

DOPPLER ASSESSMENT OF CHANGES IN VOLUME OF FIBROIDS

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Introduction

Menorrhagia is defined as bleeding that originates from the uterus. In developing countries, the majority of cases are due to fibroid uterus. Massive menorrhagia is a major clinical and surgical problem with a mortality of 80%, which is most often related to hemodynamic instability.^{3,4}

Uterine fibroids are the most frequent tumors of the female genital tract, occurring in 20–50% of women who are older than 40 years. Uterine fibroid, the most common cause of nonacute abnormal uterine bleeding, is also the most common solid uterine neoplasm occurring in 20–40% of all women during their reproductive period¹⁰.

Uterine artery embolization (UAE) was introduced in the 1970s to treat postpartum hemorrhage¹⁴. In the 1990s, this technique was successfully used preoperatively 3–10 days before myomectomy to reduce bleeding during the surgical phase¹⁴. In 1995, Ravina et al.¹⁵ proposed embolization of uterine arteries as an alternative to surgical treatment of uterine leiomyoma.

Recent important technologic advances in three dimensional color doppler sonography, have introduced a comprehensive, noninvasive method of evaluating the entire uterus, allowing detailed assessment of the vascularity and volume of fibroid^{1,2}. Three dimensional color doppler sonography can also help in the planning of a focused and efficient non uterine systemic artery embolization. It provides a precise road map for the interventional radiologist in performing an endovascular treatment for menorrhagia. Uterine artery embolization leads to good technical success and fibroid volume reduction¹⁰.

Objective

To evaluate the accuracy of doppler sonography in depicting changes in fibroid volume

Methodology

In our prospective cohort study, 60 patients (mean age, 31.67 years, age range 26-35years) referred to our institution in a six-month period for endovascular treatment of menorrhagia underwent Doppler as part of pre and post therapeutic evaluation.

Symptoms related to leiomyomas were classified into three categories:

abnormal bleeding (menorrhagia, metrorrhagia), Pressure symptoms like (Increased frequency of urination, lower abdominal heaviness, Constipation, uni-or bilateral hydronephrosis), Pelvic pain.

Results

Sixty patients with uterine fibroid selected according to the were taken up for the study.

Evaluation of clinical symptoms was classified as increased, unchanged, improved, or absent (i.e., symptom-free).

Sonographic examinations were always performed using Doppler sonography (SIEMENS ACUSON ANTARES MACHINE). Findings was analyzed by measuring the size, volume of the fibroid.

Successful embolization was done in 60 patients. For one patient catheterisation could not be done due to vasospasm on both sides and another patient had subintimal dissection during catheterisation, so procedure abandoned.

Size and volume of the fibroid is calculated by three dimensional sonographic examination. Volume of fibroid ranges from 38.23 - 220 cu cm. Average volume of fibroid before treatment is 113.02 cu .cm. Largest size of fibroid in our study is 220.32 cu.cm . In 2 cases of multiple fibroid the size of the largest fibroid is taken.

Using prolate ellipsoid formula¹⁰, fibroid volume is calculated in our study.
Volume was measured using the formula : length x width x depth x 0.5233

When computed only 60 patients came for 12 months follow up , so we have selected n= 60 for comparison statistics, the mean reduction in fibroid volume were statistically significant. By using highly correlative friedman's test, volume change after 3 months, at 6 months and at 12 months was significant (P value <0.001) with associated marked reduction in vascularity of all hypervascular fibroid.

In larger volume (>150 cu.cm) fibroids : volume reduction was 42.24 % (range 32.61 - 50.25 %) at 3 months, at 6 months 76.22% (61.47 - 89.38 %) and at 12 months was 88.02 % (range 81.12 - 93.63 %).

For medium volume (50 -150 cu.cm) fibroids : volume reduction was 47.90 % (range 24.81- 67.04 %) at 3 months, at 6 months 72.48% (44.36 - 89.12 %) and at 12 months was 83.86 % (range 61.85 - 93.24 %)

For smaller volume (< 50 cu.cm) fibroids : volume reduction was 42.24 % (range 20.00- 59.60%) at 3 months, at 6 months 76.22% (35.36 - 86.80 %) and at 12 months was 88.02 % (range 44.96- 91.92 %).

On pre - UAE US, all patient had fibroids that were mixed /hypo echoic and were hypoechoic on post- UAE US scans.

In this study moderate to marked reduction in larger fibroid volume was seen in 72.48% 83.86 % at 6 months, and 88% at 12 months respectively while using PVA with gelfoam combination

Discussion:

Fibroid uterus causing menorrhagia is one of the common morbidity encountered in the women of child bearing age group. Hence many young women opt to undergo hysterectomy at an early age. Uterine artery embolisation is minimally invasive alternative primary treatment of fibroids with preservation of uterus.

This study was done to assess the efficacy of uterine artery embolisation with three dimensional color doppler sonography. Pre embolization and postembolization three-dimensional color Doppler sonography was prospectively compared in 60 patients who underwent uterine artery embolization as primary treatment of symptomatic fibroids.

3D CDS has recently become available to quantify vascularity that gives good correlation to vessels greater than 100 micrometer. Three-dimensional color Doppler sonography was performed by using a scanner with color power angiographic imaging capability.

For purposes of comparison, fibroids were classified as either hypervascular or hypovascular relative to myometrial vascularity before and minutes to several hours after uterine artery embolization. Changes in fibroid vascularity (i.e., from hypervascular to hypovascular) as depicted by three-dimensional color Doppler sonography are stated in Edwin F 9 Med 2005.

Totally 60 samples were selected for the study, according to the inclusion and exclusion criteria. Of which for 2 patients embolisation could not be done because of subintimal dissection and vasospasm happened during the procedure. Uterine artery embolisation was performed by using a standard selective catheter and standard embolization technique. Successful embolisation was done for 30 patients. Hence we have followed 60 patients upto 12 months to assess the changes in vascularity .

In this study we have done both unilateral and bilateral UAE, where bilateral embolisation proved statistically significant (P value < 0.001**). In contrast, Edwin F, Arthur C. Fleischer, et al⁹, in their 2005 study, did unilateral UAE for all patients. Also TP Jain, DN Srivastava etal⁵⁵ 2007, demonstrated that Ipsilateral catheterization of uterine artery was safe, cost- effective and with lesser incidence of complications such as haematoma and dissection of arteries.

In this study, average volume of fibroid before embolisation is 113.02 cu.cm. (ranges 38.23 - 220 cu. cm). Largest fibroid volume in the study population was 220.32 cu.cm. In our series we have not encountered any additional complications in larger fibroids. This correlates with the recent study by

Albert J. Smeets Robbert, et al, 2009, which depicts that the complications were not increased and the clinical response is also good.

Small size fibroid (less than 7 cm) show better response in size reduction and symptomatically feel better. Less than 1 percent of patients undergo hysterectomy due to embolisation failure, Jean-Pierre Pelage et al 23 2005.

Conclusion

From this study we have found that Uterine Artery Embolisation for the patients having symptomatic uterine fibroid is an effective and safe alternate treatment with significant reduction in volume and vascularity of fibroid particularly in less than 7 cm fibroids.

* Three dimensional color Doppler sonography assists in assessing the vascularity within the fibroid before and after embolisation.

* From this study we conclude that Doppler Imaging can be a tool for pre and post UAE evaluation in assessing reduction in fibroid volume

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