Total laparoscopic hysterectomy for oncological indications with outcomes stratified by age

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Abstract

Objective. We hypothesize that there is no difference in surgical outcomes of patients undergoing total laparoscopic hysterectomy (TLH) for various oncological indications when stratified by age categories.

Methods. Data were analyzed by ANOVA and chi-square test with significance of \( P < 0.05 \), stratified by age (young: <50 years, middle: 50–64, senior age 65+).

Results. There were 208 patients, age 26–86 years: 85 young, 82 middle, and 41 senior women. Preoperative diagnoses included 13 cases of cervical dysplasia, 10 cervical or upper vaginal carcinoma, 60 endometrial neoplasias, 22 prophylaxes of familial ovarian carcinoma, 95 with complex pelvic mass, and 8 with early ovarian carcinoma. Mean body mass index (BMI) was 27.2 kg/m² for all groups. Parity increased with age (1.0, 1.3, and 2.0; \( P = 0.001 \)). Surgical duration was longer for young than middle or senior (168, 147, and 140 min, \( P = 0.0095 \)). All groups had a similar mean blood loss (133 cc, ns) and similar mean length of hospital stay (1.8 days, ns). Overall complication rate was 7.7% with no variance by age: one seroma, one hematoma, one diverticulitis, one incisional hernia, one vaginal nonhealing, one adhesive bowel obstruction, and five urologic complications (two bladder, three ureteral; four treated with catheter or stent, one reimplant. Reoperation was required in 2.8%.

Conclusions. Null hypothesis accepted: TLH appears feasible and safe for oncological practice indications throughout the life span. This pilot data can facilitate guidelines for a randomized controlled trial of TLH with TAH and laparoscopic assisted vaginal hysterectomy (LAVH).

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Keywords: Total laparoscopic hysterectomy; Age; Laparoscopic assisted vaginal hysterectomy

Introduction

Traditional therapy for persistent complex pelvic mass, endometrial pathology, and cervical and vaginal neoplasia most often includes hysterectomy and most often by open laparotomy. Laparoscopic assisted vaginal hysterectomy (LAVH) has been described as an alternative to laparotomy in oncological practice because the laparoscopic approach confers similar overall complication rates, less blood loss, slightly longer operating times, fewer transfusions, less pain, and shorter hospital stay and disability [1–7]. However, LAVH is predicated upon the ability to resect the cervix and lower uterine segment and close the vaginal incision through the vagina from below. Nulliparous, senior, and obese women who are at increased risk for ovarian and uterine cancer may thus not qualify for LAVH due to insufficient uterine prolapse or small vaginal

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capacity. Thus, since 1996, we have employed a total laparoscopic hysterectomy (TLH) technique because it is quicker and associated with less blood loss than LAVH [8,9] and is more available to senior, nulliparous, and obese women [10,11].

Senior patients undergoing hysterectomy have typically received an open laparotomy with an acceptably higher rate of complications such as wound infection, pelvic abscess, and dehiscence than observed in younger patients [12]. A recent retrospective report of laparoscopic gastric bypass experience showed no increase in morbidity for patients over age 50 with the laparoscopic approach in comparison with an open technique [13]. It would be important to record this data from a series of senior patients undergoing laparoscopic hysterectomy to confirm safety issues and to facilitate planning a prospective trial. While a randomized clinical trial would be the standard for comparing the safety, efficacy, and complication rates of open hysterectomy versus laparoscopic hysterectomy for senior women, there are, as yet, no large cohort reviews to serve as pilot data focusing on safety and feasibility outcomes as they relate to age.

In this retrospective report, the office charts of oncological patients undergoing TLH as part of their care plan were abstracted for demographics, preoperative indications, surgical and pathological data, and complications and are analyzed with outcomes stratified by age categories. We hypothesize that there is no difference in surgical outcomes of patients undergoing total laparoscopic hysterectomy (TLH) for oncological indications when they are stratified by age categories.

**Patients and methods**

**Retrospective study design**

Of 451 recorded cases of total laparoscopic hysterectomy performed over an 84-month period, there were 211 cases performed for management of cervical dysplasia, cervical or upper vaginal carcinoma, endometrial hyperplasia, carcinoma and sarcoma, complex pelvic mass, early ovarian carcinoma, and prophylaxis of familial ovarian carcinoma. The cases were stratified into three age categories (young: <50 years, middle 50–64, senior age 65+) to correlate with increasing likelihood of cardiac morbidity due to the negative impact on cardiac output and systemic vascular resistance by pneumoperitoneum [14].

