Early Evaluation Of An Electromechanical Morcellator For Laparoscopic Supracervical Hysterectomy

June 30, 2011 | Laparoscopy [1], Pregnancy and Birth [2], Pelvic Pain [3], Hysterectomy [4], ObGyn Nurses [5], Incontinence [6], Laparoscopy and Hysteroscopy [7], ObGyn Compensation Survey [8], Surgical Gynecology [9]
By James F. Daniell, MD [10]

The mean uterine weight was 146 g (60-569 g). The mean operating time was 94 minutes (60-225 min.). Actual morcellation time was available in 19 cases by reviewing videotape with an average morcellation time of 11.8 minutes (4-23 min.). Average blood loss was 125 cc (20-600 cc) with one case of late postoperative bleeding requiring operative intervention. The average cost for the procedure was $7,998 ($6,989 - $11,581). Thirty-six patients were discharged within 23 hours from the time of admission and all patients were discharged within 48 hours of the time of admission.

ABSTRACT

**Objective:** To evaluate the effectiveness, safety, and cost effectiveness of electromechanical morcellation of the uterus and adnexae to enhance laparoscopic supracervical hysterectomy (LSH).

**Design:** Forty-one consecutive cases of LSH with and without adnexectomy were reviewed. Each case utilized an electromechanical morcellator to accomplish laparoscopic removal of the uterus and adnexae.

**Setting:** Private gynecologic practice in a full service hospital

**Interventions:** LSH

**Results:** The mean uterine weight was 146 g (60-569 g). The mean operating time was 94 minutes (60-225 min.). Actual morcellation time was available in 19 cases by reviewing videotape with an average morcellation time of 11.8 minutes (4-23 min.). Average blood loss was 125 cc (20-600 cc) with one case of late postoperative bleeding requiring operative intervention. The average cost for the procedure was $7,998 ($6,989 - $11,581). Thirty-six patients were discharged within 23 hours from the time of admission and all patients were discharged within 48 hours of the time of admission.

**Conclusions:** LSH is a safe and effective method of managing patients that lack cervical pathology or pelvic relaxation. Electromechanical morcellation can enhance the performance of LSH by decreasing operative time.

INTRODUCTION

All variations of laparoscopic hysterectomy (LH) have been much discussed since first reported by Reich in 1989. One particularly controversial form of laparoscopic hysterectomy is subtotal hysterectomy (LSH). LSH was first described by Semm. Since that report, several authors have reported their initial experience with various methods for LSH. One recent report from Belgium has also reviewed 500 cases of LSH. Recent clinical commentary by Munro discussed the pros and cons of LSH in an editorial entitled "Supracervical Hysterectomy: A Time for Reappraisal." We recently published our initial experience with laparoscopic subtotal hysterectomy. In this article, we report our initial experiences with an electromechanical morcellator designed for laparoscopy and describe and discuss in detail our other modifications of LSH that we feel simplifies the procedure, and reduces operative time and intraoperative and postoperative complications.

MATERIALS AND METHODS

From January, 1996 through January, 1997 we reviewed 41 consecutive cases of laparoscopic subtotal hysterectomy performed by our group in Nashville. All operations were performed by the
senior author (JFD) with the assistance of one of the co-authors. The office records and hospital charts for these 41 women were reviewed to determine indications, clinical parameters, operating times, blood loss, length of hospitalization, and complications. All patients were interviewed at least six weeks following discharge from the hospital. Pathology reports were reviewed to obtain uterine weights and final pathologic diagnosis. With our institution of use in January 1996 of the electromechanical surgical morcellator (Karl Storz Endoscopy, Culver City, CA), operating times were monitored for both total operative times and the actual time necessary for laparoscopic morcellation and removal of the fundus of the uterus and/or adnexae. In nineteen cases real time videotapes were available for review and analysis so that exact operative and morcellation times could be obtained for accurate reporting. Findings in these 41 patients were then compared with 20 previous patients who had undergone LSH by the senior author (JFD) without the morcellator between January 1993 and December 1994.10

PATIENT SELECTION
All women underwent preoperative approval for hysterectomy through their insurance carriers, and none were deemed inappropriate candidates for surgery. Postoperatively, when hospital tissue review committees reviewed the charts, no procedures were considered unindicated. All patients were either private patients of the authors or had been referred to the senior author for consideration specifically for laparoscopic subtotal hysterectomy because of desire for retention of the cervix. The patients were all counseled preoperatively concerning the risks versus benefits of subtotal hysterectomy with retention of the cervix. The option of supracervical hysterectomy was offered only to patients who had a normal cervix and no history of any abnormal cervical pathology on Papanicolaou smears. Patients with uterine descensus or cervicitis were not offered this procedure. All patients were informed of the need for and consented to lifetime follow-up Papanicolaou smears following surgery. Indications for hysterectomy included symptomatic uterine fibroids, chronic pelvic pain, chronic menometrorrhagia uncorrectable with hormonal therapy, or endometriosis.

