Uterine Artery Embolization for Fibroid: Pre and Post Procedure Size Response According to the Location

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Abstract

Purpose: To assess the efficacy of uterine artery embolization in reducing the uterine fibroid size according to its location.

Materials and methods: A retrospective record-based study was conducted at interventional radiology department of prince sultan military medical city in Riyadh city. Medical files of all women above 18 years who underwent uterine artery embolization during the period from January 2015 to January 2020 were reviewed. All included women files were initially assessed for their data including age, puncture site, pre- and post-procedure size and location of the fibroids. Post-procedure size change and complications were assessed.

Results: A total of 160 female who underwent uterine artery embolization records for symptomatic fibroid were reviewed and data extracted. Females ages ranged from 18 to 60 years. Fibroid size reduction of less than 50% of its initial size was detected among 38 (44.7%) cases while it was reduced by 50 to 75% of its initial size among 27 (31.8%) cases but 20 (23.5%) cases showed reduction in size exceeding 75% of its initial size.

Conclusions: In conclusion, the study revealed that Uterine artery embolization is an effective less invasive, and safe therapy. The procedure efficacy was more among young females with initially small fibroid masses and the highest reduction (> 50%) in fibroid size was detected among females with fibroid at cervix (71.4%), fundus (70%) and lowest was for females with multiple fibroid (50%) with no statically significance (P = 0.432).

Keywords
Uterine fibroid, Mass, Benign lesion, Uterine artery embolization, Success, Complications

Introduction

Uterine fibroids which are also known as uterine leiomyoma are featured by being benign smooth muscle growths of the uterus [1]. Uterine fibroids are believed the most reported reproductive tract tumors among females that predominate in young menstruating women [2,3]. The overall incidence was recorded on average as 29.7/1000 patient/year, which may vary according to the women age [4-6]. Many researchers reported that the highest incidence was reported among women who are at 40 years of their life [7,8]. Uterine fibroids are amongst the most documented causes of bleeding per vagina [9]. Uterine fibroid is asymptomatic in most cases while some females may experience painful or heavy periods [9]. They may also had pain during intercourse with lower back pain [10]. A woman can have one uterine fibroid or many [9]. Occasionally, fibroids may make it difficult to become pregnant, although this is uncommon.

Uterine artery embolization (UAE) is a procedure in which an interventional radiologist uses a catheter to deliver small particles that block the blood supply to...
the uterine body. This minimally invasive procedure is commonly used in the treatment of uterine fibroids and is also called uterine fibroid embolization [10-12]. Fibroid size, number, and location are the main three potential determinants of an effective outcome of embolization intervention [13,14]. Uterine artery embolization showed faster recovery time than traditional surgeries but mostly needs repeated procedures in contrast to if surgery was done initially [11]. It is thought to work because uterine fibroids have abnormal vasculature together with aberrant responses to hypoxia (inadequate oxygenation to tissues) [15]. Uterine artery embolization can also be used to control heavy uterine bleeding for reasons other than fibroids, such as postpartum obstetrical haemorrhage or adenomyosis [16]. The current study aimed to assess the efficacy of uterine artery embolization in reducing the uterine fibroid size according to its location and to report the post-procedure complications.

Materials and Methods

A retrospective record-based study was conducted at interventional radiology department of prince sultan military medical city in Riyadh city. Medical files of all women who underwent uterine artery embolization during the period from January 2015 to January 2020 were reviewed. Females with one or more fibroids that could be subjected to clinical examination followed by MRI and were considered by the patient’s physician to justify interventional treatment. Females with fibroid size 2 cm or more were included.

Exclusion criteria included: Uterine malignancy, severe allergy to iodinated contrast media, subserosal pedunculated fibroids, recent or ongoing pelvic inflammatory disease, adenomyosis cases, post-partum haemorrhage cases and presence any contraindication to interventional radiology. The targeted sample was 150 females with one or more fibroids that were reviewed. Females with one or more fibroids that could be subjected to clinical examination followed by MRI and were considered by the patient’s physician to justify interventional treatment. Females with fibroid size 2 cm or more were included.

Post intervention assessment

After embolization procedure is done, women were assessed for change in fibroid size, pain score, symptoms and complications.

