

# Symptoms and Health Quality After Laparoscopic and Robotic Myomectomy

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## ABSTRACT

**Background and Objectives:** To compare the symptom severity and health quality outcomes of women who underwent laparoscopic and robotic myomectomy.

**Methods:** This was a prospective nonrandomized cohort study. The Uterine Fibroid Symptom and Health Related Quality of Life Questionnaire was administered to 33 laparoscopic myomectomy and 31 robotic myomectomy patients before and year after surgery. Symptom severity and health quality scores were compared between the preoperative and postoperative periods for laparoscopic and robotic myomectomy procedures.

**Results:** The mean age, operation time, estimated blood loss, body mass index, largest fibroid diameter, length of hospital stay, and number of fibroids removed were comparable for both groups ( $P > .05$ ). Symptom severity scores decreased significantly for both laparoscopic and robotic myomectomy patients at year after surgery ( $P < .05$ ), and health-related quality of life scores increased significantly in both groups at 1 year after surgery ( $P < .05$ ). Improvement in symptom severity and health quality was higher in the laparoscopy group; however, this was not statistically different from the robotic myomectomy group ( $P > .05$ ).

**Conclusion:** Laparoscopic and robotic myomectomy provide significant reductions in fibroid-associated symptom severity and significant improvement in quality of life at 1 year after surgery. The rate of improvement was comparable for both procedures.

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**Key Words:** Fibroid, Myoma, Laparoscopic myomectomy, Robotic myomectomy, Uterine Fibroid Symptom Severity and Health Related Quality of Life questionnaire.

## INTRODUCTION

Uterine fibroids are the most common genital tumors occurring in women. Historically, hysterectomy has been the primary choice of treatment for uterine fibroids.<sup>1</sup> However, currently fibroids can be treated surgically or medically, and uterine-sparing treatments have come to the forefront. The vast majority of premenopausal women who want to preserve their fertility or uteri can successfully undergo myomectomy. Thus, the frequency of performing uterine-sparing surgeries has been rising worldwide during the last decades.<sup>2</sup> Medical treatments for fibroids include gonadotropin-releasing hormone analogues, selective progesterone receptor modulators, and progesterone antagonists. However, considering the adverse effects of long-term use of these medical treatments and the possibility of regrowth of fibroids after discontinuing medical treatments, myomectomy remains the preferred option for the treatment of fibroids in premenopausal women.<sup>3</sup>

Traditionally, myomectomy is performed via laparotomy (LM). Minimally invasive procedures (laparoscopy, robot-assisted, or hysteroscopy) are rapidly becoming a common practice for performing myomectomy.<sup>4</sup> Almost decades have passed since the first description of LM.<sup>5</sup> Many studies have showed that LM is superior to open myomectomy in terms of the amount of blood loss during surgery, postoperative mobilization, and length of hospital stay.<sup>6-9</sup> There has been a considerable increase in using a robotic platform in gynecologic surgeries since 2005, when the US Food and Drug Administration (FDA) approved it for use.<sup>10</sup> Compared with traditional laparoscopy, robot-assisted surgery offers certain advantages, such as a short learning curve, great ergonomics,<sup>3</sup> -dimensional visualization, and improved articulation of EndoWrist instruments.<sup>11-13</sup> However, robot-assisted surgery is associated with increased cost.<sup>14,15</sup>

Robotic myomectomy (RM) was first performed by Advincola.<sup>16</sup> Many reports have been published, showing no

significant difference between LM and RM in terms of early surgical outcomes.<sup>9</sup>

It has been shown that open myomectomy improves quality of life.<sup>17</sup> Although studies have revealed no significant difference between LM and RM in terms of early surgical outcomes, there are scarce data regarding the effect of minimally invasive myomectomy on long-term outcomes, such as fibroid-related changes in symptoms, recurrence, and pregnancy rates and complications.<sup>12–18</sup>

In this study, we compared fibroid-related changes in symptom severity and health-related quality of life at 1 year after surgery between LM and RM surgeries.

