Didactic:
Robotic Gynecologic Surgery from Start to Finish: Strategies for Optimizing Outcomes

PROGRAM CHAIR
Arleen H. Song, MD

Devin M. Garza, MD
Kathy Huang, MD
Gaby N. Moawad, MD
Erinn Myers, MD
Nazema Y. Siddiqui, MD, MHS

Mario M. Leitao, MD
Kristin E. Patzkowsky, MD
Professional Education Information

**Target Audience**
This educational activity is developed to meet the needs of residents, fellows and new minimally invasive specialists in the field of gynecology.

**Accreditation**
AAGL is accredited by the Accreditation Council for Continuing Medical Education (ACCME) to provide continuing medical education for physicians.

The AAGL designates this live activity for a maximum of 3.75 *AMA PRA Category 1 Credit(s)™*. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

**DISCLOSURE OF RELEVANT FINANCIAL RELATIONSHIPS**
As a provider accredited by the Accreditation Council for Continuing Medical Education, AAGL must ensure balance, independence, and objectivity in all CME activities to promote improvements in health care and not proprietary interests of a commercial interest. The provider controls all decisions related to identification of CME needs, determination of educational objectives, selection and presentation of content, selection of all persons and organizations that will be in a position to control the content, selection of educational methods, and evaluation of the activity. Course chairs, planning committee members, presenters, authors, moderators, panel members, and others in a position to control the content of this activity are required to disclose relevant financial relationships with commercial interests related to the subject matter of this educational activity. Learners are able to assess the potential for commercial bias in information when complete disclosure, resolution of conflicts of interest, and acknowledgment of commercial support are provided prior to the activity. Informed learners are the final safeguards in assuring that a CME activity is independent from commercial support. We believe this mechanism contributes to the transparency and accountability of CME.
Table of Contents

Course Description ........................................................................................................................................ 1

Disclosure .................................................................................................................................................... 2

Setting Up for Success: Docking, Trocar Placement, and Troubleshooting
K. Huang .................................................................................................................................................. 4

Simulation: Safely Surfing the Learning Curve
N.Y. Siddiqui ........................................................................................................................................... 7

Understanding Energy
A.H. Song ................................................................................................................................................ 14

Multi Port to Single Site Approaches to Robotic Hysterectomy
D.M. Garza .............................................................................................................................................. 21

Myomectomy: Surgical Management for Optimal Fertility Outcomes
K.E. Patzkowsky ....................................................................................................................................... 27

Robotic Sacrocolpexy
E. Myers ................................................................................................................................................... 36

Prevention and Management of Robotic Complications
M.M. Leitao ............................................................................................................................................... 42

Approaching Advanced Endometriosis and Tissue Containment and Extraction Techniques
G.N. Moawad ........................................................................................................................................... 50

Cultural and Linguistics Competency .................................................................................................... 56
This course is a comprehensive review of current robotic surgical techniques to ensure successful surgical outcomes of even the most complex gynecologic cases. Surgical techniques to perform hysterectomy, myomectomy, endometriosis, and sacrocolpopexy will be covered. This course is designed to provide a starting point for the novice and to advance the skill set of the experienced robotic surgeon from patient selection, docking and operating room setup to strategies to successfully perform common and more complex robotic procedures. Participants will learn to prevent, recognize and manage complications, and learn about new tissue extraction methods and advances in robotic technology.

Learning Objectives: At the conclusion of this course, the clinician will be able to: 1) Demonstrate knowledge of robotic gynecologic surgeries, including hysterectomy, myomectomy, resection of advanced endometriosis, and sacrocolpopexy; 2) identify strategies to both prevent, recognize, and manage problems common in robotic surgery; and 3) discuss tissue containment and extraction techniques.

Course Outline

7:00 Welcome, Introductions and Course Overview A.H. Song
7:05 Setting Up for Success: Docking, Trocar Placement, and Troubleshooting K. Huang
7:25 Simulation: Safely Surfing the Learning Curve N.Y. Siddiqui
7:50 Understanding Energy A.H. Song
8:10 Multi Port to Single Site Approaches to Robotic Hysterectomy D.M. Garza
8:50 Questions & Answers All Faculty
9:00 Break
9:15 Myomectomy: Surgical Management for Optimal Fertility Outcomes K.E. Patzkowsky
9:40 Robotic Sacrocolpexy E. Myers
9:50 Prevention and Management of Robotic Complications M.M. Leitao
10:20 Approaching Advanced Endometriosis and Tissue Containment and Extraction Techniques G.N. Moawad
10:50 Questions & Answers All Faculty
11:00 Adjourn
PLANNER DISCLOSURE
The following members of AAGL have been involved in the educational planning of this workshop (listed in alphabetical order by last name).
Art Arellano, Professional Education Manager, AAGL*
R. Edward Betcher*
Amber Bradshaw
Speakers Bureau: Myriad Genetics Lab
Other: Proctor: Intuitive Surgical
Sarah L. Cohen
Consultant: Olympus
Erica Dun*
Joseph (Jay) L. Hudgens
Contracted Research: Gynesonics
Frank D. Loffer, Medical Director, AAGL*
Suketu Mansuria
Speakers Bureau: Covidien
Linda Michels, Executive Director, AAGL*
Arleen H. Song*
Karen C. Wang*
Johnny Yi*

SCIENTIFIC PROGRAM COMMITTEE
Sawsan As-Sanie
Consultant: Myriad Genetics Lab
Jubilee Brown*
Aarathi Cholkeri-Singh
Consultant: Smith & Nephew Endoscopy
Speakers Bureau: Bayer Healthcare Corp., DySIS Medical, Hologic
Other: Advisory Board: Bayer Healthcare Corp., Hologic
Jon I. Einarsson*
Suketu Mansuria
Speakers Bureau: Covidien
Andrew I. Sokol*
Kevin J.E. Stepp
Consultant: CONMED Corporation, Teleflex
Stock ownership: Titan Medical
Karen C. Wang*

FACULTY DISCLOSURE
The following have agreed to provide verbal disclosure of their relationships prior to their presentations. They have also agreed to support their presentations and clinical recommendations with the “best available evidence” from medical literature (in alphabetical order by last name).
Devin M. Garza
Consultant: Applied Medical, Boston Scientific Corp., Inc.
Speakers Bureau: Intuitive Surgical
Kathy Huang
Consultant: Intuitive Surgical
Mario M. Leitao
Consultant: Intuitive Surgical
Other: Ad Hoc Speaker and Lab Proctor: Intuitive Surgical
Other: Ad Hoc Speaker: Novadaq
Gaby N. Moawad
Speakers Bureau: Applied Medical, Intuitive Surgical
Erinn Myers*
Kristin E. Patzkowsky*
Nazema Y. Siddiqui
Contracted Research: Medtronic
Arleen H. Song*
Content Reviewer has no relationships.

