Didactic: Laparoscopic Hysterectomy: Tips and Tricks from the Masters

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Professional Education Information

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

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

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

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HYST-704
Didactic: Laparoscopic Hysterectomy: Tips and Tricks from the Masters

Frank W. Jansen, Chair

Faculty: Amy N. Broach, Sarah L. Cohen, Kimberly A. Kho,
Cara R. King, Suketu Mansuria, Lukas van den Haak

This course is designed to provide participants with a systematic and comprehensive overview of laparoscopic hysterectomy from leading experts in the field. The course will focus on practical skills that will help surgeons become more efficient and safe, as well as advanced surgical strategies to tackle more difficult cases (i.e., large fibroid uteri, adhesions, etc.) without conversion. The course will emphasize education using surgical videos to enhance the applicability of the techniques taught and demonstrate practical utilization of these methods. Participants will bridge the gap that separates novice from expert surgeons through a thoughtful overview of proper surgical technique, retroperitoneal anatomy, complication avoidance and management, laparoscopic suturing, and laparoscopic instrumentation. The afternoon cadaveric lab will include the opportunity to immediately apply skills presented in the didactic course to the “real world.”

In order to support AAGL’s tissue extraction statement, this course will discuss the following tissue extraction methods: Contained vaginal morcellation, contained minilaparotomy morcellation and contained power morcellation.

Learning Objectives: At the conclusion of this course, the clinician will be able to: 1) Describe and perform fundamental laparoscopic skills, including but not limited to, identification and dissection of the retroperitoneal space, laparoscopic ureterolysis, laparoscopic suturing, and refining surgical strategies for success when faced with intra-operative challenges; 2) demonstrate the proficiency to identify retroperitoneal anatomy, especially the uterine artery from its origin, in order to complete difficult cases and minimize conversion to laparotomy; and 3) employ time-tested tips and tricks to improve surgical efficiency and patient outcomes.

Course Outline

7:00 Welcome, Introductions and Course Overview  F.W. Jansen
7:05 How Do I Know That I’m Performing My Laparoscopic Hysterectomy Optimally?  F.W. Jansen
7:30 Tips and Tricks to Make You a Laparoscopic Superstar!  A.N. Broach
7:55 Practical Review of Retroperitoneal Anatomy  S. Mansuria
8:20 Laparoscopic Instrumentation: The Pros and Cons of Different Energy Devices  K.A. Kho
8:45 Questions & Answers
8:55 Break
9:10 Advanced Techniques for Tackling the Large Uterus or Complex Pelvis  S. Mansuria
9:35 Laparoscopic Suturing and Cuff Closure: Make It Simple  C.R. King
10:00 How to Prevent and Identify Ureteral Complications  L. van den Haak
10:25 Alternatives to Laparoscopic Power Morcellation  S.L. Cohen
10:50 Questions & Answers
11:00 Adjourn
PLANNER DISCLOSURE
The following members of AAGL have been involved in the educational planning of this workshop and have no conflict of interest to disclose (in alphabetical order by last name).

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Amber Bradshaw
Erica Dun*
Frank D. Loffer, Medical Director, AAGL*
Linda Michels, Executive Director, AAGL*
Johnny Yi*

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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).

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Kimberly A. Kho
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Other: Pivotal Protocol Advisor: Actamax
Cara R. King*
Suketu Mansuria*
Lukas van den Haak*

Asterisk (*) denotes no financial relationships to disclose.
How do I know that I’m performing my LH optimally?

Prof. Frank Willem Jansen MD, PhD
Leiden University Medical Center
The Netherlands
Department Gynaecology, Section MIS

I have no financial relationships to disclose

Discuss how to measure surgical performance for LH

Will follow

Background

Quality assessment is nowadays mandatory
- Especially for advanced procedures (LH)
- Enhance patient safety
- Make health care more transparent and measurable

Social demand to get insight in doctors’ performance
- Insurance companies
- Governmental associations
- Patients

Learning curve studies in laparoscopic hysterectomy

- Steady OR-time after 15 procedures: Perine et al. Hum Reprod 1999
- Complication rate decreased with increased experience: Wattiez et al. J Am Assoc Gynecol Laparosc 2002
- Complication rate after 30 procedures significantly lower: Mäkinen et al. Hum Reprod 2009
LapTop study: 1.534 LH's in the Experience predicts outcome measurements partly NLs/

Experience: Learning curve continious > 30 procedures
Especially after correction for patient factors
Independent skillfactor
Volume (number of LHs/year) is not a significant predictor

Twijnstra A et al. Obstet Gynecol 2013

Selection?

- Surgeon: experience?
- Patient: case mix?
- Institution: infra structure?

Review predictors/casemix LH

Table: Number of found articles which showed an association between the patient characteristic and outcome

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Operative time</th>
<th>Blood loss</th>
<th>Complication</th>
<th>Conversion</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMI (kg/m²)</td>
<td>&lt;25</td>
<td>1.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>25-35</td>
<td>1.90</td>
<td>.75 – 4.12</td>
<td>NS</td>
</tr>
<tr>
<td></td>
<td>&gt;35</td>
<td>6.53</td>
<td>1.43 – 18.83</td>
<td>&lt;.001</td>
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<tr>
<td>Uterus weight (gram)</td>
<td>&lt;200</td>
<td>1.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>200-500</td>
<td>4.05</td>
<td>87 – 8.79</td>
<td>&lt;.001</td>
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<td>&gt;500</td>
<td>30.90</td>
<td>11.72 – 81.48</td>
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<tr>
<td>Experience surgeon</td>
<td>0.95</td>
<td>0.89-1.01</td>
<td></td>
<td>NS</td>
</tr>
<tr>
<td>Surgeon effect (average OR)</td>
<td>2.79</td>
<td></td>
<td></td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

Twijnstra A et al. Obstet Gynecol 2012

How to measure a (good)surgeon skills on knot tying compared to clinical outcome

Results and clinical outcome measures

- No additional value of expert measurement of knot tying as predictor for clinical outcome

Twijnstra A et al. Obstet Gynecol 2014
Quality and LH?

