

# Laparoscopic assisted vaginal hysterectomy. Reconsidering the indications

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**Abstract: Background and objectives:** Laparoscopic assistance was introduced at the end of the 1980s with the purpose of enlarging the indications of vaginal hysterectomy and reducing the indications of abdominal hysterectomy. The purpose of the study is to reconsider the indications for laparoscopic assistance. **Methods:** In the period 2005-2013 1516 vaginal hysterectomies (VH) were performed on unprolapsed uteri by the same surgical team. Of these, a total of 279 (18.4%) cases received laparoscopic assistance (ALVH). **Results:** The main indications for assisting laparoscopic vaginal hysterectomies were facilitating difficult hysterectomies in 85.6% of cases and solving associated pelvic pathology in 15.4% of cases. Comparative results and specific complications of the two variants of vaginal hysterectomy are presented. **Interpretation and conclusions:** ALVH should not replace VH. ALVH is required in difficult cases or when other pelvic gynecological pathology must be solved simultaneously.

**Key words:** Laparoscopic assistance; Vaginal hysterectomy.

## INTRODUCTION

Hysterectomy is one of the most common gynecological operations and is practised on abdominal, open, laparoscopic or vaginal route. A study completed in 2009 showed that the distribution of hysterectomies according to the approach path was 56% for abdominal hysterectomies, 20% for laparoscopic (ALVH), 19% for vaginal hysterectomies (VH) and 5% for the robotic ones. [1] Even so, in our experience, patients prefer vaginal hysterectomy because of simplicity, cost effectiveness and the lack of any scarring of the abdominal wall. [2]

ACOG recommendation on the approach of hysterectomy states that ... "vaginal hysterectomy is the first choice every time is possible." [3] In reality, the decision rests solely with the surgeon that adapts to the specifics of the patient and his own abilities.

Vaginal hysterectomy has limitations related to accessibility, the size of the uterus or pelvic pathology associated. [4, 5] Laparoscopic assistance was introduced in practice in the late 1980s [6] [7] from the need to broaden the indications for vaginal hysterectomy and to limit the indications of abdominal hysterectomy. Laparoscopic assisted vaginal hysterectomy (ALVH) has recognized indications the uterine size over 12 weeks, endometriosis and concomitant adnexal pathology.[8] The main disadvantages of ALVH compared with VH concern increased operating time and bleeding and not least, cost. [9]

The low percentage of vaginal hysterectomy is not due to contraindications of the vaginal route but technical barriers that arise in the minds of surgeons on inadequate availability, reduced visibility and hemostasis safety even after a sufficient prior experience.

Choosing the right path of hysterectomy is dependent on mental attitude and dexterity of the surgeon in order to give the patient the safest and cheapest alternative.

Indications for ALVH otherwise are seen from the perspective of a surgeon who has performed over 3000 vaginal hysterectomies without laparoscopic assistance with a conversion rate of 0.6% to laparotomy, which is why we initiated this study aiming to highlight the real indication of laparoscopic assistance as well as specific complications ALVH.

## MATERIAL AND METHODS

In the period 2005-2013 a number of 1516 vaginal hysterectomy were made on unprolapsed uterus by the same surgical team in private practice. Of these, a total of 279 (18.4%) cases received laparoscopic assistance.

All cases were diagnosed clinically and confirmed by transvaginal ultrasound or magnetic resonance imaging. Cervical cytology and histopathological exam of endometrium were practised in all cases. By ultrasound examination the uterine weight was estimated using the generally accepted formula ( $L \times W \times 0.52$ ) [10, 11] Estimating the uterine weight allows also to appreciate by subtraction the real blood loss given that 40% of the calculated weight of the uterus is represented by the blood stuck in the myometrium which cannot be recovered.

### Technique

Laparoscopic assistance (ALVH) had two operative times in cases with primary assistance before and after the VH time, or one time when it was necessary to control posthysterectomy hemostasis.

Laparoscopic assisting was performed under general anesthesia with the patient supine. We did not use the uterine manipulator. Port of vision was located transumbilically from Hassan, from Dargent's technique [12]. In the case of uteri weighing more than 16 weeks the vision port was moved supraumbilically under visual control. Two of the working ports were located symmetrically at 3-4 cm medial towards the anterior-superior iliac spines and suprasymphysis on the midline.

