

Implications of performing laparoscopic-assisted vaginal hysterectomy versus abdominal hysterectomy on suitable patients in a South African hospital setting

Andreas Chrysostomou, MD, FCOG, MMed
 Department of Obstetrics and Gynaecology, Johannesburg Hospital and University of the Witwatersrand, Johannesburg

Objectives. To compare short-term clinical results with standard abdominal hysterectomy (AH), to investigate the feasibility of registrar training in laparoscopic-assisted vaginal hysterectomy (LAVH), and to investigate the impact of laparoscopy in changing the route of hysterectomy in women assessed as being unsuitable for vaginal hysterectomy (VH) on clinical examination.

Methods. 104 women scheduled for AH for benign uterine conditions were enrolled in the study. Criteria for inclusion were uterine size ≤ 14 -week pregnancy, width ≤ 9 cm and length ≤ 14 cm. Clinical ovarian pathology and uterine prolapse were criteria for exclusion. Patients were divided into two groups matched with respect to age, parity, previous pelvic surgery and indications for hysterectomy. Laparoscopic assessment of the pelvic organs before VH was performed in 58 of the 104 patients in the study, and 46 patients had AHs without laparoscopic assessment.

Results. VH facilitated by laparoscopic assessment was successful in all cases, with no need to convert to the abdominal route. The time required for LAVH compared with AH was longer, but not significantly so (mean 59.3 minutes v. 57.2 minutes). Blood loss was found to be less with LAVH than with AH, and postoperative pain and need for analgesia were significantly less ($p < 0.001$). Postoperative hospital stay was significantly shorter in the LAVH group (2.4 days) than in the AH group (3.9 days) ($p < 0.001$).

Conclusions. There was shorter hospital stay, less need for analgesia, less intraoperative bleeding and better patient satisfaction with LAVH. Moreover, LAVH decreased the number of hysterectomies done abdominally.

Since the first case report of laparoscopic hysterectomy (LH) by Reich *et al.*,¹ this minimally invasive technique is being increasingly utilised. The advantages of LH are similar to those of vaginal hysterectomy (VH), including minimal postoperative discomfort and less need for analgesics, a shorter stay in hospital and quicker return to normal daily activities. There are also fewer postoperative complications, and hospital costs are reduced.²⁻⁴

Hysterectomy is one of the most commonly performed operations in developed countries. It is estimated that approximately 20% of women living in England and Wales will have undergone a hysterectomy before the age of 55.⁵ Most surgeons perform up to 80% of procedures by the abdominal route.⁶ This can in part be explained by personal preference, but is mainly due to lack of training and experience leading to reluctance to perform VH in nulliparous women in the presence of uterine enlargement or in women with previous pelvic

surgery or previous caesarean section. The above factors should not be considered contraindications to VH, and there are publications that support this view.^{7,8} The rationale for LH is to convert an abdominal hysterectomy (AH) into a laparoscopic/vaginal procedure and thereby reduce trauma and morbidity. In the USA before the introduction of LH, only 23% of women under the age of 60 underwent VH. The introduction of LH increased the proportion of VHs to 33%.⁹

In South Africa there is a lack of nationwide statistics. The year before the initiation of this study, VHs comprised only 9.8% of all hysterectomies at Johannesburg Hospital (Fig. 1). This situation was attributed to inadequate training, patient ethnic group, previous surgery, nulliparity and absence of uterine prolapse. Ethnicity may explain the relatively low rate of VH in our country. In an epidemiological study performed in the USA the authors found that 75% of hysterectomies performed in

African-Americans were for uterine fibroids, which are a contraindication to VH. Inadequate training may have produced a generation of gynaecologists who are not happy to perform VH in the absence of prolapse in spite of the well-documented advantages of VH in comparison with AH.

Patients and methods

This comparative study investigated LAVH (study group) against AH (control group). It was approved by the Ethics Committee of the University of the Witwatersrand.

Study group

The study group comprised women admitted for AH for benign uterine conditions who were selected to undergo LAVH, provided they met the following criteria:

- Uterine size not exceeding a 14 weeks pregnant uterus on clinical examination.
- Uterine size not to exceed 14 cm length and 9 cm width on ultrasound examination.
- No evidence of ovarian enlargement or any indication for oophorectomy.
- Nulliparous women without uterine prolapse, women with previous pelvic surgery and women with previous caesarean section were included in the study group.

