

Coll. Antropol. 28 (2004) 2: 793–797  
UDC 618.14-006:615.273  
Original scientific paper

# Uterine Artery Embolization for the Treatment of Uterine Fibroids

Tomislav Strinić<sup>1</sup>, Marko Vulić<sup>1</sup>, Damir Buković<sup>2</sup>, Josip Mašković<sup>3</sup>,  
Dinko Hauptman<sup>2</sup> and Željko Jelinčić<sup>4</sup>

<sup>1</sup> Department of Obstetrics and Gynecology, Clinical Hospital Split, Split, Croatia

<sup>2</sup> Department of Obstetrics and Gynecology, University Hospital Center »Zagreb«, Zagreb, Croatia

<sup>3</sup> Department of Radiology, Clinical Hospital Split, Split, Croatia

<sup>4</sup> Department of Surgery, University Hospital Center »Zagreb«, Zagreb, Croatia

## ABSTRACT

*Uterine artery embolization can be regarded as a less invasive procedure for the treatment of fibroids compared with myomectomy, hysterectomy, and laparoscopic myolysis. The aim of this study was the evaluation of safety and efficacy of uterine artery embolization and of womens' opinion about this treatment. After gynecological examination sixty-nine premenopausal women underwent uterine artery embolization. All procedures but four were technically successful; three women underwent unilateral embolization because of vascular malformation and one of them had an allergic reaction to contrast medium. Of the 69 patients: 58 went home the day after embolization, and 11 within first week. The follow-up examinations after 3, 6 and 12 month showed a significant reduction of uterine and fibroid volume with significant improvement of bleeding. Therefore, according to this report, uterine artery embolization is a successful, minimal invasive treatment of myoma that preserves the uterus and requires shorter hospitalization and recovery times than surgery.*

**Key words:** *uterine fibroids, artery embolization, treatment*

---

## Introduction

Uterine leiomyomata (fibroids or myomata), benign tumors of the human uterus, are among the most common tumors of women and can result in a host of problems: prolonged or heavy menstrual bleed-

ing, pelvic pressure or pain, or reproductive dysfunction. The myomata are clinically apparent in about 25% of women, and they are the single most common indication for hysterectomy or myomectomy<sup>1,2</sup>.

The next advance in minimally invasive therapy is uterine artery embolization (UAE). In the female genital tract, embolotherapy for control of hemorrhage from malignancy was first reported in 1979<sup>3-5</sup>. Pais reported successful embolotherapy for postpartum hemorrhage in 1980, and Rosenthal and Colapinto for postoperative vaginal hemorrhage in 1985<sup>6,7</sup>. In the early 1990s, Ravina started to use embolization as a presurgical procedure to decrease intraoperative bleeding during fibroid surgery<sup>8,9</sup>. The embolization as a primary therapy for uterine fibroids was first performed in the 1995<sup>10,11</sup>. Since then, several large series have been reported<sup>12-18</sup>. The aim of our study was to evaluate the safety and efficacy of uterine fibroid embolization in patients with symptomatic uterine fibroids.

### Subjects and Methods

The procedure was performed in 69 patients with symptomatic uterine fibroids in the Clinical Hospital Split. All patients were premenopausal women screened by a gynecologist with the use of a designed care algorithm. A detailed gynecologic history was obtained from each patient, followed by a detailed description of the procedure including a discussion of its potential risks. They were without genital infection, other pelvic masses and without malignancy. Eligibility was not restricted by age, fibroid size, fibroid location, or previous surgical therapy. Women desiring children were excluded from the study.

