The Skinny on the Mini: Minilaparoscopy, LESS, Robotic Single-Site and the Next Frontier in Alternative Access (Didactic)

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Target Audience
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The Skinny on the Mini: Minilaparoscopy, LESS, Robotic Single-Site and the Next Frontier in Alternative Access (Didactic)

Amanda Nickles Fader, Chair
Fatih Sendag, Co-Chair

Faculty: David M. Boruta, Pedro F. Escobar, Fabio Ghezzi, Pedro T. Ramirez, Stacey A. Scheib, Kevin J.E. Stepp, Edward J. Tanner

Over the past decade, strategies to reduce the invasiveness of minimally invasive surgery and the morbidity of conventional laparoscopic access techniques have been increasingly explored. Among them are laparoscopic and robotic single-site and reduced-port surgical approaches, with a growing number of applications. Additionally, microlaparoscopy, with a decrease in instrument size, and deployable instruments and retraction techniques that do not occupy a trocar, are other methods to reduce surgical trauma. As MIS evolves further, which of these will ultimately be adopted by gynecologic surgeons and take reduction of incisions to its maximal potential? This session will explore these issues, including how to achieve safe conventional laparoscopic access in complex surgical patients, some of the latest technologies designed to facilitate single-site and microlaparoscopic procedures, and discussion of evidence-based information regarding what is currently known in terms of benefits and risks. Laparoscopic and robotic innovations that are likely to govern major changes to the current gynecologic surgery landscape are critically appraised. Attendees will be well positioned to decide which strategies they may wish to incorporate into their practices and understand the technologies that are shaping the future of gynecologic surgery.

Learning Objectives: At the conclusion of this activity, the clinician will be able to: 1) Recognize the evidence supporting alternative laparoscopic abdominal access techniques; 2) identify the safest techniques for conventional laparoscopic abdominal access in obese, pregnant or surgically challenging patients; 3) identify applications in reduced port, single-site surgery and microlaparoscopy; 4) apply new technologies and devices safely and cost efficiently to their practice; and 5) appraise emerging minimally invasive technologies and their utility in gynecologic surgery.

Course Outline

1:30 Welcome, Introductions and Course Overview  
A.N. Fader

1:35 Conventional Laparoscopic Access Techniques: A Review and Critical Appraisal  
E.J. Tanner

2:00 Optimal Laparoscopic Access in the Morbidly Obese or Surgically Complex Patient: Cases and Discussion  
A.N. Fader

2:30 Why Laparoendoscopic Single-Site Surgery (LESS) Matters: Practical Applications  
F. Sendag

2:50 A Step-by-Step Approach to LESS Hysterectomy: An AAGL Task Force Initiative  
K.J.E. Stepp

3:15 Laparoscopic Access in Pregnancy: LESS and More  
S.A. Scheib

3:35 Questions and Break  
All Faculty
<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Presenter</th>
</tr>
</thead>
<tbody>
<tr>
<td>3:50</td>
<td>Domo Arigato, Mister Roboto: Single-Site Robotic Surgery (R-LESS) in Gynecology</td>
<td>A.N. Fader</td>
</tr>
<tr>
<td>4:15</td>
<td>Debate: Should LESS or R-LESS Be Incorporated into the Gynecologic Surgical Armamentarium? Pro LESS Pro R-LESS</td>
<td>D.M. Boruta P.F. Escobar</td>
</tr>
<tr>
<td>4:35</td>
<td>Microlaparoscopy and Deployable Instruments: The Miniaturation of Gynecologic Surgery</td>
<td>F. Ghezzi</td>
</tr>
<tr>
<td>5:00</td>
<td>Integration of New Surgical Technology in the Operating Room: A Blueprint for Patient Safety and Quality</td>
<td>P.T. Ramirez</td>
</tr>
<tr>
<td>5:25</td>
<td>Questions &amp; Answers</td>
<td>All Faculty</td>
</tr>
<tr>
<td>5:30</td>
<td>Course Evaluation/Adjourn</td>
<td></td>
</tr>
</tbody>
</table>
PLANNER DISCLOSURE
The following members of AAGL have been involved in the educational planning of this workshop and have no conflict of interest to disclose (in alphabetical order by last name).
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Amanda Nickles Fader*
Pedro T. Ramirez*
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Consultant: Covidien
Fatih Sendag*
Kevin J.E. Stepp
Consultant: American Medical Systems, Covidien
Speakers Bureau: Covidien, Stryker Endoscopy
Stock Ownership: Titan Medical
Edward J. Tanner*

Asterisk (*) denotes no financial relationships to disclose.
Conventional Laparoscopic Access Techniques
A Review and Critical Appraisal
Edward Tanner, M.D.
Assistant Professor, Gynecologic Oncology
Director of Robotics, Gynecology
Johns Hopkins University

- I have no financial relationships to disclose.

OBJECTIVES

- Identify the safest techniques for conventional laparoscopic abdominal access

Minimally Invasive Gynecologic Surgery
Route of Hysterectomy at 441 U.S. Hospitals: 2007 - 2010

Laparoscopic Entry Techniques
Factors to Consider

Closed
Veress needle
Optical trocars
Direct trocar insertion

Open
Hassan
Closed Entry Techniques

Veress Needle

- Fast
- Easy
- Safe?

- Vascular injury: 0.5 per 1000 cases
- Bowel injury: 0.4 per 1000 cases
- Failed insufflation


- Veress needle entry angle
- Abdominal wall elevation
- Needle safety tests
- Number of access attempts


- 45° in thin patients
- Up to 90° in obese patients

Baggish M, 2012 (image).

- Abdominal Wall Elevation

- Limited data evaluating efficacy
- One small RCT (n=150) demonstrated no benefit


- Elevation of fascia at umbilicus increases distance to bowel and retroperitoneum

Closed Entry Techniques

Veress Needle

Safety Tests:
- "Double click" test
- Aspiration test
- Saline hanging drop test
- Insufflation pressures

Lateral "waggle" of the Veress needle should be avoided (increases size of underlying injury)


Number of Access Attempts

<table>
<thead>
<tr>
<th>Order of attempt</th>
<th>% IP access</th>
<th>% Complications</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>84.5 – 86.9</td>
<td>0.8 – 16.3</td>
</tr>
<tr>
<td>2nd</td>
<td>8.5 – 11.6</td>
<td>16.3 – 37.5</td>
</tr>
<tr>
<td>3rd</td>
<td>2.6 – 3.0</td>
<td>44.4 – 64.0</td>
</tr>
<tr>
<td>&gt;3rd</td>
<td>0.3 – 1.6</td>
<td>84.6 – 100</td>
</tr>
</tbody>
</table>


Direct Access

Meta-analysis comparing Veress to direct access:

- Increased relative risk of injuries with Veress vs. direct:
  - Preperitoneal injury: 46.7 [11.6 – 189.1]
  - Omental injury: 4.5 [2.1 – 9.6]
  - Multiple insertions: 3.0 [2.1 – 4.2]
  - Failed entry: 2.2 [1.1 – 4.6]

Major complications:
- Veress: 4
- Direct: 0


Visualization of anterior abdominal wall structures
- Bladed and bladeless versions
- Bariatric surgery

Optical Trocar

Video of optical trocar entry
Closed Entry Techniques
Optical Trocar

RCT: Direct Optical Entry vs. Veress

<table>
<thead>
<tr>
<th>Variable</th>
<th>Direct Optical Access (n=93)</th>
<th>Veress Needle Access (n=101)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration of entry, seconds</td>
<td>62.8 +/- 7.5</td>
<td>180.4 +/- 11.8</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Blood loss, mL</td>
<td>7.3 +/- 3.8</td>
<td>8.1 +/- 2.1</td>
<td>0.111</td>
</tr>
<tr>
<td>Major vascular injuries</td>
<td>0</td>
<td>0</td>
<td>–</td>
</tr>
<tr>
<td>Minor vascular injuries</td>
<td>2</td>
<td>4</td>
<td>0.682</td>
</tr>
<tr>
<td>Minor bowel injuries</td>
<td>0</td>
<td>2</td>
<td>0.498</td>
</tr>
</tbody>
</table>


Closed Entry Techniques
Radially Expanding Trocars

- Smaller fascial defect
- Decreased trocar slipping
- Less pain?

Bisgaard T, et al. 2007

Closed Entry Techniques
Summary

- Veress needle possibly associated with increased risk of minor complications versus direct access
- Veress needle not superior to other closed entry techniques for prevention of major injuries
- Direct optical entry demonstrates promise if closed entry considered

Open Entry Techniques
Hasson

- Direct entry of abdominal cavity prior to trocar insertion
- Decreased risk of visceral and vascular injuries versus closed technique?