*Initial laparoscopic time* included exploration of the entire abdominal cavity, adhesion removal, or treatment of associated pelvic pathology and laparoscopic assistance of vaginal hysterectomy type LH 1-2 according to AAGL classification. [13]

*Vaginal time* included approaching the uterus by anterior and posterior colpoceliotomy by standard technique or technical variations imposed by the anatomical situation. Disconnecting the uterus by clamping, sectioning and ligating the inferior uterine pedicle (uterosacral and vesicouterine ligaments) and uterine artery pedicle allowed the extraction of the uterus by various maneuvers (without tip-

ping by simple release, hemi section, coring or morcellation depending on its size).

Final laparoscopic time consisted generally in controlling hemostasis or realizing an adnexectomy that failed vaginally.

RESULTS

Of the total number of cases 1237 (81.5%) were operated by simple vaginal total hysterectomy. Laparoscopic assistance was considered necessary in 18.4% of cases.

The average age of the patients was 43.6 (28-61) years. 4.2% were nulliparous patients. Patients with a body mass index (BMI) of 20-24 were represented in equal proportions with the 25 -30 index. Among previous interventions, caesarean section accounted for 26.7% of all cases. Of these 60.8% had a single caesarean and 38.6% two previous caesarean sections. History of gynecological operations (myomectomies, adnexectomies, cystectomies, peritonitis, etc.) represented 13.5% of total cases. The characteristics of the group are listed in Table I.

TABLE 1. Characteristics of the group (n=1516)

- \* Total vaginal hysterectomy
- \*\* Laparoscopic assisted vaginal hysterectomy.

Age	43,6 (28-61) years	
Parity	years	
Nulliparous	2(±1)	
BMI	65	4.2%
<20		
20-24	48	3.1%
25-30	689	45.4%
>30	727	47.9%
Previous operations	52	3.4%
Without		
Caesarean section	904	59.6%
1	406	26.7%
2	247	60.8%
>2	157	38.6%
Myomectomies	2	0.1%
Adnexectomies	12	0.7%
Other interventions	149	9.7%
VH*	45	2.7%
ALVH**	1237	81.5%
	279	18.4%

Medical indications for total hysterectomy performed with or without laparoscopic assistance were dominated by symptomatic myoma in similar proportions for the VH and ALVH, respectively 57.3% vs. 58.9%. Table II. In all cases with normal sized uterus whether there was a history of medical pathology or not, we used VH. In all cases of deep ovarian or pelvic endometriosis or previous pelvic interventions, laparoscopic assistance was indicated.

TABLE 2. Medical indications of total hysterectomy.

	VH %	LAVH %
Symptomatic myomas	58.9	57.3
Abnormal uterine bleeding (with reduced size uterus)	17.4	0
Chronic pelvic pain	4.2	1.8
Complex endometrial hyperplasia	14.2	0
CIN III/CIS	2.6	0
Endometriosis	0	11.1
Previous pelvic interventions	9.8*	21.1

Along with hysterectomy interventions for stress urinary incontinence or prolapse of the vaginal walls were applied to 356 cases (23.4%). In over 80% of times these

interventions were practiced simultaneously with VH. Table III.

TABLE 3. Simultaneous interventions.

	Number of Interventions	VH (no/perc)	ALVH (no/perc)
Stress urinary incontinence	243	211 (83.6)	32 (13.1)
Cystocele	187	162 (86.6)	25 (13.3)
Rectocele	64	51 (79.6)	13 (20.3)
Perineal plasty	72	59 (81.9)	13 (18.5)

Weight of the uteri extracted by the two versions of vaginal hysterectomy was significantly in favor of the VH for the uteri under 12 weeks of pregnancy size unlike the larger than 16 weeks sized uteri that were removed by VH. Table IV.

TABLE 4. Weight of the uterus.

