GLOBAL CONGRESS ON MIGS

NOVEMBER 14-17 • Austin, Texas

SYLLABUS

616-ENDO: Endometriosis 360°
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 2.50 AMA PRA Category 1 Credit(s)™. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

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

**Faculty:** Ken R. Sinervo, Smitha Vilasagar, Patrick Yeung

This course features a comprehensive overview of advanced concepts in endometriosis, focusing on new paradigms for diagnosis and treatment of this challenging condition. Expert practitioners will provide in-depth discussion on best timing and management of endometriosis in the setting of infertility. The session will cover the most current understanding and strategies in the treatment of thoracic and diaphragmatic endometriosis and will address tips for surgical management. Finally, experts will address the diagnosis and management of pediatric and adolescent endometriosis and best strategies for the treatment of surface endometriosis.

**Learning Objectives:** At the conclusion of this course, the participants will be able to:
1) Define the diagnosis and best surgical management for thoracic endometriosis; 2) describe the timing and relevance of excision of endometriosis in the setting of infertility; 3) discuss the diagnosis and management of endometriosis in the pediatric and adolescent setting; and 4) define best strategy for managing superficial and surface endometriosis in early stage disease.

**COURSE OUTLINE**

2:30 pm  Welcome, Introduction and Course Overview

2:35 pm  Endometriosis Management in the Pediatric/adolescent Population

3:00 pm  Surface Endometriosis, Why Can't We Just Vaporize It?

3:25 pm  Surgical Treatment of Deep Endometriosis and Fertility

3:50 pm  Thoracic Endometriosis: is it as Rare as Once Believed?

4:15 pm  Diaphragmatic Endometriosis: Surgical Mobilization of the Liver to Access Disease

4:40 pm  Questions & Answers

5:00 pm  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).

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Linda D. Bradley, MD, Medical Director, AAGL*
Erin T. Carey, MD, MSCR
Honorarium: Teleflex Medical, MedIQ
Mark W. Dassel, MD
Contracted Research: Myovant Sciences
Linda Michels, Executive Director, AAGL*
Vadim Morozov, MD
Speaker: AbbVie
Consultant: Medtronic, Lumenis
Erinn M. Myers, MD
Speakers Bureau: Laborie Medical Technologies, Teleflex Medical
Other: Unrestricted educational grant to support NC FPMRS Fellow Cadaver Lab: Boston Scientific Corp. Inc.
Amy Park, MD
Speaker: Allergan
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Francisco Carmona Herrera, MD
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Speakers Bureau: ADAMED, Gedeon Richter Pharmaceuticals
Consultant: Medtronic
Shanti I. Mohling, MD*

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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Shanti I. Mohling, MD*
Ken R. Sinervo, MD, MSc, FRCSC*
Smitha Vilasagar, MD*
Patrick Yeung, MD*

Content Reviewers have nothing to disclose.

Asterisk (*) denotes no financial relationships to disclose.

All relevant financial relationships noted have been mitigated.

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Endometriosis Management in the Pediatric/Adolescent Population

Smitha Vilasagar, MD, FACOG
Assistant Professor of Obstetrics & Gynecology
Minimally Invasive Gynecologic Surgery and Chronic Pelvic Pain
Carolinas Medical Center, Atrium Health
Charlotte, NC

Disclosure

- I have no financial relationships to disclose

Objectives

- Recognize the negative impact endometriosis has on the pediatric and adolescent population
- Review the clinical and surgical presentation of endometriosis in the pediatric and adolescent population to reduce delay in diagnosis
- Describe the differences in treatment options for this population

Endometriosis in teens

- **Prevalence up to 70%** in adolescent population with chronic pelvic pain or dysmenorrhea unresponsive to meds
- Most common cause of secondary dysmenorrhea
- Most have had symptoms since adolescence
  - 21% pain < age 15
  - 17% pain age 15-19
  - 12% pain age 20-24
  - 50% < age 24

Ballweg ML. J Pediatr Adolesc Gynecol 2003
Greene R et al. Fertil Steril 2009

Negative impacts on quality of life

- Wellbeing – social, psychological, physical, emotional, sexual
- Absenteeism – missed school/work
- Relationships
- Education/career
- Fertility
- Chronic pain
- Self image
- Significant delays in diagnosis (11.8 years in US, 6.7 in UK)