Open Entry Techniques
Hasson

Lots of options!

Video of Hasson Abdominal Entry
Open Entry Techniques
Hasson

- Dr. Hasson’s 29-year experience (5284 cases)
  - Technique: vertical incision in inferior umbilicus
  - Entry time: 3-10 minutes
  - 27 complications (0.5%)
    - Minor (26): infection, hematoma, hernia
    - Major (1): small bowel injury repaired intraop


Closed versus Open Entry
Limited RCT Data

<table>
<thead>
<tr>
<th>Study</th>
<th>Setting</th>
<th>Entry Time</th>
<th>Minor Complications</th>
<th>Major Complications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Akbar (2008)</td>
<td>Cholecystectomy</td>
<td>70</td>
<td>9.2</td>
<td>2</td>
</tr>
<tr>
<td>Bemelman (2000)</td>
<td>General Surgery</td>
<td>62</td>
<td>3.9</td>
<td>0</td>
</tr>
<tr>
<td>Cogliandolo (1998)</td>
<td>Cholecystectomy</td>
<td>150</td>
<td>4.5</td>
<td>3</td>
</tr>
</tbody>
</table>

Cochrane Review

- 28 randomized control trials
- 13 different laparoscopic-entry techniques
- 4860 patients
- Primary endpoint: open-entry versus closed-entry techniques

Cochrane Review: Closed vs. Open Entry

<table>
<thead>
<tr>
<th>Condition</th>
<th>Relative risk (95% CI)</th>
<th>Odds Ratio</th>
<th>95% CI</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major Complications</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vascular injury</td>
<td>0.01 (0.00-0.93)</td>
<td>0.10</td>
<td>0.06-0.16</td>
<td></td>
</tr>
<tr>
<td>Visceral injury</td>
<td>1.00 (0.59-1.80)</td>
<td>1.00</td>
<td>0.64-1.54</td>
<td></td>
</tr>
<tr>
<td>Failure of entry</td>
<td>0.12 (0.02-0.86)</td>
<td>0.12</td>
<td>0.02-0.92</td>
<td></td>
</tr>
<tr>
<td>Minor Complications</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extraperitoneal insufflation bleeding</td>
<td>0.36 (0.05-2.61)</td>
<td>0.36</td>
<td>0.05-2.61</td>
<td></td>
</tr>
<tr>
<td>Trocar site bleeding</td>
<td>0.14 (0.00-6.82)</td>
<td>0.14</td>
<td>0.00-6.82</td>
<td></td>
</tr>
<tr>
<td>Trocar site infection</td>
<td>1.21 (0.36-4.04)</td>
<td>1.21</td>
<td>0.36-4.04</td>
<td></td>
</tr>
</tbody>
</table>

Closed versus Open Entry

Other Data
- Meta-analysis of any prospective or retrospective reports of major injuries during laparoscopic entry
- Included any study reporting both the rate of injury and number of patients evaluated

<table>
<thead>
<tr>
<th>Technique</th>
<th># of Series</th>
<th># of Procedures</th>
<th>% Major Vascular Injuries</th>
<th>Major Vascular Injuries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open</td>
<td>11</td>
<td>22,465</td>
<td>0</td>
<td>0.049</td>
</tr>
<tr>
<td>Closed</td>
<td>22</td>
<td>760,890</td>
<td>0.044</td>
<td>515</td>
</tr>
</tbody>
</table>


Laparoscopic Entry Techniques

Summary
- Limited high-quality data guiding entry choice
- Surgeon experience likely most important factor
- Possible advantage with open technique

Thank you
Laparoscopy in the Morbidly Obese Woman: Tips and Tricks

Amanda Nickles Fader, MD
Associate Professor, Gynecologic Oncology
Johns Hopkins Medical Institutions

Disclosures

- I have no financial relationships to disclose.

Objectives

- Review epidemiologic obesity trends and their implications in the U.S. gynecologic surgery patient population
- Discuss patient safety, anesthetic and positioning techniques to optimize success with laparoscopic surgery in obese women
- Define the optimal access and intraperitoneal exposure techniques in women with central and/or visceral adiposity

WHO Definition of Obesity

- BMI >25 = Overweight
- BMI >30 = Obese
- BMI >40 = Morbidly obese
- BMI >50 = Extremely morbidly obese

*Definition is controversial, does not take into account anthropomorphic measurements of % body fat

BMI = Body Mass Index, kg/m²

Gynecologic Surgery Patient Trends

- Prevalence of obesity is increasing nationally and globally
- Over 2/3 of adults in the U.S. are overweight or obese
- Trend affects a greater number of women than men which means that gynecologic surgeons can expect ~60% of the patients they take to the OR to be obese

Obesity Trends Among U.S. Adults

65% of U.S. adults are overweight or obese!

*Data from the Centers for Disease Control and Prevention, 2010
Institute of Medicine Predictions

- By 2030, 40% of U.S. adults and 35% of children will be categorized as obese
- Since majority are overweight or obese, we have accepted this as our new national identity

(IOM, Ann Int Med, 2012)

Co-morbid conditions in Obese Female Surgical Patients

<table>
<thead>
<tr>
<th>BMI</th>
<th>Number of pts</th>
<th>Mean age (yrs)</th>
<th>Hypertension</th>
<th>Diabetes</th>
<th>CAD</th>
<th>Pulmonary disease</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;30</td>
<td>161 (40.7%)</td>
<td>64</td>
<td>32.3%</td>
<td>9.3%</td>
<td>11.8%</td>
<td>6.2%</td>
</tr>
<tr>
<td>30-40</td>
<td>128 (32.3%)</td>
<td>62</td>
<td>47.7%</td>
<td>28.9%</td>
<td>10.9%</td>
<td>8.6%</td>
</tr>
<tr>
<td>&gt;40</td>
<td>107 (27%)</td>
<td>43</td>
<td>52.3%</td>
<td>35.3%</td>
<td>7.5%</td>
<td>15.9%</td>
</tr>
<tr>
<td>Total</td>
<td>396 (100%)</td>
<td>60</td>
<td>42.7%</td>
<td>22%</td>
<td>10.4%</td>
<td>9.6%</td>
</tr>
</tbody>
</table>

P value: <0.001, <0.002, <0.001, 0.505, 0.028

Obesity-attributable medical expenditures reached $120 billion in the United States in 2009, with substantial additional indirect costs in lost productivity

(Boucher, E. J. Gynecol Oncol 2003)

Gynecologic surgical patients are getting larger

- Prior studies (1970-1980s): approximately 15-40% of women undergoing GYN surgery are obese
- Recent prospective studies (1990-2000s) report that 40-90% of women are obese


Anthropormorphics Are Critical

- BMI does not tell the whole story!
- Central adiposity and pannus: how does it lay when pt supine?
- Waist-hip ratio critical
  - WHR >0.85 in women correlates with degree of central adiposity
  - “Apple” versus “pear shape”
- Apples far more challenging and more prevalent
- Associated w/ Metabolic syndrome, Type 2 DM, HTN


Central adiposity and surgical complications

- Abdominal obesity in particular confers additional risks during all types of surgery:
  - Atelectasis
  - Thromboembolism
  - Cardiovascular dysfunction
  - Wound infection

(Mokdad, JAMA, 2001)

Obesity and Laparoscopy

- Surgically, obesity was at one time considered a relative contraindication for GYN laparoscopy
- Recent studies suggest that healthy obese patients are likely to benefit from MIS, assuming the technical challenges can be overcome
- A surgical procedure which minimizes operative morbidity is preferable, and makes obese patients among the most important cohort of women to consider for MIS

(Mokdad, JAMA, 2001)
Preoperative planning

- Ensure the patient has a proper preoperative medical evaluation
- Optimize comorbidities (diabetes, asthma etc)
- Screen for obstructive sleep apnea
  - OSA increases aspiration risk

Patient Selection

- Preoperative Evaluation (EKG and CXR)
- Absolute Contraindications:
  - Increased ICP and VP Shunt
- Relative Contraindications:
  - Severe Cardiac Disease
  - Severe COPD
  - Cerebral Aneurysm
  - Obesity: BMI >40 kg/m²

Anesthesia in the Obese Patient

- Risk for altered cardiac and respiratory physiologic conditions such as increased CO₂ production and reduced chest wall compliance which leads to lower expiratory reserve volume

