

# Laparoscopic vs Robotic Myomectomy: Comparison of Short-term Surgical Outcomes

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## ABSTRACT

**Aim:** Robotic myomectomy (RM) is a newer modality of minimally invasive surgery. As compared to laparoscopic myomectomy (LM), there is greater ease, accessibility, and precision for surgeons and fewer intra and postoperative (post-op) complications. This study aims at evaluating and comparing the short-term surgical outcomes of RM and LM.

**Materials and methods:** A retrospective observational study was conducted from September 2016 to August 2019. A total of 35 study participants, 14 cases who underwent LM and 21 cases who underwent RM, were included. Variables like size and number of myomas, intraoperative blood loss, operating time, short-term surgical outcomes such as duration of hospital stay, need for blood transfusion, and complications were noted and analyzed. The mean of the two groups was compared using a two-sample unpaired *t*-test, and a *p*-value of <0.05 was considered statistically significant.

**Result:** The mean age of study participants who underwent LM was 33.7 ± 5.5 years, and for RM was 32.3 ± 5.6 years. The mean surgical or operating time was 184.6 ± 9.2 and 300 ± 14.1 minutes in LM and RM, respectively. The estimated blood loss was 395.7 ± 78 mL and 255 ± 123.5 mL in LM and RM, respectively, which was statistically significant. The number of days of hospital stay postsurgery were 3.9 ± 1.1 and 2.2 ± 1.4 days in LM and RM, respectively, which was statistically significant. The average size of myoma in LM was 6.3 ± 1.2 cm, whereas in RM was 9.2 ± 1.3 cm.

**Conclusion:** Removal of bigger, multiple fibroids, and myomas at difficult locations was made easier with less blood loss by RM when compared to LM. Short-term surgical outcomes were better in RM as compared to LM.

**Clinical significance:** Robotic myomectomy (RM) has been shown to reduce immediate post-op complications and helps in faster recovery and discharge from the hospital as compared to LM.

**Keywords:** Fibroid, Laparoscopy, Myoma, Myomectomy, Robotic.

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## INTRODUCTION

Fibroids are the most common benign tumors found in the uterus and are present in 20–25% of women in the reproductive age group. They might be symptomatic or asymptomatic, depending on their size and location. The common symptoms of fibroids are heavy menstrual bleeding, severe dysmenorrhea, pressure symptoms including acute retention of urine or hydronephrosis, and infertility.<sup>1</sup>

Myomectomy is done for patients who wish for future childbearing or want to retain their menstrual cycle or uterus. Myomectomy can be performed by an open or minimally invasive approach.

Minimally invasive surgery, including laparoscopic myomectomy (LM) and robotic myomectomy (RM), is related to shorter duration of hospital stay, early ambulation and quicker rate of recovery due to lesser intraoperative bleeding and postoperative (post-op) pain. RM provides additional benefits of three-dimensional vision, better ergonomics, greater extent of movements, negative fulcrum effect, negation of tremors, and improved dexterity of the instruments. All these benefits abolish most of the limitations of traditional laparoscopy. The learning curve of RM is steeper than that of LM.<sup>2</sup> Also, the robotic system helps in alleviating the limitations of the unfavorable location of the fibroids, such as posterior wall fibroid or cervical fibroid and is of great benefit in obese patients.<sup>3</sup> In cases of large fibroids of size ≥9 cm, RM can be considered over conventional abdominal hysterectomy as the former is associated

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with fewer intraoperative complications, and patients can be given a same-day discharge from the healthcare center. However, compared to LM, RM is associated with increased operating time and a larger cost of surgery.<sup>2</sup>

This study aims to seek the differences between the short-term surgical outcomes of RM and LM so that its findings can be implicated in the mode of surgical planning for patients undergoing myomectomy.

## MATERIALS AND METHODS

A retrospective observational study was conducted in the gynecology department of a multidisciplinary robotic surgery institute in Bengaluru, South India, from September 2016 to August 2019. The selection of study participants was done by purposive sampling. A total of 35 study participants, 14 cases who underwent LM and 21 cases who underwent RM, were included in this study. The inclusion criteria consisted of patients who underwent RM or LM and gave their consent. Patients who were not willing to give consent and who did not undergo LM or RM or underwent abdominal myomectomy were excluded from the study.

After taking verbal consent from the study subjects, they were interviewed over the telephone. Data were collected from hospital records using a predesigned questionnaire which had variables like size, location and number of myomas, intraoperative blood loss, operating time, short-term surgical outcomes such as duration of hospital stay, need for blood transfusion, and complications noted. The data collected was tabulated on Microsoft Excel 2010 and analyzed using Statistical Package for the Social Sciences version 18. The categorical variables were collated in frequency and percent; the continuous variables were calculated as mean  $\pm$  standard deviation. The mean of the two groups was compared using a two-sample unpaired *t*-test, and a *p*-value of  $<0.05$  was considered statistically significant.

