Didactic/Simulation Lab: Laparoscopic Suturing:
Practical Applications for Tissue Re-approximation,
Intra-corporeal and Extra-corporeal Knot Tying,
Barbed Suture, and Suturing Technologies

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AAGL acknowledges that it has received educational grants from the following companies:
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**Professional Education Information**

**Target Audience**
This educational activity is developed to meet the needs of surgical gynecologists in practice and in training, as well as other healthcare professionals in the field of gynecology.

**Accreditation**
AAGL is accredited by the Accreditation Council for Continuing Medical Education (ACCME) 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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SUTR-601: Didactic/Simulation Lab:
Laparoscopic Suturing: Practical Applications for Tissue Re-approximation,
Intra-corporeal and Extra-corporeal Knot Tying, Barbed Suture,
and Suturing Technologies

Joseph (Jay) L. Hudgens, Chair


This course provides an introduction to basic and advanced laparoscopic suturing techniques in a dry lab setting and is designed for participants wanting to expand their laparoscopic suturing skills. This course will present a variety of techniques for needle loading and tissue re-approximation from different port configurations in laparoscopic box trainers. Techniques and clinical applications for extra-corporeal, intra-corporeal knot tying, and running suturing techniques relevant to vaginal cuff closure, myomectomy, vaginal vault suspension, and cystotomy repair will be presented. In addition, applications of different suture materials including barbed suture will be reviewed. The participant will also have the opportunity to work with suturing devices utilized in gynecologic laparoscopy. The aim of this course is to present the material in a systematic and reproducible fashion. Faculty will provide an interactive environment to meet the needs of the individual, critical to effective learning. This course is designed for the practical application of suturing techniques and skills for immediate clinical application in his or her surgical practice.

Learning Objectives: At the conclusion of this course, the clinician will be able to: 1) Reproduce efficient techniques for laparoscopic tissue re-approximation, suture management, and running closures; 2) perform efficient intra-corporeal and extra-corporeal knot tying, identify the common mistakes that are encountered, and how to correct them; and 3) compare and distinguish potential benefits of barbed suturing technologies and devices used in laparoscopy and review the clinical applications for vaginal cuff closure, myomectomy, vaginal vault suspension, and cystotomy repair.

Course Outline

7:00 Welcome, Introductions and Course Overview J.L. Hudgens
7:05 Fundamentals of Needle Loading, Tissue Re-approximation, and Suture Management J.L. Hudgens
7:25 LAB I: Tissue Re-approximation, Suture Management, and Simulated Running Cuff Closure
   • Demonstrate efficient needle loading, tissue re-approximation, and suture management.
8:15 Techniques for Intra-Corporeal Knot Tying: Clinical Applications, Common Mistakes, and How to Correct Them F. Mohtashami
8:35  **LAB II: Intra-Corporeal Knot Tying**
- Identify the critical elements for intra-corporeal knot tying, the common mistakes that are encountered, and how to correct them.

9:25  Video Festival: Extra-Corporeal Knot Tying, Suture Selection, Barbed Suture, Suturing Technologies and Clinical Applications  
All Faculty

9:45  **LAB III: Clinical Applications of Extra-Corporeal Knot Tying, Suture Devices, and Intra-Corporeal Knot Tying Techniques**
- Identify the critical elements for extra-corporeal knot tying, the common mistakes that are encountered, and how to correct them.
- Compare and distinguish potential benefits of suturing technologies and devices used in laparoscopy.

10:45  Clinical Applications: Questions, Answers, & Course Evaluations  
All Faculty

11:00  Adjourn
SUTR-602: Didactic/Simulation Lab:
Laparoscopic Suturing: Practical Applications for Tissue Re-approximation,
Intra-corporeal and Extra-corporeal Knot Tying, Barbed Suture,
and Suturing Technologies

Fariba Mohtashami, Chair


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Course Outline

12:30   Welcome, Introductions and Course Overview        F. Mohtashami
12:35   Fundamentals of Needle Loading, Tissue Re-approximation, and Suture Management  J.L. Hudgens
12:55   LAB I: Tissue Re-approximation, Suture Management, and Simulated Running Cuff Closure
        • Demonstrate efficient needle loading, tissue re-approximation, and suture management.
1:45    Techniques for Intra-corporeal Knot Tying: Clinical Applications, Common Mistakes, and How to Correct Them  F. Mohtashami
2:10 **LAB II: Intra-Corporeal Knot Tying**
- Identify the critical elements for intra-corporeal knot tying, the common mistakes that are encountered, and how to correct them.

3:00 **Video Festival: Extra-Corporeal Knot Tying, Suture Selection, Barbed Suture, Suturing Technologies and Clinical Applications**  
All Faculty

3:20 **LAB III: Clinical Applications of Extra-Corporeal Knot Tying, Suture Devices, and Intra-Corporeal Knot Tying Techniques**
- Identify the critical elements for extra-corporeal knot tying, the common mistakes that are encountered, and how to correct them.
- Compare and distinguish potential benefits of suturing technologies and devices used in laparoscopy.

4:15 **Clinical Applications: Questions, Answers, & Course Evaluations**  
All Faculty

4:30 **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
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Other: Proctor: Intuitive Surgical
Sarah L. Cohen
Consultant: Olympus
Erica Dun*
Joseph (Jay) L. Hudgens
Contracted Research: Gynesonics
Frank D. Loffer, Medical Director, AAGL*
Suketu Mansuria
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Consultant: CONMED Corporation, Teleflex
Stock Ownership: Titan Medical
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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).
Catherine Allaire
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Liane M. Belland
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Bala Bhagavath
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Janelle Moulder Brown  
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Henk W.R. Schreuder*  
Linda-Dalal Shiber*  
Content Reviewer has no relationships.

