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**Applied Medical**

**Program Chair**
Arnold P. Advincula, MD

Ted Teh Min Lee, MD     Richard B. Rosenfield, MD     Stacey A. Schieb, MD

**Fundamentals of Laparoscopic & Robotic Hysterectomy: From Simple to Complex (Didactic)**
Professional Education Information

Target Audience
Educational activities are developed to meet the needs of surgical gynecologists in practice and in training, as well as, other allied healthcare professionals in the field of gynecology.

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

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# Table of Contents

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

Disclosure .............................................................................................................................................................. 3

Maximizing Outcomes and Minimizing Complications with Monopolar, Bipolar and Ultrasonic Devices
A.P. Advincula ......................................................................................................................................................... 5

A Primer on Pelvic and Retroperitoneal Anatomy: the Gynecologist’s Achilles Heel
T. Lee ...................................................................................................................................................................... 18

A Practical Surgical Approach to Laparoscopic Hysterectomy
R.B. Rosenfield ......................................................................................................................................................... 28

Utilizing Reduced and Single Port Techniques for Conventional Laparoscopic and Robotic Hysterectomy
S.A. Scheib ............................................................................................................................................................. 35

Surgical Roadmaps for the Complex Laparoscopic Hysterectomy
T. Lee ....................................................................................................................................................................... 40

Robotic Hysterectomy: a Systematic Approach in 3-D
A.P. Advincula ......................................................................................................................................................... 47

Tips and Tricks for Tackling the Large Uterus during Laparoscopic Hysterectomy
R.B. Rosenfield ......................................................................................................................................................... 57

Dealing with Difficult Peritoneal Access, Obesity and Vaginal Cuff Issues
S.A. Scheib ............................................................................................................................................................. 61

Cultural and Linguistics Competency ...................................................................................................................... 69
PG 105
Fundamentals of Laparoscopic & Robotic Hysterectomy:
from Simple to Complex (Didactic)

Arnold P. Advincula, Chair
Faculty: Ted Teh Min Lee, Richard B. Rosenfield, Stacey A. Scheib

Course Description

This interactive surgical video-based course is designed for individuals interested in incorporating laparoscopic hysterectomy into their minimally invasive surgical armamentarium. Basic and advanced techniques will be discussed in order to allow novice as well as experienced gynecologic surgeons to tackle simple and complex hysterectomies. Both conventional and robot-assisted laparoscopic approaches will be discussed in the setting of traditional multi-port peritoneal access as well as reduced and single port laparoscopy. An emphasis on proper energy device usage, optimization of uterine manipulation, proper retroperitoneal dissection, and management of complications will be made. Tips and tricks for the large uterus as well as navigating pelvic adhesive disease will also be discussed.

Course Objectives

At the conclusion of this activity, the participant will be able to: 1) Distinguish between optimal and suboptimal performance of colpotomy and vaginal cuff closure; 2) apply safe and efficient strategies for managing large uteri laparoscopically; 3) demonstrate proper dissection techniques for retroperitoneal exploration and ureterolysis; 4) analyze and compare various energy sources used in laparoscopic hysterectomy; 5) distinguish between conventional laparoscopic and robotic hysterectomy; and 6) apply multi-port as well as reduced and single port strategies for peritoneal access.

Course Outline

8:00 Welcome, Introductions and Course Overview A.P. Advincula
8:05 Maximizing Outcomes and Minimizing Complications with Monopolar, Bipolar and Ultrasonic Devices A.P. Advincula
8:30 A Primer on Pelvic and Retroperitoneal Anatomy: the Gynecologist’s Achilles Heel T. Lee
8:55 A Practical Surgical Approach to Laparoscopic Hysterectomy R.B. Rosenfield
9:20 Utilizing Reduced and Single Port Techniques for Conventional Laparoscopic and Robotic Hysterectomy S.A. Scheib
9:45 Questions & Answers All Faculty
9:55 Break
10:10 Surgical Roadmaps for the Complex Laparoscopic Hysterectomy T. Lee
<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
<th>Speaker</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:35</td>
<td>Robotic Hysterectomy: a Systematic Approach in 3-D</td>
<td>A.P. Advincula</td>
</tr>
<tr>
<td>11:00</td>
<td>Tips and Tricks for Tackling the Large Uterus during Laparoscopic Hysterectomy</td>
<td>R.B. Rosenfield</td>
</tr>
<tr>
<td>11:25</td>
<td>Dealing with Difficult Peritoneal Access, Obesity and Vaginal Cuff Issues</td>
<td>S.A. Scheib</td>
</tr>
<tr>
<td>11:50</td>
<td>Questions &amp; Answers</td>
<td>All Faculty</td>
</tr>
<tr>
<td>12:00</td>
<td>Course Evaluation</td>
<td></td>
</tr>
</tbody>
</table>
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Viviane F. Connor
Consultant: Conceptus Incorporated
Frank D. Loffer, Executive Vice President/Medical Director, AAGL*
Linda Michels, Executive Director, AAGL*
Jonathan Solnik
Other: Lecturer - Olympus, Lecturer - Karl Storz Endoscopy-America

