ORIGINAL ARTICLE

The Effect of Uterine Artery Embolization on Heavy Menstrual Bleeding in Patients with Leiomyomata

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ABSTRACT

Objective: To compare the effect of uterine artery embolization and medical management on heavy menstrual bleeding in patients managed for uterine fibroids.

Study Design: Comparative Cross-sectional Study.

Place and Duration of Study: The study was conducted at the Department of Gynecology and Obstetrics, Pak Emirates Military Hospital (PEMH) Rawalpindi, Pakistan from August 2021 to March 2023.

Methods: Women between the ages of 35 and 50 years who presented with heavy menstrual bleeding and were diagnosed with leiomyomata were included in this study. They were divided into two groups via block randomization. Group-I underwent uterine artery embolization while group-II received medical treatment (gonadotropin-releasing hormone (GnRH) antagonist). Clinical factors like shrinkage in the size of fibroids, rise in hemoglobin levels, and pelvic pain scores were compared in both groups at the end of three months.

Results: Out of 160 women recruited in the study, 52 (32.5%) were pre-menopausal, while 108 (67.5%) were peri menopausal. The mean age of patients who presented with heavy menstrual bleeding due to leiomyomata was 45.23 ±12.70 years. The mean rise in hemoglobin (*p*-value-0.007) and mean shrinkage size (*p*-value<0.001) were statistically significantly found more in patients who underwent uterine artery embolization as compared to those who took medical treatment. The mean pain score (*p*-value-0.01) was also found to be more in a group of patients who underwent uterine artery embolization.

Conclusion: Uterine artery embolization emerged as an effective procedure for women managed for heavy menstrual bleeding due to uterine fibroids. Medical management via gonadotropin-releasing hormone (GnRH) antagonist was inferior in efficacy in terms of mean rise in hemoglobin and fibroid shrinkage.

Keywords: *GnRH, Leiomyoma, Uterine Artery.*

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Introduction

Bleeding from the gynecological tract is a common presentation in the general practice, gynecology, and obstetrics clinics across the globe. Early recognition regarding the amount and cause of bleeding may enable the treating team to manage the patient more effectively and prevent mortality and morbidity related to this condition.[1] Management steps usually involve initial or emergency management in which vital signs of women are maintained, and immediate life-threatening conditions are ruled out.[2] Once initial management is given, treatment usually depends upon the cause of the bleeding.[3]

Heavy uterine bleeding is defined as excessive menstrual blood loss that interferes with a woman's physical, social, emotional, and/or material quality of life.[4] Multiple causes could lead to this condition in

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women. These causes may be variable according to age and reproductive stage of women.[5] Leiomyomata or fibroids in the uterine cavity are considered one of the leading causes of heavy menstrual bleeding among women of all age groups.[6] Early recognition and treatment of these fibroids can prevent long-term morbidity and poor quality of life in these women.

Multiple surgical and non-surgical management options have been in clinical practice for a long to manage the heavy menstrual bleeding in women with fibroids. Lee et al. published a review in 2123 regarding medical options available for management of uterine fibroids. They emphasized on the fact that patients should be given information care on these methods and size, number and location of fibroids should be taken into account while deciding mode of treatment for each patient.[7]

Heavy menstrual bleeding poses a huge impact on overall quality of life of women at any age and reproductive stage. Among all the causes of heavy menstrual bleeding, fibroids remain leading cause for this type of bleeding. A recent local study performed at a government hospital of Gujranwala summarized that almost 60% of multiparous women had fibroids in their uterine cavity.[8] Seeing the local burden of disease, health related consequences associated with it and limited use of new modalities like uterine artery embolization, we planned this study with the rationale to compare the effect of uterine artery embolization and medical management on heavy menstrual bleeding in patients managed for uterine fibroids at gynecology department of the largest military hospital of Pakistan.

Methods

This comparative cross-sectional study was conducted at the Department of Gynecology and Obstetrics, Pak Emirates Military Hospital (PEMH) Rawalpindi, Pakistan from August 2021 to March 2023. Sample size was calculated by WHO Sample Size Calculator by using two groups. Group-I with women who underwent uterine artery embolization as 81.9% while group-II with women who underwent medical treatment (GnRH antagonist) as 25%.[9] Nonprobability consecutive sampling technique was used to gather the sample.