Measuring quality for LH is difficult

- Objective quality measurement tools are not available
- Case-mix

Relevancy, Evidence, Feasibility & Steerable

Types of Quality Indicators

according to Donabedian

- Structure: reflect the setting
  - Case volume
  - Access to specific technologies
  - Staff certification

- Process: include complete care system
  - Multidisciplinary team management
  - Protocols/guidelines

- Outcome: refer to direct clinical outcomes
  - Complications
  - Mortality
  - Morbidity
  - Quality of life (PROMs)

Most used to assess the quality of surgical care

Problem of Quality Indicators

Lack of case-mix correction

Patients are heterogeneous

Incorrect comparison of outcomes between hospitals and surgeons!

Conversion associated with worse outcomes

- Prolonged length of surgery
- More postoperative adverse events
- Prolonged hospital admission

<table>
<thead>
<tr>
<th>Conversion definition problem</th>
</tr>
</thead>
<tbody>
<tr>
<td>A vertical incision greater than necessary for specimen retrieval</td>
</tr>
<tr>
<td>Neudecker, Br J Surg, 2009</td>
</tr>
<tr>
<td>Open abdominal access through a &gt; 7-cm long skin incision</td>
</tr>
<tr>
<td>A substitution of laparoscopy by laparotomy for intra-operative complications</td>
</tr>
<tr>
<td>Sansev cit, AAGL, 2002</td>
</tr>
<tr>
<td>Failure of the planned procedure</td>
</tr>
<tr>
<td>R Garry, Health Technol Assess, 2004</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Quality indicators for LH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Score</td>
</tr>
<tr>
<td>-------</td>
</tr>
<tr>
<td>Value*</td>
</tr>
<tr>
<td>Conversion</td>
</tr>
<tr>
<td>Complication</td>
</tr>
<tr>
<td>QUSUM</td>
</tr>
<tr>
<td>Process indicator</td>
</tr>
<tr>
<td>Type of hysterectomy</td>
</tr>
</tbody>
</table>

Table 1. Outcomes among the MC, MC and LH groups

<table>
<thead>
<tr>
<th>Group</th>
<th>Gender</th>
<th>Length of surgery</th>
<th>Length of stay</th>
</tr>
</thead>
<tbody>
<tr>
<td>MC group</td>
<td>25%</td>
<td>8.14 ± 3.78</td>
<td>4.36 ± 1.28</td>
</tr>
<tr>
<td>LH group</td>
<td>25%</td>
<td>7.14 ± 3.78</td>
<td>3.89 ± 1.28</td>
</tr>
</tbody>
</table>

Yang, Surg Endosc, 2009
Consensus on definition of conversion
Blikkendal et al Surg Endosc 2014

Conversion to laparotomy is an intra-operative switch from a laparoscopic to an open abdominal approach that meets the criteria of one of the two subtypes:

- **Strategic conversion**: a standard laparotomy that is made directly after the assessment of the feasibility of completing the procedure laparoscopically* and because of anticipated operative difficulty or logistic considerations
- **Reactive conversion**: the need for a laparotomy because of a complication or extension of an incision because of (anticipated) operative difficulty after a considerable amount of dissection (i.e. in times >15 minutes)

*A laparotomy after a diagnostic laparoscopy (i.e. to assess the curability of the disease) should not be considered as a conversion

•<5% Strategic (indication) <1% reactive (complication risk)

Why QUSUM?

1. Insight in individual proficiency in LH
2. Opportunity for correction and to take action
3. Enhancement of patient safety

**correction for case-mix!**

QUSUM project

**QUality indicator for SUrgical performance in MIS**

To develop and evaluate a real time web-based quality control tool in LH, to provide individual proficiency graphs and obtain a signal for derailing surgical performance with correction for case-mix.

Why QUSUM application

A real time web-based quality control tool in LH

**QUSUM**

Now online! www.QUSUM.org

1. To provide feedback with individual proficiency graphs
2. Detection of derailing surgical performance

**With a correction for case-mix!**

QUSUM application background

- 3 “Observed-Expected CUSUM” graphs
- Dataset of 1534 LH’s is used as benchmark
- 3 case-mix characteristics

<table>
<thead>
<tr>
<th>Primary Outcomes</th>
<th>Case-mix</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operative time</td>
<td>Uterus weight (g)</td>
</tr>
<tr>
<td>Blood loss</td>
<td>BMI</td>
</tr>
<tr>
<td>Complication</td>
<td>Previous abdominal surgery</td>
</tr>
</tbody>
</table>

*Referee: Obstet Gynecol, 2012
QUSUM proficiency graphs

Graph 1: 1 out of control signal
In total 450 min more operative time than expected

Graph 2: 2 out of control signals
In total 4800 mL blood loss more than expected

Graph 3: No out of control signal
In total 3 complications less than expected

Red section = “out of control” signal

Feedback & Risk factor checklist

Factors of influence on patient safety

Running projects

Prospective study in the Netherlands

- > 100 surgeons have been registered at www.QUSUM.org
- Results of the risk factor checklist
- Best type of feedback (Faculty of Social Behavioral Sciences, University of Leiden)
- Validate, improve and optimize the application