SCIENTIFIC PROGRAM COMMITTEE
Arnold P. Advincula
Consultant: CooperSurgical, Ethicon Women’s Health & Urology, Intuitve Surgical
Other: Royalties - CooperSurgical
Linda Bradley
Grants/Research Support: Elsevier
Consultant: Bayer Healthcare Corp., Conceptus Incorporated, Ferring Pharmaceuticals
Speaker’s Bureau: Bayer Healthcare Corp., Conceptus Incorporated, Ferring Pharm
Keith Isaacson
Consultant: Karl Storz Endoscopy
Rosanne M. Kho
Other: Honorarium - Ethicon Endo-Surgery
C.Y. Liu*
Javier Magrina*
Ceana H. Nezhat
Consultant: Intuitive Surgical, Lumenis, Karl Storz Endoscopy-America
Speaker’s Bureau: Conceptus Incorporated, Ethicon Women's Health & Urology
William H. Parker
Grants/Research Support: Ethicon Women’s Health & Urology
Consultant: Ethicon Women’s Health & Urology
Craig J. Sobolewski
Consultant: Covidien, CareFusion, TransEnterix
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Speaker’s Bureau: Covidien, Abbott Laboratories
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Arnold P. Advincula
Consultant: CooperSurgical, Ethicon Women’s Health & Urology, Intuitve Surgical
Other: Royalties – CooperSurgical
Ted Lee
Grants/Research Support: Ethicon Endo-Surgery
Consultant: Ethicon Endo-Surgery, Gyrus ACMI (Olympus)
Richard B. Rosenfield  
Other: Cofounder - Surgiview
Stacey A. Scheib  
Grants/Research Support: Intuitive Surgical  
Consultant: Covidien
Nash S. Moawad*

Asterisk (*) denotes no financial relationships to disclose.
Maximizing Outcomes & Minimizing Complications with Monopolar, Bipolar and Ultrasonic Devices

Arnold P. Advincula, MD, FACOG, FACS
Professor of Obstetrics & Gynecology
University of Central Florida College of Medicine
Director, Center for Specialized Gynecology
Director, Celebration Health Endometriosis Center
Director, AAGL/SRS MIS Fellowship
Florida Hospital - Celebration Health

Learning Objectives
• Understand the basic principles involved in today’s electrosurgery platforms.
• Discuss the issues & risks surrounding the use of monopolar and bipolar electrosurgical devices in minimally invasive surgery.
• Review the rationale behind & evolution of both advanced bipolar thermal tissue fusion devices.

Thermocautery
Use of Energy to Heat a Metal Object

Properties of Electricity
• Atoms are the basic building blocks of all matter.
• Atoms are composed of
  – Neutrons,
  – Protons (+) and
  – Electrons (-)

Disclosure
• Consultant: CooperSurgical, Ethicon Women’s Health & Urology, Intuitive Surgical
• Other: Royalties - CooperSurgical
Properties of Electricity

- Electricity is absolutely consistent in that:
  - Electricity always takes the path of least resistance,
  - Electricity always seeks ground, and
  - Electricity must have a complete circuit to do work

Principles of Electrosurgery

Using water tower as an example:
Volts equals water column (pressure)
Current equals volume of water through pipe over time
Resistance equals diameter of pipe
\[ V = IR \]

Question #1

Electrocautery & electrosurgery are one and the same thing?

1. Yes
2. No

Electrocautery vs. Electrosurgery

- Electrocautery (direct current) is the use of electricity to heat tissue to cause cautery.

- Electrosurgery (alternating current) uses the electrical current itself to heat the tissues. Current must pass through the tissues to produce the effect.

- Heat results from the excitation of the cellular ions. The excited ions in the cell collide with each other and release energy in the form of heat.
Question #2

- Electrosurgical current used in the operating room runs at?

1. 60 Hz
2. 200 kHz – 3.3 MHz
3. 54 – 880 MHz
4. None of the above

How can you introduce electricity into the body without causing electrocution?

Electrosurgery Power Delivery

RF Generator

Current flows through patient

Current flows through ground

Current is impeded by resistance provided by instrument and patient.

Ohm’s Law in action

Ohm’s law: Voltage = Current x Resistance

Current is impeded by resistance provided by instrument and patient.

Electrosurgical Effect on Cells

Radiofrequency current transfers energy to intracellular ions. Sine waveform results in oscillation of ions, imparting heat to intracellular water causing cell to burst.

Question #3

- The following are electrosurgical clinical effects?

1. Cut
2. Fulguration
3. Dessication
4. All of the above
Effect of Waveform on Tissue

**Cutting**
- Sine wave
- Low voltage (1000 volts at 50 Watts power)
- Current arcs to tissue across steam envelope
- Less heating of tissue/thermal spread than coagulation waveform

**Fulguration** (non-contact coagulation)
- Uses spark gap current
- High voltage (5000 volts at 50 watts)
- Current arcs to tissue
- Causes heating and necrosis of tissue; greater thermal spread

**Dessication**
- Uses spark gap current
- High voltage (5000 volts at 50 watts)
- Direct contact to tissue
- Causes heating and necrosis of tissue

**Waveform Comparison**
- Pure cut
- Blend
- Coagulation

Effect of Rate of Cut on Tissue
- Fast movement cuts with less thermal spread
- Slow movement cuts with more thermal coagulation

Effect of Electrode Size on Tissue
Power Flow Current

- Monopolar

RF Generator

Resistance results from medium through which current flows

Question #4

- The following can be a hazard of monopolar current?

1. Direct coupling
2. Insulation breakdown
3. Capacitance coupling
4. All of the above

Pitfalls of Monopolar Electrosurgery

- Direct Coupling (metal to metal contact)
- Insulation Breakdown
- Capacitance Coupling

Direct Coupling

Insulation Breakdown

Insulation Breakdown
Insulation Breakdown

Capacitance Coupling

• Occurs when energy is transferred to an adjacent metal structure through an insulator
• Can cause injury remote from instrument tip

Capacitance Injury

Bipolar Electrosurgery

• Safer than monopolar electrosurgery
• Current flow: electrode-tissue-electrode
• Current precisely applied to target tissue
• No need for return pad
Power Delivery

- Bipolar

![RF Generator](image)

Pitfalls of Bipolar Electrosurgery

- Power may be insufficient to coagulate large vessels
- Cutting may be inadequate
- Thermal heating of instrument
- Thermal spread increases with continued instrument activation

Bipolar Electrosurgery

Flow of energy is Through tissue between jaws

![Tissue](image)