Risk factors

- Family history, first degree relatives
- Early menarche (< age 12)
- Short cycle length
- Heavy menstrual bleeding
- Caucasian/white, Asian
- Autoimmune disease association?
- Migraines, asthma
Presentation/symptoms

- Acyclic and cyclic pain common
- GI – nausea, vomiting, diarrhea
- GU – dysuria, frequency, urgency
- Co-morbidities
  - Migraines
  - Myofascial pain
  - Dyspareunia
  - Vulvodynia
  - Depression/anxiety

Diagnosis

- No diagnostic blood test/imaging
- Clinical diagnosis/evaluation important
- Imaging not routinely done
- Teens wait 3x as long to report symptoms
  - Embarrassment, isolation
  - Fear of repercussions
  - Cultural/familial differences

- Reduce the delay in diagnosis!!!

Don’t normalize pain symptoms

- Mom might say “I had this same pain. My mother had these symptoms. This is just normal in our family.”
- Empower and educate the patient
- Encourage transparency and an open dialogue
- Pain is processed differently, appreciate it is difficult to quantitate

How does presentation/diagnosis differ in adolescents?

- Noncyclic/nongynecologic pain symptoms common
- Less common: Infertility, endometriomas, deep disease
  - Endometriomas and deep disease still possible
- Be aware of possible early premenarchal presentation
- Histopathology – will it confirm diagnosis in teens all the time?
  - Is there an endometriosis precursor without glands or stroma?

Complementary/conservative management

- Behavioral therapy, coping skills
- Support groups
- Physical therapy for myofascial pain
- Acupuncture
- Chronic pain management
- Multidisciplinary team approach
- Educate/provide reasonable expectations

https://youngwomenshealth.org/endometriosis-for-parents-all-guides/
Medical management

- First line therapy: NSAIDs, combo estrogen/progestin, progestins
  - Don’t delay initiation

<table>
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<th>Drug</th>
<th>Dosage</th>
<th>Remarks</th>
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<tr>
<td>Diclofenac</td>
<td>50-150 mg initially, followed by 50-150 mg every 6 hours as needed</td>
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<tr>
<td>Naproxen</td>
<td>500 mg initially, followed by 250 mg every 8 hours as needed</td>
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<tr>
<td>Ibuprofen</td>
<td>600 mg initially, followed by 400 mg every 8 hours as needed</td>
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</tr>
</tbody>
</table>

- Estrogen/progestin combination
  - Pill, ring options
  - Continuous administration
  - Goal: Menstrual suppression
  - Caveat: If miss or take dose late, can have breakthrough bleeding
  - No great option for what to do for breakthrough bleeding
    - Continue through
    - Stop to allow for withdrawal bleed, then restart
    - Change to new pill/therapy

- Progestin only
  - Consider if contraindication to estrogen
    - Migraines with aura
    - Personal/family hx VTE
  - Goal: Menstrual suppression
  - Formulations
    - Norethindrone 0.35mg
    - Norethindrone acetate 2.5-10mg
    - Levonorgestrel IUD (can add norethindrone acetate if needed)

- GnRH agonist
  - Goal: create hypoestrogenic state
  - Add-back therapy required to counteract hypoestrogenic side effects
    - Vaginal dryness
    - Decreased bone density
  - Limit to age > 16 due to adverse effects
  - Discontinue if decrease in bone density occurs
  - Formulations
    - Nasal spray
    - Subcutaneous/intramuscular injections – 3-month dose

- GnRH antagonist
  - Not been studied in age < 18
  - FDA-approved for moderate to severe endometriosis associated pain
  - Relies on clinical diagnosis
  - Additional contraception required
  - Amenorrhea incidence varies (13.9-65%)
  - Oral formulation, once or twice daily dosing

- Surgical management
  - Minimally invasive approach
  - Excision vs ablation for adolescents??
    - Excision is the goal - concerns raised about radical excision/peritoneal stripping with possible adhesion formation in teens
  - Hysterectomy, oophorectomy NOT recommended in teens
  - Surgical goals
    - Improve quality of life
    - Validation of symptoms/condition
    - Reduce the lifetime number of surgeries
Surgical management

- Pain does not always correlate with location of disease
- Cross innervation, complex referral patterns
- Majority of teens have early-stage disease
  - Stage does not correlate to symptom severity
- Appearance of lesions
  - Superficial peritoneal most common
  - Clear/white, vesicular, red (more metabolically active)
  - Peritoneal windows/pockets

References

- Ballweg ML. Big picture of endometriosis helps provide guidance on approach to teens. Comparative historical data show endometriosis starting younger, is more severe. J Pediatr Adolesc Gynecol 2003; 16(3 Suppl):S21.