Data analysis

After data were collected, it was modified, coded and entered to statistical software IBM SPSS version 22(SPPS, Inc. Chicago, IL). All statistical analysis was done using two tailed tests. P value less than 0.05 was considered to be statistically significant. Descriptive analysis based on frequency and percent distribution was done for all variables including demographic data, fibroid site, location, and size. Fibroid size change % was estimated by calculating the percent in reduction from initial size. Cross tabulation was used to test for distribution of post-procedure fibroid size reduction by patient’s bio-demographic data. Exact probability test was used to test for relations significance due to small frequency distributions.

Results

A total of 160 female who underwent uterine artery embolization records were reviewed and data extracted. Female’s ages ranged from 18 to 60 years with mean age of 43.5 ± 7.4-years-old. Bilateral uterine artery embolization was done among 155 (96.9%) females, Transfemoral method of embolization was the dominant among study females (93.8%; 150).

Regarding fibroid site, it was at the body among 43.8% of the patients, followed by being multiple (more the one site) among 29.4% of the cases a, and at fundus among 27 (31.8%) cases but 20 cases showed reduction exceeding 75% of its initial size. Regarding enhancement, 40 (25%) cases showed decrease in size and enhancement, 21 (13.1%) showed Decrease in size and necrosis, 6 (3.8%) showed Decrease in enhancement stable in size, while 3 (1.9%) cases had complete regression.
Table 3 illustrates distribution of fibroid size reduction after uterine artery embolization by female’s bio-clinical data. Reduction in size by more than 50% was detected among 62% of young, aged females (less than 40 years) compared to 38% of those aged 50 years or more with detected statistical significance (P = 0.049). The highest reduction (> 50%) in fibroid size was detected among females with fibroid at cervix (71.4%), fundus (70%) and lowest was for females with multiple fibroid (50%) with no statistical significance (P = 0.432). Exact of 55.6% of females underwent transfemoral embolization had significant reduction in fibroid size (> 50%) compared to 50% of trans radial cases (P = 0.956).

Table 1: Bio-demographic data of females undergone uterine artery embolization in reducing the uterine fibroid.

| Age in years | Count | Column N% |
|--------------|-------|------------|
| < 40         | 49    | 30.6%      |
| 40-49        | 71    | 44.4%      |
| 50+          | 40    | 25.0%      |

| Uterine artery embolization | Count | Column N% |
|-----------------------------|-------|------------|
| Unilateral                  | 5     | 3.1%       |
| Bilateral                   | 155   | 96.9%      |

| Fibroid site                | Count | Column N% |
|-----------------------------|-------|------------|
| Body                        | 70    | 43.8%      |
| Cervix                      | 7     | 4.4%       |
| Fundus                      | 18    | 11.3%      |
| Multiple                    | 47    | 29.4%      |
| No data                     | 18    | 11.3%      |

Table 2: Clinical outcome of uterine artery embolization in reducing the uterine fibroid.

| Outcome                                      | No   | %   |
|----------------------------------------------|------|-----|
| Technique                                    |      |     |
| Trans-femoral approach                       | 150  | 93.8%|
| Trans-radial approach                        | 10   | 6.3% |

| Fibroid size reduction                       | No % |     |
|----------------------------------------------|------|-----|
| < 50%                                        |      |     |
| 50-75%                                       |      |     |
| > 75%                                        |      |     |
| Response                                     |      |     |
| No data                                      | 76   | 47.5%|
| Decrease in size and enhancement             | 40   | 25.0%|
| Decrease in size and necrosis                | 21   | 13.1%|
| Decrease in enhancement stable in size       | 6    | 3.8% |
| Decrease in size and stable enhancement      | 4    | 2.5% |
| Stable in size and enhancement               | 4    | 2.5% |
| Complete regression                          | 3    | 1.9% |
| No enhancement - Decrease in size            | 3    | 1.9% |
| Stable in size and necrosis                  | 3    | 1.9% |

Table 3: Distribution of fibroid size reduction after uterine artery embolization by female’s bio-clinical data.