PREOPERATIVE EVALUATION
All patients had a preoperative Papnicolaou smear within three months of the scheduled surgery. Patients over 35 had an endometrial biopsy and ultrasound if clinically indicated. Patients were given the opportunity to bank autologous blood prior to surgery, and were pre-treated with oral iron prophylactically. Ten patients with fibroids and anemia secondary to menorrhagia were pretreated with GnRh analogs for three months preoperatively.

As with our recent clinical practice, we used the most cost effective methods for LSH whenever possible. Lateral 5 mm ports were used and reusable instruments, including all four trocars and sheaths and reusable scissors and Verres needles were used in all cases. After general anesthesia with endotracheal anesthesia, pelvic exam was performed on the patients to confirm the preoperative findings. A reusable uterine manipulator was placed using either a polyp forceps taped to a single toothed tenaculum, or in certain cases with a small uterus, a Hulka tenaculum was inserted. Continuous bladder drainage with a Foley catheter was used intraoperatively. A four-puncture technique was used with a 10 mm reusable cannula infraumbilically and two lateral 5 mm cannulas laterally in each lower quadrant.

These were placed under direct visualization and were placed lateral to the rectus muscle and up out of the pelvis well above the inferior epigastric vessels. This gave a good angle of attack into the pelvis and reduced the risk of bothersome bleeding from the abdominal wall puncture. Another 5 mm reusable cannula was placed suprapubically in the midline approximately 3 cm above the pubic symphysis. A video camera was attached with two videos being made, one edited tape for the patient and one real-time copy of the procedure with sound which could be later reviewed and for timing purposes to monitor the exact time of surgery and morcellation with the electromechanical morcellator. After initial laparoscopic inspection of the pelvis and entire abdomen and an intraoperative phone consultation with the family, the procedure was then commenced.

For tissue separation, bipolar coagulation was applied at 50 watts with 5 mm instruments. Initially a 5 mm disposable Maryland dissector (Everest Medical, Minneapolis, MN) was used for coagulation
and dissection during the LSH with 5 mm reusable scissors for transection. For the last 20 cases, a 5 mm combined coagulating and transecting bipolar forceps (Everest Medical, Minneapolis, MN) was used. (FIGURE 1) With traction and countertraction for adequate exposure, the bipolar coagulating device was used to coagulate and then transect the round ligaments and the infundibulopelvic (IP) ligaments (whenever the adnexae were being removed). Whenever the adnexae were being retained, the same techniques were used to coagulate and transect the round ligaments, proximal fallopian tubes, and ovarian ligaments.

Figure 1. Both the pistol grip handle and the distal grasping and cutting tip of the 5 mm bipolar coagulating and cutting multipurpose handle are illustrated in this figure. Application of finger pressure compresses the jaws of the forceps and the thumb is used to advance the cutting blade when indicated.

Once the upper portions of the fundus had been separated from its lateral attachments, the anterior cervical uterine junction was identified. We did not dissect the bladder peritoneum off of the anterior portion of the cervix, but merely coagulated the serosa transversely with bipolar coagulation forceps just above the level of the vesico uterine fold. In addition, the main branches of the uterine artery and the ureters were not dissected unless adnexal adhesions required this for adequate exposure and to facilitate removal of the adnexae. After coagulating and transecting the upper portions of the broad ligaments, the ascending branches of the uterine vessels were identified and coagulated using the bipolar coagulating forceps and then cut. At all times, care was taken to identify the main branch of the uterine artery and to know that the ureter passes under this visibly pulsing structure.

Since bipolar coagulation was being used, we were aware that temperatures above 50 degrees Centigrade could be reached as far as 1 cm lateral to the edge of any bipolar coagulating device. Thus, we always carefully monitored placement of the tips of the instruments before applying the bipolar energy. We used an amp meter at all times to note when tissue desiccation was completed and when it was thus safe to cut tissue. By using the 5 mm bipolar coagulating multifunction device, we eliminated the problems of cutting with scissors past the tip of the coagulated zone, since the cutting blade could not pass beyond the area of coagulation.

Once the ascending branches of the uterine vessels have been coagulated close to the isthmus of the uterus, the uterus would become discolored from reduced blood supply. Dilute pitressin (20 units diluted in 50 cc of saline) was then injected via a long spinal needle placed directly through the lower abdominal wall into the anterior uterine fundus to reduce cervical small vessel bleeding with separation of the uterus. This was done with the approval and vigilance of the anesthesiologist because of the potential for bradycardia or hypertension with systemic absorption. Whenever possible, the posterior peritoneum over the back of the lower uterine isthmus was coagulated with the bipolar forceps to mark the intended area for transection of the low posterior fundus. At this point, the lateral third of the isthmus just above the cervical uterine junction was transected using 50 watts cutting current with reusable 5 mm unipolar scissors incorporating active electrode monitoring via an integrated electrode (Electroscope, Boulder, CO) to reduce the potential for accidental electrosurgical injuries such as capacitive coupling.