Inclusion criteria: Women between the age of 18 and 50 years who presented with heavy menstrual bleeding and had fibroids in uterine cavity were included.

Exclusion criteria: Women with heavy menstrual bleeding due to causes other than fibroids in uterus or those who were post-menopausal were not included. Women who were diagnosed with any bleeding or clotting disorders or had deranged PT/PTTK at the time of presentation were also not included. Women with any malignant adnexal condition were also not recruited. Those who had any contraindication to uterine artery embolization or treatment with GnRH antagonist were made part of exclusion criteria as well.

After all the formalities and approval from the ethical review board committee of the hospital held on 08th March 2021 vide letter no: A/28/EC/264/2021 and written informed consent, women who were having heavy menstrual bleeding due to uterine fibroids were recruited for this study. Heavy menstrual bleeding was confirmed by detailed history takin, examination and clinical evaluation and defined as excessive menstrual blood loss which interferes with a woman's physical, social, emotional and/or material quality of life.[4] Diagnosis of leiomyomata was made by consultant gynecologist based on clinical examination supported by relevant radiological investigations.[10] Ultrasound of the abdomen and pelvis was performed by consultant radiologist at the time of presentation and three months after the treatment. Patients were divided into two groups via block randomization. Women in Group-I underwent uterine artery embolization while women in group-II received the GnRH antagonist as per international recommendations.[11,12] Patients in both groups were followed up for three months. At the end of three months' ultrasound abdomen and pelvis was repeated to look for size of fibroids. Blood complete picture was repeated for hemoglobin levels and patients were asked for pelvic pain via visual analogue scale.

All statistical analysis was performed by using the Statistics Package for Social Sciences version 24.0 (SPSS-24.0). Frequency along with percentage was calculated for menopausal status, comorbid illness

and type of treatment used to manage the study participants. Mean and standard deviation were calculated for age of the patients, shrinkage in fibroids size, rise in hemoglobin and pain scores. Both groups were compared for outcome parameters by using independent samples t-test by keeping the *p*-value<0.05 as significant.

Results

Out of 160 women recruited in the study, 52 (32.5%) were pre-menopausal while 108 (67.5%) were peri-menopausal. Table 1 summarizes the clinical and personal profiles of women who were recruited in our study. Mean age of patients who presented with heavy menstrual bleeding due to leiomyomata was 45.23 ±12.70 years.

Table 2 summarized the results of statistical analysis. Mean rise in hemoglobin (*p*-value-0.007) and mean shrinkage size (*p*-value<0.001) were statistically significantly found more in patients who underwent uterine artery embolization as compared to those who took medical treatment. Mean pain score (*p*-value-0.01) was also found to be more in group of patients who underwent uterine artery embolization.

Table 1: Characteristics of patients managed for heavy menstrual bleeding due to fibroids

Study Parameters	n (%)
Age (years)	
Mean + SD	45.23 ±12.70 years
Menopausal status	
Premenopausal	52 (32.5%)
Peri-menopausal	108 (67.5%)
Comorbid illnesses	
Diabetes Mellitus	17 (10.6%)
Hypertension	15 (9.4%)
Asthma	12 (7.5%)
Ischemic heart disease	03 (1.9%)
Others	05 (3.4%)
Types of treatment	
Medical	80 (50%)
Uterine artery embolization	80 (50%)
Body Mass Index	
Normal	75 (46.9%)
Overweight	52 (32.5%)
Obese	33 (20.6%)

Table 2: Comparison of various clinical parameters after three months of treatment

Outcome parameters	Uterine artery embolization	Medical treatment	*p*-value
Shrinkage in size of fibroids (cm)	4.21±1.21	3.49±1.25	<0.001
Rise in hemoglobin level after three months (g/dl)	2.65±1.14	2.15±1.18	0.007
Pain score at three months follow up	5.22±1.84	4.43±2.03	0.01

Discussion

Gynecologists have number of treatment options to cater for the patients suffering from heavy menstrual bleeding due to fibroids. Challenges arise where the decision needs to be taken that which treatment is best for an individual patient. A number of factors including availability of treatment, expertise of local doctors, adverse effects and patients' preference may be taken into account while choosing an option for particular patient. Now a days' use of medical or

minimally invasive options is preferred over surgical options until there is a compelling indication for surgery or other methods have either failed or could not be used.[13] We conducted this study with an aim to compare the effect of uterine artery embolization and medical management on heavy menstrual bleeding in patients managed for uterine fibroids at Pak Emirates Military Hospital Rawalpindi.

