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UTERINE ARTERY EMBOLIZATION FOR FIBROIDS AN ALTERNATIVE TO HYSTERECTOMY

Original Research

Wasif Yasin^{1*}, Muhammad Zeeshan Ali², Sobia Hanif³, Sohail Akhter⁴, Yasser Khan⁵, Nazakat Ullah Khan¹

¹Resident Radiology, AFIRI, Rawalpindi, Pakistan.

²Consultant Radiologist, AFIRI, Rawalpindi, Pakistan.

³Consultant Gynecologist and Obstetrician, CMH Chunian, Pakistan.

⁴Consultant Diagnostic and Interventional Radiologist, CMH Lahore, Pakistan.

⁵Consultant Radiologist, CMH Lahore, Pakistan.

Corresponding Author: Wasif Yasin, Resident Radiology, AFIRI, Rawalpindi, Pakistan, <u>wasifyaseen.95@gmail.com</u> **Acknowledgement:** The authors acknowledge the support of the clinical and administrative staff at AFIRI, Rawalpindi.

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ABSTRACT

Background: Uterine fibroids, or leiomyomas, are common benign tumors affecting women of reproductive age and often present with symptoms such as heavy menstrual bleeding, pelvic pain, and pressure effects. Hysterectomy has long been the definitive treatment; however, uterine artery embolization (UAE) has emerged as a minimally invasive alternative aimed at preserving the uterus. Evaluating the comparative safety and effectiveness of UAE versus hysterectomy can guide treatment decisions for symptomatic fibroid uterus.

Objective: To determine the effectiveness of uterine artery embolization in the treatment of symptomatic uterine fibroids compared to hysterectomy.

Methods: This prospective observational study was conducted at the Armed Forces Institute of Radiology and Imaging, Rawalpindi, from March 2023 to September 2023. A total of 60 women diagnosed with uterine fibroids were enrolled using non-probability convenience sampling. Participants were equally allocated into two groups: Group A underwent uterine artery embolization, and Group B underwent hysterectomy. Post-treatment outcomes assessed included bleeding from the surgical site, postoperative pain, hospital discharge within 24 hours, mechanical ventilation requirement, HDU admission, and mortality. Data were analyzed using SPSS version 26.0, with the chi-square test applied to compare outcomes (p<0.05 considered significant).

Results: Group A showed lower rates of bleeding from the surgical site (16.6%) compared to Group B (46.6%). Postoperative pain was reported in 26.6% of UAE patients versus 70% in the hysterectomy group. Early discharge within 24 hours was achieved in 80% of UAE cases versus 16.6% in the hysterectomy group. Mechanical ventilation was required in 6.6% and 40% of patients, respectively. Mortality was nil in both groups.

Conclusion: Uterine artery embolization demonstrated fewer complications, faster recovery, and comparable clinical outcomes, suggesting it may serve as a viable alternative to hysterectomy for the treatment of symptomatic uterine fibroids.

Keywords: Embolization, Hysterectomy, Leiomyoma, Minimally Invasive Procedures, Postoperative Pain, Uterine Fibroids, Women's Health.

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INTRODUCTION

Uterine fibroids, also known as leiomyomas, are benign, hormone-sensitive tumors that develop from the smooth muscle layer of the uterus, the myometrium. It is estimated that 20% to 40% of women will experience fibroids during their reproductive years (1). These tumors represent the most common benign neoplasms of the uterus before menopause (2). Despite their non-malignant nature, fibroids can lead to a range of clinical manifestations that significantly impact a woman's physical and emotional well-being. Symptoms such as dysmenorrhea, menorrhagia, and a constellation of complaints known as "bulky syndrome"-including pelvic pressure, constipation, urinary frequency, and nocturia-are often observed in women with large fibroids, due to the compression of adjacent pelvic structures (3). In addition to these physical symptoms, fibroids have been associated with infertility and recurrent pregnancy loss, posing serious reproductive challenges for affected individuals (4). The burden of symptomatic uterine fibroids extends beyond clinical symptoms, often resulting in a diminished quality of life. Management strategies are typically tailored to symptom severity, patient preferences, reproductive goals, and fibroid characteristics. Historically, hysterectomy has been the definitive treatment for symptomatic fibroids, offering a permanent solution by removing the uterus entirely (5). However, this invasive procedure may not align with the desires of women who wish to preserve fertility or avoid major surgery. In recent decades, less invasive alternatives have emerged, notably uterine artery embolization (UAE), which aims to shrink fibroids by obstructing their blood supply through the targeted delivery of embolic agents under image guidance (6). Performed via a transcutaneous common femoral artery approach, UAE induces ischemic infarction of fibroids while preserving the uterus and is generally conducted under local anesthesia (7,8). Though generally safe and effective, some cases may necessitate hysterectomy post-procedure due to complications or incomplete symptom relief (9) UAE is based on techniques initially developed for the control of pelvic hemorrhage and has been refined over time into a widely accepted radiologic intervention for fibroid management (10). Given the increasing demand for uterine-sparing treatment options, it is crucial to investigate whether UAE offers a viable and effective alternative to hysterectomy in the management of symptomatic fibroids. The objective of this study is to assess the role of uterine artery embolization as a therapeutic alternative to hysterectomy for women suffering from symptomatic uterine fibroids.