After transecting both lateral thirds of the isthmus, the uterine manipulating device was removed, but the tenaculum was maintained on the cervix for downward traction. Then with traction and counter-traction, the isthmus of the uterus was transected just above the level of the cervical junction, trying to maintain a transverse plane whenever possible. Once the body of the uterus was cut away from the cervix, the cervical stump was coagulated with the bipolar forceps for hemostasis.
The endocervical canal was then coagulated by placing the blunt 5 mm coagulating forceps into the cervical canal, making certain the jaws of the forceps were open and then applying bipolar energy and slowly rotating the forceps so that the entire cervical canal can be thermally coagulated from above with electrosurgery. This was done to hopefully destroy all the endocervical tissue which might lead to later bothersome persistent vaginal spotting.

In the past, we have used various methods for transecting the fundus from the cervix, including a bipolar needle, a harmonic scalpel blade, laser energy, blunt scissors, a 5 mm knife, and unipolar electrosurgical energy with scissors. We found that the 5 mm shielded reusable scissors with unipolar current (50 watts cutting blend 1) gave us the most rapid effective transection of the dense cervical tissue. Care was taken to stay just above the level of the cervix when cutting with the scissors so as not to remove the lateral cervical stroma containing the uterine vessels. Careful coagulation of the exposed ascending branches of the uterine vessels in each lateral cervix was then performed and any small oozing vessels from the cervical body were coagulated with the bipolar coagulating forceps. At this point, the lower 5 mm suprapubic site was converted to a 12 mm reusable sheath through which the electromechanical morcellator was introduced (FIGURE 2).

![Figure 2](image)

**Figure 2.** The Steiner laparoscopic morcellator system consists of a reusable 12 mm sheath and handle and motor driven rotating power cord. The 10 mm sharp cylinder blade rotates rapidly when the foot control to the power source seen here is activated.

The electromechanical morcellator allows a rapidly circulating sharp 10 mm cylinder to be used for tissue coring with a foot control switch. Through this instrument, the uterus and adnexae were grabbed with a 10 mm claw grasper. The tip of the rotating electromechanical morcellator was always kept close to the trocar sheath in the lower abdominal wall and not allowed to "wander" into the abdominal cavity. The tissue was pulled up into the jaws of the rotating sharp cylinder, but the cylinder was not pushed inwards. In this fashion, we were able to minimize the potential for intraabdominal accidents from the sharp rotating blade of the electromechanical morcellator. The long 10 mm cores of tissue were then pulled up out through the 12 mm port and deposited into a sterile pan. When removed, the adnexae were morcellated in a similar fashion.

After the larger portions of the tissue were removed, a 10 mm spoon forceps was introduced and used to pick up the small remaining pieces that may have fragmented during the manipulations. The patient was taken out of Trendelenburg so that any accumulated intraperitoneal fluids would pool in the lower pelvis. These fluids were aspirated and replaced with fresh heparinized Ringers (5,000 units of heparin per 1 L of lactated Ringers). Approximately 200 to 300 cc of fluid containing 2 cc of polymixin, bacitracin, and neomycin was instilled to remain intraperitoneally. Nu-Knit (Johnson & Johnson Medical, Arlington, TX) was then introduced into the abdomen with the spoon forceps through the lower 12 mm trocar sheath and placed over the cervical stump.

This piece of double thickness surgicel is designed specifically for laparoscopic application as a hemostatic agent to augment early postoperative hemostasis. The pneumoperitoneum was evacuated from the abdomen and the laparoscope was then used to inspect all the pedicles with reduced intraperitoneal CO2 pressure. At this point, the lower 12 mm trocar was removed and a reusable Carter-Thompson fascial closure device (Inlet Medical, Eden Prairie, MN) was used to close the lower 12 mm peritoneum and fascia opening with an absorbable suture. The two lateral 5 mm ports were then removed and the puncture wounds inspected for any bleeding. Finally, the umbilical 10 mm reusable sheath was removed and all four skin incisions closed with subcuticular sutures. Postoperatively, the patients were seen four to six hours after surgery, at which time the catheter
was removed. After ambulating, voiding and tolerating oral fluids, patients were discharged in the care of family members.