All surgeries were assisted by a categorical obstetrics and gynecology resident or, less often, by an attending specialized in obstetrics and gynecology who was also actively learning the technique. In this practice, every patient needing hysterectomy was scheduled for a laparoscopic approach unless she had prior surgical reports documenting severe abdominal or intestinal adhesions, clinical or radiographic evidence of metastatic carcinoma, or documented severe pulmonary disease, contraindicating prolonged steep Trendelenburg position. TLH means all surgery was performed entirely through the laparoscopic ports, including the closure of the vagina [15]. Simple total laparoscopic hysterectomy was performed for all cases of cervical dysplasia, cervical carcinoma with invasion less than 3.0 mm, endometrial hyperplasia, carcinoma, and ovarian neoplasia. A radical hysterectomy was performed for cases with invasive cervical carcinoma with invasion deeper than 3.0 mm. All pelvic masses were removed without intraperitoneal spillage in a 5 × 8 or 8 × 15 in. ripstop nylon sack with a purse string (Lapsac, Cook Surgical, Chicago, IL). The opening of the elongate sack was delivered out of the vagina by the purse string, allowing a speculum to be passed into the bag as it exits the introitus. Under direct visualization through the speculum, the mass was incised allowing any cystic material to pour out of the bag into a basin, collapsing the mass within the bag and permitting removal without intraperitoneal spillage. The nodes and omentum were delivered through the vagina. Staging was performed for all invasive cervical, uterine, and ovarian malignancies and included hysterectomy, pelvic, and aortic lymph node dissections, with omentectomy, appendectomy, and peritoneal washings and biopsies as appropriate. The hysterectomy procedure is described in detail elsewhere [10]. Many additional procedures were then performed for pelvic prolapse, incontinence, and other diagnoses such as cholelithiasis. Then the vaginal apex was closed, fixing the lateral vaginal angle to the uterosacral and round ligaments for suspension.

All patients were given printed information about their surgery: bowel prep, inpatient care, postoperative instructions, and home recovery. Discharge instructions encouraged early resumption of all general activities as soon as tolerated, including floor exercises, and return to unrestricted work at 2 weeks. Patients were seen for an abdominal incision check at 10 days after discharge and for vaginal check at 6 weeks. Patients were instructed not to engage in any vaginal penetration until after they received clearance at their 6-week vaginal check-up.

This data set has been reviewed with reports published earlier on 330 patients with data stratified by body mass index [10] and on 90 patients who had a pelvic mass [16].

**Data management and analysis**

Charts were reviewed for anonymous compilation of patient data regarding age, height, weight, parity, preoperative diagnosis, procedure(s), estimated blood loss (EBL), duration of surgery, duration of hospital stay, pathologic data including uterine dimensions, weight, cancer characteristics such as depth of invasion, grade, pelvic cytologic washings, number of nodes dissected, and complications. The data were analyzed on an SPSS statistical analysis package, using ANOVA and t test for comparison of continuous data, and chi-square analyses including Fisher’s
**Table 1**

<table>
<thead>
<tr>
<th>Patient demographics stratified by age category*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Young</td>
</tr>
<tr>
<td>((n = 85))</td>
</tr>
<tr>
<td>M (SD)</td>
</tr>
<tr>
<td>Age (years)</td>
</tr>
<tr>
<td>Parity</td>
</tr>
<tr>
<td>Body mass index</td>
</tr>
</tbody>
</table>

\( ^a \) All three categories significantly different from each other by post hoc analysis.

\( ^b \) Only young vs. senior and middle vs. senior significantly different by post hoc analysis.

\( ^c \) ANOVA.

**Results**

Among 211 patients identified with oncological indications for their hysterectomy (cervical dysplasia, cervical or upper vaginal carcinoma, endometrial hyperplasia, carcinoma, and sarcoma, complex pelvic mass, early ovarian carcinoma, mutation of BrCa 1 or 2, or family history of ovarian cancer), none was disqualified from a laparoscopic approach due to pulmonary disease or adhesions. There were three patients (1.4%) converted to open laparotomy early in the series. Two were converted at an outlying hospital because of equipment inadequacies (one young, one middle category of age). One was converted because of the unexpected finding of widespread intraperitoneal metastatic cancer (middle category). Of the remaining 208 cases, 85 were young with group average age of 42.5 years, 82 were in the middle category with group average of 55.3 years, and 41 were senior with mean age of 72.1 (Table 1). The mean parity was 1.0 for the young, 1.3 for the middle, and 2.0 for the senior women (\( P = 0.001 \)), ranging from 0 to 9. Overall, 36% of the patients were nulliparous. The mean body mass index (BMI) was 27.3 for all three groups (\( P = 0.785 \)), ranging from 17 to 54.1.

