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Laparoscopic Assistance After Vaginal Hysterectomy and Unsuccessful Access to the Ovaries or Failed Uterine Mobilization: Changing Trends

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ABSTRACT

Objectives: We conducted retrospective and prospective clinical studies at the Columbus Hospital of Rome to point out changes in choosing the route for performing hysterectomy; to evaluate the feasibility of vaginal hysterectomy (VH) and oophorectomy, even in commonly considered contraindications to the vaginal route; to describe a method of laparoscopic oophorectomy following vaginal hysterectomy; and laparoscopic assistance in impossible vaginal hysterectomies.

Methods: From November 1999 to November 2001, 226 patients (age 46.1±4.6 years, range 35 to 58) underwent hysterectomy for benign pathologies: 22 (9.7%) underwent total laparoscopic hysterectomy for the presence of severe endometriosis, limited access to the fornices, or immobile uterus with no lateral mobilization; 204 (90.3%) underwent vaginal hysterectomy. Patients with uterine prolapse were excluded. Uterine size, previous cesarean deliveries, pelvic surgeries and the requirement of prophylactic oophorectomy were not considered contraindications to the vaginal approach. We retrospectively analyzed 509 hysterectomies performed in the previous 2 years from 1997 through 1998.

Results: During vaginal hysterectomy, adnexectomy was possible in 90.6% of the cases in which it was indicated (unilateral in 21.8% because of adnexal pathology) and was technically impossible in 9.3%. In 4 patients (1.9%), it was not possible to complete a vaginal hysterectomy, owing to the presence of thick adhesions obliterating the cul-de-sac, to severe endometriosis, or to other unforeseen circumstances. In these few patients with difficult access to the ovaries (2.9% of all VH) or with difficulties in mobilizing the uterus, we resorted to laparoscopy. The pneumoperitoneum was achieved with an insufflation tube inserted via the vagina into the abdominal cavity and packing the vagina. Thus, the risks associated with the insertion of the Veress needle were avoided. In all but 2 patients in whom conversion to laparotomy was necessary, laparoscopy was successfully completed. No major complications occurred. In the retrospective analysis of 509 hysterectomies, we determined that 29% were vaginal, 43% abdominal, and 28% laparoscopic (mostly LAVH). In the following years, LAVH allowed the conversion of a significant number of abdominal or laparoscopic hysterectomies to a vaginal route, showing that the vaginal approach was possible in most of cases.

Conclusions: The vaginal approach is feasible in more than 90% of cases even if oophorectomy is required. In the few cases with difficult access to ovaries or difficulties in mobilizing the uterus, the laparoscopic route can easily be adapted by packing the vagina and obtaining a pneumoperitoneum without the risk and loss of time of the insertion of the Veress needle. In this way, it is possible to avoid a great number of LAVH, reducing operating time and the risks of a concomitant procedure.

Key Words: Vaginal hysterectomy, Laparoscopic hysterectomy, Oophorectomy, Conversion rate, Laparoscopic assistance.

INTRODUCTION

Hysterectomy remains the treatment of choice in most women with leiomyomas of the uterus. Despite the fact that vaginal hysterectomy results in less morbidity and faster recovery than abdominal hysterectomy does,[1–3] vaginal hysterectomy is performed infrequently in patients with uteri enlarged by myomas or extensive adenomyosis.[4] Some preexisting clinical conditions, such as moderate to excessive uterine enlargement, nulliparity or no prior vaginal delivery, previous cesarean or pelvic surgeries and adnexal pathologies, or the need for an oophorectomy, are generally accepted as contraindications to vaginal hysterectomy.[5] In many of these cases, laparoscopically assisted vaginal hysterectomy (LAVH) has been advocated as a replacement for abdominal hysterectomy, although its role in gynecologic surgery has not been well established. The rationale for our study is the statement

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that the vaginal route is preferred every time anatomical conditions allow it and every time the nature of the lesions to be treated does not contraindicate it.

The aims of our study were to evaluate the feasibility of vaginal hysterectomy in women with enlarged uteri and other contraindications to vaginal hysterectomy, using laparoscopy only if it became necessary in difficult cases in an effort to completely avoid abdominal surgery. Herein, we describe a technique using laparoscopic assistance for accomplishing a vaginal hysterectomy that could not be completed vaginally.

