Vaginal Cuff Dehiscence:
Diagnosis, Management and Prevention

FACULTY
Ted Teh Min Lee, MD & Rosanne Kho, MD

MODERATOR
Philip G. Brooks, MD

AAGL acknowledges that it has received support in part by educational grants and equipment (in-kind) from the following companies:
Professional Education Information

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

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

The AAGL designates this live activity for a maximum of 1.0 AMA PRA Category 1 Credit(s). Physicians should claim only the credit commensurate with the extent of their participation in the activity.

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

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

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

Vaginal Cuff Dehiscence: Diagnosis, Management and Prevention
R.M. Kho, T. Lee ............................................................................................................................... 4

Cultural and Linguistics Competency .......................................................................................... 13
Surgical Tutorial 5:  
Vaginal Cuff Dehiscence: Diagnosis, Management and Prevention

Faculty: Ted Teh Min Lee and Rosanne Kho  
Moderator: Philip G. Brooks

Course Description

Vaginal cuff dehiscence is increasingly encountered as a complication after laparoscopic and robotic hysterectomies. This surgical tutorial critically reviews the current literature given the rising number of publications on the topic. The epidemiology, clinical presentation, prevention and management of vaginal cuff dehiscence will be discussed in detail through interactive presentations from experts in the field. Emphasis will be placed on reviewing video clips of various methods of laparoscopic and robotic colpotomies and vaginal cuff closures as well as discussing tips and tricks on how to avoid and manage this dreaded complication.

Learning Objectives

At the conclusion of this course, the participant will be able to: 1) demonstrate the surgical steps and principles during colpotomy and suturing of the vaginal cuff in order to prevent a dehiscence; 2) diagnose vaginal cuff dehiscence in patients after laparoscopic and robotic hysterectomy; and 3) articulate the steps critical in repairing a vaginal cuff dehiscence in order to prevent a recurrence.
PLANNER DISCLOSURE
The following members of AAGL have been involved in the educational planning of this workshop and have no conflict of interest to disclose (in alphabetical order by last name).
Art Arellano, Professional Education Manager, AAGL*
Viviane F. Connor
Frank D. Loffer, Executive Vice President/Medical Director, AAGL*
Linda Michels, Executive Director, AAGL*
Jonathan Solnik
Other: Lecturer - Olympus, Lecturer - Karl Storz Endoscopy-America

SCIENTIFIC PROGRAM COMMITTEE
Arnold P. Advincula
Consultant: CooperSurgical, Ethicon Women’s Health & Urology, Intuitve Surgical
Other: Royalties - CooperSurgical
Linda Bradley
Grants/Research Support: Elsevier
Consultant: Bayer Healthcare Corp., Conceptus Incorporated, Ferring Pharmaceuticals
Speaker's Bureau: Bayer Healthcare Corp., Conceptus Incorporated, Ferring Pharm
Keith Isaacson
Consultant: Karl Storz Endoscopy
Rosanne M. Kho
Other: Honorarium - Ethicon Endo-Surgery
C.Y. Liu*
Javier Magrina*
Ceana H. Nezhat
Consultant: Intuitve Surgical, Lumenis, Karl Storz Endoscopy-America
Speaker’s Bureau: Conceptus Incorporated, Ethicon Women’s Health & Urology
William H. Parker
Grants/Research Support: Ethicon Women's Health & Urology
Consultant: Ethicon Women’s Health & Urology
Craig J. Sobolewski
Consultant: Covidien, CareFusion, TransEnterix
Stock Shareholder: TransEnterix
Speaker's Bureau: Covidien, Abbott Laboratories
Other: Proctor - Intuitve Surgical

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).
Ted Lee
Grants/Research Support: Ethicon Endo-Surgery
Consultant: Ethicon Endo-Surgery, Gyrus ACMI (Olympus)
Rosanne M. Kho
Other: Honorarium - Ethicon Endo-Surgery
Philip G. Brooks
Consultant: Boston Scientific Corp. Inc.
Asterisk (*) denotes no financial relationships to disclose.
Introduction: case

- 34 yo
- 7/2012 - Rob Hyst for menorrhagia, dysmenorrhea elsewhere
- 6 wk post-op check normal
- 1 week later
- Presented to ER with profuse vaginal bleeding after coitus

disclosure

Ted Lee, M.D.
- Grants/Research Support: Ethicon Endo-Surgery
- Consultant: Ethicon Endo-Surgery, Gyrus ACMI (Olympus)
Rosanne M. Kho, M.D.
- Other: Honorarium - Ethicon Endo-Surgery

Case

Dear Dr. Kho,

I am 33 years old and had a complete hysterectomy-oophorectomy (DaVinci) in August due to my BRCA2 status. On December 30th, I had emergency surgery in the ER due to my small intestine protruding through my vagina. I learned I had a vaginal dehiscence from my prior surgery brought on by sexual intercourse at 21 weeks post op. I'm interested in receiving a second opinion as my case was the first my doctors (both the gynecological oncologist who performed the hysterectomy and the obgyn who repaired the dehiscence) have seen. Given your extensive expertise in this specific condition, I was wondering if you were interested in my case and accepting new patients. Thank you in advance for your time.