| Fibroid size reduction | Factors | < 50% | 50-75% | > 75% | P-value |
|------------------------|---------|-------|--------|-------|---------|
| Age in years           |         |       |        |       |         |
| < 40                   | 11      | 37.9% | 9      | 31.0% | 31.0%   | 0.049*  |
| 40-49                  | 14      | 40.0% | 14     | 40.0% | 7       | 20.0%   |
| 50+                    | 13      | 61.9% | 4      | 19.0% | 4       | 19.0%   |
| Side                   |         |       |        |       |         |
| Unilateral             | 1       | 100.0%| 0      | 0.0%  | 0.0%    | 0.535   |
| Bilateral              | 37      | 44.0% | 27     | 32.1% | 20      | 23.8%   |
| Mass location          |         |       |        |       |         |
| Body                   | 20      | 47.6% | 14     | 33.3% | 8       | 19.0%   |
| Cervix                 | 2       | 28.6% | 1      | 14.3% | 4       | 57.1%   |
| Fundus                 | 3       | 30.0% | 5      | 50.0% | 2       | 20.0%   |
| Multiple               | 12      | 50.0% | 7      | 29.2% | 5       | 20.8%   |
| No data                | 1       | 50.0% | 0      | 0.0%  | 1       | 50.0%   |
| Technique              |         |       |        |       |         |
| Trans-femoral          | 36      | 44.4% | 26     | 32.1% | 19      | 23.5%   |
| Trans-radial           | 2       | 50.0% | 1      | 25.0% | 1       | 25.0%   | 0.956   |

P: Exact probability test

Discussion

The current study aimed to assess the clinical data for fibroid including site, size, and number, assess the...
effect of uterine artery embolization on reducing the fibroid size and enhancement. Uterine fibroids featured as benign monoclonal tumours of the uterus comprised smooth muscle cells and an extracellular matrix of collagen, fibronectin, and proteoglycan [8]. Later on with time, fibroids enlarge with enlargement of the uterus. Submucosal fibroids as well as intramural fibroids that be adjacent to the endometrial lining, are associated with painful and heavy menses [4]. Large fibroids or the overall enlargement of the uterus is associated with local pain, pressure, or compressive impacts. Though, uterine fibroids are benign, considerable symptoms were reported. Uterine artery embolization (UAE) is recently significantly recommended as a minimally invasive, uterine-sparing procedure, with more than 100,000 procedures have been performed during the last few years, mainly in the United States and Western Europe [18]. This new procedure associated with less complications and rapid cure rate and less economic burden [19-21].

Regarding outcome of uterine artery embolization, the study results showed that more than half of the cases recorded significant reduction in the uterine fibroid [22-24] size by more than 50% which was more than 75% among nearly one out of each four females. The only significant predictor for clinically significant reduction in fibroid size was females age as young aged females showed significantly better reduction in their fibroid size after embolization procedure than old, aged females (nearly 2:1). All other factors including fibroid site, used techniques had no significant relation with reduced size.

Uterine artery embolization as a main treatment for fibroids was reported by Ravina in 1995 [25], with an average follow-up of 20 months, symptoms resolved in 11 (16%). Three patients had partial improvement, and the residual heavy bleeding subsequently controlled with progestins. Failed therapy was reported among 2 females, one of which needed hysterectomy 6 weeks after the procedure and another requiring myomectomy 6 month after the procedure. All these findings were like what was reported by Bhardwaj R, et al. [17]. Where authors found that fibroids disappeared in 8 out of 35 patients (22.9%), decreased in size by > 75% in 11 patients (31.4%), and by 50-75% in 6 patients (17.1%). Five patients did not report back with ultrasound. Two patients had normal delivery after UAE. Also, Worthington-Kirsch RL, et al. [26] revealed that the mean reduction in fibroid size post UAE was 46% in with follow-up ultrasound was performed. Only one patient had post-procedure extensive infarction requiring in hysterectomy. Two patients required re-hospitalization for post-embolization syndrome. Another patient developed a self-limited episode of upper gastrointestinal hemorrhage secondary to vomiting.

Conclusions
In conclusion, the study revealed that uterine artery embolization efficacy was more among young females with initially small fibroid masses and the highest reduction (> 50%) in fibroid size was detected among females with fibroid at cervix (71.4%), fundus (70%) and lowest was for females with multiple fibroid (50%) with no statically significance (P = 0.432).

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Ethical Considerations
The study was conducted in accordance with the Declaration of Research Ethics Committee of the Prince Sultan Military Medical City approved the protocol.

Conflict of Interest
The authors declare no conflict of interest.

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