CLINICAL STUDY

Uterine Artery Embolization for Pedunculated Subserosal Leiomyomas: Evidence of Safety and Efficacy

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ABSTRACT

Purpose: To evaluate safety and efficacy of uterine artery embolization (UAE) for pedunculated subserosal (PS) leiomyomas.

Materials and Methods: Of 1,069 patients who underwent UAE for symptomatic leiomyomas or adenomyosis from 2007 to 2016, 55 patients (mean age 40.3 y ± 4.8) with 66 PS leiomyomas (mean diameter 6.61 cm ± 2.04) were enrolled. Each PS leiomyoma was categorized into 1 of 2 groups: high-risk PS leiomyoma (stalk diameter < 25% of diameter of leiomyoma) and low-risk PS leiomyoma (stalk diameter 25%–50% of diameter of leiomyoma). MR imaging was performed 3 months after UAE. Rates of infarction and volume reduction were compared between PS leiomyomas and non-PS dominant leiomyomas and between high-risk and low-risk PS leiomyomas. Complications related to PS leiomyomas were assessed.

Results: At a median follow-up of 96 days (range, 36–348 d) after UAE, none of the patients (0%) had complications related to PS leiomyomas, even among high-risk cases. Mean volume reductions of 38.2% and 38.4% were achieved for PS leiomyomas and non-PS dominant leiomyomas, respectively ($P = .953$). There were 3 (5.5%) minor adverse events, but none were related to PS leiomyoma. There was no significant difference in volume reduction and infarction rates between low-risk and high-risk PS leiomyomas.

Conclusions: UAE is safe and effective in patients with PS leiomyomas even for high-risk cases (stalk diameter < 25% of diameter of leiomyoma). PS leiomyoma should not be considered a contraindication for UAE.

ABBREVIATIONS

CIRSE = Cardiovascular and Interventional Radiological Society of Europe, PS = pedunculated subserosal, UAE = uterine artery embolization

Uterine artery embolization (UAE) is a well-established procedure for the treatment of symptomatic leiomyomas, and the American College of Obstetricians and Gynecologists has recommended UAE as a treatment option for selected women who wish to retain their uteri (1,2). However, controversy remains regarding whether pedunculated subserosal (PS) leiomyoma is a contraindication for UAE. Two practice guidelines for UAE for symptomatic leiomyomas were recently developed by the Society of Interventional Radiology (SIR) and the Cardiovascular and Interventional Radiological Society of Europe (CIRSE) (3,4). PS leiomyomas are not considered a contraindication for UAE in the SIR guideline (3). In contrast, the CIRSE guideline considers PS leiomyomas a relative contraindication because of concerns for potential detachment, infection, and sepsis (4). Despite these concerns, there have been only a few case reports describing serious complications after UAE of PS leiomyomas (5–7). With the conflicting suggestions on PS leiomyomas from SIR and CIRSE, more data on UAE for PS leiomyomas may help in making better treatment recommendations. Therefore, this study retrospectively investigated the safety and efficacy of UAE.

MATERIALS AND METHODS

Patients

The institutional review board approved this retrospective study, and the requirement for patient informed consent was

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None of the authors have identified a conflict of interest.

https://doi.org/10.1016/j.jvir.2017.11.022

EDITORS' RESEARCH HIGHLIGHTS

- This report dismisses the commonly held idea that UAE in patients with pedunculated subserosal fibroids is associated with unique and significant risk of complications.
- Stalk enhancement is equivalent to enhancement of the adjacent myometrium; this suggests that the target vasculature of embolization may be the perifibroid plexus.
- Stalk diameter does not determine complication rates, fibroid infarction rate, or volume reduction rate in these patients.