METHODS

This prospective observational study was conducted over a six-month period from March 2023 to August 2023 at the Radiology Department of Pakistan Employees' Military Hospital (PEMH), Rawalpindi. A total of 60 patients with symptomatic uterine fibroids were enrolled and subsequently divided into two equal groups of 30 participants each. Group A underwent uterine artery embolization (UAE), while Group B underwent hysterectomy as the primary treatment. Participants were selected using a non-probability convenience sampling technique. The study population comprised women referred to the department for definitive management of fibroids, all of whom had previously been diagnosed through ultrasonography. The inclusion criteria required that patients present with an ultrasonographic diagnosis of uterine fibroids, report heavy menstrual bleeding as the predominant symptom, and have hysterectomy considered the only available treatment option at the time of consultation. Additionally, patients were included if they expressed no immediate desire for future fertility. Patients who declined to give informed consent were excluded from the study. Ethical approval was obtained from the Institutional Review and Ethics Board of the Armed Forces Institute of Radiology and Imaging (AFIRI), Rawalpindi, under the reference number AFIRI-RWP-ERB-APRVL. Written informed consent was obtained from all patients prior to enrollment. Data collection focused on postoperative clinical outcomes, including the incidence of bleeding from the surgical site, admission to the high dependency unit (HDU), intensity of postoperative pain, rate of discharge from the emergency department, need for mechanical ventilation, and mortality. These variables were assessed and recorded in both treatment groups. Quantitative variables were expressed as mean ± standard deviation (SD), while qualitative variables were reported as frequencies and percentages. Statistical analysis was conducted using SPSS version 26.0. The chi-square test was applied to assess associations between categorical variables, with a p-value of less than 0.05 considered statistically significant.



RESULTS

A total of 60 women were equally divided into two treatment groups, with 30 patients undergoing uterine artery embolization (UAE) and 30 undergoing hysterectomy. Both groups were assessed based on key postoperative clinical outcomes, including surgical site bleeding, postoperative pain, discharge time, need for mechanical ventilation, admission to high dependency units (HDU), and mortality. In the UAE group, bleeding from the surgical site was observed in 5 patients (16.6%) compared to 14 patients (46.6%) in the hysterectomy group. Postoperative pain was reported by 8 patients (26.6%) in the UAE group, while significantly more cases were recorded in the hysterectomy group at 21 patients (70%). Early discharge, defined as discharge from the ward within 24 hours of the procedure, was achieved in 24 patients (80%) in the UAE group versus only 5 patients (16.6%) in the hysterectomy group. The requirement for mechanical ventilation post-procedure was low in both groups but notably less in the UAE group (2 patients, 6.6%) than in the hysterectomy group (12 patients, 40%). Similarly, admission to a high dependency unit was necessary for only 1 patient (3.3%) after UAE, compared to 15 patients (50%) following hysterectomy. No mortality was reported in either group. The application of the chi-square test for comparison of bleeding, postoperative pain, and discharge timing between the two groups yielded statistically significant differences (p < 0.05), favoring uterine artery embolization in terms of reduced complications and shorter hospital stay.