## MATERIALS AND METHODS

This was a single-institution prospective nonrandomized trial conducted in the Department of Gynecology in Maslak Hospital at Acibadem Mehmet Ali Aydinlar University, in Istanbul, in Turkey, from February 2016 through June 2017. The study was approved by the institutional ethics committee, and written informed consent was obtained from all participants.

### Patients

The study population was 95 patients aged 18 to 49 years who underwent LM or RM due to type 3, 4, and/or 5 fibroids based on International Federation of Gynecology and Obstetrics (FIGO).<sup>19</sup> The choice of surgical route of myomectomy (robotic or laparoscopic) was left to the discretion of the attending physician (M.G.) and patient preference. The attending physician is specialized in gynecologic oncology and minimally invasive gynecologic surgery and has a 25-year experience with laparoscopic surgery and a 9-year experience with robotic surgery. He is a certified da Vinci<sup>®</sup> robotic surgeon and annually performs 25 to 40 RM procedures and 40 to 50 LM procedures.

The study included myomectomies performed due to fibroids with a largest diameter of 4 to 10 cm. Indications for myomectomy were dysmenorrhea, abnormal uterine bleeding, and bladder and/or bowel symptoms. The study excluded patients with chronic nongynecologic conditions (diabetes mellitus and cardiovascular, liver, kidney, or pulmonary diseases), prior intra-abdominal surgery or any additional surgical intervention other than myomectomy during the same session, patients diagnosed with a malignancy, and pregnant women.

### Surgical techniques

All operations were performed with the patient in the lithotomy position with steep (30°) Trendelenburg. In both groups, after the port placement, diluted vasopressin solution (20-mL of 0.2 U/mL) was injected into the subserosal layer of the uterus to prevent excessive bleeding. The intra-abdominal pressure was set at 14 mm Hg throughout the operation. In the LM group (n = 33), a 10 mm 0° scope and 3 ancillary ports were used. Integrated ultrasonic and bipolar energy instruments (THUNDERBEAT<sup>®</sup>; Olympus America) were used to perform uterine incisions and myoma enucleations, which allowed us to perform both consecutive dissection and sealing actions using a single instrument. For the 31 RM patients, the da Vinci (Intuitive Surgical, Inc) Xi platform was used. The patient cart was docked centrally, and 3 robotic arms and a smoke evacuator (Airseal<sup>®</sup>; SurgiQuest, Inc) were used for all robotic cases. Uterine incisions were closed with the use of barbed 2–0 polydioxanone sutures (V-Loc<sup>™</sup> Wound Closure Device; Medtronic QuickAssist), and fibroids were removed with use of a 12-mm automatic power morcellator in both groups. Contained morcellation bags were used for myoma extractions. No perioperative complications occurred in any patient. Operation time was defined as the elapsed time from the intubation to the extubation. Estimated blood loss (EBL) was calculated as the volume difference between the irrigation and suction fluid volumes.

### Data collection and follow-up

The Uterine Fibroid Symptom and Health Related Quality of Life (UFS-QoL) questionnaire was used to compare the outcomes between both procedures.<sup>20</sup> UFS-QoL is a disease-specific Turkish-validated questionnaire consisting of 37 questions that evaluates the complaints and quality of life in patients with fibroids. The questionnaire has 2 subscales: symptom severity (SS, 8 questions) and health related quality of life (HRQoL, 29 questions). The HRQoL also has items; concern, activities, energy/mood, control, self-conscious, and sexual function. The scores of the SS and HRQoL are calculated with discrete formulas. A higher SS score correlates with a worse symptom severity, and a higher HRQoL score correlates with a better quality of life.

Patients' characteristics and perioperative data were collected during the hospitalization period. Patients who met the inclusion criteria of the study were asked to complete the UFS-QoL questionnaire on the morning of the operation day and year after surgery (via either e-mail or telephone).

