Laparoscopic Supracervical Hysterectomy: a Retrospective Analysis of 1000 Cases

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ABSTRACT

Objective: Laparoscopic supracervical hysterectomy (LASH) was analyzed with regard to surgical indications and outcomes.

Methods: This is a retrospective analysis of the first 1,000 consecutive laparoscopic supracervical hysterectomies performed by one gynecologist from September 1, 2002 to April 30, 2006. The objective of the study was to find out to what extent the indication and the outcome of surgery changed with the increase in experience of the surgeon and whether a learning curve could be established based on the results. The demographic patient data, indication for surgery, patient history with regard to previous surgery, duration of surgery, intraoperative complications, uterus weight, and length of in-patient stay were collected from the medical records.

Results: The main indication in 80.4% of cases was uterus myomatosis. The median duration of surgery was 70.9±26.3 minutes (95% CI, 69.2 to 72.5) with an average uterus weight of 212.5±177.0g (95% CI, 201 to 223.6). This was reduced from 85.4±25.9 minutes (95% CI, 78.5 to 92.3) in 2002 to 72.4±30.1 minutes (95% CI, 66.7 to 78.2) in 2006, in conjunction with an increase in average uterus weight from 192.3±145.4g (95% CI, 153.8 to 230.9) to 228.7±160.3g (95% CI, 198.1 to 259.3). Overall, one intraoperative lesion of the bladder (0.1%) occurred, and in 4 cases the surgeon had to convert to laparotomy instead, due to the size and immobility of the uterus. Sixty-eight patients had a uterus weight of more than 500 g. In 67% of the cases, surgery was performed on patients with at least one previous laparotomy, and 51.4% of the patients required further interventions.

Conclusion: An experienced surgeon can rapidly learn the technique of laparoscopic supracervical hysterectomy and can safely perform it. In patients with symptomatic uterine myomatosis, previous laparotomy and/or with a uterine weight of more than 500g, laparoscopic supracervical hysterectomy is a useful alternative to total hysterectomy. There are few complications if preservation of the cervix is not contraindicated.

Key Words: Laparoscopic supracervical hysterectomy.

INTRODUCTION

Not only among surgeons is supracervical hysterectomy gaining ever greater popularity with nonmalignant conditions[1] but also among patients. This is because minimally invasive laparoscopic supracervical hysterectomy (LASH) can be easily learned, performed with a low rate of complications, and has a faster rate of recovery for patients.[2,3] Developed European industrial countries, in particular, as well as the USA, report an increase in rates for supracervical hysterectomy.[4,5]

Generally, a new surgical procedure only asserts itself if patients are satisfied with the results. This is the case if no or only a few intraoperative and postoperative complications arise, if the recovery period is brief, and if the complaints or symptoms responsible for the surgical indication were removed or could be reduced considerably. Potential benefits or risks should be closely evaluated before propagating or criticizing a technique.[5] Unfortunately, there are no randomized studies that compare LASH with vaginal or abdominal hysterectomies. In the literature, retrospective analyses of LASH, generally compared with laparoscopic-assisted vaginal hysterectomies (LAVH) predominate.[6] A colposcopically and cytologically unobtrusive cervix is considered an essential criterion for the performance of LASH, and in the event of bleeding disorders, the preoperative sonographic exclusion of malignancy criteria. In the event of sonographic findings, histological clarification is indicated by means of a diagnostic hysteroscopy with dilation and curettage (D & C).[3,6] Because patients in many countries do not have access to regular cancer screening, this technique will not be able to assert itself in all countries.

Because no vaginal manipulation is performed when the standardized LASH[3] technique is used, this also means

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that the anatomical structures of the vagina (length of vagina, uterovaginal plexus of nerves) are not traumatized intraoperatively. In theory, at least, retention of the integrity of the upper third of the vagina including the uterosacral ligaments and the cervix seems to be important in that the risk of intraoperative complications is markedly lower than with total hysterectomy and the preservation of these structures results in a lower risk of developing postoperative uterine prolapse.[7] This study analyzes 1,000 consecutive laparoscopic supracervical hysterectomies with regard to intraoperative rates of complications and with regard to the frequency of conversion to laparotomy. Another focus of this study was whether a learning curve could be established.

