Pediatric & Adolescent Gynecology – A “How To” Approach (Didactic)

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Professional Education Information

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

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

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

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This course is designed to allow clinicians to establish an “adolescent-friendly environment” in their office setting. Strategies for practice development focused on minimally invasive surgical expertise will be presented. A “how to” approach is the underlying theme for all lectures in the postgraduate course. Gynecologic surgeons are increasingly being called upon to manage Müllerian anomalies; pre-operative as well as intra-operative expertise will be emphasized. As surgeons, we are asked with increasing frequency to assist in fertility preservation when a young patient is faced with a diagnosis of cancer or other chronic debilitating disease. Counseling and discussion of options for future fertility will be succinctly presented. The problem of obesity is a recurrent concern for clinicians; evaluation, counseling and management of obesity continue to challenge the gynecologist. Various surgical approaches that clinicians with advanced minimally invasive expertise should be able to acquire will be presented in a readily applicable manner. Current concepts with regard to management of adnexal masses, torsion, and endometriosis in the young adult will allow surgeons to garner the latest advances of gynecologic surgery in this age group.

**Learning Objectives:** At the conclusion of this activity, the clinician will be able to: 1) Use the learning process to provide counseling and expertise to facilitate development of an adolescent and young adult gynecologic surgical practice focused on minimally invasive surgical techniques; 2) evaluate and manage Müllerian anomalies with surgical as well as non-surgical approaches will be stressed; and 3) discuss the challenges of managing.

**Course Outline**

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
<th>Presenter</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00</td>
<td>Welcome, Introductions and Course Overview</td>
<td>J.S. Sanfilippo</td>
</tr>
<tr>
<td>8:05</td>
<td>A Pediatric and Adolescent Gynecology Minimally Invasive Practice – A “How to” Approach</td>
<td>J.S. Sanfilippo</td>
</tr>
<tr>
<td>8:30</td>
<td>Minimally Invasive Surgery in the Pediatric and Adolescent Patient: Vaginoscopy, Hysteroscopy, Laparoscopy and Robotics</td>
<td>R.K. Zurawin</td>
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<tr>
<td>8:55</td>
<td>Pediatric and Adolescent Gynecologic Emergencies</td>
<td>H. Appelbaum</td>
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<tr>
<td>9:20</td>
<td>Endometriosis in Adolescents – The Beginning of the Story</td>
<td>M.R. Laufer</td>
</tr>
<tr>
<td>9:45</td>
<td>Questions and Answers</td>
<td>All Faculty</td>
</tr>
<tr>
<td>9:55</td>
<td>Break</td>
<td></td>
</tr>
<tr>
<td>10:10</td>
<td>Surgical Approach to Müllerian Anomalies and Vaginal Agenesis</td>
<td>S. Brucker</td>
</tr>
</tbody>
</table>
10:35  Pediatric Gynecologic Oncology                R.K. Zurawin
11:00  Gynecologic Outcomes of Bariatric Surgery in the PAG Patient  J.S. Sanfilippo
11:25  Fertility Preservation – How and Why              S. Brucker
11:50  Questions & Answers                               All Faculty
12:00  Course Evaluation/Adjourn
PLANNER DISCLOSURE
The following members of AAGL have been involved in the educational planning of this workshop and have no conflict of interest to disclose (in alphabetical order by last name).
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Consultant: Conceptus Incorporated
Kimberly A. Kho*
Frank D. Loffer, Executive Vice President/Medical Director, AAGL*
Linda Michels, Executive Director, AAGL*
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Heather Appelbaum*
Sara Y. Brucker*
Marc R. Laufer*
Joseph S. Sanfilippo*
Robert K. Zurawin
Consultant: Conceptus Incorporated, Ethicon Endo-Surgery, Hologic

Asterisk (*) denotes no financial relationships to disclose.
Pediatric & Adolescent Gynecology
Minimally Invasive Practice
“A How To” Approach

Joseph S. Sanfilippo, MD, MBA
Professor OB, GYN, Repro Sciences
University of Pittsburgh
Magee-Womens Hospital