**Statistical methods**

Normality assessment of the variables was made by use of the Shapiro Wilks test. Descriptive statistical methods (mean, standard deviation, frequency) were used when evaluating the study data. While comparing groups, the Student *t* test was used for normal distributed quantitative data, and the Mann Whitney *U* test was used for non-normal distributed quantitative data. The Wilcoxon signed rank test was used to assess the non-normal distributed parameters of preoperative and postoperative data. The  $\chi^2$  test and Continuity (Yates) correction were used to evaluate qualitative parameters. The statistical significance level was set at .05. The R-3.4.3 program was used for the

statistical analysis (R Foundation for Statistical Computing; <https://www.R-project.org/>).

**RESULTS**

Of the 95 recruited patients, 31 were excluded from the analysis. Of these 31 patients, 12 could not be contacted or did not want to fill out the questionnaire after the surgery, 10 patients became pregnant within year after surgery, and 9 patients had an additional surgery in the same session. Thus, the study population included a total of 64 patients, with 33 in the LM group and 31 in the RM group. Characteristics of these patients are shown in **Table 1**. The 2 groups did not

**Table 1.**  
Characteristics of the 2 Groups

	Robotic Myomectomy (n = 31)	Laparoscopic Myomectomy (n = 33)	<i>P</i> Value*	Total (N = 64)
Age, y				
Min-max	28-49	26-49		26-49
Mean ± SD	38 ± 5	35 ± 5		36.84 ± 5.94
Operation time, min				
Min-max	90-200	90-185		90-200
Mean ± SD	137 ± 27	129 ± 20	.29	133.00 ± 24.42
Estimated blood loss, mL				
Min-max	50-300	50-250		50-300
Mean ± SD	160 ± 62	138 ± 53	.28	148.90 ± 58.65
Body mass index, kg/m <sup>2</sup>				
Min-max	16-33	18-41		16.33-41.57
Mean ± SD	23 ± 4	24 ± 4	.14	23.92 ± 4.43
Largest fibroid diameter, cm				
Min-max	5-10	4-9		4-10
Mean ± SD	6.8 ± 1.1	6.5 ± 1.4	.32	6.70 ± 1.32
Length of hospital stay, n days (%)			.40	
1	20 (64.5)	17 (51.5)		37 (57.81)
2	10 (32.2)	15 (45.4)		25 (29.06)
3	1 (3.2)	1 (3)		2 (3.13)
Number of fibroids removed, n (%)			.79	
1	6 (19.35)	5 (15.15)		11 (17.19)
2	10 (21.26)	12 (36.36)		22 (34.38)
3	9 (29.03)	12 (36.36)		21 (32.81)
4	6 (19.35)	4 (12.12)		10 (15.63)

Min-max = minimum minus maximum.

\*Student *t* test.