Preprocedural testing consisted of the following laboratory tests (complete blood count, blood urea nitrogen, creatinine, prothrombin time) and magnetic resonance imaging of the uterus. The patients were informed that there might be very significant pain for up to a few days after the procedure, and that there might be associated nausea and vomiting. They were

admitted to department of gynecology the day before the procedure, and they were with an empty stomach. A 5F angiographic catheter was placed under local anesthesia in the right femoral artery and advanced over the aortic bifurcation to the contralateral internal iliac artery. Digital angiography was performed to identify the origin of the uterine artery, and thereafter, the left uterine artery was catheterized with 3F microcatheter. Once the microcatheter was deep within the uterine artery, polyvinyl alcohol, 350–500 mm sized particles (Ivalon, Nycomed, Paris), were injected until there was complete stasis of flow. The 5F catheter was then maneuvered into the ipsilateral internal iliac artery, and the embolization procedure was repeated in the ipsilateral uterine artery. All catheters were removed and groin pressure was applied for 10 to 15 minutes, thus completing the procedure. The goal of the therapy was to occlude the uterine artery branches that supply only the fibroid tumors and spare the normal myometrial vessels. The arteriograms obtained after embolization revealed complete occlusion of the branches supplying the fibroids. After the embolization procedure, patients are placed at bedrest for 12 hours and are monitored for bleeding and hematoma formation at the arterial puncture sites. The Foley catheter was removed 12 hours after the procedure, and the patients had received intravenous medications for nausea, vomiting or pain control. The majority of the patients (58) left the hospital next day after the procedure. The patients completed outcome questionnaires following their treatment. They were asked whether their symptoms resolved completely, improved, remained unchanged or deteriorated. All patients with successful procedures underwent follow-up gynecologic examination within 2 weeks of the procedure and at regular intervals (approximately 6 weeks, 3 months, 6 months

and 12 months). The patients with successful procedures were evaluated at 3, 6 and 12 months after the embolization with magnetic resonance imaging. Measurements of the uterus and fibroids were obtained. Uterine volume and volume of the dominant fibroid were calculated. The percent volume reduction was calculated for each patient.

Mean values were expressed as arithmetic mean. For comparisons of metric variables Student's t-test was used.

**Results**

They were sixty five (94%) successful uterine artery embolizations, but four (6%) procedures were technically unsuccessful; three of the patients underwent unilateral embolization because of malformed vessels and one of them had allergic reaction to contrast medium. We excluded from statistical data processing

unsuccessful procedures. Clinical characteristics are summarized in Table 1. The mean patient age was 43.8 years.

The mean body mass was 67 kg and height was 168 cm. All women had children; range was one to four. The majority of patients (58) went home on the day after procedure, and rest were admitted to the hospital within the first week after the procedure (range 1 to 7 days). Duration of hospitalization was on average 1.4 days. The mean procedure time was 37 minutes; range 26 to 81 minutes.

Table 2 summarizes the rate of regression of uterine and dominant fibroid volumes.

Mean duration of clinical and magnetic resonance follow-up for all women was at least 12 months. Table 2 shows the summary statistics for the uterine and dominant fibroid volume prior to the procedure and the subsequent, 3 months, 6 months, and 12 months after the procedure. Median uterine volume decreased by 38%, 57%, and 61% after 3, 6 and 12 months after embolotherapy, respectively. Comparison of the regression of preprocedural and final uterine volume revealed statistical significance ( $p < 0.01$ ). Median dominant fibroid volume decreased by 46%, 61%, and 66% after 3, 6 and 12 months from preprocedure values, respectively. The quantum regression of pretreatment to final dominant fibroid volume also revealed statistical significance.

**TABLE 1**  
CHARACTERISTICS OF PATIENTS WITH  
SUCCESSFUL PROCEDURES (N = 65)

	Mean	Range
Age (years)	43.8	34–51
Weight (kg)	67.0	56–82
Height (cm)	168.0	157–181
Parity (number)	2.2	1–4
Procedure time (min.)	37.0	26–81
Duration of hospitalization (days)	1.4	1–6

**TABLE 2**  
RATE OF REGRESSION OF UTERINE AND DOMINANT FIBROID VOLUME DETERMINED  
BY MAGNETIC RESONANCE SCANNING (N = 65)

	FOLLOW – UP (months)				p-level*
	0	3	6	12	
Uterine volume (cm <sup>3</sup> )	862	535 (–38%)	370 (–57%)	336 (–61%)	<0.01
Dominant fibroid volume (cm <sup>3</sup> )	388	212 (–46%)	154 (–61%)	132 (–66%)	<0.01

\* t-test

**TABLE 3**  
EXPERIENCE OF THE PATIENTS (N = 65)

	N	(%)
Markedly improved	49	(72)
Moderately improved	14	(22)
Slightly improved	2	(3)
Unchanged	2	(3)
Worse	0	

Table 3 shows the experience of the patients with the outcome of the procedures.