Disclosure

I have no financial relationships to disclose.
PEDIATRIC PATIENT

- Patient Involved in History
- Frog-legged Position
- Knee-chest Position
- “Show and Tell”
- Low power Magnification
- “Good job”

ADOLESCENT EXAM-PARADIGM SHIFT

- TOOL-KIT-ACOG
- First Exam
- “Gynecologic Encounter” 13-15 Y/A
  - Collaborative with Primary Care Provider
  - Rapport with OB GYN
  - No Pelvic Exam
  - Followed By Annual Visits
- Age 21 years of age
  Stewart F et al JAMA 2001;286:671 ACS, NIH, ACOG 2002

PELVIC EXAM

- “Do You Use Tampons?”

Tool Kit for Teen Care

- The Tool Kit for Teen Care is a comprehensive resource designed by the ACOG Committee on Adolescent Health Care to help every office care for adolescent patients.
SCREENING FOR SEXUALLY TRANSMITTED DISEASES

- Sexually Active Teens Should be Screened
- "Urine screening Should be Considered When Teens are Reluctant to Have a Pelvic Exam"
  - Urine Ligase Chain Reaction-Less Expense than Cervical Cultures
- "Vaginal Swab" Screening

Health Care for Adolescents ACOG 2002

Adolescence is Risky Business

- Latest: 63% Adolescents Sexually Active: Grade 12
- ACOG: First Adolescent Health Visit: 3-15 y/a
  - Development of Trust with Healthcare Provider
- One if Four "Sexually Experienced: Adolescents Contract STI"
- Adolescent Pregnancy Rate: 39.1/1000 Adolescent Girls

Short M et al JPPAG 2013;26:1
HISTORICAL PERSPECTIVE

- Late 1970's Pediatric-sized Hopkins Rod Lens System “Telescopes”
- TOOLS Of The TRADE
  - Instrumentation 2 mm “Pediatric Endoscope
  - Small Trocar 2.5 cm length
  - 3mm Diameter Instrumentation

PEDIATRIC MIS TECHNIQUE

- Bladder Crede
- NG tube Placement
- Insufflation Pressure
  - Flow 0.5 L/minute
  - Pressure Setting
    - Infant 6-8 mmHg
    - Pediatric Age 8-10 mmHg
    - Adolescents 10-12 mmHg

PEDIATRIC PATIENT

- Veress Needle vs. Open Technique
- Ports Suture closed at End of Case-Thin Abdominal Wall
  - Separate Fascia and Skin Layers
- Post-op Reglan-Prevent Nausea
- Transdermal Scope Patch > 8 y/a
SPECIFIC PROBLEMS YOU MAY ENCOUNTER
**BREAST MASS-adolescent**

- Ultrasound
- Little if any Role for Mammography
- Monitoring 1-3 cycles
- FNA
- Malignancy 0.2% of Carcinoma-Breast < 25 y/a
  - Incidence 0.1/1,000,000 per year
- BSE Instruction

Simmons P in Pediatric & Adolescent Gynecology ed. Sanfilippo 2001 Saunders

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**Committee Opinion**

Number 350, November 2006

Breast Concerns in the Adolescent

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**ARE YOU UP TO DATE ON**

**PCOS?**

In the Adolescent?

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**WHAT DO YOU NEED TO MAKE THE DIAGNOSIS**

**REVISED DIAGNOSTIC CRITERIA-PCOS**

- 2003 CRITERIA
  - Oligo-anovulation
  - Clinical or Biochemical Signs of Hyperandrogenism
  - Polycystic Ovaries
  - And Exclusion of Other Etiologies (CAH, Cushing’s Syndrome)

Rotterdam ESHRE/ASRM PCOS Consensus Workshop Group
Fertil Steril 2004;81:19
PCOS-ULTRASOUND

- By Definition:
  - 12 or more Follicles @ 2-9mm in diameter and/or Increased Ovarian Volume (>10mL)

PCOS

- In General 35 days - Upper Limit Normal in 98% of Adults - Prospective Data
- In Adolescents: 35-40 days in 66%
- Irregular Menses Persisting 2 yrs After Menarche = Criteria to Diagnose PCOS in Adolescents