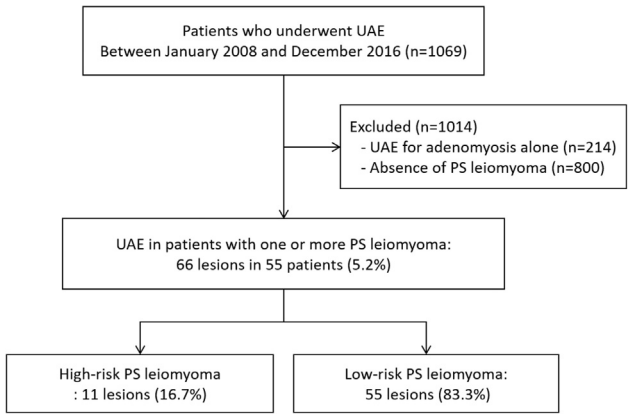

Figure 1. Flowchart of the study population.

waived for patient records and images. Between January 2007 and December 2016, 1,069 consecutive patients with symptomatic uterine leiomyomas or adenomyosis diagnosed with magnetic resonance (MR) imaging underwent UAE. Among these patients, 55 patients (mean age, 40.3 y; range, 32–51 y) with 66 PS leiomyomas were included in this study. A PS leiomyoma is a leiomyoma whose center is located outside the uterus and is attached to the uterus by a stalk narrower than 50% of the diameter of the leiomyoma (8). Each PS leiomyoma was categorized into 2 groups according to stalk size: stalk diameter < 25% of leiomyoma diameter (group A, high-risk PS leiomyoma group) and stalk diameter 25%–50% of leiomyoma diameter (group B, low-risk PS leiomyoma group) (Fig 1). Of PS leiomyomas, 11 (16.7%) had a stalk diameter < 25% of the leiomyoma diameter (group A), and 55 (83.3%) had a stalk diameter 25%–50% of the leiomyoma diameter (group B). One patient had 3 PS leiomyomas, 9 patients each had 2 PS leiomyomas, and 45 patients each had 1 PS leiomyoma. The baseline patient characteristics are summarized in Table 1.

Table 1. Baseline Characteristic of 55 Patients with ≥ 1 Pedunculated Subserosal Leiomyomas Treated with UAE

Characteristics	Value
Age at treatment, y*	40.3 ± 4.82 (32–51)
Parity	
0	37 (67.3)
≥ 1	18 (32.7)
Presenting symptoms	
Menorrhagia	48 (87.3)
Bulk-related symptoms	43 (78.2)
Dysmenorrhea	14 (25.5)
Total number of leiomyomas	
1	4 (7.3)
2–4	13 (23.6)
≥ 5	38 (69.1)
Dominant leiomyoma location	
Pedunculated submucosal	1 (1.8)
Intramural	5 (9.1)
Transmural	13 (23.6)
Subserosal	4 (7.3)
Pedunculated subserosal	32 (58.2)
Previous treatment	
Myomectomy	3 (5.5)
GnRH agonist	3 (5.5)
MRgFUS	1 (1.8)

Note–Except where indicated, data are presented as number (%) of patients.
GnRH = gonadotropin-releasing hormone agonist; MRgFUS = magnetic resonance–guided focused ultrasound surgery; UAE = uterine artery embolization.
*Data are presented as mean ± SD (range).

Embolization Procedure

All UAE procedures were performed by 1 interventional radiologist with 2 years of UAE experience (M.D.K.) before this study period. Unilateral right femoral artery access was used in all cases. A 5-F RHR catheter (Cook Medical, Bloomington, Indiana) was placed in the internal iliac artery, and a coaxial 2-F to 3-F microcatheter was advanced distally into the uterine artery. Embolization was performed with the catheter tip beyond the origin of the cervicovaginal branch. The embolic agent was nonspherical polyvinyl alcohol particles (Contour; Boston Scientific, Marlborough, Massachusetts) mixed with 60 mL of 1:1 saline solution/contrast agent mixture. Polyvinyl alcohol particles 355–500 μm in diameter were injected at the beginning of embolization and were progressively increased to 500–700 μm toward the endpoint. Embolization was continued until complete cessation of blood flow was achieved in the ascending uterine artery for 10 cardiac beats.

MR Imaging and Image Analysis after UAE

MR imaging was performed to evaluate the following parameters: (*a*) volume of the uterus; (*b*) volume, stalk diameter, and infarction rate of PS leiomyoma; (*c*) presence and degree of stalk enhancement; and (*d*) location, volume, and infarction rate of non-PS dominant leiomyomas. In particular, separation of the PS leiomyoma from the uterus