Issues in Emerging Health Technologies

Uterine Artery Embolization for the Treatment of Fibroids

Summary

✓ Uterine artery embolization (UAE), or uterine fibroid embolization, is a non-surgical treatment for uterine fibroids that preserves the uterus and offers women an alternative to surgical procedures such as hysterectomy and myomectomy.

✓ Evidence from controlled trials comparing fibroid treatments is not yet available. Case series reports indicate that UAE is a relatively safe and effective treatment for symptomatic fibroids.

✓ The effect of UAE on fertility and pregnancy is not known, though pregnancies following UAE have been reported.

✓ UAE may reduce health care costs associated with treating fibroids through shorter hospital stays and faster recoveries.

The Technology

Uterine fibroids are benign growths in the walls of the uterus. Most fibroids do not require treatment, but some women experience abnormal bleeding causing anemia, pain and pelvic pressure caused by an enlarged uterus. Fibroids may sometimes cause infertility.1

Uterine artery embolization (UAE) closes the blood supply to the uterine arteries, causing death of the tissue and shrinkage of the fibroids. In UAE the patient is sedated and given only local anesthesia. The procedure is performed by an interventional radiologist. A catheter is inserted through a small incision in the groin and threaded through the femoral artery to the uterine arteries (Figure 1). Under fluoroscopic guidance, embolic materials are injected until the blood flow to the fibroid ceases.2 Patients are usually hospitalized overnight, mainly for pain management, but the hospital stay is generally less than 24 hours.3 Smaller and submucosal fibroids appear more likely to be reduced in volume after UAE than other types of fibroids.4

Figure 1.

Reprinted with permission: FDA Consumer Magazine5

Regulatory Status

UAE is a medical procedure and, as such, is not licensed by Health Canada. The embolization materials used include polyvinyl alcohol foam particles (PVA), tris-acryl gelatin microspheres, absorbable gelatin sponges and coils. These devices have been licensed in Canada and elsewhere for general embolization purposes, but not specifically for UAE. The superiority of any particular embolization device has not yet been demonstrated.6

Two companies have filed applications with the US Food and Drug Administration (FDA) for approval of embolization agents for UAE: BioSphere for two types of tris-acryl gelatin microspheres (Embosphere® and EmboGold™ Microspheres), and Boston Scientific for Contour PVA®.
Patient Group

Thirty to forty per cent of women over the age of 30 may have uterine fibroids, and the incidence is higher in African-American women.7 Most fibroids are asymptomatic and only a minority require treatment.8 Nevertheless, fibroids were the main reason for about 40% of the 49,000 hysterectomies performed in Canadian women over the age of 35 in 1996-1997.9 In 1999-2000, 3,000 Canadian women underwent myomectomy (surgical removal of fibroids from the uterus).10

Current Practice

Drug therapy with gonadotropin-releasing hormone (GnRH) analogs may be used to shrink fibroids by blocking the natural production of estrogen. GnRH analogs are used for short periods of time, mainly to decrease the size of fibroids prior to surgery, or when surgery is not an option.5,11 Side effects of the drugs, such as menopausal symptoms and loss of bone density, limit their long-term use. Fibroids often recur when drug therapy is discontinued. These drugs are expensive and may not be covered by provincial health insurance plans (Gaylene Pron, University of Toronto, Toronto: personal communication, 2002 June 10).

Hysterectomy is the standard treatment for symptomatic fibroids in women who have completed child bearing.12 Abdominal hysterectomy is the most common type, though vaginal hysterectomies now account for about a third of all hysterectomies in Canada.11 These procedures are sometimes performed laparoscopically. Reports of major and minor complications associated with hysterectomy range widely, from 0.5 to 43%.11 The average length of hospitalization for abdominal hysterectomy in Canada is about four days.11

Myomectomy may be an alternative treatment for women who want to preserve their fertility.13 Laparoscopic myomectomy offers a shorter recovery time than open abdominal myometo-

Administration and Cost

Information on the cost of UAE in Canada has not been published. One Ontario hospital estimated the following charges for UAE: pre-admission testing ($400), ultrasound ($240), overnight surgical ward stay ($3,700), technical fees and materials ($1,300), anesthetist and morphine pain pump ($1,040). The main difference from other treatments is in the length of stay - one day for UAE compared to three or four days for myomectomy or hysterectomy (Gaylene Pron, 2002 April 24). A recent study at McGill University compared in-patient hospital costs of abdominal myomectomy, total abdominal hysterectomy, vaginal hysterectomy and UAE in 545 women treated for fibroids.16 UAE had the shortest hospital stay and the lowest in-patient nursing costs (an average cost of $1,007 for UAE, compared to $1,781 for myomectomy and $1,933 for total abdominal hysterectomy).