Week of pregnancy	VH%	ALVH %
<12 weeks	61.3	52.4
12-16 weeks	34	32.2
16-18 weeks	13.4	2.9

Operative time, blood loss and costs are significantly higher for ALVH. Operative time was considered effective working time from initiation of anesthesia. All patients with VH were operated under spinal anesthesia as opposed to those with laparoscopic assistance operated under general anesthesia. Postoperative pain was assessed by visual analogue scale (VAS), without finding any significant differences between the two types of hysterectomy. Table V.

TABLE 5. Parameter comparison VH vs HVAL.

	VH	HVAL	p
Operative time	37 min (10-70)	79 min (60-120)	.005
Blood loss	237±125	342±200	.005
Postoperative pain (VAS)	6	5	NS
Hospitalization	1.5 (12-36 ore)	2 (24-48 ore)	NS
Cost	6500 RON	7800 RON	S

Perioperative complications were represented by inadvertent bladder wounds, bleeding and urinary infections. We have not had a case of conversion to abdominal hysterectomy. Overall percentage of complications was 5.4% for VH opposed to 12.1% for assisted hysterectomy laparoscopic. Table VI.

Bladder wounds were significantly more frequent for vaginal hysterectomy 0.9% as opposed to laparoscopic assisted hysterectomy where the rate was three times lower 0.3%. All bladder wounds were recognized and intraoperative double layer suture with resorbable monofilament (PDS 3/0). Recognition of bladder wound was made by extravasation of methylene blue solution introduced at the beginning of the surgical operation in all cases when a difficult decollation of the bladder was suspected (multiple caesarean section, myomectomy history, etc.).

Hemorrhagic complications were defined as intraoperative bleeding or postoperative within 24 hours. In assessing intraoperative blood loss we excluded the quantity of blood stored in the uterine mass. Intraoperative bleeding was defined as a blood loss volume greater than 500 ml over this amount.

Intraoperative bleeding was nearly 10 times more common for ALVH compared to VH. Hemorrhage always oc-

curred after removing the uterus during vaginal operative time regardless of its size. Most frequently bleeding occurred after skid of the ligation of one of the uterine arteries in case of VH for large uteri and uterine artery avulsion ALVH regardless of the size of uterus.

TABLE 6. Operative complications.

Complications	VH n=1237	ALVH n=279
Bladder wounds	12 (0.9%)	1 (0.3%)
Hemorrhage		
• Intraoperative	11 (0.8%)	29 (10.3%)
• Postoperative	3 (0.2%)	0
Urinary infections	22 (1.7%)	4 (1.4%)

Hemostasis control was made exclusively via the vaginal route for VH and combined laparoscopic and vaginal for ALVH. Blood transfusion was necessary in one case.

Postoperative bleeding was present in 3 cases (0.2%) of the VH for uteri weight between 12-16 weeks of pregnancy and reintervention was made in the first 8-12 hours after the initial operation. Signs of hemodynamic instability occurred after 6-8 hours and the decision for reintervention was dictated by them and the decreasing of hemoglobin by 2-3 units. In these cases the vaginal stump was opened, the patient was placed in the Fowler position, blood clots were evicted, after which control of hemostasis was done laparoscopically.

We had no case of conversion to abdominal laparotomy for technical difficulties or intra or post operatory bleeding during hysterectomy.

Second generation cephalosporins were administered in a single dose 30 minutes preoperative. We had no case of septic complications or vaginal stump dehiscence.

Urinary infection was present in equal proportions for both variants of vaginal hysterectomy.

Duration of hospitalization was significantly reduced for cases operated by VH (12-24 hours) than with laparoscopic assistance (24-48 hours). Resumption of work has been done in the first week after surgery for both variants of vaginal hysterectomy.

Costs were significantly lower for VH compared to the cases operated with laparoscopic assistance.