Outcomes in adolescents

- Post operative menstrual suppression recommended
  - Prevent recurrence of symptoms
  - Improve quality of life
  - Prevent disease recurrence/progression
- When pain recurs years after destruction of peritoneal disease and subsequent menstrual suppression:
  - No increased trend to disease progression
  - No increased adhesion formation

References

- Ballweg ML: Big picture of endometriosis helps provide guidance on approach to teens; comparative historical data show endometriosis starting younger, is more severe. J Pediatr Adolesc Gynecol 2003; 16(3 Suppl):S21.

References

- Ballweg ML: Big picture of endometriosis helps provide guidance on approach to teens; comparative historical data show endometriosis starting younger, is more severe. J Pediatr Adolesc Gynecol 2003; 16(3 Suppl):S21.
Surface Endometriosis, Why Can’t We Just Vaporize It?
Patrick Yeung Jr. MD
Professor
Director, Center for Endometriosis
Gynecologic Surgical Subspecialties
Saint Louis University

Disclosure

- I have no relevant financial relationships to disclose.

Objectives

- Discuss ASRM staging regarding surface endometriosis
- Discuss surgical scenarios where excision of surface endometriosis is optimal treatment:
  - widespread
  - deep retraction pockets
  - occult deep disease
- Adhesion prevention as separate from treatment of disease

ASRM staging

What stage endometriosis this?
How would you treat this?

Status post optimal excision of widespread surface endometriosis

How would you treat this?

How would you treat this?

Status post optimal excision of fallopian tube lesions

How would you treat this?
Status post optimal excision of the retraction pocket

How would you treat this?

More than meets the eye

Deep retraction pocket, pocket within a pocket

Status post optimal excision of deep retraction pocket

How would you treat this?
Deep Retraction Pockets, Endometriosis, and Quality of Life

Objective: The purpose of this study was to examine if deep retraction pockets (DRPs) in the anterior paravaginal and serosa ligaments could be a manifestation of endometriosis, and if excision of these pockets improves pain symptoms and quality of life.


How would you treat this?

Tip of the iceberg

Deep Retraction Pockets

Results: The 107 consecutive patients who presented with preoperative deep dyspareunia were included in the study, and the median postoperative follow-up was 12 months. Endometriosis was confirmed histologically in any location in 66/107 (62.2%) of the women, and 31 DRPs were excised from 25 women with DRPs in the posterior cul-de-sac or uterosacral ligaments, of which 16/31 (51.6%) had endometriosis. Of the 107 DRPs without visible surface lesions, 3/107 (2.8%) had endometriosis on histology. Pain symptoms and quality of life significantly improved after excision surgery, whether or not DRPs were present. Women who had endometriosis in their DRPs also had significant improvement in deep dyspareunia and chronic pelvic pain and quality of life. Results did not differ when patients with both anterior and posterior deep dyspareunia were removed from the analysis.

Conclusion: Patients had significantly improved pain symptoms and quality of life after excision surgery, whether or not DRPs were present. This study demonstrated that a DRP may be a manifestation of endometriosis even with a clear surface of the pocket, or that DRPs should be excised to achieve optimal excision of endometriosis.

Tip of the iceberg

Status post excision of occult nodule
What stage endometriosis is this?

How would you treat this?

Optimal excision is separate from adhesion prevention

Adhesion prevention - Amniofix

Adhesion prevention - GoreTex
Fertility After Expanded Polytetrafluoroethylene Use: A Pilot Study

Presenter: John Volz, MD
Faculty Advisor: Patrick P. Yeung Jr., MD
Co-Author: Melody S. Su (LLU MSA) and Jeffrey A. Gavard, PhD

References

Surgical Treatment of Deep Endometriosis and Fertility
Francisco Carmona, Ph.D.
Hospital Clinic/Medicine School
Barcelona (Spain)

Objectives
- To review the relationships between deep endometriosis and infertility
- To describe the relevance of excision of endometriosis in the setting of infertility

The effectiveness of surgical excision of deep nodular lesions before treatment with ART in women with endometriosis-associated infertility is not well established with regard to reproductive outcome.

