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ORIGINAL ARTICLE

Arterial embolization of uterine fibroids

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Summary

Purpose: *The aim of this study was to analyze outcomes in a series of patients with symptomatic uterine fibroids who had undergone endovascular arterial embolization.*

Methods: *Analysis included 36 patients with uterine fibroids and average age of 38.5 years, with bilateral endovascular embolization of fibroid-feeding arteries. Solitary uterine fibroids were present in 20 (56%) patients, and multiple in 16 (44%) patients. The patients were followed up to one year after embolization.*

Results: *In the subgroup of patients with solitary uterine fibroids, 6 months after the embolization, the volume of uterine fibroids was reduced to 50% in 16 patients, and to 38% in 4 patients. After one year, the volume of uterine fibroids was reduced to 50% in all 36 patients. In the subgroup of patients with multiple uterine fibroids, 6 months after the embolization, the volume of uterine fibroids was reduced to 50% in 10 patients, and to 36% in 6 patients. After one year, the volume of uterine fibroids was reduced to 50% in 14 patients, while in 2 patients the reduction of the volume remained 36%. After one year, all patients became symptomless.*

Conclusion: *The results of this case series show high efficacy of endovascular embolization of uterine fibroids: with a minimally invasive treatment, the volume of uterine fibroids is halved and symptoms disappear, obviating the need for a surgical intervention.*

Key words: endovascular embolization, menorrhagia, uterine fibroids

Introduction

Uterine fibroids are benign, estrogen-dependent tumors of uterine smooth muscle cells [1]. Microscopically, the tumor cells are elongated, with curved nuclei. The fibroids could have subserous (pedunculated or not), intramural, submucosal or cervical localization (order according to frequency), and may appear as solitary or multiple tumors. Almost 70% of women younger than 45 years have some form of uterine fibroid; they are more frequent in smokers and obese women. Up to 25% of Caucasian women and up to 50% of afro-american women with uterine fibroids have symptoms [2].

Although uterine fibroids rarely undergo malignant transformation and show spontaneous regression after menopause with hyaline, myxomatous or lipid degeneration, they may cause menorrhagia or menometrorrhagia. After the fibroids reach a certain size, increased pressure within the pelvis may cause other symptoms, like frequent voiding, pain and constipation. During the pregnancy, the fibroids could cause abortion or premature uterine contractions [3,4].

When uterine fibroids cause symptoms, treatment is mandatory. Surgical (myomectomy or hysterectomy) and drug treatment (gonadotropin-releasing hormone analogues, medroxyprogesterone, progesterone receptor antagonists, selective modulators of estrogen receptors, or androgen antagonists) comprise the standard of care of fibroids [5,6]. On the other hand, during the last decade, a new treatment method was introduced, which blocks the inflow of arterial blood to the fibroid by endovascular (arterial) embolization [7,8]. Arterial embolization is usually used for multiple symptomatic uterine fibroids, for large (as preparation for laparoscopic surgery) or small (< 5 cm in diameter, or < 25 cm^3) tumors, and in patients with high surgical risk. This method is contraindicated during pregnancy, when the uterus is small (< 600 cm^3), for subserous peduncu-

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lated fibroids, when ovarian tumors or chronic infection are present in the pelvis, and in patients with drug/iodine allergy, renal insufficiency or in menopause. Arterial embolization is a relatively safe procedure, with low rate of complications (< 1%) reported in the literature [8]: dissection of the arterial wall, perforation of an artery, vasospasm or non-selective embolization (intra-procedural), and infection, amenorrhea, uterine necrosis, vulvar necrosis, sexual dysfunction or pulmonary embolism (post-procedural). However, the type and rate of the complications are strongly physician-dependent, decreasing in severity and numbers with experience and skill.

The aim of our study was to show one-year outcomes of endovascular embolization in a series of 36 patients with symptomatic uterine fibroids.

Methods

Endovascular arterial embolizations were carried out at the Interventional Radiology Department of Clinical Center Kragujevac, Kragujevac, Serbia, on 36 female patients (average age 38.5 years, range 32 – 46) with uterine fibroids, from October 2007 to October 2008. The patients were followed for one year after the procedure.

Inclusion criteria for arterial embolization were: solitary or multiple uterine fibroids, reproductive age and signed informed consent of the patient for the procedure. Exclusion criteria were as follows: drug/iodine allergy, menopause, pregnancy and pedunculated character of subserous fibroids.

The diagnosis of uterine fibroids was made by ultrasonography and magnetic resonance imaging (MRI), and volumes of uterine fibroids before, 6 and 12 months after the procedure were measured by MRI. In this series, there were 10 (28%) patients with subserous, 11 (30%) with submucosal, 14 (39%) patients with intramural and 1 (3%) with cervical uterine fibroid. Solitary uterine fibroids were present in 20 (56%) patients, and multiple in 16 (44%).