Unique Problems for Adolescents

- Chronic Anovulation is Common
- Menstrual Irregularities are Common
  - 40 to 50% Adolescents-Anovulatory Cycles
- Ovulatory Cycles:
  - 23-35% Gyn Year 1
  - 70-80% > Gyn Year 5
- Normal is” Menstrual Cycles 40-45days Until 2-3 years After Menarche

Tests to Order

- CHRONIC ANOVULATION-HIRSUTISM
  - No Need for LH and/or FSH
  - Obtain:
    - Total Testosterone
    - DHEA-S
    - 17Hydroxyprogesterone (AM-Fasting)
    - Prolactin
    - TSH

PCOS in ADOLESCENTS

- Long-Term Problems: Metabolic Syn-DM-Type II-Infertility
- Polycystic Ovaries May or May Not be Present - Not in NIH definition PCOS
- Ovarian Size-Max. Perimenarcheal Girl
- 10% Regularly Menstruation Adolescents-Polycystic Appearing Ovaries
- 40% Girls with Irregular Menses-Arrested Follicles-PCOS-like Phenotype with Abnormal 17-OHP Responses to GnRH analogue
- Increased cytochrome P450c17alpha Activity in Both Ovary and Adrenal-Hyperandrogenemia

Polycystic Ovarian Syndrome in Adolescence Observations

- Most Common Endocrinopathy Reproductive Age Women
- Abnormalities Begin in Adolescence-If Not Earlier 1 (intra-uterine: IUGR-Low Birth Weight and PCOS development)
- Rapid LH Pulse Frequency
- Hyperinsulinemia
- Increased Androgen Production
- Genetic: Autosomal Dominant 7 (Single Gene Disorder)
  - More Likely Polygenic-Multifactorial Mode of Inheritance
  - The Search for the “Candidate Gene” more than 50 genes looked at
  - CYP-11A codes for P450 cholesterol side chain cleavage enzyme (rate limiting enzyme)
  - Chromosome 19p13-2 located near insulin receptor = looks good

Tests to Order

- CHRONIC ANOVULATION-HIRSUTISM
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Rotterdam ESHRE/ASRM PCOS Consensus Workshop Group Fertil Steril 2004;81:19

Stewart D, et al J Clin Endocrinol Metab 2006;91:411
Hanks S Reprod Biomed Online 2006;12:526
Blank S, et al Ann NY Acad Sci 2008;1135:76
SUSPECTING CHILD SEXUAL ABUSE

- Clinging Behavior
- Nightmares
- Excessive Masturbation
  “When In Doubt Check it Out”

DEFINING SEXUAL ABUSE

- Touching Over Child’s Clothing
- Use Child for Sexual Gratification
  – Exhibitionism
  – Voyeurism
  – Child Pornography
- Child Feels Betrayed, Confused

THE NEW BUZZ WORD

- ATM
  - Abstinence 'til Marriage

EMERGENCY CONTRACEPTION

WHERE IS THE FDA-Today?

The morning-after pill is an old medical secret for today's women in today's world.
ADOLESCENT’S USE of EMERGENCY CONTRACEPTION

- Washington State Pharmacists
- 126 Teens Obtained ECP from Pharmacists
- 20 item Questionnaire
- If Pharmacy Access not Available
  22% See if Pregnant
  58% Would See a Doctor
- CONCL: ECP by Pharmacists-Efficacious

Sucato, G et al JPAG 2001;14:163

What’s New?