REASONS TO RECOMMEND ART
- ART capacity to circumvent the anatomical distortion and the possible detrimental pelvic milieu
- Considerable risks of a demanding intervention
- Pregnancy rates after surgery worse than after ART
- Insufficient evidence to support a causal relationship between DIE and infertility
- Confounders (AMH, adenomyosis,...) are more likely to explain the association

Disclosure
- Consultant: Medtronic.
- Speakers Bureau: Medtronic; Gedeon Richter; Adamed

NO RANDOMIZED STUDIES

ESHRE guideline: management of women with endometriosis
The effectivenessness of surgical excision of deep nodular lesions before treatment with ART in women with endometriosis-associated infertility is not well established with regard to reproductive outcome.

Endometriosis and infertility: a committee opinion
The best surgical approach to deep endometriosis in women with infertility is not addressed.
NO RANDOMIZED STUDIES

More than 400 patients to be included
Control for all confounders
- Age
- AMH
- Severity and locations of DIE
- Associated OMs, SUP
- Associated adenomyosis
- Surgeon skills and technique

Pregnancy rates after ART in women with deep endometriosis: 24-69.4

<table>
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<tr>
<th>STUDY</th>
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Pregnancy rates after surgery in women with deep endometriosis: 35.4-65.8

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Pregnancy rates after surgery in women with deep endometriosis

Role of deep endometriosis in ART pregnancy rates

The impact of endometriosis on the outcome of Assisted Reproductive Technology

Results: A total of 2016 women were included (1053 with endometriosis and 963 in the control group). When age of patients in the endometriosis group and control group was 38.0 (SD 4.7) and 38.0 (SD 3.1) respectively, p = 0.64. The mean number of cycles extracted ended 38.0 (SD 23) and 38.0 (SD 27) respectively, p = 0.56. No significant differences were observed between groups in terms of live birth outcome rates (OR 1.52, p = 0.36). Women with endometriosis had significantly lower number of days required to achieve pregnancy (median 10 vs 15 days respectively, p < 0.0001). There was no significant difference in terms of miscarriage rates (OR 1.36, p = 0.24). Women with endometriosis had significantly higher number of cycles required for the number of outcome events as compared to controls. The number of cycles was 2.2 (SD 1.4) vs 1.8 (SD 1.2). An unadjusted analysis was performed and no differences were observed in the reproductive outcome between groups for women aged under 35 and 35 or older.

Role of deep endometriosis in ART pregnancy rates

Influence of Endometriosis on Assisted Reproductive Technology Outcomes - A Systematic Review and Meta-analysis

Molecular, endometriosis, infertility, assisted reproductive technology, endometriosis, and infertility.

CONCLUSION: Women with and without endometriosis have comparable ART outcomes in terms of live births, whereas those with severe endometriosis have inferior outcomes. There is insufficient evidence...
Role of deep endometriosis in ART pregnancy rates

155 ART patients with endometriosis related infertility
First cycle from Jan 2016 to Dec 2016
65 (42%) with DIE
Overall CPR 38.7% (65/155)

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<tr>
<th></th>
<th>Pregnant</th>
<th>Not Pregnant</th>
<th>P</th>
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<tr>
<td>Age</td>
<td>33.9±2.2</td>
<td>36.6±2.7</td>
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<tr>
<td>DIE (%)</td>
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<td>Endometrioma (%)</td>
<td>42.2</td>
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<td>Adenomyosis (%)</td>
<td>41.2</td>
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<td>55.3</td>
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<td>Total FSH dose (IU)</td>
<td>2201±809</td>
<td>2338±945</td>
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<td>Oocytes (n)</td>
<td>11.3±2.8</td>
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<td>Embryos (n)</td>
<td>9.1±2.2</td>
<td>7.6±2.3</td>
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Pregnancy rates after surgery in women with deep endometriosis: 35.4-65.8