The preoperative indication for surgery varied significantly by age category with 23 cases of vaginal or cervical neoplasias, 125 cases with ovarian indications, and 60 cases with uterine neoplasia (Table 2). Senior women were more likely to have uterine neoplasia (14.1%, 30.5%, 56.1%; \( P = 0.0001 \)) while younger women were more likely to have cervical or vaginal neoplasia (17.6%, 8.5%, 2.4%; \( P = 0.0215 \)) or ovarian indications (68.2%, 61.0%, 41.4%; \( P < 0.0163 \)).

The surgery durations decreased with increasing age category, with young category surgeries lasting 2.8 h, middle category surgeries lasting 2.5 h, and senior category surgeries lasting 2.3 h (\( P = 0.0095 \)) (Table 3). The estimated blood loss did not vary by age, averaging 133 cc per case (\( P = 0.1210 \)), ranging 0–1000, with 93 cases having less than 50 cc blood loss. While the mean hospital stay was 1.8 days for all age categories (\( P = 0.2302 \)), 95 patients stayed only 1 day.

The mean uterine weight was 177 g in the young category, 128 g in the middle category, and 96 g in the senior category (\( P = 0.0011 \)) (Table 4). Thirteen women had uteri weighing between 300 and 800 g. The mean size of the adnexal mass was 8.4 cm (range 3–19) in the 71 cases with a preoperative diagnosis of complex pelvic mass, with no significant difference between the three groups of patients (\( P = 0.9877 \)). A radical lymphadenectomy was performed with radical hysterectomy in nine cases yielding a mean of 26 nodes without variance by age group (\( P = 0.3844 \)) ranging from 16 to 55 nodes. Nodes were sampled in 21 cases with a mean of 17 obtained per case, ranging from 4 to 29, without variance by age category (\( P = 0.4427 \)).

Ninety-eight patients had additional procedures including 27 appendectomies, 10 omentectomies, 30 lymph node

**Table 2**

<table>
<thead>
<tr>
<th>Preoperative Diagnosis</th>
<th>Young</th>
<th>Middle</th>
<th>Senior</th>
<th>( P ) value</th>
</tr>
</thead>
<tbody>
<tr>
<td>((n = 85))</td>
<td>((n = 82))</td>
<td>((n = 41))</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vaginal or cervical neoplasia</td>
<td>15 (17.6)</td>
<td>7 (8.5)</td>
<td>1 (2.4)</td>
<td>( 0.0215 )</td>
</tr>
<tr>
<td>Vaginal carcinoma</td>
<td>1 (1.2)</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Cervical dysplasia</td>
<td>7 (8.2)</td>
<td>5 (6.1)</td>
<td>1 (2.4)</td>
<td></td>
</tr>
<tr>
<td>Cervical carcinoma</td>
<td>7 (8.2)</td>
<td>2 (2.4)</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Uterine neoplasia</td>
<td>12 (14.1)</td>
<td>25 (30.5)</td>
<td>23 (56.1)</td>
<td>( 0.0001 )</td>
</tr>
<tr>
<td>Endometrial hyperplasia</td>
<td>3 (3.5)</td>
<td>5 (6.1)</td>
<td>4 (9.7)</td>
<td></td>
</tr>
<tr>
<td>Endometrial carcinoma/sarcoma</td>
<td>9 (10.6)</td>
<td>20 (24.4)</td>
<td>19 (46.3)</td>
<td></td>
</tr>
<tr>
<td>Ovarian pathology or risk</td>
<td>58 (68.2)</td>
<td>50 (61.0)</td>
<td>17 (41.4)</td>
<td>( 0.0163 )</td>
</tr>
<tr>
<td>Familial history breast/ovary cancer</td>
<td>8 (9.4)</td>
<td>9 (11.0)</td>
<td>5 (12.2)</td>
<td></td>
</tr>
<tr>
<td>Pelvic mass</td>
<td>44 (51.8)</td>
<td>39 (47.6)</td>
<td>12 (29.3)</td>
<td></td>
</tr>
<tr>
<td>Ovarian carcinoma</td>
<td>6 (9.4)</td>
<td>2 (2.4)</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

\( * \) Chi-square test.