LARCs
Long Acting Reversible Contraceptives

- 40% Unintended Pregnancies=Incorrect/Inconsistent Use of Contraceptives
- CHOICE Study
  - When Cost Removed >60% Adolescents Choose LARCs for Contraception
  - One Problem Adolescents/Young Adults Not Aware of Options
- Off Label: Control of Uterine Bleeding Ongoing Research: Endometriosis Rx

Bryant, A et al JPAG 2013;25:347

CHRONIC PELVIC PAIN

CHRONIC PELVIC PAIN IN THE ADOLESCENT

- PQRST APPROACH
  - Provocative-Palliative
  - Quality
    - Sharp or Dull
  - Radiation-Relief
    - Lower Extremity-Torsion
  - Severity
  - Timing
ENDOMETRIOSIS

- Youngest 8 y/a
- Can Occur Before Menarche-Bx Proven
- Clear-Reddish Lesions Not Brown-Black
- Pain Cyclic or Acyclic
- Adolescent-Chronic Pelvic Pain
  - Incidence Endometriosis 25-38%
  - Post-menarche 4-17% Females

Laufer M et al JAPAG 2003;16:S3

CHRONIC PELVIC PAIN

- Retrospective Study 190 Women
- Prophylactic Appendectomy

RESULTS: 154 Abnormal
- Endometriosis
- Carcinoid
- Periappendicitis
- Fibrous Obliteration
- Lymphoid Hyperplasia

Lyons T et al JAAGL 2001;8(4):542

APPENDECTOMY IN CHRONIC PELVIC PAIN

CONCLUSION: Counsel Patients Undergoing Operative Laparoscopy of the High Frequency of Abnormal Findings-Appendix

"Appendectomy Appears To Be A Worthwhile Consideration"

Lyons T et al JAAGL 2001;8(4):542

Training in Pediatric Adolescent Gyn

- Quality of Resident Education Markedly Effected by PAG Trained Faculty or Not
  - Fellowship Programs Nationwide
  - NASPAG (North American Society Pediatric Adolescent Gynecology) Education Committee Resident Education Programs
    - Short Curriculum
    - Long Curriculum
JOIN US AT NASPAG

- Philadelphia, PA
- April 24-26, 2014
- www.NASPAG.org
Minimally Invasive Surgery in the Pediatric and Adolescent Patient

Robert K. Zurawin, MD
Associate Professor
Director Minimally Invasive Gynecologic Surgery
Baylor College of Medicine
Houston, Texas

Disclosure
Consultant: Conceptus Incorporated, Ethicon Endo-Surgery, Hologic

History of Pediatric/Adolescent Gynecologic Surgery

- General Surgeons
- Gynecologists
- Pediatric Surgeons and Urologists
- Pediatric and Adolescent Gynecologists

Adoption of Minimally Invasive Surgery

GYN Resident Experience

- National Resident Data (ACGME)

<table>
<thead>
<tr>
<th>Year</th>
<th>Abdominal Hysterectomy</th>
<th>Vaginal Hysterectomy</th>
<th>Laparoscopic Hysterectomy</th>
<th>Total Laparoscopic Procedures</th>
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<td>2007</td>
<td>13</td>
<td>1</td>
<td>1</td>
<td>14</td>
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</tbody>
</table>

Miller, CH Training in Minimally Invasive Surgery - You Say You Want a Revolution
The Journal of Minimally Invasive Gynecology - March 2009 (Vol. 16, Issue 2, Pages 113-120)
CREOG Objectives

- **Pediatric and Adolescent Gynecology**
  - "**Understand** the medical and surgical treatment of pediatric gynecologic disorders"
  - "**Describe** appropriate medical and surgical treatments for patients with developmental anomalies"
  - "**Treat** adolescent gynecologic disorders medically or surgically" (but only ovarian diseases and masses, endometriosis)


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Point to Remember

In terms of surgery, especially endoscopic surgery:

*Children are not “little adults”*

---

**Fundamentals**

- Optimal surgical outcome depends on the surgeon’s knowledge of
  - **Anatomy**
    - Intimate, “autonomic” familiarity of pathologic conditions and relevant anatomic structures
  - **Technology**
    - TOTAL understanding of the surgical instruments
      - Electromechanical principles
      - Troubleshooting ANY malfunction
  - **Technique**
    - Tissue handling
    - Visual and proprioceptive coordination

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**Peritoneal Entry**

- The sine qua non of laparoscopy
- If you can't safely enter the peritoneum, you can't do ANYTHING
- If you can safely enter the peritoneum, you can do EVERYTHING

