ABSTRACT

The first subtotal abdominal hysterectomy was described by Charles Clay in 1843, and the first laparoscopic subtotal hysterectomy (LSH) was described by Semm [1] in 1991. Whether to retain or remove the cervix remains controversial, with surgeons citing sexual satisfaction and prevention of pelvic organ prolapse as indicators for retention [2]. Because the only absolute indication for cervical removal is malignancy or its precursors, debate has continued as to the optimum surgical approach to hysterectomy for other indications. The evidence obtained from evaluating the effects of retaining the cervix, via any surgical approach, on sexual, urinary, and bowel function remains controversial [3–11].

The literature evaluating LSH is limited, and only 3 randomized controlled trials (RCTs), including 342 women, have reported psychologic outcomes, complications, and additional cervical procedures [4,12,13]. For the abdominal equivalent, there are 9 RCTs, including 1553 women, and a Cochrane review reported few important differences between the 2 approaches [8]. No such comparative data are available for LSH. This practice guideline will evaluate the evidence for LSH. This report was developed under the direction of the Practice Committee of the AAGL as a service to their members and other practicing clinicians. Journal of Minimally Invasive Gynecology (2014) 21, 9–16 © 2014 AAGL. All rights reserved.

Keywords:

Cervical amputation; Laparoscopic subtotal hysterectomy; Laparoscopic supracervical hysterectomy; Pelvic organ prolapse; Total laparoscopic hysterectomy; Uterine corpus

DISCUSS

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Purpose and Scope

The purpose of this guideline is to provide clinicians with evidence-based information about the techniques for and outcomes of laparoscopic subtotal/supracervical hysterectomy.

Background

The first subtotal abdominal hysterectomy was described by Charles Clay in 1843, and the first laparoscopic subtotal hysterectomy (LSH) was described by Semm [1] in 1991. Whether to retain or remove the cervix remains controversial, with surgeons citing sexual satisfaction and prevention of pelvic organ prolapse as indicators for retention [2]. Because the only absolute indication for cervical removal is malignancy or its precursors, debate has continued as to the optimum surgical approach to hysterectomy for other indications. The evidence obtained from evaluating the effects of retaining the cervix, via any surgical approach, on sexual, urinary, and bowel function remains controversial [3–11].

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equivalent, there are 9 RCTs, including 1553 women, and a Cochrane review reported few important differences between the 2 approaches [8]. No such comparative data are available for LSH. This practice guideline will evaluate the evidence for LSH.

Identification and Assessment of Evidence

This AAGL Practice Guideline was produced after a review of the literature via a search of electronic resources including Medline, PubMed, CINAHL, the Cochrane Library (including the Cochrane Database of Systematic Reviews), Current Contents, and EMBASE, and included all articles related to subtotal/supracervical hysterectomy published from 1951 to December 31, 2012. MeSH terms and keywords “hysterectomy,” “subtotal,” “sub-total,” “supracervical,” and “supra-cervical,” including all subheadings, were used to include a broad range of clinical studies and relevant publications. Evidence involving peripartum hysterectomy was excluded.

The search was not restricted to the English-language literature, and committee members fluent in languages other than English reviewed relevant publications and provided information to the committee, translated into English. For this guideline, this included publications in Italian. The full text of all publications was retrieved, abstracted, and tabulated. Relevant publications were then reviewed, and additional references were hand-searched and added to the tabulation. All studies were assessed for methodologic rigor and graded according to the US Preventive Services Task Force classification system outlined in the Appendix.

Intraoperative Considerations

Cervical Amputation

Hysterectomy remains the most commonly performed major gynecologic surgery [8], and is associated with high patient satisfaction [14]. When the decision has been made to proceed with laparoscopic hysterectomy, consideration of cervical retention or removal is required. LSH may be performed via a multi-port [15,16], single-port [17–19], or robotically assisted laparoscopic approach [20]. Intraoperative technical considerations include the level of cervical amputation and extraction of the corpus.

LSH is approached in the same manner as total laparoscopic hysterectomy (TLH) up to and including securing the uterine vessels. After these vessels are secured, the cervix is transected at the level of the internal os, the presumed junction between endometrium and cervical columnar epithelium. If a uterine manipulator has been used, it is generally removed at this point [16,21,22]. Cervical amputation may be performed using either “cold” instruments or ultrasonic or electrosurgical instruments. Proprietary devices have also been developed specifically for this purpose [21,22], with the purported advantage of decreasing the procedural time for uterine amputation by up to 80% [23]. This benefit must be weighed against the cost of the device compared with an alternative technique. The only available comparative evidence suggests that proprietary cervical amputation devices do not reduce complication rates (Evidence level II-2) [21].