**Table 3**

<table>
<thead>
<tr>
<th>Surgical data stratified by age category*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Young</td>
</tr>
<tr>
<td>((n = 85))</td>
</tr>
<tr>
<td>M (SD)</td>
</tr>
<tr>
<td>Duration of surgery (min)</td>
</tr>
<tr>
<td>Estimated blood loss (cc)</td>
</tr>
<tr>
<td>Length of hospital stay (days)</td>
</tr>
</tbody>
</table>

\( ^a \) The young category had significantly longer operating times than middle or senior in post hoc analysis.

\( ^* \) ANOVA.
Radical node adnexectomy and no additional procedures (Table 6). performed on cases having only simple hysterectomy or duration, blood loss, and length of hospital stay was salpingo-oophorectomy per se, an analysis of surgical the data on the laparoscopic hysterectomy and bilateral procedures were included, as needed by the patient. In other gynecological, oncological, and nongynecological dissections (9 radical, 21 samplings), 9 ureterolyses, 6 Burch procedures, and 3 cholecystectomies (these by a general surgeon) (Table 5). However, the specific times required for these additional procedures were not recorded or subtracted from the duration of surgery.

The preceding analyses have included cases in which other gynecological, oncological, and nongynecological procedures were included, as needed by the patient. In order to analyze the data for simple hysterectomy only and to determine if the additional surgical procedures skewed the data on the laparoscopic hysterectomy and bilateral salpingo-oophorectomy per se, an analysis of surgical duration, blood loss, and length of hospital stay was performed on cases having only simple hysterectomy or adnexectomy and no additional procedures (Table 6). Among these 155 patients, there were no differences in surgicopathologic variables between the age groups. For the patients who had only simple hysterectomy or adnexectomy

Table 4
Pathologic data stratified by age category (Tukey–Kramer) Young Middle Senior P value
(n = 85) (n = 82) (n = 41) (SD) (SD) (SD)
Pathology of uterusa Length (cm) 9.2 (1.9) 8.4 (2.2) 7.5 (1.6) 0.0001b Width (cm) 6.3 (1.9) 5.7 (1.4) 4.9 (1.1) 0.0001b Depth (cm) 4.4 (1.5) 3.9 (1.4) 3.4 (1.0) 0.0005b Weight (g) 177 (145) 128 (86) 96 (51) 0.0011b Ovarian mass (cm) 8.3 (3.7) 8.3 (7.5) 8.6 (5.1) 0.9877b
Radical node Dissect® 28.2 (15.2) 17.5 (2.1) 0.3844b Node sampling® 13.9 (7.7) 15.1 (8.5) 0.4427

a All three categories significantly different from each other by multiple specific comparisons.
Young from middle and young from senior significantly different by multiple specific comparisons.
Ovarian dimensions only included for 74 patients with neoplastic enlarged ovaries.
Node counts are from 19 of the 21 patients sampled and from nine patients having radical dissection.

and no other procedure, the mean operating time was 134 min, with 21 completed in 90 min.

Final pathology diagnoses (Table 7) confirmed 1 vaginal carcinoma, 12 cervical dysplasias, 10 cervical carcinomas, 13 endometrial hyperplasias, 43 endometrial carcinomas or sarcomas, 10 ovarian carcinomas, 1 breast cancer recurrence, and 117 with benign ovarian neoplasias and findings. Lower tract neoplasia (P = 0.0250) and ovarian neoplasia or indications (P = 0.0268) were associated with younger age category, while endometrial neoplasia (P = 0.0001) was associated with senior age category.

The overall complication rate for the series was 7.7% without variance by age category (P = 0.3778) (Table 8). These include one case of diverticulitis, one seroma, one hematoma evacuated, one bowel obstruction from adhesions, one vaginal perforation during sex at 6 weeks, and five urologic injuries: two cystotomies with immediate intraoperative repair, one bladder fistula catheterized, one stented ureteral fistula, and one reimplemented ureteral fistula among three patients in the young and two patients in the middle categories for age, with no senior category patients having urologic complications.