Asterisk (*) denotes no financial relationships to disclose.
Fundamentals of Needle Loading, Tissue Re-approximation, and Suture Management

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Assistant Professor
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Jackson, MS

Disclosure

• Contracted Research: Gynesonics

Objectives

1. Present the different port placements used in laparoscopic suturing
2. Present a system for setting the needle
3. Discuss strategies for tissue re-approximation and Suture Management

System

1. Set the Needle
2. Re-approximate
3. Knot Tying

Geometry

• Anatomy
• Laparoscope
• Instruments
• Needle

Geometry = The Study of Relationships
Geometry

Parallel = Miss
Perpendicular = Hit

Port Placement 1

Port Placement 2

Ipsilateral
- Ergonomics
- Assistant
- One Sided

Contralateral
- Ideal Triangulation
- Poor Ergonomics?
- No Assistant

Suprapubic
- Gravity
- Ergonomics?
- Two Sided
System

1. Set the Needle
2. Re-approximate
3. Knot Tying

System

• Set (perpendicular)
• Parallel (tissue)
• Rotate (key)
• Reset

Tie Knot

Needle Entry

• Direct-trocar
• Back loaded
• Abdominal Wall

• 5mm......Backload
• 8mm......SH-1
• 10mm.....CT-2 & CT-1
• 12mm.....CT

Setting the Needle

A-B-C
A-C

"B" = 1/3 from Point
"C" = 1/3 from Swedge

"A" = 2cm from Swedge

Beginner
Advanced

Setting the Needle

A-B-C
A-C Method

1. Setting the Needle
2. A-B-C
3. Left Hand
4. Right Hand
**Expert Needle Loading**

**Right Hand Motion**

Novice

Expert

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

**System**

1. Set the Needle
2. Re-approximate
3. Knot Tying

**Ipsilateral Relationship**

**Mechanics Produce**
Contra-lateral Relationship

Contralateral Mechanics

Supra-pubic Relationship

Supra-pubic Relationships

Supra-pubic Relationship

Extra Corporeal Cuff Closure
Re-approximation Video 1

System
- Set (perpendicular)
- Parallel (tissue)
- Rotate (key)
- Reset

Tie Knot

Suture Management
1. Pulley
2. Walk the Line
3. Hand over Hand

Rules for Suture Management
- 1. Never let go with both hands
- 2. Grasp the suture perpendicular
- 3. Walk the Line
- 4. Use a Pulley

Drills

References
Techniques for Intra-corporeal Knot Tying: Clinical Applications, Common Mistakes, and How to Correct Them

Fariba Mohtashami, MD, FRCSC
Clinical Assistant Professor
University of British Columbia
Vancouver, Canada

Disclosure
I have no financial relationships to disclose.

Objectives
- Identify the indications for intracorporeal knot tying
- Discuss technical skills to tie intracorporeal knots
- Use the learning process to better understand the common mistakes and how to avoid them

Intracorporeal knot tying
- Is an advanced skill
- Requires great manual dexterity
- Has a steep learning curve
- Rate-limiting step in many procedures
- Must be mastered by every laparoscopic surgeon
- Anyone can learn it in the dry lab!

Indications for intracorporeal knot tying
- Any indication for laparoscopic suturing and knot tying
- Tying knot with minimal tension
  - Bladder repair
  - Bowel repair
  - Closing peritoneum
- The initial and final knot for continuous suturing
- When extracorporeal knot tying fails
  - Suture breaks off
  - Knot pusher unavailable

Steps for Intracorporeal knot tying
- Choose the trocar for needle delivery
  - 10 mm trocar: Direct entry
  - 5 mm trocar: Backload
- Cut the suture in advance
  - Interrupted: 6 inches (15 cm)
  - Figure of eight: 8 inches (20 cm)
  - Continuous running: 12 inches (30 cm)
- Place suture
- Throw square knots: 4 throws in opposite directions for Vicryl
  - Cut suture and remove needle under direct visualization
Technique for Intracorporeal knot tying

- Ease
- Rapidity of execution
- Reproducibility
- Tightness of the knot

If you can do an instrument tie, you can do intracorporeal knot tying!

Instrument tie
- Video

Intracorporeal tie
- Video

- Fixed port sites
- Long instruments
- Fulcrum effect
- Impaired tactile feedback
- Lack of 3-dimensional view

Technique for Intracorporeal knot Tying

- Leave a short tail (2-3 cm)
- Make a good loop
- Supinate left hand
- Align suture parallel to right instrument
- Wrap the suture around the needle driver
- Grasp the tip of the short tail
- Pull hands to the opposite direction
- Move left hand over the knot

Smiley Knot
- Video
Expert Knot
- Video

Vaginal Cuff
- Video

Bowel Repair
- Video

Common Mistakes
- Video
  - Cut the suture in advance

Common Mistakes
- Video
  - Align suture parallel to needle driver

Common Mistake: Bow Tie
- Video
  - Leave tail short, grasp the tip
Common Mistake: Drifting
- Video
- Stay over the short tail

Tips for Success
- Leave a short tail
- Make a good loop...
  - No loop, no knot!
- Do not drift
- Supinate left hand
- Align suture parallel to right instrument
- Work at tip of instruments
- Make small circles to wrap the suture
- Do not leave left hand behind
- Grasp the tip of short tail

References
- Charles H. Koh. Laparoscopic Suturing in the Vertical Zone. Endo Press 2008: Tuttingen, Germany

Questions?
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).