Is fibroid location associated with hemorrhage and complication rates following laparoscopic myomectomy?

CURRENT STATUS: Under Review

Gynecological Surgery  ⬅️ Springer

Kiper Aslan, Adnan Orhan, Engin Turkgeldi, Ebru Suer, Nergis Duzok, Kemal Ozercan, Baris Ata, Gurkan Uncu

Kiper Aslan  
Uludağ University  
airobi, kiperaslan@yahoo.com.tr

Adnan Orhan  
Bursa Uludag Universitesi

Engin Turkgeldi  
Koc Universitesi Tip Fakultesi

Ebru Suer  
Uludag Universitesi Tip Fakultesi

Nergis Duzok  
Uludag Universitesi Tip Fakultesi

Kemal Ozercan  
Uludag Universitesi Tip Fakultesi

Baris Ata  
Koc Universitesi Tip Fakultesi

Gurkan Uncu  
Uludag Universitesi Tip Fakultesi
Subject Areas

*Surgical Obstetrics & Gynecology*

Keywords

*Myomectomy, Laparoscopy, Leiomyoma, Fibroid*
Abstract

Objective To determine whether hemorrhage and complication rates vary according to location of the dominant fibroid following laparoscopic myomectomy. Background Laparoscopic myomectomy is associated with less postoperative pain, analgesic requirement, shorter hospitalization period, and less febrile complications when compared to conventional laparotomy. Despite the advantages, complications like hemorrhage, blood transfusion, bowel and urinary tract injury and conversion to laparotomy may be seen in laparoscopic myomectomy. We don’t know whether fibroid location effect these complications.

Materials & Methods Women, who underwent laparoscopic myomectomy at two different tertiary academic hospitals, were analyzed retrospectively. Only women with at least one intramural fibroid (Monroe type 3, 4 or 5) were included. Patients were categorized according to localization of the dominant fibroid, i.e. anterior uterine wall, posterior uterine wall, and fundus. Change in hemoglobin levels before and after surgery, and complication rates were compared across categories.

Results 219 women with mean age of 35.7 +/- 6 years were included. There were 81 women with fundal fibroid, 56 with anterior wall, and 72 with posterior wall fibroid. Other 10 women with intraligamentary and isthmic fibroid were excluded. The mean fibroid diameter was 6.7 ± 2.6, 6.6 ± 2.3, and 6.7 ± 2.3 cm in the fundal, anterior and posterior groups, respectively (p=0.9). The median (25 th – 75 th percentile) changes in hemoglobin levels were 1.5 (0.8 – 2.2), 1.3 (0.6 – 2.1), and 1.3 (0.9 – 2) g/dl in fundal, anterior and posterior wall groups, respectively (p = 0.55). There were 5 (6.2%), 5 (8.9%), and 2 (2.8%) complications in fundal, anterior, and posterior wall groups, respectively (p = 0.33).

Conclusion Incidence of hemorrhage or complication does not seem to vary depending on fibroid location. However, the sample size was limited, the observed values suggest that fibroid location does not affect hemorrhage and complication rates.

Background

Fibroids are the most common benign tumors of the female genital system and 25-30% of women are diagnosed with a fibroid during their lifetime. [1] While fibroids can be asymptomatic, some patients present with abdominal discomfort or pain, abnormal uterine bleeding, anemia or subfertility depending on the size and location of the fibroid among other factors.[2] While asymptomatic fibroids can be managed expectantly, symptomatic fibroids may require surgical treatment. Medical treatment may also be effective on reducing the number of women required surgery. Currently Ulipristal acetate (Selective Progesterone Receptor Modulator) has been suggested to reduce the fibroid size and the symptoms. In a multicenter study it’s shown that using Ulipristal acetate may reduce the symptoms in 57% in symptomatic women and provide the treatment without surgery.[3] Although medical approach, most symptomatic women may undergo surgery. Compared to conventional myomectomy with laparotomy, laparoscopic myomectomy is associated with less postoperative pain, analgesic requirement, shorter hospitalization period, and less febrile complications.[4] Despite the advantages, Complications like hemorrhage, blood transfusion, bowel and urinary tract injury and conversion to laparotomy may be seen in laparoscopic myomectomy.

Even though most fibroids can be excised with laparoscopy, opinions vary regarding patient selection. Fibroid location and size are factors that are invariably considered to determine eligibility. Although presence of an association between fibroid location and surgical complications is logical and straightforward, a quantitative assessment of this association would be helpful for better patient selection for laparoscopic myomectomy.

Materials And Methods
This was a multicenter retrospective study conducted at the Dept. of Obstetrics and Gynecology of Uludag University Faculty of Medicine Hospital, Bursa and Dept. of Obstetrics and Gynecology of Koc University School of Medicine, Istanbul, Turkey. Uludag University Institutional Review Board approved the study protocol with the ethic committee number 2014-12/10. We screened our electronic records to identify patients who underwent laparoscopic myomectomy between January 2013 to and January 2018. All patients underwent a systematic preoperative assessment including medical history, pelvic examination, gynecologic ultrasonography, and laboratory assessment. The location and size of fibroids were documented by imaging methods including transvaginal and transabdominal ultrasonography or an abdominal MRI prior to the operation. Only women with at least one intramural fibroid (Munroe type 3,4 or 5) were included in the analysis.

All operations were performed under general anesthesia. Patients were placed in dorsal lithotomy position, a Foley catheter was inserted to the urinary bladder and a uterine manipulator was fixed on the cervix. Pneumoperitoneum was achieved with insufflation of 3 – 3.5 lt of CO₂ insufflated with a Veress needle inserted through the umbilicus. The A 10 mm port was placed intra-umbilically for telescope, a 10 mm port was placed approximately 3-4 cm medial to the left superior iliac spine, and a 5 mm port was placed through the left superior quadrant at the level of or slightly below umbilicus. The location of ancillary ports depended on the location and size of fibroids. Following exploration of the abdomen and examination of the uterus an incision over the dome of the fibroid was done using a harmonic scalpel. For anterior wall fibroids, the incision line was parallel to the longitudinal axis of the uterus, whereas a transverse or oblique incision was preferred fundal or posterior wall fibroids. Sharp dissection was continued until identification of the plane between the fibroid and its pseudocapsule. Fibroid(s) was enucleated from its bed by traction and counter traction. After enucleation, the fibroid bed was inspected for bleeders and bipolar coagulation was applied as deemed necessary by the surgeon. There wasn’t used any intra-myometrial medication or aqua dissection for less hemorrhage. The fibroid bed was sutured in a transverse, continuous, and non-locating fashion with no. 1 Vicryl or no.0 V-Lock suture in 1 or -2 layers depending on the depth of fibroid bed. Copious irrigation and lavage was done to check hemostasis. Fibroids were morcellated (Karl storz, Germany) through a 10 mm sleeve. All operations were performed by the same advanced surgeons. All the patients were up and about within six hours of surgery, were orally allowed, and were discharged the next morning.

Patients' age, fibroid location (categorized as fundal, posterior wall, anterior wall), size of the largest fibroid, number of the fibroids, change in hemoglobin concentration from before surgery to postoperative day 1, complications (conversion to laparotomy, excessive bleeding requiring blood transfusion, residual fibroid) were collected from electronic medical records.

Distribution of data was assessed with histograms. Depending on distribution characteristics, continuous variables were defined with mean (standard deviation) or median (25th and 75th percentiles). Categorical variables were defined as percentages. One-way analysis of variance (ANOVA), Kruskal-Wallis, chi-square test and its derivatives were used for between group comparisons. A two tailed p value < 0.05 was considered as statistically significant.

**Results**

219 women with mean age of 35.7 +/- 6 years were included. Mean fibroid diameter was 6.7 +/- 2.3 cm. There were 81 women with fundal, 56 with anterior wall, and 72 with posterior wall fibroids. All these fibroids were intramurally located. One woman with an isthmic, 8 women with intraligamentary and one woman with cervical fibroid were excluded from comparative analysis. Age, preoperative hemoglobin levels, fibroid size and numbers in each group are presented in Table 1. There were no significant differences between the groups for these variables. Change in hemoglobin concentration and complication rates are presented in Table 2. In 46 patients there was no need to determine postoperative hemoglobin values because of minimal hemorrhage so change in hemoglobin concentrations was analyzed in 173 patients and values were likewise similar between the groups. One patient with a fundal fibroid was diagnosed with a residual fibroid after surgery, two patients in the fundal fibroid group, and five patients in the corpus anterior group required blood transfusion. Three patients in fundal fibroid and one patient in corpus posterior fibroid group required conversion to laparotomy due to bleeding.
during surgery. One patient in corpus posterior fibroid group had severe vaginal bleeding after discharge and required re-hospitalization. The low absolute numbers in complications prevented a reliable statistical comparison, but there was no obvious trend towards an increased complication rate in any of the groups.

**Discussion**

Abdominal myomectomy was first introduced by Boney in 1931[5], and it had been the only surgical procedure for years until endoscopic techniques were described. Abdominal myomectomy is still proper procedure for multiple and giant myomas. Semm described laparoscopic myomectomy in 1979 for subserosal myomas.[6] In the beginning of the 1990s, laparoscopic myomectomy began to be performed in intramural myomas. Laparoscopic myomectomy has less hemorrhage, fewer adhesions and shorter recovery time when compared with laparotomic myomectomy. In a retrospective study with 1001 patients, Paul P.G and colleagues showed that hemorrhage and blood transfusion are the most seen complications in laparoscopic myomectomy.[7] In a prospective study including 2050 laparoscopic myomectomy between the years 1998-2004, the overall complication rate was found 11.1%. Most seen complication was hemorrhage and mean hemoglobin drop was 1.5 g/dl.[8] In a study about predictors of hemorrhage in laparoscopic myomectomy, there was found that hemorrhage risk is associated with duration of surgery, the largest diameter of fibroid, cumulative fibroid weight, and the number of the suture.[9] There are numerous studies about the prediction of hemorrhage risk in laparoscopic myomectomy but none of them mention whether the location of fibroid is associated with the risk of hemorrhage or other complications. Based on these concerns, in our study we planned to detect whether hemorrhage and complication rates vary according to the location of the dominant fibroid. In our study, median fibroid size was 6.7 cm; similar with Sizzi’s large case serial (6.4cm).[8] Our median hemoglobin drop was 1.5 g/dl in fundal group, 1.3 g/dl in anterior group and 1.3 g/dl in posterior fibroid group. The results were similar with other studies. Except of four patients (laparo-conversion), all the myomas enucleated by laparoscopy, all the patients had no severe bleeding. There was no bowel or urinary tract injury.

There are two factors associated with hemoglobin drop in LM. These are appropriate dissection cleavage during myomectomy and fast suturation after myomectomy. If the surgeon could not find the fibroid capsule properly, there would be more hemorrhage during dissection. Finding the proper cleavage may be difficult in some degenerated fibroids. The second process of the operation is suturing the myomectomy incision. Suturation may be difficult depending on the location and size of fibroid. Also, if the surgeon is not advanced, suturation time may be longer and it may cause more hemorrhage during the operation. If the surgeon is not advanced, there may be need ancillary port to make the operation with less hemorrhage. In our study we could not find the number of operations made with ancillary port.

The primary aim of the study was to obtain whether the fibroid location affects the hemorrhage rates. As the result, bleeding does not seem to vary depending on fibroid location. Although we were not able to conduct a reliable statistical comparison of complication rates due to small sample size, the observed values suggest that intramural fibroids located in the anterior wall can be more prone to have more hemorrhage than fundal or posterior wall fibroids.

