Educational Grant
AAGL acknowledges that it has received support in part by educational grants and equipment (in-kind) from the following companies: 3-Dmed, Applied Medical, Bayer HealthCare, Blue Endo, Boston Scientific, CooperSurgical, Coviden, ETHICON, Karl Storz Endoscopy-America, Inc.
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 to provide continuing medical education for physicians.

The AAGL designates this live activity for a maximum of 17.25 AMA PRA Category 1 Credit(s)™. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

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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.
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16th Annual Advanced Workshop on Gynecologic Laparoscopic Anatomy & Minimally Invasive Surgery Including Pelvic Floor Reconstruction

Resad P. Pasic, Scientific Program Chair
Arnaud Wattiez, Co-Chair
Shan M. Biscette, Lab Director

Guest Faculty: Joseph (Jay) L. Hudgens, David J. Levine,
Charles E. Miller, Patrick P. Yeung

Local Faculty: Ali Azadi, Alexandra Blinchevsky, Nicolette Deveneau, Sean L. Francis,
Thomas G. Lang, Ronald L. Levine, Jonathan H. Reinstine, Linda Shiber, Lori L. Warren

Course Description

This course is designed for gynecologists with advanced laparoscopic skills who wish to expand their knowledge of retroperitoneal and Space of Retzius anatomy and the various surgeries performed therein. This extensive two-day course will expose the participants to the knowledge and expertise of world-renowned laparoscopic surgeons who will guide them through didactics and hands on cadaveric sessions utilizing unembalmed female cadavers.

No more than three participants are assigned to each cadaver and are closely supervised by experienced faculty instructors. Each participant will have the opportunity to operate, assist and observe in a rotational format to optimize their learning experience and suturing technique. The course will focus on demonstration of pelvic sidewall dissection, preparation for laparoscopic hysterectomy, uterosacral colposuspension, Burch retro pubic colposuspension and paravaginal defect repairs using the laparoscopic approach.

Pelvic floor reconstructive procedures will be highlighted during breakout sessions to accommodate those with a particular interest in increasing their skills in these procedures.

Course Objectives

At the conclusion of this activity, the participant will be able to: 1) Appraise skills learned to relevant pelvic anatomy and apply them for surgery including laparoscopic hysterectomy and pelvic floor surgery; 2) apply skills learned to pelvic side wall dissection and illustrate retroperitoneal structures; 3) explain the ergonomics, theory and rationale for reproducible laparoscopic suturing; 4) demonstrate measurable improvement in laparoscopic suturing skills; 5) apply principles of electro surgery to fresh tissue cadaver and discriminate between different tissue sealing devices; and 6) identify risk factors for laparoscopic complications and manage treatment of such.
# Course Outline

## Friday, May 16, 2014

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<tr>
<th>Time</th>
<th>Session</th>
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<tbody>
<tr>
<td>7:45</td>
<td>Welcome, Introduction and Course Overview</td>
<td>R.P. Pasic</td>
</tr>
<tr>
<td>8:00</td>
<td>Fundamental Laparoscopic Pelvic Anatomy</td>
<td>R.P. Pasic</td>
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<tr>
<td>8:40</td>
<td>Energy Modalities in Endoscopic Surgery</td>
<td>C.E. Miller</td>
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<tr>
<td>9:20</td>
<td>Pelvic Sidewall Dissection, Retroperitoneal Anatomy for Endometriosis</td>
<td>A. Wattiez</td>
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<tr>
<td>10:00</td>
<td>Refreshment Break</td>
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<tr>
<td>10:20</td>
<td>Laparoscopic Suturing</td>
<td>J.L. Hudgens</td>
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<tr>
<td>11:00</td>
<td>Pearls of Laparoscopic Hysterectomy</td>
<td>S.M. Biscette</td>
</tr>
<tr>
<td>11:40</td>
<td>Questions and Answers</td>
<td>All Faculty</td>
</tr>
<tr>
<td>12:00</td>
<td>Working Lunch</td>
<td></td>
</tr>
<tr>
<td>1:00</td>
<td>Hands-On Cadaver Dissection (3 participants per cadaver)</td>
<td></td>
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<tr>
<td></td>
<td>• Review Surface Anatomy of the Pelvis</td>
<td></td>
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<tr>
<td></td>
<td>• Anatomy and Technique of Performing Uterosacral Ligament Suspension</td>
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<tr>
<td></td>
<td>• Retroperitoneal Spaces, Vessels, Nerves Dissection</td>
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<tr>
<td></td>
<td>• Dissection of Pelvic Sidewall</td>
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<tr>
<td></td>
<td>• Laparoscopic Suturing</td>
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</tr>
<tr>
<td>5:00</td>
<td>Adjourn</td>
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<td>Back to the Burch, Slings and Things</td>
<td>S.L. Francis</td>
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<tr>
<td>9:20</td>
<td>Complications of Laparoscopy and How to Avoid Them</td>
<td>R.P. Pasic</td>
</tr>
<tr>
<td>10:00</td>
<td>Questions and Answers</td>
<td>Faculty</td>
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<tr>
<td>10:15</td>
<td>Refreshment Break</td>
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<tr>
<td>10:30</td>
<td>Hands-On Cadaver Dissection</td>
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<tr>
<td></td>
<td>• Anatomy and Refined Techniques of Performing Laparoscopic Hysterectomy</td>
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<td>• Dissection of the Space of Retzius</td>
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<tr>
<td></td>
<td>• Laparoscopic Suturing</td>
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<tr>
<td>12:30</td>
<td>Lunch</td>
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<tr>
<td>1:30</td>
<td>Hands-On Cadaver Dissection – Continued</td>
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<tr>
<td></td>
<td>• Laparoscopic Repair of Bowel, Bladder and Ureteral Injury, Sacrocolpopexy</td>
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<td></td>
<td>• Review of Laparoscopic Anatomy</td>
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<tr>
<td></td>
<td>• Vaginal Pelvic Floor Reconstruction using TVT, Trans Obturator Slings</td>
<td></td>
</tr>
<tr>
<td>5:00</td>
<td>Adjourn</td>
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PLANNER DISCLOSURE
The following members of AAGL have been involved in the educational planning of this workshop and have no conflict of interest to disclose (in alphabetical order by last name).
Art Arellano, Professional Education Manager, AAGL*
Viviane F. Connor*
Kimberly A. Kho*
Frank D. Loffer, Executive Vice President/Medical Director, AAGL*
Linda Michels, Executive Director, AAGL*
M. Jonathan Solnik
Other: Medical Advisory Board: ZMed, Inc.
Johnny Yi*