Physiology of Pneumoperitoneum: Pulmonary Concerns

<table>
<thead>
<tr>
<th>Function</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respiratory mechanics</td>
<td>Increased</td>
</tr>
<tr>
<td>Peak inspiratory pressure</td>
<td>Increased</td>
</tr>
<tr>
<td>Respiratory compliance</td>
<td>Decreased</td>
</tr>
<tr>
<td>Ventilatory changes</td>
<td>Increased</td>
</tr>
<tr>
<td>Respiratory ratio</td>
<td>Decreased</td>
</tr>
<tr>
<td>Tidal volume</td>
<td>Decreased</td>
</tr>
<tr>
<td>Minute ventilation</td>
<td>Increased</td>
</tr>
<tr>
<td>Pulmonary oxygen exchange</td>
<td>Unchanged</td>
</tr>
<tr>
<td>Physiologic dead space to tidal volume ratio</td>
<td>Unchanged</td>
</tr>
<tr>
<td>Alveolar-arterial oxygen gradient</td>
<td>Unchanged</td>
</tr>
</tbody>
</table>

Intubation Issues in the Obese

- 1% difficult intubation, 10% difficult ventilation
- Induce with 30 degree head-up position
  - Improves well tolerated apneic time
- Neck size >40cm can be an issue
- Difficult intubations 8 times more common in those with obstructive sleep apnea
- Higher risk of aspiration

Physiology of Steep Trendelenberg

- Cardiovascular: ↑VR, ↑CO and ↑SV
- Pulmonary: ↑Resistance, ↓Compliance
- Neurological: ↑ICP and ↑IOP
- Airway: Laryngeal and Facial Edema
### Anesthesia tips and tricks
- Establish need for additional lines
- Run patient dry
- **Pressure control ventilation**
  - Minimizes peak airway pressures
  - Prevents hypercarbia
  - Improves oxygenation during laparoscopic obesity surgery compared with volume-controlled ventilation
  - High plateau pressures in obese patients due to reduced pulmonary compliance can be lowered using pressure-controlled mechanical ventilation

### Anesthesia/Pneumo Tips
- Obtain pneumo while flat/supine and consider putting ports in b/f T-berg
  - Less intraperitoneal pressure on diaphragm
- Once pelvic exposure obtained, ports are in, drop CO2 pressures to 12-15 mmHg & T-berg
- Prevents severe decreases in functional residual capacity and improves total lung compliance
- Discuss anticipated length, complexity of the case with anesthesia so assessment of obesity-related physiologic changes taken into account

### Top Ten Tips for Safe Laparoscopy in Obese Women
1. **#10: Take the time to think about the setup before the case**
   - Individual patient characteristics
   - BMI and WHR—trocar placement and length/type of ports
   - Previous surgery
   - Informed consent
   - Uterine and cervical size will dictate manipulator tip size and colpotomy cup size
   - Communicate your needs to OR staff

2. **#9: Fleet’s Enema or mechanical bowel prep**
   - Randomized controlled trial
   - *Yang, Mansuria, Lee, Guido et al, JMIG 2011*
   - Routine bowel prep vs. NA PO4 enema b/f GYN laparoscopy were equivalent in terms of pelvic exposure, bowel prep more uncomfortable
   - Morbidly obese pts and pts w/ adhesive dz excluded

3. **#8: Ensure operating table has a weight capacity that will accommodate morbidly obese patients and also has optimal intraoperative maneuverability**
   - Ensure bean bag, gel pad, or egg crate is positioned properly for patient comfort and to prevent patient slippage

4. **#7: Ensure buttocks is slightly beyond the end of the bed**
5. **#6: Tuck both arms every time!**
   - Pad/support all pressure points, wrap hands/fingers
   - Use sleds or arm extenders

6. **#5: Position the patient yourself!**
   - Low lithotomy
   - Thighs parallel to the floor, knees flexed at no more than 60 degrees, knee in line with contralateral shoulder

7. **#4: Tuck both arms every time!**
   - Pad/support all pressure points, wrap hands/fingers
   - Use sleds or arm extenders

8. **#3: Position the patient yourself!**
   - Low lithotomy
   - Thighs parallel to the floor, knees flexed at no more than 60 degrees, knee in line with contralateral shoulder

9. **#2: Ensure operating table has a weight capacity that will accommodate morbidly obese patients and also has optimal intraoperative maneuverability**
   - Ensure bean bag, gel pad, or egg crate is positioned properly for patient comfort and to prevent patient slippage

10. **#1: Fleet’s Enema or mechanical bowel prep**
    - Randomized controlled trial
    - *Yang, Mansuria, Lee, Guido et al, JMIG 2011*
    - Routine bowel prep vs. NA PO4 enema b/f GYN laparoscopy were equivalent in terms of pelvic exposure, bowel prep more uncomfortable
    - Morbidly obese pts and pts w/ adhesive dz excluded
Top Ten Tips for Safe Laparoscopy in Obese Women

- 2: Consider Open Hasson or Left Upper Quadrant (Palmer's Point) Entry Incisions

- #1: Remember Capa Blanca!
  - Jerome Belinson, MD
  - Think like a chess player
  - Plan your moves 2-3 steps ahead

Laparoscopy in Centrally Obese

- Like Scuba Diving
- Above the water, it may be stormy…but go below and it can be calm and smooth

Surgical Beanbag and Gelpad

- Surgical Bean Bag Steep Trendelenberg Immobilizer

Patient Positioning: Legs, Feet and Hips

- Positioning more critical than ever
  - Higher risk of pressure sores and neuropathies in obese
  - Make sure operative bed is fitted for patient
  - May require special bed for extreme morbid obesity
  - Consider Ultrafin stirrups for lithotomy
  - Corporeal padding
  - Padding of fingers, wrists, elbows and shoulders and knees/calves

Patient Positioning: Arms

1. Place 2 narrow foam pads over chest, being sure to cover the triceps completely
2. Secure with Velcro strap
3. Re-secure with wide tape twice

Patient Positioning: Chest

Patient Positioning Video

Surgical Access and Pneumoperitoneum

Surgical Access: Veress Needle?

- Creation of a pneumoperitoneum is an important step, as most complications occur at this time
- Can be challenging to perform in patients with significant truncal adiposity or reperitoneal fat
- Avoid use of Veress needle in morbidly obese patients
  - May not be as dependable in obese as the chances of insufflating the pre-peritoneal space with CO2 gas may impair intraperitoneal visualization and exposure

Surgical Access: Open Hasson Technique
Surgical Access: LUQ Approach

- LUQ technique most optimal?
  - Palmer’s point
  - 2-5 mm long optical trocar
  - DO NOT elevate the abdominal wall excessively

LUQ Access Video

Fader et al LUQ

- 113 cases
- Median BMI 31
- 109/113 cases successful (95%)
- ¼ failed LUQ successful Hasson

The pannus and trocar placement

- In patients with a panniculus, anatomic landmarks are distorted
- Old school teaching: panniculus should be pushed cephalad until the umbilicus is 8 cm cephalad to the ASIS prior to umbilical entry
- Contemporary approach: LUQ or supra-umbilical approach with optical trocar
- Position additional trocars more laterally and superiorly (above pannus)

Additional Trocars

- Initially increase the insufflation pressure to 20 mmHg to allow a greater distance for trocar placement
- Then reduce the pressure to 10-15 mmHg to prevent CO2 retention and decreased chest wall compliance

Visceral adiposity: optimize exposure

- Fold small bowel out of the pelvis
- Consider a laparoscopic fan
- If RS colon is redundant, a puppeteering stitch with a 36 inch Ethibond or PDS suture can be placed through the RS epiploica and brought through the skin to improve pelvic exposure
MIS in Obese EC Patients: Robotics vs. LAVH vs. TLH

- Pacific Northwest Oncology: 1000 robotic cases in GYN oncology program analyzed retrospectively; ~400 EC cases
  - 2.9% conversion rate
  - Compared with laparotomy, women undergoing robotic surgery had lower EBL (46.9 vs 197.6 mL, P < .0001), shorter hospitalization (1.4 vs 3.3 days, P < .0001), fewer major complications (6.4% vs 20.6%, P < .0001), and higher lymph node counts (15.5 vs 13.1, P = .007)
- UNC compared robotics vs. laparoscopy for obese EC patients
  - Robotic surgery was associated with shorter operative time (p=0.0004), less blood loss (p<0.0001), increased lymph node retrieval (p=0.004) and shorter hospital stay (p=0.0119)