---
Extent of the Problem
- ~ 4 million laparoscopies per year in the U.S.
- 0.5 - 3 percent of laparoscopic procedures have complications related to peritoneal entry
- Number of complications = ~ 60,000 per year


Challenges to Peritoneal Access
- Childhood Obesity
- Previous abdominal surgery
  - Previous pediatric surgery
  - Previous laparoscopy!!
- Adhesions to the umbilical undersurface occur in 21.2% of adult patients who have undergone a prior laparoscopy through an umbilical incision; 10.8% in children


Decision Tree
- Umbilicus or Alternative Site?
- Elevate abdominal wall?
  - Hand elevation or towel clips?
- Veress needle or Direct Trocar Entry?
- Bladed or Bladeless Trocar?
- Optical trocar or non-optical trocar?

Consensus Guidelines
- Middlesbrough Consensus - International Collaborative Group met in 1999
  - Basic guidelines are still followed today
- Council of the Society of Obstetricians and Gynaecologists of Canada

Umbilicus
- Thinnest point on abdominal wall
- Overlies vital bowel and vascular structures
- Frequent site of umbilical hernias with hernia sacs and/or bowel contents
- Adhesions from prior surgery

Safe Veress Needle Entry
- Comparison of elevation of the abdominal wall
  - Hand elevation
  - Towel clips placed 2 cm on either side of umbilicus
  - Towel clips placed at the edge of the umbilicus

<table>
<thead>
<tr>
<th>Method</th>
<th>Intraumbilical</th>
<th>2 cm lateral</th>
<th>Hand elevation</th>
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<tbody>
<tr>
<td>Mean (mm)</td>
<td>6.8</td>
<td>5.14</td>
<td>3.5</td>
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<tr>
<td>P value</td>
<td>&lt;0.01</td>
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</table>

Alternative Sites of Insufflation

- Transuterine
- Cul-de-sac
- Left upper quadrant

Reference:

Primary Port Placement

- 4 FB
- Palmer’s Point

Reference:

Basic Trocars

- Optical entry
- Open entry
Optical Trocar Entry

You’ve picked the site – now what?

- Critical principles:
  - Force of entry into abdominal wall
    - 4-6 kg in reusable trocars
    - 2-3 kg in shielded bladed retractable trocars and bladeless trocars
  - Insufflate to desired Pressure NOT Volume
    - Increase to 20 – 25 mm Hg until all ports are placed, then reduce to 15 mm Hg


Secondary Port Placement

- ALWAYS place secondary ports under direct visual guidance
- Use least amount of force, smallest diameter, and least traumatic puncture
- Avoid critical structures in anterior abdominal wall

Caveat: Trauma to Ilioinguinal and Iliohypogastric Nerves


Combined View

Operative Procedures

- Open laparotomy
- Minimally invasive procedures
  - Laparoscopy
  - Hysteroscopy
  - Vaginoscopy
Gynecological Operations
- Congenital Abnormalities
- Foreign body
- Trauma
- Ovarian cysts
- Pelvic Pain/Endometriosis
- Malignancies
- Pelvic Inflammatory Disease
- Ectopic pregnancies

Congenital Abnormalities
- Septae
- Duplications and defects of fusion
- Dysgenetic ovaries

Septate Uterus
- Historical repair
  - Strassman procedure
  - Tompkins metroplasty
- Hysteroscopic management
  - Blind division with scissors
  - Lasers
  - Monopolar cautery in hypotonic solution
  - Bipolar cautery in normal saline
Duplications

- Didelphys
- Defects of fusion
  - lateral
  - vertical
- Rudimentary horns
  - communicating
  - noncommunicating

Uterus Didelphys

Didelphys with Obstructed Hemivagina

OHVIRA

OHVIRA
Principles of Resection
- Preoperative radiologic evaluation
- Laparoscopy/hysteroscopy/vaginoscopy
- Adequate dissection to isolate blood supply
- Midline plane
- Proper instrumentation to insure minimal collateral tissue injury
- Port placement and number