Question #5

- Ultrasonic devices?
  1. Blend monopolar & bipolar current
  2. Run at 200 kHz – 3.3 MHz
  3. Utilize a radiofrequency of 50 kHz
  4. Incorporate mechanical motion
  5. Numbers 1 & 3

Ultrasonic (Mechanical) Energy

- Utilizes mechanical motion instead of RF
- Instruments oscillate at 55 KHz
- Mechanical energy transmission heats tissue, causing cell lysis
- Can be used for cutting and small vessel coagulation (cannot coagulate without cutting)
- Technique sensitive
Ultrasonic Devices

Flow of energy is Surface to Surface

- Causes heating by friction in tissue
- No temperature control
- Instrument tip remains hot after application

Harmonic Ace (Ethicon Endo-Surgery)
Sonicision (Covidien)
SonoSurg (Olympus)

Laparoscopic Left Salpingectomy with Ultrasonic Scalpel

Evolution of Electrosurgical Vessel Sealing

LigaSure
Gyrus
EnSeal

Evolution of Electrosurgery

Monopolar
- Current passes from active electrode into the tissue, through the patient, to the dispersive pad to the ESU

Conventional bipolar
- Current passes from one electrode through tissue and returns to the ESU via the second electrode of the instrument. No grounding pad.

Advanced bipolar
- Current passes from one electrode through tissue and returns to the ESU via the second electrode of the instrument. No grounding pad.
- Consistent hemostasis without sticking or thermal heating
- Vessel sealing
- Bipolar cutting
- Concept of "tension-free sealing and transection" is very important

Ligasure
- Permanently fuses vessels up to and including 7 mm in diameter and tissue bundles without dissection or isolation
- Seals withstand 3x normal systolic blood pressure
- Provides a unique combination of pressure and energy to create vessel fusion
- Measures tissue impedance/resistance at the electrode site (feedback-controlled response system)
- Minimal sticking or charring
- Reduces thermal spread
Gyrus System

- **PlasmaKinetic Vapor Pulse Coagulation (PK VPC):** bipolar energy delivered as a series of pulses
  - Minimizes thermal spread
  - Minimizes tissue sticking
  - Minimizes heating of instrument
  - Minimizes surgical plume
- Multiple instruments, each has a unique default setting which determines the pulse on/off cycle and wattage
  - Output load curve customized for each instrument
  - Pulse rate tailored to maximize performance

PlasmaKinetic Vapor Pulse Coagulation Overview

- **Vapor Pulse Coagulation: The End Point**
  - Pulses are repeated until the tissue cannot absorb the high energy pulses (visual of tissue swelling and release of steam with each pulse)
  - Tissue cannot absorb the high energy current when it is fully and uniformly coagulated
  - The audible and visual impedance monitor provides a reference for endpoint desiccation

Conventional bipolar may cause sticking, thermal spread, and excess heating of instrument, due to constant power being delivered to the targeted tissue.
Second Generation
Of Electrosurgery
Devices

Smart Generator Control

EnSeal System

Arteries have coiled elastin centrally located (inner layer)

Veins have elastin distributed throughout

Electrosurgical Vessel Welding

Hydrothermal rupture of hydrogen cross-links by elevating to 60-95°C

Cooling & renaturation of entangled unwound collagen strands

Vessel wall fusion can be achieved using RF energy to denature collagen & elastin in vessel walls to reform into a permanent seal

High uniform mechanical compression increases entanglement and re-crosslinking upon thermal relaxation

High tensile strength with substantial elasticity
**Conventional Closing Mechanism**

**EnSeal Closing Mechanism**

**EnSeal Proprietary Technology**

**Cutting I Beam**

Mechanical incision by I-beam as tissue is progressively squeezed.

**Smart Electrode Technology**

**EnSeal**

Self-controlled electrode-network

Temperature sensitive, high density polyethylene with embedded nanometer-size conductive carbon spherules
Internal Electrode
Electrode with Nano-Particle Energy and Temperature Control
Spark-Control Intermediary Layer

EnSeal TRIO

Optimizing Patient Positioning and Understanding Radiofrequency Energy in Gynecologic Surgery

Where do we go next?

ALTRUS (ConMed)
Thermal Tissue Fusion

ALTRUS “seal line”
Altrus – Advantages

• Visually: minimal lateral thermal spread, smoke plume & instrument sticking

• A pure thermal-based system (NO RF CURRENT) eliminates:
  – Direct coupling
  – Capacitance coupling

What will surgeons ask?

4 Basic Questions

• Will patient outcomes improve?
• Will my ability to render care improve?
• Generalizability & reproducibility to the masses?
• Costs?

Conclusion

• There is no perfect energy device, yet.
• Understanding device characteristics will optimize tissue effect outcomes.
• As a rule, “less is often best”, with energy sources.

?’s
A PRIMER ON PELVIC RETROPERITONEAL ANATOMY: THE “GYNECOLOGIST'S ACHILLES HEEL”

Ted T.M. Lee, M.D., FACOG
Director, Minimally Invasive Gynecologic Surgery
Magee Womens Hospital
UPMC

Disclosure
- Grants/Research Support: Ethicon Endo-Surgery
- Consultant: Ethicon Endo-Surgery, Gyrus ACMI (Olympus)

The mother of surgery is anatomy, the father is exposure.

John Mikuta, M.D.