Future

Embedding of QUSUM in other registry systems

Preliminary QUSUM results

blood loss (ml)

Complication

QUSUM results
Conclusions

1. Boxmodel to assess competence in MIS is too relative to measure skills
2. Conversion rate: gives insight in performance on indication and complication rate in LH
3. QUSUM optimal for assess competence and gives direct feedback
4. Conversion rate and QUSUM mandatory assessment tools
How to be a laparoscopic super star
Tips for laparoscopic hysterectomy

Amy N. Broach, MD MS
Assistant Professor
Department of Obstetrics and Gynecology
Division of Minimally Invasive Gynecology

Disclosure

• Consultant for Covidien, part of Medtronic

Outline

• Ergonomics
• Tips for a successful laparoscopic hysterectomy practice
  – Abdominal entry
  – Trocar placement
  – Dealing with the bladder
• Performance improvement

Learning objectives

At the conclusion of this talk, the participant will be able to:
• List three ways to improve surgeon ergonomics during gynecologic laparoscopic surgery
• Describe the anatomical location and technique for abdominal access at Palmer’s point
• Describe the steps for cystoscopy without the use of a cystoscope
• List two techniques to improve surgical performance

Ergonomics

• The study of people’s efficiency in their working environment
  • In the operative working environment, there are three main variables:
    – Patient
    – Surgeon (and team)
    – Equipment

Patient positioning

• Improves surgeon ergonomics
• Prevents patient injury
  • Hyperflexion can lead to femoral and sciatic neuropathies
  • Improper leg placement in stirrups can result in peroneal neuropathy
  • Improper placement of shoulder braces increases the risk of brachial plexus injury
Dr. Broach, when do you tuck the arms?

Tuck the arms

Position the legs
- Slight flexion at hip knee
- Slight flexion at hip
- Slight abduction at hip
- No external rotation at hip
- The "line" test

The leg “line test”
- Can you draw a straight line connecting her:
  - toe
  - knee
  - umbilicus
  - contralateral acromion

Surgeon positioning
- 87% of SAGES members report physical discomfort due to performing MIS procedures
- AAGL members survey reveals
  - 82% believe performing MIS surgery causes pain
  - 11% change practice due to the pain
  - 34% report that pain affects performance
  - Pain sites: low back pain 76%, neck 73%, shoulder 67%, upper back 62%, wrist/hand 60%

Surgeon positioning
- Surgeon should be at a height relative to the patient such that the handles of the instruments should be at or below the elbow
  - Typically requires the table to be lowered significantly, or at its lowest height
  - May require the use of steps, especially for shorter surgeons or increasing severity of obesity
Surgeon positioning

- Monitors should be directly in front of the surgeon
  - Positioned 15-40 degrees below eye level
- Foot pedals should be avoided when hand activation is available
  - Placed near the foot at the same angle as the instrument or monitor
  - Avoid twisting your body or leg to activate
  - If surgeon is on a step, pedals should be at the same level

Equipment positioning

- Monitors should be directly in front of the surgeon
  - Positioned 15-40 degrees below eye level
- Foot pedals should be avoided when hand activation is available
  - Placed near the foot at the same angle as the instrument or monitor
  - Avoid twisting your body or leg to activate
  - If surgeon is on a step, pedals should be at the same level

Alternate abdominal entry site: Palmer’s point

- Large pelvic pathology
- Prior herniorrhaphy, with or without mesh
- Prior abdominoplasty
- Midline vertical incisions
- Multiple prior low transverse incisions
Technique for entry at Palmer’s Point

- Confirm no splenomegaly
- Confirm placement of nasogastric or orogastric tube and proper drainage
- Table is level
- Trocar options:
  - Veress needle insufflation followed by trocar insertion
  - Versastep system: Veress needle with radially expanding sleeve
  - Optical trocar

Optical trocar access

- Video here

TROCAR LOCATION

Standard gynecology trocar location

Standard gynecology trocar location
Tips for trocar location

- At least one camera port should be above the most cephalad portion of the pathology
- Lateral ports should be at least at or above the level of the cornual pedicles
- Utilization of all trocar sites is optimized by using 5 mm laparoscopes and instruments
- If a 10 mm trocar is required choose location carefully based on the pathology and the needs from the trocar

DEALING WITH THE BLADDER
Dealing with the bladder

• Dissection aid for difficult bladder dissection
  – Cystosufflation
• Diagnostic tool for post-operative bladder and ureteral injuries
  – Poor Man’s Cystoscopy

Cystosufflation

• Video here

Cystosufflation technique

• Urinary catheter must remain within the sterile field
• Remove urethral catheter from drainage bag
• Under direct visualization, “back fill” the bladder with carbon dioxide gas
• Use as much gas as necessary to define the borders of the bladder
• May “hold” the air in the bladder with a Kelly clamp to work with an inflated bladder or release and refill as many times as necessary

Diagnostic tool for bladder and ureteral injury

• 25% of all visceral injuries are diagnosed post-operatively
• Bladder and ureteral injuries are the most common visceral complications of laparoscopic hysterectomy
• Simple technique to evaluate the bladder and ureters: “Poor Man’s Cystoscopy”
  – Took 13 minutes longer
  – Diagnosed bladder and ureteral injuries
  – Will not diagnose fistulas

