Didactic:
Taking Your Laparoscopic Hysterectomy to the Next Level

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HYST-703: Didactic:  
Taking Your Laparoscopic Hysterectomy to the Next Level  
Suketu Mansuria, Chair  
Faculty: Amy N. Broach, Cara R. King, Alan M. Lam, G. Bernard Taylor, Karen C. Wang

This course is designed to provide the participant 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, including advanced surgical strategies to tackle more difficult cases (i.e., large fibroid uteri, adhesions, etc.) without conversion. Education will be enhanced by using videos to demonstrate surgical techniques and practical application of these methods. Participants will learn how to bridge the gap that separates novice from expert surgeons through a thoughtful overview of proper surgical technique, retroperitoneal anatomy, performance of retroperitoneal dissections, complication avoidance and management, and advanced laparoscopic suturing. Participants are encouraged to register for the afternoon cadaveric lab, which will provide the opportunity to immediately apply skills learned in the didactic course to the “real world.”

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

Course Outline

7:00 Welcome, Introductions and Course Overview  
7:05 TLH for Dummies: Step-By-Step Approach to the Laparoscopic Hysterectomy  
7:30 Tips and Tricks of the Masters  
7:55 Retroperitoneal Anatomy Made Ridiculously Simple  
8:20 Case Closed! Laparoscopic Suturing and Cuff Closure  
8:45 Questions & Answers  
8:55 Break  
9:10 That’s So Retro: Using Retroperitoneal Anatomy to Your Advantage to Tackle the Large Uterus or Complex Pelvis  
9:35 The Minimally Invasive Hysterectomy from the Eyes of a Urogynecologist  
10:00 To Err Is Human: Complication Management and Avoidance  
10:25 The Ureter...Friend! Not Foe!!!  
10:50 Questions & Answers  
11:00 Adjourn
PLANNER DISCLOSURE
The following members of AAGL have been involved in the educational planning of this workshop (listed in alphabetical order by last name).
Art Arellano, Professional Education Manager, AAGL*
R. Edward Betcher*
Amber Bradshaw
Speakers Bureau: Myriad Genetics Lab
Other: Proctor: Intuitive Surgical
Sarah L. Cohen
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Consultant: CONMED Corporation, Teleflex
Stock Ownership: Titan Medical
Karen C. Wang*

FACULTY DISCLOSURE
The following have agreed to provide verbal disclosure of their relationships prior to their presentations. They have also agreed to support their presentations and clinical recommendations with the “best available evidence” from medical literature (in alphabetical order by last name).
Amy N. Broach
Consultant: Covidien
Cara R. King*
Alan M. Lam*
Suketu Mansuria
Speakers Bureau: Covidien
G. Bernard Taylor
Speakers Bureau: Coloplast
Karen C. Wang*
Content Reviewer has no relationships.

Asterisk (*) denotes no financial relationships to disclose.
Objectives
- Describe 8 key steps for safe execution of a laparoscopic hysterectomy
- Explain surgical techniques to maximize visualization and efficiency

8 Basic Steps of Laparoscopic Hysterectomy
- 1. Insertion of uterine manipulator
- 2. Abdominal survey
- 3. Ligation of upper pedicles
- 4. Separation of broad ligament
- 5. Bladder flap
- 6. Skeletonization and ligation of uterine vessels
- 7. Uterine transection
- 8. Specimen removal and cuff closure

Why is correct placement critical??
- Enhance exposure of posterior cul de sac
- Lateralization of the uterus facilitates perpendicular desiccation of the uterine artery
- Delineation of the cervico-vaginal junction for colpotomy
- Inward traction increases distance between uterine artery and the ureter

In 12% of patients, the ureter is found within 5 mm from the lateral cervical wall.

