

Safety and Effectiveness of UFE in Fibroids Larger than 10 cm

Viktor Bérczi · Éva Valcseva · Dóra Kozics ·
Ildikó Kalina · Pál Kaposi · Péter Sziller ·
Szabolcs Várbíró · Erzsébet Mária Botos

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Abstract

Introduction Early literature suggested that the size of the uterus, the size of the dominant fibroid, and the amount of applied embolization particles would be the risk factors for major postprocedural complications, but recent publications have confuted these early results. The purpose of our study was to evaluate whether the size of the dominant fibroid would influence the complication rate and effectiveness in a large single-center cohort.

Patients and Methods From 28 April 2008 until 31 December 2012, 303 patients had uterine artery embolization (UAE). 262 patients had small [largest diameter <10 cm (Group 1)], 41 patients had large [largest

diameter >10 cm (Group 2)] fibroid. UAE was performed from unilateral femoral access using 500–710 and 355–500 μm polyvinyl alcohol particles. Periprocedural and postprocedural complications and numerical analog quality-of-life scores (0—unbearable symptoms; 100—perfect quality of life) were listed and statistically analyzed.

Results During the mean follow-up time [7.79 ± 5.16 (SD) month], data on 275 patients ($275/303 = 90.8\%$) were available. Quality-of-life score was 33.3 ± 23.5 and 33.5 ± 24.1 before, whereas 85.6 ± 16.0 and 81.5 ± 23.5 after UAE in Group 1 and Group 2, respectively, (Mann–Whitney *U* test one-sided, $p = 0.365$). There were 4 myoma expulsions, 1 acute myomectomy, and 2 acute hysterectomies reported from Group 1, meanwhile 1 myoma expulsion, 1 acute myomectomy, and 2 acute hysterectomies were documented from Group 2 (NS differences).

Conclusion There was no significant difference in the effectiveness and in the number of minor and major complications between fibroids with <10 cm largest diameter compared to those >10 cm.

Keywords Uterine artery embolization (UAE) · Dominant fibroid · Major complications · Acute hysterectomy and myomectomy

V. Bérczi (✉) · É. Valcseva · D. Kozics · I. Kalina ·
P. Kaposi · E. M. Botos
Department of Radiology and Oncotherapy, Semmelweis
University, Budapest, Hungary
e-mail: berczi@hotmail.com

É. Valcseva
e-mail: evapeneva@gmail.com

D. Kozics
e-mail: dora.kozics@gmail.com

I. Kalina
e-mail: ilkalina@t-online.hu

P. Kaposi
e-mail: kaposipal@gmail.com

E. M. Botos
e-mail: erzsebetbotos@gmail.com

P. Sziller · S. Várbíró
2nd Department of Gynaecology and Obstetrics, Semmelweis
University, Budapest, Hungary
e-mail: psziller@t-online.hu

S. Várbíró
e-mail: varbiroszabolcs@gmail.com

the only definitive treatment and eliminates the possibility of recurrence [1]. As an alternative of hysterectomy, uterine artery embolization (UAE) has been applied since 1995 [2]. UAE performed by an interventional radiologist is a procedure in which the uterine arteries are embolized resulting in leiomyoma devascularisation and involution. The most common indication of UAE is symptomatic fibroid in the uterus. The main goal of this intervention is to decrease symptoms: it is a minimal invasive procedure with shorter hospital stay and faster recovery than surgical intervention. Following embolization of the uterine arteries, the blood supply of the normal myometrium is not destroyed but the size of the fibroid decreases with approximately 50 % in volume. Besides fibroids, this procedure is also performed in adenomyosis, therapy-resistant postpartum bleeding and arteriovenous malformations [1–3]. UAE is considered a safer procedure with fewer major complications when compared with hysterectomy [4, 5].

A broad range of complications have been described after UAE with widely varying rates, most of them minor complications. Major complication rates have been reported ranging from 1 to 17 % [6, 7]. Early reports in the literature have suggested an increased rate of complications such as infection, sepsis, and uterine necrosis leading to emergency hysterectomy when UAE was used to treat large (>10 cm) fibroids [2, 3, 8, 9], and it has been suggested that UAE should not be performed for large fibroids (>10 cm in diameter) or uteri with >100 cm³ volume [7]. Other more recent studies have refuted this and found no increased risk of complications associated with large fibroids or large uterus volume [10–12]. The purpose of this study was to retrospectively determine clinical outcome and percent of minor and major complications in patients with fibroids <10 or >10 cm largest diameter in a large cohort of patients.

Materials and Methods

Between 28 April 2008 and 31 December 2012, 303 UAE were performed in our department. The mean age of the patients was 42.3 years (range 24–54 years). Leading symptoms were strong menstrual bleeding accompanied by pelvic pain, anemia, and urgent sensation of urination. Some of our patients reported fertility problems or subsequent desire for pregnancy. All treated patients had full documentation of symptoms (Table 1), previous gynecological history, diameters of the largest fibroid, and follow-up information including complications.