Any patient who was considered to be suitable for VH on routine standard clinical assessment by a consultant was excluded. All patients booked into the author's unit for AH were entered into the study group provided they met the inclusion criteria described above. The laparoscopic assessment was carried out by the author in all cases, and all the VHs were performed by registrars in training under the supervision and with the assistance of the author.

Control group

Controls were selected from gynaecological units not participating in the study. They were matched with respect to age, parity, previous pelvic surgery and indications. All the AHs were carried out by the registrars in training at Johannesburg Hospital under the supervision and with the assistance of the consultants. Unfortunately it was not practically possible for the same surgeon to operate on all the control patients. However, this limitation was noted when comparing the outcomes in the two groups.

LAVH

Before proceeding to VH a laparoscopic assessment of the pelvis and pelvic organs was performed. The laparoscopic component of VH includes assessment of the pelvic organs, release of adhesions and treatment of endometriosis where necessary (up to stage I of LAVH). Provided the entry conditions were confirmed and any adhesions could be released laparoscopically, VH was

performed. The laparoscope was left in position to assess the progress and any complications of the procedure. Following VH and the closure of the peritoneum and vaginal vault, laparoscopy was performed in all cases to assess haemostasis and flush out blood and debris.

All patients received prophylactic antibiotics during surgery.

Data analysis

Comparative parameters were tested for significant differences using Student's *t*-test for normally distributed continuous data and the Mann-Whitney test for non-parametric data. A *p*-value of <0.5 was considered to be statistically significant.

Outcome measures

VHs facilitated by prior laparoscopic assessment and AHs were compared as follows:

1. Operative parameters and complications

- Operation time (minutes).
- Specimen weight, to demonstrate any difference in uterine size between groups.
- Blood loss intraoperatively (estimated) and need for intraoperative blood transfusion. Blood loss was assessed by best estimated volume loss.
- Necessity of converting the VH to an abdominal approach.
- Operative complications.

2. Short-term clinical outcome

- Hospital stay (days).
- Postoperative need for blood transfusion. If blood transfusion was required, the volume of blood given was recorded.
- Postoperative pain – the pain scale is a simple 10 cm visual analogue scale, which has been used previously and is easily comprehended by patients.
- Amount, frequency and type of analgesia required.
- Febrile morbidity and the need for antibiotics.

The laparoscopic part of the study did not require additional funding. The gynaecological theatre was equipped with the necessary laparoscopic instruments to perform laparoscopic surgery.

Results

There were 58 cases in the study group (LAVH) and 46 in the control group (AH). All VHs facilitated by laparoscopic assessment were successful, with no need to convert to the abdominal route. Patient characteristics at inclusion, the indications for hysterectomy and the weights of the uteri were similar in the two groups of patients (Tables I and II). No cases from the study group were excluded. Seven patients in the LAVH group required adhesiolysis and 2 were found to have minimal

Table I.	Characteristics of the study and control groups (means (ranges))	
	LAVH (N=58)	AH (N=46)
Age (yrs)	44.3 (28 - 56)	42.7 (28 - 60)
Weight of uterus (g)	151.4 (86 - 286)	135.2 (65 - 280)
Parity	2.4 (0 - 5)	2.6 (0 - 5)

Table II.	Indications for hysterectomy in the study and control groups (patients could have more than one indication)	
	LAVH (N=58)	AH (N=46)
Multifibroid uterus	36	30
Chronic pelvic pain	31	23
Menorrhagia	27	22
Polyp protruding through cervix	4	1
Cervical intra-epithelial neoplasia III	4	8
Severe dysmenorrhoea	7	3
Deep dyspareunia	5	2
Endometrial hyperplasia	0	1
Mentally retarded	0	1

endometriosis necessitating ablation. No gross ovarian abnormality was found.

The time required for surgery was not significantly longer for LAVH than for AH (59.3 minutes v. 57.2 minutes). Postoperative hospital stay and convalescence were significantly shorter in the LAVH group, with a hospital stays of 2.4 days for LAVH and 3.9 days for AH. There was significantly less postoperative pain and less need for analgesia in the LAVH group. Blood loss during the procedure was significantly less in the LAVH group than in the AH group (Table III), although no patient received a blood transfusion. One major complication occurred in the AH group and none in LAVH group (Table IV). This was deep-vein thrombosis presenting with pyrexia and resolving with antibiotics and enoxaparin. A temperature above 38°C more than 24 hours after the operation and necessitating intravenous administration of antibiotics

was recorded in 7 patients in the AH group but none in the study group. Of women who underwent LAVH, 74% (43 of 58) had at least one of the five conditions (a large uterus, nulliparity, previous caesarean section, previous laparotomy and fibroids protruding through the cervix) that are generally considered relative contraindications to VH.