If you know your anatomy, know how to provide exposure, know how to dissect, know how to suture, you will become__________

Objectives
- Promote understanding of pelvic retroperitoneal surgical anatomy using dissection techniques based on actual surgical procedures (Different from the approach used in Gross Anatomy in Med School)
- Special focus on pelvic sidewall anatomy

Gateway to the Retroperitoneum
Relevance of Retropubic Space Anatomy

- Pubovaginal sling, TVT
- Burch
- Paravaginal defect repair
Relevance of Rectovaginal and Medial Pararectal Space

- Rectovaginal endometriosis
- Rectal resection
- Sacrocolpopereineopexy
Important Structure in Medial Pararectal Space: Middle Rectal Artery

Relevance of Presacral/retrorectal Space Anatomy

- Presacral neurectomy
- Sacrocolpopexy
- Rectosigmoid Resection
Pelvic Sidewall Anatomy
- Ureteral identification
- Uterine artery ligation
- Pelvic nodes
Utility of Uterine Artery Ligation

- Pathology which make the ascending branch of uterine artery inaccessible. (Large fibroid, cervical fibroid, broad ligament fibroid, retroperitoneal fibrosis/endometriosis involving the parametrium, ovarian remnant, ovary densely adherent to the parametrium.)
Uterine Artery Ligation using Medial Umbilical Ligament

If you know your anatomy, know how to provide exposure, know how to dissect, know how to suture, you will become__________
New Spokespeople for
Holiday Inn Express
A Practical Surgical Approach to Laparoscopic Hysterectomy

AAGL - PG 105

Presented by Richard B Rosenfield, MD
Director of Gynecology
Pearl Women's Center / Pearl Surgicenter
Portland, OR, USA

Learning Objectives

• Review of hysterectomy statistics in the US
• Review the differences in terminology for laparoscopic hysterectomy
• Identify Benefits of Laparoscopic Hysterectomy when compared to traditional approaches

Basic Statistics

• 600,000 Hysterectomies per year in USA
  – Majority by Invasive Techniques
  – Minimally Invasive Approaches
    • TVH
    • LAVH
    • LSH
    • TLH
    • TRH

LSH and TLH

• Is there a contraindication for laparoscopy?
• Size of uterus, size of patient, previous surgery?
• Cancer?

Why Laparoscopy?

• Better Visualization
• Less Tissue Trauma
• Fast Recovery
• Cosmesis
• Outpatient Potential

Disclosure

• Co-Founder, Chief Medical Officer of SURGiVIEW
Laparoscopic Entry

- Be Safe and Consistent
- Use trocars you are familiar with to avoid loss of pneumo, slippage, unplanned trauma
- Consider towel clips for elevation of anterior abdominal wall
- Consider LUQ entry if concern of adhesions

How to get from point A to Point B

LSH Pearls- the room

- Operating Room Table- height and tilt
- Proper Positioning- Arms and Legs
- Dual Monitors
- Camera Resolution and Scope Quality
- Uterine Positioning

LSH Pearls- the surgeon

- Visualization is everything
- Maintain hemostasis to ensure visualization
- Slow and steady beats fast and sloppy
- 30 Degree Laparoscope imperative for complex advanced laparoscopy

LSH Pearls- the surgeon

- Seal vessels prior to transection
- Ablate endocervical canal for reduced cyclic bleeding (up to 5% in literature)
- Morcellation
  – Several vendors- Gynecare, Lina, Wolf, Storz
  – Run the outside of specimen
  – Calcified fibroids may dull blade

Ergonomic Morcellation
LSH Pearls - the assistant

• Help with visualization, because…
• Help with uterine manipulation
  – Cornua or Fimbria
• Lean Technique
• Morcellator stays in position and blade is in mid-view; 5 mm scope from low lateral port

BMI 59 - too big?

Standardize Your Approach

• Dysplasia
• Cervical Bleeding
• Deep Dyspareunia, Pelvic Pain
• Need for Intact endometrium

TLH- Why?

• Mastery of LSH prior to TLH
• Use of Colpotomizer- drop ureters, visualize colpotomy target
• Suturing- practice with Lap Trainer
• Ranfac Knot Pusher or V Loc
• BEWARE of magnification
TLH Pearls

- Use of Bipolar or Harmonic Device to reduce smoke for anterior and posterior Colpotomy
- Use Bipolar at 3 and 9 o’clock for uterine branches
- Maintain pneumoperitoneum with uterus in vagina, Bulb (or gloved Raytec)

Why do we have complications?

- Surgeon or Environment?
- What variables can we control?

Surgeons are victims of their surroundings

- How low does the table go?
- What is max degree of Trendelenberg?
- Do you know the crew?
- Have you selected the tools in the laparoscopy set?

Is this safe?

I Have a Choice?
Controlling Variables

If you take control of your surgical environment, you minimize the opportunity for avoidable error.

Anesthesia

- Preemptive management of pain and nausea
- “Balanced Anesthetic”
  - Rapidly cleared medications
  - Local Anesthetic Injection
  - Toradol, Decadron, Reglan, Zofran, Propofol, Versed (the magic 5)

Anesthesia

- There is no one named, “Anesthesia”
- Ok to change table position to help both you and your anesthetic provider
- Proper airway selection for outpatient cases

Anesthesia

- Preop - no magic; consider NSAIDs
- Intraop - rapidly cleared meds
- Postop - AVOID use of LONGACTING NARCOTICS and NAUSEA POTENTIATORS
  (Scopolamine Patch in cases of proven nausea)

Nursing and OR staff

- Crew understands roles and goals
- In Surgicenter, this is easy - Nurses understand how to mobilize patients
- Verbal encouragement for discharge (gentle but firm motivation)
- Foley removed in Operating Room
The 9 Step Program

1. Learn to walk before you run

2. Begin at the Beginning

3. Happy *preop* patients become happy *postop* patients

4. Find Your Paintbrush and Canvas

5. Surround yourself with competence and minimize risk

6. Become friends with your anesthesia team

7. Gentle Forcefulness Transitions Patients

8. The Art of Early Discharge- Assurance, Reassurance, Availability

9. Track Your Data

Where we were, 1929

Where we are…

Where are we going?
Technology...  

Is Changing....

You must keep up !