Rate of Technology Diffusion

UAE has been widely publicized in the popular media and there is considerable demand for this procedure. As many as 20,000 to 25,000 women have been treated with UAE worldwide since it was first introduced about 10 years ago.17

The Society of Interventional Radiology web site18 lists over 20 Canadian physicians who perform UAE. Most Canadian teaching hospitals, and some community hospitals now have interventional radiologists on staff. However, many interventional radiologists do not have hospital admitting privileges (Gaylene Pron, 2002 June 10).
Concurrent Developments

Myolysis is a laparoscopic surgical technique that uses electrical or laser coagulation to destroy the fibroid or its blood supply. This is performed following several months of GnRH analog therapy to shrink the fibroid. The procedure leaves the uterus intact, but it may cause adhesions. Cryomyolysis involves "freezing" the fibroids. Published evidence on the long-term effectiveness of this treatment is lacking.

Mifepristone (RU-486) is a synthetic steroid that may effectively treat fibroids, without adverse effects on bone density. Mifepristone, commonly known as the "abortion pill", is not yet available in Canada.

Laparoscopic bipolar coagulation ("surgical embolization" of the uterine arteries) using general anesthesia has been reported. Clinical results were similar to those reported in UAE case series, for example, ultrasound measures of reductions in uterine volume (46%) and dominant fibroid volume (76%). Results from long-term follow-up are not yet available.

Other treatments under investigation for fibroids include the use of high-intensity focused ultrasound, laser, or radiofrequency ablation, and a 'combination procedure' that uses UAE to shrink fibroids followed by myomectomy to remove remaining fibroids.

The Evidence

To date, the published evidence on UAE is from case series. Results from these series seem similar: heavy bleeding and uterine bulk are controlled in 85-90% of patients. About 80% of women reported a return to normal activities within four days of UAE, (90% within ten days).

The first phase of a Canadian prospective, multi-centre trial of 555 women was recently completed. The trial examined the safety, patient acceptability, and efficacy of UAE. The results will be published this year (Gaylene Pron, 2002 February 20). Preliminary results reported 50% shrinkage of fibroids after UAE at three months follow-up and continued shrinkage for up to one year. Menorrhagia improved in about 80% of the women in the trial.

The submissions for regulatory approval of embolization agents for UAE to the FDA were based on two US trials: one trial that compared women who had UAE to a cohort of women who had hysterectomies, and another trial based on a comparison with women who had myomectomies. In addition to the US trials, a randomized controlled trial of 200 women, comparing UAE to hysterectomy and myomectomy, is underway in Scotland, but results are not expected for two years.

The Cardiovascular and Interventional Radiology Research and Education Foundation (CIRREF) in the US has created a Uterine Artery Embolization (UAE) Fibroid Registry for Outcomes Data (FIBROID). Its purpose is to refine UAE methods and to collect data on the safety and long-term effectiveness of UAE, and its impact on patients' quality of life and fertility. Over 2,000 patients have been enrolled in the registry, but analyses of the data are not yet available.

Adverse Effects

The mortality rate for UAE has been estimated as between 0.02%-0.1% while that for hysterectomy is estimated at 0.6%. UAE is associated with complications such as vaginal discharge, allergic reactions to the contrast media and hematoma formations at the puncture site. Postembolization syndrome (fever, nausea, vomiting, leukocytosis and flu-like symptoms lasting for several days) is common. This condition is self-limiting but can be difficult to distinguish from infection.

Most patients experience moderate to severe pain following UAE and require pain control, anti-inflammatory and sometimes anti-nausea medications for several days. Patient-controlled
analgesia is commonly recommended. Ovarian failure (premature menopause), perhaps due to non-targeted embolization of the arteries supplying the ovaries, has been reported at rates from 1-15%.

Other risks include thrombosis, radiation exposure and failure to detect a rare type of uterine carcinoma, leiomyosarcoma, using the standard pre-operative tests. The effect of UAE on fertility is unknown, though pregnancies following UAE have been reported in several studies.

Complications from UAE may require some women to have a subsequent hysterectomy. Eight of over 500 patients in the Canadian trial of UAE required a hysterectomy due to complications. Other studies have reported a risk from 0.7 to 10%.

Implementation Issues

Until recently gynecologists treated uterine fibroids, but interventional radiologists perform UAE. Pre-operative testing and post-operative care require a multidisciplinary approach and the expertise of both specialties.

The techniques used for UAE vary between centres and physicians. The optimum level of embolization and the most effective embolization materials have not yet been determined.

The case series published thus far show similar results, though uncontrolled trials such as case series tend to overestimate the efficacy of new treatments. Investigators from the Canadian trial are seeking funding for long-term follow-up of participants. The results of such studies may clarify uncertainties surrounding the long-term effectiveness of UAE and its effect on fertility. Some researchers believe UAE should continue to be monitored, either through trials or national registries, until these areas of uncertainty have been resolved.

There is a high rate of patient satisfaction with UAE. Women's perceptions are that UAE offers a permanent treatment for fibroids, preserving the uterus and avoiding major surgery and prolonged convalescence. The reduced hospital stay for UAE compared with hysterectomy and myomectomy, and a quicker recovery and return to work, may reduce the health care and societal costs associated with this condition.

References