Madueke-Laveaux et al. in 2023 worked on an interesting paper regarding use of GnRH antagonist for managing patients suffering from heavy menstrual bleeding due to uterine fibroids. They came up with the conclusion that both injectable and oral administration of these agents may be treatment of choice for this condition in times to come but choice of patient and risk vs benefit analysis should be taken into account by the treating team. Our results highlighted that the use of uterine artery embolization was superior to medical treatment.[14] Kröncke et al. did extensive work on the role of uterine artery embolization in treating uterine fibroids. They revealed this was an effective and safe treatment for managing uterine fibroids. Adverse effects were mostly mild and self-limiting. Our results supported their findings.[15]

Artuk et al. in 02023 compared two methods used for bleeding secondary to fibroids uterus. Their endpoint parameter was the overall quality of life in these women after the treatment. They concluded that both methods were effective, but myomectomy was superior to uterine artery embolization in their study participants.[16] We compared medical treatment to uterine artery embolization, and endpoint parameters were the rise in hemoglobin, shrinkage in fibroids size, and pelvic pain. Uterine artery embolization was a more effective option in our study participants. The role of GnRH antagonist in the management of heavy bleeding associated with uterine fibroids was studied in premenopausal women by Ali et al. It was revealed that this therapeutic option had promising results, and it could be used in routine for the said purpose.[17] We compared this option with uterine artery embolization and found the embolization procedure more effective than the GnRH antagonist.

A study was published from Kazakhstan which compared medical treatment with uterine artery embolization for management of menstrual bleeding secondary to leiomyomata. Authors came up with the findings that group of patients managed with uterine artery embolization had better outcome when compared to group of patients managed with medical treatment.[9] Results of our study revealed that uterine artery embolization emerged as an effective and safe procedure for women managed for heavy menstrual bleeding due to uterine fibroids. Medical management via gonadotropin-releasing hormone (GnRH) antagonist was inferior both in efficacy and adverse effects on uterine artery embolization in our study participants. The results of our study concluded that uterine artery embolization was a better treatment option for women suffering from uterine fibroids as compared to medical treatment. Results of different studies done in the recent past supported our findings and established the efficacy and safety of uterine artery embolization for the management of leiomyomata of the uterus.[18-21]

Daniels et al., in 2022, selected a cohort of premenopausal women who wanted to avoid hysterectomy for heavy menstrual bleeding due to fibroids. Women were divided into two groups and one group underwent uterine artery embolization and the other one had myomectomy. Both management options were effective, but myomectomy was slightly superior.[22] We did not include myomectomy in our study and only compared uterine artery embolization with medical treatment, and found the embolization procedure superior.

Study limitations

Multiple factors could lead, or effect hemoglobin rise in these patients which include nutrition, lifestyle and comorbid diseases. Therefore, it cannot be concluded that the rise in hemoglobin at the end of three months was due to treatment offered for fibroids. Similarly, local pelvic pain could be due to several factors and not just an adverse effect of the treatment provided. Controlling these factors and making study design better can generate better results in this regard.

Conclusion

Uterine artery embolization emerged as an effective procedure for women managed for heavy menstrual

bleeding due to uterine fibroids. Medical management via gonadotropin-releasing hormone (GnRH) antagonist was inferior in efficacy both in terms of mean rise in hemoglobin and fibroid shrinkage.

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Authors Contribution

SK: Idea conception, study designing, data collection, data analysis, results and interpretation, manuscript writing and proof reading
MA: Study designing
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AS: Data analysis, results and interpretation
MT: Data collection