Thank you

Videos

• Stepwise approach to Laparoscopic Hysterectomy
Utilizing Reduced and Single Port Techniques for Conventional Laparoscopic and Robotic Hysterectomy

Stacey A. Scheib, MD, FACOG
Director of Minimally Invasive Gynecology
Johns Hopkins Hospital

OBJECTIVE

• Explain the theory and rationale behind single port and reduced port laparoscopy
• Identify the limitations of single port and reduced port hysterectomy
• Apply single incision and reduced port laparoscopy to hysterectomy

Background

• Gynecology has been at the forefront of single site surgery starting almost 40 years ago.
  – The offset operating laparoscope used for laparoscopic tubal ligations,
  – The first complex procedure, a hysterectomy and bilateral salpingo-oophorectomy was performed by Pelosi and Pelosi in 1991, without additional trochars.

Despite these early efforts, single site surgery did not become a standard surgical technique in gynecologic surgery for several reasons and is now only taken off due to advances in technology.

Morbidity

• Each additional port used potentially increases morbidity
  – Bleeding
  – Port-site hernia
  – Internal organ injury
  – Vascular injury
  – Post-operative wound infection
  – Decreases cosmetic outcome

Why Bother?

Grants/Research Support: Intuitive Surgical
Consultant: Covidien
Pain

• Potential decrease in postoperative pain and need for postoperative pain medications, which might be due to avoidance of multiple muscle-splitting incisions.\(^4\)\(^7\)

Gynecology and Single Incision

• Anatomy of the Pelvis
• Ease of Specimen Removal

Disadvantages

• Restricted by a surgeon’s experience with advanced laparoscopy.
  – Loss of triangulation
  – Special instrumentation
  – Learning curve

Single Incision Hysterectomy: Let’s break it down

Just Remember

• Follow standard laparoscopic fundamentals (LESS and reduced port laparoscopy is an ACCESS technique...NOT a new procedure)
• Includes using all normal precautionary steps such as identifying and isolating ureters, bladder, and bowel

What will you need to get started?

• Port
• Laparoscope – Angled or Flexible Tip
• Instruments – Traditional Straights
• Energy – Anything but ultrasonic technology
• Uterine Manipulator
• Morcellator
Abdominal Entry: Hasson Technique

1. Skin Incision
   • 2-3 cm
   • Omega or Vertical Incision
2. Identify fascia.
3. The fascia is grasped and elevated with a pair of Allis or Kocher clamps.
4. Adherent subcutaneous tissue is gently dissected free.
5. Incision made in fascia
   • At least 1-2 finger breaths
6. Peritoneum entered bluntly or sharply

Putting in the Port

• This will vary slightly based on the port selected

Where is the surgeon?

• Stand by the patient’s head
• May need to move the OR table away from anesthesia

Cross Over Technique

• Grasper goes in contralateral trochar from the direction of retraction
• If you are clashing instruments, most likely instruments are in the wrong trochars... pull everything out and reassess
• Set yourself up to be successful... camera, then grasper, and finally energy

Cross Energy Above or Below the Grasper?

ABOVE
• Round ligament
• Bladder flap
• Colpotomy
• Cervical amputation

BELOW
• Infundibulopelvic ligament
• Utero-ovarian ligament
• Fallopian tube
• Round Ligament
• Uterine artery
• Colpotomy
• Cervical amputation
Morcellation

- Video
- When using a morcellator, must visualize tip at all times…Patient Safety First!
- Keep in the midline

Cuff Closure

- Vaginal closure
- Laparoscopic suturing device with an articulating laparoscopic grasper
- Vertical laparoscopic closure with a “puppet string” at 12 o’clock (advanced single incision laparoscopic technique)

Worst Case Scenario

Add another trochar!!!

Closure

- Close the fascia
- May need to stitch base of umbilicus down to fascia
- Place several buried interrupted to space out tension
- Subcutaneous stitch to reapproximate skin
- Discourage use of skin glue

Single Incision Robotic Assisted Hysterectomy

- Limitations with current system
- Need a 30 degree “UP” scope (8mm if available)
- Will need up to a 4 cm facial incision

Port Configuration
Take Home

• Anticipate the need for “cross-over” of instruments
• Expect every step to take more thought and concentration
• Utilize a bariatric and/or articulating scope to remove clutter from the immediate operating field
• Be aware of a tendency to accept less anatomic visualization than conventional laparoscopic and don’t accept this…Patient Safety First!
• If it is necessary, place an additional trochar

Your turn...

REFERENCES

Objectives
- Facilitate the understanding of strategies and techniques for difficult hysterectomy based on sound surgical principles and knowledge of retroperitoneal pelvic anatomy.

Situations which distort pelvic anatomy
- Fibroid uterus
- Endometriosis with obliteration of cul de sac.
- Severe uterine adhesions to the bladder and anterior abdominal (c-section, myomectomy).
- Dense ovarian adhesion to the ovarian fossa and parametrium with or without retroperitoneal fibrosis.
- Obesity. Increased retroperitoneal adiposity.

Helpful Tools in Difficult Hysterectomy
- Angled scope (30 or 45 degree) or flexible scope
- Ureteral stents
- Use the uterine manipulator with a well fit obturator.
- Powerful morcelator
- Reliable vessel sealer
Anterior Abdominal Wall Adhesions
45 Degree Scope

Ureter at Risk

- Not knowing the location of ureter halts the progression of surgery for the careful and invites disaster for the careless.

- Ureteral stents let you know the course of the ureter so you can zip along when you are away from the ureter and refine your dissection as you get closer.
Ureteral Stent

General Strategies for Hysterectomy

- **Always Take the Easier Pedicles**
- Do not tackle the hard pedicle without securing the easier pedicles
- Can always take the uterovarian and go back for the IP.
- Can always take one IP (sacrifice one ovary) if uterovarian is difficult

Uterine Artery Ligation - Four Ways

- Conventional
- Anterior approach (ascending branch)
- Posterior approach (ascending branch)
- Lateral Approach - at its origin from internal iliac.