Asterisk (*) denotes no financial relationships to disclose.
Setting Up for Success: Docking, Trocar Placement, and Troubleshooting

KATHY HUANG, M.D.
DIRECTOR of Gynecologic Robotic Surgery
NYU LANGONE MEDICAL CENTER
ASSISTANT PROFESSOR
NYU SCHOOL OF MEDICINE

Disclosure

- Consultant: Intuitive Surgical

Patient Positioning

- Patient - Foam - OR Table
- Steep Trendelenburg

Uterine Manipulators

Port Placement

- Veres needle
- Pressure setting: 20mmHg
- First port: 5mm LUQ: noncommittal
- 90 degrees to the fascia
- Avoiding collision

Docking
Robotic Instruments

Bipolar instruments
monopolar instruments

Needle Drivers
Large vs Mega
Suture Cut?

Other Instruments

Hysterectomy

Colpotomy
Simulation: Safely Surfing the Learning Curve

Nazema Y. Siddiqui, MD MHSc
Assistant Professor, Department of Obstetrics and Gynecology
Division of Urogynecology and Reconstructive Pelvic Surgery
Director, Duke Robotic Training Program

Disclosure
Contracted Research: Medtronic

Objectives
✓ Discuss ways to optimize the training experience
✓ Where to focus dry lab practice
✓ Review web-based and simulation curricula; training tools

Why do we need simulation?
- Robotic surgery continues to increase
  - Urology, GYN, General Surgery (thoracic, colorectal)
- Steep learning curve exclusive to robotic surgery
- Learning curve magnified in trainees
  (learning robotic techniques + learning procedure)

Operative Efficiency

Suggestions
✓ Utilize a standard training program for initial practice
  - Residents, new surgeons
✓ Provide opportunities for ongoing/advanced practice
  - Upper level trainees, new surgeons
✓ Periodically review systems & implementation
Initial Training: Bedside Skills and Dry Lab Training

RTN Curriculum

- Incorporates ACGME 6 core competencies (important for trainees)
- Milestones approach
- Divides the learner into two phases
  - Phase I - bedside assistant training
  - Phase II - console training

Phase I - Bedside Assistant

Phase II - Console Training

RTN skill drills
- Series of 5 “dry lab” skill drills and assessment form
Phase II - Console Test

To operate on console:
• Practice using RTN skill drills or VR simulators
• Attend a proctored testing session
• Score > 13/20 for each drill during testing session

(benchmark for trainees developed through RTN studies)

Robotic Training Network

Original Research
Validity and Reliability of the Robotic Objective Structured Assessment of Technical Skills

Ongoing Training: VR simulators

Skills degradation
• “Skills degrade significantly within 4 weeks of inactivity in newly trained surgeons”
Ongoing Training – VR Simulation

- Virtual Reality Simulators
  - Intuitive Surgical “backpack”
  - MIMIC DV Trainer
  - 3D Systems – RobotiX Mentor

- Ongoing drills/dry lab practice

**Simulation Training**
- Level 1
  - Peg Board #1
  - Ring Walk #1
  - Camera Targeting - Basic (Camera Targeting #1)
  - Energy Switching #1
  - Ring Walk #1
  - Camera Targeting #2 (no drill for DaVinci Simulator)
  - Needle Tying – Needle manipulation
  - Rope Walk – Suture manipulation (no drill for DaVinci Simulator)

- Level 2
  - Peg Board #2
  - Match Board #1
  - Energy Switching #2
  - Thread the Rings #1
  - Energy Dissection #1
  - Match Board #3

- Level 3
  - Camera Targeting #2
  - Camera Targeting #1 (as drill for DaVinci Simulator)
  - Camera Targeting #3

**Ongoing drills/dry lab practice**
- Average of 20 hours of simulation lab time
  - Range 9.7-38.2 hours

**“Morristown” Protocol**
- Series of skills to allow novice surgeons to train towards expertise
- Average of 20 hours of simulation lab time
  - Range 9.7-38.2 hours
- Established predictive validity
  (passing protocol predicts successful completion of robotic hysterectomy in times comparable to experts)
Procedure Specific Training

Hysterectomy

- Perform drills that simulate activities needed for hysterectomy
  - List of drills (dry lab or VR trainer)
  - Perform a simulated hysterectomy on VR trainer

VR Hysterectomy

Simulation-based hysterectomy procedure training created by 3D Systems and developed in collaboration with the Fundamentals of Robotic Gynecologic Surgery (FRGS) group.

Content provided by Intuitive Surgical, Inc.

Advanced Procedures

- Drills that simulate activities needed for procedure
  - E.g. for sacrocolpopexy, complete a list of relevant drills (dry lab or VR trainer)
  - Perform a simulated procedure on a model

Sacrocolpopexy – VR Drills

- Drills that simulate activities needed for sacrocolpopexy
  - List of drills (dry lab or VR trainer)
Sacrocolpopexy – VR Drills

Procedural Considerations

Equipment and Instruments

Model... Sacrum

Sacrocolpopexy – Model

Sacrocolpopexy – Model Creation

Jason S. Yeh, MD, FACOG
Reproductive Endocrinologist & Fertility Specialist
Director of Patient Education
Houston Fertility Institute

https://www.youtube.com/watch?v=YwPdwI1wE5U&feature=youtu.be

Sacrocolpopexy – Suturing mesh

Sacrocolpopexy – Sacrum
<table>
<thead>
<tr>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓ Robotic training program should involve bedside, dry lab, and other simulation activities</td>
</tr>
<tr>
<td>✓ For new surgeons, skills degrade after 4 weeks of inactivity</td>
</tr>
<tr>
<td>✓ Simulation curricula available</td>
</tr>
<tr>
<td>• RTN, Morristown Protocol</td>
</tr>
<tr>
<td>✓ Procedure Specific simulation is more difficult to obtain, but still available</td>
</tr>
</tbody>
</table>
Understanding Energy in Robotic Surgery

ARLEEN H. SONG, MD MPH
ASSISTANT PROFESSOR
DIVISION OF MINIMALLY INVASIVE GYNECOLOGIC SURGERY
DUKE UNIVERSITY

I have no financial relationships to disclose.