The number of VHs performed at Johannesburg Hospital since 1995 and the impact of the study on VH numbers is shown in Fig. 1. The proportion of VHs increased from 9.8% of all hysterectomies at the beginning of the study period (July 2001) to 19.2% at completion of the study (December 2004).

Discussion

This study demonstrated that all patients admitted for AH who met the inclusion criteria set up for the study could be operated on vaginally after being assessed laparoscopically. The benefit of laparoscopic assessment is that, where necessary, adhesions can be released, the ovary visualised and endometriosis treated. Although LAVH necessitated slightly longer theatre time than AH, this was more than compensated for by the well-documented postoperative benefits of shorter recovery time and hospital stay and less pain.²⁻⁴

Hysterectomy is the most common gynaecological operation, and the vaginal route is preferable. However,

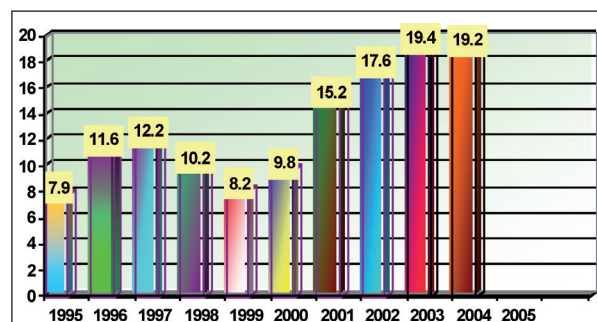


Fig. 1. Vaginal hysterectomies performed at Johannesburg General Hospital (as a percentage of all hysterectomies), 1995 - 2004. The study period was July 2001 - December 2004.

Table III.	Operation time and postoperative course in the study and control groups (mean (range))		
	LAVH N=58	AH N=46	p-value
Operation time (min)	59.3 (40 - 90)	57.2 (40 - 90)	0.60*
Hospital stay (days)	2.4 (2 - 5)	3.9 (3 - 5)	<0.001 [†]
Median postoperative pain as assessed by VAS	Day 1: 3 (2 - 5)	6 (4 - 7)	<0.001 [†]
	Day 2: 1 (0 - 3)	4 (2 - 5)	<0.001 [†]
Number of opiate injections required	2.4 (2 - 4)	4.2 (3 - 5)	<0.001 [†]
Estimated blood loss (ml)	152 (50 - 300)	254 (75 - 750)	<0.001 [†]

*Student's t-test.
[†]Mann-Whitney test.
 VAS = visual analogue scale.

Table IV. Complications in the immediate postoperative period in the study and control groups

		LAVH (N=58)	AH (N=46)
Major	Haemorrhage necessitating blood transfusion	0	0
	Urinary tract damage	0	0
	Pulmonary embolism	0	0
	Bowel damage	0	0
	Deep-vein thrombosis	0	1
Minor	Pyrexia requiring antibiotics	0	7
	Wound sepsis	0	0
	Wound erythema	1	0

the vaginal procedure seems to be ignored by most surgeons, resulting in an extremely high rate of AH.⁶ The main indication for LH is to convert AH into a vaginal operation, or a difficult VH into an easy one.

The presence of adhesions and endometriosis, locations of fibroids and the feasibility of VH in the absence of uterine prolapse can in my view best be assessed by laparoscopy. The results of this study are in agreement with those of Kovac *et al.*,¹⁰ who demonstrated that laparoscopy before AH made it possible for 91.3% of women to undergo an uncomplicated VH. In our study all cases in which AH was planned went on to VH and in no case was it necessary to convert from VH to AH.

Our results are not in agreement with some studies, which showed that LH significantly increase theatre time,^{11,12} as it is not so much the laparoscopy itself that increases the operating time but the amount of hysterectomy performed laparoscopically as opposed to vaginally. Laparoscopic surgery should be converted to a vaginal procedure as early as possible (e.g. after adhesiolysis, assessment of the ovaries and location of fibroids, as in our study). Nothing is gained by continuing dissection, since this not only considerably and unnecessarily prolongs the surgery but also increases the risk of visceral damage and haemorrhage. In agreement with the above studies, we found length of hospital stay to be significantly shorter and the need of analgesia to be significantly less for LAVH than for AH. Postoperative pain as assessed by the VAS was less after LAVH than after AH, explaining the lesser need for analgesia in LAVH group.