2. Abdominal survey (video)
- Strategic evaluation of the pelvis and upper abdomen
- Restore anatomy
- Create game plan for case

3. Ligation of upper pedicles: Round ligament
- Round ligament ligation
- IP vs. utero ovarian ligation
- Utilize avascular triangle of the pelvic sidewall
  - Round ligament
  - IP ligament
  - External iliac

3. Ligation of upper pedicles: +/- BSO
- Salpingo oophorectomy: ligation of infundibulopelvic ligament
- Ovarian conservation: ligation of utero-ovarian ligament
- Either option, recommend creation of a retroperitoneal window

3. Ligation of upper pedicles video

Tricks for difficult manipulator placement
- Laparoscopic guidance
- Dilator taped to tenaculum
- Breisky retractors
- Suction bulb cut in half
- Sponge stick stained with methylene blue
4. Separation of broad ligament
- Anterior and posterior leaves are separated to expose the uterine vessels
- Palpate cup to confirm trajectory
- Find plane laterally and slide medially

5. Bladder flap video

6. Skeletonization and ligation of uterine vessels
- Utilize uterine manipulator for cephalad pressure and for optimizing perpendicular uterine artery ligation
- Ensure assistant keeps upper pedicle at 3 and 9 o'clock
- Desiccate both uterine arteries prior to transection
- If uterine vessels are large, may need multiple burns to shrink

7. Uterine transection
- Total laparoscopic hysterectomy → Colpotomy
- Supracervical hysterectomy → Uterine amputation

- Pneumo occluder balloon inflated?
- Bladder adequately mobilized?
- Rectum adequately mobilized?
- Uterine/cardinal complex dissected below colpotomy cup?
- Ureter identified and lateralized?
7. Uterine transection video

8. Specimen removal and cuff closure
   • Specimen removal options:
     • Vaginal extraction → intact or fractionated
     • Abdominal extraction → power morcellator or mini-lap with hand morcellation, with or without a bag
     • Vaginal cuff closure

Conclusion
• Laparoscopic hysterectomy can be consistently executed by mastering 8 key steps
• Adequate exposure and hemostasis are essential for optimized outcomes

References

Thank you.
Tips and tricks of the Masters

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

Disclosure

• Consultant: Medtronic

Learning objectives

At the conclusion of this talk, the participant will be able to:
• Describe the proper patient positioning technique
• 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
• Describe a technique to aid with bladder dissection

Who is a Master?

• Master (noun)
  • a skilled practitioner of a particular art or activity.
• Mastery (noun)
  • comprehensive knowledge or skill in a subject or accomplishment
• Mastery of hysterectomy:
  • Skill to safely, efficiently complete hysterectomy in patients with various complex pathologies and environments

Make yourself and your patient comfortable

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

- Slight flexion at hip knee
- Slight flexion at hip
- Slight abduction at hip
- No external rotation at hip
- The “line” test

Position the legs

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.

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.

Peritoneal access

Starting the case safely may not be through the umbilicus...

We love belly buttons!
Fitting the square peg into the round hole

http://www.teendirect.biz/how-to-avoid-being-a-square-peg-in-a-round-hole/

Peritoneal access

- Laparoscopic entry is responsible for:
  - The majority of major vessel injuries
  - Approximately half of bowel injuries
  - Overall incidence of major injuries at time of entry is 1.1/1000

Veress needle

- Most common primary entry approach used by gynecologists worldwide
- Responsible for 1/3 to 1/2 of major intra-abdominal vascular and intestinal injuries
- Complications dramatically increase with each attempt at peritoneal access

<table>
<thead>
<tr>
<th>Veress needle insertion attempts</th>
<th>Complication rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 attempt</td>
<td>0.0-16.3%</td>
</tr>
<tr>
<td>2 attempts</td>
<td>16.31-37.5%</td>
</tr>
<tr>
<td>3 attempts</td>
<td>44.4-64%</td>
</tr>
<tr>
<td>4 attempts</td>
<td>84.6-100%</td>
</tr>
</tbody>
</table>

Incidence of umbilical adhesions

- Rate of umbilical adhesions
  - Previous laparoscopic surgery: 0% to 15%
  - Previous laparotomy with horizontal suprapubic incision: 20% to 28%
  - Previous laparotomy with longitudinal incision: 50% to 60%

When to consider an alternate abdominal entry site

- Multiple attempts to enter with the Veress at the umbilicus
- Midline vertical incisions
- Multiple prior low transverse incisions
- Prior herniorrhaphy, with or without mesh
- Prior abdominoplasty
- Large pelvic pathology
- You’re really not sure

My preferred non-umbilical entry site: Palmer’s point
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

I need to see!
Trocar location and choice of laparoscope

When the standard technique is not enough...