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).
Ali Azadi*
Shan M. Biscette*
Alexandra Blinchevsky*
Nicolette Deveneau*
Sean L. Francis
Speakers Bureau: Astellas
Joseph (Jay) L. Hudgens*
Thomas G. Lang*
David J. Levine
Consultant: Halt Medical
Ronald L. Levine*
Charles E. Miller
Grants/Research: Abbott Laboratories, Covidien, Femasy, Intuitive Surgical, Olympus, Novartis
Consultant: Abbott Laboratories, Boston Scientific, CareFusion, Covidien, Ethicon Endo-Surgery, Ethicon
Women’s Health & Urology, Femasys, Ferring Pharmaceuticals, Halt Medical, Hologic, Intuitive Surgical, OmniGuide
Speakers Bureau: Ethicon Endo-Surgery, Ethicon Women’s Health & Urology, Femasys, Ferring
Pharmaceuticals, Intuitive Surgical, Merck Serono, Smith & Nephew Endoscopy
Resad P. Pasic
Grants/Research: Karl Storz
Consultant: Ethicon Endo-Surgery
Speakers Bureau: CooperSurgical
Jonathan H. Reinstine*
Lisa Shiber
Other: Paid Stipend: Ethicon Endo-Surgery
Lori L. Warren
Speakers Bureau: Ethicon Endo-Surgery
Arnaud Wattiez
Consultant: Karl Storz
Patrick P. Yeung
Consultant: Lumenis

Asterisk (*) denotes no financial relationships to disclose.
PELVIC ANATOMY & PELVIC FLOOR THROUGH THE LAPAROSCOPE

RESAD PASIC M.D., Ph.D.
Professor OB-GYN
UNIVERSITY OF LOUISVILLE
SCHOOL OF MEDICINE

Disclosures
• Resad P. Pasic
• Grants/Research: Karl Storz
• Consultant: Ethicon Endo-Surgery
• Speakers Bureau: CooperSurgical

Objective
• Review of the anatomy of the pelvic floor

The mother of surgery is exposure
The father is ANATOMY!!!

Why Learn Surgical Anatomy?
Surgery is
More Efficient Faster
More Effective Better Results
More Confident Safer
Can Minimize Complications!

A  Median Umbilical Fold
B   Medial Umbilical Fold
C   Lateral Umbilical Fold

A   Superficial Epigastric artery
B Inferior Epigastric artery
A Median Umbilical Fold
B Medial Umbilical Fold
C Lateral Umbilical Fold
Trans illumination

Normal Orientacion of Pelvic Viscera in Standing Woman

- **HORIZONTAL**
  - Bladder
  - Upper 2/3rds of Vagina
  - Rectum

- **VERTICAL**
  - Urethra
  - Lower 1/3rd of Vagina
  - Anal Canal
Pelvic Support
Three Levels (or Axes)

I. Cardinal-Uterosacral Ligament Complexes

II. “Paravaginal” Supports
   - Pubocervical fascia
   - Rectovaginal fascia

III. Vertical orientation of urethra, vaginal outlet, anal canal

Three Levels of Pelvic Support
In Standing Woman

I. Upper Vertical - Suspensory Axis
II. Horizontal - Attachment Axis
III. Lower Vertical - Fusion Axis

Suspensory Axis

- Suspends upper vagina over levator plate
- Allows “flap-valve” mechanism to prevent prolapse

Uterosacral Ligaments

Horizontal Axis

- Two flexible platforms / hammocks
- Trapezoidal in shape
- Parallel, with the vagina in-between
- Pubocervical fascia – prevents cystocele
- Rectovaginal fascia – prevents rectocele
**Pubocervical Fascia**
Horizontal platform
- Perineal membrane under urethra . . Anterior
- “Fascial White Lines” . . . . . . . Lateral
- Pericervical ring . . . . . . . . . . . Posterior

**Endopelvic Fascia**
- Three dimensional meshwork
  - Collagen
  - Elastin
  - Smooth muscle
  - Formed in sheets
- NOT parietal fascia
- Beneath parietal peritoneum
- Envelope visceral structures for support

**Rectovaginal Septum**
- Fibroelastic sheet that prevents rectoceles
- “Fascial white lines”
- Uterosacral ligaments
- Perineal body

**Present Concept of Visceral Fascia**
- **OLD THINKING**
  - Visceral Fascia stretches or attenuates
  - therefore repair of vaginal relaxation entails plication or shortening of the attenuated visceral fascia
  - Usually absorbable suture
- **NEW THINKING**
  - Visceral Fascia has some elasticity but then BREAKS
  - Repair of pelvic floor defects entails repair of the site-specific fascial breaks
  - Usually with permanent sutures
Anatomy of paravaginal defect

The Levator Plate is formed by midline fusion of the Levator Ani muscles between the Anorectal Junction and the Cervix

Pelvic Floor Defects
- Anterior compartment
  - urethrocele
  - Cystocele
- Middle compartment
  - utero-vaginal prolapse
- Posterior compartment
  - enterocele
  - rectocele
Cystocele
• Breaks in the continuity of the pubocervical fascia?

Prolapse
• Break in attachment of cardinal - uterosacral ligament complexes to pericervical ring. Usually seen with enterocele.

Enterocele or Cul-de-sac Hernia
• Break in the continuity of the pubocervical fascia to the rectovaginal apex

Rectocele
• The breaks in the continuity of the rectovagina fascia

Avascular planes
Para-rectal Space

- Uterine Artery
- Ureter
- Ant. Div. Internal Iliac

Vesicovaginal Space

- Potential space between the bladder and vagina
- Lateral -- bladder pillars/ureters
- Covered by the anterior peritoneal reflection
- Must be dissected for completion of a hysterectomy

Pararectal Space

- Vaginal Artery
- Uterine Artery
- Obliterated Umbilical Artery

Vesicovaginal Space

- Posterior and inferior to the base of the broad ligament
- Medial -- ureter and rectum
- Lateral -- iliococcygeus fascia and muscles
- Posterior -- internal iliac vessels and connective tissues
- Floor -- levator ani muscles
- Leads to ischial spine and sacrospinous ligament
Rectovaginal Space

- Superiorly -- cul-de-sac peritoneum and uterosacral ligaments
- Laterally -- iliococcygeus muscles
- Posteriorly -- rectum – visceral fascial capsule
- Anteriorly -- vagina – visceral fascial capsule
- Inferiorly -- perineum

Pelvic Brim

- Peritoneum
- Ovarian Vessels
- Ureter
- Common Iliac Artery
- Common Iliac Vein
- Obturator Nerve
- Sacroiliac Joint

Para-Vesicle Space

- Superior Vesicle Artery
- Uterine Artery
- Vaginal Artery
- Ureter
- Obliterated Umbilical Artery

Obturator Space

- Obturator Nerve
- Obturator Artery
- Obturator Vein
- Obturator Internus

Pelvic Sidewall – 3 Surgical Layers

- Ureter
- Internal iliac vessels
- Cardinal ligament sheath

- External iliac vessels
- Obturator vessels and muscle

Complements Dr. Brill
You are here to learn Surgical Dissection Techniques!

- ‘mm by mm’ progression of dissection
- Grasp and tent
- mm incisions - superficial
- Push and spread (‘poke and open’)
- Traction and countertraction
- Gentle wiping – ‘teasing’ to thin the tissues
Energy Modalities in Endoscopic Surgery

Objectives

At the end of this discussion, the attendee will be able to:

1. Explain the difference between monopolar coagulation and monopolar cutting current.
2. Explain the difference between traditional bipolar energy and advanced bipolar technology.
3. Explain how ultrasonic energy differs from standard electrosurgery.
Conventional Electrosurgery
Pitfalls and risks

Monopolar Electrosurgery

- Electrical current proceeds through conductive tissue via an active electrode to return (dispersive) electrode and back to ESU
  - Although equivalent amount of current are conducted through each electrode, thermal effect between active and return electrodes is due to marked discrepancy in surface area.