Anterior Approach

- Ligation of the ascending branch uterine artery without opening the posterior broad ligament.
- Good for uterus with large fibroid uterus with poor access to the cul de sac and posterior broad ligament. Large fibroid uterus not maneuverable by the manipulator
- Not good for patients with fibrosis in the parametrium from endometriosis or dense bladder adhesions from c-sec.
Posterior Approach

- Ligation of ascending branch of uterine artery without developing bladder flap.
- Excellent in patients with extensive and dense uterine adhesions to the bladder and anterior abdominal wall.
- Technique usually not available during open surgery, unique to laparoscopic approach.
Lateral Approach

- Commonly done in radical hysterectomy for cervical cancer.
- Good for retroperitoneal fibrosis in the parametrium seen in severe endometriosis.
- Ovarian remnant.
- Large fibroid uterus.
- Maybe difficult to visualize without angled scope in broad fibroid uterus.
Know Your Anatomy like the Cab Driver Knows the Streets in any Big City

- Need to know more than one way to get from point A to point B so if you get in the jam you know the alternate route.
- Try the alternative route when there is no traffic/pressure.
- Know the freeway as well as the side streets
Robotic Hysterectomy: A Systematic Approach in 3-D

Arnold P. Advincula, MD, FACOG, FACS
Professor of Obstetrics & Gynecology
University of Central Florida College of Medicine
Director, Center for Specialized Gynecology
Director, Celebration Health Endometriosis Center
Director, AAGL/SRS Accredited MIS Fellowship
Florida Hospital - Celebration Health

Disclosure

- Consultant: CooperSurgical, Ethicon Women’s Health & Urology, Intuitive Surgical
- Other: Royalties - CooperSurgical

OBJECTIVES

- Review the rationale behind considering a standardized approach to the simple hysterectomy (from instrumentation to technique).
- Discuss the potential implications stemming from improper patient positioning, peritoneal access, port placement, and uterine manipulation.
- Demonstrate principles and techniques of robot-assisted laparoscopic dissection & suturing.
- Review the key steps leading up to and involved in optimal colpotomy & vaginal cuff management.

Instrument Tray Standardization

“Nurse, get on the internet, go to SURGERY.COM, scroll down and click on the ‘Are you totally lost?’ icon.”

Hysterectomy Spectrum

- TLH
- VH
- Robotic Hyst
- LAVH
- LSH
- TAH
- TAH

47
Top Tray
- Robotic instruments

Middle Tray
- Cords
- Laparoscopic instruments
- Open instruments

Bottom Tray
- Vaginal instruments
- Dilators
- Speculum

Back Table

Vaginal Mayo Stand

Roving Instrument Cart

Key Technical Steps
- Patient positioning
- Peritoneal access & strategic trocar placement
- Uterine manipulation
- Docking (center, L/R)
- Survey of operative field ("a game of chess")
- Adnexal management
- Round ligament & entry into broad ligament
- Vesico-uterine reflection
- Identification of ureters
- Skeletonization & ligation of uterine vasculature
Key Technical Steps

- Retention or removal of cervix
- Management of vaginal cuff
  - Colpotomy
  - Closure
- Specimen extraction
  - Mechanical morcellation

“Start of the Case”

- Dorsal lithotomy
- Arms padded and tucked at sides
- Steep Trendelenburg
- Bowel Prep
- Decompress stomach & bladder
- Collaborate with Anesthesia team

Low lithotomy position: abdominal or laparoscopic approach

Figure 5: Low lithotomy position. The trunk to thigh angle should be approximately 100 degrees, and never more than 180 degrees.

Barnett et al. 2007

Optimal Patient Positioning

OR Bed Setup

Figure 7: Hip abduction and rotation in lithotomy position. The hips should be abducted such that the thigh is parallel, and external rotation is unrestricted.

Barnett et al. 2007
OR Bed Setup

Egg Crate Foam Mattress Technique

Port Placement: “standard rules but individualized”

Center-docking

Side-docking

3-Arm (Left)
4-Arm (Left)

Uterine Manipulation Method

- ZUMI Apple Obturators
- V CARE

RUMI colpotomizer system

Choose Appropriate RUMI Tips

Impacts uterine maneuverability!

“Choose Proper Koh Colpotomizer Cup Size”

Size Matters

Colpotomy Ring

Normal relationship of uterus to fornix and uterine artery.

- Ureter #1
- Ureter #2

“Size Matters”
“Inflate Pneumo-occluder Balloon Prior to Colpotomy”

**Adnexal Management**
- Retain adnexa or remove after hysterectomy for improved exposure (“preservation of triangle”)
- Immediate removal

**Vesico-Uterine Reflection/Bladder Flap**

**Efficient Colpotomy**
- Energy source does not matter; what matters is the way the energy source is handled
- Upward tension on colpotomizer
- Tolerate some bleeding (vaginal cuff should not look like charcoal)

**OPTIMIZATION OF ELECTROSURGERY USAGE**
Waveform Comparison
- Pure cut
- Blend
- Coagulation

Effect of Rate of Cut on Tissue
- Fast movement cuts with less thermal spread
- Slow movement cuts with more thermal coagulation

Effect of Electrode Size on Tissue
- The finer the electrode, the less coagulation

Pitfalls of Monopolar Electrosurgery
- Direct Coupling (metal to metal contact)
- Insulation Breakdown
- Capacitance Coupling

Insulation Breakdown

Maximum Monopolar ESU Power Settings for da Vinci Systems

Insulation Failure Instrumentation

Mucosal Injuries, With Kaplan I

Objective: The purpose of this study was to evaluate the incidence and severity of mucosal injuries associated with monopolar electrosurgery. Study design: A prospective, controlled, randomized, double-blind study comparing 30 patients, 15 in group A and 15 in group B. Group A was treated with standard monopolar electrosurgery, while group B was treated with bipolar electrosurgery. Results: The incidence and severity of mucosal injuries were significantly lower in group B compared to group A. Conclusions: Bipolar electrosurgery may be a safer alternative to monopolar electrosurgery for mucosal injuries.
Properties of Electricity