Fitting the square peg into the round hole

http://www.teendirect.biz/how-to-avoid-being-a-square-peg-in-a-round-hole

Standard gynecology trocar location

Standard gynecology trocar location
Standard gynecology trocar location

• video with large pathology at umbilical port

Trocar location for large pathologies:
The minimal amount of required change

Trocar location for various pathologies:
My preferred trocar mapping

Trocar location for various pathologies:
My preferred trocar mapping:

Tips for trocar location

• At least one camera port should be above the most cephalad portion of your 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
Choice of laparoscope

- Diameter
  - 5 mm or 10 mm
- Optical angle
  - Zero degree, thirty degree and forty-five degree

You can only see what is directly in front of you.

Choice of laparoscope

- Video zero vs thirty degree scope

Dealing with the bladder

- Use of the posterior approach for securing the uterine vessels
- Dissection aid for difficult bladder dissection
- Cystosufflation
- Diagnostic tool for post-operative bladder and ureteral injuries
  - Poor Man’s Cystoscopy

Bladder and anterior abdominal wall adhesions

- Cesarean section rate in the US is 32% as of 2014
- Incidence of adhesions following cesarean deliveries varies widely
  - 24-75%
  - Indication for cesarean
  - Type of hysterotomy
  - Suture material
  - Closure of peritoneum
- Higher incidence of cystotomy at the time of hysterectomy
  - OR 8.9 for patients with 2 or more cesarean deliveries
  - OR 18 for patients with 3 or more cesarean deliveries
The posterior approach to the uterine arteries

- Posterior broad ligament is dissected towards the coalescence of the uterosacral ligaments
- The avascular space anterior to the uterine vessels is isolated (below the vesicouterine scar)
- Confirm the colpotomy cup anterior and posterior to the uterine vessels
- Dessecate the uterine vessels, devascularizing the uterus

Posterior approach to the uterine vessels

- Video here

Who needs milk when you have carbon dioxide?

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” (Abb. 6)  
- Took 13 minutes longer  
- Diagnosed bladder and ureteral injuries  
- Will not diagnose fistulas

References

1. www.google.com  
10. Poole, KR. Cystosufflation to Prevent Bladder Injury. JMG. 2009; Mar-Apr;16(2):195.7.  

Poor Man’s Cystoscopy

- Video here

Cystoscopy tips

- Ureteral efflux can usually be seen with sterile water alone  
- Many urine staining agents exist and can be used  
- Level the patient  
- Prevents the kidneys from working against gravity  
- Evacuate pneumoperitoneum  
- Less pressure on the ureters  
- Consider using 10 mg of intravenous furosemide  
- 6 minutes have passed despite the use of ALL “tips” and NO efflux  
- Consider catheterization of the ureter  
- Consider urology consult

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  
  - Utilisation of the posterior approach to devascularize the uterus prior to proceeding with adhesiolysis  
  - Utilisation of two tools to prevent and diagnose bladder injury
Retroperitoneal Anatomy Made Ridiculously Simple

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

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

• 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

• 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

Disclosures

Speakers Bureau: Medtronic
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 adehesiolyis
      • Control the uterine blood supply without injuring the bowel or bladder
      • Devascularizing the uterus prior to adhesiolyis will minimize bleeding/improve visualization-decreasing the risk of bowel/bladder injury

Pelvic Sidewall

• 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

Pelvic Sidewall

• 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)

Pelvic Sidewall

• 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
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

Pelvic Sidewall

• 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

Pelvic Sidewall

• 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 (ie. 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

Evaluation Question

- What is the common border between the pararectal and paravesical spaces?
  A. Ureter
  B. Internal iliac/hypogastric artery
  C. Uterine artery
  D. Rectum
  E. Bladder

Thank You
Case Closed! Laparoscopic Suturing and Cuff Closure

Cara R. King, DO, MS
Assistant Professor, University of Wisconsin-Madison
Department of Obstetrics and Gynecology
Minimally Invasive Gynecologic Surgery

Disclosures
• I have no financial relationships to disclose.