Principles of Electricity

- Electric current follows the path of least resistance
- Conductivity directly proportional to the water (salt) content of tissue (blood, nerve, muscle, adipose, bone)
- As tissue desiccates, resistance increases and the current seeks an alternate pathway.

Monopolar Electrosurgery
Cutting and coagulation waveforms

Principles of Monopolar Electrosurgery
Peak open circuit voltages

Principles of Monopolar Electrosurgery
Monopolar blade and tissue temperature

Principles of Monopolar Electrosurgery
Actions of electrosurgery
Principles of Monopolar Electrosurgery

Safer waveform: cut

- Lower voltages:
  - Less capacitance
  - Less spark travel distance
  - Lower temperature

Principles of Monopolar Electrosurgery

Current concentration

- Function of the variable resistance of tissues
- Function of tissue desiccation
- Function of current density

Principles of Monopolar Electrosurgery

Effectiveness of vessel sealing

- Monopolar electrocautery provides reliable hemostatic control for vessels 1mm or less
- Hemostatic control can be increased by compressing the vessel in an instrument

Principles of Monopolar Electrosurgery

How it works

Technology: variables impacting tissue effect

- Power setting (watts)
- Wave form (cut/them/coag)
- Size of instrument tip
- Technique
- Time on tissue
- Patient variables

Water content

- Patient characteristics (adult, child, male, female)
- Tissue properties (edema)

Pitfalls and Risks of Conventional Electrosurgery
Pitfalls and Risks of Conventional Electrosurgery

As in many laparoscopies, Mrs. Fox's surgeon inserted a wand-like electrical tool into her abdomen to cut tissue and seal blood vessels. A miniature video camera let him view his work, but did not show the stray electricity escaping from the wand's shaft. No one suspected when Mrs. Fox was sent home that a stray wire spark might have seared a tiny hole in her intestine.

Potential Risks of Monopolar Electrosurgery

- Alternate site burn
- Indifferent electrode failure
- Direct coupling
- Capacitive coupling
- Insulation failure
- Surgical fires

Potential Risks of Monopolar Electrosurgery

Alternate site burn

- Ground-referenced generators

Four Zones of Injury

- Zone 1 – the small area at the tip of the active electrode; the only area in direct view of the surgeon
- Zone 2 – the area just beyond the active electrode tip to the distal end of the cannula; outside the surgeon's view
- Zone 3 – the area of the active electrode covered by the cannula system; outside the view of the surgeon
- Zone 4 – the portion of the active electrode and cannula system; outside the patient's body

Incidence of injury

- Gynecology
  - Electrosurgical injuries in laparoscopy
    - 2 per 1,000
- General surgery
  - Bowel perforation in laparoscopic cholecystectomy
    - 1.4 per 1,000 (40% estimated electrosurgical)
Pitfalls and Risks of Conventional Electrosurgery

Alternate site burn (injury)
Prevented by isolated generator. Current must return to the generator or it shuts off.

Potential Risks of Monopolar Electrosurgery
Indifferent electrode injuries
- Regionally dependent
- Injury could occur as a result of increased current concentration

Indifferent Electrode (Return Pad) Failure

Correct
Active Electrode (pencil) Indifferent Electrode

Incorrect
Active Electrode (pencil) Indifferent Electrode

Pitfalls and Risks of Conventional Electrosurgery

When to use two patient return electrodes
- Place of additional PREs increases the dispersion of electrosurgical current and heat at the pad-to-patient interface
  - Obesity
  - Emaciation
  - Fluid Environment
  - Long duty cycles

Potential Risks of Monopolar Electrosurgery
Unintended direct coupling
The energized electrode comes into contact with another conductive instrument or object in the operative field.
- Heat production
  - Necrosis beneath metal
  - Current flow to unintended sites

Pitfalls and Risks of Conventional Electrosurgery

Direct Coupling Injury
- Unintended coupling of active electrode with a non-insulated instrument
- Metal forceps or metal telescope contacts active electrode
Pitfalls and Risks of Conventional Electrosurgery

Direct Coupling

Insulation Failure
- Insulation coat on active electrode is compromised
  - Rough handling of instrumentation
  - Instrument cleaning/repeated sterilization
  - Manufacturer defect
  - During surgery with repeated insertion and removal into the cannula
  - Electrical heating – open circuit activation
    - High voltage radiofrequency current can be powerful enough to compromise intact active electrode insulation if the surgeon activates the active electrode when not in close proximity to target tissue

Insulation Failure

Porosity detector
- Tests for insulation failure by noting energy leaks
- A loop is passed over instrument

Insulation Failure

- Reusable instruments 19% (31/165)
- Laparoscopy sets 71% (12/17)
- Multiple leaks per single instrument 5% (8/165)
Pitfalls and Risks of Conventional Electrosurgery

Capacitive Coupling

Electric current transferred from the active electrode through intact insulation and into adjacent conductive materials without direct contact.

Factors at Risk of Capacitive Coupling

- Increased generator power
- Coagulation current (high voltage)
- Dwell time
- Surgical technique
  - Desiccation
  - Fulguration
  - Actuating electrode--off site
- Use of hybrid port systems

Factors That Reduce Capacitive Coupling

- Generator mode
  - Blend or cut mode
- Power setting
  - Lower power
- Dwell time
  - Shorter dwell time
- Surgical techniques
  - Desiccation
- Laparoscopic ports
  - Metal vs. plastic (no hybrid)

Separation of Instruments and Vulnerable Tissue

- Capacitive coupling, insulation failure and direct coupling injuries all require close proximity of the laparoscopic instruments and vulnerable tissue.
Factors That Maintain Separation of Instruments and Vulnerable Tissue

- Proper port placement
- Maintaining pneumoperitoneum
- Awareness of instrument position

Radio Frequency Current Leakage

- Active electrode cords should not be wrapped around metal instruments
- Active electrode and other electrical device cords should not be bundled together

Potential Risks of Monopolar Electrosurgery

Surgical fires – the fire triad

- Up to 650 per year*
- 20-30 are disabling and 1-2 are fatal*
- In 70% electrosurgical equipment provides the ignition*

Recommended - Best Practices
- Consider using cut waveform
- Use lowest power setting for desired tissue effect
- Check insulation on all instruments and connectors before use
- Use isolated generator and patient contact quality monitoring system (standard practice in the U.S.)

Techniques To Avoid
- Avoid an open circuit
- Limit activation with electrode off tissue (limit direct coupling)
- Clean eschar off of the instrument tip
- Avoid inadvertent contact of metal-to-metal

Follow Manufacturer’s Written Instructions

- The ESU and accessories should be used according to the manufacturer’s written instructions
  - Each type of ESU has specific manufacturer’s written operating instructions to be followed for safe operation of the unit
  - Accessories should be used, handled, cleaned, and processed according to the manufacturer’s instructions
How do we achieve hemostasis in surgery?