MIS in Obese Endometrial Cancer Patients: LAVH vs. TLH

- Cleveland Clinic
  - TLH superior to LAVH in morbidly obese EC &/or nulliparous EC survivors
  - OR times faster (p=.04) and more feasible to close cuff from above

Fader et al, J Min Inv Gynecol, 2009

Robotic Surgery in Morbidly Obese Women

- Gallo T, Azodi M, AAGL abstract, 2011
  - 442 women undergoing MIS hysterectomy
  - 58% were obese or morbidly obese
  - No differences in EBL, complication rates or length of stay by BMI
  - Robotic surgery feasible with few conversions to laparotomy in morbidly obese

- One of few studies examining role of MIS in morbidly obese female patients

Conclusions

- MIS very feasible and beneficial in morbidly obese women as long as co-morbidities are optimized
- Consider critical patient safety issues in OR including proper preop planning, positioning and well-fitted SCDs
- Consider pressure control ventilation and minimizing IAP CO2 pressure
- Consider Hasson or LUQ approach to abdominal access
- Lateralize and elevate the additional trocars and utilize intraperitoneal tricks to improve pelvic exposure

Minimally Invasive Surgery: A New Standard of Care in Obese Women

Open Vertical Incision  Open Transverse Incision  Laparoscopic or robotic Incision
Acknowledgments

- Ted Lee, MD
- AAGL
- Bing Grumbine, MD
- My family and patients
Why Laparoendoscopic Single-Site Surgery (LESS) Matters: Practical Applications

Fatih SENDAG, M.D., Professor
Ege University Faculty of Medicine
Department Obstetrics and Gynecology
Izmir TURKEY

Disclosure
I have no financial relationships to disclose.

ADVANTAGES
- Cosmetic advantage
- Decrease in
  - incision risks
  - morbidity of bleeding
  - incisional herni
  - organ damage
  - postoperative pain?

DISADVANTAGES
- Longer operative time?
  - Crossed over articulating instruments
  - Limitation of movement
  - Vaginal cuff suturing
  - Longer learning curve?

PATIENT SELECTION CRITERIA
- More than two previous midline vertical laparotomies
- Previous panniculectomy
- Advanced malignancy
  
May not be suitable candidates!

SINGLE PORT DEVICES
Single port devices

- The aim is to minimize the extracorporeal interaction of the devices (known as ‘sword fighting’) causing limitation of movement internally.

QuadPort (Advanced Surgical Concepts; Wicklow, Ireland)

- Four working channels
  - One 15 mm, one 12 mm, and two 5 mm ports

Uni-X Single Port Access Laparoscopic System (Panel Systems, New Jersey, USA)

- Three working channels for 5 mm instruments
- Requires stitches to secure it in place to the fascia

Gelpoint (Applied Medical Systems, Ranco, Santa Margarita, California, USA)

- Allow for the introduction of ports or instruments of varying shapes and sizes in different configurations
- The port can balloon out during insufflation causing the instruments to be pushed further from the operative field!

Covidien multi-channel SILS™ port

- Multi instrument access port
- Separate channel allows for CO2 insufflation
Instrument crowding and lack of triangulation are two of the biggest problems that limit use of the single incision technique as compared to traditional laparoscopy with multiple ports.

It is possible to overcome the lack of triangulation by utilizing special single-port instrumentation, including flexible and/or articulating instruments, which allow for intracorporeal triangulation.
Conventional laparoscopes have a large extracorporeal profile with a light cable perpendicular to the telescope – this latter feature can be problematic and exacerbates instrument clashing in LESS procedures. One method to minimize this problem is by using a lower profile camera system, such as one in which the video laparoscope is integrated with a coaxial light cable in line with the shaft of the telescope.

**Optics**
- Conventional laparoscopes have a large extracorporeal profile with a light cable perpendicular to the telescope – this latter feature can be problematic and exacerbates instrument clashing in LESS procedures.
- One method to minimize this problem is by using a lower profile camera system, such as one in which the video laparoscope is integrated with a coaxial light cable in line with the shaft of the telescope.

**Deflectable optic: Endoeye 5 mm**

**Uterin manipulators**
- RUMI® Colpotomizer system™

**Optics**
- 5 or 10 mm, 30° laparoscope
LEARNING CURVE

Experience, Fader et al (2010)
- Review of 31 LESS TLH/BSO cases

<table>
<thead>
<tr>
<th>Variables (n=16)</th>
<th>Mean ± SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean age (years)</td>
<td>48 ± 4</td>
</tr>
<tr>
<td>Mean BMI (kg/m²)</td>
<td>28.08 ± 2.43</td>
</tr>
<tr>
<td>Indications (n)</td>
<td></td>
</tr>
<tr>
<td>- Uterine fibroid</td>
<td>6</td>
</tr>
<tr>
<td>- Dysfunctional uterine bleeding</td>
<td>6</td>
</tr>
<tr>
<td>- Endometrial hyperplasia</td>
<td>4</td>
</tr>
</tbody>
</table>

*See from initial skin incision to single port device is inserted (min).
*Defined as time from initial skin incision to skin closure (min).

These preliminary results suggest a similar learning curve for conventional laparoscopy and LESS procedures.

Initial Experience – single incision TLH (Sendag et al) - 2010

<table>
<thead>
<tr>
<th>Variables (n=16)</th>
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<tbody>
<tr>
<td>Mean operation time (minutes)</td>
<td>108 ± 29.4</td>
</tr>
<tr>
<td>Mean hospitalization stay (days)</td>
<td>1.6 ± 0.49</td>
</tr>
<tr>
<td>Mean blood loss (ml)</td>
<td>45 ± 23.1</td>
</tr>
<tr>
<td>Postoperative complications</td>
<td>0/16</td>
</tr>
<tr>
<td>Conversion to multipl port approach or laparotomy</td>
<td>0/16</td>
</tr>
</tbody>
</table>

Initial Experience - single incision TLH (Sendag et al)- 2010

- Transumbilical single-incision total laparoscopic hysterectomy: technique and initial experience in Turkey
- Sendag F, Turan V, Zeybek B, Bilgin O
- Ege University Faculty of Medicine, Department of Obstetrics and Gynecology, Izmir, Turkey.

Difficulties

Cuff Suturing

- Movement ability of the instruments are limited
- Barbed suture technology
- Flattened needles
**Difficulties Instrumentation**

- The operator and the assistant have to work consistently
- Three hands and three instruments in a very small area!
- Semi- flexible/ longer scopes will be more comfortable

**SILS port placement**

**Single incision with 3 trocar placement**

**Single port placement**

**Outside view**

**Energy modalities Enseal**
One month after single incision TLH

Cosmetic results - scarless surgery -

Advantages of single port?

- Cosmetic
- Postoperative pain

COSMETIC OPTIONS

- Multiport laparoscopy
- Single port laparoscopy
- Multiport robot
- Single port robot

Keywords: Single incision laparoscopic hysterectomy, scarless surgery, cosmetic outcome.
A comparative cross sectional study on cosmetic outcomes after single port or conventional laparoscopic surgery

<table>
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<tr>
<th>Variable</th>
<th>SP-US</th>
<th>Conventional LS</th>
<th>P value</th>
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<tbody>
<tr>
<td>VAS of umbilical scar</td>
<td>4.65±2.41</td>
<td>4.25±2.75</td>
<td>0.887*</td>
</tr>
<tr>
<td>SCC scar</td>
<td>1.196±0.48</td>
<td>1.176±0.48</td>
<td>0.815</td>
</tr>
<tr>
<td>PGUS scar</td>
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<td>1.95±0.30</td>
<td>0.090*</td>
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Mean ± SD

A randomized prospective study of single-port and four-port approaches for hysterectomy in terms of postoperative pain

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<th>P value</th>
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<td>Mean VAS pain score (0-10)</td>
<td>4.8±2.4 (8.8)</td>
<td>3.8±2.0 (5.0)</td>
<td>0.952</td>
</tr>
<tr>
<td>POD 1</td>
<td>3.4±1.2 (3.8)</td>
<td>2.9±1.0 (3.5)</td>
<td>0.100</td>
</tr>
<tr>
<td>POD 2</td>
<td>3.9±1.2 (3.9)</td>
<td>3.7±1.2 (3.9)</td>
<td>0.091</td>
</tr>
<tr>
<td>POD 3</td>
<td>2.8±1.2 (3.8)</td>
<td>2.2±1.2 (3.5)</td>
<td>0.562</td>
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Mean ± SD