Objectives
• Use the learning process to better understand various port placements used in laparoscopic suturing
• Execute laparoscopic suturing with incorporation of 5 simple steps
• Apply these techniques for efficient vaginal cuff closure

Port placement
• Ipsilateral
• Contralateral
• Suprapubic (low midline)

Port placement
• Ipsilateral
• Contralateral
• Suprapubic (low midline)

Triangulation

Ipsilateral
• Ergonomics
• Extrapelvic pathology
• Assistant
Contralateral

- No assistant
- Poor ergonomics?

Suprapubic (Low Midline)

- Allows access to bilateral pathology
- Assistant

Suprapubic (Low Midline)

- Assistant
- Surgeon

Suprapubic (Low Midline)

- Assistant
- Surgeon

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

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

Recover Needle

1. Release tissue from needle grasper
2. Grasp distal end of needle with needle grasper
3. Release needle from needle driver
4. Stabilize tissue with needle driver
5. Rotate wrist to follow curve of needle
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

Vaginal Cuff Closure

- Modified Richardson stitches at the apices
- Close the remaining vaginal cuff with a running suture or figure of eight

Modified Richardson Stitch

- 1. Anterior to pedicle
- 2. Posterior to pedicle
- 3. Incorporate uterosacral ligament

Modified Richardson Stitch Video

Vaginal Cuff Closure Video
In Summary

• Port placement should be thoughtful with optimization of triangulation
• Laparoscopic suturing can be mastered utilizing 5 key steps
• Laparoscopic vaginal cuff closure is optimized with application of these 5 key steps and utilization of angle stitches

References

• Hudgens, Joseph. Port placement, needle loading, and tissue re-approximation. 41st Global Congress, AAGL, 2012.

Thank you.

Questions?
That’s So Retro!!!
Using Retroperitoneal Anatomy to Your Advantage to Tackle the Large Uterus or Complex Pelvis

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

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

GENERAL TECHNIQUES FOR THE DIFFICULT HYSTERECTOMY

Fibroid Uteri
• Lupron (GnRH Agonist)
  — Even a small reduction in size has benefits
    • Improved manipulation of the uterus
    • Improved visualization of the pelvic sidewall and uterine blood supply
      — Especially if the fibroid(s) are in the lower uterine segment
    • Decreased morcellation times

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
Consultant: Medtronic
Pelosi Manipulator

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)

Angled Scopes???

- KISS!!!

Difficult Hysterectomies

- Surgical approach
  - 90% of the case is securing the blood supply
    - 4 Vessels need to be secured
      - 2 upper pedicles (utero-ovarian or IP's)
      - 2 lower pedicles (uterine)
    - If the four vessels cannot be secured within 1.5-2 hrs convert to laparotomy
  - Secure the blood supply first and then perform:
    - Removal of the fibroids prior to hysterectomy
    - Adhesiolysis for scarred bladders or bowel adhesions in the posterior cul-de-sac
    - Ureterolysis
    - “Do the easy part first and then the hard parts become easy!”
**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

**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

**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 inadvertent 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

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

Barber, et al. Obstet Gynecol; 2011
Gregory, et al. Semin Perinatol; 2010

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

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

Uterus
Bladder
Cross-Section of Uterus

Bladder

Uterus

Cervix

Thank You

Questions?

Evaluation Question

What two spaces should be developed to identify the uterine artery from its origin?
A. Presacral and retrorectal spaces
B. Pararectal and paravesicle spaces
C. Obturator and rectovaginal spaces
D. Pararectal and retrorectal spaces
E. Paravesicle and obturator spaces
The Minimally Invasive Hysterectomy from the Eyes of a Urogynecologist

Bernard Taylor, MD
Department of Obstetrics and Gynecology
Division of Female Pelvic Medicine and Reconstructive Surgery

Disclosures and COI

Speakers Bureau: Coloplast

Learning Objectives

• Identify patients at risk for development of prolapse after hysterectomy
• Describe prophylactic apical suspension procedures
• Describe various techniques to avoid and identify genitourinary injury at the time of MIS hysterectomy