**Table 2.**  
Comparison of Transformed Scores Between RM and LM Groups

	Robotic Myomectomy (n = 31)	Laparoscopic Myomectomy (n = 33)	P <sup>†</sup>
	mean ± SE (median)	mean ± SE (median)	
Symptom severity			
Preoperative	44.76 ± 4.18 (46.88)	46.59 ± 4.32 (43.75)	.92
Postoperative	24.90 ± 2.87 (25)	23.87 ± 2.23 (25)	.82
Difference	-19.86 ± 3.39 (-18.75)	-22.73 ± 3.55 (-15.62)	.71
P <sup>‡</sup>	.001*	.001*	
Concern			
Preoperative	55.97 ± 5.90 (60)	52.88 ± 6.38 (35)	.83
Postoperative	75.00 ± 4.65 (85)	80.15 ± 3.91 (90)	.69
Difference	19.03 ± 5.05 (10)	27.27 ± 5.92 (20)	.18
P <sup>‡</sup>	.001*	.001*	
Activity			
Preoperative	62.0 ± 5.49 (67.86)	59.85 ± 5.26 (53.57)	.78
Postoperative	75.92 ± 4.06 (78.57)	84.96 ± 3.64 (92.86)	.09
Difference	13.82 ± 4.34 (3.57)	25.11 ± 5.27 (14.29)	.06
P <sup>‡</sup>	.005*	.001*	
Energy			
Preoperative	61.17 ± 5.54 (71.43)	56.6 ± 5.09 (53.57)	.54
Postoperative	74.42 ± 4.55 (85.71)	81.17 ± 2.78 (89.29)	.66
Difference	13.25 ± 4.35 (7.15)	24.57 ± 4.44 (21.42)	.07
P <sup>‡</sup>	.003*	.001*	
Control			
Preoperative	59.84 ± 5.45 (65)	57.73 ± 5.00 (55)	.82
Postoperative	75.65 ± 4.55 (85)	82.73 ± 2.64 (85)	.68
Difference	15.81 ± 4.50 (10)	25.00 ± 4.86 (25)	.22
P <sup>‡</sup>	.002*	.001*	
Self-conscious			
Preoperative	63.44 ± 4.84 (58.33)	68.69 ± 4.69 (75)	.38
Postoperative	76.08 ± 4.35 (83.33)	81.06 ± 3.52 (83.33)	.51
Difference	12.63 ± 4.05 (8.33)	12.37 ± 4.32 (16.67)	.30
P <sup>‡</sup>	.005*	.008*	
Sexual function			
Preoperative	62.9 ± 5.54 (62.5)	64.02 ± 5.67 (62.5)	.89
Postoperative	75.40 ± 3.45 (75)	79.17 ± 4.37 (100)	.32
Difference	12.50 ± 5.05 (0)	15.15 ± 4.73 (0)	.74
P <sup>‡</sup>	.036*	.003*	

Continued

**Table 2.**  
Continued

	Robotic Myomectomy (n = 31)	Laparoscopic Myomectomy (n = 33)	<i>P</i> <sup>†</sup>
	mean ± SE (median)	mean ± SE (median)	
HRQoL total			
Preoperative	60.62 ± 5.02 (60.34)	58.70 ± 4.63 (55.17)	.79
Postoperative	75.33 ± 3.94 (83.62)	82.03 ± 2.67 (88.79)	.44
Difference	14.71 ± 4.14 (5.17)	23.33 ± 4.37 (20.69)	.07
<i>P</i> <sup>‡</sup>	.001*	.001*	

\*Significance  $P < .05$ . <sup>†</sup>Mann–Whitney *U* Test. <sup>‡</sup>Wilcoxon signed rank test.

significantly differ in terms of age, operation time, EBL, BMI, largest fibroid diameter, length of hospital stay, and number of fibroids removed ( $P > .05$  for all).

**Table 2** represents the comparisons of UFS-QoL transformed scores in the preoperative period and year after surgery between the LM and RM groups as well as the differences in the corresponding scores between the preoperative period and year after surgery within the same group. Preoperative SS scores of the 2 groups were comparable and significantly decreased in both the LM and RM groups at 1 year after surgery ( $P < .05$ ). The LM group had a higher improvement in the SS score compared with the RM group; however, this difference did not reach statistical significance ( $P > .05$ ).

Similarly, both groups had comparable preoperative HRQoL scores and the scores were significantly improved year after surgery in both groups ( $P < .05$ ). This improvement was better in the LM group than in the RM group, with no statistical significance ( $P > .05$ ). In the subanalyses of questionnaire scores, all items of the HRQoL score were significantly increased in both study groups ( $P < .05$ ). In (concern, activities, energy/mood, control, and sexual function) of 6 items, the difference in the mean score increase was greater in the LM group than in the RM group. This increase was not statistically significant ( $P > .05$ ).