MATERIALS AND METHODS

The medical files of the first 1,000 patients were evaluated. Of the demographic data, the age of the patients, body mass index (BMI), and the classification of the patient in accordance with the American Society of Anesthesiologists (ASA) score (I-IV) were recorded. It was also documented whether the patient had a history of gynecological or surgical laparotomies and to what extent additional surgical interventions such as adhesiolysis or adnexal interventions became necessary during LASH, as these factors increase the surgical risk and prolong surgery. The evaluation also included indications for LASH, uterine weight, the duration of surgery, as well as the number and type of intraoperative complications.

Although the patients were in most cases referred by their ambulant gynecologists for LASH surgery, they also received extensive individual counseling after the presurgical examination (palpation, colposcopy, vaginal sonography) from the surgeon regarding all possible organ-sparing surgical techniques as well as different methods of hysterectomy. Patients with therapy-resistant bleeding disorders or suspected adenomyosis without evidence of myoma received additional information about methods of endometrial ablation. All patients suffering from uterine myomatosis, uterine myomatosis with bleeding disorders, or uterine myomatosis with suspected adenomyosis were consolidated under the diagnosis uterine myomatosis. Another group consolidates all women with suspected adenomyosis whether this involves bleeding disorders or not.

Because the size, form, and weight of the uterus as well as the type of previous operations influence the duration of surgery, a classification of uterine weights into 4 groups was devised (Group 1: ≤100 g; Group 2: 101 g to 500 g; Group 3: 501 g to 1000 g, and Group 4: >1000 g).

The frequency and indications that lead to the decision in favor of a laparotomy were also analyzed.

All operations were performed using a standardized surgical technique already published.[3] The surgeon, the assistant, and the surgical nurse with instrument tables stand on the left side of the patient. We do not use any uterine manipulators. Following disinfection of the vagina and catheterization of the bladder, carbon dioxide insufflation via a Veress needle placed through an incision in the inferior umbilical fossa is performed to an intraabdominal pressure of 15 mm Hg. After introduction of a 5-mm trocar through this incision, diagnostic laparoscopy is done with a 30-degree laparoscope. The patient's position is then changed to maximum Trendelenburg position. Under direct visual guidance, two 5-mm trocars are introduced lateral to the epigastric vessels in the left and right lower abdomen close to the pubic hair border (a normal sized uterus).

Localization of additional trocars depends on uterine size. The larger the uterus, the further above the symphysis pubis the lateral trocars need to be positioned. If the uterus extends as far as the umbilicus, we insufflate below the left costal arch, and introduce a trocar here or in the umbilicus. For the LASH, only a few reusable instruments are used. In addition to the standard 5-mm instruments, a bipolar coagulation clamp, Metzenbaum scissors, 3 various grasping forceps, a needle holder, a unipolar hook, and a suction-irrigation system are used.

To mobilize the uterus, the round ligaments, fallopian tubes, and ovarian ligaments are coagulated with bipolar forceps and dissected with endoscopic Metzenbaum scissors. For this, the uterus is retracted to the contralateral side with grasping forceps. After separating the ovaries and fallopian tubes from the uterus and dissecting through the round ligaments, a bipolar coagulation zone is placed on the bladder peritoneum, which delineates the planned direction of the incision to open the bladder peritoneum. From the dissected round ligaments, the bladder peritoneum is undermined by using scissors. The bladder peritoneum can then be opened, and the bladder pushed slightly caudad. Following identification and skeletonization of the uterine vessels, they are coagulated with the bipolar forceps and divided using the Metzenbaum scissors. The bladder peritoneum can then be mobilized from the anterior surface of the cervix. In this situation, it is not necessary to push away the bladder as is done in a total hysterectomy, because now the uterine body is dissected off in the upper third, cephalad to where the uterosacral ligaments leave the cervix. For this purpose, we use a unipolar hook. Starting from the left, the uterus is