I look forward to hearing from you. (Jan 24, 2011)
Hello Dr. Kho,

I am a 40 year old married woman, diagnosed with a Low Malignant Potential Ovary Tumor in June. I had a Robotic Hysterectomy in August. In November my vaginal cuff tore open and I had it repaired. I had to undergo another surgery this past Wednesday for scar tissue removal and as soon as I was prep for surgery the vaginal cuff tore open again. My body has been through a lot physically and mentally. I am trying to find someone of experience and knowledge with this situation before this may happen to me again. I have no guarantees that my cuff will not tear open again they have told me.

I am desperate! (Jan 28, 2011)

The Scope of the Problem

The rate of cuff dehiscence ranges from 0-7.5% based on various reports.

With incidence of 4% based on studies by Kho and Siedhoff, approximately 3000 cuff dehiscence occur annually in the US due to laparoscopic hysterectomy.


Definition

- Full-thickness separation of the anterior from the posterior vaginal cuff

Results 2006-2009 Summary

<table>
<thead>
<tr>
<th>Year</th>
<th>TAH</th>
<th>TVH</th>
<th>LAVH</th>
<th>TLH</th>
<th>Total Hysterectomies</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2007</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2008</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2009</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Objectives:

demonstrate the surgical steps and principles during colpotomy and suturing of the vaginal cuff in order to prevent a dehiscence
diagnose vaginal cuff dehiscence in patients after laparoscopic and robotic hysterectomy
articulate the steps critical in repairing a vaginal cuff dehiscence in order to prevent a recurrence.
### Results


<table>
<thead>
<tr>
<th>Mode of Hysterectomy</th>
<th>Dehiscences</th>
<th>Total # of Cases</th>
<th>Incidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>TAH</td>
<td>11</td>
<td>6,708</td>
<td>0.16%</td>
</tr>
<tr>
<td>TVH</td>
<td>1</td>
<td>2,259</td>
<td>0.04%</td>
</tr>
<tr>
<td>LAVH</td>
<td>2</td>
<td>642</td>
<td>0.31%</td>
</tr>
<tr>
<td>TLH</td>
<td>6</td>
<td>854</td>
<td>0.70%</td>
</tr>
<tr>
<td>&quot;Total Hysterectomies&quot;</td>
<td>20</td>
<td>10,463</td>
<td>0.19%</td>
</tr>
</tbody>
</table>

### Risk Ratio of Cuff Dehiscence Comparing TLH to All Other Modes of Hysterectomy

<table>
<thead>
<tr>
<th>Modes of Hysterectomy</th>
<th>Risk Ratio (2006-2009)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TAH</td>
<td>2.0 (0.7-5.6)</td>
</tr>
<tr>
<td>TVH</td>
<td>6.9 (0.8-58.6)</td>
</tr>
<tr>
<td>LAVH</td>
<td>1.6 (0.3-8.3)</td>
</tr>
</tbody>
</table>

### Mayo AZ experience

#### Incidence and Characteristics of Patients With Vaginal Cuff Dehiscence After Robotic Procedures

*Rosanne M. Rho, MD, Mohamed N. Sidd, MD, Jeffrey L. Corvilia, MD, Paul M. Magid, MD, Mary Ellen Weidman, MD, and Javier F. Mayora, MD*

**OBJECTIVE:** To estimate the incidence and characteristics of a robotic technique has been used increasingly in Obstet Gynecol 2009:114 (1): 231

#### Mayo AZ experience

- **Median time to presentation:** 43 d or 6 wks. (Range: 11 - 127 d or 2-18 wks)
- **Trigger event:**
  - Coitus: 10
  - Vaginal dilator: 1
  - None: 10
  - No post-op pelvic abscess/cuff cellulitis
- **Symptoms:**
  - Vaginal bleeding: 11
  - Watery discharge: 8
  - Asymptomatic: 2
  - Bowel evisceration: 6 (28%)
  - Involving the midportion of vaginal cuff
    - Cuff appearance
      - Clean
      - Persistent granulation tissue
**Laparoscopic Hysterectomy Cuff Dehiscence: Possible Risk Factors**

- Suture material
- BMI
- Age

---

**Braided Suture vs Delayed Absorbable Monofilament**

Dehiscence rate of **2.76%** for TLH between 2000-2005 when Polysorb is the only suture used.

Dehiscence rate of **0.75%** for TLH between 2006-2009 when delayed absorbable monofilament is the predominant suture used.