## DISCUSSION

In the present study, we found that both LM and RM procedures significantly improve fibroid-related SS and HRQoL at 1 year after surgery. Furthermore, the improvement rate was similar in the 2 groups. Studies comparing LM with RM have not revealed significant differences in perioperative outcomes, such as operation time, EBL, and

length of hospital stay.<sup>9,21</sup> However, a limited number of studies evaluated changes in SS and HRQoL in patients who underwent minimally invasive myomectomy.<sup>17,22–24</sup> Flyckt et al. did not find significant differences in both fertility and bleeding complaints in an average 8-year follow-up of patients who underwent abdominal myomectomy, LM, or RM.<sup>24</sup> Pitter et al. showed a significant improvement in the fibroid-related symptoms in a retrospective study of patients undergoing RM.<sup>23</sup> However, the aforementioned studies assessed the postoperative symptoms alone. Palomba et al. found similar HRQoL scores during both preoperative and postoperative periods when comparing LM with mini-LM.<sup>22</sup> They assessed the postoperative HRQoL at months after surgery, which may be considered within the healing period. We assessed the postoperative HRQoL at 1 year after surgery, which is considered the mid- or long-term result. The fact that surgical procedures often cause daily complaints for the first few months can obscure a real change in the HRQoL after surgery. Thus, we believe that the assessments of symptom relief and HRQoL should be done at least 6 months after LM or RM.

The most common complaints of patients with fibroids are pain and increased menstrual bleeding.<sup>25</sup> The assessment of pain and bleeding complaints for fibroid treatment modalities have been commonly made using standard quality of life questionnaires: the Short Form-36 or the disease-specific questionnaire UFS-QoL. Pain and bleeding severity are evaluated in the SS subscale on the UFS-QoL. Spies et al. used both of these questionnaires at 6 and 12 months after surgery and found that myomectomy improve quality of life.<sup>26</sup> In our study, we found that, based on the UFS-QoL questionnaire, the SS significantly improved to 18 and 22 in the RM and LM groups, respec-



tively, and no statistical difference existed in the degree of improvement between both groups. Fibroids also negatively affect sexual life because they may cause pain during sexual intercourse and decreased libido.<sup>25,27,28</sup> Previous studies have shown an improvement in the sexual life of patients who underwent myomectomy.<sup>27,28</sup> To our knowledge, there is no study evaluating the effect of RM on sexual life. Our results showed that both RM and LM significantly improved the sexual functions in the patients.

Fatigue and a decrease in physical activity are frequently found in patients who are diagnosed with fibroid.<sup>25</sup> We found that patients who underwent LM had a greater improvement in the energy and activity subscores than did those who underwent RM, although this was not statistically significant. In addition, a positive difference was found in favor of laparoscopy, which was not statistically significant for the anxiety and control subscales. Although we cannot interpret the reason for this difference, we believe that additional studies are needed to compare the impact of localization and the size of the incisions in endoscopic myomectomy surgeries, because the most significant difference between the procedures are the localization and size of the incisions.

Our study confirmed the findings of previous studies that revealed that RM and LM have a similar efficacy on the improvement of symptoms and the HRQoL of patients with myoma. Thus, it is reasonable to prefer LM because RM is associated with a higher cost and a longer operation time compared with LM. However, there is another consideration regarding these results. It has been 40 years since the first reported LM and only 15 years since the first RM.<sup>5–16</sup> Within 15 years, RM has become comparable with LM in almost every respect. When we consider the prediction of decrease in operation time and cost with the increasing frequency of use of the robotic platforms, it is reasonable to assume that RM *can be* preferred more frequently for both physicians and patients in the *future*. It should also be noted that fertility and pregnancy outcomes of RM will also have an important place in this preference. Furthermore, technological advances of robotic platforms rapidly continue, especially in single-port robotic procedures; these developments may totally change minimally invasive gynecologic surgery aspects.

The strengths of our study are the comparable perioperative outcomes of RM and LM groups and a disease-specific questionnaire that was administered to the patients both preoperatively and postoperatively. The limitations of our study were small sample size and the absence of recurrence and pregnancy data. Additionally,

the questionnaire was administered on the morning of the operation, which may have affected the patient responses.

## CONCLUSION

Both RM and LM reduce the severity of symptoms associated with fibroid and improve the quality of life at 1 year after surgery. This improvement appears to be similar for both procedures. As there is still insufficient data in the literature, prospective randomized trials including pregnancy outcomes will provide clarity regarding the preference of minimally invasive myomectomy approach.

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