**FOLLOW-UP**

All patients were seen two and six weeks postoperatively and closely questioned concerning their recovery. They were encouraged to resume their regular activities in two weeks, but to avoid intercourse for one week following surgery. Patients undergoing oophorectomy with no contraindications to estrogen replacement therapy were started on estrogen the day after surgery to help them avoid early postoperative estrogen deficiency symptoms. All patients were again counseled that they must have annual follow-up Pap smears, as well as their routine scheduled gynecologic exams.

**RESULTS**

Clinical indications for hysterectomy in this series are shown in Table 1.

The age range of the patients was 26 to 59 years, with the mean age being 43. Only three patients were under 35 and the youngest patient had severe endometriosis and bilateral endometriomas. Nineteen of the women in this series were nulliparous, with 14 having had previous Cesarean section, but only 8 having experienced a vaginal delivery. Uterine weights ranged from 48 to 569 grams, with a mean weight of 146 grams. The 48 gram uterus was from an 80 pound woman with adenomyosis. Evaluation of hospital days revealed a mean stay of 1.04 days.

Thirty-seven patients were discharged within 23 hours, and the other four stayed 48 hours. Actual time of the operation was calculated from placement of the first trocar until the closure of the 12 mm fascial suture and recorded in each case. Mean operating time was 94 minutes, with the minimum time being 60 minutes and the maximum time 225 minutes. The patient with prolonged operative time reflected an extremely difficult operation. She had a 5 cm broad ligament fibroid and extensive adhesions from two previous open myomectomies which required significant dissection before the LSH could begin. In addition, the morcellator stopped working because of technical error in its assembly, and the majority of the morcellation was carried out with more tedious slower methods. Average blood loss was estimated as 125 cc with a maximum blood loss of 600 cc, and minimum blood loss of 20 cc. No patients received any blood transfusions in this series.

Table 2 summarizes these outcome variables and compares them with our similar findings in our initial report on LSH from 1994. Representative mean hospital costs were calculated excluding surgical, anesthesiology, and pathological fees, and before managed care discounts were included. The mean actual cost for these procedures was $7,998 with a minimum of $6,989 and a maximum charge of $11,581. As expected, this highest charge occurred in the patient with 225 minutes of operative time.

On review of videotapes for this study, only 19 patients had actual real time video covering the full morcellation procedure. By viewing real-time videotapes of these operations it was possible to determine the actual time necessary to perform tissue removal with the electromechanical morcellator. Times for morcellation ranged from 4.2 minutes up to 23 minutes in this group of 19 patients with a mean time of 11.38 minutes.

(Figure 3) illustrates this graphically comparing uterine weights to morcellation times for 19 of 41 patients and demonstrates the relationship between total operative anesthesia time and morcellation times previously described.
Complications in this study were few and included two patients with minimal postoperative cervical bleeding which stopped spontaneously within four months. One other patient who underwent bilateral adnexectomy with the LSH had persistent right lower quadrant pain following surgery and was thought to have probable postoperative adhesions. However, seven months post LSH, she underwent a diagnostic laparoscopy which revealed minimal postsurgical adhesions to the cervical stump and the left lower pelvic sidewall, but no adhesions in the area of her right lower quadrant pain and a normal appendix. With subsequent treatment for spastic colon syndrome, her symptoms resolved.

There was one significant postoperative complication that led to follow-up operative procedures. The patient with significant postoperative complications was a 32 year old 80 pound female with two previous Cesarean deliveries. She had a very small uterus (48 grams) and cervix with endometriosis, adenomyosis, and significant adhesions to the anterior cervix. During this LSH an upper portion of the small cervix on the left side was resected. Because of persistent mild cervical bleeding, a ball electrode was used transcervically three months after the LSH to coagulate the endocervical canal. This was done under laparoscopic visualization which revealed that the remaining left lateral cervix was very small with significant post-operative thermal necrosis. Ten days following this minor second operative procedure, the patient developed profuse cervical bleeding and underwent an emergency laparotomy with trachelectomy to remove a necrotic small residual cervix. At the emergency laparotomy done on a weekend night, the patient was noted to have a very small remaining portion of the left cervical tissue and it was theorized that the final bleeding episode occurred because of sloughing of the medial portions of the cervical branch of the uterine artery entering this area of thermal necrosis.

At six weeks follow-up exam and questioning, all sexually active patients reported satisfactory intercourse without significant dyspareunia. Since no pre-surgical questionnaires of sexual function were used in this study, no attempt was made to assess postoperative sexual function in this group. No patients developed any urinary tract infections or postoperative urinary dysfunction. There were no problems with trocar site hematomas, hernias, or wound healing in this series.