Seventy-two percent of the patients were without symptoms of menorrhagia, hypermenorrhea, pelvic pain or pressure, 3 months after embolization. Twenty – two percent of patients had moderate improvement in their symptoms, and only three percent of the women had only improvement. Two patients (3%) were slightly dissatisfied with the outcome of the procedure, as they had not had any change in their symptoms. No patient had markedly worse and no serious complications were observed. Approximately twenty percent of the patients developed fever and malaise in the first 7 to 14 days. Also, approximately one third of women complained of a persistent mucoid vaginal discharge for up to 3 months after procedure. This had resolved spontaneously in all women. Five women have become amenorrheic for some time after embolization, but all these patients resumed menses within 6 months.

## Discussion

A method of nonsurgical treatment of uterine fibroids involving embolization of the uterine arteries, has been discussed. This technique, performed by interventional radiologists, has long been used in cases of intractable postoperative and postpartum hemorrhage<sup>3–7</sup>. Its application for reducing the size of benign uteri-

ne tumors has recently been reported by some authors<sup>8–18</sup>. The procedure is rapid, with most procedures taking less than 1 hour. It can be performed independent of the size of the uterus, in contrast to laparoscopic procedures, which are often difficult in an abdomen filled with fibroids. In addition, all fibroids are treated simultaneously.

All authors who have published a series of any size, have reported essentially identical outcome statistics<sup>3,10–18</sup>. Our initial experience parallels that of others<sup>3,10–17,19</sup>. Symptoms were substantially improved in similar percentages, patient satisfaction with the procedure was high, and there were few complications requiring therapy. The high rate of women's satisfaction with uterine artery embolization in our study was directly related to their improvements in menorrhagia and to the reduced influence on their life.

The uterine and dominant fibroid volume reduction seen in our study at follow – up after uterine artery embolization was similar to that reported by others<sup>3,10–17,19</sup>. A time course for uterine and dominant fibroid volume reduction after embolization has not been determined, but our study and other studies have shown the most reduction after six months<sup>3,9,10,12–19</sup>.

Overall, uterine artery embolization for the treatment of uterine fibroids is minimally invasive, preserves the uterus, and requires shorter hospitalization and recovery times than hysterectomy and myomectomy. Successful pregnancy after this procedure has been reported<sup>9,10,20</sup>. The overall effect of this procedure on future fertility and childbearing remains the greatest unknown. We agree with several authors that embolization is not a first – line treatment for patients who desire fertility. Ongoing follow – up, however, is needed to evaluate the long term efficacy of this therapy.

