retention, sleep disturbance, backache, localized pain, and “other symptoms” (not specified).
Limitations of the 12- and 24-month analyses, shown in Tables 5 and 6, included lack of intention-to-treat analysis and failure to describe secondary study hypotheses and statistical analyses clearly. The RCT had a small sample size and thus might have been underpowered to detect clinically meaningful differences in secondary outcomes, so these results do not rule out potential differences between treatments.

**Table 5. Relevance Gaps**

<table>
<thead>
<tr>
<th>Study</th>
<th>Population&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Intervention&lt;sup&gt;b&lt;/sup&gt;</th>
<th>Comparator&lt;sup&gt;c&lt;/sup&gt;</th>
<th>Outcomes&lt;sup&gt;d&lt;/sup&gt;</th>
<th>Follow-Up&lt;sup&gt;e&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brucker et al (2014)&lt;sup&gt;3&lt;/sup&gt;; Kramer et al (2016)&lt;sup&gt;4&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
<td>1. Insufficient to determine reintervention rates</td>
<td></td>
</tr>
</tbody>
</table>

The evidence gaps stated in this table are those notable in the current review; this is not a comprehensive gaps assessment.

<sup>a</sup> Population key: 1. Intended use population unclear; 2. Clinical context is unclear; 3. Study population is unclear; 4. Study population not representative of intended use.

<sup>b</sup> Intervention key: 1. Not clearly defined; 2. Version used unclear; 3. Delivery not similar intensity as comparator; 4. Not the intervention of interest.

<sup>c</sup> Comparator key: 1. Not clearly defined; 2. Not standard or optimal; 3. Delivery not similar intensity as intervention; 4. Not delivered effectively.

<sup>d</sup> Outcomes key: 1. Key health outcomes not addressed; 2. Physiologic measures, not validated surrogates; 3. No CONSORT reporting of harms; 4. Not establish and validated measurements; 5. Clinical significant difference not prespecified; 6. Clinical significant difference not supported.

<sup>e</sup> Follow-Up key: 1. Not sufficient duration for benefit; 2. Not sufficient duration for harms.

**Table 6. Study Design and Conduct Gaps**

<table>
<thead>
<tr>
<th>Study</th>
<th>Allocation&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Blinding&lt;sup&gt;b&lt;/sup&gt;</th>
<th>Selective Reporting&lt;sup&gt;d&lt;/sup&gt;</th>
<th>Data Completeness&lt;sup&gt;e&lt;/sup&gt;</th>
<th>Power&lt;sup&gt;d&lt;/sup&gt;</th>
<th>Statistical&lt;sup&gt;f&lt;/sup&gt;</th>
</tr>
</thead>
</table>

The evidence gaps stated in this table are those notable in the current review; this is not a comprehensive gaps assessment.


<sup>b</sup> Blinding key: 1. Not blinded to treatment assignment; 2. Not blinded outcome assessment; 3. Outcome assessed by treating physician.

<sup>c</sup> Selective Reporting key: 1. Not registered; 2. Evidence of selective reporting; 3. Evidence of selective publication.
Pregnancy Outcomes After RFVTA
Keltz et al (2017) published a systematic review of published literature on pregnancy outcomes after thermal ablation of uterine fibroids. For RFVTA, reviewers identified 20 pregnancies reported in 4 case series; the denominator (ie, the number of patients treated in these series) was not reported. Of the 20 pregnancies, 7 were undesired and were electively terminated. For the remaining 13 pregnancies, there was 1 spontaneous abortion and 12 full-term births. Nine of the 12 live births were delivered by cesarean section.

Section Summary: Radiofrequency Volumetric Thermal Ablation
A systematic review and an RCT comparing RFVTA with laparoscopic myomectomy have been published. The meta-analysis found low rates of reintervention with RFVTA and quality of life outcomes that were similar to myomectomy and UAE at 12 months. Data on reintervention rates at 36 months was limited to a single study and no studies reported reintervention rates at 60 months. The RCT found that RFVTA was noninferior to laparoscopic myomectomy on the primary outcome (length of hospitalization). A number of secondary outcomes of the RCT were reported at 12 and 24 months, including symptoms and quality of life outcomes; none differed significantly between groups. The RCT only had 43 patients in subgroup analyses at 12 and 24 months. Additional well-designed RCTs with longer follow-up are needed to determine the effect of RFVTA on health outcomes compared with other treatment options.