## RESULT

In this study, a total of 35 patients were interviewed, and data were collected from hospital records after taking consent from them by using a predesigned, pretested semi-structured questionnaire. Out of the total of 35 participants studied, 14 underwent LM, and 21 underwent RM.

Table 1 shows that the mean age of patients who underwent LM was  $33.7 \pm 5.5$  years, whereas the mean age of study participants who underwent RM was  $32.3 \pm 5.6$  years. The majority of patients were nulliparous in both groups. The most common presenting symptom in the LM group was infertility (50%), and in the RM group was dysmenorrhea (85.7%).

The estimated blood loss in LM and RM was  $395.7 \pm 7$  and  $255 \pm 123.5$  mL, respectively. Duration of hospital stay postsurgery was  $3.9 \pm 1.1$  and  $2.2 \pm 1.4$  days in LM and RM, respectively. The post-op hemoglobin was repeated after 24 hours of surgery to calculate the

**Table 1:** Baseline characteristics of the study participants

Variable		LM (n = 14)	RM (n = 21)
Age		$33.7 \pm 5.5$	$32.3 \pm 5.6$
History of previous abdominal surgery	No	9 (64.2%)	7 (33.3%)
	Yes	5 (35.8%)	14 (66.7%)
Parity	Nulliparous	8 (57.1%)	15 (71.5%)
	Multiparous	6 (42.8%)	6 (28.5%)
Symptoms	Infertility	7 (50%)	2 (9.5%)
	Menorrhagia	3 (21.4%)	9 (42.8%)
	Dysmenorrhea	4 (28.5%)	18 (85.7%)
	Pressure symptoms	3 (21.4%)	2 (9.5%)

hemoglobin drop. The hemoglobin drop noticed in the LM group was  $2 \pm 0.5$  gm%, and in the RM group was  $1.1 \pm 0.9$  gm% (Table 2).

Table 3 shows that the average size of myoma in LM was  $6.3 \pm 1.2$  cm, and in RM, it was  $9.2 \pm 1.3$  cm. Maximum cases in the LM group had fundal fibroid (57.1%), while the RM group had posterior fibroid (42.8%). Most of the fibroids in the LM group were of subserosal type (50%), and in the RM group were intramural type (76.2%).

Two patients in the LM group required blood transfusion, and one case in the LM group with an anterior wall intramural fibroid of size 15 cm was converted to laparotomy due to intraoperative heavy bleeding. There was no conversion to laparotomy in the RM group.

## DISCUSSION

In our study, the mean age of study participants who underwent LM was  $33.7 \pm 5.5$  years, and RM was  $32.3 \pm 5.6$  years. However, in the study conducted by Takmaz et al.,<sup>4</sup> the mean age of patients who underwent RM and LM were  $38 \pm 5$  years and  $35 \pm 5$  years, respectively. Our center is a tertiary care institute where young patients come for infertility treatment. Fibroids are one of the common causes of infertility,<sup>1</sup> thus, the lower mean age in the present study was due to early detection of fibroids in those patients coming with complaints of infertility and myomectomy was done as a part of fertility treatment.

Eight (57.1%) patients were nulliparous, and six (42.8%) patients were multiparous in the LM group compared to 15 (71.5%) and six (28.5%) patients being nulliparous and multiparous, respectively, in RM group. The findings were similar to the study conducted by Barakat et al.<sup>5</sup> where 58.6 and 68.6% of patients who underwent LM and RM, respectively, were nulliparous.

**Table 2:** Surgical outcome measures

Surgical outcome	LM (n = 14)	RM (n = 21)	<i>p</i> -value
Surgical time (minutes)	$184.6 \pm 9.1$	$300 \pm 14.1$	$<0.001^*$
Preoperative hemoglobin (gm%)	$12 \pm 1.6$	$12.3 \pm 0.3$	0.391
Estimated blood loss (mL)	$395.7 \pm 78$	$255 \pm 123.5$	$<0.001^*$
Post-op hemoglobin (gm%)	$10 \pm 1.8$	$10.9 \pm 0.8$	0.014*
Hemoglobin drop (gm%)	$2 \pm 0.5$	$1.1 \pm 0.9$	0.014*
Hospital stay (days)	$3.9 \pm 1.1$	$2.2 \pm 1.4$	$<0.001^*$

\*Statistically significant

**Table 3:** Features of removed myoma

	LM (n = 14)	RM (n = 21)
Size of myoma (cm)	$6.3 \pm 1.2$	$9.2 \pm 1.3$
Location of myoma		
Fundal	8 (57.1%)	5 (23.8%)
Anterior	2 (14.3%)	6 (28.5%)
Posterior	3 (21.4%)	9 (42.8%)
Pseudo broad ligament	1 (7.2%)	2 (9.5%)
Cervical	0	1 (4.7%)
Number of myomas		
1	10 (71.4%)	11 (52.4%)
$\geq 2$	4 (28.6%)	10 (47.6%)
Type of myomas		
Subserosal	7 (50%)	3 (14.2%)
Intramural	6 (42.9%)	16 (76.2%)
Broad ligament	1 (7.1%)	1 (4.8%)
Cervical	0	1 (4.8%)