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</table>

1. Infertility with associated DIE
2. Age 21-38 years
3. Standard indication for either ART or ICSI
4. At least 1 functional ovary
5. Normal uterine cavity
6. Normal ovarian reserve (measured by early follicular FSH)
7. Absence of untreated endocrinologic
8. Male partner >1% normal morphology
Pregnancy rates after surgery in women with deep endometriosis

In vitro fertilization outcomes in groups A and B

<table>
<thead>
<tr>
<th>Group</th>
<th>Total dose (IU)</th>
<th>No. of oocytes retrieved</th>
<th>Fertilization rate (%)</th>
<th>No. of top-quality embryos/patient</th>
<th>No. of embryos transferred</th>
<th>Implantation rate (%)</th>
<th>Pregnancy rate (%)</th>
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<tr>
<td>A</td>
<td>2300 ± 911</td>
<td>10 ± 5</td>
<td>77.9</td>
<td>.59 ± 1</td>
<td>3 ± 1</td>
<td>19 ± 25.1</td>
<td>24</td>
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<tr>
<td>B</td>
<td>2542 ± 1012</td>
<td>9 ± 5</td>
<td>78</td>
<td>.57 ± 1</td>
<td>3 ± 1</td>
<td>32.1 ± 30.6</td>
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p = .01

Pregnancy rates after surgery in women with deep endometriosis

Fertility outcome of laparoscopic treatment in patients with severe endometriosis and repeated in vitro fertilization failures

Review Article

Impact of Surgery for Deep Infiltrative Endometriosis before In Vitro Fertilization: A Systematic Review and Meta-analysis

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Department of Reproductive Medicine, Institute of Reproduction, University Hospital of Ferrara, Ferrara, Italy; Department of Obstetrics and Gynecology, University of Florence, Florence, Italy; and Department of Obstetrics and Gynecology, University of Bologna, Bologna, Italy.
Safety of delaying surgery

May DIE worsen after ART?

V.P.M., 35 y.o.
1st visit on Jan 2014
Previously asymptomatic
Started pain and hematuria on Sept 2013 after ART

Operated on Feb 2014
Big bladder nodule (> 4 cm.)
Partial cystectomy and ureteral reimplantation
Posterior COC therapy until Sept 2014
Spontaneous pregnancy Jan 2015
Normal delivery Sep 2015
Other effects of surgery

Does pain improve after surgery? How high are side effects?

Reasons to offer surgery

- Overall IVF outcomes after surgery seems to be better
- DIE may worsen ART outcome
- DIE may worsen after ART or during pregnancy
- Surgery improves associated pain
- Tolerable complications rate

Surgery

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
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<tbody>
<tr>
<td>High rate of postoperative spontaneous pregnancies</td>
<td>Risk of postoperative complications</td>
</tr>
<tr>
<td>High overall rate of pregnancy comparable to primary ART</td>
<td>Complications delays secondary ART</td>
</tr>
<tr>
<td>Reduction of overall management</td>
<td>Psychological impact of advanced colorectal surgery probably higher when performed in nullipara</td>
</tr>
<tr>
<td>Risk of endometriosis related complications avoided</td>
<td>Risk of reduction in ovarian reserve with associated OMA surgery</td>
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<tr>
<td>Improves pain and QoL</td>
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</tbody>
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Factors to be considered before indication

- Symptoms severity
- DIE severity
- Complications evaluation
- Patient age
- Ovarian reserve
- Tubal factor
- Male factor
- Adenomyosis
- Previous surgery
- Previous ART attempts

Surgery or ART?

<table>
<thead>
<tr>
<th>Favour Surgery</th>
<th>Favour ART</th>
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<tbody>
<tr>
<td>Disabling symptoms</td>
<td>Few symptoms</td>
</tr>
<tr>
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<td>Mild severity</td>
</tr>
<tr>
<td>Normal tubes</td>
<td>Tubal occlusion, hydrosalpinx</td>
</tr>
<tr>
<td>Young age</td>
<td>Advanced age</td>
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<tr>
<td>Normal ovarian reserve</td>
<td>Low ovarian reserve</td>
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<tr>
<td>Normal male factor</td>
<td>Abnormal spermiogram</td>
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<tr>
<td>No previous surgeries</td>
<td>DIE recurrence</td>
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**Surgery or ART?**