Indication for MIS Hysterectomy

The Urogynecology Hysterectomy
Forecasting the Prevalence of Pelvic Floor

- Pelvic Organ Prolapse diagnosis estimated to increase by 60%*
- Approximately 11-20% of women will undergo surgery for prolapse in their lifetime
- Nearly 30% of women who undergo prolapse surgery have repeat operations

Wu 2009*
Olsen 1997 and Wu 2013**

Pathophysiology

- Not well understood
- Genetic predisposition
- Aberrant connective tissue metabolism
- Pregnancy and hormonal effects


Factors Contributing to Pelvic Support Defects

- Childbirth
- Connective tissue
- Pelvic neuropathies
- Obesity
- Congenital factors
- Environmental
- Aging
- Hysterectomy

Most often the etiology is multifactorial.

Clinical Presentation

- Visible prolapse
- Vaginal pressure
- Incontinence or voiding difficulty
- Discomfort with intercourse
- Vaginal laxity
- Difficulty with stool evacuation

When Do Symptoms Occur
Early Recognition of Asymptomatic Patient

Apical Vaginal Support

Prophylactic Suspension Procedures
- Laparoscopic/Abdominal/Robotic
  - Uterosacral suspension
- Vaginal
  - McCall’s
  - Uterosacral suspension

The Hysterectomy of Choice?
- Abdominal
- Robotic
- Laparoscopic
- Laparoscopic Supracervical
- Vaginal

Surgeon and Disease Dependent

Hysterectomy Does Not Cause Prolapse or Incontinence
Laparoscopic Supracervical Hysterectomy

- No increased risk of prolapse
- Preservation of the paracervical support Does Not prevent prolapse
- No benefit regarding bladder function
- All women must be informed regarding risk of bleeding
- Need for cervical surveillance

Cochrane Report 2006

Prolapse of Cervical Stump

- Barnett et al.
  - Cervical stump prolapse complicating LSH in nulliparous women
  - 2007 International Urogynecol J Pelvic Floor Dysfn
  - Obese, no prolapse prior to surgery

- Hilger et al.
  - Removal of the retained cervical stump
  - 2005 Am J Obstet Gynecol
  - 335 pts. retrospectively studied
  - ¾ pts for prolapse

Trachelectomy

- UpToDate
  - Kho & Magrina
  - Series of 70 supracervical Hys
  - 24%, cyclical bleeding, pelvic pain, dyspareunia
  - Indications
    - Prolapse 52%
    - Pelvic mass 25%
    - Bleeding
    - Pelvic pain
    - Non-cervical cancer
  - Surgical approach

Prophylactic Apical Suspension Procedures

- Vaginal
  - Uterosacral Ligament Suspension
  - McCall Culdoplasty
  - Sacrospinous Ligament Suspension

- Abdominal
  - Uterosacral Ligament Suspension

Laparoscopic Uterosacral Suspension
Vaginal Uterosacral Suspension

- video

McCalls Culdoplasty Suspension

- video

A randomized trial of Prophylactic Uterosacral Ligament Suspension at the time of hysterectomy for Prevention of Vaginal Vault Prolapse (PULS)

M Alperin. Contemp Clin Trial. 2013 Jul; 35(2)

The majority of urinary tract injuries occurring in gynecologic surgeries for benign disease are not recognized unless specific evaluation of the lower urinary tract occurs

Intraoperative Recognition of a Ureteral Injury

- Cystoscopy can be used to help in the diagnosis
- Cost effective with the injury rate occurs at least 1.5% of the time (Visco et al, OGYN '01)
- Occult injuries can be missed and routine cystoscopy has been shown to increase recognition

Abdominal/Laparoscopic US ligament Suspension

Uterosacral ligament → Ureter
Helical suture around proximal US lig
US lig. → Posterior paracervical ring bilaterally
Anatomic Considerations

Apical Compartment

Relationship of the Ureter to the Uterosacral Ligament

Uterosacral "Ligament"

Cervix

Rectum

Ureteric course diverges from the ligament as it courses cephalad

Prophylactic Ureteral Catheterization in Gynecologic Surgery: a 12 Year Randomized Trial in a Community Hospital

- Study to determine the efficacy of preoperative ureteral stent to prevent ureteral injury
- All major gynecologic surgery January 1996 – December 2007 randomized to stent or no stent
- Bilateral stents placed in 1,583 patients
- A ureteral injury occurred in 19/1,583 stented patients and 17/1,583 no stent patients (p=0.774)
- Conclusion: PROPHYLACTIC URETERAL STENTS DO NOT PREVENT URETERAL INJURIES.