Nur and Lee, et al, Vaginal cuff dehiscence after different modes of hysterectomy: a follow-up study, Obstet Gyn, accepted publication pending

---

**Braided Suture vs Barbed Absorbable Monofilament**

Dehiscence rate of **4.2%** for TLH when the cuff is closed with braided suture. (6 polysorb +4 vicryl) 10/238

Dehiscence rate of **0.0%** for TLH when cuff is closed with Quill suture. 0/149


---

**Lower BMI as a Risk Factor for Cuff Dehiscence**


Median BMI of Robotic hyst dehiscence patients: **23 (15/21 </=25)** in the Mayo study

Hur and Lee, et al, Vaginal cuff dehiscence after different modes of hysterectomy: a follow-up study, Obstet Gyn, accepted publication pending


---

**Characteristics**

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>n</th>
<th>Unadjusted means</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMI (dehiscence/no dehiscence)</td>
<td>387</td>
<td>26.8 (8.6)/31.4 (8.8)</td>
<td>0.10</td>
</tr>
</tbody>
</table>


---

**Characteristics**

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>n</th>
<th>Unadjusted means</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (dehiscence/no dehiscence)</td>
<td>387</td>
<td>39.8 (5.0)/43.4 (6.7)</td>
<td>0.09</td>
</tr>
</tbody>
</table>

Etiology: Coagulation ???

<table>
<thead>
<tr>
<th>Old</th>
<th>New</th>
<th>Awareness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colpotomy: monopolar</td>
<td>50 watt</td>
<td>30 watt</td>
</tr>
<tr>
<td>Closure</td>
<td>Single layer</td>
<td>Double-layer (running/interrupted)</td>
</tr>
<tr>
<td>Purchase</td>
<td>Full-purchase (&gt;5mm)</td>
<td></td>
</tr>
<tr>
<td>Suture</td>
<td>Delayed-absorbable (vicryl/PDS, non-barbed/barbed)</td>
<td></td>
</tr>
<tr>
<td>Post-op: pelvic rest</td>
<td>6 weeks</td>
<td>6 weeks, vigorous post-op exam</td>
</tr>
</tbody>
</table>

Vaginal Cuff Dehiscence: Mayo-AZ

<table>
<thead>
<tr>
<th>Year</th>
<th>Total cases</th>
<th>Total VCD cases</th>
<th>Incidence %</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>61</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2005</td>
<td>71</td>
<td>1</td>
<td>1.4</td>
</tr>
<tr>
<td>2006</td>
<td>87</td>
<td>2</td>
<td>2.3</td>
</tr>
<tr>
<td>2007</td>
<td>119</td>
<td>7</td>
<td>5.9</td>
</tr>
<tr>
<td>2008</td>
<td>162</td>
<td>11</td>
<td>6.8</td>
</tr>
<tr>
<td>total</td>
<td>510</td>
<td>21</td>
<td>4.1</td>
</tr>
</tbody>
</table>

Mode of Hysterectomy

<table>
<thead>
<tr>
<th>Type of Repair</th>
<th>TAH (n=11)</th>
<th>TVH (n=2)</th>
<th>LAVH (n=2)</th>
<th>TLH (n=13)</th>
<th>All (n=28)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vaginal</td>
<td>2 (18.2%)</td>
<td>0 (0.0%)</td>
<td>1 (50.0%)</td>
<td>0 (0.0%)</td>
<td>3 (10.7%)</td>
</tr>
<tr>
<td>Laparoscopic</td>
<td>0 (0.0%)</td>
<td>0 (0.0%)</td>
<td>1 (50.0%)</td>
<td>0 (0.0%)</td>
<td>1 (3.6%)</td>
</tr>
</tbody>
</table>

Debride necrotic edge until visible bleeding is encountered.

Use delayed absorbable suture for repair.

Repair of Vaginal Cuff Dehiscences:

- Vaginal: 19
- Combined vaginal/laparoscopic: 1
- Secondary healing: 1
- No bowel resections required

No sig diff in incidence across the years. (p = 0.069)
Management of Dehiscence

Recurrence:
- 2 (Total: 3 [33, 44, 45 yo])
- 2 (67%): active smokers
- Mean time to presentation: 77 d (55 - 94 d)

Trigger event:
- Coitus: 2
- Bowel evisceration: 1

Management:
- Overinflate the Foley to 100 cc.
- Displace the bowel away from the cuff edge.
- Pull the cuff edge toward the introitus for easier repair.