METHODS

The prospective part of the study analyzed 226 consecutive women with an enlarged uterus weighing between 280 g and 2000 g with or without one or more of the following commonly considered contraindications to vaginal surgery (previous pelvic surgery, history of pelvic inflammatory disease, moderate or severe endometriosis, concomitant adnexal masses or an indication for adnexectomy, nulliparity with lack of uterine descent and limited vaginal access) who underwent hysterectomy between November 1999 and November 2001. With regard to uterine size, no upper limits were set. Exclusion criteria were pelvic prolapse, relaxation, or uteri weighing $<$280 g in the absence of other contraindications.

With the exception of oncologic pathologies, no woman was a candidate for abdominal surgery in this period. The indications for hysterectomy included an enlarged uterus with myomas in 128 patients, myomas with abnormal uterine bleeding or menorrhagia in 64 patients, and myomas in the presence of adnexal pathology in 34 patients. Twenty-two laparoscopic hysterectomies (10%) were scheduled in women with severe endometriosis or vaginas narrower than 2 fingers wide with or without an immobile uterus with no lateral mobilization or intraligamentous myomas. If the uterus was large and the uterine vessels hard to identify, the lateral umbilical ligaments were used for identification and the uterine vessels coagulated at their origin with the internal iliac vessels.[6]

The 2 groups of patients undergoing vaginal or laparoscopic hysterectomy were studied and compared for operative indications, demographic characteristics, concomitant procedures (adhesiolysis, cystectomy, uterine morcellation), total operative time, length of hospital stay, use of analgesics, perioperative change in hemoglobin levels, and surgical complications.

Demographic data included were age and patient weight (in kilograms), parity and nulliparity, previous pelvic surgery (cesarean delivery, myomectomy), the presence of adnexal pathologies or endometriosis, and uterine weight (in grams).

Sixty patients were scheduled to undergo bilateral oophorectomy at the time of vaginal surgery, 14 monolateral because of adnexal pathology.

Two surgeons experienced in laparoscopic and vaginal surgery performed all the procedures. Vaginal hysterectomy was done according to the modified Heaney technique. In cases in which adnexectomy was technically impossible because of difficult access to the ovary or if uterine mobilization was impossible because of the presence of thick adhesions, we converted to laparoscopy. The insufflation tube was inserted through the vagina into the abdominal cavity, and the vagina was packed with a soaked pad to maintain the pneumoperitoneum obtained without a Veress needle. In the most difficult cases, a 12-mm trocar was inserted in the cul-de-sac and secured with a purse-string suture to allow the scope to inspect the cavity. The primary umbilical trocar was introduced and the procedures successfully completed.

Complications were classified as (1) intraoperative events, (2) intraoperative bleeding necessitating transfusion, (3) infections, (4) a fall in hemoglobin levels $\geq$4 g/dL, (5) operative injury to the bladder, bowel, or ureters, (6) postoperative complications necessitating redo surgery and, (7) readmission to the hospital. Conversion to laparoscopy was not considered an intraoperative complication because laparoscopy permitted us to avoid abdominal surgery.

Prophylactic antibiotics were administered intravenously to all patients just before surgery. The operative time was calculated from the anesthesia chart and included the induction of anesthesia and the positioning of the patient.

The preoperative hemoglobin concentration was compared with that observed on postoperative day 1, and the perioperative hemoglobin concentration change thus calculated. Postoperative fever was considered to be body temperature $\geq$38°C in 2 consecutive measurements at least 6 hours apart, excluding the first 24 hours. The hospital stay was tracked in whole days.

The *t* test was used to verify significant differences between the 2 groups (if any), for the variables age, patient weight, operative time, uterine weight, hospital stay, and hemoglobin levels. The multiple regression model and analysis of variance (ANOVA) were used to evaluate the relationship between the operative time and the presence

of endometriosis or adnexal pathology, nulliparity, and uterine weight in the 2 groups.