- The components of normal hemostasis include:
  - Vasoconstriction
  - Platelet aggregation
  - Fibrin deposition (coagulation)

- In surgery, hemostasis is improved by:
  - Compression, sutures, staples and/or topical hemostatic agents
  - Energy based devices such as electrosurgery or ultrasonic energy
  - The use of compression
  - The application of heat to tissues
  - The time of application

Key Factors for Achieving Hemostasis

The Importance of Compression

- Compression increased hemostasis by:
  - Decreasing tissue volume and water content
  - Promoting better intima and intima contact
  - Promoting fusion of the collagen within vessel walls
  - Decreasing the time for tissue effect due to increased resistance

Heat and Time

Vessel Access

- Is a 5mm vessel always a 5mm?
- Angle of approach is often as important as the size of the vessel
  - Increases transection length
  - An angled approach reduces mean burst pressures

Why a Perpendicular Approach?

- Decreasing tissue surface area via a perpendicular approach may minimize lateral thermal spread and maximize efficiency

Tissue Dynamics

- Tissue type and variability plays a role in tissue effects
Electrons seek path of least resistance
- Resistance is inversely proportional to the water content
  - i.e. blood, nerve, muscle, adipose, bone
- Resistance increases with tissue desiccation
- Current seeks an alternate pathway

Impact of Unintended Current Flow
- As you're treating the tissue, the tissue impedance changes
- As the tissue impedance increases on the gallbladder side then the current starts to flow towards the duodenum
- Effect may be compounded by current density on duodenal side

Traditional Bipolar

Technology
- High current concentrations
- Relatively low voltage
- Current generates heat in tissue

Mechanism of Hemostasis
Traditional bipolar

Technology: Flow of Energy
- Damage can extend beyond the electrode contact
  - Rise in temperature percolates through the tissues
  - Desiccation increases resistance
  - Current balloons around electrodes
- Coagulation or tissue effects are technique sensitive

How it Works
Traditional bipolar
Advanced Bipolar Electrosurgery

Mechanism of hemostasis

Technology Advancements
- low voltage
- increased mechanical compression
- integration of adjacent tissue w/ increased time
- reduced interference damage
- integrated cutting

Three mechanisms to create compression
- spring and pin
- tube within a tube
- controlled gap

Advanced Bipolar Electrosurgery

Compression

Controlled gap vs. spring and pin*

Heat management

The management of heat in surgery is critical
- Optimize tissue effect within the end-effector
  - Contain heat within target tissue
  - A function of compression, heat (electrical energy delivery) and time
- Sources of heat and thermal spread
  - Current electrical (joule) heating of tissue
  - Convection due to steam
  - Conduction from direct contact

Advanced Bipolar Electrosurgery

Compression – key to sealing

energy devices improve hemostasis by:
- type of compression
- application of heat
- over time

Advanced Bipolar Electrosurgery

How it works

Graph for illustrative purposes only to demonstrate compression, heat and time across energy modalities.
Ultrasonic Energy

The Ultrasonic Hand Piece
How it works

- Electrical energy from the generator is converted to mechanical motion in the hand piece

![Diagram of Ultrasonic Hand Piece](image)

Motion Through Blade Extender

- Ultrasonic wave transferred to blade extender at the hand piece mount
- Blade extender is supported by silicone rings positioned at nodes

**Blade vibrates at 55,500 times per second**

Ultrasonic technology

The generator

- Generator compensates for changes in impedance
  - Generator adjusts voltage to maintain frequency and displacement of the blade

Ultrasonic technology

Coagulation process

- Denaturation of proteins (breakdown of protein in the cells is denatured)
- Inter-tissue heat generated (tissue coagulation)
- Simultaneous cutting and coagulation takes place at a temperature high enough to necrose (with minimal thermal spread)

Active Surgical Temperatures in Tissue

- Proteins denatured to both a tissue
- Vaporization of water dissases tissues
- Coagulation (cohesion)

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</thead>
<tbody>
<tr>
<td>50°C</td>
<td>Ultrasound</td>
</tr>
<tr>
<td>50°C</td>
<td>Tissue</td>
</tr>
<tr>
<td>150°C</td>
<td>Electrosurgery</td>
</tr>
<tr>
<td>420°C</td>
<td>Electrocoagulation</td>
</tr>
</tbody>
</table>
Ultrasonic Technology
Factors affecting cutting and coagulation

Power settings
- **Power Setting**: Sets the current delivered by the generator, which determines blade displacement.
- **Power Level 5**
  - 100% current set point = 100% displacement (i.e. 65 microns)
  - Increased cutting effect
- **Power Level 1**
  - 50% current set point = 50% displacement (i.e. 33 microns)
  - Increased coagulation effect

How It Works
- Ultrasonic shears
  - Motion of the blade creates an area of transient low pressure, causing fluids to vaporize at low temperatures
  - Fluid vapor expands, causing the layers to separate, which enhances visualization of a vascular plane of dissection
  - Separates tissue planes

Cavitational Effect

Ultrasonic Maximizing cutting and coagulation

Ultrasonic Maximizing cutting and coagulation
The management of heat in surgery is critical:

- Optimize tissue effect within the end-effector
  - Contain heat within target tissue
  - A function of compression heat (mechanical energy delivery) and time
- Sources of heat and thermal spread
  - Conduction due to steam
- No electricity runs to or through the patient

With any ultrasonic device, continued activation after tissue transaction can result in increased blade temperatures.

With Adaptive Tissue Technology, the generator will adjust its output to the tissue condition.
The Impact of Adaptive Tissue Technology on Harmonic Ace®

- Adaptive Tissue Technology enables more precise and efficient delivery of energy.
- The maximum temperature reached is >10°C less than that reached with Harmonic Ace® without Adaptive Tissue Technology when used.
- Harmonic Ace® provides a 28% reduction in thermal spread versus Harmonic Ace® Shears without Adaptive Tissue Technology.

Benefits of Ultrasonic Coagulation

- Vessels are sealed or welded together
  - Bessel walls are not eroded
- Minimal spread of energy
- Minimal tissue sticking
- Minimal smoke generation
- No current-induced neuromuscular stimulation
- Coagulates 5mm vessels with some shears and 2mm vessels with blades

Ultrasonic Energy
How it works

Energy Modalities in Endoscopic Surgery

References

Laparoscopic Suturing

Jay L. Hudgens, M.D.
Assistant Professor, University of Mississippi
Director of Minimally Invasive Surgery
Wiser Women’s Hospital
Jackson, MS

Disclosure

I have no financial relationships to disclose.

Objectives

Review Obstacles to Laparoscopic Suturing and how to Overcome them.

Use the learning process to understand Ergonomics, Theory, & Rationale, for Reproducible Laparoscopic Suturing.

Present a SYSTEM for LEARNING Laparoscopic Suturing.

System

1. Set the Needle
2. Reapproximate
3. Knot Tying

Learning Laparoscopy?

If you can’t see you can’t operate
Learning Laparoscopy?