At the conclusion of this lecture, you should:

- Review the basic principles of electricity
- Identify and understand the different energy sources used in robotic surgery
- Discuss potential advantages and risks of these energy sources
- Identify strategies to reduce thermal injury in robotic surgery

Basics of Electricity

- Always seeks ground
- Always moves through least path of resistance
- Requires a complete circuit to do work
- In patient: Current originates from generator, enters patient and seeks path of least resistance and returns to generator

Conception of electrosurgery

- 19th Century
- French physicist Becqueraul
  - Passed direct current through wire to heat it and cauterize tissue
- French biophysicist D’Arsonval
  - Pioneered use of alternating current in human body
  - Demonstrated that low frequency was safe in humans
  - Use AC to prevent neuromuscular stimulation

Refinement of Electrosurgery

Harvey Cushing, MD
Neuropsychologist

William T. Bovie, PhD
Physicist
**Foundation of Electrosurgery**

- **Current**: Electrons (measured in amperes) moving in a circuit.
- **Circuit**: Uninterrupted pathway for flow of electrons.
- **Impedance**: Obstacle to the flow of current (measured in ohms).
- **Voltage**: Force pushing current through resistance (measured in volts).
- Ohm’s law: Voltage = Current x Resistance.

**Types of Energy in Robotic Surgery**

- **Monopolar**: Hook, spatula, and shears.
- **Bipolar**: Maryland, fenestrated, curved, precise, and micro forceps.
- **Advanced bipolar**: PK, Endowrist One Vessel Sealer.
- **Ultrasonic**: Harmonic Ace.
- **Laser**.

**Monopolar Electrosurgery**

- Desiccation, vaporization, fulguration and coaptation.
- Effects achieved by current power settings, contact or noncontact technique, current waveform, duration of current waveform activity, electrode size/configuration, and tissue conductivity.
- Cut versus Coagulation.

**Monopolar Energy**

- Generator produces current which travels through the active electrode (Bovie) into the patient tissue, through the return electrode and back into the generator.

**Monopolar Energy: Cutting Mode**

- Continuous, low voltage current concentrating energy at small area.
- Rapid tissue heating.
- Vaporization.
- Hold tip of electrode close, but not in direct contact with tissue.

**Monopolar: Coagulation Mode**

- Interrupted, high voltage current dispersed over large surface area.
- Modulated current: Tissue heated more slowly leading to dehydration effect.
- Ideal for sealing vessels.
- More tissue damage and thermal spread.
Optimal use of Monopolar

- Lowest power setting
- Low voltage waveform
- Brief intermittent activation
- Do not use in close proximity to vital structures
- Useful on “cut” mode to dissect near vital structures
- Useful on “cut” mode to cause deeper effect (removal of deep endometriotic lesion)
- Useful on “coag” on tissue with high resistance (adipose, fibrous tissue)
- Useful on “coag” for large surface area with superficial bleeder

Bipolar

- Energy confined to tissue between two electrodes
- Forceps, blades of scissors or graspers
- No dispersion pad needed

Bipolar energy

- Effective for hemostasis
- Desiccation results in coaptation and thermal welding of blood vessels
- “Enhanced bipolar”
  - Tissue feedback from generator measuring impedance
  - Lowest possible power setting is used to achieve desired tissue effect
Bipolar Electrosurgical Thermal Effects

- Senses tissue impedance at active electrode site
- Adjusts current and output voltage in cut and blend modes to maintain consistent surgical effect
- Uses lower power settings and voltages in cut and blend modes
- Reduces lateral thermal spread
- Minimizes sparking
- Reduces need to adjust power settings

Vessel sealing technology “Enhanced Bipolar”

- Ligasure
  - Seals vessels up to 7mm
  - Minimal sticking/charring
  - Unable to cut; cut with blade
- Gyrus
  - Greater thermal spread (3.6mm)
  - Mechanical blade for cutting
  - Significant smoke production

Harmonic scalpel

- MECHANICAL energy (vibrations at tip of active blade – 55,000 times per second) - NO electrocautery
- Leads to denaturation of proteins and separation of tissue
- Produces significant steam from vaporization
- Blade remains “hot”
- Active blade is black “move towards the white”
- No risk for electrical injury
- Coagulate vessels between 3-5mm
- Blade can break off - avoid excessive traction

Light Amplification and Stimulated Emission of Radiation (LASER)

- Laser energy generated when electrons jump from higher to lower energy levels during their circuits around the nucleus
- Induces molecular vibration and thermal energy
- Laser consists of an energy source, focusing mechanism, and radiating mechanism
- Type of medium determines wavelength
  - Carbon dioxide, Argon, Potassium-titanium-phosphate (KTP), neodymium-yttrium aluminum garnet (NdYAG)
Monopolar Tissue Effects

- **Dessication:** Hemostasis < 1 mm vessel
  - Direct contact of electrode
  - Typically use "cutting" current
  - Pronounced lateral spread

- **Vaporization:**
  - Non-touch
  - Use "cutting" current
  - Explosion of cells, low voltage sparks, minimal smoke
  - Results in cutting effect

- **Coaptation:** Sealing of < 2 mm vessel
  - Cutting current
  - Contact and compression of vessel wall
  - Similar to bipolar; pronounced lateral spread

- **Fulguration:** Hemostasis < 1 mm vessel
  - Non-touch
  - Use "coagulation" current
  - Need higher voltage compared to cutting due to impedance of air
  - Chars tissue over large area, high voltage sparks, smoke

Variables Affecting Tissue Effects

- **Waveform:** Coag vs Cut
- **Power setting (= current x voltage)**
- **Electrode size**
  - Smaller electrode
  - Higher current concentration
  - Greater thermal spread

- **Time**
  - Longer time of activation produces more heat, greater thermal spread

- **Electrode manipulation**
  - Sparking vs direct contact to control vaporization or dessication

- **Tissue type**
  - Fat, bone, and fibrous tissue have high resistance
  - Muscle, skin, and vessels have low resistance
  - Eschar
    - High resistance to current-therefore ineffective

Results

**Prospective Comparison of Four Laparoscopic Vessel Ligation Devices**

Gregory R. Lambertson, M.D., Ryan S. Kim, Daniel I. Jin, Takeshi U. Lindner, M.D., Ronald C. Johnson, M.D., and G. Diano Gallo, M.D.

Department of Urology, Loma Linda University Medical Center, Loma Linda, California

**Table 1: Summary of the Evaluation Parameters for the Four Randomized Methods**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Ligation</th>
<th>Gyn PK</th>
<th>Overl.</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermal spread (Mean, °C)</td>
<td>12.3 ± 1.2</td>
<td>12.5 ± 1.1</td>
<td>12.1 ± 1.0</td>
<td>0.050</td>
</tr>
<tr>
<td>Incidence of complications</td>
<td>3/20 (15%)</td>
<td>2/20 (10%)</td>
<td>4/20 (20%)</td>
<td>0.120</td>
</tr>
<tr>
<td>Success rate (%)</td>
<td>95%</td>
<td>90%</td>
<td>92%</td>
<td>0.750</td>
</tr>
<tr>
<td><strong>Conclusion:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Significant difference by *log-rank* test.

