Which vaginal cuff closure route produces better clinical results after laparoscopic hysterectomy? Laparoscopic or the vaginal route

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ABSTRACT

Objective: The aim of this study was to compare the complications and clinical outcomes of laparoscopic closure of the vaginal cuff and cuff closure through the vaginal route after total laparoscopic hysterectomy (TLH).

Material and Methods: This retrospective study conducted from February 2012 to December 2021 involved a total of 362 patients who underwent TLH. Of these patients, 148 received vaginal cuff closure using no. 0 Vicryl™ (polyglactin 910), which is endoscopically absorbable, and 214 received vaginal cuff closure through the vaginal route using the same suture material. The gynecological examination findings 1 and 6 months after the operation were obtained from the electronic medical records of the postoperative treatment interventions and from the patients' files. Together with the major complications that occurred, complications such as vaginal cuff dehiscence, hematoma, cuff cellulitis, granulation, spotting, vaginal discharge, and cuff prolapse were recorded.

Results: The operation duration was found to be significantly shorter for the patients whose vaginal cuffs were sutured through the vaginal route than for the patients whose vaginal cuffs were endoscopically sutured (107.75±7.19 and 83.55±8.44, respectively; p<0.01). It was also found that laparoscopic suturing is more advantageous than suturing through the vaginal route in terms of the formation of vaginal cuff granulation, abnormal vaginal discharge, and abnormal mucosal band-shaped adhesion in the vaginal cuff.

Conclusion: Laparoscopic suturing and knotting is a process that requires much experience and skill and that may lengthen the operation duration. However, the laparascopically closure of the vaginal cuff seems safer.

Keywords: Laparoscopic suturing, total laparoscopic hysterectomy, vaginal cuff, vaginal cuff suturing.

INTRODUCTION

Hysterectomy is the most common abdominal gynecological surgical practice.[1] Total laparoscopic hysterectomy (TLH) was first performed Reich et al. in 1989.[2] This minimally invasive method has come to be preferred more than laparotomic hysterectomy for several reasons, such as the fact that it causes less intraoperative bleeding, involves a shorter post-operative hospital stay, allows a quicker resumption of daily life activities, and is relatively less costly.[3] Complications related to the vaginal cuff after TLH, however, such as dehiscence, infection, hematoma, and healing disorders, are quite frequent. After a laparotomic and vaginal hysterectomy, the vaginal cuff dehiscence is within the range of 0.1–0.2%. On the other hand, it is estimated that this rate is 5–10 times higher in minimally invasive procedures.[4] The risk of vaginal cuff complications increases with coit in the early post-operative period, with early excessive activity, with diabetes, and with corticosteroid use. Nevertheless, closure of the vaginal cuff with the correct technique and with a suitable suture material can decrease the cuff closure complications.[5]

The endoscopic suture and knotting application requires a high level of surgical skill and is among the significant factors determining the operation duration.[6] The tension originating from laparoscopically and robotically applied knots in animal models was detected to be less compared to that from the conventional suturing, which is associated with the increase in post-operative bleeding, hematoma, and vaginal cuff dehiscence risk in the laparoscopic approach.[7]

The aim of this study was to compare the complications resulting from and clinical results of laparoscopic vaginal cuff closure and vaginal cuff closure through the vaginal route in patients who underwent TLH.

MATERIAL AND METHODS

The study was approved by the local ethics committee (Approval date: March 31, 2021, and No: 7/VI). The written informed consent was obtained from all participants in accordance with Helsinki Declaration.

This retrospective study was conducted from February 2014 to December 2021 and included a total of 362 patients who underwent TLH due to benign indications in the uterus. Of these patients, 148 received vaginal cuff closure using no. 0 Vicryl™ (polyglactin 910), which is endoscopically absorbable, and 214 received vaginal cuff closure through the vaginal route using the same suture material. Inclusion criteria were as follows: Age >18 years, laparoscopic completion of entire procedure up to colpotomy, and benign indication for hysterectomy. Patients who underwent hysterectomy due to invasive malignant lesions in the uterine cervix, ovarian, and endometrium or due to pelvic abscess, previous radiation therapy, and those who underwent a subtotal hysterectomy, and inability to express adequate informed consent to participate in the study and patients dropped out from the follow-up were excluded from the study.