Differences between the groups regarding total operative time and uterine weight that correlated with hemoglobin changes were analyzed using the Pearson correlation test.

A P value <0.05 was considered statistically significant. All analyses were performed using Statistical Software for Windows (StatSoft Inc., 1997).

The percentages of vaginal hysterectomies performed were compared with the reviewed charts of patients who underwent hysterectomy in the previous years for the same indications.

Table 1.
Primary Indications for the Performance of Total Hysterectomy

Indication	Patients (n)	Percent
Fibroids	128	56.6
Fibroids and abnormal uterine bleeding or menorrhagia	66	29.3
Fibroids and adnexal pathology	32	14.1

RESULTS

The indication for hysterectomy was fibroids in all 226 cases; associated pathologies included abnormal uterine bleeding or menorrhagia in 66 patients and adnexal pathology in 32 patients **(Table 1)**. No patients had uterovaginal prolapse. Demographic characteristics of patients who underwent vaginal and laparoscopic hysterectomy are shown in **Table 2**. The mean age of the patients was 46.1±4.6 years (range, 35 to 68).

Forty-eight were nulliparous and the mean parity of the remaining 178 was 1.6 (range, 1 to 4). Thirty-two patients had undergone previous pelvic surgery and 14 had undergone a cesarean delivery. The mean uterine weight was 420.5±262 g (range, 150 to 2000). For the laparoscopic group, the mean uterine weight was 413.4±165.7 SD g (range, 265 to 995): only 1 patient with severe endometriosis obliterating the cul-de-sac had a uterus weighting less than 280 g.

Nine percent of patients who underwent vaginal hysterectomy had more than one of the conditions generally considered contraindications to vaginal surgery: nulliparity, previous pelvic surgery, adnexal pathologies, and uterus greater than 280 g. Six of 22 patients who under-

Table 2.
Patient Demographics

	Valid n	Mean	Minimum	Maximum	Standard Deviation
Vaginal Hysterectomy					
Age (years)	204	46.96	38	68	4.80
Patient weight (kg)	204	68.98	46	108	11.35
Parity	170	1.94	1	4	0.71
Uterine weight (g)	204	427.74	150	2000	254.75
Operating time (min)	204	67.66	30	170	29.23
ΔHemoglobin	204	12.08	8.55	15.55	1.28
Hospital stay (days)	204	2.94	1	6	1.04
Total Laparoscopic Hysterectomy					
Age (years)	22	45.3	40	49	2.9
Patient weight (kg)	22	65.2	52	78	5.7
Parity	22	0.7	0	3	1.2
Uterine weight (g)	22	413.4	265	995	165.7
Operating time (min)	22	125	95	190	21.3
ΔHemoglobin	22	0.9	0.6	1.3	0.2
Hospital stay (days)	22	2.1	1	3	0.9

went total laparoscopic hysterectomy had severe endometriosis.

The operative time ranged from 30 to 140 minutes (mean 61.59±21.80) for the vaginal hysterectomy, increasing up to 170 minutes (mean 83.6±38.28) in cases of adnexectomy or laparoscopic assistance. Operating time for total laparoscopic hysterectomy ranged from 95 to 190 minutes (mean 125±21.3).

No statistically significant differences existed between the 2 groups as to mean age, parity, pre- and postoperative hemoglobin levels, the mean uterine weight, and need for analgesia. The patients in the laparoscopic group were nulliparous in 75% of cases (versus 17% of the vaginal group) ($P<0.001$). Operating time was longer for the laparoscopic group ($P<0.001$), but the length of hospital stay was shorter ($P<0.001$) **(Table 3)**. Although the operative time increased with the weight of the uterus, a relationship between uterine weight and operative time was not statistically confirmed in the patients who underwent vaginal hysterectomy. Regarding total laparoscopic hysterectomy, the multiple regression model showed a statistically significant correlation between the length of the procedure and uterine weight ($P<0.001$) and the presence of endometriosis ($P<0.01$), but nulliparity showed no significance. Only for the total laparoscopic hysterectomy group did the Pearson correlations show greater differences in hemoglobin changes with the increase in operating time ($P<0.05$), and the size of the uterus did not affect the changes in hemoglobin levels.