Excision or Coagulation of Endocervix

Several methods have been described to decrease post-procedural cyclic bleeding, including excision and coagulation of the remaining endocervix [15,24]. In the first study to evaluate the effect of endocervical excision or ablation on postoperative bleeding rates, 140 women were randomized to undergo LSH and reverse conization using a laparoscopic loop electrode (n = 70) or LSH without conization (n = 70) [13]. In that blinded study, no differences in intermittent postoperative vaginal bleeding were observed at 12-month follow-up, with 33% of women without conization reporting vaginal bleeding compared with 37% with conization (Level I). Prior to this RCT, the same authors evaluated 30 women who had undergone reverse cervical conization using a laparoscopic electrosurgical electrode and reported short procedure times (means [SD], 61.9 [24.7] seconds; 95% confidence interval, 51.0–72.9) and no complications [25].

In a retrospective case series of 400 women treated using a combination of a proprietary loop amputation device and electrosurgical coagulation of the cervical canal, only 2% had intermittent postoperative vaginal bleeding [22]. Intermittent vaginal bleeding has been reported after all adjunctive cervical procedures on the remaining endocervical tissue.

Retrieval of Uterine Corpus

Retrieval of the uterine corpus after transection is a central component of performance of LSH. Historically, this was achieved via simple mechanical morcellation performed through an extended abdominal port incision or posterior colpotomy [26,27]. Subsequent developments included refinement of manual morcellation techniques [28] and introduction of electromechanical electrosurgical morcellators [29], with tissue fragments removed through the morcellator, a port, or posterior colpotomy [30,31]. Transcervical uterine morcellation and extraction has also been described [32]. Inasmuch as none of these approaches has been compared in controlled studies, superiority of one technique has not been established. Consequently, the technique selected will depend on surgeon preference and availability of instrumentation required to complete retrieval.

Operative Time and Costs

The requirement of specialized equipment for retrieval of the uterine corpus contributes to the cost of LSH (Level II-c) [28]. In a prospective series, 52 women underwent LSH using standard surgical equipment costing $266, compared
with the single-use equivalents costing $2209, with a mean operating time of 2 hours 14 minutes [28]. The same authors published a series of 437 LSH cases in which the more expensive single-use instruments were used, with a mean operating time of 1 hour 10 minutes [33]. This approach to reducing operating time is associated with increased cost of devices for each case, with the net effect on overall cost dependent on a number of factors including the price of the single-use device and the per-minute costs of operating room time. However, such comparisons of new and standard devices and techniques are best undertaken in the context of a RCT that includes an economic evaluation of both resource use and clinical outcomes.

**Guidelines for Intraoperative Approach to LSH**

1. Depending on the pathologic condition, the approach to LSH may be multi-port, single-port, or robotically assisted laparoscopy, with no evidence for superiority of any of these approaches (Level C).
2. Mechanical cutting, electrosurgical/ultrasonic instruments, or specifically designed instruments may amputate the uterus, with no evidence for superiority of one technique over another (Level B).
3. Additional procedures performed on the cervix do not seem to affect the occurrence of postoperative vaginal bleeding (Level B).
4. Uterine retrieval may be performed transcervically, with proprietary morcellation instrumentation transabdominally, or mechanically via extended incision of an abdominal port (Level B).
5. The addition of specific instrumentation for laparoscopic morcellation increases costs and may decrease operative time, with no data reporting cost-benefit (Level B).
6. No data show superiority of one type of morcellator over any other (Level C).

**Outcomes after LSH**

**Intraoperative Outcomes**

One RCT compared 71 women undergoing LSH with 70 undergoing TLH [12]. That study reported no statistical differences for intraoperative blood loss or mean operative time between the 2 techniques. Operative data from the few prospective studies and a larger number of retrospective comparative studies for LSH vs other surgical approaches report few differences in operative time or blood loss between the approaches [27,34–45]. Together, these studies compared 3004 LSH cases with 1053 laparoscopically assisted vaginal hysterectomies (LAVH), 2129 TLH procedures, 512 total abdominal hysterectomies (TAH), and 23 total vaginal hysterectomies (TVH). There were no statistical differences reported in transfusion rates for any of these studies, with some reporting statistical differences in blood loss of a few milliliters to 100 mL. Operative times for LSH in these studies ranged from 47 to 181 minutes [27,34–45].