Complications of Monopolar Electrosurgery

- **Prevalence of 2.5 per 1000 procedures**
- **Most commonly unrecognized thermal injuries**
  - Bowel, ureteral
  - Delayed injury: 4-10 days

Insulation Failure

- **Occurs with break in insulation of instrument**
- **Compromise of insulation sheath**
- **Visual inspection**
- **Caused by sterilization and use of high voltage**
Direct coupling

- Occurs when an activated instrument touches another conductor in contact with vital structure (bowel).

Capacitive coupling

- When capacitor created (two conductors separated by insulator) and forms stored energy.
  - Electrostatic field is created between the two conductors and current transmitted once net charge exceeded.
  - AC induces unintended stray current to adjacent conductor.

Unpeeled Return Electrode!

- High Current Density
  - Unpeeled Return Electrode!
  - Burn = Heat x Time / Surface Area

Active electrode monitoring

- Utilized to avoid complications of monopolar electrosurgery.
  - Continuously checks for appropriate placement of grounding pad, insulation failures, and capacitive coupling.
  - Will discontinue current if those problems arise.

Injuries Specific to LASER

- Ignition of flammable materials
- Inadvertent reflection by surgical instruments leading to injury in nontargeted tissue

Thermal Spread

- Traditional bipolar devices: 2 – 22 mm
  - Ultrasonic (Harmonic): 0 – 3 mm
  - Dependent on application time and setting
  - Thermal spread of up to 25 mm in animal models with continuous dissection for 10-15 sec.

Vessel sealers:

- Ligasure:
  - 10mm Ligasure: 1.6 mm spread
  - 5mm Ligasure: 0.4 mm spread
- Gyrus PK:
  - 6.3 mm spread
Avoiding Complications

- Use of monopolar energy necessitates return electrode pads ("grounding pad")
- Use intermittent bursts of energy
- Avoid activation without being in contact with tissue unless intent is for sparking
- Use lowest power settings
- Avoid touching instruments during surgery
- Maintain panoramic view of surgical field during application of energy
- Observe tissue changes

Important to have a fundamental understanding of energy source in order to:

- Know the limitations of the energy source chosen
- Select appropriate instrument
- Prevent and recognize thermal complications

References

Single Site to Multiport Approaches To Robotic Hysterectomy

Goals
- Review systematic approach to hysterectomy on robotic platform
- Compare and Contrast Single Site vs Multisite
- “See and Select” approach

Systematic Approach to Hysterectomy
- **Pathology**
  - Uterine size and shape
  - Prior surgery
  - Endometriosis
  - Adhesions
- **Ports**
  - Number
  - Placement

Multi Site Approach To Hysterectomy

Disclosures
- Consultant: Applied Medical, Boston Scientific Corp., Inc.
- Speakers Bureau: Intuitive Surgical

Port Placement: <14w
**Successful Complex Robotics Maximizing “4th Arm”**

- Placement
- Docking – “Not too close”
- Right handed surgeon = RIGHT side docking
- Functional Wristed Retractor
  - Prograsp
  - Single Tooth Tenaculum

**Video Docking: Maximizing 4th Arm**

**Port Placement: SI/XI**

**Systematic Approach to Hysterectomy**

- Port Placement
- Normalize anatomy
- Identify ureters
- Exposure
  - Maximize mobility

**Port Placement: Large Complex**
Video edited Large Uterus

Single Site vs Multi Site

<table>
<thead>
<tr>
<th>Non-wristed semi rigid instruments</th>
<th>Wristed rigid instruments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Camera port: umbilicus</td>
<td>Camera port placement: flexible</td>
</tr>
<tr>
<td>Virtually “scarless”</td>
<td>Visible scars</td>
</tr>
</tbody>
</table>

WHAT?

- Gel port x 1
- Umbilical Incision x 1 = 2.5 cm
- Hysterectomy and adnexa

Texas Institute for Robotic Surgery

- da Vinci, Si System
- 8.5 mm Si Scope
- Curved instrument cannulae
- 5 mm, non-wristed (YETI) semi-rigid instruments
- Single-Site Port

Single Site Robotics

WHY?

- Aesthetics & Cosmesis
- See & Select Protocol
- Extraction Site
Post Op Cosmesis

Laparoscopic Single Port vs Robotic Single-Site

- Unstable, in-line optics
- Instrument crowding
- Lack of triangulation

Single Port

- Stable, 3D HD visualization
- Precise, ergonomic control
- Maintains triangulation

Single-Site™ for Robotics

Single Site Robotics

WHO?

- Patient Selection
- Surgeon Selection

SS: Patient Selection

NO!

SS Hysterectomy: Patient Selection

- Initial Cases
  - BMI < 35 (Alexis)
  - Minimal Pathology
  - <12wk size uterus
  - Add “+1”

- Post Learning Curve
  - BMI >35 *Alexis
  - Moderate Pathology
  - <16wk size
  - Add “+1”

Yes.. Single-Site
Learning Curve Data For Single-Site


• A Comparison of Outcomes between Robotic-Assisted Single-Site Laparoscopy versus Multi-Port Laparoscopy for Gynecologic Surgery. Published Online: August 21, 2016. Publication stage: In Press Accepted Manuscript. JMIG

Multi-center retrospective cohort study: SS Robotic vs. SILS

See & Select Approach

Review History and bimanual exam

If unsure: Place routine daVinci Camera Port: assess difficulty

Select approach: [4A, 4B, 4C].

Tip:
• Mark 3rd arm lateral >15cm

Video Single Site Entry

Assistant Center Docking

Video Single Site Hysterectomy
Video Single Site Cuff Closure

Summary

• Plan Ports based on Pathology - One size does NOT fit all!
• Work towards mastering 4th arm use
• Single Site 16w or less and moderate pathology
• Single Site incision useful as an extraction site
• Multi Site for high complexity and a large uterus
• Be Flexible – choose number of ports “on the fly”

Thanks!

Devin Martin Garza, M.D., FACOG
Clinical Assistant Professor, University of Texas Dell Medical School
Minimally Invasive Surgery
Rennaissance Women’s Group
Texas Institute for Robotic Surgery, Austin, Texas
Myomectomy: Surgical Management for Optimal Fertility Outcomes

Kristin Patzkowsky, MD
Assistant Professor
Minimally Invasive Gynecologic Surgery
Johns Hopkins Hospital

I have no financial relationships to disclose.

Objectives

- To better define the impact of fibroids on infertility and potential fertility
- Describe pre-op and operative interventions to optimize patient outcomes
- Suggest recommendations for post-op surveillance and management

History of myomectomy

- 1845: 1st abdominal myomectomy in US, John Atlee
  - Case series, 14 abdominal myomectomies, 5 deaths
- Mortality rate:
  - Early 1900s: 40%
  - Mortality at Johns Hopkins:
    - 1889-1906: 6%
    - 1906-1909: <1%

History of myomectomy

Abdominal myomectomy was “so dangerous and difficult as not to be thought of except in desperate conditions.”