Meyer-Rokitansky (MRKH)
- Vaginal agenesis
- Variable development of internal genitalia
- Problems if viable endometrium – obstruction
- MRI insufficient for diagnosis – need laparoscopy
Gynecological Operations

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- Malignancies
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Ovarian Cysts
- Functional
- Hemorrhagic Corpus Luteum
- Non-functional
  - Benign
  - Malignant

Functional Cyst
Para-ovarian cysts
Benign Neoplasms

Dermoids

- Tendency to leak, especially if thin, attenuated cyst wall
- Copious irrigation
- Watch for bilaterality
- Negligible risk of complications if spill occurs

The Problem

- The vast majority of adnexal masses are benign
- The vast majority of adnexal masses treated by gynecologists result in preservation of the ovary
- The vast majority of ovarian masses treated by pediatric surgeons end up with salpingo-oophorectomy

Gynecological Operations

- Congenital Abnormalities
- Foreign body
- Trauma
- Ovarian cysts
- Pelvic Pain/Endometriosis
- Malignancies
- Pelvic Inflammatory Disease
- Ectopic pregnancies

Laparoscopic Appearance

- Implants seen in adolescents are not typical of what is seen in adults
- Adolescents have clear vesicles, white implants, small hemorrhagic or petechial spots of the pelvic peritoneum
- Endometriosis found microscopically on biopsy of normal appearing peritoneum in 6% of patients (Nisolle FertilSteril 1990;53:984)
Gynecological Operations
- Congenital Abnormalities
- Foreign body
- Trauma
- Ovarian cysts
- Pelvic Pain/Endometriosis
- Malignancies
- Pelvic Inflammatory Disease
- Ectopic pregnancies

Sexually Transmitted Disease
- Persistent vaginal discharge
- Absence of foreign body
- Inconsistent history of sexual abuse
- Often negative cultures in ER or referring physician’s office
- Look for trauma to hymen, fourchette, but may be absent

Gynecological Operations
- Congenital Abnormalities
- Foreign body
- Trauma
- Ovarian cysts
- Pelvic Pain/Endometriosis
- Malignancies
- Pelvic Inflammatory Disease
- Ectopic pregnancies
Remember

Children are not “little adults”
They require special techniques and instrumentation

Laparoscopic Equipment

- Never need more than 5 mm scope
- 3 mm and 5 mm ports
- Special insufflation requirements in children less than 6 years old
- Consider equipment for heating and humidifying insufflated environment
- Adhesion prevention after ALL non-infected procedures

Emergency Situations

- Ectopic pregnancy
- Pelvic inflammatory disease
- Uncontrolled menorrhagia
- Undiagnosed vaginal bleeding
  - Sexual abuse
  - Foreign body

Objective

Maintain Reproduction Function

Exception

- Associated anomalies or medical conditions that prohibit fertility
  - Congenital heart disease
  - Profound retardation
  - End-stage renal disease
  - Acute life-threatening medical conditions
Summary

- Minimally invasive surgical techniques are within the grasp of all pediatric and adolescent gynecologists
- It is not enough to have the proper instrumentation available. You must be comfortable with the use of all equipment
- Competent surgical team
- Adequate visualization
- KNOW YOUR ANATOMY AND EMBRYOLOGY
Vulvovaginal bleeding

I have no financial relationships to disclose.

True precocious puberty

- Activation of the HPO axis
- Includes secondary sexual characteristics
- Idiopathic
- Cerebral lesions
- Primary hypothyroidism
Evaluation of the prepubertal child

- Lithotomy
- Frog-legged
- Knee to chest
- Vaginoscopy
- Colposcopy
- Killian nasal speculum

Evaluation of the adolescent vulva and vagina

- Manual
- Vaginoscopy
- Colposcopy

Prepubertal vestibule

Normal hymenal variations

Normal hymenal variations
The hymen

- Crescentic
- Annular
- scalloped
- Redundant
- Imperforate
- Cribiform
- Microperforate
- septated