held against the anterior wall with grasping forceps and pulled cephalad. From the right, dissection is carried out step by step with the unipolar hook. During dissection, major smoke accumulation can be prevented by actuating the suction on the hook. In this phase, clear vision is essential to avoid injuries to adjacent organs. We then begin by positioning the dissected body of the uterus in the right-hand mesogastrium to enable hemostasis to be carried out in the wound area. After efficient hemostasis in the area of the cervical stump, bipolar coagulation of the cervical canal is performed. Coagulation is performed by opening and simultaneously rotating the clamp in the cervical canal. The cervical stump is covered with peritoneum by means of a continuous purse-string suture using a Vicryl thread. Both uterosacral ligaments are included in the suture.

To be able to remove the uterus, we first widen the incision in the left-hand lower abdomen to 10mm to 20 mm. An electric Steiner or Sawahle morcellator (Karl STORZ, Tuttlingen, Germany) or a Semm morcellator (WISAP, Munich, Germany) is introduced under direct vision. After morcellation is completed, the fascia underlying the left-sided incision is closed using 1 or 2 interrupted sutures, as is the skin. If the uterus is very enlarged, a 5-mm or 10-mm additional port may be necessary. This is usually placed centrally above the symphysis pubis. The first LASH recorded in this analysis is at the same time also the first operation of this type to be performed independently by the surgeon.

Statistical Analysis

The data collated from the clinical records was analyzed using SPSS software version 16.0. 1.5 (SPSS Software, Chicago, IL). Mean values were calculated and shown with their standard deviations and 95% CI.

Statistical significance was demonstrated by using the Mann-Whitney U test and the Wilcoxon test and ANOVA to compare groups. For all statements of significance, the probability of error of $\alpha = 0.05$ (5%) was used, so that statistical significance was considered to be achieved with $P < 0.05$.

RESULTS

1000 LASH procedures were performed from September 1, 2002 to April 30, 2006. The mean age of the patients was 45.2±5.8 years (95% CI, 44.9 to 45.6). The patients had an average BMI of 30.6±26.0 (95% CI, 29.0 to 32.3). The anesthetist assigned 35.7% (N=357) of the patients to ASA score I, 49.8% (N=498) to ASA score II, and 14.3%

(N=143) to ASA score III. Only 2 patients (0.2%) had a preoperative assignment to ASA score IV.

In this study, 670 (67%) patients had a history of at least one gynecological or surgical laparotomy, and 514 (51.4%) required further surgical interventions during LASH; 335 patients required additionally adnexal surgery. In 356 patients, adhesions were divided, and in 69 patients a surgical treatment of endometriosis was necessary. In 9 patients, LASH was combined with a sacropexy of the cervical stump.

The main indication for LASH was uterine myomatosis in 80.4% (N=804) of cases. Therapy-resistant bleeding disorders were present in 11.4% (N=114) of patients but without further preoperative pathological findings, and 8.2% (N=82) had a suspicion of adenomyosis uteri. Looking at the distribution of surgical indications in relation to the years observed, it can be established that it was only in the first year that the share of women with uterine myomatosis was 67.8% lower and thus relatively consistently presented the main indication throughout the period observed. The share of women treated with LASH, due solely to bleeding disorders or adenomyosis, was highest in 2002 **(Table 1)**.