## REFERENCES

1. STEWART, E. A., Lancet, 357 (2001) 293. — 2. CRAMER, S. F., A. PATEL, Am. J. Clin. Pathol., 94 (1990) 435. — 3. HUTCHINS, F. L., R. WORTHINGTON — KIRSCH, Obstet. Gynecol. Clin. North. Am., 27 (2000) 397. — 4. ATHANASOULIS, C. A., A. C. WALTMAN, A. B. BARNES, Gynecol. Oncol., 4 (1976) 144. — 5. BREE, R. L., H. M. GOLDSTEIN, S. WALLACE, Surg. Gynecol. Obstet., 143 (1976) 597. — 6. PAIS, S. O., M. GLICKMAN, P. E. SCHWARTZ, Obstet. Gynecol., 55 (1980) 741. — 7. ROSENTHAL, D. M., R. COLAPINTO, Am. J. Obstet. Gynecol., 151 (1985) 227. — 8. RAVINA, J. H., J. M. BOURET, D. FRIED, Contracept. Fertil. Sex., 23 (1995) 45. — 9. RAVINA, J. H., D. HERBRETEAU, N. CIRARU — VIGNERON, J. M. BOURET, E. HOUDART, A. AY-MARD, Lancet, 346 (1995) 671. — 10. RAVINA, J. H., J. M. BOURET, N. CIRARU — VIGNERON, D. REPIQUET, D. HERBRETEAU, A. AY-MARD, Bull. Acad. National Med., 181 (1997) 233. — 11. GOODWIN, S. C., S. VEDANTHAM, B. MCLUCAS, A. E. FORNO, R. PERELLA, J. Vasc. Interv. Radiol., 8 (1997) 517. — 12. GOODWIN, S. C., B. MCLUCAS, M. LEE, G. CHEN, R. PERELLA, S. VEDANTHAM, S. MUIR, A. LAI, J. W. SAYRE, M. DELEON, J. Vasc. Interv. Radiol., 10 (1999) 1159. — 13. SPIES, J. B., A. R. SCIALLI, R. C. JHA, I. IMAOKA, S. M. ASCHER, V. M. FRAGA, K. H. BARTH, J. Vasc. Interv. Radiol., 10 (1999) 1149. — 14. KLEIN, A., M. L. SCHWARTZ, Am. J. Obstet. Gynecol., 184 (2001) 1556. — 15. WATSON, G. M. T., W. J. WALKER, B. J. O. G., 109 (2002) 129. — 16. PRON, G., J. BENNETT, A. COMMON, J. WALL, M. ASCH, K. SNIDERMAN, Fertil. Steril., 79 (2003) 79. — 17. ZUPI, E., M. POCEK, M. DAURI, D. MARCONI, M. SBRACIA, E. PICCIONE, G. SIMONETTI, Fertil. Steril., 79 (2003) 107. — 18. STRINIĆ, T., D. KARELOVIĆ, Int. J. Gyn. Obstet., 83 (2003) 52. — 19. GOODWIN, S. C., S. M. BONILLA, D. SACKS, J. Vasc. Interv. Radiol., 12 (2001) 1011. — 20. STRINIĆ, T., D. BUKOVIĆ, D. KARELOVIĆ, L. BOJIĆ, I. STIPIĆ, Coll. Antropol., 26 (2002) 577.

*T. Strinić,*

*Department of Obstetrics and Gynecology, Clinical Hospital Split, Spinčićeva 1,  
21000 Split, Croatia*

## TERAPIJA UTERINIH FIBROIDA EMBOLIZACIJOM UTERINE ARTERIJE

### SAŽETAK

Embolizacija uterinih arterija minimalno je invazivan zahvat, u usporedbi s histerektomijom, klasičnom ili laparoskopskom enukleacijom mioma. Cilj ovog rada bio je procijeniti korist i uspješnost embolizacije uterinih arterija i mišljenje pacijentica o zahvatu. Nakon ginekološke obrade u šezdeset devet žena u prijemnopauzi izvršena je embolizacija uterinih arterija. Četiri zahvata bila su neuspješna; u triju žena izvršena je jednostrana embolizacija poradi malformiranih krvnih žila, jedna je imala alergijsku reakciju na kontrastno sredstvo. Od 69 pacijentica 58 ih je napustilo bolnicu slijedeći dan poslije zahvata, a ostalih 11 tijekom prvog tjedna. Kontrolni pregledi nakon 3, 6 i 12 mjeseci pokazali su značajno smanjenje veličine maternice i mioma i značajno poboljšanje krvarenja. Dakle, prema ovom izvješću, embolizacija uterinih arterija je uspješan, minimalno invazivan način liječenja mioma koji sačuva maternicu i uključuje kraću hospitalizaciju i kraće vrijeme oporavka u odnosu na kirurško liječenje.