## DISCUSSION

Laparoscopic assisted vaginal hysterectomy was introduced by the authors in 2005, after over 20 years of experience with over 3,000 vaginal hysterectomies. When laparoscopic assistance was introduced over 85% of hysterectomies were performed vaginally with about a 8.6% rate of complications and laparocconversion of 0.6%. [14]

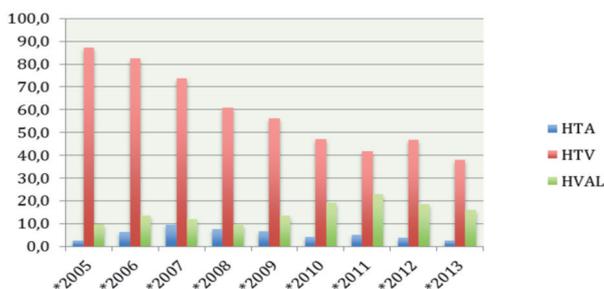


Figure 1. – Percentage distribution of types of hysterectomies practiced

HTA = abdominal hysterectomy; VH= vaginal hysterectomy; HVAL = laparoscopic assisted hysterectomy.

During the first trial period we noticed a decrease in abdominal hysterectomies in favor of vaginal while at the end of th period LAVH lead to significant decrease in abdominal (HTA) and vaginal (VH) hysterectomy. Figure 1.

In our study, laparoscopic assistance was indicated in two situations: to limit the risk of intraoperative complications and surgical effort, due to a difficult vaginal hysterectomy, in 236 cases (85.6%), or in order to simultaneously treat associated pelvic pathology in 43 cases (15.4%). Uncertain haemostasis during VH which was necessary in 9 cases (2.1%) remains the most justified indication for laparoscopic assistance.

TABLE 7. Indication of HVAL.

Patient safety/Surgical comfort	236 cases (85.6%)	
• Size, shape and mobility of the uterus		
• Known or not previous interventions		
o Adnexal pathology	167	56.7%
o Peritonitis	69	21%
o Other		
• Uncertain hemostasis	9	2.1%
<b>Necessity to treat a pelvic associated pathology</b>		
<b>43 cases (15.4%)</b>		
• Pelvic endometriosis	5	1.7%
• Adnexal pathology or suspicion of difficult anexectomy	30	10.7%
• Other	8	2.8%

A systematic study conducted in 2009 only on randomized controlled batches concluded that VH should be the first option compared to abdominal hysterectomy and when this is not possible laparoscopic hysterectomy or laparoscopic assisted vaginal hysterectomy (ALVH) can replace HA. [1]

Under these conditions VH on unprolapsed uterus must become an operation that can be practised by any experienced gynecologist surgeon in the base of fulfillment of minimum conditions related to the availability of vaginal route and anatomic characteristics of size, shape and mobility of the uterus. Most contraindications of VH can be overcome by experience. A study conducted on a sample of 280 cases showed that large uterus, nulliparity, previous cesarean operations or previous laparotomies do not constitute a contraindication for vaginal hysterectomy. [15] This implies a selection of cases so that vaginal hysterectomies with high difficulty level should be addressed to experts or require laparoscopic assistance.

S. Sheth, one of the most experienced surgeons in vaginal hysterectomy states that uteri with sizes up to 12 weeks of pregnancy can be extracted exclusive vaginally and the bigger than 16-18 weeks ones require laparoscopic assisting (HVAL). For uteri larger than 18 weeks abdominal hysterectomy is the best solution. [16] Surgeons trained in vaginal hysterectomy easily exceed the size limit considered safe [17] without subjecting the patient to unnecessary risks but at the cost of a particular surgical effort, but with the satisfaction of a simple evolution, without risk of complications for the patient.

In our view large uteri can be extracted in good condition by VH with a much more reduced intraoperative bleeding compared to same uteri size extracted with laparoscopic assistance.

For the pre-surgical assessment of VH, the key elements are assessing the size and mobility of the uterus. Appreciating the size of the uterus by fundal height is not sufficient; so that the ultrasound is required in particular in case of globular uteri which typically have equal size in all three diameters. [18] In these cases disconnecting the arte-

rial pedicles is difficult and sometimes vaginal hysterectomy fails. [19] Uterine mobility can only be assessed with an anesthetized patient with pelvic muscles relaxed and is a skill that is learned over time. "A mobile uterus is a normal uterus, an immobile uterus has a problem." [16]

Based on our wide experience, we have preferred that large uteri over 16 to 18 weeks should be extracted by VH for the following reasons:

Bleeding is much reduced for VH compared to VHAL [20]. Factors that make bleeding less for VH are:

- Vascular disconnecting of the main vascular pedicle at the onset of surgery
- Continuous caudal traction on the uterus that produces:

Tensioning the superior vascular pedicle and reducing the blood flow

Accommodating a large uterus into the pelvis as it is extracted (progressive tourniquet)

- The risk of uterine artery avulsion which can produce heavy bleeding difficult to control is virtually nonexistent. [21]

The laparoscopic approach is especially difficult for uteri with large transverse diameter.