Only one intraoperative complication occurred, which corresponds to a percentage of 0.1. None of the patients required a blood transfusion. The single intraoperative complication was verified 4 weeks after surgery. It was a thermally induced lesion of the bladder. As a result of 2 caesarean deliveries the patient's adhesions had to be removed intraoperatively, and the bladder had to be mobilized. It was fixed to the anterior wall of the uterus with scar tissue. Laparoscopy performed 4 weeks after LASH, revealed an inflamed and partially necrotic lesion of the posterior bladder wall of 1.5 cm to 2 cm in size. This was sutured via a mini-laparotomy. Overall, a conversion to laparotomy was required in 4 cases. This corresponds to a conversion rate of 0.4%. In none of the patients was the reason for conversion to laparotomy an intraoperative complication; in all cases, the reason was the size and/or the lack of mobility and thus the insufficient overview available during laparoscopy. The average uterine weight of the extirpated uteri in this group was 976 g, the lightest uterus was 750 g, and the heaviest was 1185 g.

The average duration of surgery was 70.9±26.3 minutes (95% CI, 69.2 to 72.5), and the median weight of the extirpated uteri was 212.5±177.0 g (95% CI, 201.3 to 223.6). The mean duration of hospital stay was 2.21± 0.55 days (95% CI, 2.18 to 2.25). Of the uteri, 531 (53.1%) were removed with a 15-mm, 455 (45.5%) with 20-mm, and 14 (1.4%) with 10-mm electric morcellator.

Table 1.
Indications, Duration of Surgery and Risk Factors

	2002		2003		2004		2005		2006	
	N	%	N	%	N	%	N	%	N	%
ASA Score										
I	17	28.8	98	38.3	89	34	101	32.3	38	34.5
II	38	64.4	125	48.8	146	55.7	121	38.7	51	46.4
III	4	6.8	31	12.1	25	9.5	86	27.5	20	18.2
IV	–		2	0.8	2	0.8	5	1.5	1	0.9
Indications										
Myomas	40	67.8	205	80.1	219	83.6	253	80.9	87	79.1
Adenomyosis	8	13.6	20	7.8	12	4.6	27	8.6	15	13.6
Bleeding disorder	11	18.6	31	12.1	31	11.8	33	10.5	8	7.3
Previous laparotomies	36	61	170	66.4	172	65.6	221	70.6	71	64.5
Additional surgical interventions	28	47.5	123	48	122	46.6	175	55.6	66	60
Uterine Weight (Mean g ± SD)	192 ± 145.4		214.4 ± 202.2		213.0 ± 153.3		208.4 ± 184.9		228.7 ± 160.3	
Duration of Surgery (Mean min ± SD)	85.4 ± 25.9		72.4 ± 27.0		67.3 ± 24.3		69.1 ± 24.9		72.4 ± 30.1	
BMI (Mean min ± SD)	27.6 ± 9.7		31.2 ± 35.0		31.4 ± 33.5		30.0 ± 11.9		30.7 ± 12.2	

Median duration of surgery, which was longest in the first year with 85.4±25.9 minutes (95% CI, 78.5 to 92.3), was already reduced significantly (P<0.05) in the second year to 72.7±27.0 (95% CI, 69.3 to 76.1) minutes, although average uterus weight [214.4±202.2 (95% CI, 189.3 to 239.6 g)] was higher, the share of ASA III patients (18.2%) had also increased, the BMI was higher [31.2±35.0 (95% CI, 26.9–35.6)], and more patients (66.4%) had a history of previous surgery **(Table 1)**.

The average duration of surgery was reduced even further in 2004 [67.3±24.3 minutes (95% CI, 64.3 to 70.3)] and 2005 [69.1±25.0 minutes (95% CI, 66.2 to 71.9)]. The uterus weight of most patients (65.7%) was in UG 2, 27.5% were in UG class I, and 6.8% had a uterus weight in excess of 500 g (in 9 cases >1000 g). Only with 2 of 9 patients with a uterus weight >1000 g was a conversion to laparotomy required. Mean duration of surgery in the uterine weight group 1 was 59.7±21.8 minutes (95% CI, 57.2 to 62.3). This increased to 70.7±20.9 minutes (95% CI, 69.1 to 72.3) in uterine weight group 2, and 113.8±34.6 minutes (95% CI, 104.8 to 122.8) in uterine weight group 3. The longest duration was in uterine weight group 4 at 147.1±38.6 minutes (95% CI, 117.5 to 176.7) **(Table 2)**.