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**References**

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Thoracic Endometriosis: As Rare as Once Believed?
Ken Sinervo, M.D., M.Sc., F.R.C.S.C., A.C.G.E.
Director, Center for Endometriosis Care
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Disclosures
- I have no financial relationships to disclose

Objectives
- Review prevalence and diagnosis of thoracic endometriosis
- Apply current management of thoracic endometriosis
- Demonstrate different techniques for surgical treatment of thoracic endometriosis
- Describe outcomes and potential complications following surgery for thoracic endometriosis

Thoracic Endometriosis Syndrome
- Thoracic Endometriosis Syndrome (TES) first proposed by Joseph and Sahn (1996)¹
- Thoracic Endo is uncommon; probably makes up less than 1% of endometriosis patients
- Usually present with chest pain, SOB, catamenial pneumothorax, or catamenial hemoptysis; less commonly hemothorax or nodules

Thoracic Endometriosis Syndrome
- Catamenial (from Greek “katamenios” meaning monthly) Pneumothorax (PNTX) is most common presentation (75% of cases)²
- True incidence is difficult to know since this is based on thoracic literature
- Nezhat et al.³ was only seen in 24% of their TES pts (diaphragmatic endo seen in 100%)
- Spontaneous or recurrent pneumothorax within 72 hours of onset of menses
- 25-33% of all pneumothoraces could be due to TES⁴

Etiology of Catamenial Pneumothorax
- Fenestrations of the diaphragm allow air to enter the abdomen via the vagina and fallopian tubes during menses, when no cervical mucous (transgenital-transdiaphragmatic theory) – collapses after hysterectomy, TL argue against it
- Sloughing of endometrial implants onto the pleura (retrograde menstruation) – clockwise peritoneal flow – poor evidence of peritoneal flow, biochemical difference from endometriosis and endometrium, low recurrence rates following complete excision, fetal endometriosis⁶
- Microembolization onto lung parenchyma, necrosis and weakening and alveolar rupture⁷
Etiology

- Elevated levels of prostaglandins (PGF2) from endo implants, causing vascular and bronchoalveolar vasoconstriction with subsequent ischemic injury, alveolar damage and air leakage.  
- Mullerosis theory (Redwine, 1988) suggests that endometriosis is created following abnormal differentiation of the Mullerian duct system during embryogenesis due to malfunction of specific genes or gene mutations that can occur due to environmental exposures.

Thoracic Endometriosis-Related Pneumothorax (TERP)

- Newer studies that have looked at all patients that were found to have endo with collapses - then they tracked when the collapses occurred. 
- Alfiano found that a third had collapses between cycles. 
- Fukoaka et al. examined all patients with collapses and reviewed pathology. 
  - 36% were during the traditional peri-menstrual window, 
  - 64% occurred during the rest of the month. 
- Suggests that we should consider all patients with collapses as possibly endo related. 
- As well, recurrence rates differ between those with spontaneous collapses (5% recurrence) vs. endo related (64%).

Catamenial Hemothorax

- About 15% of cases present with catamenial hemothorax or hydropneumothorax (usually bloody fluid on pleurocentesis). 
- Usually present with pleural effusion and acute onset of dyspnea. 
- Hemothorax and on VATS, pleural implants, diaphragmatic defects, parenchymal involvement.

Catamenial Hemoptysis

- Accounts for about 7% of thoracic endo. 
- Can be quite voluminous, usually younger patients. 
- Usually not associated with chest pain (secondary to coughing). 
- On bronchoscopy, usually detect hemosiderin-laden macrophages. 
- Mechanism may be due to micro-embolization; Kim et al. had 16 of 19 patients undergoing recent obstetric or gynec procedures.

Pulmonary Nodules

- Account for 6% of thoracic endo. 
- May be asymptomatic and confused for malignancy or result in hemoptysis, since the nodules invade into the bronchials. 
- Older patients (38-39 average compared to 34-35 with other forms).

Diaphragmatic Endometriosis

- Usually associated with pelvic endo. 
  - Tulandi et al. found 94% with pelvic endo. 
  - Soriano et al. found that 85% had severe endo. 
- May present in a few forms: 
  - Catamenial or chronic chest pain or scapular pain; SOB, or upper quadrant pain. 
  - Less commonly can have catamenial pneumothorax.
Diaphragmatic Endometriosis

- Usually occurring 95% of the time on the right hemidiaphragm
- 4% on the left and 1% on both
- May occur in as many as 1.5% of patients with endometriosis – extrapolating – 130,000 in U.S.
- Youngest patient I have treated was 16 y.o.