Techniques to Avoid Injury to Ureter

- Avoid excessive handling of the ureter itself - grasp the adventia
- Attempted to leave the ureter attached to the peritoneum - less devascularization
- Open retroperitoneal spaces to trace the course of the ureter
- Trace the external iliac vessels to the pelvic brim to find the ureter crossing over the common iliac vessels

Incidence and risk factors of Bladder Injuries during Laparoscopic Hysterectomy

- Total of 1503 TLH analyzed over 14 years
- Rate of bladder injury was 1% and decreased to 0.4% after 100 cases performed
- Cesarean section and prior laparotomy associated with increased risk of bladder injury


Intraoperative Recognition of a Bladder Injury

- A visible laceration
- Extravasation of urine
- Appearance of air Foley catheter bag
- Sudden increase in bleeding from the wound
- Intravesical instillation of methylene blue or indigo carmine through the Foley catheter
Summary

- Hysterectomy type does not predispose to prolapse
- Recognition of early prolapse may provide opportunity for prevention
- Consider prophylactic uterosacral L. suspension/reattachment or culdoplasty at time of hysterectomy to prevent future prolapse
- Cystoscopy must be performed in any patient undergoing a suspension procedure
To Err Is Human: Complication Management and Avoidance

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Board, World Endometriosis Society (WES)
Past President, Australian Gynaecological Endoscopy & Surgery Society (AGES)

Disclosure
I have no financial relationships to disclose.

Presentation Objective

• To err is human
• What is the risk of malpractice claim?
• Classification of complications
• Incidence of complications
• Avoidance
• Management
• How to minimise the risk of malpractice suit

To err is human
........................................... to forgive divine

To Err is Human: Building a safer health system is a report issued in November 1999 by the U.S. Institute of Medicine.

• “groundbreaking” for suggesting that 2-4% of all deaths in the United States are caused by medical errors.
• Errors were not rare or isolated, and only by broad planning could they be diminished.
• Most errors are systemic in the health care industry, and cannot be resolved at the level of individual health care providers.

https://en.wikipedia.org/wiki/To_Err_is_Human

What is the threat of litigation or malpractice claim?
• the risk of a claim
• the probability of a claim leading to a payment
• the size of payment
Malpractice Risk According to Physician Speciality

Dr. Noorchashm:

Informed consent

• The possible or likely nature of the illness or disease
• The proposed approach to investigation, diagnosis and treatment:
  – what the proposed approach entails
  – the expected benefits
  – common side effects and material risks of any intervention
  – whether the intervention is conventional or experimental
    – who will undertake the intervention
• Alternative options for investigation, diagnosis and treatment;
• The degree of uncertainty of any diagnosis arrived at
• The degree of uncertainty about the therapeutic outcome
• The likely consequences of not choosing the proposed diagnostic procedure or treatment, or of not having any procedure or treatment at all
• Any significant long term physical, emotional, mental, social, sexual, or other outcomes associated with a proposed intervention
• The time involved
• The costs involved, including out of pocket costs.

Intestinal injury

Incidence:
- 0.06 to 0.3% for diagnostic laparoscopy
- 0.3–0.5% in operative laparoscopy

Significance:
While relatively uncommon, intestinal injuries can result in serious complications including death with reported mortality rate from laparoscopy-induced bowel injury between 3 to 6%.