DISCUSSION

For nonmalignant conditions the LASH technique represents an alternative to total hysterectomy, with a low level of intraoperative and postoperative morbidity.[3] The selection of patients in the first year most certainly played a role in the low rate of intraoperative complications. In the first year the average uterine weight, the number of patients with previous surgery, and the number of ASA III patients was lower compared with the following years. Some patients with previous surgery had already undergone organ-sustaining surgery (myoma enucleation, endometrium ablation), and some had undergone myoma embolization. The only intraoperative complication that arose in the course of the 1000 LASH operations performed occurred during the 18th operation. On the one hand, it was one of the first operations performed; on the other hand, the patient also had a higher operative risk, based on a history of 2 caesarean deliveries.

The average duration of surgery in 2002 (N=59) of 84.6 minutes with a median uterus weight of 192.4 g was significantly shorter than the duration of the first 30 LASH operations in the study executed by Ghomi et al,[2] which reported a duration of surgery of 166.0 minutes with a median uterus weight of 132.8 g. The authors reported a reduction in surgery time to 142.3 minutes with a median uterus weight of 154.6 g after a further 30 LASH operations. They are of the opinion that surgeons go through a learning curve, that an experienced surgeon can, however, safely perform this technique during the learning curve, and that it takes 30 LASH operations before one gains proficiency with this technique.

Table 2.
Duration of Surgery Depending on the Uterine Weight

	2002	2003	2004	2005	2006	Σ
Group 1*						
No of patients (%)	17 (28.8)	81 (31.6)	64 (24.4)	90 (28.7)	25 (22.7)	277 (27.7)
Uterus weight (Mean g ± SD)	75.6 ± 14	75.9 ± 14.7	74.09 ± 18.4	68.0 ± 21.5	73.0 ± 16.0	72.6 ± 18.3
Duration of Surgery (Mean min ± SD)	96.6 ± 35.5	59.5 ± 18.6	55.3 ± 18.2	57.6 ± 19.8	54.4 ± 10.3	59.7 ± 21.8
Group 2*						
No of patients (%)	38 (64.4)	160 (62.5)	183 (69.9)	199 (63.6)	75 (68.2)	655 (65.5)
Uterus weight	201.5 ± 87	223.1 ± 95.5	227.6 ± 105.7	210.9 ± 99.1	232.7 ± 106.6	220.5 ± 100.5
Duration of Surgery	78.7 ± 19.7	73.2 ± 19.6	68.9 ± 23.2	69 ± 19.7	70.4 ± 20.2	70.7 ± 20.9
Group 3*						
No of patients (%)	4 (6.8)	11 (4.3)	14 (5.3)	20 (6.4)	10 (9.1)	59 (5.9)
Uterus weight	602.7 ± 85.4	682.6 ± 147.5	669.2 ± 125	640.1 ± 118.5	588 ± 46.8	643.5 ± 116.9
Duration of Surgery	89.7 ± 6.3	125.6 ± 42.4	107.6 ± 25	107.2 ± 27.7	132.2 ± 47.1	113.8 ± 34.6
Group 4*						
No of patients (%)		4 (1.6)	1 (0.4)	4 (1.3)		9 (0.9)
Uterus weight		1267.7 ± 251	1128	1062.3 ± 61.2		1160.9 ± 189.1
Duration of Surgery		159 ± 31.1	130	139.5 ± 51.3		147.1 ± 38.6

*Group 1: ≤100 g; Group 2: 101 g to 500 g; Group 3: 501 g to 1000 g; Group 4: >1000 g.