- 1875, W.H. Byford, MD. Chairman’s address to the AMA

History of myomectomy

TeLinde’s Operative Gynecology, 2003:

“This procedure (laparoscopic myomectomy) is appropriate in very few patients for several reasons…

...In both circumstances, the myomata are likely to be large and laparoscopic myomectomy is rarely the most appropriate procedure for removal”
Effect of fibroids on fertility: all locations.

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Number of studies/substudies</th>
<th>Relative Risk</th>
<th>95% CI</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clinical pregnancy rate</td>
<td>16</td>
<td>0.849</td>
<td>0.734-0.963</td>
<td>p&lt;0.029</td>
</tr>
<tr>
<td>Implantation rate</td>
<td>14</td>
<td>0.821</td>
<td>0.722-0.932</td>
<td>p&lt;0.022</td>
</tr>
<tr>
<td>Ongoing pregnancy/live birth rate</td>
<td>17</td>
<td>0.897</td>
<td>0.589-0.925</td>
<td>p&lt;0.001</td>
</tr>
<tr>
<td>Spontaneous abortion rate</td>
<td>16</td>
<td>1.678</td>
<td>1.373-2.051</td>
<td>p&lt;0.001</td>
</tr>
<tr>
<td>Preterm delivery rate</td>
<td>3</td>
<td>1.357</td>
<td>0.927-1.895</td>
<td>NS</td>
</tr>
</tbody>
</table>


Location, location, location

- **Submucosal**
  - In an ART population:
    - Detrimental effect on fertility outcomes
    - Improved outcomes with fibroid removal
- **Intramural**
  - **Gray zone**
- **Subserosal**
  - Do not appear to effect fertility outcomes
  - Removal does not confer benefit


Submucosal Fibroids & Infertility

- **Submucosal fibroids are associated with decreased fertility:**
  - Decreased implantation rates from 11.5% to 3.0%
  - Decrease in ongoing pregnancy rate from 30% to 14%
  - Increased risk of miscarriage 22% to 47%
- **Benefit of myomectomy in women with infertility:**
  - 40% pregnancy rate/yr in women who underwent myomectomy vs 21% in the cohort who declined myomectomy

Intramural fibroids & Infertility

- Intramural fibroids appear to be associated with decreased fertility & increased pregnancy loss
  - Cavity distortion
  - Size
  - Proximity to endometrium
  - Location within the uterus (& how defined)

- Benefits of myomectomy unclear
  
Pritts et al, Fertil Steril, 2009

Fibroids in Pregnancy & Delivery

- Higher rate of c-section
  - Malpresentation
  - No difference in labor curve
- Increased risk post partum hemorrhage & emergency hysterectomy
- Inconsistent data:
  - PPROM / PTD
  - Previa
  - Growth restriction
  - Abruptio


When to intervene?

When to intervene...

34yo G2P0 with AUB, anemia & SAB.
38yo G1 with AUB, anemia, desires future childbearing.
41yo G0 with AUB, anemia, planned IVF transfer.

The “art” of medicine

43yo G0 untested fertility, AMH 0.2, desires future childbearing.
35yo G1P1, s/p SVD 6 months ago. Asymptomatic. Concerned about impact of surgery on future pregnancy & delivery.
41yo G0, recently married, desires pregnancy.

PRE-OP CONSIDERATIONS
PreOp Considerations

• MRI pelvis w/wo gadolinium contrast
  – Mapping; size, #, location.
  – Eval for other pathology adenomyosis/oma, leiomyosarcoma
  – Critical for counseling

• Severe anemia
  – GnRH agonist
  – IV iron
  – Cell salvage
  – PreOp UAE with gelfoam

Deciding on Surgical Route

• Laparoscopic vs Robotic myomectomy
  – No RCTs exist
  – 8 retrospective studies (large heterogeneity)
• Iavazzo et al, Meta-analysis, 2016.
  – No difference in:
    • Operative time
    • Blood loss
    • Transfusion
    • Length of stay
    • Post operative pain
    • Complications
    • Post operative fertility

• Barakat et al, 2011
  • Retrospective review, 575 myomectomies, Jan 1995-Dec 2009
    – 393 (68.3%) abdominal
    – 93 (16.2%) laparoscopic
    – 89 (15.5%) robotic
  • Outcomes: OR time, EBL, ΔHgb, intra-op & post-op complications, length of stay, myoma weight

Surgical outcomes by approach

<table>
<thead>
<tr>
<th></th>
<th>Abdominal (390)</th>
<th>Laparoscopic (93)</th>
<th>Robotic (25)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surgical time (min)</td>
<td>126.00 (95.00, 177.00)</td>
<td>155.00 (98.00, 200.00)</td>
<td>181.00 (151.00, 265.00)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Blood loss (mL)</td>
<td>200.00 (100.00, 437.50)</td>
<td>150.00 (100.00, 200.00)</td>
<td>100.00 (50.00, 212.50)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Hemoglobin drop (g/dL)</td>
<td>2.00 (1.40, 2.90)</td>
<td>1.55 (1.20, 2.40)</td>
<td>1.30 (0.80, 2.28)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Hospital Stay (d)</td>
<td>3.00 (2.00, 3.00)</td>
<td>1.00 (0.00, 1.00)</td>
<td>1.00 (1.00, 1.00)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Myoma weight (g)</td>
<td>263.00 (80.50, 449.00)</td>
<td>96.65 (49.50, 237.25)</td>
<td>223.00 (85.25, 391.90)</td>
<td>.002</td>
</tr>
</tbody>
</table>
Myomectomy

Basic tenets of surgery:
• Meticulous tissue dissection
• Minimal blood loss
• Minimal damage to reproductive tissues
• Multilayer closure

Minimizing blood loss

• Misoprostol / cytotec
  – Prostaglandin E1 analog
  – 400mcg 1hr prior to surgery
  – Reduced EBL, decreased transfusion rate

Minimizing blood loss

• Vasopressin
  – Synthetic derivative of ADH
  – Potent vasoconstrictor
  – Plasma ½ life 10-20 min
  – Possible side effects; hypotension, bradycardia, cardiac arrest, pulmonary edema
  – Recommended dilution .05-.3 units/mL
  – Reduced EBL, decreased transfusion rate

Minimizing blood loss

• Tranexamic acid
• GnRH agonist
• PreOp UAE
• Tourniquet
• Oxytocin
• Hemostatic agents; Floseal, Tisseal

Myometrial Incision and Closure

• Uterine incision; vertical vs transverse
• CO2 laser
• Barbed suture for closure

Minimizing blood loss

Myometrial Incision and Closure

- Benefit of the CO2 laser?
  - Least thermal damage to surrounding tissue
  - Choussein et al, 2015
    - Retrospective comparison of myomectomy using laser vs ultrasonic energy
    - No difference in EBL or operative time
  - Benefit?... tbd

Choussein et al, JMG 2015.