Vaginal morcellation of the uterus was carried out in all cases. Morcellation techniques used were Lash intramyometrial coring, uterine bisection, myomectomy, and wedge debulking. Several different morcellation procedures were often used in the same woman.

The operative complications are summarized in **Table 4**. Two cases of intraoperative hemorrhage and two of postoperative bleeding occurred. In no case was a blood transfusion necessary. Sixteen patients experienced postoperative fever or febrile infections. Thus, the overall complication rate was 9.8%. In no case was a repeat surgery or readmission to the hospital necessary. One intraoperative conversion to abdominal surgery was necessary in a patient with a uterus weighing 2000 g and a history including previous pelvic surgery. Thick adhesions between the bladder and uterus and adhesions obliterating the posterior cul-de-sac were present. Bleeding occurred during vaginal anterior dissection and the decision was made to proceed via the abdominal route. The same situation occurred in a nulliparous patient with a history of pelvic surgery and endometriosis of the cul-de-sac and a uterus weighing 1800 g.

During vaginal hysterectomy, adnexectomy was possible in 90.6% of the cases in which it was indicated (unilateral

Table 3.
Differences Between Demographic Characteristics of Patients and Outcome Measures

	Vaginal Hysterectomy (n=204)	Laparoscopic Hysterectomy (n=22)	*P* Value†
Age (years)*	46.96	45.3	NS
Patient weight (kg)*	68.98	65.2	NS
Parity*	1.9	0.8	NS
Nulliparity (%)	16.6	75.0	<0.01
Previous laparotomy (%)	35.0	37.0	NS
Adnexal pathology (%)	14.7	12.2	NS
Uterine weight (g)*	427.74	413.4	NS
Operative time (min)*	67.7	125.0	<0.01
ΔHemoglobin*	1.4	0.9	NS
Hospital stay (days)*	2.9	2.1	<0.01
Analgesic requirement (days)*	0.74	0.5	NS

*Mean.

†*t* test. $P<0.05$ considered as statistically significant.

Table 4.
Complications of Hysterectomy

	Vaginal Hysterectomy (n=204)	Percent	Laparoscopic Hysterectomy (n=22)	Percent	*P* Value*
Overall Rate	20	9.9	2	9	NS
Conversion	2	0.9	0	0	
Unexplained Fever	12	5.8	1	4.5	
Urinary Tract Infection	4	1.7	1	4.5	
Blood Transfusion	0	0	0	0	
Vaginal Cuff Bleeding	2	0.9	0	0	
Reoperation	0	0	0	0	
Readmission	0	0	0	0	

*t test. $P<0.05$ was considered statistically significant.

in 21.8% because of adnexal pathology). The additional operative time required to remove the ovaries vaginally varied from 10 to 30 minutes (mean 21.41 minutes). Ovariectomy was technically impossible in 9.3% of the cases in which it was indicated. In these 6 cases (2.9% of vaginal hysterectomy), the adnexa were laparoscopically removed after vaginal hysterectomy. In 1.9% of cases, it was impossible to complete the vaginal hysterectomy, in 3 cases because of the presence of severe endometriosis and thick adhesions obliterating the cul-de-sac and impeding the access to the pouch of Douglas; in 1 case, at the end of the vaginal morcellation, a last remaining piece of the uterine fundus was dragged into the abdominal cavity making its retrieval impossible. Laparoscopy revealed the presence of thick adhesions between the uterine fundus and the abdominal wall at the level of the umbilicus. These were successfully lysed. In all these cases, laparoscopic assistance allowed us to complete the vaginal hysterectomy. All the total laparoscopic hysterectomy procedures were successfully carried out. No minor or major complications occurred.

A comparison between this study and the hysterectomies performed in the 2 previous years (1997 to 1998) showed that the rate of abdominal hysterectomies decreased from 43% to 0.9%, whereas vaginal hysterectomies increased from 29% to 87.6%. Laparoscopic hysterectomies were 28% in the previous years (most of them were LAVH) and 11.5% in the present study (9.7% total laparoscopic hysterectomies and 1.7% converted to laparoscopic vaginal hysterectomies) ($P<0.001$) **(Table 5)**.