Electricity is absolutely consistent in that:
- Electricity always takes the path of least resistance,
- Electricity always seeks ground, and
- Electricity must have a complete circuit to do work

Direct Coupling

Capacitance Coupling

EndoWrist® One™ Vessel Sealer
- Designed to seal & cut up to 7 mm diameter vessels
- Single use disposable
- 8 mm diameter instrument
- Compact snake wrist

Key Concept #4: Adequate Suturing

Conventional & robot-assisted laparoscopic suturing rely heavily on the principles of:
- Adequate bites of tissue beyond the cut electrosurgical edge (do not suture through devitalized tissue)
- Incorporation of both vaginal epithelium and fascia
Tissue Extraction: Morcellation

Efficiency/Safety Strategies

- Undock patient side-cart if robotic case
- Place morcellator at camera port site
- Use 5 mm laparoscope placed in one of the lower quadrant trocars reduced to 5 mm
- Chip management
- Benign Endometrial Sampling

Final Steps

- Irrigate operative field
- “Low pressure check”
- Cystoscopy with Indigo Carmine or Pyridium
- Inspect vaginal cuff with speculum

Post-Operative Care

- Pelvic rest for 8 weeks
- No STDs
  - Sex
  - Tampons
  - Douching
- Vaginal cuff inspection at 8 weeks post-op

TLH: 4.93%
TVH: 0.29%
TAH: 0.12%
Overall: 0.14% in 7039 pts over 6 years

RaTLH: 4.1% in 530 pts
Conclusion

- Success with the simple (complex) minimally invasive hysterectomy relies heavily on a well-thought strategy from start to finish.

Prevention of vaginal cuff complications is multifactorial (not an issue of absent haptic feedback)

- Colpotomizer
- Bladder flap development
- Efficient use of energy source during colpotomy (energy source does not matter)
- Adequate suturing (suture type does not matter)
- Pelvic rest (8 weeks)
Tips and Tricks for Tackling the Large Uterus during Laparoscopic Hysterectomy

AAGL - PG 105

Presented by Richard B Rosenfield, MD
Director of Gynecology
Pearl Women's Center / Pearl Surgicenter
Portland, OR, USA

Learning Objectives

• Define Large Uterus
• Review Anatomical Changes and Relationships with a Large Uterus
• Video Session Reviewing Parallel Port Technique for Hysterectomy with Large Uterus

So, What Defines LARGE

• According to CMS, and our CPT codes
  • 250 grams
  • What about 500 grams
  • 1000 grams
  • 3000 grams

Is there a size limit for LSH / TLH

• “In my experience, and with my training, I feel that this surgery would best be approached…”
• What’s the downfall of trying?

Disclosure

• Co-Founder, Chief Medical Officer of SURGiVIEW

Big PATIENT
**Big UTERUS**

**SURGICAL APPROACH**

**5 Trocar Approach**

**Why ?**
- 750 Consecutive Cases
- 100% Success
- 0% Conversion to Laparotomy
- Uteri as Large as 2000 grams in outpatient center with same day discharge home

**Anatomical Consideration**
- Uterine Size
- Patient Size
- Patient Pelvis
- Number of Fibroids
- Location of Fibroids
- Relation of Fibroids to Pelvis, Ureters, and other confounding variables

**Energy Source**
- Can you secure large vessels ?
- Can you seal vessels without cutting them ?
- Do you measure blood vessel diameter ?
- Endoclips, suture ligation, retroperitoneal dissection to origin of uterine artery
Uterine Manipulation

- Acorn Cannula is a cervical manipulator
- Intrauterine placement optimal
- Intrapерitoneal options (tenaculum, lean technique)

Morcellation

- Single Use versus Multi-use
- Blade dulling can be problematic
- Arm fatigue
- Scatter of Tissue

Laparoscopic Entry

- Umbilical versus LUQ
- Use trocars you are familiar with to avoid loss of pneumo, slippage, unplanned trauma
- Consider towel clips for elevation of anterior abdominal wall
- Move everything CEPHALAD

How to get from point A to Point B

Stepwise Approach

- Easy Side FIRST if possible
- Anterior Approach
- Enucleate Fibroids
- Caution with ureters
- Once uterines are secure, so are you!

Pearls

- Seal vessels prior to transection
- Try LEAN technique over grasping to avoid bleeding
- Discuss EACH STEP with assistant
- Use OR Table as a tool
- Morcellation
LSH Pearls - the assistant

- Help with visualization
- Help with uterine manipulation
  - Cornua or Fimbria
- Lean Technique
- Morcellator stays in position and blade is in mid-view; 5 mm scope from low lateral port

Videos

- Stepwise approach to Laparoscopic Hysterectomy
Dealing with Difficult Peritoneal Access, Obesity, and Vaginal Cuff Issues

Stacey A. Scheib, MD, FACOG
Director of Minimally Invasive Gynecology
Johns Hopkins Hospital

OBJECTIVE

• Identify when to use non-umbilical entries
• Employ safe practice to laparoscopic entry
• Implement preoperative, perioperative, and postoperative management for the obese patient
• Apply safe practice to minimize cuff complications

Peritoneal Access

Open or Hasson Technique

• “Mini-laparotomy” entry
• A cannula with a cone-like sleeve is inserted. The peritoneal edge and fascia are tagged and attached to the cannula.