During the first 60 operations, they observed 2 intraoperative complications (one lesion of the intestinal tract – operation no. 11, one lesion of the bladder – operation no. 31). To date, no randomized prospective controlled studies have been executed that compare LASH operations with abdominal (TAH), vaginal (TVH), or laparoscopic-assisted hysterectomies (LAVH). A retrospective analysis of these 4 surgical techniques, which were performed on 117 patients, resulted in longer surgery times for the 2 laparoscopic techniques compared with abdominal or vaginal hysterectomies, while duration of surgery for the LAVH [81.1 minutes (N=28)] with an average uterus weight of 117.7 g was longer than for the LASH [67.7 minutes (N=29)] with an average uterus weight of 140.6 g.[8] Intraoperative complications only occurred in the LAVH group.[2] With regard to the overall morbidity of the 4 above-mentioned surgical techniques, the author found slight benefits in favor of LASH. An important factor with regard to the success of surgical therapy is the proper selection of patients. At 80.4%, most patients had surgery due to symptomatic myomas or uterine growth. The total number of patients who received surgery due to adenomyosis or therapy-resistant bleeding disorders only amounted to 19.6%. The long-term results of a study[9] with a median follow-up of 66 months after 70 LASH operations, which were all performed by the same surgeon, showed that 17 patients suffered from complaints or symptoms originating from the cervical stump. The cervical stump of 16 patients (22.8%) was removed, and one patient received laparoscopic adhesiolysis. Of the above-mentioned 17 patients, 14 had undergone treatment for endometriosis prior to the LASH operation. Three intraoperative complications (4.3%) were described among the 70 LASH operations; indications for surgery were menorrhagia and dysmenorrhoea. Patients with a uterus larger than the 16th week of pregnancy were excluded. A significant learning curve for LASH was not encountered because the surgeon had performed LAVH for 16 years.[10] This may also be the reason why the duration of surgery in the first year was shorter than that of other authors. Although the number of patients (67.0%) with one or several previous laparotomies was high, and 35.5% of patients received adhesiolysis, 33.5% adnexal surgery, 6.9% treatment of endometriosis, and 0.9% a sacropexy of the cervical stump. The rate of conversion (0.7%) and the rate of intraoperative complication (0.1%) were low. Conversion to laparotomy was not due to the size of the uterus but the lack of uterine mobility, closeness of myomas to the cervix or the

lateral wall of the pelvis. The surgeon's increased experience with the technique of morcellation and the size of the morcellator used, have contributed to the reduction duration of surgery. Lyons et al[11] reported the benefits of LASH when operating on large uteri. Of 54 patients with a uterine weight in excess of 300g, there was only one conversion to laparotomy, due to extensive endometriosis of the intestinal tract; 2 intraoperative complications occurred; the rate of transfusion was 0%; and 31 patients had a uterus weight of more than 500 g. In our own analysis, we performed surgery on 68 patients with a uterus weight in excess of 500 g. The combination of large uteri and endometriosis presents a major challenge to the surgeon.[11] In 5 of 7 patients with endometriosis, this could be operated on in stage 4. In our opinion, endometriosis is not a contraindication for LASH; it should, however, be completely resected, as further surgery may otherwise become necessary as described by Okaro et al.[9] Our results reflect the experience gained by a single surgeon. A study[3] that has already been published on the perioperative complication rate of 1706 LASH operations performed by 3 surgeons has already reported intraoperative and postoperative complication rates of 0.2% and 1.2%, respectively, and a conversion rate of 0.82%. The 2 other surgeons only experienced initial intraoperative complications during operation no. 181 and 171. These results show that a learning curve could only be shown for the reduction of surgery time, but not that the first few operations were associated with a higher rate of complications.

CONCLUSION

This retrospective study was able to show that LASH can rapidly be learned by an experienced surgeon and that it can be performed safely, with a low rate of intraoperative complications. Uterus myomatosis was the main indication for LASH. In cases of large uteri with weights in excess of 500g and with patients who have undergone surgery previously, LASH should also be considered as an alternative to the total hysterectomy techniques if preservation of the cervix is not contraindicated.

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