One patient developed postoperative herniation of the small bowel into a lateral 10-mm trochar incision. Our

Table 7
Final diagnosis stratified by age category* Young Middle Senior P value
(n = 85) (n = 82) (n = 41) (n %)
Vaginal cervical neoplasia 15 (17.6) 7 (8.5) 1 (2.4) 0.0250
Vaginal carcinoma 1 (1.2) 0 0
Cervical dysplasia 7 (8.3) 4 (4.9) 1 (2.4)
Cervical carcinoma 7 (8.2) 3 (3.7) 0
(2 IIA, 8 IB1)
Uterine neoplasia 11 (12.9) 23 (28.0) 22 (53.7) 0.0001
Endometrial hyperplasia 3 (3.5) 5 (6.1) 5 (12.2)
Endometrial carcinoma/sarcoma 8 (9.4) 18 (22.0) 17 (41.5)
(18 IA, 13 IB, 5 IC, 3 IIB, 2 IIIA, 2 IIIB)
Ovarian neoplasia/indications 59 (69.4) 52 (63.4) 18 (43.9) 0.0268
Benign 53 (62.4) 46 (56.1) 18 (43.9)
Ovarian carcinoma (4 IA, 2 IB, 2 IC, 2 IIC, 1 IIIB)
Metastatic breast carcinoma 1 (1.2) 0 0
* Chi-square test.
of the lower uterine section. This injury occurred in an area
resolved with intravenous antibiotics and a low residue diet.

and familiar left lower quadrant pain. Her symptoms
known diverticulitis was associated with a low-grade fever
not reveal an abscess. The exacerbation of one patient's
Needle aspiration of the fluid relieved her discomfort but did
CT scan revealed a small fluid collection in the pelvis.

postoperatively and had no leukocytosis or fever, but a
symptomatic relief. The other patient presented with pelvic
by pelvic hematoma and symptomatic seroma. The post-
the postoperative courses of two patients were complicated
redundant portion of the sigmoid colon immediately behind
simple lysis of adhesions by laparoscope with immediate
adhesions of the distal ileum to the vaginal apex. She had
returned to her usual sexual activity.

recurrence of the traumatic vaginal dehiscence and has
deep penetration for another 6 months. She has not had
any penetration for another 6 weeks and then to avoid very
depth penetration for another 6 months. She has not had
recurrence of the traumatic vaginal dehiscence and has
returned to her usual sexual activity.

One patient developed a small bowel obstruction from
adhesions of the distal ileum to the vaginal apex. She had
simple lysis of adhesions by laparoscope with immediate
resolution of symptoms. Prior to removing the instruments
at the end of every case, we now attempt to place the
redundant portion of the sigmoid colon immediately behind
the raw vaginal apex, but this is not always possible.

Despite having unrewarding findings at both operations,
the postoperative courses of two patients were complicated
by pelvic hematoma and symptomatic seroma. The post-
operative hematoma was evacuated laparoscopically for
symptomatic relief. The other patient presented with pelvic
pain postoperatively and had no leukocytosis or fever, but a
CT scan revealed a small fluid collection in the pelvis.
Needle aspiration of the fluid relieved her discomfort but did
not reveal an abscess. The exacerbation of one patient’s
known diverticulitis was associated with a low-grade fever
and familiar left lower quadrant pain. Her symptoms
resolved with intravenous antibiotics and a low residue diet.

One patient with two prior cesarean deliveries had
preoperative warning that uterine scarring may increase
her risk of bladder injury during dissection of the bladder off
of the lower uterine section. This injury occurred in an area
of thinning of the bladder wall within the cesarean scar on
the uterus. A second patient had cystotomy during

Discussion

Uterine, ovarian, and cervical neoplasias constitute the
custom oncological indications for hysterectomy; how-
ever, patients may also prefer to have hysterectomy in
association with any of these indications to reduce bother-
some gynecologic symptomatology and reduce future
cancer risk. While the cervical neoplasia rate remains
constant with age [17], the rates of uterine and ovarian
cancer increase with advancing age [18]. Among women
with BrCa 1 or 2 mutation or a history of breast cancer,
especially if they are taking Tamoxifen [19], both ovarian
and uterine cancers have been observed at higher than
expected rates, justifying that hysterectomy be offered at the
time of prophylactic oophorectomy [17]. This also sim-
plies their future decisions about hormone replacement
therapy, if needed, and ameliorates any menorrhagia or
dysmenorrhea. While we and others have demonstrated the
safety and feasibility of laparoscopic hysterectomy and
staging procedures to prevent [20], diagnose [21], or stage
[22–25] these early cancers, the current body of literature
suffers from a paucity of data regarding the potential
fluence of age on outcomes and complication rates on
total laparoscopic hysterectomy [26–28].