American College of Obstetricians and Gynecologists (ACOG) recommends assisting laparoscopic vaginal hysterectomy in the following situations: lysis of adhesions, pelvic endometriosis treatment, difficult anexectomy, fibroids that make VH difficult or necessity to explore the abdomen and pelvis. [22]

In our opinion, the problem of laparoscopic assistance is a preferred option for uteri (12-16 weeks) with or without pelvic or adnexal associated, especially for surgeons with limited experience in vaginal hysterectomy for reasons of patient safety, or for experienced surgeons who want to reduce surgical effort by a long elegant and safe operator time.

Previous experience has allowed us to treat by vaginal hysterectomy, cases that in the study group we assisted laparoscopically with a similar rate of intraoperative complications.

Particular surgical effort, uncertainty over what remained in the pelvis after vaginal hysterectomy in cases with associated pelvic pathology or postoperative hemorrhage were the arguments that led us to introduce laparoscopic assistance as a safety feature for the cases we have considered potential complicated, or which have further complicated.

LAVH offers as a main advantage, preparing the uterus to be removed vaginally without the tilting maneuver, but also brings a disadvantage that generates a specific type of complication - uterine artery avulsion, which we found in 8 of the 29 cases of intraoperative bleeding. For this reason we introduced the uterine artery coagulation and cutting technique originally by Kohler [23] for large uteri. Uterine artery avulsion occurs due to traction exerted on the uterus following section of the inferior pedicle. The uterus remains anchored only by the uterine artery pedicle which detaches from the parametrium.

When planning a vaginal hysterectomy, the surgeon must address the associated pelvic static disorders that can be treated simultaneously. In our study group we treated concomitantly 566 complementary interventions for pelviperineal restoration of which 39% were achieved during simple vaginal hysterectomy and 37% during laparoscopic assisted hysterectomy.

Operating time is dependent on factors related to the experience of the surgeon, the size of the uterus and the patient's body mass index. Estimated operating time in this study is lower than the data in literature showing 37 min for

VH and 79 min for LAVH [24] and we consider that the main factor was the experience of the same surgical team.

Some authors consider that uteri greater than 500g cannot be treated by vaginal hysterectomy and recommended laparoscopic assistance. [25] We believe that the indication of laparoscopic assistance in these cases applies to globally enlarged uteri by adenomyosis or associated adnexal pathology. A large uterus with multiple fibroid nodules can be removed more easily than exclusively by the vaginal route than a similar sized globally enlarged uterus. [24]

Peri and post-operative complications are more reduced for VH compared to LAVH. [5, 26] In our study they have been less than the rate cited in the literature. The percentage of bladder wounds accounted for 0.3% of the total HVAL number compared to 1.29 %. [27]

Laparoscopic assistance offers the chance to facilitate a difficult vaginal hysterectomy. The need to "assist laparoscopically" a vaginal hysterectomy without unnecessarily prolonging the intervention and submit the patient to unnecessary risks is the main problem that arises in this kind of intervention. Alan Johns says ... "never add the risks of laparoscopy to another surgical procedure unless you are sure the benefits of the endoscopic procedure outweigh the risks." The answer to the question, "vaginal or laparoscopic surgery" is "both": the vaginalist and the laparoscopist can coexist in the same person and the appropriate mode is used according to what is best and safest for the patient.

## CONCLUSIONS

Laparoscopic assisted LAVH is required in difficult cases or when a pelvic gynecological pathology must be solved simultaneously. The uterus greater than 12 weeks is not an indication of laparoscopic assistance. Laparoscopic assisted vaginal hysterectomy prevents the complications of difficult VH and is an element of patient safety.

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