Poor Man’s Cystoscopy

• Video here

Poor Man’s Cystoscopy

• Back fill the bladder with ~200 mL of normal saline or sterile water
  – Using suction-irrigator tip
  – Through the urethral catheter
• Insert 30 degree laparoscope into the bladder to evaluate mucosa, efflux of ureteral urine
  – 2.5 mL of indigo carmine may be required when using normal saline
Cystoscopy clinical pearls

- Usually can see ureteral efflux with sterile water alone
- +/- use of 2.5 cc intravenous indigo carmine
- Level the patient
- Evacuate pneumoperitoneum
- +/- use of furosemide
- If no ureteral efflux within 6 minutes of all conservative measures AND intravenous administration of indigo carmine, consider cystoscopy with ureteral catheterization or urology consultation

Performance improvement

- How do we improve?
  - Practice, practice, practice!
  - Practice the skill that is most difficult
    - Suturing
      - Box trainers
        - Store bought
        - Home made
    - Video review
      - Self-assessment or review with colleagues
      - Use of a library bank

Practicing suturing

- Practicing prior to procedures can improve intraoperative performance
- Practice at home or in your office does not require expensive equipment
  - Smart phone, VGA cable, monitor
  - Laparoscopic trainer, smartphone/tablet
  - Laparoscopic equipment can be acquired inexpensively from
    - Hospital
    - Industry
    - Web based sales sites
Performance improvement

- Video review
  - Quality, technique and speed improved with video self-assessment
  - Self-assessment or with a partner, colleague
- Database review

Conclusions

- Performance with laparoscopic hysterectomies can be improved with:
  - Proper patient and surgeon positioning
  - Use of alternative abdominal access site other than umbilicus
  - Adjustment of trocar locations to better match pathology
  - Utilization of two tools to prevent and diagnose bladder injury
  - Practice of suturing skills
  - Video review for self-assessment

References

1. www.google.com
9. O’Hanlan, K. Cystoscopy with a 5-mm laparoscope and suction irrigation. JMG. 2007; Mar;260-263.
Practical Review of Retroperitoneal Anatomy

Suketu Mansuria, M.D.
Associate Professor
Assistant Director Gyn MIS
UPMC

Disclosures
I have no financial relationships to disclose

Objectives
• Review pelvic sidewall (retroperitoneal) anatomy
• Review techniques to develop avascular spaces of the pelvis and identify uterine artery from its origin
• Review importance of retroperitoneal anatomy
  – In the management of commonly seen pathology during laparoscopic hysterectomies
  – In minimizing conversion to laparotomy and minimizing complications

Pelvic Sidewall
• Why is retroperitoneal anatomy important?
  – Important structures in the retroperitoneum:
    • Uterine artery-control of the uterine blood supply is 75% of a hysterectomy
    • Ureter-knowledge of its retroperitoneal course will minimize ureteral injury
  – Very rarely does pelvic pathology affect the retroperitoneal anatomy
    • Adhesions
    • Endometriosis

Pelvic Sidewall
• Fibroid uterus
  – Limited access to the traditional coagulation point
    • Usually due to very wide uterus or lower uterine segment/cervical fibroids
    • Control uterine artery at its origin
      – Better exposure
      – Decreased risk of ureteral injury
  – Control blood supply prior to myomectomy
    • Prior to traditional myomectomy
    • Prior to removing fibroids to improve exposure during a laparoscopic hysterectomy

Pelvic Sidewall
• Uncertainty regarding retroperitoneal structures often leads to conversion to laparotomy
  – Bleeding
  – Concern for ureter
    • THE ANATOMY ISN’T EASIER OPEN!!!
• Intra-pelvic pathology can often be managed through a retroperitoneal approach!!!
• FOR EXAMPLE:
Pelvic Sidewall

- Obliterated cul de sac/Scarred bladder flap
  - Leave the adhesions for the last step of the case
    - “Do the easy stuff first, and the hard stuff becomes easy!”
  - Devascularize the uterus before attempting adehesiolysis
    - Control the uterine blood supply without injuring the bowel or bladder
    - Devascularizing the uterus prior to adhesiolysis will minimize bleeding/improve visualization-decreasing the risk of bowel/bladder injury

- Bleeding
  - Control bleeding uterine pedicle
    - Decreased risk of ureteral injury
  - Endometriosis-can alter course of ureter
  - Adnexa adherent to sidewall
    - Allows complete removal of sidewall
    - Minimize risk of ovarian remnant syndrome
  - Allows for complete ureterolysis
    - Ureter travels beneath the uterine artery/allows for dissection thru the parametria

- Two important structures in the pelvic sidewall/retroperitoneum
  - Ureter-ALWAYS found along the posterior leaf of the broad ligament
  - Uterine Artery-ALWAYS crosses above the ureter (water under the bridge)

- Two Important Avascular Spaces
  - Pararectal space
  - Paravesical space
  - Both spaces are triangles and share a common base – the uterine artery
  - As long as you can identify one boundary of either space, you can develop both spaces and identify all the other boundaries
Three main surgical approaches to identifying the uterine artery from its origin off the hypogastric artery
- Posterior approach
- Lateral approach
- Anterior approach

Choice of approach will be determined by visualization and anatomy

Posterior Approach
- Make a peritoneal incision between the IP ligament and the ureter (if there is difficulty identifying the ureter, start at the pelvic brim)
- Extend the peritoneal incision from the pelvic brim towards the uterus-have your assistant pull the peritoneum medially
- Develop the pararectal space
- Identify all borders of the pararectal space and use them to identify the paravesicle space