Laser or Bipolar Needles

Clinical Context and Therapy Purpose
The purpose of therapy with laser or bipolar needles in patients who have uterine fibroids is to provide a treatment option that is an alternative to or an improvement on existing therapies.

The question addressed in this evidence review is: Does the use of laser or bipolar needles improve the net health outcome in women with uterine fibroids?

The following PICOTS were used to select literature to inform this review.

Patients
The relevant population of interest is women with symptomatic uterine fibroids.

Interventions
The therapy being considered is laser or bipolar needles.
Comparators
The following therapies and practices are currently being used to make decisions about managing uterine fibroids: medical management, UAE, myomectomy, and hysterectomy.

Outcomes
The outcomes of interest are, complications, postoperative pain and recovery time, symptom resolution, need for reintervention, and health-related quality of life.

Timing
Immediate follow-up would be a week for postoperative pain and recovery; and 3 to 5 years of follow-up would be needed to monitor for fibroid recurrence and retreatment.

Setting
Laser or bipolar needles are administered is an inpatient or ambulatory surgery setting with treatment by a gynecologic surgeon.

Case Series
Several case series were identified, most published in the 1990s. For example, Goldfarb (1995) reported on outcomes for 300 women with symptomatic fibroids no larger than 10 cm who underwent myolysis using either Nd:YAG or bipolar needles. The author reported that the coagulating effect of the bipolar needle devascularized the fibroids, and the resulting shrinkage was comparable to that produced by Nd:YAG laser. An earlier study by Goldfarb (1992), included 75 patients who presented with symptomatic fibroids 5 to 10 cm in diameter. Symptoms included pelvic pain, pressure, dyspareunia, and recurrent menorrhagia. The Nd:YAG laser was inserted into the fibroid multiple times (eg, 75 to 100 punctures to coagulate a 5-cm fibroid). Based on an 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. Nisolle et al (1993) reported on a case series of 48 women offered myolysis instead of myomectomy if they had completed childbearing. The authors reported that maximal decrease in fibroid size had occurred by 6 months, however, as reported, it is unclear among the 28 of 48 patients with more than 2 fibroids whether all fibroids were treated in each patient, and, if not, how treated fibroids were selected. Additionally, no associated patient symptoms were reported.

Several authors have reported pelvic adhesions as a complication of the Nd:YAG laser procedure, 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.

Section Summary: Laser or Bipolar Needles
The evidence base on the use of lasers or bipolar needles only includes case series, small in size, and published in the 1990s. RCTs comparing laser and bipolar
needles with alternative treatments for uterine fibroids and reporting health outcomes are needed.

**Cryomyolysis**

**Clinical Context and Therapy Purpose**
The purpose of cryomyolysis in patients who have uterine fibroids is to provide a treatment option that is an alternative to or an improvement on existing therapies. The question addressed in this evidence review is: Does cryomyolysis improve the net health outcome in women with uterine fibroids?

The following PICOTS were used to select literature to inform this review.

**Patients**
The relevant population of interest is women with symptomatic uterine fibroids.

**Interventions**
The therapy being considered is cryomyolysis. Cryomyolysis entails inserting a -180°C cryoprobe into the center of a fibroid, which creates an ‘iceball’ within the fibroid. Several freeze-thaw cycles are typically used, and the process may not be standardized.

**Comparators**
The following therapies and practices are currently being used for managing uterine fibroids: medical management, UAE, myomectomy, and hysterectomy.

**Outcomes**
The outcomes of interest are, complications, postoperative pain and recovery time, symptom resolution, need for reintervention, and health-related quality of life.

**Timing**
Immediate follow-up would be a week for postoperative pain and recovery; and 3 to 5 years of follow-up would be needed to monitor for fibroid recurrence and retreatment.

**Setting**
Cryomyolysis is administered in an inpatient or ambulatory surgery setting with treatment by a gynecologic surgeon.

**Case Series**
No controlled studies evaluating cryomyolysis were identified.

Two case series have been identified. Zreik et al (1998)\textsuperscript{12} published a prospective pilot study with 14 patients, and Zupi et al (2004)\textsuperscript{13} presented their experience with 20 patients.\textsuperscript{12,13} In both case series, the authors reported that patients had symptom resolution. In the Zreik et al (1998) series, cryomyolysis maintained or slightly reduced the myoma volume by 6%. In the Zupi et al (2004) study, cryomyolysis was associated with a 25% reduction in fibroid size. Zupi
et al (2005) reported on 1-year follow-up of these patients. Mean shrinkage in fibroid size continued until 9 months after surgery, to a mean volume reduction of 60%. In the Sandberg (2018) systematic review (discussed above), the risk of reintervention was 15%. Interpretation of these studies is limited due to their small sample sizes and lack of comparison groups.