Myometrial incision and closure

- Barbed suture
- Reduced suturing time
- Reduced EBL
- Conflicting data re: adhesion formation


Operative Tips and Tricks

- Minimize number of incisions
- Don’t dig holes
- Ok to trim excess myometrium (but only the excess)
- Multi-layer closure
- Close cavity in event of entry
- Minimize exposed suture

video

video
POST-OP CONSIDERATIONS

Post-Op Adhesions

- Pelvic Adhesions
- Intra-uterine adhesions

Adhesion Formation & Prevention

- Pelvic Adhesions
  - 30-90% after open, 20-40% after laparoscopy
  - Pelvic pain, ileus/SBO, tubal sterility, future surgical morbidity

Gynecology and Obstetrics

Adhesion Formation & Prevention

- Factors influencing the risk of adhesions
  - Increasing myoma size
  - Increasing number of myomas
  - Myoma location, posterior > anterior
  - Use of adhesion barrier


Role of Adhesion Barriers

- Mechanical Barriers
  - Liquid Barriers
    - Polyethylene glycol (Spraygel), Icodextrin solution (Adept), Hyaluronic acid solution (sepraspray)
  - Solid Barriers
    - Hyaluronic acid sheets (sepra film)
    - Oxidized regenerated cellulose (interceed)
      - Reduced effectiveness in the presence of blood or excess peritoneal fluid
  - Fibrin Glue
    - Fibrin sealant
      - Human fibrinogen and thrombin (tisseal, evicel), mimics last step of coagulation cascade

Gynecology and Obstetrics

Adhesion Formation and Prevention

- Intra-uterine Adhesions
  - 20-50% incidence
  - No association with:
    - Fibroid size or number
    - Cavity entry
    - Blood loss


Prevention of Intra-uterine Adhesions

- Physical barriers
  - Estrogen
  - Intrauterine Foley Catheter
  - IUD
  - Intrauterine hyaluronic acid
  - Repeat hysteroscopy with adhesiolysis

Healy et al, AJOG, 2016.

Fibroid Recurrence

<table>
<thead>
<tr>
<th>Time since Myomectomy</th>
<th>Recurrence Rate</th>
<th>ReOperation Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 years</td>
<td>53%</td>
<td>7%</td>
</tr>
<tr>
<td>8 years</td>
<td>84%</td>
<td>16%</td>
</tr>
</tbody>
</table>

Factors influencing recurrence:
- Increasing number of fibroids
- Young age
- Larger uterine size


Subsequent Conception and Pregnancy

- Time to conception
  - 3-6 months?
- Uterine rupture
  - <1% Risk of rupture
    - Multi-layer closure
    - Minimize use of electrocautery

### Pregnancy Outcomes following Robotic Myomectomy

- **Pitter et al., 2013.**
  - 872 women undergoing robotic myomectomy between 10/2005 – 11/2010
  - 107 women conceived
  - 127 pregnancies
  - 92 deliveries

- **Results:**
  - Mean age at myomectomy: 34.8 ± 4.5 yrs
  - Mean size of myomas: 3.9 ± 3.2
  - Mean myoma size: 7.5 ± 3.0 cm
  - Mean myoma weight: 191.7 ± 144.8 g

### References


### References


### References


Robotic Sacrocolpopexy: Appropriate Technique and Common Complications

Erinn M. Myers, MD
Assistant Professor
Female Pelvic Medicine and Reconstructive Surgery
Carolinas HealthCare System
Charlotte, NC

Objectives
- Review procedural steps for sacrocolpopexy
- Discuss common sites of injury
- Discuss management of intraoperative complications

You don’t have to operate
- Remember this is ELECTIVE
- Appropriate patient selection
- Use caution
  - Extensive prior abdominal surgery
  - Extreme weight

Technique and Complications
- Improper positioning: Nerve injury
- Robotic arm interference: can’t complete the case
- Abdominal access: Avoiding bowel and vascular injury
- Can’t find the promontory: Injury to iliac vein
- Difficulty with dissection avascular spaces: Bladder and bowel injury
- Absence of haptic feedback: using visual not tactile clues for dissection
- Mesh complications

Positioning
Docking to Avoid Arm Interference

Safe abdominal entry: Palmer’s point

Promontory is 3 cm medial to right ureter at pelvic brim

The Ureter as a Landmark for Robotic Sacrococcygeal


Tips for finding sacral promontory

- Finding the promontory: Retrorectal dissection can solve this in obese patients
Presacral Hemorrhage

- It shouldn’t happen if you’re at the promontory
- Proper visualization, use 30° down scope if needed
- Floseal™ hemostatic matrix works for both venous and arterial bleeding
- Use a raytec sponge for initial compression
- Don’t panic

Bladder injury

- Follow the rule of the FAT
- Retrograde fill the bladder to identify boundaries
  - Cystosufflation
  - Retrograde fill with fluid

O’Hanlan, KA. JMiG. 2009
Anatomic outcomes one year after minimally invasive sacrocolpopexy: a comparison between permanent and barbed delayed absorbable suture

- Retrospective cohort analysis
- Included women who underwent a minimally invasive sacrocolpopexy over 36 month period
  - 0 Ethibond (95%) and CV2 Gortex (5%)
  - 2-0 Vloc 180
- Objective: To compare recurrent prolapse ≥ hymen and mesh exposure rates at 12 months

### Results

<table>
<thead>
<tr>
<th></th>
<th>Permanent n=140</th>
<th>BDA n=73</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recurrent Prolapse</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 weeks</td>
<td>9/122 (7.4%)</td>
<td>1/49 (2.0%)</td>
<td>0.28</td>
</tr>
<tr>
<td>1 year</td>
<td>10/64 (15.6%)</td>
<td>5/30 (16.7%)</td>
<td>1.0</td>
</tr>
<tr>
<td>Mesh Exposure</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 weeks</td>
<td>0/139 (0%)</td>
<td>0/68 (0%)</td>
<td>1.0</td>
</tr>
<tr>
<td>1 year</td>
<td>0/72 (0%)</td>
<td>0/37 (0%)</td>
<td>1.0</td>
</tr>
</tbody>
</table>

### Mesh Complications

- Light-weight mesh
- Avoid braided permanent suture
- +/- concomitant hysterectomy

### Summary

- Proper positioning:
  - prevent nerve injury and avoid robotic arm interference
- Abdominal access:
  - Remember Palmer’s point
- Sacral Promontory:
  - 3 cm medial to ureter at pelvic brim and Retrorectal dissection
- Anterior and posterior vaginal dissection:
  - Fat goes with the viscera
  - Retrograde fill bladder, EEA sizer in rectum
- Mesh complications:
  - Consider supracervical hysterectomy
References


Questions?

Which of the following is true regarding the sacral promontory?