- Depth Perception
- Monocular Vision
- Fixed Instrumentation

Visual Angle

Perspective

- Vanishing Point
- Horizon Line

Occlusion

Monocular Cues
Depth Perception

Visual Angle, Motion & Occlusion

Geometry

- Anatomy
- Laparoscope
- Instruments
- Needle

Parallel = Miss
Perpendicular = Hit

Triangulation

Learn to Learn

Whole - Part - Whole

The Key To Efficient Learning = Immediate Accurate Reliable Feedback
1. Set the Needle
2. Reapproximate
3. Knot Tying

Contralateral
- Ideal Triangulation
- Poor Ergonomics?
- No Assistant

Ipsilateral
- Ergonomics
- Assistant
- One Sided

Suprapubic
- Gravity
- Ergonomics?
- Two Sided

System
Mechanics Produce

Feel Reproduces

Mechanics

- Set Needle Perpendicular
- Place Tissue Parallel
- Axial Rotation

System

- Set
- Parallel
- Rotate
- Reset

Setting the Needle

A-B-C

“A” = 2 cm from Swedge

“B” = 1/3 from Point

“C” = 1/3 from Swedge

Setting the Needle

A-B-C

Left Hand

Right Hand
Setting the Needle

A-B-C

A-C

Learn to Learn

Whole – Part – Whole

System

1. Set the Needle

2. Re-approximate

3. Knot Tying
System

Mechanics Produce

Knot Tying

• Set
• Parallel
• Rotate
• Reset

To Throw Knot

• Make a Short Tail
• Align Suture Parallel to Right Instrument
• Move Left Hand OVER Knot

Intra-corporeal Knot Tying

There is no place like HOME!
Suture Management

Goal is Control

It’s all about the Loop

Common Mistakes

Keys For Success

- Short Tail
- Parallel
- Length of Loop

Right Hand Motion

Novice

Expert

Hiemstra et al JMG 2011 vol. 18, pgs 494-499

Let the Left Hand Work
References


**Pearls of Laparoscopic Hysterectomy**

Shan Biscette, M.D. FACOG  
Assistant Professor Obst/GYN  
Division of Minimally Invasive Gynecologic Surgery  
University of Louisville

**Objectives**

- Indications for hysterectomy
- Identify the types of hysterectomy
- Choose a route of hysterectomy
- Review technique for laparoscopic hysterectomy
- Recognize the complications of laparoscopic hysterectomy

**Disclosure**

- I have no financial relationships to disclose.

**Hysterectomy**

- First performed vaginally by Soranus of Ephesus in 120 A.D.
- Laparoscopic hysterectomy first performed by Harry Reich in 1989.
- Most common procedure performed in women worldwide
- 2nd most common surgical procedure performed in the U.S.
  - 500,000 performed annually
  - $5 billion in healthcare dollars
- Rate of hysterectomy has remained stable worldwide
- Operative route is changing

**Trends**

- Hystectomy
- Appendectomy
- Bariatric
- Obesectomy

<table>
<thead>
<tr>
<th>Year</th>
<th>Nationwide Inpatient Sample</th>
<th>Nationwide Inpatient Sample</th>
<th>Major – Women’s Hospital</th>
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</thead>
<tbody>
<tr>
<td>1990</td>
<td>74%</td>
<td>64%</td>
<td>74.5%</td>
</tr>
<tr>
<td>2000</td>
<td>64%</td>
<td>22%</td>
<td>36%</td>
</tr>
<tr>
<td>2010</td>
<td>24%</td>
<td>22%</td>
<td>17.2%</td>
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<tr>
<td>2013</td>
<td>0.3%</td>
<td>14%</td>
<td>3.3%</td>
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</table>

Sources: 2004–2007 Thomson Reuters

*< 2004 Industry Estimates

Nationwide Inpatient Sample

Magee – Women’s Hospital

Note: 1990 2000 2005 2010

Abdominal 74% 64% 74.5% 36%

Vaginal 24% 22% 22% 17.2%

Laparoscopic 0.3% 14% 3.3% 43.5%
Indications

- Abnormal uterine bleeding 20%
- Menorrhagia/HMB
- Endometriosis and adenomyosis 20%
- Uterine fibroids 30%
- Pelvic pain 10%
- Uterine prolapse 15%
- Chronic pelvic pain 10%
- Cancer 6%

Types of hysterectomy

- Total abdominal hysterectomy (TAH)
- Total vaginal hysterectomy (TVH)
- Laparoscopic assisted vaginal hysterectomy (LAVH)
- Total Laparoscopic hysterectomy (TLH)
- Supracervical hysterectomy (SH/LSH)

Laparoscopic hysterectomy

- Less postoperative pain
- Shorter length of hospitalization
- Quicker recovery
- Better quality of life at 6 weeks postoperatively
- Fewer wound or abdominal wall infections
- Techniques are applicable to a larger number of pathologies
- Surgeons need to learn and apply laparoscopic techniques when considering hysterectomy

Selecting Hysterectomy Route

- Vaginal access
- Uterine size, myoma size, number and location
- Feasibility of vaginal morcellation
- Uterine mobility and descent
- Concurrent pathologic conditions
  - Previous pelvic surgery
  - Endometriosis
  - Adhesions
- Surgeon’s Skill

Hysterectomy for Benign Disease: Uterus accessible trans-vaginally

- > 14 weeks size
- Vaginal apex < 2 fingers
- BMI > 30
- Immobile uterus
- Significant extraterine pathology
  - Significant adnexal mass
  - Cul-de-sac inaccessible
  - Severe adhesions
  - Severe endometriosis
TLH  LAVH  TAH

1. BMI > 30
2. HIV positive
3. Small uterus not accessible vaginally because of
   1. Pelvic contracture
   2. Acquired or congenital extremity abnormality that restrict access
4. Not recommended in uterus > 24 weeks size

Patient selection

- Few absolute contraindications for laparoscopy
  - Medical conditions affecting anesthesia or positioning
  - Conditions affecting abdominal entry

- Relative circumstances
  - Morbid obesity (BMI >30)
  - Previous abdominal scars
  - Midline incisions

- Uterine size – not a contraindication
  - Fixed uterus is a challenge!

Current Guidelines for Route of Benign Hysterectomy

- ACOG: Vaginal hysterectomy is the approach of choice whenever feasible, based on well-documented advantages and lower complication rates. Laparoscopic hysterectomy is an alternative to abdominal hysterectomy for those patients in whom a vaginal hysterectomy is not indicated or feasible.

- Cochrane Review: Vaginal hysterectomy should be performed in preference to abdominal hysterectomy. Where vaginal hysterectomy is not possible, laparoscopic hysterectomy has some advantages over abdominal hysterectomy.