The pre-operative demographic data, operation data, early and late period complications, and gynecological examination findings 1 and 6 months after the surgery, and data regarding the post-operative treatment interventions were obtained from the patients' electronic medical records and files. Demographic data (e.g., age, gravida, body mass index, and previous abdominal surgical data), data related to the operation (e.g., surgical indications, length of stay in the hospital, and operation duration), and data regarding the major complications that occurred after the surgery (e.g., bladder/ureter/great vessel/bowel injury and blood transfusion) were recorded. In addition, complications such as vaginal cuff dehiscence, hematoma, cuff cellulitis, granulation, spotting, vaginal discharge, and cuff prolapse were recorded.

Surgical Procedure

In this study, all the operations were performed by the same experienced surgeon, under general anesthesia, the patients were prepared in the dorsolithotomy position. For uterus manipulation, a RUMI® II system (Cooper Surgical, Trumbull, CT, USA) was inserted in the uterine cavity. Using the cervical cup adapted to the RUMI® II manipulator as a guide, monopolar cautery and colpotomy were performed, and the uterus was removed from the vaginal route. The vaginal cuffs of one group of patients were sutured through the vaginal route through the continuous locking technique using the absorbable no. 0 Vicryl™ (polyglactin 910; Ethicon, Somerville, NJ, USA) suture material, whereas the vaginal cuffs of the patients in the other group were sutured through laparoscopic intracorporeal separate and knotting with the same material. In both methods, the uterosacral ligament, dense connective tissue layers, rectovaginal fascia, and paravaginal fascia were included in the sutured vaginal cuff.

Statistical Analysis

The data obtained from the study were analyzed using the Statistical Package for the Social Sciences (SPSS) 20.0 for Windows (SPSS Inc., Chicago, Illinois, USA) program. Continuous data were expressed as the mean±standard deviation and percentage. Student's t-test was used for continuous variables. Mann–Whitney U-test was used for the intergroup comparisons of parameters without normal distribution. Chi-square test was used for comparison of qualitative data. The statistical significance level of the data obtained from the study was interpreted with "p" value and p<0.05 was considered to be statistically significant.

RESULTS

The data obtained from the 362 patients who had undergone TLH were evaluated. The demographic features and TLH indications of the 148 patients whose vaginal cuffs were closed laparoscopically and of the 214 patients whose vaginal cuffs were closed through the vaginal route are presented in Table 1. It was found that in both groups, myoma uterine and abnormal uterine bleeding were the most common hysterectomy indications.

The mean operative time was 83.55±8.44 min in patients whose vaginal cuffs were sutured vaginally and 107.75±7.19 min in patients whose vaginal cuffs were sutured by the intracorporeal endoscopic method. The mean operation time of the patients whose vaginal cuff was sutured vaginally was statistically significantly shorter than the vaginal cuff sutured endoscopically (p<0.01). Although the weight of the hysterectomy materials was higher in the patients in whom the cuff was sutured vaginally (229.77±16.35 gr) than the cuff sutured endoscopically (199.60±14.18 gr), no statistical difference was found.

Table 1: Patients' demographic features and their hysterectomy indications			
	Vaginal cuff closure method		
	Endoscopic suturing (n=148)	**Vaginal suturing (n=214)**	**p**
Age (year)	48.33±4.15	49.90±3.34	>0.05
BMI (kg/m²)	28.56±3.23	27.46±2.05	>0.05
Parity (n)	3.73±0.42	3.38±0.34	>0.05
Previous abdominal surgery n, %			
Caesarean	35 (23.6)	42 (19.6)	>0.05
Appendoctomy	5 (3.3)	3 (1.4)	>0.05
Myomectomy	9 (6)	5 (2)	>0.05
Ovarian surgery	2 (1.3)	4 (1.8)	n/s
TLH indications n, %			
Uterine myoma	85 (57.4)	135 (63)	>0.05
Abnormal uterine bleedings	21 (14.1)	44 (20.5)	=0.02*
Premalignant lesions of the cervix	14 (9.4)	23 (10.7)	>0.05
Premalignant lesions of the endometrium	19 (12.8)	16 (7.4)	>0.05
Chronic pelvic pain	6 (4)	4 (1.8)	>0.05
Operative time (min)	107.75±7.19	83.55±8.44	=0.01*
Weight of the uterus (gr)	199.60±14.18	229.77±16.35	>0.05