Before embolization, imaging of the uterus was typically done by pelvic CE-MR. For 7 out of 303 patients, MR was not done predominantly due to claustrophobia, for

Table 1 Complaints of fibroid patients before UFE

Complaints (<i>n</i> = 303, 100 %)		
Distribution of menstruation		
Dysmenorrhea	277	91.4
Anemia	50	16.5
Pain		
Pelvic pain	64	21.1
Lumbar pain	20	6.6
Dyspareunia	6	2.0
Pressure		
Pelvic pressure	32	10.6
Frequent urination	107	35.3
Obstipation	5	1.7
Fertility		
Subfertility/infertility	4	1.3

these patients, transabdominal or transvaginal ultrasound was performed. Clinical efficacy was assessed using numerical analog quality-of-life score (0-unbearable symptoms; 100-perfect quality of life) before and after the procedure. All periprocedural and postprocedural complications were listed during the procedure and at the follow-up interviews. Minor complications included temporary fever (not longer than 4 weeks without any need of antibiotics), temporary amenorrhea, long-lasting postprocedural menstrual bleeding, postprocedural dysmenorrhea, aspecific infection (fever without pelvic complication and need for antibiotics). These complications did not require hospitalization or remarkable medication. Major complications were determined as myoma expulsion, emergency myomectomy, or emergency hysterectomy due to infectious complication of the necrotized fibroid. Elective myomectomy or elective hysterectomy was also listed.

The patients were divided into two groups based on the largest diameter of the largest fibroid; Group 1: diameter ≤10 cm, and Group 2: diameter >10 cm. Statistical analysis of the relationship between fibroid diameter and complications was performed using Fisher's exact test. Mann–Whitney *U* test was applied for the statistical analysis of quality-of-life score in the two groups.

Embolization Procedure

UAE was performed using a standard technique with right common femoral arterial punctures and bilateral catheterization of the uterine arteries with 4F catheters. In 19 cases (all belonged to Group 1), only unilateral embolization was done because of tortuous origin of the uterine artery, early venous filling, retrograde filling of the ovarian artery, or unidentifiable uterine artery. Embolization was performed using nonspherical polyvinyl alcohol (PVA) particles

500–700 and 355–500 μm in diameter (Contour; Boston Scientific-Target Therapeutic, Fremont, CA). The angiographic end point for embolization was defined as near stasis of contrast medium flow in the uterine arteries. Manual compression was applied to the puncture site at the end of the procedure. All embolization procedures were done by the same interventional radiologist with more than 15 years experience. All patients were given antibiotics (amoxicillin or clindamycin) immediately before the procedure and during the hospital stay. Pain was managed with intravenous nalbuphine (morphinan derivative), pyrazolone, and non-steroid anti-inflammatory drugs. After UAE, patients were kept in the hospital overnight for observation.

Results

Clinical Efficacy in Group 1 and Group 2

The number of patients in Group 1 (≤ 10 cm) and Group 2 (> 10 cm) was 262 and 41, respectively. Follow-up is available on 275 patients ($275/303 = 90.8\%$) (Group 1: $239/262 = 91.2\%$; Group 2: $36/41 = 87.8\%$). Mean follow-up time was 7.79 ± 5.16 (SD) month (7.6 ± 4.9 for Group 1, and 8.98 ± 6.7 for Group 2). Symptoms improved at least partially in 94.6 and 91.7 % in Group 1 and Group 2, respectively, (Table 2A). Quality-of-life score was 33.3 ± 23.5 and 33.5 ± 24.1 before, whereas 85.6 ± 16.0 and 81.5 ± 23.5 after UAE in Group 1 and Group 2, respectively, (Mann–Whitney U test one-sided, $p = 0.365$) (Table 2B).

Complications in Group 1

The vast majority of these complications were minor, such as fever (12 cases), temporary amenorrhea (7), prolonged menstruation (4), aspecific infection (2), intermittent menorrhagia (4), aspecific infection (2), postprocedural dysmenorrhea (23), and intermittent menorrhagia (4). Among major complications, expulsion of a fibroid was reported in 4 cases, all of them appeared in between the 2 weeks and 3 month following uterine fibroid embolization (UFE); one of these patients needed supplementary surgical gynecological intervention to complete the expulsion. In 2 cases, acute hysterectomy was necessary on the 5th and 9th postprocedural week followed by appearance of strong pelvic pain, fever, and elevated septic blood parameters in both patients. Elective myomectomy was done because of persistent symptoms, 7.5 months following UFE (Table 3).

All 19 patients who had unilateral embolization belonged to Group 1, follow-up is available in 12 cases and none of them had remarkable complications.