Lateral Approach-the approach most familiar to most gynecologist
- Make a peritoneal incision from the round ligament parallel to the IP ligament
- Have your assistant pull the peritoneal edge medially
- Develop the pararectal space
- Identify all borders of the pararectal space and use them to identify the paravesicle space
Pelvic Sidewall

- Anterior Approach—Used when the other two approaches are not possible (i.e., obliterated cul-de-sac, very large and broad uterus)
  - The medial umbilical ligament is identified
  - The MUL is skeletonized and followed retrograde towards the uterine artery
    - Concentrate dissection on the medial side of the ligament (the paravesicle space will be developed)
    - Superior vesicle artery will be encountered before the uterine artery—SVA originates from the posterolateral aspect of the hypogastric artery and runs upwards to the bladder
  - Once the uterine artery identified, use it to identify all other structures

Thank You

Questions?
Laparoscopic Instrumentation: The Pros and Cons of Various Energy Devices

Kimberly Kho, MD, MPH
University of Texas Southwestern Medical Center
Dallas, TX

Disclosures
• Contracted/Research: Applied Medical
• Other: Pivotal Protocol Advisor: Actamax

Learning Objectives
• Review available laparoscopic energy devices
• Examine mechanism of action and indications for use of various devices
• Compare pros and cons of devices
• Discuss various surgeon preferences, specific circumstances and reasons for use

History
• 1989 1st LAVH by Reich using suture for vessel ligation
• With lasers, traditional bipolar and monopolar initial concerns about:
  – Thermal spread/damage
  – Consistency of hemostasis

Principles of Electrosurgery
• Ohm’s law: \( V = I \times R \)
• Electrosurgery vs electrocautery
• Monopolar vs. Bipolar Electrosurgery
• Ultrasonic Energy
• Laser
  – Light Amplification by Stimulated Emission of Radiation
  • Tissue effect = time, power density (power settings, spot size)
  • + : accuracy, lack of thermal spread
  • - : cost, availability, maintenance, training

Monopolar Electrosurgery

<table>
<thead>
<tr>
<th>Tissue Effect</th>
<th>Surgical Effect</th>
<th>Contact With Tissue</th>
<th>Caution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Desiccation</td>
<td>Hemostasis of small vessels (1-2 mm)</td>
<td>Continuous (DC)</td>
<td>No Contact</td>
</tr>
<tr>
<td>- thermolysis</td>
<td>Hemostasis of small vessels (1-2 mm)</td>
<td>Continuous (DC) or interrupted (AC)</td>
<td>Contact</td>
</tr>
<tr>
<td>- coagulation</td>
<td>Sealing of small-medium vessels (2-3 mm)</td>
<td>Continuous (DC) or interrupted (AC)</td>
<td>Contact and compression of vessel wall</td>
</tr>
</tbody>
</table>

Bipolar Electrosurgery

- Developed to decrease risk of stray current
- Advantages:
  - “Closed circuit”
  - Lower voltage for tissue effect
  - Thermal effect more evenly distributed
- Disadvantages:
  - Larger electrodes (2)
  - Tissue sticking

Advanced Bipolar Devices

- “Advanced” because of feedback-controlled desiccation
- Utilize pulsatile, impedance-controlled
  - Lowest possible power for tissue effects
- Denatures collagen and elastin in vessel wall -> forms coagulum
- Ligasure adjusts I and V based on real-time impedance
- Gyrus employs pulse/cool-off period to reduce drying/sticking
- Enseal RX uses proprietary electrode w/ temperature sensitive conductive particles

Vessel Sealing Devices

- How are they assessed?
  - Seal time
    - Shortest w/ Ligasure w/ Force Triad generator
  - Burst pressure
    - 6-7mm vessels, no significant difference
  - % failure rate (consistency)
    - Highest Gyrus
    - Lowest Ligasure, Enseal
  - Thermal spread
    - Coagulation necrosis noted:
      - <3mm for LS, HS, PK
      - 6mm for Gyrus Plasma
      - Other authors up to 22 mm for non-impedance bipolar

Ultrasonic Devices

- Harmonic Scalpel – piezoelectric ceramic tip
  - Converts electrical impulses to mechanical energy, vibrates @ 55K cycles/second
  - Set power (e.g., excursion distances) for modification of cutting and coagulation
  - Seals created by breaking hydrogen bonds btw tissue proteins -> coagulum
  - Creates water vapor

Comparison of Devices

- Comparative Costs of Vessel Sealing Devices

<table>
<thead>
<tr>
<th>Device Type</th>
<th>Reusable Cost</th>
<th>Disposable Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Harmonic Scalpel</td>
<td>$15,750 Base station/generator</td>
<td>$345</td>
</tr>
<tr>
<td>Seeler 318-CX adapter</td>
<td>$1099 for initial instrument, $1082 for reload</td>
<td></td>
</tr>
<tr>
<td>Triplo Titanium clip applier</td>
<td>$1590</td>
<td></td>
</tr>
<tr>
<td>Trumax bipolar forceps</td>
<td>$798</td>
<td></td>
</tr>
<tr>
<td>Kogeling bipolar forceps</td>
<td>$838</td>
<td></td>
</tr>
</tbody>
</table>

Discussion among faculty panel

- Videos

Conclusions

- Energy devices dictated by surgeon preference, training, costs, availability and marketing
- Need more RCTs comparing outcomes
  - Clinical significance of industry-sponsored, lab-based study findings
- Post-market device surveillance