Table 5.
Changing Trends in Approaching Hysterectomy

	Abdominal Hysterectomy (%)	Vaginal Hysterectomy (%)	Laparoscopic Hysterectomy (%)
1997–1998	43	29	28
1999–2001	0.9	87.6	11.5 ($P<0.001$)*

*t test. $P<0.05$ was considered statistically significant.

DISCUSSION

Total abdominal hysterectomy is associated with increased morbidity in comparison with vaginal hysterectomy[1,7] and higher complication rates, increased hospital stay, and slower recovery. Nevertheless, abdominal hysterectomy exceeds vaginal hysterectomy for benign disease by a ratio of at least 3:1 or more in most countries **(Table 6).**[8–12] Traditional contraindications to vaginal surgery include an enlarged uterus, a history of pelvic pain or endometriosis, previous pelvic surgery, nulliparity, and indications for oophorectomy. These contraindications have been challenged by several authors who have reported doing vaginal hysterectomies in the presence of one or more contraindications without significant increases in complication rates.[5,13] The indications for vaginal versus abdominal hysterectomy appear to vary from one institution to another and appear to be based on personal preferences rather than on evidence reported in the literature.[14] The practice style and surgical experience

Table 6.
Percent of Surgical Procedures Used to Perform Hysterectomy: Review of the Literature

Study	Country	Abdominal	Vaginal	Laparoscopic
Johns, et al (1995)	USA	46.4	20.7	32.9
Härkki-Siren, et al (1998)	Finland	83.8	10.9	5.3
Davies, et al (1998)	UK	71.7	20.1	8.2
Chapron, et al (1999)	France	43.4	47.0	9.6
ISTAT (1999)	Italy	66.0	33.0	1.0
Present study (2002)	Italy	0.9	87.6	11.5

of the physician have been identified as important variables influencing the decision to perform hysterectomies with a specific technique.[15,16]

Studies similar to this one suggest that uterine enlargement should not be considered a contraindication to vaginal hysterectomy.[5,17] Vaginal hysterectomy should be considered even in the presence of considerable uterine enlargement. No matter how large the uterus, once the uterosacral and cardinal ligament have been divided, the uterine vessels can be secured quite easily.[17] Our data, which did not correlate the size of the uterus with greater changes in hemoglobin levels in cases of vaginal hysterectomy, confirm the statement that, once the lower pedicles have been secured, the morcellation part of the vaginal procedure, even if time consuming, is to be considered without consequences regarding blood loss. Previous pelvic operations, including cesarean deliveries, are regarded as relative contraindications to vaginal hysterectomy,[18] although scanty data in the literature do not support this statement.[19–21] In the present study, the surgical morbidity rate of the patients with previous pelvic surgeries was not significantly different from that among women in the groups without a history of abdominal operations. No injury to the bladder, which could be considered the major potential problem with vaginal hysterectomy after a previous cesarean delivery, was reported.

Wilcox et al,[2] analyzing data from the National Hospital Discharge Survey on hysterectomy in the United States from 1988 to 1990, stated that although prophylactic adnexectomy was performed in 85% of the patients older than 45 years who underwent abdominal hysterectomy, the same procedure was performed in only 18% of patients who underwent vaginal hysterectomy. Some gynecologists are advocating oophorectomy as an indication for laparoscopically assisted vaginal hysterectomy.[22,23] Certainly, the indications for ovarian removal should be similar regardless of whether an abdominal, laparoscopic, or vaginal hysterectomy is performed.[24] In the present series, prophylactic oophorectomy was scheduled in all menopausal patients except one who refused to sign the informed consent for oophorectomy. Our capability to remove one or both of the ovaries transvaginally without laparoscopic assistance (90.6%) coincides with the results of other reports from surgeons with experience in vaginal surgery.[25–28] The more frequent causes of failure were tubo-ovarian adhesions, endometriosis, and inaccessibility.