Three age categories were selected to reflect the
incremental likelihood of cardiac comorbidities. Pneumo-
peritoneum decreases cardiac output and increases systemic
vascular resistance [14], and both of these increase risk of

Table 8
Complications stratified by age category

<table>
<thead>
<tr>
<th>Complication</th>
<th>Young (n = 85)</th>
<th>Middle (n = 82)</th>
<th>Senior (n = 41)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diverticulitis</td>
<td>0</td>
<td>0</td>
<td>1 (2.4)</td>
<td></td>
</tr>
<tr>
<td>SBO from vaginal adhesions</td>
<td>1 (1.2)</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Traumatic vaginal dehiscence</td>
<td>0</td>
<td>1 (1.2)</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Incisional hernia</td>
<td>1 (1.2)</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Seroma</td>
<td>1 (1.2)</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Hematoma</td>
<td>0</td>
<td>0</td>
<td>1 (2.4)</td>
<td></td>
</tr>
<tr>
<td>Urologic subtotal</td>
<td>3 (3.5)</td>
<td>2 (2.4)</td>
<td>0</td>
<td>0.4797</td>
</tr>
<tr>
<td>Cystotomy repaired</td>
<td>1 (1.2)</td>
<td>1 (1.2)</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Bladder fistula catheterized</td>
<td>1 (1.2)</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Ureter fistula stented</td>
<td>1 (1.2)</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Ureter fistula reimplanted</td>
<td>0</td>
<td>1 (1.2)</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Total complications</td>
<td>9 (10.6)</td>
<td>5 (6.1)</td>
<td>2 (4.9)</td>
<td>0.3778</td>
</tr>
<tr>
<td>Required reoperation</td>
<td>3 (3.5)</td>
<td>2 (2.4)</td>
<td>1 (2.4)</td>
<td>0.8988</td>
</tr>
</tbody>
</table>

* Chi-square test.
cardiac disease. These changes would have minimal effect on younger women but could be incrementally deleterious for women past age 50 when heart and lung diseases begin to present and potentially pose more significant threat past age 65, when heart and lung diseases are epidemic [12]. In addition, respiratory mechanics can be adversely affected by the pneumoperitoneum [29]. Higher than usual inspiratory pressures are often needed when ventilatory compliance is reduced, as in Trendelenburg position [30]. In this report, we have addressed the concerns about performing a hysterectomy as part of the laparoscopic management of women with cervical or vaginal neoplasmia and cancer, endometrial hyperplasia and cancer, and pelvic mass as well as ovarian cancer, with particular focus on outcomes stratified by age.

Despite our standard of not offering the laparoscopic approach to women with severe adhesions or pulmonary disease, no patients were turned down for a TLH for these reasons. Additionally, there were no respiratory or cardiac complications in this series or in the series of 451 patients from which it was drawn.

Many are concerned that there are significantly longer operating times with a laparoscopic approach, especially as reported with the LAVH [31]. However, our data confirm reasonable operating times (about 2.5 h on average) and no deleterious changes with age. Operating times were significantly shorter in the senior group. The significantly smaller weight and dimensions of the uterus could account for this difference. The operating times for our patients included many younger patients having additional procedures, such as cholecystectomy, node dissection, Burch colpopexy, omentectomy, appendectomy, and fulgeration of endometriosis. Although inclusion of these cases with additional procedures certainly confounds interpretation of the operating times for hysterectomy, this retrospective clinical series reflects the spectrum of surgical procedures realistically performed concomitantly in gynecologic oncology practice.

There was no difference in blood loss by age category; however, blood loss decreased with experience as 23 of the last 40 patients in the series lost 0–50 cc of blood.

The durations of stay in the hospital showed a trend to increase with age, but hospital stays for all patients continue to decrease in the series, with 36 of the last 40 patients going home on postoperative day 1.

Our node dissections, both radical and sampling, yielded similar numbers of nodes as reported for other resections or samplings [32,33] with no attributable complications.