**Bladder, Bowel, Pain, and Sexual Outcomes**

In a randomized study, 63 women with endometriosis, leiomyomas, or abnormal uterine bleeding were randomized to undergo LSH (n = 31) or laparoscopically assisted vaginal hysterectomy (n = 32) and were followed up for 6 months postoperatively to evaluate differences in sexual function, pain, and psychologic outcomes (Level I) [4]. There were substantial improvements from baseline function in both groups, with no differences for these outcomes between groups. Additional clinical outcomes were not reported.

A separate randomized study compared sexual and psychologic outcomes at baseline and at 12 months in 132 women who were assigned to undergo either supracervical hysterectomy via either the abdominal or laparoscopic approach or total hysterectomy via the abdominal, laparoscopic, or vaginal approach [46]. The number of women undergoing LSH was not separately reported. Statistically significant improvements were reported in 2 of 10 sexual factors assessed, favoring the subtotal group; however, no difference between groups was reported in the 5 psychologic factors at 1 year postoperatively.

A nonrandomized patient-preference study that examined short-term quality of life in 71 women after TLH and 51 women after LSH reported a substantially improved physical-component score on the 36-item Short Form Health Survey at 3 to 4 weeks postoperatively for women in the LSH group [47]. There was no difference in postoperative pain, nausea, return to normal activities, or the mental component score between the groups (Level II-2).

Less robust studies have suggested improvements in sexual function for women undergoing LSH vs TLH when evaluated 6 months postoperatively. These differences were attributed to vaginal vault pain, vaginal shortening, changes in cervicovaginal innervation, and absent production of cervical mucus in women undergoing TLH [40,48,49] (Level III). Return to vaginal intercourse after surgery may be shorter after LSH than after TLH [48].

In women with persistent pelvic pain after LSH, endometriosis is a common subsequent surgical finding [50] (Level III). No data suggest that LSH increases the risk of endometriosis. A retrospective study that compared 362 women undergoing LSH with morcellation vs other types of hysterectomy showed a new diagnosis of endometriosis-associated pain in 1.4% in both groups [51].

In theory, compared with TLH, LSH should decrease lower urinary dysfunction because the neurovascular bundles of the bladder are not damaged during surgery; however, there are no data from RCTs to support this. For the laparotomic equivalent in which total and supracervical abdominal hysterectomies are compared, data from randomized trials, including meta-analyses, have not supported this theory (Level I) [52]. There are no available data to...
support the hypothesis of improved or impaired bowel function after LSH.

**Cyclic Bleeding Related to Retention of Cervix**

With retention of the cervix, there is always the possibility of ongoing vaginal bleeding, with a wide reported incidence of 0% to 37% that may occur up to 4 years after the index surgery [21,53]. Variables that may contribute to this wide range include the surgical approach to cervical amputation, the definition of intermittent vaginal bleeding, and the duration of follow-up [2,7,22,41,43,48,49,54–59]. When present, the volume of cyclical bleeding is reported to be small [49], and it may have minimal clinical effect. Preoperative information about this possibility should be given to women contemplating LSH [59].

Identification of residual endometrium via endocervical biopsy of the cervical stump is not predictive of bleeding after LSH (Level II-3) [24,54,57]. Similarly, treatment of the cervical canal via reverse conization or electrosurgical destruction does not always prevent bleeding [13,15,24,49,60,61].

**Gynecologic Malignancy**

Endometrial malignancy may develop in women who have undergone LSH, and this risk is increased in women who receive unopposed estrogen replacement therapy [54]. There are reports of a progestin challenge test being used to assess the suitability of using unopposed estrogen replacement therapy [22]; however, no long-term data are available to support this approach.

An American College of Obstetricians and Gynecologists guideline suggests that women with known or suspected gynecologic cancer, current or recent cervical dysplasia, or endometrial hyperplasia are not candidates for subtotal hysterectomy [62]. For women who undergo LSH, the reported risk of cervical cancer is low, 0.1% to 1.9% [63]. Insofar as cervical malignancy, 2% to 9.4% of cases arise from the residual cervix after any type of subtotal hysterectomy [64–67], with an interval of 9 to 26 years between the index surgery and diagnosis [65,67,68]. The histologic subtypes of malignancy do not differ when the cervix is retained [65,67,69–71]. The risk of future malignancy should not be a deterrent in women who wish to undergo LSH; however, informed consent regarding the need for ongoing cervical surveillance postoperatively is essential.