**Section Summary: Cryomyolysis**
The literature on cryomyolysis includes small case series, with no literature identified in the last decade. Controlled studies comparing cryomyolysis with alternative treatments for uterine fibroids and differentiating between outcomes related to fibroid treatment and outcomes related to the treatment of abnormal bleeding are needed.

**Magnetic Resonance Imaging-Guided Laser Ablation**

**Clinical Context and Therapy Purpose**
The purpose of magnetic resonance imaging (MRI)-guided laser ablation in patients who have uterine fibroids is to provide a treatment option that is an alternative to or an improvement on existing therapies.

The question addressed in this evidence review is: Does MRI-guided laser ablation improve the net health outcome in women with uterine fibroids?

The following PICOTS were used to select literature to inform this review.

**Patients**
The relevant population of interest is women with symptomatic uterine fibroids.

**Interventions**
The therapy being considered is MRI-guided laser ablation.

**Comparators**
The following therapies are currently being used about managing uterine fibroids: medical management, UAE, myomectomy, and hysterectomy.

**Outcomes**
The outcomes of interest are, complications, postoperative pain and recovery time, resolution of symptoms, need for reintervention, and health-related quality of life.

**Timing**
Immediate follow-up would be a week for postoperative pain and recovery; and 3 to 5 years of follow-up would be needed to monitor for fibroid recurrence and retreatment.

**Setting**
MRI-guided laser ablation is administered is an inpatient or ambulatory surgery setting with treatment by a gynecologic surgeon.
Nonrandomized Studies
No RCTs evaluating MRI-guided laser ablation were identified. A nonrandomized study by Hindley et al (2002) was identified (see Tables 7 and 8). Results from the women treated with MRI-guided laser ablation were compared with a historical control group of 43 women who underwent a hysterectomy. Compared with the historical control group, the total score on the Menorrhagia Outcomes Questionnaire was significantly lower (ie, worse outcomes) in those undergoing percutaneous myolysis. The quality of life subscores did not differ statistically.

Table 7. Summary of Key Nonrandomized Trial Characteristics

<table>
<thead>
<tr>
<th>Study</th>
<th>Type</th>
<th>Country</th>
<th>Participants</th>
<th>Treatment</th>
<th>Comparator</th>
<th>FU, y</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hindley et al (2002)</td>
<td>Cohort with historical controls</td>
<td>U.K.</td>
<td>109 women with symptomatic fibroids seeking to avoid surgery</td>
<td>66 to MRI-guided laser ablation</td>
<td>43 to hysterectomy</td>
<td>1</td>
</tr>
</tbody>
</table>

FU: follow-up; MRI: magnetic resonance imaging.

Table 8. Summary of Key Nonrandomized Trial Results

<table>
<thead>
<tr>
<th>Study</th>
<th>Mean Fibroid Volume Reduction (Range), %</th>
<th>MOQ Total</th>
<th>MOQ QOL/Satisfaction</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>At 3 Months</td>
<td>At 1 Year</td>
<td></td>
</tr>
<tr>
<td>n/N (%)</td>
<td>47/66 (71)</td>
<td>24/66 (36)</td>
<td>34/66</td>
</tr>
<tr>
<td>MRI-guided laser ablation</td>
<td>-31 (21 to -76)</td>
<td>-41 (13 to -78)</td>
<td>51.5</td>
</tr>
<tr>
<td>Hysterectomy</td>
<td>NR</td>
<td>NR</td>
<td>48.7</td>
</tr>
<tr>
<td>p</td>
<td></td>
<td></td>
<td>0.02</td>
</tr>
</tbody>
</table>

MRI: magnetic resonance imaging; MOQ: Menorrhagia Outcomes Questionnaire; NR: not reported; QOL: Quality of Life.

The purpose of the gaps tables (see Tables 9 and 10) is to display notable gaps identified in each study. This information is synthesized as a summary of the body
of evidence following each table and provides the conclusions on the sufficiency of
the evidence supporting the position statement.

Table 9. Relevance Gaps

<table>
<thead>
<tr>
<th>Study</th>
<th>Population a</th>
<th>Intervention b</th>
<th>Comparator c</th>
<th>Outcomes d</th>
<th>Follow-Up e</th>
</tr>
</thead>
</table>

The evidence gaps stated in this table are those notable in the current review; this is not a comprehensive gaps assessment.

