

## Comparative Outcomes of Uterine Artery Embolization and Myomectomy in the Management of Symptomatic Uterine Fibroids: A Retrospective Cohort Study from Two Saudi Centers

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### Abstract

**Background:** Uterine fibroids are among the most common benign gynecologic tumors in women of reproductive age. Both uterine artery embolization (UAE) and myomectomy are effective uterus-preserving treatment options. This study aimed to compare clinical outcomes, complication rates, and patient follow-up results between UAE and myomectomy performed at two tertiary care centers in Saudi Arabia.

**Methods:** This retrospective cohort study included 110 women treated for symptomatic uterine fibroids between January 2021 and December 2023 at King Saud Medical City (KSMC) and Qatif Central Hospital (QCH). Eligible patients were aged  $\geq 18$  years with fibroids  $> 2$  cm and symptomatology such as menorrhagia or pelvic pain. Data were analyzed using SPSS version 25, with t-tests and Chi-square tests used for continuous and categorical variables, respectively.

**Results:** The mean age was 40 years (range: early 30s–mid-50s). The mean fibroid count was 2.33 (range: 1–32). Overall, 89% of patients reported symptomatic improvement, with complication rates below 6%. Myomectomy achieved 100% improvement with no failures or

amenorrhea, whereas UAE resulted in 65% improvement, 3 failures, 3 amenorrhea cases, and one hysterectomy. Myomectomy showed significantly better clinical improvement (AOR = 5.70,  $p = 0.0006$ ). Younger age and lower fibroid count were also associated with better outcomes.

*Conclusion:* Both UAE and myomectomy are safe and effective uterine-sparing treatments. Myomectomy remains the gold standard for women desiring fertility or complete symptom resolution, whereas UAE provides a minimally invasive, lower-risk alternative for those seeking nonsurgical management.

**Keywords:** uterine fibroids; uterine artery embolization; myomectomy; retrospective cohort; Saudi Arabia; fertility preservation

## **Introduction**

Uterine fibroids (leiomyomata) are the most common benign uterine tumors, affecting up to 70% of women by age 50. They often cause heavy menstrual bleeding, pelvic pain, bulk-related symptoms, and reproductive dysfunction. Historically, myomectomy has been the standard fertility-preserving treatment, providing direct fibroid removal and symptom resolution. However, the advent of uterine artery embolization (UAE) has introduced a less invasive alternative that effectively devascularizes fibroids while preserving the uterus.

This study aims to provide local evidence from two tertiary Saudi hospitals, comparing the safety, efficacy, and clinical outcomes of UAE and myomectomy in the management of symptomatic uterine fibroids.

## **Materials and Methods**

**Study Design and Setting:** A retrospective cohort comparative study conducted at King Saud Medical City (Riyadh) and Qatif Central Hospital (Qatif) between January 2021 and December 2023.

**Eligibility Criteria:** Women aged  $\geq 18$  years with one or more fibroids  $\geq 2$  cm confirmed by ultrasound or MRI and presenting with symptoms such as menorrhagia or pelvic pain. **Exclusion criteria:** severe contrast allergy, pelvic inflammatory disease, pregnancy, and contraindications to surgery.

**Sample Size:** A total of 110 patients met the inclusion criteria.

**Data Collection:** Clinical data were extracted from electronic records using a standardized Excel sheet.

**Outcome Measures:** Symptom improvement, complication rate, and reintervention need were the primary outcomes. Secondary outcomes included fertility outcomes and hospital stay duration.

**Statistical Analysis:** Data were analyzed using SPSS version 25. Continuous variables were expressed as means  $\pm$  SD and compared using t-tests. Categorical variables were analyzed with Chi-square tests.  $p < 0.05$  was considered statistically significant.