**DISCUSSION**

This short term retrospective study indicates that use of an electromechanical morcellator can enhance LSH. In the past, LSH required a colpotomy, a larger abdominal wall incision, or use of tedious mechanical methods to morcellate the fundus. This device first described by Steiner\textsuperscript{11} rapidly cores the uterus, removes the uterus and adnexae very rapidly, and reduces the operating times. In this study we reduced our average operating times for LSH by 16 minutes which in our operating
room ($15/minute) results in a minimal cost savings alone of $240 per case. Actual dollar costs for LSH in this 1996 series were more than 1994 costs. However, our hospital reported to us annual inflation increases for all LAVH procedures of 8% per annum. Thus in 1994 dollars, costs for this series of operations were calculated to be $881 less per patient.

This method of LSH reduces operator fatigue and avoids colpotomy or larger abdominal wall incisions which can increase morbidity and give poor cosmetic results. Patients in this series were all appreciative of the fact that they only had two visible 5 mm trocar sites in each lateral lower quadrant. The 10 mm umbilical incision was hidden in the umbilicus since it was always made vertically deep down in the umbilicus, and the 12 mm suprapubic trocar site was always hidden in the pubic hair after full recovery from surgery. After personally viewing their videotapes, several patients commented on the fact that this actually was a "sutureless" hysterectomy, since the only sutures used were subcuticular sutures in the abdominal wall and the one fascial closure stitch. No intraabdominal suturing was necessary, since bipolar coagulation was used for occluding all vascular pedicles.

The electromechanical morcellator requires careful coordination between the assistant, the scrub nurse, and the surgeon. The technique that we have developed for morcellator use keeps the 12 mm sheath close to the abdominal wall and pulls the tissue up against the rotating blade held high up in the lower abdomen just outside the tip of the 12 mm sheath. This reduces the chances for inadvertent injury from the sharp rotating blade. By bringing the morcellator in through the lower suprapubic site, we avoid introduction of large trocar sites laterally in the abdomen with the potential sequelae of bleeding, hernia defect or poor cosmetic results. When using the morcellator, it is appropriate to morcellate fibrotic tissue first while the blade is sharpest. In this fashion, dense fibroids can be morcellated before the less dense uterine and adnexal tissues are removed. One should discuss the use of this technique with hospital tissue committees and pathologists before undertaking to use the morcellator, since the pathologists need to be alert to the fact that tissue will be coming to them in long cylindrical cores and thus fragmented. For many years in our hospital we have done morcellation of fibroids using non-mechanical techniques and have yet to encounter any problems with anatomical final pathological diagnosis. The constant fear is that one will morcellate a leiomyosarcoma and the pathologists will be unable to reconstruct the exact location and depth of penetration of the lesion. Clearly, the morcellator should only be used on masses which the operator is confident are benign.

Complications in this study were limited to the cervical stump. In the past, we have used colpotomy on occasion to remove bulky uteri after LSH. With colpotomy, one introduces the potential for ascending infection, cuff cellulitis, and it prolongs the time postoperatively before a patient may have intercourse because of the vaginal sutures. In this series and our previously reported series, we had no bladder or ureteral injuries. This reflects the fact that we do not dissect the bladder in any of our cases. We also do not dissect the ureter, although the ureter is identified and traced in all cases down to where it passes under the uterine artery. If the thermal effect from bipolar cautery stays above the uterine artery, one is unlikely to produce any thermal damage to the ureter which passes beneath that structure.

Since the bladder peritoneum is not dissected anteriorly with our technique, we make no attempts to reperitonealize the cervical stump. We have elected to place Nu-Knit over the cervical stump, which we feel reduces any early minor postoperative oozing. Nu-Knit is double thickness Surgicel (J&J Medical, Arlington, Texas) packaged specifically for laparoscopic application for hemostasis. It dissolves within one hour into a gel similar to Surgicel. There are no studies in humans to suggest that Nu-Knit reduces postoperative adhesions, but theoretically, its hemostatic effects on the cervix should reduce postoperative bleeding and thus the potential for adhesions. We have recently had an opportunity to view the cervical stumps in three patients who had undergone laparoscopic subtotal hysterectomy prior to 1996. In all these patients, adnexal disease led to a repeat laparoscopy. In these patients, there was excellent reperitonealization over the cervix, with no adhesions present. To address the actual instance of adhesion formation after laparoscopic subtotal hysterectomy, one would have to perform second-look laparoscopy in every patient, and this is clearly not indicated.