Does single-port access (SPA) laparoscopy mean reduced pain? A retrospective cohort analysis between SPA and conventional laparoscopy

![Image of patient with labeled pain areas](image_url)

Table 1

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Mean ± SD
da Vinci
single site surgery

Single Port Laparoscopy vs da Vinci Single-Port

Single Port Laparoscopy
- Unstable, endoscopy is performed on the same axis with the instrument
- Instrument collision
- Difficult to move and maneuver

da Vinci Single-Port
- Stable, supported by 3D HD visioning
- Precise, ergonomic control
- Ease of manoeuvering

Robotic single site hysterectomy
Sendag et al.
CONCLUSION

- Promising alternative method with scarless abdominal surgery
- LESS is feasible and safe in gynecology
- Evolving new articulating instrumentation, and optics will provide better outcomes
- Future work is needed to better define the ideal operative procedures

References
A Step-by-Step Approach to LESS Hysterectomy: An AAGL Task Force Initiative

Kevin J. E. Stepp, MD
Director, Advanced Surgical Specialties for Women
Chief, Urogynecology and Minimally Invasive Surgery
Carolina Healthcare System

Disclosures

• Consultant: American Medical Systems, Covidien
• Stockholder: Titan Medical
• Speakers Bureau: Covidien, Stryker Endoscopy

AAGL Practice Guidelines Committee

• Purpose
  – Promote a standardized approach to improve safety and efficiency for single port laparoscopy.
  – Describe the technique of several key opinion leaders and educators throughout the international community.
  – Create an educational video for common use

Assumptions

• Benign indications
• Leave ovaries (but can be easily modified for removal if desired.)
• Endometriosis or other pathology is not present
• Ureter is identifiable without extensive dissection
• Bladder adhesions are minimal

Choosing Equipment

• Articulating instruments vs straight
• Articulating camera vs angled
• Energy considerations
  • smoke
  • minimizing instrument exchanges
  • reliable seal/minimize bleeding
• Additional retractor devices
  • microlap, mini-lap, sutures, tricks

Choosing Equipment

• Uterine manipulator
Planning the incision

• Vertical infra-umbilical
• Vertical intra-umbilical
• Semi-circular/Omega

Step 1: Choosing and placing the port

• Characteristics of each port

Step 1: Choosing and placing the port

• Characteristics of each port
• Port orientation

Gaining Access

Head
Camera port
Inserting the camera

- Camera is placed through which port cannula?
- Camera handle is brought down as close to the patient's chest which elevates the camera to the anterior abdominal wall internally.

Step 2: Inserting assistant instrument

- Understanding direction of traction so handle moves away from midline on the outside, maximizing room for camera and operative instrument/energy device on the outside.
- Place assistant instrument through left port and control with surgeon's left hand. Manipulate tissue so handle falls lateral and away from camera.
- Elevate the uterus toward right shoulder and away from bowel by placing handle laterally to the right and down away from camera.

Step 3: Insert operating instrument/energy device

- Energy device comes in from center.
  - Be mindful of handle orientation to minimize clashing.
  - “Going gangsta”
- Begin uterine left side.
  - Uterus should be deviated to right.
    - Via uterine manipulator.
    - Augmented by assistant instrument/grasper.
  - Grasp and seal the utero-ovarian ligament.

Step 3: Insert operating instrument/energy device

- Grasp and seal the utero-ovarian ligament.
- Continue seal until beyond the round ligament.
- Open the broad ligament to expose the uterine vessels.
- Upward traction on the uterine manipulator exposes the uterine vasculature and increases distance to ureters.
- Seal the uterine vasculature.

Step 4: Create bladder flap

- Assistant grasper now can be moved inferriorly on the uterus if necessary.
  - Variation: assistant grasper may elevate the bladder peritoneum.
- Best to create bladder flap without changing instruments.
- Rotate the jaws of the energy device to simulate articulation.
- Variation: if necessary, operative instrument/energy device can be exchanged with monopolar/bipolar hook or spatula for bladder flap.
- Remove hook or spatula when bladder flap complete.
Step 5: Right side uterus

- Position uterus to left with uterine manipulator
- Using left hand assistant grasper, now create tension on right utero-ovarian ligament with lateral traction on right ovary. (assistant handle still falls lateral and away from midline.)
- Repeat Step 3

Step 5: Insert operating instrument/energy device

- Re-insert energy device if necessary
- Grasp and seal the utero-ovarian ligament
- Continue seal until beyond the round ligament
- Open the broad ligament to expose the uterine vessels
- Upward traction on the uterine manipulator exposes the uterine vasculature and increases distance to ureters
- Assistant grasper may be used to elevate the bladder flap peritoneum creating the “cave”
- Connect to previous bladder flap from left side.
- Seal the uterine vasculature
Step 6(a)- Supracervical option
Amputate the fundus

- Maintain uterus to left with manipulator.
- Remove assistant grasper and operative instruments
- Place assistant grasper now through right lateral port. Grasp fundus or place posteriorly behind cervix. Elevate the uterus toward left shoulder and away from bowel by placing handle laterally to the right and down away from camera.
- Insert monopolar/bipolar hook or spatula through the contralateral port for amputation. Instrument should be midline.
- Complete 50% amputation from right side, using reverse cone.

Step 6(a)- Supracervical option
Amputate the fundus

- To complete the amputation from the left side, position the uterus to right with the uterine manipulator.
- Remove assistant grasper and operative instruments
- Place assistant grasper now through left lateral port. Grasp fundus or place posteriorly behind cervix. Elevate the uterus toward right shoulder and away from bowel by placing handle laterally to the left and down away from camera.
- Insert monopolar/bipolar hook or spatula for amputation. Instrument should be midline.
- Complete remaining amputation from left side, using reverse cone.

Step 6(a)- Supracervical option
Amputate the fundus

Step 7: Cuff or Cervical Closure

- May close the vaginal cuff vaginally
- Variation: may close vaginal cuff or cervix laparoscopically, but we recommend suturing assist devices such as Endostitch, barbed-suture, RD-180, Laparo-Tie, etc.

Step 8: Morcellation

- We recommend deliver specimen vaginally if possible (TLH)
- Option 1: Place scope through cervix to view the umbilical port. Morcellator can be inserted through the umbilical port.
- Option 2: Camera remains trans-umbilical - Position the articulating scope laterally and fully articulated to view the morcellator insertion.
- Option 3: When case is completed, grasp specimen with secure grasper. Remove port. Morcellate the uterus trans-umbilically with scissor or scalpel.

Step 9: Close umbilical incision

- Close fascia
- Close umbilical skin
- Place dressing
Laparoscopic Access in Pregnancy: LESS and Beyond

Stacey A. Scheib, MD, FACOG
Director of Minimally Invasive Gynecology
Director of the Hopkins Multidisciplinary Fibroid Center

Objectives

• Recognize the role of laparoscopy for the treatment of adnexal masses in pregnancy
• Position a gravid patient for laparoscopic surgery
• Obtain entry into the abdomen of a gravid patient safely
• Apply techniques for retrieving an ovary from the posterior cul de sac of a gravid patient

Surgery in Pregnancy

• ~1 in 500 to 1 in 635 women will require non-obstetrical abdominal surgery during their pregnancies.1,2
• The most common non-obstetrical surgical emergencies complicating pregnancy are acute appendicitis, cholecystitis, and intestinal obstruction.1
• For GYN, ovarian cysts, mass, torsion, and abdominal pain of unknown origin are the most common reasons
• The incidence of adnexal masses in pregnancy is estimated between 1-4%.3,4

When to Operate on Adnexal Cysts or Masses?3,4

• Torsion or Severe Pain11-19
• Potential malignancy10
• Adversely impact the pregnancy
• Obstruct labor
• Persist into the 2nd trimester and
  – >10cm in size
  – Symptomatic

Advantages of Laparoscopy versus Laparotomy in Pregnancy

• Less postoperative pain22, 24, 36
• Less postoperative ileus22, 24, 36
• Decreased fetal respiratory depression20-33
• Lower risk of wound complications21, 34, 36
• Diminished postoperative maternal hypoventilation26, 36
• Shorter hospital stays22, 24, 36
• Decreased risk of thromboembolic events
• Faster return to work22, 24, 36
• Improved visualization reduced uterine irritability by decreasing the need for uterine manipulation37, 38
Safety of Laparoscopy in Pregnancy

- Any trimester
- Up to 26 to 28 weeks
- No long term effects on fetus
- Laparotomy may be necessary as dictated by the patient’s clinical condition and operative findings