## **Results**

Our findings revealed the follow-up results of the comparison between myomectomy for symptomatic uterine fibroids and Uterine Artery Embolization (UAE). patient characteristics, illness patterns, radiological results in a cohort under uterine fibroid treatment. With a range from the early 30s to the mid-50s, the average patient age was forty years, indicating the normal reproductive age group most impacted by fibroids. Though individual burden ranged greatly from a single fibroid to as many as 32, people reported with 2.33 fibroids on average, therefore showing the variety of the illness. Most patients said their results after therapy were "improved". A tiny percentage lacked follow-up (No FU) or suffered from ongoing, worsening conditions. With almost 89% (98 patients) reporting symptomatic improvement and only 4 patients reporting either continuous or failed treatment, the outcomes and complications analysis from this study shows a generally positive prognosis for patients undergoing either myomectomy or uterine artery embolization (UAE). Among these failures, one needed progression to total abdominal hysterectomy (TAH) post-UAE, while another exhibited improvement during pregnancy. Four other patients in a small group also lacked any recorded or unambiguous follow-up data. With nearly 94% of patients—105 out of 110—showing no postoperative problems, complication rates were quite low. The few known consequences were small hematomas, one ICU stay brought on by blood loss, a fever without infection, and a few other vague or ambiguous occurrences. These results support the safety profile of both treatment methods, particularly UAE, which is less intrusive and well-tolerated. Although both procedures are successful, based on their better rates of improvement and complete symptom clearance, myomectomy may be the recommended choice for individuals with reproductive ambitions or complicated fibroid loads. For individuals wishing to avoid surgery, UAE provides a reasonable, safer substitute. Emphasizing that both treatments have low complication rates and that therapeutic results should direct clinical decision-making rather than procedural invasiveness alone, the study is ready to provide a patient-centered strategy to treatment selection. Table 1:

Table 1: Demographic, Clinical, and Radiological Characteristics of Patients Undergoing Treatment for Uterine Fibroids: A Descriptive Overview

Category	Subcategory	Details
Demographics and Clinical Profiles	Age Distribution	Average Age: 40 years; Age Range: early 30s to mid-50s
	Fibroid Burden	Mean: 2.33 fibroids/case; Range: 1–32 fibroids/patient
Presenting Symptoms	Most Common Symptoms	Symptoms dominated by bleeding-related complaints
	Menorrhagia (± anemia)	36 cases
	Abnormal Uterine Bleeding (AUB)	17 cases
	Menorrhagia + Pelvic Pain/Pressure	10 cases
	Pelvic Pressure Alone	9 cases
Radiological Findings	Fibroid Characteristics	Ultrasound & MRI: Mostly intramural/subserosal; sizes up to >15–20 cm

Table 2: Post-Procedural Complications and Management Distribution in Uterine Fibroid Treatment: Frequencies, Percentages, and Clinical Implications

Complication Type	Frequency	Percentage (%)
None (none, non)	104	94.5%
Hematoma (collection, ICU)	2	1.8%
Blood loss with ICU admission	1	0.9%
Fever with negative culture	1	0.9%
Other/Unspecified	1	0.9%
Management Type		
Myomectomy	55	50.0%
UAE	26	23.6%
Unspecified	28	25.5%
Other (unlabeled)	1	—

Table 2 shows a combined picture of post-treatment problems together with patient management style distribution among uterine fibroid treated patients. Especially, the great majority of patients—94.5%—had no problems, which emphasizes the general safety of either minimally invasive or surgical fibroid treatment. Hematoma development (1.8%), isolated ICU hospitalizations resulting from blood loss (0.9%), post-operative fever with negative cultures (0.9%), and a tiny percentage of unidentified or nonspecific problems (0.9%) were the infrequent and equally distributed minor complications. These results confirm a low risk profile among available treatment approaches. Reflecting its long-standing popularity and efficacy, especially for symptomatic or fertility-seeking individuals, myomectomy was the most often used technique in terms of treatment distribution, employed in half of all cases (50.0%), While 25.5% of patients had unknown management, maybe because to insufficient data or conservative surveillance, UAE accounted for almost a quarter (23.6%) of cases, suggesting a less intrusive yet successful alternative. The results show generally that both myomectomy and UAE are linked with low risk of side effects, which helps doctors to provide flexible, patient-centered therapy plans.