The main concern of traditional gynecologists who are opposed to LSH is the potential for
subsequent cervical disease that would not occur if the cervix had been removed at the primary operation.\textsuperscript{12} Clearly, in this study and in our group of patients in our previous report from 1994, it is too soon to address the question of subsequent abnormal cervical pathology. To date, we have only had one patient following an LSH in our practice who has developed an abnormal Pap smear. A colposcopy and office biopsy revealed minimal atypia in that patient. It has been proposed by others that a prophylactic cervical conization can be performed at the time of LSH.\textsuperscript{13} The theoretical advantages are that the squamocolumnar junction is removed, and therefore the potential for subsequent abnormal cellular changes is hopefully eliminated. In our previous experience, in two patients in which we did prophylactic cervical conization with LSH, postoperative cervical bleeding occurred, most likely because of excess hyperemia of the cervix from the trauma of the LSH combined with the concomitant conization. In addition, our hospital tissue committee questioned our indications for doing conization in these two patients when there were only normal Pap smears and the final pathology report revealed normal cervical squamocolumnar epithelium. In the eyes of this committee, this was unnecessary and inappropriate surgery with unnecessary risks and costs to the patient. Thus, because of the potential complications of a prophylactic conization combined with the fact that it is unnecessary surgery on normal tissue, we think that elective prophylactic conization with LSH should be abandoned. Instead, patients should be carefully followed after LSH with annual Pap smears and office colposcopy, biopsy and excisional procedures only when clinically indicated. Clearly, patients who are not capable of or available for careful long term postoperative follow-up should not be given the opportunity to undergo LSH.

In the past, a comprehensive review of the early literature on laparoscopic hysterectomies of all types including LSH concluded that the surgical complications are less with all forms of laparoscopic hysterectomy than with abdominal or vaginal hysterectomy.\textsuperscript{14} Another review compared all LAVH types except LSH (3,112 operations) to abdominal hysterectomy (1,118 operations).\textsuperscript{15} This review of 34 reports noted a higher rate of bladder and ureter injuries with LAVH versus TAH. Hopefully our technique for LSH can reduce the risk of urinary tract injury. Recently, a countrywide study from Finland reported on over 70,000 laparoscopies, including both diagnostic and operative.\textsuperscript{16} In that nationwide report, ureteral injuries were .3 per 1,000 and bladder injuries .3 per 1,000. All of those injuries except two occurred after total laparoscopic hysterectomy, but none occurred after LSH. To our knowledge, there has not yet been a report of a ureteral or bladder injury following a laparoscopic subtotal hysterectomy. Obviously, this is a possibility, particularly if bipolar cautery is used too low or too lateral to the cervix. The surgeons must always be aware that lateral thermal damage can occur as much as 1 cm from the edge of the bipolar coagulation instrument.\textsuperscript{17} Such thermal injuries usually present as a later complication after slow thermal necrosis.

Laparoscopic supracervical hysterectomy is a very controversial procedure. Munro recently stated in his excellent clinical summary that "as a result, supracervical hysterectomy could be postulated to be associated with fewer short and long term complications and reduce direct costs of care."\textsuperscript{9} We cannot draw any conclusions until prospective randomized blinded randomized studies have been performed comparing laparoscopic subtotal hysterectomy with other forms of hysterectomy. Such studies have been performed comparing vaginal hysterectomy with laparoscopic hysterectomy,\textsuperscript{18} and also comparing abdominal hysterectomy with laparoscopic assisted vaginal hysterectomy (LAVH).\textsuperscript{19} In the authors' opinion and others',\textsuperscript{15} it would be very difficult in America to enroll patients for a randomized study of LSH versus LAVH or TAH. Patients who are coming to physicians seeking retention of the cervix and who are candidates for having the cervix retained, are not going to volunteer for a study in which they have a 50% chance of having their cervix removed. Because of this fact, any randomized prospective studies comparing LSH to LAVH will be impossible with our patient population.

Bladder function following LSH clearly needs further clinical evaluation. In the past, Kilkku et al\textsuperscript{20} evaluated bladder function symptoms in a non-randomized study of 212 patients undergoing abdominal total or supracervical hysterectomy, and concluded that retaining the cervix reduced the postoperative bladder frequency symptoms. Lalos and Bjerle\textsuperscript{21} evaluated 22 patients equally divided between total abdominal and supracervical hysterectomy comparing objective symptoms and urodynamic studies. They found no differences in either group concerning the frequency of symptoms of incontinence or bladder dysfunction. However, this was a very small study and this
subject clearly needs to be more carefully evaluated in the future.

Unfortunately, since Masters and Johnson, no new pioneer studies on sexual response have appeared in the modern gynecologic literature. The only data available to us is now over a decade old, and concerned patients undergoing abdominal subtotal versus total hysterectomy.\(^2^2\) It is clear that this available data, which was fully reviewed by Hasson\(^5\) fails to demonstrate any difference in sexual function in women undergoing total versus subtotal hysterectomy, either by the abdominal or laparoscopic approach. Problems in scientifically evaluating the complex physiology of the female sexual response will make it very difficult to construct proper studies, particularly if prospective randomized studies are to be employed. We do, however, encourage investigators in the field of female sexual response to consider trying to design and go forward with such studies to address the very important question of the role of the cervix in sexual activity and response.