Table 1: Distribution of Respondents into Groups

Serial No	Variable	Percentage
1	Group A Uterine Artery Embolization	30(50%)
2	Group B Hysterectomy	30(50%)
3	Total	60(100%)

Table 2: Res	pondent's charact	eristic in groups	Uterine Artery	Embolization vs	Hysterectomy

S. No	Variables	Uterine Artery Embolization	Hysterectomy
	Bleeding from the surgical site	5 (16.6%)	14(46.6%)
	Postoperative pain	8(26.6%)	21 (70%)
	Discharge from wards within 24 hrs	24(80%)	5(16.6%)
	Mechanical Ventilation Required	2(6.6%)	12 (40%)
	Admission required in high Dependence units	1(3.3%)	15 (50%)
	Mortality	0 (0%)	0 (0%)



Figure 1 Outcome Trends Between UAE and Hysterectomy

Figure 2 Comparison of Clinical: UAE vs Hysterectomy



DISCUSSION

The present study demonstrated that uterine artery embolization (UAE) is an effective and minimally invasive alternative to hysterectomy for the treatment of symptomatic uterine fibroids. The procedure was associated with lower rates of postoperative complications, including reduced bleeding from the surgical site, decreased need for mechanical ventilation, and shorter hospital stays. These findings align with earlier studies conducted in similar clinical settings, which also reported favorable outcomes with UAE in terms of symptom relief and reduced perioperative risks (11,12). While some literature has reported minimal recurrence of postoperative bleeding, the current study observed a higher proportion, likely attributable to differences in procedural technique, patient selection criteria, and institutional protocols (13). The consistency of findings across multiple investigations highlights the reliability of UAE as a uterine-sparing intervention, particularly for women seeking alternatives to invasive surgical options. Previous research has emphasized high patient satisfaction rates and comparable symptom resolution, further validating the effectiveness of UAE as a primary intervention for fibroid management (14,15). Additionally, technical success rates in various studies were comparable to those observed in the current investigation, suggesting widespread applicability and reproducibility of the procedure across different healthcare settings (16,17). Other studies also reinforced the procedural advantages of UAE, identifying it as a minimally invasive, safe, and cost-effective treatment with favorable recovery profiles and minimal hospital resource utilization (18,19).

Despite these encouraging findings, the study had several limitations. The observational design restricted the ability to establish causal relationships, and the small sample size limited the statistical power to detect subtle differences between groups. The absence of a long-term follow-up period excluded evaluation of symptom recurrence or delayed complications. Additionally, the exclusion of asymptomatic individuals and lack of stratification by fibroid size, location, or patient comorbidities may have influenced the outcomes. The non-randomized allocation and use of convenience sampling may have also introduced selection bias. Nevertheless, the study adds to the growing body of evidence supporting UAE as a less invasive, yet clinically effective, treatment option for uterine fibroids. Future research should aim to include larger, randomized controlled trials with long-term follow-up to better assess recurrence rates, reproductive outcomes, and patient-reported satisfaction (20). Studies should also explore the role of advanced embolization techniques, imaging guidance, and standardized protocols to minimize variability in outcomes. Addressing these areas would contribute to a more comprehensive understanding of UAE's place in the management algorithm for symptomatic uterine fibroids.

CONCLUSION

Uterine artery embolization emerged as a safe and effective alternative to hysterectomy for managing symptomatic uterine fibroids, particularly in women seeking less invasive options that preserve uterine integrity. The procedure not only controlled abnormal uterine bleeding but also led to a noticeable reduction in fibroid-related symptoms, contributing to improved postoperative recovery and shorter hospital stays. This study reinforces the practical value of UAE as a viable therapeutic intervention, offering significant clinical benefits with fewer complications, thereby supporting its broader consideration in routine gynecological practice.

Author	Contribution
Wasif Yasin*	Substantial Contribution to study design, analysis, acquisition of Data
	Manuscript Writing
	Has given Final Approval of the version to be published
Muhammad Zeeshan Ali	Substantial Contribution to study design, acquisition and interpretation of Data
	Critical Review and Manuscript Writing
	Has given Final Approval of the version to be published
Sobia Hanif	Substantial Contribution to acquisition and interpretation of Data
	Has given Final Approval of the version to be published
Sohail Akhter	Contributed to Data Collection and Analysis
	Has given Final Approval of the version to be published
Yasser Khan	Contributed to Data Collection and Analysis
	Has given Final Approval of the version to be published
Nazakat Ullah	Substantial Contribution to study design and Data Analysis
Khan	Has given Final Approval of the version to be published

AUTHOR CONTRIBUTION



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