**Guidelines for Outcomes after LSH**

1. No data demonstrate a clinically important reduction in operative blood loss or operative time for LSH vs any other approach (Level B).
2. There are no differences in psychologic outcomes or pain after LSH vs total hysterectomy (Level B).
3. Short-term sexual outcomes may be improved in women who undergo LSH (Level B).
4. No data demonstrate a difference in bladder or bowel function with LSH vs any other approach to hysterectomy (Level B).
5. All women undergoing LSH should be warned of the possibility of ongoing intermittent vaginal bleeding and the need for cervical surveillance (level B).
6. No available method prevents or predicts ongoing intermittent vaginal bleeding after LSH (Level B).
7. The risk of cervical malignancy after supracervical hysterectomy is low and should not be a deterrent to LSH (Level B).
8. No available evidence provides guidance about the optimal approach to hormone replacement therapy after LSH (Level C).

**Complications after LSH**

**Operative Complications**

One RCT compared complications in women undergoing LSH (n = 71) with women undergoing TLH (n = 70) [12]. In that study, there was no difference in hospital readmission in the first year of follow-up (6% for TLH vs 7.4% for LSH). There was an increased risk of readmission of women weighing >100 kg, regardless of the mode of surgery (odds ratio, 2.5). Urinary complications were rare in both groups (0 for LSH vs 2 for TLH) (Level I). In nonrandomized studies, complication rates for LSH ranged from 0% to 19% [16,27,38,41,72]. Randomized trials that compared laparotomic supracervical hysterectomy with total abdominal hysterectomy showed no significant differences for most postoperative complications, including urinary tract injury, pain score, wound infection, persistent pain after discharge, bowel obstruction, or pelvic organ prolapse [5,7,11,73]. A large retrospective study suggested comparable complication rates for TLH (1.59%) and supracervical hysterectomy (1.36%) (II-3) [27]. A similarly low rate of complications was reported in a separate retrospective series of 1692 LSH procedures (II-3) [72]. After LSH, bladder injuries have been reported to occur in 0.25% to 0.75% of procedures [22,27], but are more common in patients who have previously delivered via cesarean section. Ureteral injuries during LSH have been reported in 0.19% of procedures [27], and bowel injury in 0.2% to 0.5% of procedures [22,27].

No available evidence supports the hypothesis that LSH is safer than other techniques for hysterectomy.

**Morcellation-Associated Complications**

It has been suggested that morcellation of the uterus during LSH may cause iatrogenic endometriosis. Endometriosis has been documented after LSH with morcellation in women with no endometriosis at the index surgery [74–76]. Peritoneal endometrial hyperplasia has also been reported after uterine morcellation [77]. Other evidence suggests no
increase in the rate of endometriosis after morcellation, and a retrospective study demonstrated subsequent endometriosis in 3 of 217 women (1.4%) after LSH with morcellation compared with 2 of 145 women (1.4%) after total vaginal hysterectomy, total abdominal hysterectomy, or laparoscopically assisted vaginal hysterectomy without morcellation [51]. These data suggest that morcellation is not necessarily responsible for new onset of endometriosis.

Peritoneal leiomyomatosis is rare and has been documented in case reports after morcellation [78–82]. These leiomyomas are genetically identical to the original morcellated myoma [80], and may be located in the pelvis, upper abdomen [83], and around the vasculature and heart [84,85]. Currently, there are insufficient data to enable determination of incidence. Nevertheless, the clinical consensus is that all visible uterine fragments should be removed from the pelvis and abdomen after morcellation; however, there is no evidence that doing so will prevent disseminated leiomyomatosis. There are case reports of serious complications including sepsis, subphrenic abscess, and bowel obstruction when morcellated tissue is not retrieved from the abdomen [79,86,87].

Pelvic Organ Prolapse

No data support the notion that cervical preservation with LSH prevents future pelvic organ prolapse [8]. Prolapse is more likely to recur in women in whom this is the index indication for surgery, regardless of the method of hysterectomy [88,89]. Case reports document new development of cervical prolapse after LSH [90].