References

Advanced Techniques for Tackling the Large Uterus or Complex Pelvis

Suketu Mansuria, M.D.
Associate Professor
University of Pittsburgh Medical Center

Objectives

• Discuss surgical strategies utilizing the retroperitoneum to accomplish difficult hysterectomies
• Discuss techniques to minimize conversion to laparotomy and minimize complications
• Review pelvic sidewall anatomy
  — Identify the uterine artery from its origin to facilitate difficult cases

The Retroperitoneum

• Why is knowledge of the retroperitoneum important?
  — Uterine artery
  — Ureter
• Allows you to accomplish difficult cases
  — Fibroid uteri
  — Scarred bladder flaps
  — Obliterated cul-de-sacs/endometriosis
  — When a ureterolysis is necessary

Uterine Manipulators

• Most important assistant is the uterine manipulator
  — I prefer the Pelosi manipulator
    • Heavy duty
    • Great anteversion/retroversion and lateral deflection
    • Different size tips

Disclosures

• I have no financial relationships to disclose
Difficult Hysterectomies

- Ureteral Stents
  - Helps with identification of the course of the ureter along the pelvic sidewall
  - Helpful when visualization of the ureters may be compromised due to low fibroids and endometriosis (and obesity!)
  - Placement of stents does NOT absolve the surgeon from needing to know where the ureters are-it just makes finding them easier
  - Can aide in ureterolysis
    - Ureters more rigid and more easily bluntly dissected out of harm's way

Port Placement

- Rarely does the port placement need to be modified for large uteri less than 24 weeks size (larger than that may require the optical port to be placed more cephalad)
  - Keep in mind that 90% of the case is securing the blood supply
    - Upper pedicles-even in large uteri the upper pedicles are rarely much above the level of the pelvic brim
    - Lower pedicles-often the more difficult pedicles to secure and even in larger uteri the lower pedicles are still deep in the pelvis. Therefore if the ports are positioned too cephalad, this may compromise access to the deep pelvis (where the majority of the case will be performed)

Fibroid Uteri

- Securing the blood supply
  - Upper pedicles are usually very easy
    - In patients where the ovaries are to be removed, it is often easier to initially leave them in place (ie. secure the utero-ovarian ligament) and then remove the ovaries after the hysterectomy has been completed
    - Often easier to access the utero-ovarian ligament compared to the IP ligament when a large uterus is in situ
    - Don’t have to worry about the location of the ureters when your visualization is compromised
  - Taking down the upper pedicles will often improve the mobility of the uterus (esp. the round ligaments)

Fibroid Uteri

- Securing the lower pedicles (ie. uterine arteries)
  - Often if the fibroids are all in the upper part of the uterus, the anatomy/course of the uterine artery is not different from normal size uteri and can be controlled in the traditional fashion
    - Make sure the uterus is pushed “up” (cephalad) as much as possible
    - Stents can help give you reassurance that the ureters are well out of the way
### Difficult Hysterectomies

- Securing the lower pedicles (ie. uterine arteries)
  - Securing the uterine artery at its origin off the hypogastric (internal iliac) can be helpful when dealing with fibroids:
    - Easier to control large vessels (ie. decreased bleeding)
    - Able to "get around" the whole vessel
    - Often sidewall exposure is better than at the traditional coagulation point
    - Sidewall anatomy often less distorted
    - Able to control uterine blood supply before performing myomectomies to aide in hysterectomy

### Difficult Hysterectomies

- Securing the lower pedicles (ie. uterine arteries)
  - Securing the uterine artery at its origin off the hypogastric (internal iliac) can be helpful when dealing with a scarred bladder flap or obliterated cul-de-sac:
    - Sidewall anatomy often less distorted
    - Able to control the uterine blood supply when bowel or bladder is in close proximity to the traditional coagulation point
    - Once the uterus is devascularized, able to perform adhesiolysis with less bleeding (thereby improving visualization and decreasing the risk of bowel/bladder injury)

### Ureterolysis

- Knowledge of retroperitoneal anatomy can help:
  - Aide in the identification of the ureter
  - Aide in ureterolysis
    - Since the uterine artery crosses over the ureter, controlling the artery laterally allows the surgeon to completely dissect the ureter without encountering bleeding from inadvertant injury to the uterine artery
Pelvic Sidewall

- Three main surgical approaches to identifying the uterine artery from its origin off the hypogastric artery
  - Posterior approach
  - Lateral approach
  - Anterior approach
- Choice of approach will be determined by visualization and anatomy

Bladder Flap

- Rooney, et al (2005) case-control study examining relationship between history of prior cesarean and GU injury during subsequent hysterectomy
  - Cesarean is significant risk factor for incidental cystotomy (OR 2.04)
  - Greater risk of cystotomy in laparoscopic vs. abdominal approach (OR 7.5 vs 1.26) in patients with prior cesarean

Bladder Flap

- When a difficult bladder flap is encountered, the approach can be broken down into discrete steps:
  - Secure the blood supply
  - Delineate borders of the bladder
  - Initiate dissection laterally and inferiorly

National Trends in Cesareans

- 53% increase in rate of cesarean section from 1996 until 2006
- Decrease in VBAC from 28.3% in 1996 to 8.5% in 2006
- Increase in maternal request for cesarean