Measures to detect and allow intra-operative repair of gastro-intestinal injuries

1. Routine inspection of bowels after entry
2. Use alternative entry site and consider direct visual entry in patients with suspected midline intra-abdominal adhesions,
3. Useatraumatic forceps when manipulating bowels
4. Observe bowels during insertion, removal and reinsertion of instruments
5. Check integrity of laparoscopic instrument insulation to avoid insulation failure
6. Limit the extent of adhesiolysis to the 'essential' only
7. Use sharp scissors for adhesiolysis
8. Take care and limit the use of thermal energy when working close to bowel wall
9. Rectal leakage test with to check for leak or thinning
10. Systematic closure of all trocar sites ≥ 10 mm


Delayed clinical presentation of intestinal injuries

- Variable and subtle symptoms:
  - mild abdominal distention,
  - mild pain or guarding at the trocar site
  - low-grade fever
  - diarrhea with normal bowel sounds
  - mild hypoaia

- Respiratory distress may be mistaken for:
  - chest infection
  - pulmonary embolism

- Classical symptoms such as:
  - acute abdominal pain,
  - vomiting
  - Tachycardia
  - Hypovola
  - Hypertension
  - Abdominal rigidity and fever

- Once peritonitis becomes generalised, patient's condition may deteriorate quickly
  - sub-diaphragmatic abscess
  - Septic shock
  - Multi-organ failure
  - Death

Urinary tract injury

- Incidence
  - Urethral: 0.05% to 8.3% of all laparoscopies
  - Bladder: 0.02%–8.3%
  - Ureteric: 0.5%–3%

- While injuries to the bladder are easily recognised, injuries to the ureters are frequently missed during surgery.
- Delayed diagnosis of urinary tract injury is associated with serious morbidity such as fistula formation, peritonitis, loss of renal function and is a frequent cause of medicolegal litigation.

The value of routine cystoscopy and prophylactic placement of ureteral stents in reducing risk of urinary tract injury?

- Routine cystoscopy clearly increases the intraprocedural detection rate of urinary tract injuries, this systematic review shows that it also appears to have a significant effect on the postoperative injury detection rate.
- Routine postoperative imaging is advocated in the absence of routine cystoscopy and the presence of certain high-risk factors.
- Routine use before major gynaecological surgery can expedite intra-operative identification of the ureters and may reduce accidental ureteral injury.
- The use of bilateral prophylactic ureteral catheterisation in major gynaecological surgery led to improved detection of ureteral injuries, minimising complications.
- The use of bilateral prophylactic ureteral catheterisation at laparoscopy can reduce the risk of postoperative ureteral injury.
- The use of prophylactic ureteral catheterisation at laparoscopy is recommended for all procedures, not just those with a high risk of injury.

Management of patient with suspected GIT or GUT injuries in the postoperative period

- Prompt admission for assessment, intravenous hydration, parental antibiotics and insertion of a nasogastric tube.
- Imaging studies and blood tests should be used to guide clinical decision making as they are not always conclusive.
- Abdominal radiographs, ultrasound examination, computed tomography (CT) and intravenous pyelography may reveal an under the diaphragm, distended bowel loops with multiple fluid levels, or localised fluid collections.
- Early involvement of other specialists (urologist, surgeon, radiologist, intensive care specialist, anaesthesiologist, microbiologist and histopathologist) is advised.
- A low threshold for an exploratory laparotomy or laparoscopy if the patient’s condition is unclear.
- A second-look operation should include a thorough peritoneal lavage and close inspection of the bowel to identify the site of injury.
- The damaged segment of bowel must be assessed with closure of the defect with or without diversion.
- Small-bowel injury may require an ileostomy.
- Large-bowel injuries may require a Hartmann’s procedure.

Common reactions to an allegation of medical negligence

- Betrayal
- Anger
- Anxiety
- Overreaction
- Irritation
- Frustration

To err is human ... but how to minimise the risk of malpractice suit

1. Document, document, document
2. Know the Applicable “Standard of Care”
3. Judgment calls will never get you in trouble
4. Don’t sweat the small Cases
5. Bedside Manners Matter
6. Insurance Coverage

https://www.acs.org/iamic/articles/anatomy-malpractice-lawsuit/
References


Evaluation question

The best way to minimise the risk of a malpractice suit is:
1. take out the most comprehensive insurance cover
2. transfer all your assets to your spouse
3. record the bare essential information
4. Keep the disclosure to a minimum
5. when in doubt, write it down
Ureter: Friend, not Foe
Karen C. Wang, MD
Assistant Professor