- **Population key**: 1. Intended use population unclear; 2. Clinical context is unclear; 3. Study population is unclear; 4. Study population not representative of intended use.
- **Intervention key**: 1. Not clearly defined; 2. Version used unclear; 3. Delivery not similar intensity as comparator; 4. Not the intervention of interest.
- **Comparator key**: 1. Not clearly defined; 2. Not standard or optimal; 3. Delivery not similar intensity as intervention; 4. Not delivered effectively.
- **Outcomes key**: 1. Key health outcomes not addressed; 2. Physiologic measures, not validated surrogates; 3. No CONSORT reporting of harms; 4. Not establish and validated measurements; 5. Clinical significant difference not prespecified; 6. Clinical significant difference not supported.
- **Follow-Up key**: 1. Not sufficient duration for benefit; 2. Not sufficient duration for harms.

Table 10. Study Design and Conduct Gaps

<table>
<thead>
<tr>
<th>Study</th>
<th>Allocation a</th>
<th>Blinding b</th>
<th>Selective Reporting d</th>
<th>Data Completeness e</th>
<th>Power d</th>
<th>Statistical f</th>
</tr>
</thead>
</table>

The evidence gaps stated in this table are those notable in the current review; this is not a comprehensive gaps assessment.

- **Blinding key**: 1. Not blinded to treatment assignment; 2. Not blinded outcome assessment; 3. Outcome assessed by treating physician.
- **Selective Reporting key**: 1. Not registered; 2. Evidence of selective reporting; 3. Evidence of selective publication.
- **Data Completeness key**: 1. High loss to follow-up or missing data; 2. Inadequate handling of missing data; 3. High number of crossovers; 4. Inadequate handling of crossovers; 5. Inappropriate exclusions; 6. Not intent to treat analysis (per protocol for noninferiority trials).
- **Power key**: 1. Power calculations not reported; 2. Power not calculated for primary outcome; 3. Power not based on clinically important difference.
- **Statistical key**: 1. Analysis is not appropriate for outcome type: (a) continuous; (b) binary; (c) time to event; 2. Analysis is not appropriate for multiple observations per patient; 3. Confidence intervals and/or p values not reported; 4. Comparative treatment effects not calculated.
Section Summary: Magnetic Resonance Imaging-Guided Laser Ablation
A single nonrandomized study with historical controls was identified. Data reporting was incomplete, and self-reported outcomes were worse compared with a historical control group of women undergoing a hysterectomy. RCTs comparing MRI-guided laser ablation with alternative treatments for uterine fibroids and reporting health outcomes are needed.

Summary of Evidence
For individuals who have symptomatic uterine fibroids who receive RFVTA, the evidence includes an RCT and systematic review. Relevant outcomes are symptoms, quality of life, and treatment-related morbidity. The meta-analysis found low rates of reintervention with RFVTA and quality of life outcomes that were similar to uterine artery embolization and myomectomy at 12 months. Data on reintervention rates at 36 months were limited to 1 study and no studies reported reintervention rates at 60 months. The single RCT with a follow-up longer than 3 months 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, including symptoms and quality of life. None of the secondary outcomes demonstrated significant between-group differences in a subgroup analysis of 43 patients. Additional well-designed RCTs with longer follow-up are needed to determine the effect of RFVTA on health outcomes compared with other treatment options. The evidence is insufficient to determine the effects of the technology on health outcomes.

For individuals who have symptomatic 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 then may not reflect current practice. RCTs comparing laser or bipolar needles with alternative treatments for uterine fibroids are needed to evaluate the safety and efficacy of this technology adequately. The evidence is insufficient to determine the effects of the technology on health outcomes.

For individuals who have symptomatic 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 with alternative treatments for uterine fibroids are needed to evaluate the safety and efficacy of this technology adequately. The evidence is insufficient to determine the effects of the technology on health outcomes.

For individuals who have symptomatic uterine fibroids who receive magnetic resonance imaging-guided laser ablation, the evidence includes a study with historical controls. Relevant outcomes are symptoms, quality of life, and treatment-related morbidity. A single study with historical controls is not sufficiently robust to evaluate this technology. RCTs comparing magnetic resonance imaging-guided laser ablation with alternative treatments for uterine
fibroids are needed to evaluate safety and efficacy adequately. The evidence is insufficient to determine the effects of the technology on health outcomes.