Physiologic Changes During Pregnancy That Effect Surgery

- Respiratory System
  - Increase in minute ventilation
  - Decrease in functional residual capacity
  - Oxygen consumption increase greater than cardiac output increase
  - Decrease in SVO2 (percentage of O2 saturation in the pulmonary arterial blood)
  - Aortocaval compression
  - Decreased residual lung volume
  - Decreased functional residual capacity

Physiologic Changes During Pregnancy That Effect Surgery

- Cardiovascular changes
  - Cardiac output increases 30%
  - Aortocaval compression with increase in abdominal pressure
  - Decrease in BP with reverse trendelenberg
  - Increase in blood volume

Positioning

- Left lateral decubitus position
  - Lying flat can decrease cardiac output by 30%
  - 15° tilt is appropriate

DVT Prophylaxis

- Pregnancy is a hypercoagulable state
- 0.1-0.2% incidence of DVT
- Pneumoperitoneum
- Prophylaxis
  - Pneumatic compression devices both intraoperatively and postoperatively
  - Role of unfractionated or low molecular weight heparin
  - Early ambulation
Other Anesthesia Considerations

- Orogastric or nasogastric tube
  - Aspiration prophylaxis
  - Decompression of stomach
- Resolve dehydration and hypovolemia

ENTRY TECHNIQUES

Where should I start?

- Adjust the initial access according to the fundal height\(^{26, 28, 47-50}\)
  - Palmer’s point
  - Supraumbilical

Veress Entry or Blind Insertion

- Should be avoided\(^{51, 52}\)

Direct Entry

- Video

Hasson Entry

- Technique for every gestational age
Pneumoperitoneum

- Repercussions of insufflation with CO₂
- Keep pressures ≤ 15mmHg²⁶,²⁸ but use the least amount necessary for visualization
- Maternal monitoring with end tidal CO₂²²,²⁶,²⁸
- Gasless laparoscopy⁵³-⁶⁰

Ovary, Ovary... Oh, Where is the Ovary?

- Most often sitting on uterus
- Adnexa in the cul de sac

Tips to Retrieve the Ovary

- Lifting the uterus
  - Fan retractor
  - Bowel grasper open
- Sponge on a stick in the posterior fornix
- Endocatch bag
- Once the ovary is out of the cul de sac, drop the uterus back down

Role of LESS in Pregnancy

- Open approach
- No additional ports⁵¹,⁵²
- Larger incision for specimen removal
- Hernia?⁵³
- Safe, Feasible⁵⁴-⁵⁶

ROLE OF LESS IN PREGNANCY

LESS Video
Take Home

- Laparoscopy is safe in pregnancy
- Left lateral tilt
- Hasson or direct entry
- Supraumbilical or Palmer’s point
- Lowest pressure necessary for insufflation
- LESS is an option

References

References


Is LESS More? The Merger of Robotics and Single-Site Surgery

Amanda Nickles Fader, MD
Associate Professor, Gynecologic Oncology
Johns Hopkins Medical Institutions; Baltimore, MD

Disclosures

I have no financial relationships to disclose.

Objectives

- Discuss the evolution of minimally invasive surgery and anatomic rationale for single-site robotics
- Review several videos and the learning curves and outcomes data associated with robotic single-site surgery

Appraisal of New Surgical Approaches and Technologies

- Use of technology in medicine has historically outpaced the availability of data to support rapid adoption
- Market forces may influence consumers, physicians and health care organizations
- Are controlled data available to justify widespread adoption of a technology?
- Are claims of clinical superiority sound?
- Is health care resource utilization being optimized?

Conventional Multiport Robotics

- Tenant of laparoscopy is triangulation and preservation of surgical planes
- Requirement for 3-6, rectus muscle-splitting ports
- At times requires increasing incision size of one of the ports to accommodate specimen removal (ovarian masses/gall bladders, kidneys, spleen, fibroids etc)

Shin et al, JMG, 2012

Conventional Robotics/Laparoscopy

- Morbidity of multiple incisions
  - Pain, infection, vascular/visceral injury, hernia, scarring
  - Morbidity improved with decreased port sites
    - 317 patients—4 port laparoscopy with 5 mm and 10 mm trocars
    - 5% rate of nerve entrapment requiring treatment in lower quadrant port sites
What Do Women Prefer?

- Retrospective survey study
- Healthy gynecology patients
- Given 3 pictures of abdominal wall with theoretical laparoscopic, LESS and robotic incisions drawn
  - Asked to rate their preferences for incision types
- 254 responded
  - Women preferred both single-site and tiny laparoscopic incisions over robotic incisions (p<.001)
  - Limitations: many women had already undergone conventional laparoscopy and subjects were not shown pictures of actual patients who had undergone surgery and cosmetic results of the surgical approaches

Laparoendoscopic Single-Site Surgery ("LESS")

- An advanced minimally invasive surgical procedure in which the surgeon operates exclusively through a single, small entry point through a "natural" orifice (ie, at the patient's navel)
  - "Scarless" surgery
- Outcomes data in urology, general surgery and gynecology is promising
  - Demonstrate feasibility, safety and improved pain profiles and cosmesis

Open Hasson Incision

- 1.5-2.0 cm vertical incision at the base of umbilicus
- Insert multi-channel, single port device

Umbilical Incision and Single Port Placement

Exteriorization of Specimens

Limitations of LESS! Suturing etc.
LESS Cosmetic Outcomes: “Scarless Incisions”

Patient satisfaction scores high in several retrospective/prospective series

Robotic Single Port Surgery

New cannulas & semi-rigid instruments
- 5-lumen port:
  - 2 x da Vinci instrument, Scope, Assist cannula, Insufflation
  - Restored triangulation
  - Intuitive® movement

Robotic Single Site Hysterectomy

- 45 year old woman with BMI of 28 & breast cancer on taxomifen; BRCA1+ mutation
- Risk-reducing TLH/BSO
- 3 cm umbilical incision and Applied Medical Gelport® with 12 mm robotic scope and two 8 mm robotic trocars
- Operative time: 168 minutes
- No post op complications, hosp stay 1 day
- No IV or po narcotics post op

Robotic Single Site!

Existing 8.5 mm scope (30° scope)

Robotic Single-Site Tools

Single Site Port Set Up
New Single-Site Instrumentation

- Single-Site dVH FDA clearance received 2/19/13
  - Cleared for benign hysterectomy and salpingo-oophorectomy
  - NOT cleared for myomectomy, sacrocolpopexy, endometriosis resection, etc.

- NEW dVH-B-specific instrumentation
  - Bipolar Maryland
  - Curved Needle Driver
  - Permanent Cautery Hook

Video Robotic Single Site Hysterectomy

Video: Umbilical Closure

Cosmesis
Does LESS increase the risk of umbilical hernia?

- Conventional laparoscopy imposes a 0.2-3% risk of umbilical hernia when utilizing 5-12 mm ports.

- Umbilical hernia formation may be categorized by timing of onset:
  - Early: <3 months postoperatively
  - Late: >3 months postoperatively

References:

Does LESS increase the risk of umbilical hernia? (Fader et al, JMIG, 2011)

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Total patients (n=211)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TLH +/- BSO</td>
<td>102 (59%)</td>
</tr>
<tr>
<td>SCH +/- BSO</td>
<td>7 (4.1%)</td>
</tr>
<tr>
<td>USO/BSO</td>
<td>51 (24.6%)</td>
</tr>
<tr>
<td>Ovarian cystectomy</td>
<td>5 (2.4%)</td>
</tr>
<tr>
<td>Other</td>
<td>4 (2.0%)</td>
</tr>
<tr>
<td>Median EBL (cc)</td>
<td>125 (range 70-760)</td>
</tr>
<tr>
<td>Conversion</td>
<td></td>
</tr>
<tr>
<td>Conventional/laparoscopy</td>
<td>6 (3.5%)</td>
</tr>
<tr>
<td>Laparotomy</td>
<td>4 (2.0%)</td>
</tr>
<tr>
<td>Operative time (minutes)</td>
<td>12 (25-289)</td>
</tr>
<tr>
<td>Median hospital stay (days)</td>
<td>1 (0-5)</td>
</tr>
</tbody>
</table>