Several studies have now recently appeared in the literature which clearly show that LAVH of all types reduces operative morbidity, and hastens recovery compared to abdominal hysterectomy.\(^2^3,2^4\) No study yet has carefully evaluated the subgroup of laparoscopic hysterectomies performed by the laparoscopic subtotal approach. However, all of the initial reports of LSH compared to LAVH indicate shorter operating times for LSH, reduced blood loss, and a trend toward lower complication rates, particularly involving infectious processes from the cervical cuff and bladder or ureteral injury. Unfortunately, all of the initial studies involve single operators or groups extremely experienced in operative laparoscopy who are still constantly modifying their techniques. Table 3 lists and compares some of these initial studies.

Many techniques have now been described for laparoscopic subtotal hysterectomy. We feel as ours has evolved, it now combines safety, simplicity, reproducibility, and cost effectiveness. We minimize our use of disposable instruments and use bipolar electrosurgery extensively to allow use of smaller trocar sites and to save money. Our technique of four punctures allows good traction and counter traction during the procedure. Our method for evacuation of smoke and irrigation throughout surgery also allows us basically to utilize a five port technique since the port containing the bipolar device also allows active suction and irrigation at the same time via the trocar stop cock site. Thus, we can enhance the view while constantly irrigating throughout the procedure without wasting a port for constant placement of a suction aspiration device. In addition, the chore of suction of smoke and selected irrigation passes to the scrub nurse, thus freeing both hands of the surgeons. This enhances constant exposure by allowing use of two 5 mm graspers for traction and counter traction.

We all need to be constantly aware of the costs of the items we use in surgery, and whenever safe effective reusable means are available as alternatives to disposable means, we should incorporate those into our therapeutic regimen. This fact has clearly been addressed recently in an excellent editorial by Hurd and Diamond.\(^2^5\) Recent studies in France,\(^2^6\) Switzerland,\(^2^7\) and America\(^2^8\) clearly indicate that disposable laparoscopic instruments can be up to seven times more costly to patients yet show no safety advantages. In the past, the senior author (JFD) reported very high costs for early LAVH cases.\(^2^9\) In retrospect, these high costs reflected high usage of laparoscopic stapling devices and throw-away instruments. Table 4 illustrates our "old" instrument preferences compared with our "new" replacement reusable instruments. From this list one clearly sees where much money was wasted in the past. At current costs to our hospital over $2,000 is saved per operation with our conversion to reusable instrumentation where possible. This has occurred with reduced operating times and no increase in complications.

While costs are of concern, one must always put safety first with all patient care. One example when both safety and costs both are superior is by switching back to reusable 5 mm scissors. A recent study demonstrated in a controlled animal laboratory setting that reusable scissors with thicker insulation are safer for unipolar electrosurgical use at laparoscopy than disposable single use thinner insulated ones.\(^3^0\) Now even safer unipolar electrosurgery is possible at laparoscopy by using scissors or probes that incorporate active electrode monitoring to eliminate the rare but tragic complications from capacitive coupling.\(^3^1\) We advise all careful laparoscopists using unipolar electrosurgery to incorporate this safe feature analogous to automobile airbags into their personal laparoscopic
CONCLUSIONS
Clearly, supracervical hysterectomy is becoming more popular, both among patients and gynecologists in the industrialized world. We feel that with modern office screening and treatment of the cervix, that the argument for routine prophylactic removal of the cervix to eliminate the risk of cervical cancer has become archaic. Do we recommend prophylactic removal of the vagina in women undergoing hysterectomy because of the low theoretical risk of vaginal cancer? Clearly, not. Therefore, why do some physicians still insist on prophylactic removal of the cervix in women who are not at significant risk for cervical cancer and who are committed to careful lifetime follow-up. Many women who in the past have undergone endometrial ablation for treatment of dysfunctional uterine bleeding still have their uterus and cervix intact, leaving them at risk for subsequent cervical (and uterine) pathologies. Obviously, no one argues with this simple operation to minimize treatment for menorrhagia. We agree with Harry Hasson, who has said "the cervix is not a useless organ and should not be removed during hysterectomy without a proper indication."5 It is time to rethink our concepts of removing the cervix and to enhance our personal skills for laparoscopic surgery. Much more clinical investigation is required to address long term benefits of LSH. In addition, classifications of subtotal hysterectomies need to be standardized so that people will be comparing apples to apples when reporting outcomes. Hopefully, in the near future, carefully designed prospective studies of LSH can address some of these critical areas of concern. Such scientific information will be necessary as we continue to strive to develop the most effective, safe, and cost effective method to manage diseases which require hysterectomy among our patients.