There is no specific cut-off age for removal of the ovaries in our institution. In this study removal of the ovaries was common among women over 45 having an AH and almost universal among those over 47. In the LAVH group we managed to remove the ovaries vaginally in only 3 out of 10 women over the age of 45. This may be considered as a limitation of this study. The 7 women whose ovaries we failed to remove were not at high risk for ovarian malignancy, and laparoscopic assessment showed their ovaries to be macroscopically normal. Removal of the ovaries in order to prevent ovarian cancer remains controversial for women not at high risk. It is estimated that about 200 oophorectomies will be needed to avoid 1 case of ovarian cancer.¹³

The results of this case control study, with relatively small numbers of patients who were not randomised,

demonstrated that LAVH can be performed safely on selected patients who would otherwise be scheduled for AH. The finding of less operative bleeding in the LAVH group is in agreement with another study.¹⁴ We did not perform routine postoperative measurement of the haemoglobin (Hb) concentration to document the above statement, but none of the patients received a blood transfusion. However, the fact that we did not routinely measure the postoperative Hb may be considered a weakness of the study, as objective proof of different amounts of blood loss could not be documented.

Although cost analysis and patient satisfaction are out of the scope of this study, shorter hospital stay is likely to save costs. Patients who had had LAVH reported returning to their normal daily activities sooner and having a better quality of life than patients who had had AH.

There were no major complications in the two groups, other than one deep-vein thrombosis in a woman who underwent AH. Seven patients had pyrexia at 24 hours after AH necessitating antibiotic treatment, which is regarded as a minor complication. The fact that we found no case of pyrexia in the postoperative period in the LAVH group is in agreement with another study¹⁵ that found less postoperative febrile morbidity after VH compared with AH.

There are reports that uteri up to a 14-week size can be removed vaginally, with the proviso that it may be necessary to convert to AH,¹⁶ or at least that a VH can be attempted while the patient is under anaesthetic.¹⁷ In my view this may lead to unacceptable complications such as haemorrhage necessitating blood transfusion, pose a risk of bladder and bowel damage, increase theatre time and mean disappointment for the patient. If there is doubt about the likelihood of successful VH it may be wiser to proceed directly to AH. A skilful vaginal surgeon can remove large uteri; one surgeon has reported removing uteri of 1 kg and larger.¹⁸ Such cases are not appropriate for the training of registrars in vaginal surgery or VH. Also, we should not abandon the laparoscope and schedule the next woman with a 14-week uterus for a VH if there is any doubt that this procedure will be successful. LAVH may offer a transition into more aggressive vaginal surgery.

In this study laparoscopic assessment after performing VH may have improved haemostasis, with flushing out

of clots and blood preventing vault haematoma and febrile morbidity in the immediate postoperative period. According to Marshall and Smith,¹⁹ the amount of blood clots that remain in the pelvis after VH which has seemed to be dry and haemostatic is surprising. Flushing out the clots may have been beneficial for the patients in our study.

One of the limitations of the study was that the same surgeon was not able to do all the control procedures. The outcome of the study was influenced by the experience of the registrars in both groups and also by the experience of the consultants in the control group. A major difficulty, not only for this study but for any randomised trial in surgery, is the uncontrollable effect the surgeon has on the outcome.

The American College of Obstetricians and Gynecologists²⁰ guidelines recommend that choice of the route of hysterectomy should depend on the patient's anatomy and the surgeon's experience. If the gynaecologist did not perform enough VHs during training, he or she may be inclined to perform hysterectomy by the abdominal route when it could safely be performed vaginally. Fear of litigation should complications arise is another factor affecting choice of procedure.

In 1998 the Royal College of Obstetricians and Gynaecologists²¹ recognised that the route of hysterectomy should be audited to determine the optimal rate of VH. The audit should include surgeon preference, degree of descent of the uterus and need and opportunity for more training in vaginal surgery. In South Africa there is a lack of national statistics, but at Johannesburg Hospital the rate of VH was 9.8% a year before the beginning of the study and reached 19.2% by the end (Fig. 1), which is significant if one takes into consideration that the vast majority of our patients are black Africans with benign conditions such as uterine fibroids.

The fact that all the VHs in this study were done by registrars under the author's supervision and with his assistance highlights the important issue of training and teaching. There is a need nationally for more training in VH as well as other vaginal procedures to produce a new generation of vaginal surgeons capable of performing VHs in the absence of uterine prolapse for selected benign conditions, as there are too few opportunities to encounter uterovaginal prolapse to allow adequate training in vaginal surgery. This study provides evidence of the feasibility of registrar training in VH using laparoscopic assistance.