*: P value <0.05; BMI: Bodymass index; Values were given as mean±standard deviation (range) or number (%).

For the patients who had undergone TLH, the intraoperative and post-operative major and minor complications that occurred are shown in Table 2. In terms of the major complications, no differences were found between the groups. It was found that endoscopic suturing is more advantageous than suturing through the vaginal route in terms of granulation formation, abnormal vaginal discharge, and mucosal-adhesion formation in the vaginal cuff. Within 39 patients whose vaginal cuff was sutured vaginally with complaints of abnormal vaginal discharge, six patients had Escherichia coli, and one patient had abnormal colonization of the Klebsiella strain in the vaginal discharge culture. Eight of the patients whose vaginal cuff was sutured endoscopically had abnormal vaginal discharge complaints, however, none of them had abnormal microbial strains isolated in their vaginal culture.

Only one of the patients whose vaginal cuff was endoscopically sutured intracorporeally had vaginal cuff dehiscence. Vaginal vault prolapse (stage >2) rates were similar between vaginally sutured (n=9) and endoscopically sutured (n=7) groups.

DISCUSSION

In this study, we aimed to compare the complications and clinical results of laparoscopic vaginal cuff closure and vaginal cuff closure through the vaginal route in patients who underwent TLH. We found no differences between the laparoscopic closure of the vaginal cuff and the vaginal cuff closure through the vaginal route in terms of intraoperative or post-operative major complications such as great

vessel/bowel/bladder-ureter, bleeding, and blood transfusion in the patients who had undergone TLH. Besides, the operation duration was found to be significantly shorter for the patients whose vaginal cuffs were sutured through the vaginal route and also it was found that laparoscopic suturing is more advantageous than suturing through the vaginal route in terms of the formation of vaginal cuff granulation, abnormal vaginal discharge, and abnormal mucosal band-shaped adhesion in the vaginal cuff.

It was previously reported that more complications could occur (e.g., dehiscence, vaginal bleeding, granulation formation, cuff infection, and vaginal cuff prolapse) in hysterectomy performed with the laparoscopic method. Vaginal cuff dehiscence accompanied by evisceration is one of the life-threatening complications that are feared to develop in patients undergoing TLH.[8] Vaginal cuff dehiscence is characterized by partial- or full-thickness separation of the vaginal cuff. It can lead to evisceration of peritoneal contents, bowel ischemia, and peritonitis.[9] It is emphasized that after hysterectomy, especially in premenopausal patients, the most significant risk factor that increases vaginal cuff complications is coit earlier than 1 month post-operative.[10] Speculate that women after menopause had a lower risk of vaginal cuff dehiscence due to decline in sexual frequency.[11] Contrary to the results of the many early prospective studies that have been conducted, in the recent studies involving more patients, no difference was detected in terms of vaginal cuff dehiscence whether hysterectomy was performed laparoscopically or through the abdominal or vaginal route.[12] In their meta-analysis, Uccella et al. found that the dehiscence rate in the intracorporeal closure of the