A. It is located 3 cm medial to the right ureter at the pelvic brim
B. It is located above the L5-S1 disc
C. It is located 1 cm below the bifurcation of the aorta
D. Visualization is improved with a 30 degree up scope
E. Bleeding can occur if the dissection is too close to the inferior sacral artery
Preventing and recognizing complications in robotic gynecologic surgery

Essential Basic Tips in Avoiding Complications

**“APTESS”**

- Anatomy - master anatomy
- Principles – master surgical principles
- Tools – master your tools
- Exposure – maximize exposure
- Structures – maximize identification of structures
- Standardize – techniques across all surgeons

Robotic Platform

**General thoughts**

- A tool
- Not new surgery or procedure
- A tool that makes minimally invasive surgery easier
- Very rare to have “robotic” complication if used properly
- Surgeon who is using the robot has a complication as with any other tool
- A complication is inevitable
- Many are avoidable

Disclosure

Other: Ad Hoc Speaker and Lab Proctor: Intuitive Surgical
Other: Ad Hoc Speaker: Novadaq

**Boozler’s Law of Surgical Exposure**

DOBES NOT INCREASE COMPLICATIONS

Less than laparotomy

<table>
<thead>
<tr>
<th>Series</th>
<th>Robotic</th>
<th>Laparoscopic</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rosero 2013</td>
<td>N</td>
<td>0.8%</td>
<td>0.9</td>
</tr>
<tr>
<td>Any complication</td>
<td>41,144</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight 2013 (JAMA)</td>
<td>N</td>
<td>5.5%</td>
<td>0.8</td>
</tr>
<tr>
<td>Any complication</td>
<td>11,737</td>
<td>75,161</td>
<td></td>
</tr>
<tr>
<td>Weight 2012 (JCO)</td>
<td>N</td>
<td>8.1%</td>
<td>0.1</td>
</tr>
<tr>
<td>Any complication</td>
<td>1,437</td>
<td>1,247</td>
<td></td>
</tr>
</tbody>
</table>

Wright JD, et al. JAMA 2013;309:689-698
Nerve injuries

Patient Positioning Injury

Improper positioning during surgery is a cause of post-operative morbidity.

Spectrum of injury, often transient:
- Joint pain
- Muscle ache
- Paresthesia
- Weakness

Complications associated with improper patient positioning are poorly described and rarely reported.

Patient Positioning Injury

Compartment Syndromes

- Prolonged abnormal positioning
- Direct soft tissue pressure, typically over bone
- Muscle hypoxia/ischemia and reperfusion
- Tissue swelling within closed fascia compartment
- Progressive vascular tamponade
- Nerve injury

Limb Injuries – Most common
- Anatomical isolation
- Fascial compartments

Risk factors: obesity, male, long case (>4 hours)

Robotics

Patient positioning

Robotics

Patient positioning
Patient Positioning

Instructions for Use


Positioning for robotic procedures

Key points

- Low lithotomy – avoid unnatural and/or excessive flexions/extensions
- Arms tuckd, thumbs up, hands padded
- Patient cannot move during procedure
- Avoid medial pressure on neck
- Strap tight around chest
- Alert at 4 hours – check patient, limbs, consider break from Trendelenburg

MIS: 2 categories of injury

At insertion= laparoscopy

- About 10^-1 to 10^1
- 83% of injuries reported L-scopy
  - 4.4% Veress Needle, 39% trocar (half disposable)

During MIS

- Gas embolus
- Ox sat, arryth., hypoT, mill wheel
- Rt sided failure
- Remove Veress, 100% O2, Trend, Rt Atrium. Cath.
- About 25% mortality

Vascular injury

Sandral et al. J Vasc Surg 2001; 32 486
Bernoud F, Zuckett, MD

Robotic Trocar Placement

Avoids inferior epigastrics

Minimum Distances
Major Vascular Injury

Basic tips & common sense approach

- Have a “timeout” process in place for each case
- Have vascular instruments handy for each case
- DO NOT start randomly moving or removing instruments
- Grasp bleeding vessel with robotic grasper
- Throw in sponge
- Relax, take charge, and plot out next steps (robot won’t move)
- Call for laparotomy set up
- Call for laparoscopic bulldog clamps, 5-0 prolene sutures, hemostatic agents
- Find out who is around who can truly help
- Convert to laparotomy any time uncomfortable and before too late
- Obtain best exposure surrounding site of injury
- Assess extent of injury
- Attempt repair if possible
- If not, call for help if none there yet and convert

Instrumentation

Vascular clamps

Avulsion Injury

Borrowed: P.Escobar, MD

Renal vein avulsion injury and repair

Burn Injury

Borrowed: P.Escobar, MD

Right external iliac artery injury and repair

Major Vascular Injury

Converting considerations

- Robot can be undocked very quickly if needed
- Put all instruments in view
- Pull them all out with trocars still attached to robotic arms
- Can leave one arm attached that is grasping vessel, remove all others, pull them as far away as possible and convert
- Apply bulldog clamps over site, proximal/distal, whatever works and then undock and convert
Emergent Conversion for Major Complication

- Mostly vascular emergencies
- Gowns and gloves always open and available for all console surgeons
- Robot emergency “team timeout” done during “Contingency Plan” section of active timeout for each case

<table>
<thead>
<tr>
<th>Who</th>
<th>What</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attending Surgeon</td>
<td>1. Call for emergent conversion to open procedure, designate person in charge of maintaining tamponade.</td>
</tr>
<tr>
<td>Circ RN</td>
<td>3. Open Robotic Emergency Tray</td>
</tr>
<tr>
<td>Anesthesia Team</td>
<td>4. Notify anesthesia attending via Vocera</td>
</tr>
<tr>
<td>Anesthesia Team</td>
<td>5. Initiate fluid resuscitation. Confirm adequacy of IV access.</td>
</tr>
<tr>
<td>Anesthesia Team</td>
<td>6. Initiate blood products.-request confirmation when sent.</td>
</tr>
<tr>
<td>Blonde assistant</td>
<td>7. Maintain tamponade, may initiate removal of some robotic instruments at the direction of attending surgeon.</td>
</tr>
<tr>
<td>Attending Surgeon</td>
<td>8. Undock Robot at discretion of Attending Surgeon</td>
</tr>
<tr>
<td>Attending Surgeon</td>
<td>9. Proceed to open</td>
</tr>
<tr>
<td>Circ RN</td>
<td>10. Notify all available service attendings for additional help</td>
</tr>
</tbody>
</table>

GU injury

Ureteral injury

How to avoid

- SIMPLE
- OPEN RP SPACE AND IDENTIFY IT!
- Master anatomy
- Upward traction of uterus is helpful
- Lateral extension of cautery, inadvertent clamping, and/or kinking greatest if you aren’t aware of ureter’s location
- Avoid excessive devascularization
- Avoid placement of wide sutures at vaginal cuff angles
- If difficult case, dissect and follow ureter to ensure no injury or kinking
- Ureteral stent use??
- Cystoscopy DOES NOT AVOID injury