Summary of First 30 Cases

<table>
<thead>
<tr>
<th>Case #</th>
<th>Procedure</th>
<th>OR time</th>
<th>Doc time</th>
<th>Curren's Time</th>
<th>Uterine weight</th>
<th>BMI</th>
<th>Age</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>dvH</td>
<td>275</td>
<td>8</td>
<td>193</td>
<td>19</td>
<td>150</td>
<td>439</td>
</tr>
<tr>
<td>2</td>
<td>dvH</td>
<td>122</td>
<td>8</td>
<td>62</td>
<td>14</td>
<td>50</td>
<td>128</td>
</tr>
<tr>
<td>3</td>
<td>dVH</td>
<td>202</td>
<td>6</td>
<td>131</td>
<td>77</td>
<td>400</td>
<td>312</td>
</tr>
<tr>
<td>4</td>
<td>Cystectomy</td>
<td>112</td>
<td>10</td>
<td>29</td>
<td>N/A</td>
<td>&lt;10</td>
<td>N/A</td>
</tr>
<tr>
<td>5</td>
<td>dvH/BSO</td>
<td>167</td>
<td>7</td>
<td>117</td>
<td>22</td>
<td>25</td>
<td>256</td>
</tr>
<tr>
<td>6</td>
<td>LYSIS/BSO</td>
<td>125</td>
<td>25</td>
<td>47</td>
<td>N/A</td>
<td>25</td>
<td>N/A</td>
</tr>
<tr>
<td>7</td>
<td>dVH</td>
<td>162</td>
<td>6</td>
<td>131</td>
<td>77</td>
<td>400</td>
<td>345</td>
</tr>
</tbody>
</table>
Patient Selection and Getting Started

- **Exclusion criteria:** >2 previous vertical midline incisions, panniculectomy or no native umbilicus

- Gear patient selection towards easy patients in the beginning
  - Thin women, virgin abdomens, BSO, DVH on small uteri

- Consider Single-site Plus One!
- Practice with simulators or at a course
- Proctor for first 2-5 cases

Acknowledgments

- Stacey Scheib
- AAGL
Disclosure

- I have no financial relationships to disclose.

Learning objectives

By the end of this course, participants should be able to:

1. Recognize the benefits of downsizing ports
2. Describe the available miniaturized instruments
3. Discuss applications of mini- and micro-laparoscopy
4. Identify limitations of miniaturized instruments
5. Illustrate design and benefits of deployable instruments

Terminology

<table>
<thead>
<tr>
<th>External diameter (mm)</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥ 5 mm</td>
<td>CONVENTIONAL</td>
</tr>
<tr>
<td>3 to 5 mm</td>
<td>MINI</td>
</tr>
<tr>
<td>&lt; 3 mm</td>
<td>MICRO</td>
</tr>
</tbody>
</table>

Is this a minilaparoscopy?

Surgery done exclusively using ≤ 3-mm instruments

The only exception is the use of a 5-mm scope

Benefits

- Incision-related complications
- Pain
- Cosmesis
Benefits

Incisional hernias in adults

None | 24 case reports | 7 case reports | 0 - 5.2% | 3.1%

Benefits

Postoperative pain
Laparoscopic cholecistectomy vs. needlescopic cholecistectomy

Randomized trial mini-LPS versus conventional LPS
- Benign adnexal masses
- Postoperative pain evaluation by VAS (mm)

<table>
<thead>
<tr>
<th>Postoperative time (hrs)</th>
<th>3-mm ports</th>
<th>5-mm ports</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Median pain score N=88</td>
<td>Median pain score N=49</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>20 (0-50)</td>
<td>32.5 (0-40)</td>
<td>0.04</td>
</tr>
<tr>
<td>3</td>
<td>15 (0-44)</td>
<td>20 (0-71)</td>
<td>0.25</td>
</tr>
<tr>
<td>24</td>
<td>6 (0-50)</td>
<td>5 (0-50)</td>
<td>0.14</td>
</tr>
</tbody>
</table>

Cosmesis
Laparoscopic cholecistectomy vs. needlescopic cholecistectomy

Benefits

Robotic hysterectomy
Minilaparoscopic hysterectomy
**Armamentarium**

<table>
<thead>
<tr>
<th>Instrument</th>
<th>3 mm</th>
<th>2 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optical system</td>
<td>☑</td>
<td>☑</td>
</tr>
<tr>
<td>Scissors</td>
<td>☑</td>
<td>☑</td>
</tr>
<tr>
<td>Grasper</td>
<td>☑</td>
<td>☑</td>
</tr>
<tr>
<td>Biopsy puncher instrument</td>
<td>☑</td>
<td>☑</td>
</tr>
<tr>
<td>Suction irrigation system</td>
<td>☑</td>
<td>☑</td>
</tr>
<tr>
<td>Clip applicator</td>
<td>☑</td>
<td>☑</td>
</tr>
<tr>
<td>Needle holder</td>
<td>☑</td>
<td>☑</td>
</tr>
<tr>
<td>Monopolar hook</td>
<td>☑</td>
<td>☑</td>
</tr>
<tr>
<td>Bipolar instruments</td>
<td>☑</td>
<td>☑</td>
</tr>
</tbody>
</table>

**Applications: a premise**

**Transvaginal specimen retrieval**

- Simple
- Fast
- Safe
- Not painful
- Increasingly used in other specialities
- Supported by evidence

**RCT: Transumbilical vs. transvaginal specimen retrieval**

**Women undergoing mini-laparoscopy for adnexal masses**

<table>
<thead>
<tr>
<th></th>
<th>Trans-umbilical extraction (N=33)</th>
<th>Trans-vaginal extraction (N=34)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain assessment:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VAS score hour 1</td>
<td>2.6 ± 2.9</td>
<td>1.2 ± 2.0</td>
<td>0.03</td>
</tr>
<tr>
<td>VAS score hour 3</td>
<td>2.4 ± 1.0</td>
<td>1.4 ± 2.0</td>
<td>0.02</td>
</tr>
<tr>
<td>VAS score hour 24</td>
<td>1.1 ± 1.5</td>
<td>1.4 ± 2.6</td>
<td>0.62</td>
</tr>
<tr>
<td>Analgesic rescue dose</td>
<td>5 (15.6%)</td>
<td>1 (2.8%)</td>
<td>0.10</td>
</tr>
<tr>
<td>Cosmesix® (VAS)</td>
<td>9.7 ± 0.5</td>
<td>9.8 ± 0.4</td>
<td>0.09</td>
</tr>
<tr>
<td>Dyspareunia® (VAS)</td>
<td>0.34 ± 0.55</td>
<td>0.24 ± 0.43</td>
<td>0.52</td>
</tr>
<tr>
<td>Satisfaction with surgery® (VAS)</td>
<td>9.5 ± 0.6</td>
<td>9.6 ± 0.5</td>
<td>0.66</td>
</tr>
</tbody>
</table>

* at 2 months follow-up

**Applications**

**Hysterectomy**

- 5mm scope
- 3mm port
Hysterectomy

RCT conventional TLH vs. mini-LH

<table>
<thead>
<tr>
<th></th>
<th>TLH</th>
<th>MLH</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operative time (min)</td>
<td>60 (30 – 155)</td>
<td>57.5 (30 – 135)</td>
<td>.55</td>
</tr>
<tr>
<td>Estimated blood loss (ml)</td>
<td>190 (10 – 600)</td>
<td>190 (10 – 500)</td>
<td>.22</td>
</tr>
<tr>
<td>Uterus weight (grams)</td>
<td>210 (30 – 1330)</td>
<td>225 (60 – 1600)</td>
<td>.65</td>
</tr>
<tr>
<td>Uterus weight ≥ 500 grams</td>
<td>8 (21.1%)</td>
<td>9 (23.7%)</td>
<td>.99</td>
</tr>
<tr>
<td>Volume of inflated CO₂ (l)</td>
<td>186 (52 – 566)</td>
<td>89 (25.6 – 280)</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Hemoglobin drop (grams/dl)</td>
<td>1.1 ± 1.0</td>
<td>0.9 ± 0.8</td>
<td>.26</td>
</tr>
<tr>
<td>Hospital stay (days)</td>
<td>1 (1 – 2)</td>
<td>1 (0 – 2)</td>
<td>.73</td>
</tr>
<tr>
<td>Postoperative day 6/1 discharge</td>
<td>30 (94.7%)</td>
<td>30 (92.1%)</td>
<td>&gt;.90</td>
</tr>
</tbody>
</table>

Endometrial cancer

Lymph node dissection

Endometrial cancer

Minilaparoscopy vs. laparoscopy (historical controls)