Closed Techniques

• Direct Entry +/- Optical Trochar
  – Trochar is inserted without pneumoperitoneum
• Veress Needle
  – Involves the insertion of a Veress Needle (a needle equipped with a spring-loaded obturator) into the peritoneal cavity, followed by gas insufflation then insertion of a trocar
  – The use of the Veress Needle was associated with an increased incidence of failed entry, extraperitoneal insufflation and omental injury

Grants/Research Support: Intuitive Surgical
Consultant: Covidien
Candidates for Non-Umbilical Entry

- Obesity
- Suspected Adhesive Disease
- Prior ventral hernia repair
- Extreme thinness
- Pregnancy
- Abdominal wall laxity
- Large pelvic mass

Upper Abdomen

- Palmer’s point
- Left 9th or 10th Intercostal space
- Supraumbilical
- Need an naso- or oro-gastric tube
- Contraindications: hepatosplenomegaly, portal hypertension, gastropancreatic masses, prior gastric bypass

Trans-Uterine Entry

- Patient in Trendelenberg and uterus is antverted prior to long Veress insertion
- Helpful for obese women and those with contraindications to umbilical and left upper quadrant entry
- Contraindications: fibroids, infertility work up

Trans-Vaginal Entry

- Inserted in the midline of a taut posterior fornix approx 1.75cm with long Veress
- Helpful for obese women and those with contraindications to umbilical and left upper quadrant entry
- Contraindications: fixed retroverted uterus, prior pelvic infection

Good Practice

- The angle of the Veress/trochar at the umbilicus should vary according to the BMI of the patient

Good Practice

- Insertion with patient flat
- Insertion with patient in Trendelenberg
Good Practice

- An opening intraperitoneal pressure ≤ 10mm Hg\textsuperscript{15-21}
- Use an alternative technique after 3 failed Veress attempts\textsuperscript{15,16}

Obesity

Obesity Definitions and Trends

- Morbid Obesity, Super Obese and Super-Super Obese
- The prevalence in these groups is increase much faster than the prevalence of obesity\textsuperscript{22-24}
- Treating the morbid and super obese will NOT be rare event anymore

Percentage increase in BMI categories since 1986 (source: Behavioral Risk Factor Surveillance Survey)


Routine Assessment

- Higher incidence of co-morbidities due to their weight, which implies greater overall operative risk\textsuperscript{25}
- A comprehensive medical history and physical examination including questions about her exercise tolerance and OSH screening questions\textsuperscript{26}
- Labs: CBC, Glucose, BUN, Cr, coagulation studies
- Chest X-ray
- EKG\textsuperscript{27}
- Tailor any addition other studies based on the patient’s risk factors and not the degree of obesity\textsuperscript{28,29}

DVT Prophylaxis

- The American College of Chest Physicians guidelines that bariatric surgery patients have a high risk VTE and have recommended routine pharmacologic prophylaxis combined with mechanical prophylaxis\textsuperscript{30}
- The American Association of Clinical Endocrinologists (AACE)/The Obesity Society (TOS)/the American Society for Metabolic and Bariatric Surgery (ASMBS) guidelines have recommended the insertion of preoperative IVC filters in bariatric surgery patients who have a particularly high risk of VTE\textsuperscript{31,32}

Positioning the Patient

- Risk of the pressure sores and nerve injuries is very high in these patients\textsuperscript{33-37}
  - Risk depends on the amount of compressive force applied and the duration of the compression\textsuperscript{36-37}
  - Compression for a duration for 6-8 hours or more can result in structural damage to the nerves\textsuperscript{36-37}
  - Most common are ulnar and sciatic nerves
- Allot extra time for positioning
- Trial of Trendelenberg
Laparoscopy in the Obese Patient

• Can be accomplished safely without an increase in complications.

• Why bother?
  – ↓ postoperative pain, ↓ impairment of postoperative pulmonary function, ↓ length of hospital stay, ↓ time to return to work and routine activities, and ↓ rate/severity of infections when compared to open gastric bypass.
  – ↓ in the rate of incisional hernia (about 7 to 1) and infection rates (10.5 vs. 1.3%)

Technical Implications

• ↓ respiratory function
  • ↑ intra-abdominal pressure
  • Weight of chest
  • ↓ total compliance and functional reserve capacity
  • ↑ intra-abdominal pressure
  • Hepatic steatosis, thickened transverse colon, and ample visceral fat
  • ↓ visualization and require longer trocars with the concomitant need for ↑ torque and ↑ operator fatigue.

Making Adjustments

• Can avoid with appropriate changes in ventilation by anesthesia
• Less Trendelenberg
• Decreasing pneumoperitoneum pressure
• Mechanically pulling sigmoid out of pelvis
• Mechanically lifting the pannus

Laparoscopic Pannus Retraction Techniques

• Video

Postoperative Management

• Extended DVT prophylaxis for 3-4 weeks postoperative for high risk patients.
• Covalence in the semi-recumbent position postop.
• Aggressive pulmonary toilet with incentive spirometry and chest physical therapy
• Early institution of CPAP
• Early ambulation
• Respiratory distress or failure to wean from ventilatory support should raise suspicion and prompt an evaluation for acute postoperative complications.

Postoperative Management

• Urinary output of 30mL/hr
• Avoiding volume overload
• Use of short acting opioids
• LOW THRESHOLD for keeping in house
Closing the Vaginal Cuff

Difficult Laparoscopic Cuff Closures

- Vaginal closure
- Use of “puppet strings”
- Barbed suture

Vaginal Cuff Complications

- Dehiscence[^52-55]
  - Energy
  - Size of the bites
  - Laparoscopic Suturing
- Abscess
  - Presence of bacterial vaginosis
- Fistula
  - Sutures in the bladder

Looking at Cuff Closure

- Use the lowest settings possible for colpotomy
- Minimize use of electrosurgery
- Take good bites of the cuff: at least 5 mm beyond the edge and spaced 5 mm apart
- Role of 2 layer closure and barbed suture[^53,55]
- Cystoscopy

REFERENCES


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.

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