STEP 1: Preparation and Positioning

- Lithotomy position
- Padded stirrups
- Arms tucked
- Buttocks 1-2 inches off the table
- Antiskid padding
- Foley catheter
- Uterine manipulator

Equipment for laparoscopic hysterectomy

- Uterine manipulator/colpotomizer
- Grasper
- Energy source
- Suction irrigator
- Myoma screw
- Laparoscopic needle driver
- Knot pusher
- Suture
- Pnuemo-occluder

STEP 2: Insertion of uterine manipulator
STEP 2: Uterine manipulator/colpotomizer

Insufflation techniques

- Transumbilical
- Direct
- Open laparoscopy (Hasson technique)
- Transuterine insufflation
- Subcostal insufflation (Palmers point)

Rationale:
A 3 kg force applied constantly at 10 mm Hg – depth under umbilicus = 0.6 cm
A 3 kg force applied constantly at 25 mm Hg – depth under umbilicus = 5.6 cm

STEP 3: ABDOMINAL ENTRY AND TROCAR PLACEMENT

Insufflation failures

- Obese patients
- Very thin patients
- Patients with abdominal scars
- Patients with failed insufflations
**A Anatomy**
- Adnexa

**B Broad Ligament**
- Blood Vessels
- Bladder

**C Cardinal ligament**
- Colpotomy
- Cuff Closure

**Technique for laparoscopic hysterectomy**

- Video of laparoscopic hysterectomy using the ABC technique

**Complications of LH**
- Injuries during LH occur at two points:
  - During trocar placement
  - During dissection of the ligaments attaching the uterus to the pelvic cavity

**Complications**
- Electromechanical Morcellation
- Extraction of specimen
  - Vaginal morcellation
  - Mechanical morcellation

- Injuries during LH occur at two points:
  - During trocar placement
  - During dissection of the ligaments attaching the uterus to the pelvic cavity
Complications

- Colon
  - Perforated by surgical instruments
- Bladder
  - Cases of severe adhesive disease
- Ureters
  - Damaged during mobilization
- Urethra
  - Damaged during division of the cardinal ligament and at the pelvic brim

<table>
<thead>
<tr>
<th>Urologic Injuries</th>
<th>Total N = 71 (9.9%)</th>
<th>Reoperation N = 34 (4.7%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cystotomy, with repair</td>
<td>12 (1.7%)</td>
<td>10 (1.2%)</td>
</tr>
<tr>
<td>Bladder fistula, catheterized</td>
<td>1 (0.1%)</td>
<td>1 (0.1%)</td>
</tr>
<tr>
<td>Ureterotomy, with repair</td>
<td>3 (0.4%)</td>
<td>3 (0.4%)</td>
</tr>
<tr>
<td>Ureter fistula, reimplanted</td>
<td>4 (0.5%)</td>
<td>4 (0.5%)</td>
</tr>
<tr>
<td>Ureter fistula, stented</td>
<td>3 (0.4%)</td>
<td>3 (0.4%)</td>
</tr>
</tbody>
</table>

Intestinal

- Bowel Injury from dissections     | 3 (0.4%)            | 1 (0.1%)                 |
- Adhesive bowel obstruction        | 3 (0.4%)            | 3 (0.4%)                 |

Hemorrhagic

- Postoperative pelvic bleed        | 5 (0.7%)            | 5 (0.7%)                 |

Retroperitoneal hematoma           | 6 (0.8%)            | 6 (0.8%)                 |

Vaginal cuff bleed                  | 11 (1.3%)           | 4 (0.6%)                 |
- Postoperative wound bleed        | 1 (0.1%)            | 1 (0.1%)                 |

Infectious

- Pelvic cellulitis                | 9 (1.1%)            | 9 (1.1%)                 |
- Pelvic seroma                    | 2 (0.3%)            | 2 (0.3%)                 |
- Pelvic abscess                   | 5 (0.6%)            | 3 (0.4%)                 |
- Diverticulitis                   | 1 (0.1%)            | 1 (0.1%)                 |

Wound Healing

- 5 - 3 mm trocar hernia           | 4 (0.5%)            | 4 (0.5%)                 |
- Vaginal dehiscence or injury     | 5 (0.7%)            | 2 (0.3%)                 |
- Pelvic suture granuloma          | 1 (0.1%)            | 1 (0.1%)                 |

Retained Surgical Device          | 1 (0.1%)            | 1 (0.1%)                 |

References

Laparoscopic Treatment of Apical Vaginal Prolapse

DAVID J. LEVINE M.D.
CO DIRECTOR OF MINIMALLY INVASIVE GYNECOLOGIC SURGERY
MERCY HOSPITAL ST. LOUIS MO.

Objectives
- understand the physiologic and anatomic basis of apical prolapse
- Describe the laparoscopic treatments for apical prolapse
- Review the results and complications of surgical repair of apical prolapse

Apical Prolapse
- Disruption of the uterosacral complex results in apical prolapse
- Most commonly caused by not reapproximating the uterosacral complex to the pericervical ring at the time of hysterectomy
- Directly related to vaginal birth and its associated use of forceps, prolonged second stage of labor and multiple deliveries

Pelvic floor musculature
- Tonically contracted the pubococcygeus and iliococcygeus form a shelf called the pelvic plate
- This forms the horizontal floor on which the bladder and proximal 2/3rds of the vagina and rectum rest
- These muscles relax only during voiding or bowel evacuation

Disclosures
- Consultant: Halt Medical
Vaginal apex is the keystone of pelvic organ support. Without good suspension of the uterus or post hysterectomy vaginal cuff, the anterior and posterior walls are exposed to intra-abdominal forces that drive these tissues to the introitus. Because of the significant contribution of the apex to anterior vaginal support, the best surgical correction of the anterior and posterior walls may fail unless the apex is adequately supported.

**Surgical repair**
- Uterosacral ligament vault suspension
- Sacrocolpopexy

**Surgical goals for Apical repair**
- Restoration of normal anatomic relationships
- Preservation of vaginal length
- Preservation of vaginal function

**Uterosacral ligament vault suspension**
- Laparoscopic advantages
  - Excellent visualization of the anatomy
  - Relaxing peritoneal incisions to prevent ureteral kinking
  - Bowel is easily retracted out of the way
  - Multiple support sutures can be placed without undue tension
  - Less skill dependent than sacrocolpopexy
Uterosacral ligament suspension
- At the time of hysterectomy
- Uterosacral ligaments are placed on stretch by pushing the uterus cephalad and ventrally
- The middle portion of the uterosacral ligaments can be identified at the level of the ischial spine.
- Absorbable sutures are placed through the ligaments at their midportion and tagged for easy identification at the time of repair.

Uterosacral ligament fixation
- Post hysterectomy
- Peritoneal incisions are made lateral to the ligament and medial to the ureter to decrease tension
- Anterior pubocervical fascia is delineated as well as the rectovaginal fascia
- Permanent suture is used to reapproximate the ligaments to the fascia
- 2-3 sutures per side
Uterosacral colpopexy

- Columbo and Milani
- 124 patients randomized between sacrospinous fixation and high uterosacral ligament fixation
- Both found greater than 90% success for restoration of apical support
- Subsequent anterior compartment prolapse was 21% sacrospinous vs 6% uterosacral

Sacrocolpopexy

- "gold standard"
- Preserves the normal axis of the vagina
- Maximal vaginal depth is preserved for sexual activity
- Synthetic suspensory material can provide a source of strength where the native tissue with prolapse is weak
- Expert laparoscopic skill is necessary

Principles which have evolved are:
- a) extensive coverage of the anterior and posterior walls of the vagina with mesh
- b) permanent suture must be used
- c) peritoneal tunnel between the sacral promontory and the cul de sac
- d) tension free
- e) when available robotics improves access to some planes and makes suturing less arduous
Maher’s randomized clinical trials 2004

- 95 pts. Sacrocolpopexy vs. sacrospinous
- Objective and subjective cure rates were the same: 94-91 and 76-69
- Frequency – urgency cured: 27-37
- Post op constipation: 36-27
- Preop dysparunia resolved: 56-43
- Sacrospinous was followed by higher risk or anterior vault prolapse: 45% vs 16%