In a study of 128 hysterectomies in which morcellation was required, Mazdisnian et al[29] reported that 16% of planned vaginal hysterectomies were not successfully completed. Kovac[25] performed vaginal hysterectomies in 97% of patients having the presumptive risk factors that are often believed to mandate abdominal hysterectomy. Laparoscopic surgery was necessary to permit a transvaginal operation in only 19% of considered preoperative indications for laparoscopically assisted vaginal hysterectomy.

Doucette et al[5] vaginally completed all the hysterectomies challenging generally accepted contraindications to vaginal hysterectomy although the size of the uterus was smaller than those in our study (>180 versus >280 g). In our series, we had 2 conversions to laparotomy. The number would have been 6 had conversion to laparoscopy not been necessary in 4 patients. Sabella et al[30] reported a technique for laparoscopic completion of a vaginal hysterectomy, stating that a way to define the role of laparoscopically assisted vaginal hysterectomy is to start the hysterectomy vaginally and use laparoscopic assistance only if it becomes necessary, but he failed to show the rate of aborted hysterectomies. In our series, the failure rate was 2.9% of planned vaginal hysterectomies. Laparoscopy was used to successfully complete hysterectomies in all but 2 patients. It should be emphasized that no additional operative morbidity was found when con-

verting to an abdominal hysterectomy because of a technical inability to complete the planned vaginal procedures, according to other reports.[29]

Indications for laparoscopy should not be uterine enlargement, because the biggest uterus ultimately has to be delivered vaginally anyway. An exception is the presence of big intraligamentous myomas in which uterine division at its origin with the hypogastric artery can be carried out better via laparoscopy, whereas vaginal access to the uterine vessels would be difficult or impossible. Our experience shows that laparoscopy is useful in situations with coexisting pelvic pathologies, such as dense adhesions or endometriosis. The presence of severe endometriosis or thick adhesions and the higher incidence of nulliparous women in the patients selected for total laparoscopic hysterectomy explain the surgical difficulties that lead to longer operating times. The correlation between the longer operating time or the presence of severe endometriosis, or both, and the greater changes in hemoglobin levels in patients undergoing total laparoscopic hysterectomy is easily explained with the technical, anatomical, and surgical difficulties due to associated pathologies, such as endometriosis obliterating the cul-de-sac, intraligamentous myomas, and thick adhesions. The lack of correlations between the greater drop in hemoglobin levels and nulliparity is explained by the fact that, in this case, the more difficult and time-consuming part of the procedure is the morcellation, once the uterine vessels have been secured.

In our earlier experience, laparoscopically assisted vaginal hysterectomy replaced some abdominal hysterectomies.[31] The aim of the laparoscopically assisted vaginal hysterectomy was to extend the applications of a vaginal route, particularly in allowing safe use of the vaginal approach in patients for whom, according to traditional standards, vaginal hysterectomy is contraindicated. Consequently, laparoscopically assisted vaginal hysterectomy gave us greater confidence when following a vaginal route. Experience showed us that in most cases hysterectomy could have been done vaginally also in the presence of commonly considered risk factors. Moreover, laparoscopically assisted vaginal hysterectomy increases costs and operating time in most cases, not to mention risks proper to the access technique. It has to be emphasized that laparoscopy is associated with complications related to abdominal entry, including major vascular injuries.[32,33] Data on complications after laparoscopic hysterectomy reported that trocar injuries occurred in 1.57% of cases and bowel injury occurred in 0.47%.[34] Injury to the epigastric vessels was reported in 0.43% of cases.[35] At present, we do not feel that adding the risk of insertion of a Veress needle and primary trocar in all patients to start the procedure with a diagnostic laparoscopy is advisable. This cannot be required even in cases with considered contraindications or risk factors or when oophorectomy is required. Adnexectomy in our series was successfully carried out, when required, in 90.6% of cases, even when adnexal pathologies were present. Previous pelvic surgery did not negatively influence the outcome of surgery in 94.2% of cases. In 3.2% of cases, problems arose completely unexpectedly.

CONCLUSION

Vaginal hysterectomy appears to be feasible in about 87.6% of cases, according to published reports.[36–39] Laparoscopic surgery or a laparoscopic conversion allowed us to succeed in carrying out a hysterectomy in 1.9% of cases, reducing to the minimum the necessity for abdominal hysterectomy (0.9%).

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