With open laparotomy, senior women have been shown to have a higher incidence of surgical and medical complications resulting in extended hospitalizations and additional procedures compared with younger women [12]. In a series of 471 patients undergoing abdominal hysterectomy for benign disease and with small uteri (<280 g), the complication rate was 13.3% [34]. Complications in our series occurred in 7.7% of patients with no variance by age category. Overall, five patients, or 2.4%, sustained a urologic injury, three bladder and two ureteral, and none occurring within the senior category. This rate is similar to recent laparoscopic reports ranging from 3.4% to 8.3% [35–37] and gives credence to the learning curve concept [38]. The lessons learned from these early complications have prevented further injuries in the latter two thirds of our series. Increased expertise has resulted in decreased blood loss, shorter hospitalizations, and fewer complications. Laparoscopic surgeons are urged to perform their initial series of total laparoscopic hysterectomies with trained colleagues.

We believe that the learning curve for TLH exists because the procedure is not yet being taught in residency training programs. Surgeons who have developed their own TLH techniques, well outside of their residency training, generate the many reports of complications describing “learning curves” [35–38]. If randomized trials confirm the utility of the TLH approach, learning curves will be avoided by meticulous residency training as is currently provided for abdominal and vaginal hysterectomy approaches.

Although all the patients operated on in this series remain alive without disease recurrence, no conclusions can be drawn as to the suitability of TLH in cancer management regarding survival because the series is too small. Our goal was to review the use of TLH as might be employed in a typical gynecologic oncology practice to highlight safety and feasibility issues that would facilitate planning of randomized trials.

In this series, 36% of the patients were nulliparous, 52% were overweight or obese, and 19% were both nulliparous and overweight or obese, rendering LAVH impractical for most [39,40]. In previous studies, we have confirmed that a total laparoscopic approach is facile and efficient for nulliparous women [38,41,42] and useful also for women with high BMI [11].

Even for women with descensus and vaginal capacity, we still plan and perform the entire surgery laparoscopically. This is in part because vaginal hysterectomies have been associated with higher risk of posthysterectomy urinary incontinence and vault prolapse [43–45]; but also because we prefer to prevent prolapse by suturing the lateral vaginal apices to the uterosacral ligaments. This provides visible elevation and support to the vaginal apex not achievable from below.

Interpretation of the data from this retrospective observational series carries many challenges regarding both validity and utility. First, the initial nonrandom, clinically based assignment of laparoscopic approach introduces selection bias with regard to comorbidities, even though no patients have been excluded from TLH due to their age, obesity, adhesions, or cardiopulmonary comorbidity. Every patient needing hysterectomy had a laparoscopic approach scheduled from the outset in the absence of prior surgeries documenting severe adhesions. While this standard introduces some degree of selection bias, it is likely that such
bias will not pose problem in the suggested randomized clinical trials. Additionally, our excluding patients with metastatic disease may confound interpretation of the applicability of TLH, but these are warnings for open surgeries as well. We have piloted these guidelines for assignment of approach to reflect the wisdom of current clinical laparoscopic surgical safety standards [14,46,47] and believe that they will be useful in randomized trials as well.

Second, this methodology is limited in terms of generalizability, as many other gynecologic surgeons may not have the laparoscopic experience to begin to perform this procedure, with a resultant higher complication rate. They may learn it on their own, with a resultant higher morbidity and steeper learning curve.

Third, there are many patient variables that were not abstracted or analyzed in this small observational series such as nutritional status and other significant medical comorbidities, which make broad conclusions in this retrospective study difficult.

Lastly, there were over 173 additional procedures performed concomitantly with the hysterectomy, contributing to complications, blood loss, durations of surgeries, and length of hospital stay. This reflects the standard practice of gynecologic oncologists to address pelvic floor dysfunction, adhesions, and anomalous findings at surgery. This report shows that total laparoscopic hysterectomy can be offered to select patients without significant increase in morbidity due to age. Future randomized study protocols should ideally control for patients’ baseline health and allow for additional procedures, which are then accounted for in the analysis.

Conclusions

Total laparoscopic hysterectomy appears to be feasible and safe for women of all ages who require surgical management of gynecologic pathology. When patients are stratified by age, the duration of surgery, blood loss, length of hospital stay, and complication rates do not increase with increasing age. This report provides descriptive data regarding surgical and postoperative parameters, discusses complications, and highlights clinical considerations that are important to the safety and design of randomized, clinical trials. Based on this cohort of cases, randomized prospective studies of TLH are warranted to validate the utility of this approach, with attention to both short- and long-term complications in all ages of women.

References