There are some limitations of our study. First, all the operations were performed by 6 surgeons. Although all of the surgeons are seniors on their departments, it’s better to perform by one advanced surgeon for more reliable results. Another conflicting factor is the type of the suture material. It’s widely known that using barbed suture during myomectomy makes the duration of operation shorter with less hemorrhage and it’s shown that using barbed suture has no negative impact on myomectomy scar healing in a multicenter study.[10] In our study, we used both types of the suture and we couldn’t analyze the effect of the suture type on LM complications.

The other concerning issue is morcellation. The major risk in morcellation is malignancy potential of fibroids. As known, occult sarcoma or leiomyosarcoma incidence during myomectomy or hysterectomy is 0.39 %.[11] Spillage or contamination of tissues during morcellation carries risk of dissemination of tumoral cells through abdomen and other organs and shortens the survey of survival and increases the recurrence risk.[12] There are
numerous case reports about disseminated leiomyosarcoma and sarcoma after uncontained power morcellation during myomectomy[13] and it’s showed that uncontained power morcellation is associated with high risk of mortality in women with occult sarcoma.[12] There are novel containing methods during myomectomy or hysterectomy; like morcellation in plastic bags. [14] Although there are these novel containing methods, there is still suspicion of malignancy spillage during morcellation. In our study, we morcellated all the fibroids, and plastic bag was used depending on surgeon’s choice. plastic bag was used in approximately thirty percent of the cases. There was just 1 patient in 219 with the unexpected pathology result with stump (Smooth tumors with uncertain malignant potential). There was no recurrence during six years follow up of this patient. Patient selection, age, ultrasound findings are important factors for excluding malignancy, but occult sarcoma or leiomyosarcoma may be present even without any finding.[15] Thus, laparoscopic myomectomy should be performed under contained morcellation according to the novel studies. But recently surgeons leave laparoscopic myomectomy because of these unclear issues, and laparotomy rates begin to increase. After FDA report against the use of Power morcellation, Multinu et. Al showed that laparotomy rates in hysterectomy / myomectomy operations significantly increased and minor complication rates increased 20%. They advised balancing against the potential harms of morcellation during a shared decision-making process between clinician and patient.[16]

**Conclusion**

In conclusion our study is the first study showed that fibroid location does not affect hemorrhage and complication rates. Other factors like; fibroid size, suturation technique and material, surgeon’s experience may affect the hemorrhage and complication rates. Due to our small sample size and retrospective design, our results should be assessed by larger prospective trials.

**Tables**

Table-1 Demographic Data of Patients
## Table 2 - Hemorrhage and Complication Rates

|                          | Fundal (n = 81) | Anterior (n = 56) | Posterior (n = 72) |
|--------------------------|-----------------|-------------------|--------------------|
| **Median Hb Change in g/dl (25th – 75th percentile)** | 1.5 (0.8 – 2.2) | 1.3 (0.6 – 2.1)  | 1.3 (0.9-2)        |
| **Complication**         |                 |                   |                    |
| Transfusion              | 6.2% (5/81) *   | 8.9% (5/56)       | 2.8% (2/72) **     |
| Laparoconversion         | 2.5% (2/81)     | 8.9% (5/56)       | 0                  |
|                          | 3.7% (3/81)     | 0                 | 1 (%1.4)           |

* one patient has residual fibroid after surgery.

**one patient has severe vaginal bleeding after discharge.
Declarations

Ethic Approval:
Bursa Uludag University Institutional Review Board approved the study protocol with the ethic committee number 2014-12/10.

Availability of data and materials
The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Competing interests
The authors declare that they have no competing interests

Funding
There is no funding in this study.

Authors’ contributions
Kiper Aslan M.D. Writing, analysis, interpretation of data
Adnan Orhan M.D. Surgeon
Engin Türkgeldi M.D. Surgeon
Ebru Suer Médécine Collection Data
Nergis Duzok M.D. Collecting Data
Kemal Özerkan Prof. Dr. Surgeon
Barış Ata Prof. Dr. Surgeon, design of the work, revision
Gürkan Uncu Prof. Dr. Surgeon, revision

Acknowledgements
Not applicable

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