Table 2: Postoperativ complications					
Complications	**Vaginal cuff closure method**				**p**
	Endoscopic suturing (n=148)		**Vaginal suturing (n=214)**		
	n	**%**	**n**	**%**	
Major complications					
Bladder injury	4	2.7	4	1.8	n/s
Ureter injury	2	1.35	1	0.4	n/s
Great vessel injury	0	0	1	0.4	n/s
Bowel injury	1	0.6	2	0.9	n/s
Blood transfusion	31	20.9	37	17.2	0.05
Cuff complications					
Dehiscence	1	0.6	0	0	n/s
Vaginal cuff prolapse	7	4.2	9	4.2	>0.05
Vaginal cuff bleeding	4	2.4	3	1.4	n/s
Cuff cellulite	2	1.35	3	1.4	n/s
Granulation	3	1.8	25	11.6	<0.001*
Abnormal vaginal discharge	8	4.8	39	18.2	<0.001*
Cuff hematoma	2	1.3	3	1.5	n/s
Mucosal band-formed adhesion	1	0.6	19	8.8	<0.001*

*: P value <0.05.

vaginal cuff is 1% and that in the closure through the vaginal route is 2.9%.[13] In our study, among all the patients who underwent TLH, there was only one patient who experienced cuff dehiscence, and it was not complicated by evisceration.

Hysterectomy is considered to be a potential risk factor for pelvic organ prolapse (POP) with an incidence of post-operative vault prolapse varying from 2% to 43%.[14,15] Uccella et al.[13] found that there are no significant differences among the laparoscopic or abdominal or vaginal route closure of the vaginal cuff in terms of the risk of vaginal cuff prolapse. The route of hysterectomy is not associated with a difference in recurrence, grade, or subsequent treatment of prolapse when the indication for hysterectomy is considered.[16] Although there were no patients with POP indication in our study, according to the POP quantification grading[17] system after TLH, the rate of stage >2 vaginal cuff prolapse in our study was 4.2% in both endoscopically sutured and vaginally sutured groups.

One of the processes that are thought to increase cuff complications in TLH is colpotomy with electrocauterization.[6] Especially, it can increase the possible bowel adhesions on the vaginal cuffs of patients who underwent hysterectomy due to malignancy, the bowel problems in patients who need brachytherapy, and the risk of ileus. It may be safer for such patients to undergo colpotomy with the sharp dissection method using laparoscopic scissors instead of electrocauterization.

Intensive vaginal discharge and spotting are among the frequent complaints of patients after TLH. The infection rate related to vaginal cuff after TLH has been reported to be 7.4%.[15] In our study, the total infection rate in the laparoscopically sutured cases was 6.7%, and that in the vaginal route sutured cases was 19.6%. In the culture samples from the post-operative vaginal discharge of the subjects in our study, the most frequent microbial agent colonization was E. coli. Infection findings were seen more frequently in the patients whose cuffs were closed through the vaginal route (p<0.001).

In our study, prolonged and recurrent vaginal spotting with granulation formation finding on the vaginal cuff was the most frequently seen symptom which decreases the post-operative satisfaction of the patients. Biopsy was performed on the lesions of the patients with granulation, and the biopsy area was cauterized. None of the patients' pathology results showed malignant findings. The granulation rate after TLH has been reported to be 1.4% with laparoscopic suturing and 1.1% with suturing through the vaginal route.[6] In this study, the granulation rate after TLH with laparoscopic suturing was 1.8%, and that with suturing through the vaginal route was 11.6%. The granulation formation on the vaginal cuffs of the patients whose cuffs were sutured through the vaginal route was significantly higher (p<0.001).

In this study, the vaginal cuff hematoma rates were 1.3% and 1.5%, respectively, for the patients whose vaginal cuffs were closed laparoscopically and for those whose vaginal cuffs were closed through the vaginal route. In the literature, similar rates (1% and 2.9%, respectively) are reported.[13]

Safer cuff suturing can be applied by observing the vaginal cuff and the Douglas pouch peritoneum boundaries. For obese women

and those with atrophic vaginas, the cuff boundaries to be sutured can be visualized better with the laparoscopic method than with suturing through the vaginal route.[6]