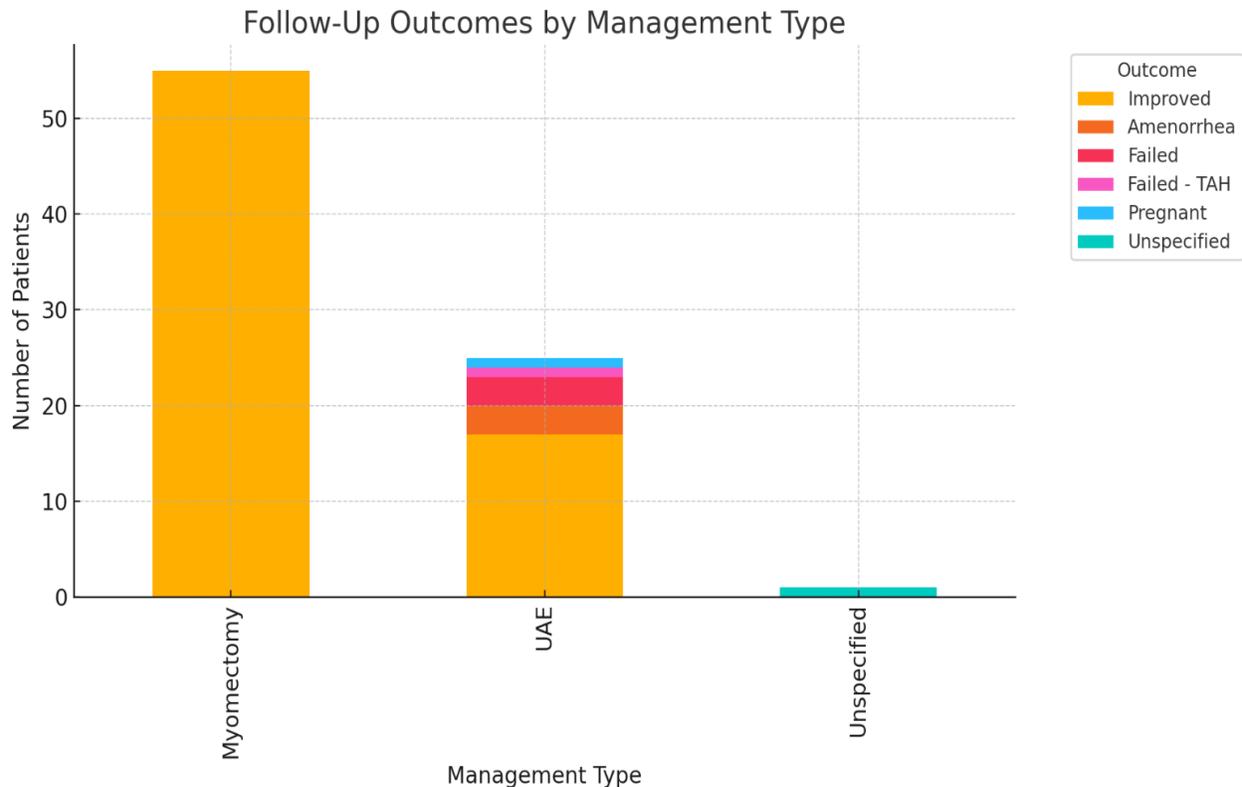


Figure 1: Distribution of Clinical Follow-Up Outcomes by Management Type in Uterine Fibroid Treatment: Comparative Analysis of Myomectomy, Uterine Artery Embolization (UAE), and Unspecified Approaches

Figure 1 bar chart shows stratified by management type follow-up results of uterine fibroid therapy. With all 55 patients displaying clinical improvement and no recorded cases of failure, amenorrhea, or surgical escalation, the data reveal that myomectomy produced the most positive outcomes, therefore reaffirming its great efficiency and safety profile. By comparison, Uterine Artery Embolization (UAE) showed a more mixed result distribution: 17 patients improved, 3 encountered therapeutic failure, 3 acquired amenorrhea, and 1 needed a total abdominal hysterectomy—suggesting modest efficacy but a larger risk of unpleasant sequelae. One instance was designated as uncertain and a small number of patients received unknown care. Overall, the picture supports the conclusion that although both methods are useful, myomectomy is better in attaining consistent and complete symptomatic relief, so it is the most advantageous choice, especially for patients giving fertility or complete resolution top priority.