Table 2 Satisfaction analysis and summary of pre- and postprocedural quality-of-life scores

(A)	Group 1 (239/262)		Group 2 (36/41)		
Satisfaction					
Has UFE improved your symptoms?					
Yes	184	77.0 %	28	77.8 %	
Partially	42	17.6 %	5	13.9 %	
No	13	5.4 %	3	8.3 %	
Would you recommend this treatment to other patients?					
Yes	236	98.7 %	35	97.2 %	
No	3	1.3 %	1	2.8 %	
(B) Score	Group 1 (239/262)		Group 2 (36/41)		p
Numerical analog quality-of-life score					
Preprocedural	33.3 ± 23.5		33.5 ± 24.1		0.940
Postprocedural	85.6 ± 16.0		81.5 ± 23.5		0.365

Panel A Both groups showed high satisfaction with the treatment. The vast majority, including some patients with major complications, would recommend this treatment to other fibroid patients. *Panel B* Summary and statistical analysis of pre- and postprocedural numerical analog quality-of-life score presents major improvement of symptoms in both groups with no significant differences between scores the two groups (Mann–Whitney U test)

UFE uterine fibroid embolization

Complications in Group 2

The following minor complications were documented: fever (5 cases), temporary amenorrhea (1), aspecific infection (1), postprocedural dysmenorrhea (2), and intermittent menorrhagia (1). Major complications as fibroid expulsion of the fibroid were reported in 1 case, the necrotized fibroid tissue appeared in the cervical canal in the 6th post-interventional month. As septic complications, one emergency myomectomy occurred in the 6th postprocedural week; acute hysterectomy was reported in 2 cases, 3, and 6 weeks following UAE (Table 3).

An elective myomectomy was reported 8 months after UAE because the embolized fibroid grew back to the pre-embolization size resulting in symptom recurrence. In another case, the large uterine mass was unchanged in size and unusually strong post-interventional blood flow was detected during transvaginal ultrasound, malignancy was suspected. Hysterectomy was decided, elective surgery was performed 8 months after UAE; subsequent histology, however, excluded malignancy (Table 3).

Discussion

From the very beginning of the acceptance of UAE as an alternative treatment for hysterectomy, many centers tried

Table 3 List of minor and major complications following UFE in patients with fibroids <10 cm (Group 1) and >10 cm (Group 2)

Complications	Group 1 (239/262) (%)		Group 2 (36/41) (%)		<i>p</i> value
	Number	%	Number	%	
Fever	12	5.0	5	13.9	0.063
Temporary amenorrhea	7	2.9	1	2.8	1.0
Prolonged menstruation	4	1.7	0	0.0	1.0
Aspecific infection	2	0.8	1	2.8	0.354
Postprocedural dysmenorrhea	23	9.6	2	5.6	0.550
Intermittent menorrhagia	4	1.7	1	2.8	0.519
Myoma expulsion	4	1.7	1	2.8	0.519
Acute myomectomy	0	0.4	1	2.8	–
Elective myomectomy	1	0.0	1	2.8	0.090
Acute hysterectomy	2	0.8	2	5.6	0.253
Elective hysterectomy	0	0.0	1	2.8	–

Statistical analysis was performed using Fisher's exact test

to investigate risk factors for complications. Early publications suggested that the size of the fibroid, the total uterine size, and the amount of applied PVA particles represent higher risk. Recent publications debated these suggestions [12].

Pelage et al. [8] published their data about 80 patients with UAE. Although the size of the fibroid was not given, they reported one case when acute hysterectomy was needed 17 days following UAE due to necrosis and infection of a large subserosal fibroid. In their discussion, the authors referred to another group who reported two cases of emergent hysterectomy related to fibroid infection following large uterine myoma [3, 9].

Katsumori et al. [10] published their study with the involvement of 152 patients. The authors specially focused on risks of UAE in groups with fibroid smaller or larger than 10 cm [6]. Based on their experience, there was no statistically significant difference in septic complications between the two groups ($p = 0.172$) [6]. In 2008, Firouzina et al. studied cases of 101 patients whether size, position, and the number of fibroids influence the effectiveness or complication rate of UAE. No correlation was found between the number of complications and the size of the fibroid [11].

From 2010, two further groups published that large uterine fibroid would not mean contraindication for UAE. Smeets et al. investigated long-term follow-up data of 71 patients with large uterine fibroids. One patient appeared 7 weeks later with vaginal discharge and fever, thus hysterectomy was performed [13]. The role of the fibroids larger than 10 cm was worked out on 121 cases in a study from Parthipun et al. [12]. Out of 30 patients with large fibroid, only one septic complication was reported but there was no necessity of hysterectomy. From the group having fibroid smaller than 10 cm in size, one emergent

hysterectomy was reported. Extensive statistical analysis of this study revealed no significant correlation between large uterine fibroid and septic hysterectomy [12].

Based on our experience on the largest series for such an analysis so far (303 patients) and recent results from the literature, UAE can be considered as a safe and effective procedure for treatment of fibroids larger than 10 cm of the largest diameter. Since there was no significant difference in complications between patients having fibroids smaller or larger than 10 cm, UAE can be offered for women having large uterine fibroid.

Conflict of interest Viktor Bérczi, Éva Valcseva, Dóra Kozics, Ildikó Kalina, Pál Kaposi, Péter Sziller, Szabolcs Várbíró, and Erzsébet Mária Botos have no conflict of interest.

Statement of Informed Consent Informed consent was obtained from all individual participants included in this study.

Statement of Human and Animal Rights All procedures performed in this study involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

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