Conclusion

- Level 1 evidence supports a higher anatomic efficacy with abdominal route of surgery compared to the vaginal route
- Abdominal sacrocolpopexy has greater morbidity, higher cost and less dysparunia than sacrospinous ligament fixation (the laparoscopic approach was not compared)
- No one vaginal approach to apical repair was found any better than the others

To Mesh or not to Mesh

- Long term outcomes of native tissue repairs compared to mesh are unknown
- 1 in 3 women require a second surgery after native tissue repairs
- July 2011 FDA communication stated that serious complications are not rare and that mesh has not been shown to be provide improved outcomes
- Increased number of reports to the MAUDE database including mesh exposure, erosion and protrusion into the vagina as well as contractures

Bibliography

- Lawrence L L Lin. Laparoscopic vaginal vault suspension using uterosacral ligaments; a review of 133 cases. JMI 12/3 216-220
- Maher C. Surgical management of pelvic organ prolapse in women; Cochrane database Syst Rev. 2010 Apr14;(4):CD004014
BACK TO THE BURCH; SLINGS & THINGS

Sean L. Francis, MD FACOG
Division Director & Fellowship Director,
Division of FPMRS, Dept. of OB/GYN

OBJECTIVES
- Epidemiology of urinary incontinence
- Diagnosis
  - ISD vs. SUI
- Treatment options
- Review of sling types
- Laparoscopic Burch
  - Data
  - Anatomy of the Space of Retzius
  - Tips and tricks
- Robotic Burch (Review anatomy of Cooper's Ligament)

INTRODUCTION
- Urinary Incontinence: involuntary loss of urine
- Prevalence in middle aged and older women: 50%
- Cost in $30 billion in direct cost
- Psychosocial impact and Quality of life
- Prevalence of incontinence nursing home patients: 50-77%
- Young adult, 20% to 30%; Middle age, 30% to 40%; Elderly, 30% to 50%

THE COST OF INCONTINENCE
- Pads protection and laundry: 50-75% of annual cost of incontinence
- Nursing home admissions: 15%
- Treatment: 10%
- Complications: 5%
- Diagnosis and evaluations: 1%

EVALUATION FOR SUI VS. ISD
- History
  - Prior incontinence surgery
  - Radiation, cancer, meds
  - Physical
    - Pelvic exam
    - Palpate urethra
    - Cystoscopy
    - Urodynamic testing
- Labs
  - UA and PVR
- Valsalva leak point pressure <60 cmH2O
- Maximal urethral closure pressure <20 cmH2O

DISCLOSURE
- Speakers Bureau: Astellas
TREATMENT OPTIONS

• Medications?
  • Alpha adrenergics
  • Beta adrenergics
  • Anti-muscarinics
  • Estrogen (receptors on detrusor and urethra*)
  • SSRI

• Physical therapy

• Surgery
  • Slings
    • Retropubic slings
    • Suburethral slings
    • Suburethral tape
  • Incontinence bracing

• Microwave


CHOOSING THE CORRECT SURGERY

• 1. Best SUI surgery is the first surgery
  • Altered surgical planes
  • Higher risk of complications

• 2. Best surgery is one surgeon is most familiar
  • No substitute for surgical experience

HISTORY OF INCONTINENCE SURGERY

• 1914 Anterior Repair
  • Cure rates: 1yr 31-100% Improvement rates: 1y 65-88% 2yr 37-72% 4yr 70-76%

• 1949 MMK (2.5% osteitis pubis)

• 1961 Burch
  • Cure rates: 1yr 66% 5yr 90%

• Laparoscopic Procedures
  • Cure rates: 1yr 80% 5yr 77%

Data from Karram et al. Obstet Gynecol 2003;101:128-136

MINIMALLY INVASIVE PROCEDURES FOR STRESS INCONTINENCE

<table>
<thead>
<tr>
<th>Brand</th>
<th>Jennings</th>
<th>Advantages</th>
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<td>Polypropylene mesh</td>
</tr>
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tvT RANDOMIZED, CONTROLLED TRIALS


SLINGS

• Traditional fascial slings
• Retropubic mesh slings
• Obturator slings
• Mini-slings
TRANS-OBTURATOR SLING

- Introduced by Delorme in 2001
- Novel approach to slings
- Reduce risk of bladder, bowel and vessel injury including irritative symptoms
- ? Need for cystoscopy
- Thigh pain and neurologic pain


MINI-SLINGS

- Secure
- Mini arc
- Adjust
- Solyx

MINI ARC DATA 69.1-91.4%


WHICH SLING…WHEN?

<table>
<thead>
<tr>
<th>Sling Type</th>
<th>Obese</th>
<th>SD</th>
<th>SUI, Bp, Urethral Pressure</th>
<th>Post Radiation</th>
<th>Mesh phobia</th>
<th>Recurrent SUI</th>
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<td>Retropubic</td>
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</table>

A. Pradham et. al. Int Urogynecol J 2012

SLING SURGERY FOR STRESS URINARY INCONTINENCE IN WOMEN: A SYSTEMATIC REVIEW AND METAANALYSIS 2014 AJOG

- MUS vs. Burch
  - Either intervention
  - Pubovaginal sling vs. Burch
    - Slings better objective and subjective
  - Pubovaginal slings vs. MUS
    - Subjective favored MUS
    - Recurrence favored obturator not significant
  - Minislings vs. full-length MUS
    - Objective and subjective cure rates significantly favor full-length
SLING COMPLICATIONS
• Retention
• Erosions
• Extrusion
• Bladder perforation (0.2-3.5%)
• Hematoma (0.8-1.6%)
• Infection <1%
• Denovo irritative voiding symptoms
  - 11.4-13.8%

LESS LIKELY COMPLICATIONS/MANAGEMENT
• Cystotomy
• Fistula
• Persistent or recurrent incontinence
• Voiding dysfunction and retention
• Erosion into bladder, urethra, vagina
• Urinary tract infections

Systemic review and meta-analysis

LEGAL ASPECTS

FDA WARNING ON MESH USE
• Oct 2008 FDA issued notice of rare but serious complications of mesh use in POP/SUI repairs
• Over 1,000 reports from mesh manufacturers
• Complications
  • Erosion thru vaginal epithelium
  • Infection
  • Pain
  • Urinary problems
  • Recurrence of prolapse and/or incontinence

2011 FDA UPDATE
• 2008 through Dec. 31, 2010
• FDA received 2,874 additional complications associated with surgical mesh devices used to repair POP and SUI
  • POP 1,503
  • SUI 1,371
• The review showed that transvaginal POP repair with mesh does not improve symptomatic results or quality of life over traditional non-mesh repair.
FDA RECOMMENDATIONS TO PHYSICIANS

- Obtain specialized training and be aware of risks
- Be vigilant for possible erosion or infection
- Watch for intraop complications in using tools, ie perforation
- Inform patients that mesh implantation is permanent, and complications may require additional surgery and may not be correctable
- Inform patients about potential for serious complications effecting QOL, dyspareunia, scaling, and narrowing of vagina
- Provide patient with written copy of patient labeling from mesh manufacturer, if available.