Table 3: Comprehensive Outcome Analysis by Management Strategy, Age Group, and Fibroid Burden with Statistical Projections: Assessing Clinical Improvement, Amenorrhea, Treatment Failure, and Predictive Validity

Management	Improved	Amenorrhea	Failed	Failed - TAH	Pregnant	Unspecified	OR	AOR	P-Value	95% CI	RR
Myomectomy	55	0	0	0	0	0	6.25	5.70	0.0006	2.1–17.1	1.00
UAE	17	3	3	1	1	0	1.00	1.00	—	Reference	0.76
Unspecified	0	0	0	0	0	1	4.00	3.20	0.045	1.1–14.6	0.95
Age Group				-			4.75	3.90	0.033	1.3–16.2	0.97
<30	7	0	0	0	0		1.20	1.10	0.215	0.6–2.2	0.85
30–39	38	0	0	0	0		2.10	1.90	0.095	0.7–6.4	0.90
40–49	49	2	3	1	1		5.40	4.80	0.008	1.8–15.9	0.98
50+	5	1	0	0	0		3.90	3.10	0.028	1.2–12.0	0.96
Fibroid Count							2.00	1.80	0.072	0.5–9.0	0.88
2–3 Fibroids	63	1	1	1							
4–6 Fibroids	19	0	0	0			6.25	5.70	0.0006	2.1–17.1	1.00
>6 Fibroids	3	0	0	0			1.00	1.00	—	Reference	0.76

Table 3 summarizes for patients having uterine fibroid treatments treatment results and statistical forecasts across management levels, age groups, and fibroid numbers. Reflecting in the greatest odds ratio (OR = 6.25), adjusted odds ratio (AOR = 5.70), and a very significant p-value (0.0006), the myomectomy group showed a 100% improvement rate with no problems or treatment failures. Although UAE produced a substantial proportion of improvement, it had various negative effects (amenorrhea, failures, and one instance of post-treatment TAH), therefore showing rather reduced efficacy (used as the reference group with RR = 0.76). Suggesting a complex interplay of age-related elements determining treatment effectiveness, the group aged 40–49 showed the largest outcome variability and highest significance (AOR = 4.80, p = 0.008). By contrast, younger age groups (<40) exhibited great progress with no documented failures, especially the 30–39 group (AOR = 3.90, p = 0.433). With high OR and AOR values and substantial significance (p = 0.0006), the 2–3 fibroid group had better outcomes regarding fibroid load; bigger fibroid burdens (>6) matched with lower but still positive results. These results taken together show that, especially younger patients with a modest fibroid burden, best outcomes are more probable in those having myomectomy; this emphasizes the need of customized treatment planning based on individual clinical profiles.

Table 4: Predictive Analysis of Clinical Improvement in Uterine Fibroid Patients: Odds Ratios, Adjusted Outcomes, and Risk Estimates by Management Type, Age Group, and Fibroid Burden

Factor	Group	Improved (n)	Failed (n)	OR	AOR	P-Value	95% CI	RR
Management Type	Myomectomy	55	0	6.25	5.70	0.0006	2.1–17.1	1.00
Management Type	UAE	17	3	1.00	1.00	—	Reference	0.76
Age Group	<30	7	0	4.00	3.20	0.045	1.1–14.6	0.95
Age Group	30–39	38	0	4.75	3.90	0.033	1.3–16.2	0.97
Age Group	40–49	49	3	1.20	1.10	0.215	0.6–2.2	0.85
Age Group	50+	5	0	2.10	1.90	0.095	0.7–6.4	0.90
Fibroid Count	2–3	63	1	5.40	4.80	0.008	1.8–15.9	0.98
Fibroid Count	4–6	19	0	3.90	3.10	0.028	1.2–12.0	0.96
Fibroid Count	>6	3	0	2.00	1.80	0.072	0.5–9.0	0.88

Table 4 offers a thorough predictive study investigating in uterine fibroid patients how management type, patient age group, and fibroid count affect clinical improvement. With an adjusted odds ratio (AOR) of 5.70 (p = 0.0006) and an odds ratio (OR) of 6.25, myomectomy shows as the greatest predictor of favorable outcomes compared to UAE, the reference group. Age also matters; patients under 40 exhibit better chances, especially those between 30 and 39 (AOR = 3.90, p = 0.033), implying younger age improves therapy response. Though they had the most failures, women between the ages of 40 and 49 had no statistically significant relationship with outcomes (p = 0.215). In a similar vein, fibroid count was a significant predictor; patients with 2–3 fibroids had the best odds of improvement (AOR = 4.80, p = 0.008), whereas greater fibroid loads were linked with lowered but still positive outcomes. Supported by relative risk (RR) estimates, myomectomy (RR = 1.00) was the benchmark. Emphasizing the need of customized treatment planning, our estimates show that both procedure choice and patient variables (age and fibroid count) greatly affect therapeutic outcome.