Before the arterial embolization, the patients had the following symptoms: menorrhagia (34; 94%), pelvic pain (30 patients; 83%), constipation (26 patients; 72%), frequent voiding (28 patients; 78%) and arterial hypotension (30 patients; 83%).

In all our patients, bilateral endovascular embolization of the uterine fibroids was performed, using "cross-over" technique of selective embolization of arteries feeding the fibroids. For the majority of the embolizations, a 4F caliber catheter was used, and for a few cases with narrow arteries a 2.7F caliber catheter was appropriate. The embolization was made by Bead Block particles with 750-900 μ in diameter. The procedures were made in a special angio-theater, with narrow X-ray beam, used for maximum of 5 min (Figures 1 and 2). Thirty min before the procedure the patients were given 2 g of cefazolin i.v., as antibiotic prophy-

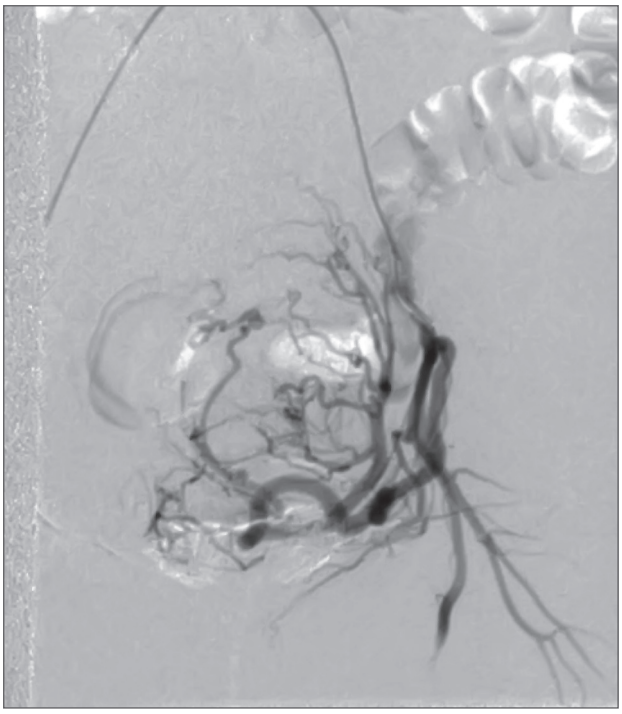

Figure 1. Selective endovascular arterial embolization of uterine fibroid: arteriography.

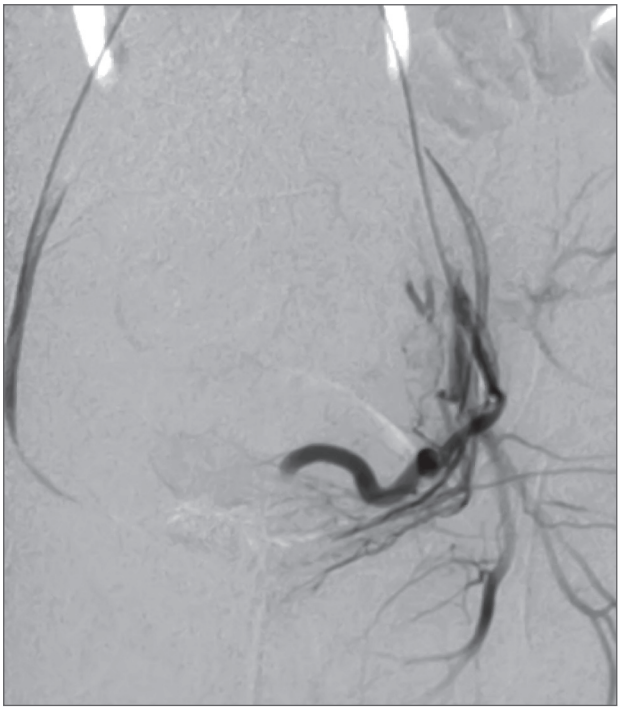

Figure 2. Arteriography of uterine artery after embolization.

laxis. Twelve to sixteen hours post-embolization the patients were discharged.

Results

Efficacy

The diameters of uterine fibroids ranged from 36 to 252 mm. The majority of the patients (83%) had uterine fibroids with largest diameter < 50 mm and volume < 30 cm^3. There was only one patient with extremely large uterine fibroid (252 × 165 × 185 mm), for whom embolization was only preparation for surgical intervention.

In the subgroup of patients with solitary uterine fibroid, 6 months post-embolization, the volume of uterine fibroids was reduced to 50% in 16, and to 38% in 4 patients (Figures 3 and 4). After one year, the volume of uterine fibroids was reduced to 50% in all 36 patients.