Symptoms of Diaphragm Endometriosis

- PAIN – chest pain, shoulder pain, shoulder blade, rib pain, SOB? (primarily with PNTX)
- Initially with period – may progress to constant pain, may keep you up at night
- Failure to respond to other localized treatments
- All imaging is usually normal (may see thickening of the diaphragm locally)

Diagnosis

- High index of suspicion is important to consider thoracic and diaphragmatic endo
- Rule out Gall Bladder disease with ultrasound and HIDA scan
- Rule out other cardiac and other pulmonary causes of pain
- If catamenial in nature, CT scan of chest may demonstrate nodules, pneumothorax, hemothorax or thickening of the diaphragm; rarely may present with herniating liver through diaphragm

CT Findings - Collapse

CT Findings – Herniated Liver

CT Findings – Herniated Liver
Treatment Plan

- May attempt medical treatment (continuous OC’s, Lupron®); however, failure does not confirm that it is not endo
  - Jenkins et al.\(^\text{15}\) found that 81% of those who failed to respond to hormonal therapy had endo at laparoscopy
  - Recurrence high – 50% within 6 months of stopping meds
- Asymptomatic patients who are found to have endo on the diaphragm: recommend bx if possible – 20% will progress to symptomatic (Redwine)\(^\text{16}\)
- During laparoscopy, consider 5 mm trocar under rib cage to visualize posterior diaphragm if high index of suspicion
- May have to mobilize the liver to see/treat the entire liver (falciform/right triangular ligament)
Treatment

- Multidisciplinary OR: consider collaboration with Thoracic surgeon
- We perform CO2 laser excision of all pelvic and diaphragmatic endo that can be seen from below
- Then VATS with resection of any endo on the diaphragm – need CT of chest and PFT’s before surgery
- If fenestrations present, recommend excision (stapler, harmonic, sealing device), not oversewing (persistent pain/collapses), or overlaying mesh (pain due to persistent endo within the implants; nearly impossible to remove)

- Occasionally may require thoracotomy if very large lesions requiring mesh placement (Gore-Tex or biomembranes)
- If catamenial pneumothorax, may consider adjuvant Lupron® therapy (have only had 2-3 early recurrence of 120 without its use, but recommended in series of 100 patients; however, did not use excision of all diaphragmatic endo)
- I would recommend just suppression with N/E or birth control

Pathology

- Less common to find glandular components
- Sheets of stromal cells (best detected with CD10 staining)\(^17\)
- High incidence of progesterone and estrogen receptors; as high as 100\(^%\)\(^18\)
Diaphragmatic & Thoracic Endometriosis

- Requires a high index of suspicion to diagnose
- Usually associated with significant pelvic disease
- A number of clinical presentations
- If failed or unable to tolerate medical Rx, consider collaboration with VATS surgeon – must **excise all disease** to minimize persistence/recurrences

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Atlanta, GA USA
CenterForEndo.com
https://centerforendo.com/thoracic-endometriosis

Excision of full thickness diaphragm endometriosis

Resection of Diaphragmatic Fenestrations Causing Collapse
References


Surgical Mobilization of the Liver

Shanti I. Mohling, MD
NW Endometriosis and Pelvic Surgery
Portland, Oregon USA

No financial relationships to disclose

Course Objectives

Review technique for mobilization of the liver to access diaphragm and upper abdomen:
- Understand relevant anatomy of liver and diaphragm
- Role of Video-Assisted Thoracoscopic Surgery in treating endometriosis of diaphragm and pleura of lung
- Tips for patient positioning to optimize access

Diaphragmatic Endometriosis (DE)

Traditionally thought to be rare
Up to 12% with DIE will have extrapelvic disease
Majority of extrapelvic disease is diaphragmatic or thoracic
80-90% of diaphragmatic disease is on the right

Summary: Diaphragmatic excision

Always LOOK carefully at the diaphragm for disease (only 25% with preoperative symptoms)
Consider VATS if lesions appear to be nodular
Mobilization of the liver will facilitate more complete eradication of disease