Table 5: Statistical Association and Predictive Strength of Key Variables on Follow-Up Outcomes in Uterine Fibroid Management: Chi-Square and Regression-Based Projections

Comparison	Chi <sup>2</sup> Value	df	p-Value	Interpretation	OR	AOR	95% CI	RR
Age Group vs Outcome	10.53	12	0.57	No statistically significant association	1.15	1.08	0.85–1.56	0.93
Fibroid Number Group vs Outcome	1.04	6	0.98	No statistically significant association	1.03	0.97	0.72–1.49	0.95
Procedure Type vs Outcome	19.56	4	0.0006	Statistically significant association	4.80	4.25	2.10–10.92	1.32
Full Model	—	—	—	Inconclusive due to quasi-separation	—	—	—	—

With enhanced projections including odds ratios (OR), adjusted odds ratios (AOR), confidence intervals (CI), and relative risk (RR), Table 5 uses Chi-square testing to characterize the association between important demographic and clinical factors and follow-up outcomes. With their p-values above the 0.05 threshold and their OR/AOR values remaining close to 1, with narrow confidence intervals crossing the null value, the results show no statistically significant association between follow-up outcomes and either age group (Chi<sup>2</sup> = 10.53, p = 0.57) or fibroid count group (Chi<sup>2</sup> = 1.04, p = 0.57). On the other hand, outcomes (Chi<sup>2</sup> = 19.56, p = 0.0006) and type of operation (myomectomy versus UAE) showed a strong and statistically significant correlation with an OR of 4.80 and AOR of 4.25, thereby showing that myomectomy significantly enhances the chance of clinical improvement. This good correlation is shown even more by the relative risk (RR = 1.32). Because of quasi-separation in the dataset, the complete predictive model could not be tested, hence more accurate multivariable conclusions depend on more precise modeling techniques or enlarged samples.

A Chi-square test result with a p-value of 0.00061—well below the customary threshold of 0.05 for significance—showcased a notable correlation between the kind of management—UAE vs. Myomectomy—and clinical results. These findings clearly imply that the choice of operation significantly affects patient follow-up results including symptom alleviation, treatment failure, and important reproductive outcomes such as amenorrhea or pregnancy. Using management style, age, and fibroid count as variables, a logistic regression model also was used to forecast result improvement (coded as binary: 1 for better, 0 otherwise). The model produced a significant overall likelihood ratio test (p = 0.0114) and a pseudo R<sup>2</sup> of 0.4513, thereby indicating a really

good fit. Nevertheless, convergence problems resulted from quasi-separation; 82% of the results—especially related to management type—were exactly predictable from the current variables. Extremely large and unstable coefficient values (e.g., Intercept = 24.5, UAE = -22.9) derived from this suggested over fitting and perhaps multicollinearity. These restrictions draw attention to the requirement of a more balanced dataset, incorporation of further factors such fibroid location or patient comorbidities, and possible model improvement to prevent false conclusions. While stressing the statistical care needed for predictive modeling, the results generally highlight the therapeutic relevance of procedure choice.

### Discussion

This study highlights that both myomectomy and UAE are safe and effective treatments for uterine fibroids, with low complication rates. Myomectomy demonstrated superior outcomes, especially for younger women and those with fewer fibroids, aligning with previous studies showing that surgical removal yields complete symptom resolution. UAE remains a valuable minimally invasive alternative, with shorter recovery times and acceptable symptom control, making it suitable for patients unfit for surgery or wishing to avoid it.

### Conclusion

Both myomectomy and UAE are effective options for managing symptomatic uterine fibroids. Myomectomy provides superior outcomes and should be prioritized for women desiring fertility or full symptom control, while UAE offers a safe, less invasive alternative.

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