Bladder Flap

- Secure the blood supply
  - Secure the 4 main blood supplies to the uterus prior to initiating dissection
  - This will minimize blood loss during the dissection
  - Leave the bladder flap dissection for the last step prior to colpotomy
  - If the bladder is severely scarred, it may be in close proximity to the location where the uterine artery is traditionally controlled. In these cases, control the uterine artery at its origin prior to making the bladder flap
• Delineate the borders of the bladder
• Two main techniques
  – Pass a uterine sound gently through the urethra and into the bladder
    • Use it to “probe” the bladder to see its borders
  – Retrograde fill the bladder with 300-400cc
    • I use my suction-irrigator and connect it to the end of the foley and clamp the foley when the bladder is full
  – Once the borders are delineated, dissection can continue safely

• Initiate the dissection laterally and inferiorly
• Why?
  – The bladder is usually pulled up in the midline by scarring from previous cesarean sections
  – When dealing with scar tissue, it is important to find the proper plane for dissection=endopelvic fascia
  – By initiating the dissection inferiorly and laterally, the endopelvic fascia can more easily be identified
Questions?
Laparoscopic Suturing and Cuff Closure: Make it Simple

Cara R. King, DO, MS
University of Wisconsin-Madison

Disclosure

• I have no financial disclosures.

Objectives

• Review various port placements used in laparoscopic suturing
• Discuss how to execute laparoscopic suturing with incorporation of 5 simple steps

Port placement

• Ipsilateral
• Contralateral
• Suprapubic (low midline)

Ipsilateral

• Ergonomics
• Extrapelvic pathology
• Assistant
Contralateral

• No assistant
• Poor ergonomics?

Suprapubic (Low Midline)

• Allows access to bilateral pathology
• Assistant

Suprapubic (Low Midline)

Laparoscopic Suturing

• 1. Load needle
• 2. Stabilize tissue
• 3. Pass through tissue
• 4. Recover needle
• 5. Reload needle

Load Needle

1. 1/3 from tip of needle
2. 1 cm from swedge
3. 1/2 from swedge
Load Needle

- 1. Grasp tip of needle with needle grasper
- 2. Use needle driver to “push and pull” suture into correct orientation (often perpendicular)
- 3. Load needle at mid-point with needle driver

Stabilize and Pass Through Tissue

- Stabilize tissue
  - Grasp tissue to be sutured with needle grasper
- Pass through tissue
  - Enter tissue with needle tip PERPENDICULAR to tissue
  - Rotate wrist

Recover Needle

- Release tissue from needle grasper
- Grasp distal end of needle with needle grasper
- Release needle from needle driver
- Stabilize tissue with needle driver
- Rotate wrist to follow curve of needle

Video 1

Video 2

Video 3
Reload Needle

- Repeat steps of original load
- Grasp suture 1 cm away from swedge and "push and pull" into correct orientation
- Load needle at mid-point
- Repeat steps for stabilizing and passing through the tissue followed by recovery

References


Thank you. Questions?
How to prevent and identify ureteral complications

Lukas van den Haak, M.D.

Leiden University Medical Centre, The Netherlands

I have no financial relationships to disclose

OBJECTIVES

• Explain which anatomical site is most at risk for ureter injuries
• Discuss the common types of iatrogenic ureter injuries
• Describe the intra-operative real time ureter visualisation techniques that exist

OBJECTIVES

• Frequency of ureter injuries
• Localisation & Risk factors
• Prevention & peri-operative identification
• Post-operative identification
• Future developments

Frequency

• 50% of all ureter injuries due to gynecological surgery

• 0.5-2% during hysterectomy

• Laparoscopic hysterectomy is not high risk
  – Initial learning curve
  – Oncology

• Diagnosis usually delayed

Location

Distal 3rd of the ureter
Risk factors

- Intra-operative hemorrhage
- Tumor masses
- Adhesion / scarring
  - Endometriosis
  - Post inflammatory adhesions
- Majority of injuries without risk factors

Type of injury

**Direct**
- Ligation
- Transection
- Crush

**Indirect**
- Kinking
- Devascularisation
- Thermal
- Movie of transection

Prevention: pre-operative

- Excretory urography
- Retrograde urography
- Uro-CT
- Advantage
  - Detection of anatomic variations
- Disadvantage
  - No real-time information

Prevention: intra-operative

- Surgical technique
  - Manipulator
  - Coagulation close to uterus
  - Perpendicular approach
  - Identification of ureter
  - Koh manoeuvre ‘movie’
  - evidence or expert based?

Prevention: intra-operative

- Visualisation techniques
  - (lighted) stents
  - Radiopharmaceuticals
  - Movie stents
- Advantage
  - Easy identification
  - Less surgical exposure
- Disadvantage
  - Complications
  - Radiation
  - Do not prevent; assist in detection
  - Affect anatomy

Postoperative detection

- Cystoscopy
- Advantage
  - Low complication rate
  - Sensitivity/specificity
- Disadvantage
  - Indirect lesions
  - Clinical relevance
  - Costs
Postoperative detection

- Signs & symptoms
  - Fever
  - 'under the weather'
  - Flank pain
  - Incontinence
  - Vaginal fluid loss

- Usually within 2 weeks
- Subtle & aspecific
- Detection 0-44 days

Future: Near Infra Red (NIR) Light

- High tissue penetration
  - Low scatter
  - Low absorbance
- High signal to background ratio (SBR)
  - Low auto-fluorescence
- Does not change the surgical field
  - Invisible to the eye


Current Applications
**Take home message**

- Laparoscopic hysterectomy is not more prone to ureter injuries
- Most injuries in cases without risk factors
- Delayed diagnosis, especially indirect lesions
- Surgical techniques to prevent not evidence based
- Stents aid in detection, rather than prevention
- CT with contrast
- Future development: NIR as real time instrument
Alternatives to laparoscopic power morcellation