Registrars in teaching hospitals must receive more training in VH. The present number of VHs that a registrar is required to perform before he or she can attempt the College of Medicine examinations is not sufficient to ensure competency in this procedure in specialist practice. All possible efforts must therefore be employed for registrars to get more exposure and training in VH.

Conclusion

Challenging the routine contraindications to VH by the use of laparoscopic assessment can lead to an increased number of VHs. Deficient registrar training in VH is a major problem in our postgraduate programme, and this study provides evidence of an additional opportunity to allow registrars to safely perform more VHs.

1. Reich H, De Caprio J, McGlynn F. Laparoscopic hysterectomy. *J Gynecol Surg* 1989; 5: 213-216.
2. Garry R. Various approaches to laparoscopic hysterectomies. *Curr Opin Obstet Gynecol* 1994; 6: 215-222.
3. Dickec RC, Greenspan J, Strauss LT, et al. Complications of abdominal and vaginal hysterectomy among women of reproductive age in the United States. *Am J Obstet Gynecol* 1982; 144: 841-848.
4. Kovac SR. Hysterectomy outcomes in patients with similar indications. *Obstet Gynecol* 2000; 95: 787-793.
5. Coulter A, McPherson K, Vessey M. Do British women undergo too many or too few hysterectomies? *Soc Sci Med* 1988; 27: 987-994.
6. Vessey MP, Mackintosh V, McPherson K, Coultz A, Yeates D. The epidemiology of hysterectomy: Findings in a large cohort study *Br J Obstet Gynecol* 1992; 99: 402-407.
7. Raymond CD, Howard T, Stephan C. Challenging generally accepted contraindications to vaginal hysterectomy. A technique for vaginal hysterectomy. *Am J Obstet Gynecol* 2001; 184: 1386-1391.
8. Porges RF. Changing indications for vaginal hysterectomy. *Am J Obstet Gynecol* 1980; 136: 153-158.
9. Wattie A., Cohen SB, Salvaggi L. Laparoscopic hysterectomy. *Curr Opin Obstet Gynecol* 2002; 14: 417-422.
10. Kovac SR, Cruikshand SH, Petto HF. Laparoscopy-assisted vaginal hysterectomy. *J Gynecol Surg* 1990; 6: 185-193.
11. Nezhat F, Nezhat C, Gordon S, Wilkins E. Laparoscopic versus abdominal hysterectomy. *J Reprod Med* 1992; 37: 247-250.
12. Olsson J, Ellström M, Hahlin M. A randomised prospective trial comparing laparoscopic and abdominal hysterectomy. *J Obstet Gynaecol* 1996; 103: 345-350.
13. Rees MCP. Menopausal menstrual problems. In: McPherson A, Walter D, eds. *Women's Health*. Oxford: Oxford University Press, 1997: 320-321.
14. Howard FM, Sanchez RA. A comparison of laparoscopic assisted vaginal hysterectomy and abdominal hysterectomy. *J Gynecol Surg* 1993; 9: 83-90.
15. Ellström M, Ferraz-Nunes J, Hahlin M, Olsson JH. A randomised trial with cost-consequence analysis after laparoscopic and abdominal hysterectomy. *Obstet Gynecol* 1998; 91(1): 30-34.
16. Varma R, Tahseen S, Amali U, Lokugamage AU, Kunde D. Vaginal route as the norm when planning hysterectomy for benign condition: Change in practice. *Obstet Gynecol* 2001; 4: 613-616.
17. Sheath SS. The scope of vaginal hysterectomy. *Eur J Obstet Gynecol Reprod Biol* 2004; 115: 224-230.
18. Magos A, Bournas N, Sinba R, Richardson RE, O'Connor H. Vaginal hysterectomy for the large uterus *Br J Obstet Gynaecol* 1996; 103: 246-251.
19. Marshall L, Smith JR. Laparoscopically assisted vaginal hysterectomy. In: *Operative Laparoscopy. The Master's Techniques in Gynaecological Surgery*. 2nd ed. Philadelphia: Lippincott-Raven Publishers, 1998: chapter 16, 217-220.
20. American College of Obstetricians and Gynecologists. *Quality Assurance in Obstetrics and Gynaecology*. Washington, DC: ACOG, 1989.
21. Royal College of Obstetricians and Gynaecologists. *Effective Procedures in Gynaecology Suitable for Audit*. London: RCOG, 1998.