The mean surgical or operating time was  $184.6 \pm 9.1$  minutes and  $300 \pm 14.1$  minutes in LM and RM, respectively. The average time taken in RM was 203 minutes in a study conducted by Asmar et al.<sup>6</sup> As per the study conducted by Mallick and Odejinmi,<sup>1</sup> the average duration of surgery in LM was  $112.9 \pm 2.5$  (107.9–117.9) minutes which was less in comparison to finding in our study. The longer operating hours for RM can be attributed to the extra time required while setting up the instruments and docking the robot. It is of importance in patients with morbid conditions who cannot stay in general anesthesia for a longer duration of time. In such patients, robotic surgery might not be feasible.

The estimated blood loss was  $395.7 \pm 7$  and  $255 \pm 123.5$  mL in LM and RM, respectively, which was statistically significant. In a study conducted by Takmaz et al.,<sup>4</sup> the mean blood loss in RM and LM was  $160 \pm 62$  and  $138 \pm 53$  mL, respectively, which is not corresponding with our study. However, in a study conducted by Wang et al.,<sup>7</sup> estimated blood loss in RM cases was significantly less than that for LM, with a weighted mean difference (WMD) of 33.03 and a *p*-value being significant. The lower amount of blood loss in robotic surgery can be attributed to the high precision of surgery with better controls.

In the current study, the number of days of hospital stay postsurgery were  $3.9 \pm 1.1$  and  $2.2 \pm 1.4$  days in LM and RM, respectively, which was statistically significant. This was similar to the study conducted by Wang et al.,<sup>7</sup> where the length of hospital stay was significantly smaller in cases of RM with WMD 1.74, and the *p*-value was significant.

The average size of myoma in LM was  $6.3 \pm 1.2$  cm, whereas in RM was  $9.2 \pm 1.3$  cm. The mean diameter of myoma removed in LM, in a study conducted by Barakat et al.<sup>5</sup> was 6.7 cm which was similar to findings in our study. However, the mean diameter of the myoma removed in RM in the above study was 7.7 cm, which is smaller than the average diameter of the myoma removed in RM in our study. In a study conducted by Asmar et al.,<sup>6</sup> the mean diameter of the fibroid removed was 7.3 cm in RM, which is comparatively smaller than the mean diameter of the fibroid removed in our study. The present study reveals that pseudo broad ligament fibroid was removed in 7.2 and 9.5% of cases of LM and RM, respectively. Similarly, in a study conducted by Barakat et al.,<sup>5</sup> 3.23 and 10.11% cases of broad ligament fibroid were removed in LM and RM, respectively. The present study reveals that 76.2 and 42.9% of cases had an intramural fibroid removed by RM and LM, respectively. This finding was supported by a study conducted by Barakat et al.,<sup>5</sup> where 78.65 and 59.14% of cases had intramural fibroids removed by RM and LM, respectively. This shows that RM is a comparatively safer and preferable procedure than LM when it comes to the removal of bigger fibroids or fibroids at difficult locations like broad ligament fibroids.

A total of 71.4% cases of LM and 52.4% cases of RM had a single fibroid removed in our study. Also, 28.6 and 47.6% of LM and RM, respectively, had more than or equal to two fibroids removed in the present study. This was contradictory to findings in a study conducted by Takmaz et al.,<sup>4</sup> where 19.35 and 15.15% of cases of RM and LM had removal of a single fibroid, respectively and 80.65 and 84.85% of cases of RM and LM had removal of multiple fibroids (more than or equal to two fibroids), respectively. The current study reveals that RM was more efficient in the removal of multiple fibroids.

There was zero conversion rate when laparoscopy was robotically assisted in our study.

However, very few studies have been done on this topic, and more studies need to be done on related topics on a larger scale to compare and corroborate the findings in this study.

### Limitation

Long-term outcomes such as recurrence rate and need for reintervention were not assessed. Patients were asked to refrain from getting pregnant for 6 months postmyomectomy procedure. Hence the conception rate wasn't able to be calculated as well as a therapeutic mode for the treatment of infertility could not be ascertained.

### CONCLUSION

Robotic myomectomy (RM) has been shown to reduce immediate post-op complications and helps in faster recovery and discharge from the hospital as compared to LM. Removal of bigger, multiple fibroids and myomas at difficult locations was made easier by RM when compared to LM. Suture placing with laparoscopy was difficult and required well-trained surgeons as compared to robotic surgeries. Robotic surgeries have a shorter learning curve. RM can also be a preferred treatment modality for persevering uterus in patients with infertility presenting with multiple fibroids or large-size fibroids which would have been otherwise subjected to conventional abdominal hysterectomy.

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