Use of Foley Catheter to Facilitate Cuff Dehiscence repair

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Hysterectomy cases</th>
<th>Total VCD cases</th>
<th>Incidence %</th>
<th>Recurrence</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>61</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2005</td>
<td>71</td>
<td>1</td>
<td>1.5</td>
<td>0</td>
</tr>
<tr>
<td>2006</td>
<td>97</td>
<td>2</td>
<td>2.1</td>
<td>0</td>
</tr>
<tr>
<td>2007</td>
<td>119</td>
<td>7</td>
<td>5.9</td>
<td>3</td>
</tr>
<tr>
<td>2008</td>
<td>162</td>
<td>11</td>
<td>6.8</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>510</td>
<td>21</td>
<td>4.1</td>
<td>3</td>
</tr>
</tbody>
</table>

No sig diff in incidence across the years. (p = 0.069)

Management of Cuff Dehiscence

<table>
<thead>
<tr>
<th>Mode of Hysterectomy</th>
<th>TAH (n=11)</th>
<th>TVH (n=2)</th>
<th>LAVH (n=2)</th>
<th>TLH (n=13)</th>
<th>All (n=28)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evisceration at Presentation</td>
<td>3 (27.3)</td>
<td>0</td>
<td>0</td>
<td>7 (88.3)</td>
<td>10 (35.7)</td>
</tr>
</tbody>
</table>

Hur and Lee, et al, Vaginal cuff dehiscence after different modes of hysterectomy: a follow-up study, Obstet Gyn, accepted publication pending

Take Home Message on Evisceration

Evisceration does not equal to laparotomy or bowel resection

Early diagnosis and intervention is key in avoiding more adverse outcome.
**Key Factors on Prevention of Cuff Dehiscence**

- Minimize thermal injury during colpotomy
- Proper suturing techniques
- Counseling on delayed intercourse

**Minimizing Cuff Thermal Injury Start before Colpotomy**

Take the cardinal ligament until the tip of the vessel sealer is immediately on top or slightly lateral to the edge of cup. Less bleeding = less thermal damage from chasing bleeding.

**Keys to Minimize Thermal Injury during Colpotomy**

- Reduce energy dwell time regardless of the types of energy.
- Use pure cutting current.
- Increase power density by minimizing the contact surface area. (avoid digging into the tissue)
- Keep the electrode moving.
- Have a TARGET. Use a colpotomizer
- Allow your suturing to take care of some bleeding

**Etiology: Coagulation ???**

<table>
<thead>
<tr>
<th>OLD</th>
<th>NEW AWARENESS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colpotomy: monopolar</td>
<td>50 watt</td>
</tr>
<tr>
<td>Closure</td>
<td>Single – layer</td>
</tr>
<tr>
<td>Purchase</td>
<td>Full-purchase (5mm)</td>
</tr>
<tr>
<td>Suture</td>
<td>Delayed-absorbable (very/POD, non-barbed/barbed)</td>
</tr>
<tr>
<td>Post-op pelvic rest</td>
<td>6 weeks</td>
</tr>
</tbody>
</table>

**Thermal Damage**

- What Does Water Absorption Mean?

Green lines denote the desiccation zones.
Yellow lines outline edematous zones.
The calculated injured area (a) includes all zones.

**Videos of colpotomy: with energy and with cold knife**
Power density is the amount of energy concentrated in a spot of given size.

\[ \text{Power Density} = \frac{\text{Power (Watts)}}{\text{Spot size (cm}^2\text{)}} \]

This relationship explains why a smaller spot size has a higher power density than a large spot size.

**Beam Divergence & Power Density**

**Controlling Power Density: Distance & Power**

Videos with CO2 laser fiber for colpotomy and double layer closure of vag cuff

**Vaginal Cuff Closure**

- Use large needle like CT-1 or GS21 to ensure “good bite”
- Use monofilament delayed absorbable suture.
- Consider suturing vaginally if not comfortable with laparoscopic suturing

- Interrupted
- Figure of eight
- Continuous running
- Barbed suture
Transvaginal cuff closure is associated with a 3 and 9 fold reduction in vaginal cuff dehiscence when compared to laparoscopic and robotic cuff closure.


Hello Dr. Kho,

I am a 40 year old married woman, diagnosed with a Low Malignant Potential Ovary Tumor in June. I had a Robotic Hysterectomy in August. In November my vaginal cuff tore open and I had it repaired. I had to undergo another surgery this past Wednesday for scar tissue removal and as soon as I was prepped for surgery the vaginal cuff tore open again. My body has been through a lot physically and mentally. I am trying to find someone of experience and knowledge with this situation before this may happen to me again. I have no guarantees that my cuff will not tear open again they have told me.

I am desperate! (Jan 28, 2011)

Conclusion

Laparoscopic and robotic hysterectomy is associated with higher rate of cuff dehiscence compared to other routes of hysterectomy.

Proper steps can be taken to minimize this complication.

With early recognition and intervention, cuff dehiscence can be managed with minimal morbidity.

Counsel and reassure your patients

Surgical

Counseling

Reassure
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.