Symptomatic fibroids affect one in every three women over the age of 35, and are responsible for approximately 30% of all hysterectomies. The precise etiology of fibroids is unknown, but studies suggest that estrogen stimulation is an important factor. Fibroids tend to grow after puberty or during pregnancy, and usually decrease in volume in the post-menopausal period.

**Classification of Fibroids**

Fibroids are benign uterine tumors composed of smooth muscle and varying amounts of fibrous connective tissue (Table 1). Malignant transformation is rare and occurs in less than 1% of cases. Fibroids are classified as submucosal, intramural or subserosal (Figure 1). Symptoms and treatment vary according to these subtypes.

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**Uterine Artery Embolization:**

Treatment For Symptomatic Uterine Fibroids

The most common gynecologic neoplasms in women of reproductive age are uterine fibroids, also known as leiomyomas or myomas. Uterine artery embolization is an increasingly popular alternative to surgery for the treatment of symptomatic fibroids.

By François Belzile, MD, Andrew J. Benko, MD, and Bao Bui, MD

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**Dr. Belzile is assistant professor, department of radiology, division of vascular and interventional radiology, Université de Sherbrooke, Sherbrooke, Quebec. His area of special interest is arterial intervention and uterine artery embolization.**

**Dr. Benko is assistant professor, department of radiology, division of vascular and interventional radiology, Université de Sherbrooke, Sherbrooke, Quebec.**

**Dr. Bui is assistant professor, department of radiology, division of vascular and interventional radiology, Université de Sherbrooke, Sherbrooke, Quebec.**
Intramural. This is the most common type of fibroid, but it is often asymptomatic. Some women may experience menorrhagia or an increase in volume of the uterus, resulting in bladder compression and frequent urination. In rare cases, it may be associated with infertility.

Subserosal. This type of fibroid also is usually asymptomatic. Pedunculated, subserosal leiomyomas may undergo torsion and subsequent infarction. Potentially bigger than the other types, these fibroids may cause compression of the bladder or other adjacent organs.

Submucosal. This is the least common type of fibroid, but is frequently symptomatic, causing dysmenorrhea, menorrhagia and infertility. Spontaneous abortion also may occur.

Most fibroids are asymptomatic. When symptoms occur, abnormal menstrual bleeding is the most common complaint presented (Table 2).

Pain, which occurs in approximately 30% of symptomatic women, is probably the result of acute degeneration of the fibroid or is caused by pressure on adjacent organs.

Diagnosis

Physical examination and radiologic imaging are the principal tools for the diagnosis of fibroids. Among the imaging modalities, transvesical and/or endovaginal ultrasound are the most commonly used because of their accessibility and cost effectiveness (Figure 2).¹

Magnetic resonance imaging (MRI) seems to be the best modality and may more clearly delineate individual tumors, thus, facilitating the differentiation between submucosal, intramural and subserosal fibroids (Figure 3). Comparison of pre- and post-embolization MRI studies is helpful,² and can confirm fibroid shrinkage in the months

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**Table 1**

**Classification of Fibroids**

<table>
<thead>
<tr>
<th>Types</th>
<th>Frequency</th>
<th>Symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intramural</td>
<td>+++</td>
<td>++</td>
</tr>
<tr>
<td>Subserosal</td>
<td>++</td>
<td>+</td>
</tr>
<tr>
<td>Submucosal</td>
<td>+</td>
<td>+++</td>
</tr>
</tbody>
</table>

**Table 2**

**Symptoms**

- Abnormal menstrual bleeding
- Pelvic pain or discomfort
- Bladder compression with frequent urination
- Abdominal swelling
- Infertility

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Figure 1. Types of fibroids.
Adapted from the Georgetown University Medical Center Uterine Artery Embolization Web site: www.fibroidoptions.com/backgrmd.htm. What are fibroids?
following embolization. MRI also is the method of choice for identifying other gynecologic pathology that may mimic symptomatic fibroids, such as adenomyosis. The limited availability and the cost of MRI continue to limit its widespread use in the workup of fibroids.

**Treatment Options**

*Hormonal therapy* is frequently used as the primary treatment for menstrual disorders, but it may fail to control bleeding in up to 66% of women (Table 3).

*Hysterectomy* is relatively safe and essentially guarantees permanent relief from symptoms, It
Uterine Artery Embolization

Figure 4. Diagram of an angiographic catheter in left uterine artery from a right femoral artery approach. Adapted from the Georgetown University Medical Center Uterine Artery Embolization Web site: www.fibroidoptions.com/embol.htm. Uterine fibroid embolization.

Figure 5. Diagram showing particle embolization of the left uterine artery. Adapted from the Georgetown University Medical Center Uterine Artery Embolization Web site: www.fibroidoptions.com/embol.htm. Uterine fibroid embolization.