Increasing surgical experience has been associated with lower rates of major complications, highlighting the effect of a learning curve.[18] Surgical complexity has also been associated with complications, with more complex surgeries usually performed by higher volume surgeons, with inherently higher complication rates.[19,20] Laparoscopic suturing and knotting is a process that requires much skill and experience.[21] Individual differences between surgeons in terms of quickness of knotting and strength of the knot are frequently observed.[22] The surgeon's skill and experience were among the determining factors of the operation time.[23] In our study, the average operation duration for the patients whose vaginal cuffs were closed laparoscopically was 107.75±7.19 min and that for the patients whose vaginal cuffs were closed through the vaginal route was 83.55±8.44 min, and a significant difference was found between the groups in favor of suturing through the vaginal route (p=0.01). Hwang et al.[6] found that the operation time was significantly shorter in the laparoscopically sutured group [76.74(40–220) min] than in the vaginal route group [85.77(45–290) min]. In a meta-analysis, Uccella et al.[13] found that operation time was 90.6±44.7 min in laparoscopically sutured group and 92.6±43.7 min in vaginal route group and there were no significant differences among groups.

Several surgical suture materials have been launched in the market to decrease these differences.[24] Among those are the self-fixing barbed suture materials (e.g., V-Loc™).[25] Studies have shown that these products can be reliably used in laparoscopic cuff suture, shorten the operation duration, and are effective suture materials.[26] However, some studies have indicated that these products are expensive and increase the risk of intra-abdominal adhesion.[27] Another study demonstrated the non-superiority of barbed suture with respect to conventional suture regarding surgical time and incidence of complications.[28] In our study, the vaginal cuffs of all the study participants were sutured with no. 0 Vicryl™ (polyglactin 910; Ethicon, Somerville, NJ, USA).

It has been reported that the vaginal length is better preserved in patients with laparoscopically sutured vaginal cuffs after TLH than in those with cuffs closed through the vaginal route; consequently, laparoscopic suturing of the vaginal cuffs is more advantageous in terms of sexual function.[29] Moreover, in patients with the vaginal cuff sutured through the vaginal route, the need for reconstruction due to vaginal cuff healing problems was found to be more frequent.[13] In our study, in 8.8% of the patients who underwent TLH and whose vaginal cuffs were sutured through the vaginal route, mucosal thin band-shaped adhesion that caused dyspareunia symptoms was found (Fig. 1). After we dissected this band formed adhesion, the patients' dyspareunia complaints resolved.

The most obvious limitation of this study was its retrospective nature, Apart from the total operation duration, the lack of data about the cuff suturing time was another limitation of our study. The main strength of our study is esteemed number of TLH cases including the data on post-operative vaginal cuff healing outcomes.
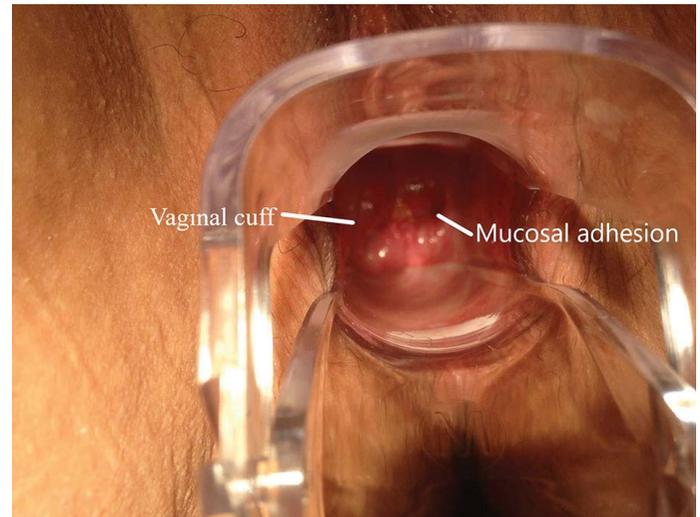

Figure 1: Vaginal mucosal adhesion.

CONCLUSION

Consequently, endoscopic suturing and knotting is a process that requires much skill and experience, but it seems that intracorporeal closure of the vaginal cuff after TLH is safer. Yet, although the closure of the cuff through the vaginal route requires greater caution in relation to the cuff complications, it is still an effective method. To determine whether laparoscopic vaginal cuff closure or vaginal cuff closure through the vaginal route is the superior technique, more prospective studies are needed.

Statement

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