SUPPLEMENTAL INFORMATION

Practice Guidelines and Position Statements

American College of Obstetricians and Gynecologists
The American College of Obstetricians and Gynecologists (2016) reaffirmed its 2008 position on alternatives to hysterectomy in the management of leiomyomas.\textsuperscript{16,17} Recommendations based on good and consistent scientific evidence were that abdominal myomectomy is a safe and effective treatment for women with symptomatic leiomyomas and that uterine artery embolization is a safe and effective option for appropriately selected women who want to retain their uteri. The bulletin contained no recommendations on myolysis using laparoscopic or percutaneous techniques.

U.S. Preventive Services Task Force Recommendations
Not applicable.

Medicare National Coverage
There is no national coverage determination. In the absence of a national coverage determination, coverage decisions are left to the discretion of local Medicare carriers.

Ongoing and Unpublished Clinical Trials
Some currently unpublished trials that might influence this evidence review are listed in Table 11.

Table 11. 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>Ongoing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NCT01750008\textsuperscript{a}</td>
<td>The LUSTOR (Laparoscopic Uterine Sparing Techniques Outcomes and Reinterventions)Trial</td>
<td>51</td>
<td>Jun 2018 (ongoing)</td>
</tr>
<tr>
<td>NCT02260752</td>
<td>Patient Centered Results for Uterine Fibroids (COMPARE-UF)</td>
<td>10,000</td>
<td>Sep 2019</td>
</tr>
<tr>
<td>NCT02228174\textsuperscript{a}</td>
<td>Evaluation of the Gynesonics System for Transcervical Treatment of Symptomatic Uterine Fibroids With Radiofrequency Ablation Under Integrated Intrauterine Sonography</td>
<td>147</td>
<td>Oct 2019</td>
</tr>
<tr>
<td>Study ID</td>
<td>Study Title</td>
<td>Nct Number</td>
<td>Start Date</td>
</tr>
<tr>
<td>----------</td>
<td>--------------------------------------------------</td>
<td>-------------</td>
<td>------------</td>
</tr>
<tr>
<td>NCT02100904</td>
<td>Uterine Leiomyoma Treatment With Radiofrequency Ablation (ULTRA) Registry (ULTRA Registry)</td>
<td>200</td>
<td>Jun 2022</td>
</tr>
<tr>
<td>NCT02163525a</td>
<td>Post Market TRUST - U.S.A. Study</td>
<td>300</td>
<td>Dec 2023</td>
</tr>
</tbody>
</table>

NCT: national clinical trial.

a Denotes industry-sponsored or cosponsored trial.

REFERENCES


Billing Coding/Physician Documentation Information

58578: Unlisted laparoscopy procedure, uterus
58674: Laparoscopy, surgical, ablation of uterine fibroid(s) including intraoperative ultrasound guidance and monitoring, radiofrequency (new code 1/1/2017)
58999: Unlisted procedure, female genital system (nonobstetrical)
76940: Ultrasound guidance for and monitoring of, parenchymal tissue ablation
76998: Ultrasonic guidance, intraoperative
77022: Magnetic resonance guidance for, and monitoring of, parenchymal tissue ablation

ICD-10 Codes

D25.0-D25.9: Leiomyoma of uterus, code range

This code is not to be reported with codes 76998 and 0071T.

There is no specific CPT code for laparoscopic or percutaneous lysis of uterine fibroids. The following codes might be used for a laparoscopic procedure:

58578: Unlisted laparoscopy procedure, uterus
58999: Unlisted procedure, female genital system (nonobstetrical)

For percutaneous procedures, the following code would likely be used to describe the magnetic resonance imaging component of the procedure:

77022: Magnetic resonance guidance for, and monitoring of, parenchymal tissue ablation

For ultrasound guidance, one of the following codes might be used:

76940: Ultrasound guidance for and monitoring of, parenchymal tissue ablation
76998: Ultrasonic guidance, intraoperative

Effective in 2017, there is a category I CPT code for radiofrequency ablation of uterine fibroids:

58674: Laparoscopy, surgical, ablation of uterine fibroid(s) including intraoperative ultrasound guidance and monitoring, radiofrequency.

Prior to 2017, there was a category III CPT code:

0336T: Laparoscopy, surgical, ablation of uterine fibroid(s), including intraoperative ultrasound guidance and monitoring, radiofrequency.
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 herein). 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).

Additional Policy Key Words
N/A

Policy Implementation/Update Information
9/1/15  New Policy, considered investigational.
9/1/16  No policy statement changes.
9/1/17  No policy statement changes.
9/1/18  No policy statement changes.
9/1/19  No policy statement changes.

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