Objectives
- Employ your knowledge of the anatomy of the pelvis to prevent inadvertent injury
- Formulate a systematic approach to the retroperitoneal dissection of the ureter in complex laparoscopic procedures
- Apply these surgical techniques to your practice

Statistics
- Estimate 52-82% of all iatrogenic urinary tract injuries occur during gynecologic surgery
- Incidence estimated 0.2-15/1000 cases
- High volume surgeons (> 30/yr) had a decrease in incidence of bladder and ureteral injuries during hysterectomy

Anatomy Review
- Ureteral injuries more common with TLH compared to TAH and TVH
- 90% of injuries occur at lower 1/3 of ureter
- Most common location of ureteral injury:
  - Ligation of IP ligament
  - Ligation of uterine vessels

Disclosures
- I have no financial relationships to disclose

References
1 Findley AD et al. Curr Opin Obstet Gynecol 2006
2 AAGL Practice Report 2012
Anatomy Review

Identification of the ureter during hysterectomy

The ureter is located on the posterior leaf of the broad ligament and courses under the ureteric artery. Prior to any surgical manipulation, it usually lies on the lateral to the common iliac artery. The ureter must be identified before clamping and cutting the ureteric artery to avoid injury.

Pelvic Sidewall

- Familiarize yourself with retroperitoneal space
- Ureter
  - Posterior leaf of broad ligament
- Uterine artery
  - Crosses over the ureter

Pelvic Sidewall

- Ureterolysis
- Control uterine arteries at origin

Tackling the Retroperitoneum

- Three approaches to retroperitoneal exploration of pelvic sidewall
  - Posterior
  - Lateral
  - Anterior

Tackling the Retroperitoneum: Posterior Approach

- Incise peritoneum between IP ligament and ureter
- Extend incision from pelvic brim parallel to ureter
- Develop pararectal space
- Identify the paravesicle space
Tackling the Retroperitoneum:
Lateral Approach
- ***GYN Favorite***
- Incise peritoneum lateral to IP ligament
- Develop pararectal space
- Identify the paravesicle space

Tackling the Retroperitoneum:
Anterior Approach
- Uses
  - Obliterated cul de sac
  - Large bulky uterus
  - If unable to utilize the other two approaches
- Identify medial umbilical ligament
  - Follow retrograde towards uterine artery

To Stent or Not Stent?
- Lack high quality data to support use as a means to reduce injury
- Chou et al. 2009
  - RCT 3141 women
  - No difference in incidence of ureteral injury 1.2 bilateral stent vs 1.1% no stent, P = 0.774

Ureteral Stents
- Controversial
- Helpful in cases of significant retroperitoneal fibrosis (endometriosis) or obese patients
- Need privileges

Visualizing the course of the ureter
- Intraurethral injection of indocyanine green (FDA approved)
- Visualize under near-infrared light
- To date, unproven to reducing errors during surgery

Intraoperative Cystoscopy
- Most lower urinary tract injuries are detected by intraoperative cystoscopy.
- 80-90% sensitivity for ureteral trauma
- May miss injuries related to energy based tools (ultrasound and radiofrequency)
- AAGL Practice Committee recommends that surgeons and institutions consider routine cystoscopy at the time of laparoscopic hysterectomy

Chou et al. Int Urogynecol J Pelvic Floor Dysfunc 2009
Chou et al. Int Urogynecol J Pelvic Floor Dysfunc 2009
AAGL Practice Report 2012

Gynecology and Obstetrics
Visualization of ureteral efflux

- Discontinued in 2014

- Alternative:
  - IV methylene blue < 7 mg/kg
  - IV Sodium fluorescein 0.25-1 ml of 10% preparation
  - Oral phenazopyridine 100-200 mg PO
  - Use sterile water with or without dextrose

Findley et al. Curr Opin Obstet and Gynecol 2016
Doyle et al. Obstet Gynecol 2015

References

- AAGL Practice Report Practice Guidelines for Intraoperative Cystoscopy In Laparoscopic Hysterectomy

Thank you
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

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.

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 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.