CONSENT "PROCESS"

Informed surgical consent for a mesh/graft-augmented vaginal repair of pelvic organ prolapse

- Dennis Miller & Alfredo L. Milani & Suzette E. Sutherland & Bonnie Navin & Rebecca G. Rogers

Consent:
Initial each item

- I know of plans to use a permanent mesh prosthesis in my prolapse or incontinence surgery.
- The mesh technique to be used is called _______________________.
- My doctor has obtained specialized training in this technique.
- My doctor is aware of all the risks and has told me of these risks.
- My doctor has told me that the implantation of surgical mesh is permanent.
- My doctor has told me that bowel, bladder, urethra, ureters, rectum or blood vessels may be injured during surgery and that this may require additional surgery now or later.
- My doctor has told me that additional surgery could be required if complications develop, such as, infection or erosion of the mesh into the vagina, bladder, urethra, ureters or rectum.
- My doctor has told me that surgery for any complications may or may not correct the complication.
- My doctor has told me that pain with intercourse may develop, because of scarring and narrowing of the vaginal walls in prolapse repair.
- My doctor has told me that other complications may affect my quality of life, such as, long lasting pelvic pain.
- My doctor has given me a copy of the patient labeling from the mesh manufacturer.

Inform patients that implantation of surgical mesh is permanent, and that some complications associated with the implanted mesh may require additional surgery that may or may not correct the complication.
Inform patients about the potential for serious complications and their effect on quality of life, including pain during sexual intercourse, scarring, and narrowing of the vaginal wall (in POP repair).

OPTIONS

- Fascial sling
- Burch
- Evaluation
- Experience
- Anatomy
- Tips & Tricks

Burch Literature

- MC Lapitan and JD Cody 2012 (Cochrane)
  - 2 sutures better than 1
- Burch success rates = TVT & TOT
- Fascial Sling
- LapiOpen
- ME Abo et al. N. Eng J of Med 2007
  - Fascial sling vs Burch
  - RCT or 655
  - 66 vs 49% @24mths
  - Post op complications = sling
REFERENCES

- Schlegel MD. Sling surgery for stress urinary incontinence in women: a systematic review and metaanalysis. AJOG. 2014
Complications of Laparoscopy and how to Prevent them

Resad Paya Pasic M.D., Ph.D.  
Professor  
Obstetrics and Gynecology  
University of Louisville  
School of Medicine  
Louisville, Kentucky

Learning Objectives

- Review of endoscopic entry techniques and risks associated with laparoscopic entry  
- To present the risk and management of vascular complications  
- To review the risk and management of bowel injuries  
- To present the risk and management of genitourinary injuries.

Chapron C at al.

- Multicenter study, 7 centers in France, 9Y  
- 29,966 patients  
- Mortality: 3,33/100 000  
- Overall complication rate: 4,64/100  
- Risk is directly proportional to the complexity of the procedure (p=0,0001)

Surgeons experience has 3 consequences

- Statistically significant decrease in bowel injuries (p=0.0003)  
- Statistically significant decrease in serious complications that require laparotomy during standard laparoscopic operations (p=0.01)  
- Statistically significant increase in laparoscopic treatment of complications (p=0.0001)

DISCLOSURE

- Grants/Research: Karl Storz  
- Consultant: Ethicon Endo-Surgery  
- Speakers Bureau: CooperSurgical
What it takes to become an expert?

Standards from Airline industry
5,000 hours

Risk Factors for Laparoscopic Complications

- Previous abdominal surgery
- Difficulty or complexity of laparoscopic procedure
- Low / High BMI

LAPAROSCOPIC COMPLICATIONS

- Positional
- Equipment
- Insufflation
- Electrical energy

- Trocar placement
- Vascular injury
- Bowel injury
- Genitourinary
- Wound hernia

Positional Complications

- Brachial plexus - arm extension > 90°
- Peroneal nerve - lateral pressure
- Femoral & Sciatic nerve - compression

- Shoulder brace
- Return electrode positioning
- Foley catheter

Time Line for Complications

- Immediate postoperative / first 24 hours
  - Vessel/Vascular injury
    - Vital signs H&H

- 48-72 hours postoperative
  - Uretal injury
    - Creatinine IVP

- Days to weeks
  - Bowel injury
    - Clinical signs
Patients should get better every day

Always Check the Equipment Before Each Surgery!

ELECTRICAL INJURY

Always keep the tips of your instruments in the center of the screen, while applying energy!!

Never use two different power sources in the abdomen at the same time!

Insufflation Failures

- Obese patients
- Thin Patients
- Patients with abdominal scars
- Patients with failed insufflation

Alternative Insufflation Techniques

- Transumbilical
- Direct
- Open laparoscopy (Hasson)
- Transuterine insufflations
- Subcostal insufflations (Palmers point)
Figure 3. Laparoscopic photograph of a trocar inserted on the umbilical site. The trocar and with the peritoneal cavity.
Choose the right Insufflation technique

Vascular Injury
- Abdominal wall bleeding
  - Inferior epigastric artery
- Intra peritoneal vessel injury
  - Mesentery, ovarian, uterine artery
- Retro peritoneal major vessel injury
  - Iliac, vena cava, aorta

Secondary trocar placement always under direct vision!
Retro peritoneal vessel injury

• Early recognition is the key to survival
• Direct compression on aorta
• IV fluids
• Do not open the peritoneum over a hematoma!
• Call a vascular or trauma surgeon !!!
**BOWEL INJURY**

- Not from Veress needle
- Injury may not be apparent for 4-5 days
- Any symptoms of peritonitis (sharp abdominal pain, vomiting) must be considered as bowel injury unless proven otherwise!!
- Use bowel prep

**Small bowel injury**

- Bands
- Leukocytes
- C - Reactive Protein $>100$ MG/L

- No antibiotics
- Surgery!

**Brosens et al.**

- Minor operative laparoscopy associated with 0.08% risk of bowel injury
- Major operative laparoscopy associated with 0.33%
- Injuries decrease significantly with experience
- Delayed diagnosis remains major problem; up to 15% of injuries not diagnosed during laparoscopy; one in five cases of delayed diagnosis results in death

Genitourinary complications

- Bladder..............Indigo carmine
  - If <1cm consider Foley catheter for 7-10 days
  - If >1cm laparoscopic 2 layer closure + Foley
  - Cystoscope

- Ureter..............Trace from pelvic brim
  - Small non electrical injury - primary repair over stent
Genito urinary tract Injury Evaluation

- Cysto, Ureteral stents
- Indigo carmine vs. Methilene blue
- Creatinine
- IVP

Bladder injury

Incisional hernia

Incision Hernia
Basic Laparoscopic Contraindications

**ABSOLUTE**
- Conditions which mitigate against creation of pneumoperitoneum
- Cardiovascular
- Pulmonary

**RELATIVE**
- Training and experience
- Availability of necessary instrumentation
- Diffuse peritonitis
- Shock or impending shock
- Obesity

“COMPLICATIONS AND LITIGATION IN GYNECOLOGIC ENDOSCOPY”

- “Most medical malpractice lawsuits that involve gynecologic endoscopy and laparoscopy result from either improper prevention, inadequate recognition, or delayed intervention.”

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.

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