Ureteral Anatomy

Effect of Traction

Best way to avoid ureteral injury
Rates of lower GU tract injury in GYN

Meta-analysis of retrospective series

<table>
<thead>
<tr>
<th>Source</th>
<th>Study Type</th>
<th>Total Number</th>
<th>Rate of Injury</th>
<th>Rate of Injury/1000</th>
<th>95% CI</th>
<th>Rate of Injury per 1,000</th>
<th>95% CI</th>
<th>Rate of Injury per 1,000</th>
<th>95% CI</th>
<th>Rate of Injury per 1,000</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>VHA 2001</td>
<td>VHA 2001</td>
<td>5,222,000</td>
<td>0.2</td>
<td>0.05</td>
<td>0.00-0.11</td>
<td>0.05</td>
<td>0.00-0.11</td>
<td>0.05</td>
<td>0.00-0.11</td>
<td>0.05</td>
<td></td>
</tr>
<tr>
<td>VHA 2001</td>
<td>VHA 2001</td>
<td>4,822,905</td>
<td>0.6</td>
<td>0.15</td>
<td>0.09-0.21</td>
<td>0.15</td>
<td>0.09-0.21</td>
<td>0.15</td>
<td>0.09-0.21</td>
<td>0.15</td>
<td></td>
</tr>
<tr>
<td>VHA 2002</td>
<td>VHA 2002</td>
<td>19,425</td>
<td>3.5</td>
<td>1.2</td>
<td>0.5-2.0</td>
<td>1.2</td>
<td>0.5-2.0</td>
<td>1.2</td>
<td>0.5-2.0</td>
<td>1.2</td>
<td></td>
</tr>
<tr>
<td>VHA 2003</td>
<td>VHA 2003</td>
<td>10,549</td>
<td>3.1</td>
<td>1.2</td>
<td>0.7-1.9</td>
<td>1.2</td>
<td>0.7-1.9</td>
<td>1.2</td>
<td>0.7-1.9</td>
<td>1.2</td>
<td></td>
</tr>
</tbody>
</table>

Use of cystoscopy during hysterectomy

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Prep (N)</th>
<th>No prep (N)</th>
<th>Peeto OR</th>
<th>95%CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anastomotic leak</td>
<td>1275</td>
<td>1258</td>
<td>0.99</td>
<td>0.74-1.31</td>
</tr>
<tr>
<td>Peritonitis</td>
<td>1999</td>
<td>1984</td>
<td>0.74</td>
<td>0.59-0.98</td>
</tr>
<tr>
<td>Wound infection</td>
<td>2095</td>
<td>2092</td>
<td>1.00</td>
<td>0.95-1.05</td>
</tr>
<tr>
<td>Re-op rates</td>
<td>2375</td>
<td>2358</td>
<td>1.04</td>
<td>0.85-1.29</td>
</tr>
<tr>
<td>Mortality</td>
<td>2054</td>
<td>2072</td>
<td>0.93</td>
<td>0.58-1.51</td>
</tr>
</tbody>
</table>
Mechanical Bowel Prep
Laparoscopy

Mechanical Bowel Prep
Laparoscopy view

Mechanical Bowel Prep
Laparoscopy view

Mechanical Bowel Prep
Laparoscopy

Injury management

Traumatic Colon Injury
Unprepped bowel


48
Traumatic Rectal Injury

Unprepped bowel

Unrecognized injury

- Patients get better fast after MIS
- Low threshold for assessing for injury
- Abdominal pain, significant distention, fever, increased WBC, bandemia
- Do not be fooled if abdominal exam “benign”
- Delayed diagnosis – 4-5% mortality

Platform fault or malfunction

"Mistakes are always forgivable, if one has the courage to admit them."

—Bruce Lee

THANK YOU!

Special Thanks to all the wonderful strong women that I have the privilege of being a part of their life.
Approaches to Advanced Endometriosis and Tissue Containment and Extraction Techniques

GABY MOAWAD, MD, FACOG
Assistant Professor of Obstetrics and Gynecology
AAGL Fellowship Co-Director
Director of GYN Robotic Surgery
The George Washington University

OBJECTIVES

- MRI CORRELATION TO INTRAOPERATIVE FINDINGS OF DEEPLY INFILTRATIVE ENDOMETRIOSIS (DIE)
- FIREFLY TECHNOLOGY
- REVIEW OPERATIVE TIPS AND TRICKS IN DIE
- REVIEW OPERATIVE TIPS AND TRICKS IN TISSUE CONTAINMENT

DISCLOSURES

Speakers Bureau: Applied Medical, Intuitive Surgical

MRI CORRELATION TO INTRAOPERATIVE FINDINGS OF DIE

Endometriosis Protocol

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Pelvic</th>
<th>Needle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aperture</td>
<td>1.5&quot;</td>
<td>1.5&quot;</td>
</tr>
<tr>
<td>Tumor resection</td>
<td>0 mm slip clips</td>
<td>0 mm slip clips</td>
</tr>
<tr>
<td>Tumor resection</td>
<td>4 mm slip clips</td>
<td>4 mm slip clips</td>
</tr>
<tr>
<td>Tumor resection</td>
<td>6 mm slip clips</td>
<td>6 mm slip clips</td>
</tr>
</tbody>
</table>

BLADDER ENDOMETRIOSIS

Patient is a 45 y/o with known diagnosis of endometriosis...

She was diagnosed 2 years ago after presenting with a bowel obstruction resulting in necessary exploratory laparotomy and bowel resection

BLADDER ENDOMETRIOSIS

T2 Weighted Image
BLADDER ENDOMETRIOSIS

RECTOVAGINAL ENDOMETRIOSIS

UTERSOSACRAL LIGAMENT ENDOMETRIOSIS

24 y/o who presented with right lower quadrant pain radiating to her rectum and significant dyspareunia.

Her exam revealed adnexal tenderness and fullness on the right side.
UTEROSACRAL LIGAMENT ENDOMETRIOSIS

SIGMOID ENDOMETRIOSIS

50 y/o with persistent pelvic pain despite numerous attempts at medical intervention

Pain described as “stabbing” in the right lower quadrant

SIGMOID ENDOMETRIOSIS: MRI

FIREFLY™ TECHNOLOGY

- LAUNCHED 2011
- FDA CLEARANCE: LAP CHOLE SYSTEM
- INDOCYANINE GREEN (ICG)
- INFRARED 803nm LASER ILLUMINATOR
- IR CAMERA
- ICG IDENTIFIES VASCULARITY USING FIREFLY™ CAMERA
CLOSURE

REFERENCES


Thank you
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.

~