Guidelines for Prevention of Short- and Long-Term Complications of LSH

1. No data support reduced operative morbidity when LSH is performed vs any other type of hysterectomy (Level B).
2. Compared with other forms of hysterectomy, laparoscopic supracervical hysterectomy with uterine morcellation does not seem to increase the risk of a subsequent diagnosis of endometriosis (Level C).
3. Leiomyomatosis occurs rarely after morcellation (Level C).
4. Removal of all leiomyoma fragments and peritoneal lavage are recommended as good clinical practice (Level C).
5. There is no evidence that LSH is protective against future pelvic organ prolapse (Level C).

Recommendations for Future Research

There is a paucity of high-quality outcomes data for LSH. The following areas are proposed for future research:

1. Randomized trials of LSH vs TLH in women undergoing hysterectomy because of benign indications to assess clinical outcomes, complications, patient satisfaction, and resource use.
2. Prospective patient preference assessment of approach to hysterectomy (LSH and TLH), assessing the outcomes discussed.

References


Appendix

**Quality of Evidence and Strength of Recommendations**

Studies were reviewed and evaluated for quality according to the method outlined by the US Preventive Services Task Force.

I Evidence obtained from at least 1 properly designed randomized controlled trial.

II Evidence obtained from non-randomized clinical evaluations.

II-1 Evidence obtained from well-designed controlled trials without randomization.

II-2 Evidence obtained from well-designed cohort or case-control analytic studies, preferably from more than 1 center or research center.

II-3 Evidence obtained from multiple time series with or without the intervention. Dramatic results in uncontrolled experiments also could be regarded as this type of evidence.

III Opinions of respected authorities, based on clinical experience, descriptive studies, or reports of expert committees.
Based on the highest level of evidence found in the data, recommendations are provided and graded according to the following categories:

Level A: Recommendations are based on good and consistent scientific evidence.
Level B: Recommendations are based on limited or inconsistent scientific evidence.
Level C: Recommendations are based primarily on consensus and expert opinion.

Publications that do not fit the AAGL evidence classification are classified as SR5, Systematic review; R5, Review; P5, Prevalence or Incidence Study; L5, Laboratory Study; N/A if not otherwise classified.

This report was developed under the direction of the Practice Committee of the AAGL as a service to their members and other practicing clinicians. The members of the AAGL Practice Committee have reported the following financial interest or affiliation with corporations: Jason A. Abbott, PhD, FRANZCOG—Consultant and Speakers Bureau: Hologic Inc.; Krisztina I. Bajzak, MD, FRCSC, MSc—nothing to disclose; Isabel C. Green, MD—nothing to disclose; Volker R. Jacobs, MD, PhD, MBA—nothing to disclose; Neil P. Johnson, MD, CREI, FRANZCOG, FRCOG, MRCGP—nothing to disclose; Marit Lieng, MD, PhD—nothing to disclose; Malcolm G. Munro, MD—Consultant: Abbott Laboratories, Aega Medical, Inc., Bayer HealthCare Corp., Boston Scientific Corp., Channel Medical Group, Conceptus Inc., CooperSurgical, Inc., EndoSee Corp., Ethicon Women’s Health & Urology, Femasys, Inc., Gynesonics, Inc., Halt Medical, Inc., Hologic Inc., Idoman Teoranta, Karl Storz Endoscopy. Stock ownership: Baxter Healthcare Corp., Channel Medical Group, Gynesonics, Inc., Halt Medical, Inc., Sony Medical Equipment; Sukhbir Singh, BSc, MD, FRCSC—Consultant: Abbott Laboratories, Ethicon Endo-Surgery, Inc. Speakers Bureau: Bayer HealthCare Corp., Ethicon Endo-Surgery, Inc., Minerva Surgical, Inc. Grants/research: Bayer HealthCare Corp., Covidien; Eric R. Sokol, MD—Consultant: American Medical Systems, Inc. Grants/research: Contura International. Stock ownership: Pelvalon, Inc.

The members of the AAGL Guideline Development Committee for Laparoscopic Subtotal/Supracervical Hysterectomy have reported the following financial interest or affiliation with corporations: Jason A. Abbott, PhD, FRANZCOG—Consultant and Speakers Bureau: Hologic Inc.; Marit Lieng, MD, PhD—nothing to disclose; Thomas Lyons, AB, MS, MD—Consultant: Gyrus ACMI (Olympus Corp.), Ethicon Endo-Surgery, Inc., SurgiQuest, Inc., Ethicon Women’s Health & Urology. Grants/research, royalties: Ethicon Endo-Surgery, Inc.; Errico Zupi, MD—nothing to disclose.