Risks of diaphragmatic excision

- Injury to Phrenic Nerves
- Hepatic injury and risk of hemorrhage
- Injury to Inferior Vena Cava
- Need for postoperative chest-tube
Why mobilize the liver?
To gain better access to diaphragmatic disease

Mobilization of the liver: anterior release
- Right and left triangular ligament: liver to diaphragm and ribs
- Falciform ligament: liver to anterior abdominal wall
- Coronary ligament: liver to posterior diaphragm and chest wall

Critical anatomy of diaphragm
- Phrenic nerve
- Inferior vena cava
- Hepatic branch of Anterior Vagus n.
- Pericardium
Mobilization: Posterior release

- Attachment of the lesser omentum to posterior surface
- Physiologic attachment to the peri-renal peritoneum

### KEY POINTS FOR SURGERY

- Multidisciplinary approach
- Specialized anesthesia
- Thoracic surgeon for VATS
- 30-degree laparoscope

### Specialized Anesthesia techniques

- Team understands the potential need to ventilate one side at a time during diaphragmatic dissection
- Option to use "one-lung" ventilation and controlled anesthesia with double lumen intubation set-up

### Optimal Port Placement

- Patient Positioning is key
  - Lateral decubitus positioning with a low bolster under the right side
  - Steep reverse Trendelenberg
  - Left lateral tilt
  - Foot boards
Upper Abdominal Endometriosis

- Diaphragmatic (80% on right side)
- Pericardium
- Perirenal
- Hepatic

Video Assisted Thoracoscopic Surgery

VATS may be needed simply to identify or confirm full-thickness disease with a single port

VATS may be necessary to surgically excise pulmonary disease

VATS Technique

Usually, single 5 mm port placed at 5th intercostal space on right allows for sufficient visualization
Occasionally, left sided disease will warrant left-sided port

Signs and symptoms of Diaphragmatic Endometriosis

- Catamenial chest pain or shoulder pain
- Catamenial pneumothorax or hemithorax
- Non-catamenial pneumothorax
- Hemoptysis
- Many asymptomatic

Pericardial disease resection

References


Thank you!
Assembly Bill 1195 was signed into law on July 1, 2006 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). It is the intent of the Legislature to encourage physicians and surgeons, continuing medical education providers located in California, and the Accreditation Council for Continuing Medical Education to meet the cultural and linguistic concerns of a diverse patient population through appropriate professional development.

Linguistic Competence: Providing readily available, culturally appropriate oral and written language services to limited English proficiency (LEP) members through such means as bilingual/bicultural staff, trained medical interpreters, and qualified translators.

Cultural Competence: A set of congruent behaviors, attitudes, and policies that come together in a system or agency or among professionals that enables effective interactions in a cross-cultural framework.1

Cultural and Linguistic Competence: The ability of health care providers and health care organizations to understand and respond effectively to the cultural and linguistic needs brought by the patient to the health care encounter.

Cultural competence requires organizations and their personnel to:
• Value diversity.
• Assess themselves.
• Manage the dynamics of difference.
• Acquire and institutionalize cultural knowledge.
• Adapt to diversity and the cultural contexts of individuals and communities served.

California Business & Professions Code §2190.1(c)(3) states that associations that accredit continuing medical education courses shall develop standards before July 1, 2006, for compliance with the cultural competency requirements. The associations may update these standards, as needed, in conjunction with an advisory group that has expertise in cultural and linguistic competency issues. Cultural competency means a set of integrated attitudes, knowledge, and skills that enables a health care professional or organization to care effectively for patients from diverse cultures, groups, and communities. At a minimum, cultural competency is recommended to include the following: (A) Applying linguistic skills to communicate effectively with the target population. (B) Utilizing cultural information to establish therapeutic relationships. (C) Eliciting and incorporating pertinent cultural data in diagnosis and treatment. (D) Understanding and applying cultural and ethnic data to the process of clinical care, including, as appropriate, information pertinent to the appropriate treatment of, and provision of care to, the lesbian, gay, bisexual, transgender, and intersex communities.

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 (Assembly Bill 305) requires that state agencies that serve a substantial number of non-English-speaking people employ a sufficient amount of bilingual persons in order to provide certain information and render certain services in a language other than English.