In the subgroup of patients with multiple uterine fibroids, 6 months post-embolization, the volume of uterine fibroids was reduced to 50% in 10, and to 36% in 6 patients. After one year, the volume of uterine fibroids was reduced to 50% in 14 patients, while in 2 patients the reduction of the volume remained 36%.

Six months post-embolization, the patients had the following symptoms: menorrhagia (2 patients; 5%), pelvic pain (0 patients; 0%), constipation (1 patient; 3%), frequent voiding (4 patients; 11%), and arterial hypotension (4 patients; 11%). One year post-embolization all patients were symptomless.

Safety

No intra-procedural complications of endovascular embolization in this series were recorded.

Also, no post-procedural complications of endovascular embolization were recorded. However, transient post-embolization syndrome lasting for a maximum of 10 h was recorded in some patients: 11 (30%) patients had pelvic pain, nausea with vomiting was recorded in 13 (36%) patients and fever up to 38° C in 8 (22%) patients.

Figure 3. MRI of an uterine fibroid before treatment.

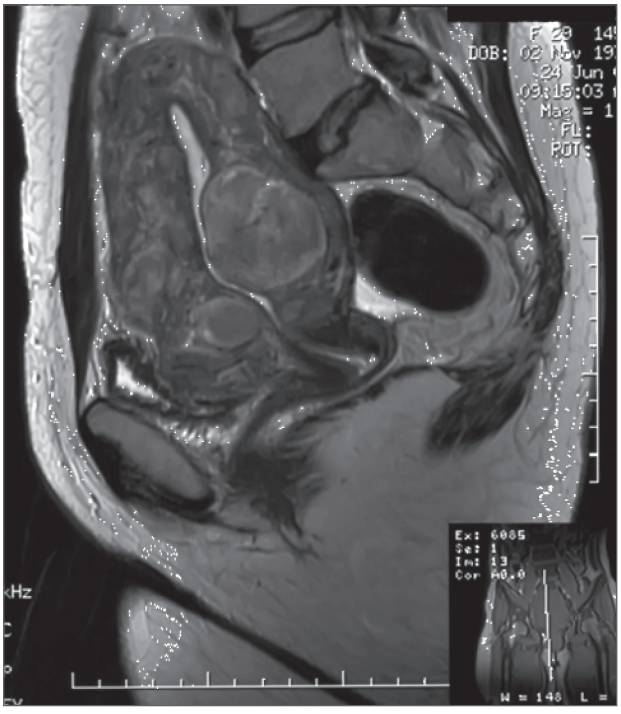

Figure 4. MRI of the same patient 6 months after embolization.

Discussion

Endovascular embolization of uterine fibroids is a minimally invasive therapeutic procedure with high efficacy and safety [9]. In our series, the effect of embolization on the volume of the fibroids after 6 months was better in patients with solitary tumors than in those with multiple fibroids. However, this difference almost disappeared after one year, making it clinically irrelevant.

The majority of our patients had uterine fibroids <50 mm in diameter; when such fibroids are treated with embolization, their volume shrinks by 50% and the fibroids loose their potential to cause symptoms. The patients can then reach menopause symptomless;

taking into account that uterine fibroids shrink in menopause anyway, such patients probably will never seek additional surgical or drug therapy of the fibroids [10-12]. In our series > 88% of the patients became symptomless after 6 months, and virtually all did not have any symptom after one year. This favorable result was probably due to the high proportion (83%) of patients with fibroids < 50 mm in diameter.

Intra-procedural complications could be prevented by appropriate patient choice and preparation, by correct choice of the embolization material, as well as by good manipulation technique [10-12]. No patient in this series developed intra-procedural complications, due to the right choice of thin microcatheters which could reach fibroid-feeding arteries and to the rich experience of interventional radiologists who performed the procedures.

However, post-embolization syndrome, especially nausea and vomiting, was recorded in our patients more frequently than in other studies [9]. This was probably caused by non-standard use of premedication with antiemetics and analgesics, and consequent inadequate protection of some patients. An interventional radiology unit which undertakes endovascular embolization should develop evidence-based local protocols for prophylaxis of the post-embolization syndrome.

The results of our series show high efficacy of endovascular embolization of uterine fibroids: with a minimally invasive treatment (the procedure is performed under local anaesthesia and the patients are discharged from hospital the same day), the volume of uterine fibroids is halved and symptoms disappear, obviating the need for a surgical intervention which carries significant morbidity. In order to ensure also the safety of this procedure, the choice of appropriate catheters and embolization materials, as well as the experience of the interventional radiologists are necessary elements for a desirable outcome.

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