Table 1- Indications for LSH - 41 patients

<table>
<thead>
<tr>
<th>Final Pathologic Diagnosis</th>
<th>Indication</th>
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<tbody>
<tr>
<td>Fibroids</td>
<td>23</td>
</tr>
<tr>
<td>Endometriosis</td>
<td>5</td>
</tr>
<tr>
<td>Bleeding</td>
<td>5</td>
</tr>
<tr>
<td>Chronic pelvic pain</td>
<td>3</td>
</tr>
<tr>
<td>Adenomyosis</td>
<td>5</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td><strong>41</strong></td>
</tr>
</tbody>
</table>

Table 2 - Comparison of Study Variable Outcomes

<table>
<thead>
<tr>
<th>Variable</th>
<th>1994 LSH</th>
<th>1996 LSH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cases</td>
<td>20</td>
<td>40</td>
</tr>
<tr>
<td>Average Operating Time (hrs:min)</td>
<td>1:46</td>
<td>1:30</td>
</tr>
<tr>
<td>Average Estimated Blood Loss (mL)</td>
<td>200</td>
<td>125</td>
</tr>
<tr>
<td>Average Hospital Stay (Days)</td>
<td>1.10</td>
<td>1.04</td>
</tr>
<tr>
<td>Number of Complications</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Mean Hospital Costs</td>
<td>$7,501</td>
<td>$6,719</td>
</tr>
</tbody>
</table>

*Not including pathology, anesthesia, managed care discounts or surgeons fees

Inflation corrected cost estimate; actual calculated cost was $7,999.

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Table 3 - Comparative Studies LH versus LSH

<table>
<thead>
<tr>
<th>Operating Authors</th>
<th>Procedure</th>
<th>n</th>
<th>Operating time (min)</th>
<th>Blood loss (mL)</th>
<th>Hospital stay (hr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lyons (1993)</td>
<td>LH</td>
<td>50</td>
<td>145</td>
<td>250</td>
<td>37</td>
</tr>
<tr>
<td></td>
<td>LSH</td>
<td>50</td>
<td>118</td>
<td>50</td>
<td>18</td>
</tr>
<tr>
<td>Richards and Simpkins (1995)</td>
<td>LH</td>
<td>21</td>
<td>117</td>
<td>210</td>
<td>46</td>
</tr>
<tr>
<td></td>
<td>LSH</td>
<td>20</td>
<td>127</td>
<td>179</td>
<td>34</td>
</tr>
<tr>
<td>Lalonde and Daniell (1996)</td>
<td>LH</td>
<td>20</td>
<td>124</td>
<td>245</td>
<td>41</td>
</tr>
<tr>
<td></td>
<td>LSH</td>
<td>20</td>
<td>106</td>
<td>200</td>
<td>26</td>
</tr>
</tbody>
</table>

*LH = laparoscopic hysterectomy; LSH = laparoscopic subtotal hysterectomy*

Table 4 - Comparison of 1991 Instrument Usage for LAVH to 1998 Usage for LSH or LAVH Columbia/HCA Women's Hospital, Nashville, Tennessee

<table>
<thead>
<tr>
<th>Laparoscopic Instrumentation Instruments</th>
<th>&quot;Old&quot; 1991</th>
<th>&quot;New&quot; 1998</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verres needle</td>
<td>All disposable</td>
<td>Reusable</td>
</tr>
<tr>
<td>Trocars and Sheath</td>
<td>Disposable</td>
<td>Reusable, shielded</td>
</tr>
<tr>
<td></td>
<td>10 mm - one</td>
<td>10 mm - one</td>
</tr>
<tr>
<td></td>
<td>12 mm - two</td>
<td>5 mm - three</td>
</tr>
<tr>
<td></td>
<td>5 mm - one</td>
<td>12 mm - one</td>
</tr>
<tr>
<td>5 mm Scissors</td>
<td>Disposable</td>
<td>Reusable, end point safety monitored</td>
</tr>
<tr>
<td></td>
<td>non-safety monitored</td>
<td></td>
</tr>
<tr>
<td>Vascular Occlusion</td>
<td>12 mm cutter handle</td>
<td>5 mm bipolar coagulation/transection forcep (disposable)</td>
</tr>
<tr>
<td></td>
<td>4-6 staple cartridges</td>
<td></td>
</tr>
<tr>
<td>Hydrodissection System</td>
<td>5 mm disposable probe and mechanical Dorsey/ Nezhat Pump system</td>
<td>5 mm suction/aspiration reusable probe PumpVac Plus with 10 cc vacuum syringe (disposable)</td>
</tr>
<tr>
<td>Uterine Manipulator</td>
<td>Disposable systems</td>
<td>Reusable polyp forceps or Hulka tenaculum</td>
</tr>
</tbody>
</table>

*Estimated $2,000 extra costs to patients - 1998 Columbia/HCA contract purchase prices*

References:
References


Source URL:
http://www.obgyn.net/laparoscopy/early-evaluation-electromechanical-morcellator-laparoscopic-supracervical-hysterectomy

Links: