https://sexualsciencejournal.com/
August **2025**, Volume **1**, Issue **2**
https://doi.org/10.33719/sexscij.2508.14

International Journal of SEXUAL SCIENCE

ORIGINAL ARTICLE

Effects of Using Uterine Manipulator on Vaginal Length After Abdominal Hysterectomy: A Prospective Randomized Study

Merve Olgun [1], Emin Üstünyurt [1]

[1] Department of Obstetrics and Gynaecology, Private Clinic, Bursa, Türkiye

Received: 4 May 2025 / **Accepted:** 8 August 2025

Abstract

Objective: This study aims to research the effects of the uterine manipulator on operation time, complications, and postoperative vaginal length in abdominal hysterectomies.

Materials and Methods: Eighty-five women underwent abdominal hysterectomy and were randomized into two groups: a study group using a uterine manipulator (n=35) and a control group (n=50). The study recorded demographic characteristics, indications for hysterectomy, intraoperative blood loss, changes in postoperative hemoglobin, and postoperative vaginal lengths. Vaginal length was measured preoperatively and on the first postoperative day. The primary outcome, the effect of uterine manipulator usage on vaginal length, was analyzed using a Student's t-test.. Pearson's correlation test was used to evaluate the correlation between intraoperative blood loss and postoperative vaginal length. P values < 0,05 were considered significant.

Results: No significant differences were found between the groups regarding demographic data and hysterectomy indications. Postoperative vaginal length change was statistically less in the study group than in the control group (p<0,001). We also observed that less intraoperative blood loss was associated with less shortening of postoperative vaginal length (p<0,001). Intraoperative blood loss was significantly less in the study group compared to the control group (study group: 347±169 ml; control group: 439±150 ml; p=0,010). There was no significant difference in operation time between the groups (p=0.178), and no correlation was found between postoperative vaginal length and BMI.

Conclusion: The result of this study indicated that using a uterine manipulator in abdominal hysterectomy might be preferable due to better postoperative vaginal length and less intraoperative blood loss.

Keywords: vaginal length, hysterectomy, uterine manipulator

INTRODUCTION

Hysterectomy, described as the extirpation of the uterine corpus with or without cervix, is the most common gynecological operation in the world (1-3).

Despite reduced hysterectomy for benign indications, about 600,000 women undergo hysterectomy per year in the United States (4-5).

The benign indications are uterine leiomyoma, abnormal uterine bleeding, endometriosis, and uterine prolapse, and the malignant indication is the internal genital tract malignancies (4-7). Attendant bilateral salpingo oophorectomy is realized in about 50 % of all hysterectomies (8-10). Hysterectomy is performed by different routes and their combinations: vaginal, abdominal, and minimally invasive techniques

Corresponding Author: Merve Olgun, İstiklal Mahallesi, Pars Sokak, No:4/1, İç Kapı No:22 Osmangazi / Bursa, Türkiye
E-mail: drmerveolgun@gmail.com

(laparoscopy, robotic surgery). Hysterectomy for benign indications has conventionally been applied by abdominal and vaginal approaches, which are most common in developed countries (1,4,11).

Vaginal shortening is frequently observed following hysterectomies, particularly those performed via the abdominal approach. A decrease in vaginal length after hysterectomy is commonly associated with sexual dysfunction, particularly dyspareunia (12,13).

Abdominal hysterectomy is performed in the presence of a large abdominopelvic organ or severe adhesion. This route allows the abdominopelvic organs to be best observed and manipulated. However, it is the most common approach to see hemorrhage, infection, and genitourinary tract injury (1,5). These complications are reduced by using the manipulator in laparoscopic hysterectomy (13). In addition, the uterus is elevated and removed from the uterocervical junction so that the vaginal tissue is preserved (14-16).

While there are many known benefits of abdominal hysterectomy, it is uncertain how the route of operation affects vaginal length. To our knowledge, this is the first study that defines a new technique of abdominal hysterectomy using RUMI II uterine manipulator and analyzes the vaginal length changes and surgical outcomes of the first 85 cases.

MATERIALS AND METHODS

Eighty-five women who applied to the University of Health Sciences, Bursa Yuksek İhtisas Training and Research Hospital between September 2015 and September 2017, and underwent abdominal hysterectomy for benign indications, which are abnormal uterine bleeding, leiomyoma, endometrial hyperplasia without atypia, postmenopausal bleeding, endometrial polyps, and adnexal masses, were included in the study. The exclusion criteria are high suspicion or diagnosed malignancy of the genital tract. All operations were conducted by a consistent surgical team consisting of three surgeons.

All patients were randomized into two groups: a study group in which a uterine manipulator is used during the operation (n = 35) and a control group (n = 50). Demographic characteristics (age, parity, BMI, and surgical information), indications of hysterectomy, preoperative and postoperative vaginal lengths, intraoperative blood loss, and changes in postoperative hemoglobin values of all patients included in the study were recorded.

The vaginal length of each patient was measured preoperatively and on the first postoperative day by the same clinician. Cervix to hymen (1. distance), anterior fornix to hymen (2. distance), and posterior fornix to hymen (3. distance) are measured preoperatively and postoperatively. We calculated the difference between preoperative and postoperative measurements.

In the study group, operation time was calculated from the beginning to place the manipulator into the vagina until the skin was sutured. Calculation was made from skin to skin in the control group.

The study was approved by the Bursa Yüksek İhtisas Training and Research Hospital clinical research ethics committee (Approval No: 2011-KAEK-25 2015/22-16, Date: 2015-12-02).

Statistical Analysis

All analyses were performed using the Statistical Package for the Social Sciences Software, version 18.0 (SPSS Inc., Chicago, USA). The normality of the data was tested using the Kolmogorov-Smirnov test, and all continuous variables showed normal distribution ($p>0.05$). Continuous variables were presented as mean ± standard deviation (SD) or median (minimum-maximum). The differences between groups were assessed by using Student's t-test or the Mann-Whitney U test. Correlations between variables were evaluated with Pearson's or Spearman's correlation coefficient test. Significance was defined as $p < 0.05$.

RESULTS

Some of the demographic data for the patients are summarized in Table 1, and there were no significant differences between the study group and the control group in terms of demographic data and hysterectomy indications ($p > 0.05$).

Postoperative vaginal length changes were found to be statistically less in the study group than in the control group ($p < 0.001$) (Table 2). The difference between preoperative and postoperative vaginal lengths was found to be statistically less in the study group than in

the control group ($p < 0.001$) (Table 3). It was also found that the intraoperative blood loss in the study group was less than in the control group. (Study group: 347 ± 169 ml; control group: 439 ± 150 ml; $p = 0.010$). There was no significant difference between the study group and the control group in terms of the operation time (study group: 74 ± 17 min; control group: 80 ± 23 min; $p = 0.178$) (Table 4).

DISCUSSION

Women who undergo hysterectomy indicate a postoperative decrease in vaginal length that is reduced by a non-clinically significant amount. In this study, we investigated the effects of the uterine manipulator on operation time, complications, and postoperative vaginal length during abdominal hysterectomies. Postoperative vaginal length changes were found to be statistically shorter in the manipulator group than

Table 1. Some Demographic Data of The Study Population in Both Groups

	Manipulator Group (n = 35)		Control Group (n = 50)		P
	Mean ± SD	Min-Max	Mean ± SD	Min-Max	
Age (year)	49.8 ± 7.9	42-82	48.6 ± 7.1	40-65	0.452
BMI (kg/cm^2)*	31.2 ± 5.4	21-44	29.0 ± 7.4	19-53	0.143
Gravida	3.6 ± 1.6	2-8	3.9 ± 2.6	0-12	0.582
Para	3.2 ± 1.3	2-8	3.4 ± 2.4	0-12	0.707
Uterine length	8.2 ± 2.9	5-19	8.6 ± 3.4	3.6-25	0.656
Uterine anteroposterior diameter	5.4 ± 2.6	3-16	5.3 ± 2.3	1.5-14	0.843

*BMI: body mass index. Uterine size measured in centimeters.

Table 2. Comparison of Postoperative Vaginal Length Changes For All Patients

	Manipulator Group (n=35)	Control Group (n=50)	p
	Mean ± SD	Mean ± SD	
1. Distance (mm)*	81 ± 7	70 ± 8	<0.001
2. Distance (mm)#	81 ± 9	71 ± 7	<0.001
3. Distance (mm)+	92 ± 9	80 ± 8	<0.001

*1. distance: Cervix to hymen; #2. distance: anterior fornix to hymen; +3. distance: posterior fornix to hymen (mm: millimeter).

Table 3. Comparison of Differences Between Preoperative and Postoperative Vaginal Length in Both Groups

	Manipulator Group (n=35)	Control Group (n=50)	P
	Mean ± SD	Mean ± SD	
A distance (mm)*	-2 ± 6	-1 ± 8	0.631
B distance (mm)#	3 ± 2	8 ± 5	<0.001
C distance (mm)+	3 ± 2	13 ± 7	<0.001

*A distance: differences between preop and postop 1. distance. #B distance: differences between preop and postop 2. distance. +C distance: differences between preop and postop 3. distance. (mm: millimeter)

Table 4. Comparison of Intraoperative Blood Loss, Changes in Postoperative Hemoglobin Values, and Operation Time in Both Groups

	Manipulator Group (n=35)		Control Group (n=50)		P
	Mean ± SD	Min-Max	Mean ± SD	Min-Max	
Changes in postoperative hemoglobin values (g/dl)	1.17 ± 0.6	0.1-2.4	1.2 ± 0.7	0.2-3.9	0.483
Intraoperative blood loss (ml)	347 ± 169	100-860	439 ± 150	200-730	0.010
Operation time (min)	74 ± 17	35-120	80 ± 23	60-135	0.178

Intraoperative blood loss is measured in milliliters. Operation time is measured in minutes. (ml: milliliter, min: minute)

in the control group. We analyzed that intraoperative blood loss was lower in patients with less shortening of postoperative vaginal length. It was also obtained that the intraoperative blood loss in the manipulator group was less than in the control group. There was no significant difference between the groups regarding operation time. Several factors may explain why this difference did not reach statistical significance.

One possible reason is the relatively small sample size of the study population.

Another contributing factor could be that, although fewer clamps were used in surgeries involving the manipulator, the process of inserting and positioning the device may have prolonged the operation time.

Many factors affect vaginal length; age, race, menopausal status, gravida, para, weight, height, and type of surgery performed are just some of them. Tan et al. (17) quantitatively evaluated the association between these variables and total vaginal length, reporting that it was significantly shorter after pelvic reconstructive surgery compared to hysterectomy, with no significant difference between abdominal and vaginal hysterectomy procedures. In a randomized study comparing the effects of vaginal cuff closure techniques on vaginal length during vaginal hysterectomy, preoperative lengths were similar between groups; however, postoperative measurements were significantly shorter in the horizontal closure group compared to the vertical closure group (18). Similarly, a meta-analysis of randomized trials concluded that horizontal vaginal vault closure results in a significantly shorter postoperative vaginal length in vaginal hysterectomies (19).

Several studies have compared vaginal length across different hysterectomy routes (13–20). However, to the best of our knowledge, no study has compared using a manipulator during abdominal hysterectomy. Ercan et al. (12) evaluated vaginal length and sexual function after vaginal, total abdominal, and total laparoscopic hysterectomy. They found significantly shorter vaginal lengths in the vaginal hysterectomy group compared to the laparoscopic group.

De la Cruz et al. (21) demonstrated that total vaginal length was significantly longer following robotic hysterectomy than vaginal hysterectomy. At the same time, Chen et al. (22) showed that abdominal hysterectomy yielded significantly longer postoperative vaginal lengths compared to the vaginal approach. Polat et al. (13) compared laparoscopic and abdominal hysterectomy in terms of postoperative vaginal length, dyspareunia, and lower urinary tract function. Their findings indicated that vaginal length was significantly longer after laparoscopic hysterectomy, with no significant differences observed in dyspareunia or urinary tract outcomes.

CONCLUSION

In conclusion, hysterectomy results in a reduction in vaginal length regardless of the surgical route. To our knowledge, this is the first study to introduce a modified abdominal hysterectomy technique using the RUMI II uterine manipulator, which appears to influence postoperative vaginal length positively. However, the clinical significance of this finding remains unclear. We speculate that this effect may be attributable to reduced cardinal ligament dissection, similar to the approach used in laparoscopic hysterectomy. To confirm this hypothesis and determine its implications for sexual function, future large-scale prospective randomized controlled trials are needed.

In the present study, no ureteral or bladder complications were observed in either group. We believe that with a larger sample size, the potential benefits of using a uterine manipulator in abdominal hysterectomy—including improved vaginal length preservation—may become more evident. Additionally, in cases with severe pelvic adhesions due to conditions such as abscess or endometriosis, the use of a manipulator may help reduce ureteral and bladder injury risk.

Acknowledgments: None.

Funding: This study was carried out without any financial support from institutions or external sources.

Conflict of Interest: We have no conflicts of interest to declare regarding the design, conduct, or publication of this study.

Informed Consent: All participants provided written informed consent prior to inclusion in the study.

Ethical Approval: The study was approved by the Bursa Yüksek İhtisas Training and Research Hospital clinical research ethics committee (Approval No: 2011-KAEK-25 2015/22-16).

Author Contributions: Concept and Design: Merve Olgun, Emin Üstünyurt; Supervision: Emin Üstünyurt; Data Collection and/or Processing: Merve Olgun; Materials: Merve Olgun; Analysis and/or Interpretation: Merve Olgun, Emin Üstünyurt; Literature Search: Merve Olgun; Writing and Critical Review: Merve Olgun, Emin Üstünyurt.

REFERENCES

1. Lonnee-Hoffmann, R., & Pinas, I. (2014). Effects of hysterectomy on sexual function. Current Sexual Health Reports, 6, 244–251. https://doi.org/10.1007/s11930-014-0029-3
2. Committee Opinion No 701: Choosing the Route of Hysterectomy for Benign Disease. (2017). Obstetrics and gynecology, 129(6), e155–e159. https://doi.org/10.1097/AOG.0000000000002112
3. Clayton, R. D. (2006). Hysterectomy. Best Practice & Research Clinical Obstetrics & Gynaecology, 20(1), 73–87. https://doi.org/10.1016/j.bpobgyn.2005.09.007
4. Whiteman, M. K., Hillis, S. D., Jamieson, D. J., Morrow, M., Podgornik, M. N., Brett, K. M., & Marchbanks, P. A. (2008). Inpatient hysterectomy surveillance in the United States, 2000–2004. American Journal of Obstetrics and Gynecology, 198(1), 34.e1-7. https://doi.org/10.1016/j.ajog.2007.05.039
5. Farquhar, C. M., & Steiner, C. A. (2002). Hysterectomy rates in the United States 1990-1997. Obstetrics & Gynecology, 99, 229. https://doi.org/10.1016/s0029-7844(01)01723-9
6. Spilsburry, K., Semmens, J. B., Hammond, I., & Bolck, A. (2006). Persistent high rates of hysterectomy in Western Australia: A population-based study of 83,000 procedures over 23 years. BJOG: An International Journal of Obstetrics & Gynaecology, 113, 804. https://doi.org/10.1111/j.1471-0528.2006.00962.x
7. Multinu, F., Casarin, J., Hanson, K. T., Angioni, S., Mariani, A., Habermann, E. B., & Laughlin-Tommaso, S. K. (2018). Practice patterns and complications of benign hysterectomy following the FDA statement warning against the use of power morcellation. JAMA Surgery, 153(6), e180141. https://doi.org/10.1001/jamasurg.2018.0141
8. Parker, W. H. (2010). Bilateral oophorectomy versus ovarian conservation: Effects on long term women's health. Journal of Minimally Invasive Gynecology, 17(2), 161–166. https://doi.org/10.1016/j.jmig.2009.12.016
9. Hassan, H., Allen, I., Sofianopoulou, E., Walburga, Y., Turnbull, C., Eccles, D. M., Tischkowitz, M., Pharoah, P., & Antoniou, A. C. (2024). Long-term outcomes of hysterectomy with bilateral salpingo-oophorectomy: A systematic review and meta-analysis. American Journal of Obstetrics and Gynecology, 230(1), 44–57. https://doi.org/10.1016/j.ajog.2023.06.043
10. Cusimano, M. C., Chiu, M., Ferguson, S. E., Moineddin, R., Aktar, S., Liu, N., & Baxter, N. N. (2021). Association of bilateral salpingo-oophorectomy with all cause and cause specific mortality: Population based cohort study. BMJ, 375, e067528. https://doi.org/10.1136/bmj-2021-067528
11. Kavallaris, A., Chalvatzas, N., Kelling, K., Bohlmann,

M. K., Diedrich, K., & Hornemann, A. (2011). Total laparoscopic hysterectomy without uterine manipulator: Description of a new technique and its outcome. Archives of Gynecology and Obstetrics, 283, 1053–1057. https://doi.org/10.1007/s00404-010-1494-1

12. Ercan, Ö., Özer, A., Köstü, B., Bakacak, M., Kıran, G., & Avcı, F. (2016). Comparison of postoperative vaginal length and sexual function after abdominal, vaginal, and laparoscopic hysterectomy. International Journal of Gynecology and Obstetrics, 132, 39–41. https://doi.org/10.1016/j.ijgo.2015.07.006
13. Polat, M., Kahramanoglu, I., Senol, T., Senturk, B., Ozkaya, E., & Karateke, A. (2016). Comparison of the effect of laparoscopic and abdominal hysterectomy on lower urinary tract function, vaginal length, and dyspareunia: A randomized clinical trial. Journal of Laparoendoscopic & Advanced Surgical Techniques, 26(2), 159-163. https://doi.org/10.1089/lap.2015.0437
14. Aarts, J. W., Nieboer, T. E., Johnson, N., Tavender, E., Garry, R., Mol, B. W., & Kluivers, K. B. (2015). Surgical approach to hysterectomy for benign gynaecological disease. Cochrane Database of Systematic Reviews. https://doi.org/10.1002/14651858.CD003677.pub5
15. Johnson, N., Barlow, D., Lethaby, A., Tavender, E., Curr, L., & Garry, R. (2005). Methods of hysterectomy: Systematic review and meta-analysis of randomised controlled trials. BMJ, 330, 1478. https://doi.org/10.1136/bmj.330.7506.1478
16. Garry, R., Fountain, J., Mason, S., Hawe, J., Napp, V., Abbott, J., Clayton, R., Phillips, G., Whittakr, M., Lilford, R., Bridgman, S., & Brown, J. (2004). The eVALuate study: Two parallel randomized trails, one comparing laparoscopic with abdominal hysterectomy, the other comparing laparoscopic with vaginal hysterectomy. BMJ, 328(7432), 129. https://doi.org/10.1136/bmj.37984.623889.F6
17. Tan, J. S., Lukacz, E. S., Menefee, S. A., Luber, K. M., Albo, M. E., & Nager, C. W. (2006). Determinants of vaginal length. American Journal of Obstetrics & Gynecology, 195, 1846–1850. https://doi.org/10.1016/j.ajog.2006.06.063
18. Vassallo, B. J., Culpepper, C., Segal, J. L., Moen, M. D., & Noone, M. B. (2006). A randomized trial comparing methods of vaginal cuff closure at vaginal hysterectomy and the effect on vaginal length. American Journal of Obstetrics & Gynecology, 195, 1805–1808. https://doi.org/10.1016/j.ajog.2006.07.010
19. Pergialiotis, V., Daskalakis, G., Thomakos, N., Haidopoulos, D., Loutradis, D., & Rodolakis, A. (2019). Impact of vertical versus horizontal vaginal cuff closure on vaginal length following hysterectomy: A meta-analysis of randomized trials. International Urogynecology Journal, 30(8), 1239–1245. https://doi.org/10.1007/s00192-019-03881-5
20. Kiremitli, S., Kiremitli, T., Ulug, P., Yilmaz, N., Yilmaz, B., Kulhan, M., Kulhan, N. G., Dinc, K., Kirkinci, A., & Kurnuc, F. Z. (2022). The effect of hysterectomy types on vaginal length, vaginal shortening rate and FSFI scores. Taiwanese Journal of Obstetrics & Gynecology, 61(3), 427–432. https://doi.org/10.1016/j.tjog.2022.02.042
21. Chen, B., Ren, D. P., Li, J. X., & Li, C. D. (2014). Comparison of vaginal and abdominal hysterectomy: A prospective non-randomized trial. Pakistan Journal of Medical Sciences, 30(4), 875–879. https://doi.org/10.12669/pjms.304.4436
22. De La Cruz, J. F., Mayers, E. M., & Geller, E. J. (2014). Vaginal versus robotic hysterectomy and concomitant pelvic support surgery: A comparison of postoperative vaginal length and sexual function. Journal of Minimally Invasive Gynecology, 21(4), 629-634. https://doi.org/10.1016/j.jmig.2014.04.011