<table>
<thead>
<tr>
<th></th>
<th>Minilaparoscopy group</th>
<th>Conventional laparoscopy group</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operative time (min)</td>
<td>155 (110-200)</td>
<td>195 (115-375)</td>
<td>0.0004</td>
</tr>
<tr>
<td>Estimated blood loss (ml)</td>
<td>100 (10-400)</td>
<td>100 (10-400)</td>
<td>0.00</td>
</tr>
<tr>
<td>Blood transfusions</td>
<td>1 (4.3%)</td>
<td>2 (2.5%)</td>
<td>0.64</td>
</tr>
<tr>
<td>Lymph nodes yield (nl)</td>
<td>19.2 ± 7.4</td>
<td>18.6 ± 7.2</td>
<td>0.70</td>
</tr>
<tr>
<td>Intraoperative complications</td>
<td>0 (0%)</td>
<td>2 (2.5%)</td>
<td>1.0</td>
</tr>
<tr>
<td>Postoperative complications</td>
<td>2 (8.7%)</td>
<td>11 (13.7%)</td>
<td>0.73</td>
</tr>
</tbody>
</table>

Applications

Cervical cancer
Cervical cancer

Mini-LRH vs. LRH
Prospectively collected data

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>mLHR (N=35)</th>
<th>LRH (N=222)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operative time (minutes)</td>
<td>180 (90-240)</td>
<td>180 (90-375)</td>
<td>0.97</td>
</tr>
<tr>
<td>Estimated blood loss (ml)</td>
<td>85 (10-600)</td>
<td>100 (10-1200)</td>
<td>0.19</td>
</tr>
<tr>
<td>Transfusion</td>
<td>1 (2.9%)</td>
<td>6 (2.7%)</td>
<td>1.0</td>
</tr>
<tr>
<td>Type B radical hysterectomy</td>
<td>11 (31.4%)</td>
<td>43 (19.4%)</td>
<td>0.12</td>
</tr>
<tr>
<td>Pelvic lymph node yield</td>
<td>24 (6 - 56)</td>
<td>20 (4 - 57)</td>
<td>0.79</td>
</tr>
<tr>
<td>Parametral width (cm)</td>
<td>3.4 (2 - 5.5)</td>
<td>3.5 (1.5 - 7)</td>
<td>0.81</td>
</tr>
<tr>
<td>Vaginal cuff length (cm)</td>
<td>1.5 (1 - 3.2)</td>
<td>1.6 (0.8 - 3.6)</td>
<td>0.97</td>
</tr>
</tbody>
</table>

Our experience

Microlaparoscopy

Operative procedures (2-mm instruments exclusively)

Citations identified in MEDLINE
keyword search terms:
"microlaparoscopy" OR "mini-laparoscopy"
OR "endoscopic" (N=317)

EXCLUDED
- Not pertinent
- Diagnostic procedures
- Review/commentary
- Misclassified as micro
- Hybrid procedures

- Pediatric series N=4
- Urologic series N=1
- General surgery series N=1
- Gynecologic series N=1

Last Updated: August 30, 2013

Operative microlaparoscopy: gynecologic series

"Micro-LPS" n=16
2-mm only n=10

- Lysis of adhesions (n=1)
- Endometriosis stage I (n=6)
- Endometriosis stage II (n=3)

FEASIBLE PROCEDURES:

- Micro- BSO
- Micro- Hysterectomy
- Marionette-like technique

Data are still being collected!
Deployable instruments

Magnetic anchoring and guidance systems (MAGS)

External handheld magnet
Conventional trocar (entry port for multiple Instruments)

Inertible magnetic intracorporeal instrument

PROS

- Triangulation
- Increased range of motion
- Trocar occupied only during insertion
- Alleviate instruments collision

CONS

- Image quality
- Magnetic coupling strength
- Abdominal wall thickness
- Extra costs

FDA approved
Preliminary experience in humans

References


References


Conclusion

Effectiveness
Simplicity

“Simplicity is the ultimate sophistication” Leonardo da Vinci

References
Surgical Technology Integration: Is Patient Safety at Risk?

Pedro T. Ramirez, M.D.
Professor
Director of Minimally Invasive Research & Education
Department of Gynecologic Oncology

Objectives

• Current environment in field of MIS
• Critical issues in OR environment
• Impact of novel surgery on standard care
• Data on OR safety & new technology
• Strategies for successful integration

OR Environment

• Knowledge is essential
• Teamwork critical
• Errors are costly
• Productivity is vital
• Safety is paramount

Disclosure

I have no financial relationships to disclose.
The role of surgeons in identifying emerging technologies for health technology assessment

Common Ground-challenged

Definition: One’s working knowledge and/or assumption about what other people within a communication setting know

The more complex the system the more information that is required in the OR

Patient Safety in the Operating Room: I. Preoperative

Surgeon’s Responsibility:
Complex Case with New Technology (Robot)

- Responsible for set up
- Performing surgery
- Maneuvering the robot
- Providing commands to assistant
- Directing nursing team
- Assuring safe use of technology
- Proper dismantling of system
Goals of Study:

- How staff adapts to new technology as measure by job satisfaction and motivation (N=154)

MGH-ORF Project

Goal:

To test new approaches to OR technology and work processes

Conclusions

- Nurses and physicians respond very differently to new technology
- Groups with longer experience at higher risk of burnout
- Introduction of new technology leads to significant stress

Standard of Care

Definition (NCI):

Treatment that is accepted by medical experts as a proper treatment for a certain type of disease and that is widely used by healthcare professionals. Also called best practice, standard medical care, and standard therapy.

Ambitious Advertisement

High Consequence System!

Judah Folkman
1933-2008

When a basic scientist is informed that another investigator cannot reproduce his work, it has a chilling effect; for the surgeon; however, it is a source of pride
Reasons for Unintended Consequences

- Complexity
- Dynamics
- Intransparency
- Ignorance

Tools to Minimize Errors: Improving Patient Safety

- Formal training with surgeons and staff
- Diminish rotation of surgical team
- Predetermined set of rules
- Consistent time out process (WHO)

Conclusion

- Surgeons should NOT be passive recipients
- Seek critical data that shows true benefit
- Establish solid common grounds
- Engage OR team in learning & training
CULTURAL AND LINGUISTIC COMPETENCY

Governor Arnold Schwarzenegger signed into law **AB 1195** (eff. 7/1/06) requiring local CME providers, such as the AAGL, to assist in enhancing the cultural and linguistic competency of California's physicians (researchers and doctors without patient contact are exempt). This mandate follows the federal Civil Rights Act of 1964, Executive Order 13166 (2000) and the Dymally-Alatorre Bilingual Services Act (1973), all of which recognize, as confirmed by the US Census Bureau, that substantial numbers of patients possess limited English proficiency (LEP).

California Business & Professions Code §2190.1(c)(3) requires a review and explanation of the laws identified above so as to fulfill AAGL’s obligations pursuant to California law. Additional guidance is provided by the Institute for Medical Quality at [http://www.imq.org](http://www.imq.org).

**Title VI of the Civil Rights Act of 1964** prohibits recipients of federal financial assistance from discriminating against or otherwise excluding individuals on the basis of race, color, or national origin in any of their activities. In 1974, the US Supreme Court recognized LEP individuals as potential victims of national origin discrimination. In all situations, federal agencies are required to assess the number or proportion of LEP individuals in the eligible service population, the frequency with which they come into contact with the program, the importance of the services, and the resources available to the recipient, including the mix of oral and written language services. Additional details may be found in the Department of Justice Policy Guidance Document: Enforcement of Title VI of the Civil Rights Act of 1964 [http://www.usdoj.gov/crt/cor/pubs.htm](http://www.usdoj.gov/crt/cor/pubs.htm).

**Executive Order 13166, “Improving Access to Services for Persons with Limited English Proficiency”**, signed by the President on August 11, 2000 [http://www.usdoj.gov/crt/cor/13166.htm](http://www.usdoj.gov/crt/cor/13166.htm) was the genesis of the Guidance Document mentioned above. The Executive Order requires all federal agencies, including those which provide federal financial assistance, to examine the services they provide, identify any need for services to LEP individuals, and develop and implement a system to provide those services so LEP persons can have meaningful access.

**Dymally-Alatorre Bilingual Services Act** (California Government Code §7290 et seq.) requires every California state agency which either provides information to, or has contact with, the public to provide bilingual interpreters as well as translated materials explaining those services whenever the local agency serves LEP members of a group whose numbers exceed 5% of the general population.

If you add staff to assist with LEP patients, confirm their translation skills, not just their language skills. A 2007 Northern California study from Sutter Health confirmed that being bilingual does not guarantee competence as a medical interpreter. [http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=2078538](http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=2078538).