Figure 6A, 6B and 6C. Angiographic images during embolization: A) Pelvic angiogram showing enlarged uterine arteries (twisting vessels in the central portion of the pelvis); B) Selective angiogram of the left uterine artery showing opacification of the fibroid (pre-embolization); and C) Post-embolization pelvic angiogram showing occlusion of both uterine arteries with absence of blood supply to the fibroid.
remains a major abdominal surgery, however, and should be taken seriously. Fibroids are the single most common indication for this operation, and account for approximately 30% of hysterectomies performed on women. A subsequent pregnancy is, of course, not possible.

**Myomectomy** is a major surgery where leiomyomas are removed without removing the uterus. Twenty per cent to 25% of women have a second surgery (usually hysterectomy) due to a recurrence of symptoms. Successful pregnancy rates following myomectomy are around 20%.

**Uterine artery embolization** (UAE) is a relatively new and less invasive approach for the treatment of symptomatic uterine fibroids. The concept of pelvic therapeutic vascular embolization is not new. The first UAE for obstetrical hemostasis was reported in 1979, and UAE is now a well-established procedure for the management of life-threatening postpartum hemorrhage. More than 8,000 of these procedures have been performed worldwide since the initial experience with UAE for the treatment of uterine fibroids took place in the United States in the 1990s.

UAE is a percutaneous interventional procedure that blocks the arteries supplying blood to the fibroids, thereby causing necrosis and shrinkage of the fibroids (Figures 4 and 5). Benefits of UAE include avoidance of surgical risks and preservation of the uterus, as well as potential preservation of fertility, shorter hospitalization and shorter recovery times. Results to date indicate that the procedure is safe and effective.

**Procedure**

UAE is performed by an interventional radiologist in the angiography suite under conscious sedation. An angiography catheter is inserted into the patient’s femoral artery (Figure 6A), and a uterine artery is selectively catheterized (Figure 6B). After injecting radio-opaque dye to confirm adequate catheter position, embolization of the vessel is performed using polyvinyl alcohol (PVA) particles (Figure 6C), which are occasionally supplemented with gelatin sponge pledgets. The process is then repeated for the contralateral uterine artery, usually via the same arterial access. The procedure takes approximately one to two hours.

UAE is a minimally invasive procedure that often only requires an overnight stay, primarily for pain relief. Most women return to work within a week, which is in sharp contrast to the recovery period for hysterectomy or myomectomy.

**Patient Selection**

UAE is considered in patients with symptomatic fibroids, who are seeking an alternative to hysterectomy. In Sherbrooke, Quebec, the authors generally will not perform the procedure in women for whom continued childbearing capabilities are an issue. If a woman’s primary goal is pregnancy, the authors rec-
ommend myomectomy, if possible. Although several normal, full-term pregnancies have been reported following UAE,1 embolization is only considered if myomectomy is not possible since, currently, we simply do not have enough data on how UAE affects fertility.

Contraindications to UAE include pregnancy, acute pelvic infection, asymptomatic fibroid, severe contrast medium allergy and the absence of a hormonal therapy trial (Table 4).

Side Effects and Complications

Pain is expected after a UAE procedure and, for most patients, consists of moderate-to-severe cramping. Patients generally stay in the hospital overnight for pain relief and control with intravenous analgesics. They are given oral pain medication when discharged. The pain rarely persists for more than four days, and patients are usually able to perform their day-to-day activities, which is an advantage over conventional surgery.

UAE is associated with a low risk of complications—in the range of 3%. Uncommon potential complications include uterine infection or infarction, and premature ovarian failure in less than 1% of patients (the risk seems to be higher in women over the age of 45, which may be due to the fact that they are close to menopause).

Treatment Results

The technical success rate is more than 95%. In the literature, UAE is effective for the control of bleeding disorders in 87% to 94% of cases. There is a decrease in pelvic pain in 80% to 92% of cases. A reduction in fibroid volume by 37% to 50% is seen at six months.6,7 Research is under way to ascertain the recurrence rate and the effect of the procedure on fertility.

Conclusion

There are several treatment options for symptomatic fibroids. The primary approach is hormonal therapy, but treatment failures are frequent. Hysterectomy is relatively safe and produces good results, but it remains a major surgery and subsequent pregnancy is impossible. Myomectomy also is a major surgery where fibroids are removed, but the uterus is spared. Subsequent pregnancy is possible, but a recurrence of symptoms after myomectomy is not unusual. UAE is a relatively new, minimally invasive approach in the treatment of symptomatic fibroids. It is effective with a short recovery period and carries a low risk of complications. UAE is an attractive option in women seeking an alternative to conventional therapy.

Acknowledgments

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References