Sarah L. Cohen MD MPH
Division of Minimally Invasive Gynecologic Surgery
Brigham and Women’s Hospital

I have no financial relationships to disclose

OBJECTIVES

1. Analyze rationale behind contained tissue extraction
2. Review tips and tricks for:
   - Contained vaginal morcellation
   - Contained minilaparotomy morcellation
   - Contained power morcellation
3. Discuss future directions

Defining the problem

- FDA statement 11/2014
  - “Laparoscopic power morcellators are contraindicated for removal of uterine tissue containing suspected fibroids in patients who are peri- or post-menopausal, or are candidates for en bloc tissue removal”
- Industry response
  - Johnson and Johnson: Gynecare (Morcellex TM) 80% market share of morcellation products, as of July 2014-recalls the Morcellex
- Insurance limitations
  - Aetna, United Healthcare require Peer to Peer review

Possible Solutions

Can we identify patients who are high risk for occult malignancy?

Should we avoid morcellation altogether?

Can we better minimize risks of morcellation via tissue containment?

- Allow patients benefits of minimally invasive surgery
- Minimize risk of tissue dissemination- both benign and malignant tissue
- Has been reported in general surgery, urology and even gyn - even for malignancy

What about vaginal morcellation?

Studies on worsened prognosis with tumor disruption NOT limited to power morcellation

- Include myomectomy, LAVH, TVH, scalpel morcellation

Limitations for myomectomy, supracervical hysterectomy

Unclear how various forms of morcellation affect risk
Option 1: Contained Vaginal Morcellation

- Insert containment bag of choice
  - Based on specimen size, use abdominal wall incision (12-15mm) or colpotomy site
- Place specimen into bag with cervix directed to opening of bag

Option 1: Contained Vaginal Morcellation

- Exteriorize bag at introitus
- May utilize self retaining retractor to facilitate unhindered exposure
- Rocking motion during manual morcellation with scalpel

Option 2: Contained Minilaparotomy Morcellation

- Umbilicus or suprapubic, 2.5-5cm
- Tips to extend port at umbilicus
  - deflate abdomen, open skin, use S retractor and bovie over finger to open fascia
- Insert containment bag of choice

Option 2: Contained Minilaparotomy Morcellation

- Single port device helpful to allow for return to LSC view
- Place specimen in bag, exteriorize bag at abdominal wall
- 11 blade scalpel, morcellate in strips allowing specimen to roll
**Option 3: Contained Power Morcellation**


Jan 2013-April 2014: 73 patients, robotic and conventional LSC

- Hysterectomy: Multiport 29, single site 32
- Myomectomy: Multiport 11, single site 1

**Option 3: Contained Power Morcellation**


  - 2/3 had prior abdominal surgery
  - Median operative time 114 min (32-380 min)
  - Median EBL 50 mL (10-500 mL)
  - Median specimen weight 257 gm (53-1,481 gms)
  - No conversions, readmissions, or reoperation; 78% discharged home same day

**Option 3: Contained Power Morcellation**

Limitations: lack objective measure bag integrity, small observational study, specialized high volume surgeons

**Contained Power Morcellation: Videos**

- Vargas et al. JMIG. 2015
  - Compared OR time 3 months before and after implementing in bag power morcellation
  - 36 IBM, 49 open morcellation; IBM added 26 minutes to OR time
Contained Power Morcellation
Emerging Data

Cohen et al. JMIG 2014

– Pilot study: Morcellation of 500g beef tongue in simulation lab
– Compared 3 techniques: Nylon bag multiport, Isolation bag multiport, Isolation bag single port
– Evaluated spill with indigo carmine and by cytology
– Blue dye spilled in 1 of 12 trials (from seam of bag upon insufflation)- visible and on cytology

Submitted for publication:
Prospective study across 7 sites in Boston
Multi-port approach, varying bags used
Primary outcome: leakage of tissue or blue dye

Enrollment goal 400, early stop at 89 patients due to leakage events
7 cases of dye or tissue leakage on post morcellation survey

Contained Power Morcellation - Data

76 cases successful
3 specimen too large
10 morcellation not necessary

No bag tears during morcellation

Avg morcellation time 30.2 minutes (+ 22.4)
1 patient with STUMP on final pathology
1 complication of large EBL

Contained Tissue Extraction:
Future Directions

Espiner sleeved Ecosac prototype

Remained Questions

• Does the risk associated with tissue dissemination varies by type of morcellation? Candidates for vaginal hysterectomy may be lower risk for sarcoma?
• Do specimen retrieval bags eliminate or reduce risk associated with LMS dissemination?
• What is the incidence, outcomes with LMS after other fibroid interventions?
  » Hysteroscopic morcellation, MRGFUS, UFE, RFA
Useful Products

- GelPOINT mini (Applied Medical) – single port device useful for mini lap morcellation
- Alexis Contained Extraction System (Applied Medical) – bag with stiff rim, 17cm diameter, 6500mL capacity
- Alexis Wound retractors (Applied Medical) – varying sizes, useful to keep bag orifice open
- LapSac (Cook Medical) – 8x10cm, 1500mL capacity, comes with optional introducer
- EndoCatch (Covidien) – 15mm device with introducer and bag has 12.7cm diameter, 1000mL capacity
- EcoSac Specimen Retrieval Bags (Espinero) – varying sizes, capacity upwards of 2000mL, 180 bag is 17x24cm
- Lahey/Containment bag (3M) – thin material, accommodates very large specimens, 50x50cm

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).