Estrogen effect

Vaginal Bleeding

Non gynecologic

Dermatologic

Hormonal

Traumatic

Structural

Infectious

Classification for genital injuries in female children

<table>
<thead>
<tr>
<th>Genital injury score</th>
<th>Extent of injury</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Isolated genital injury distal to hymen</td>
</tr>
<tr>
<td>II</td>
<td>Isolated genital injury including hymen</td>
</tr>
<tr>
<td>III</td>
<td>Isolated genital injury including vagina</td>
</tr>
<tr>
<td>IV</td>
<td>Hymenal or vaginal injury plus partial tear of anorectum</td>
</tr>
<tr>
<td>V</td>
<td>Vaginal injury plus complete tear of anorectum</td>
</tr>
</tbody>
</table>


Vulvar blood supply

Traumatic injuries

- Saddle injury
- Accidental penetrating injuries
- Accidental vaginal insufflation injuries
- Crush or shear injuries
- Animal or human bites
- Burns
- Sexual abuse
- Coital injuries
- Foreign body
- Self manipulation
### Mechanism of traumatic genital injuries

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Straddle injuries</strong></td>
<td>Soft tissues of the vulva are compressed between an object and the boney</td>
</tr>
<tr>
<td></td>
<td>pelvis resulting in ecchymoses, abrasions, lacerations, or hematomas</td>
</tr>
<tr>
<td><strong>Accidental penetrating injuries</strong></td>
<td>Piercing of the vulva, vagina, urethra, bladder, anus, or rectum with a</td>
</tr>
<tr>
<td></td>
<td>sharp or pointed object</td>
</tr>
<tr>
<td><strong>Accidental vaginal insufflation injuries</strong></td>
<td>Pressurized water enters the vagina causing over distension of the vaginal</td>
</tr>
<tr>
<td></td>
<td>walls resulting in tearing</td>
</tr>
<tr>
<td><strong>Crush or shear injuries</strong></td>
<td>Crush injuries can result in fragments of bone penetrating into the vagina</td>
</tr>
<tr>
<td></td>
<td>or lower urinary tract; shear injuries can result from rapid abduction of</td>
</tr>
<tr>
<td></td>
<td>the lower extremities</td>
</tr>
</tbody>
</table>

### Animal or human bites

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Irrigate with 1% povidine-iodine solution</td>
<td>Predominantly for animal bite wounds</td>
</tr>
<tr>
<td>Wound debridement</td>
<td></td>
</tr>
<tr>
<td>Antibiotic prophylaxis</td>
<td></td>
</tr>
<tr>
<td>Tetanus vaccine for mammalian bites</td>
<td>Predominantly for mammalian bite wounds</td>
</tr>
<tr>
<td>Rabies immunization</td>
<td></td>
</tr>
</tbody>
</table>

### Burns

- Accidental
- Inflicted
- Chemical

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cold for 20 minutes</td>
<td>with cold tap water</td>
</tr>
<tr>
<td>Vaginal lavage</td>
<td></td>
</tr>
</tbody>
</table>

### Assessment of vulvar injury

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>History</td>
<td></td>
</tr>
<tr>
<td>Examination</td>
<td></td>
</tr>
<tr>
<td>Valsalva</td>
<td></td>
</tr>
<tr>
<td>Vaginal lavage</td>
<td></td>
</tr>
<tr>
<td>2% lidocaine jelly</td>
<td></td>
</tr>
</tbody>
</table>

### Laceration

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exam under anesthesia</td>
<td></td>
</tr>
<tr>
<td>Possible diagnostic exploratory</td>
<td></td>
</tr>
<tr>
<td>laparoscopy or exploratory</td>
<td></td>
</tr>
<tr>
<td>laparotomy</td>
<td></td>
</tr>
<tr>
<td>Gelfoam, Surgicel</td>
<td></td>
</tr>
<tr>
<td>Electro or chemical cauterly</td>
<td></td>
</tr>
<tr>
<td>Suturing</td>
<td></td>
</tr>
</tbody>
</table>

### Management of vulvar hematoma

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ice packs</td>
<td></td>
</tr>
<tr>
<td>Bed rest</td>
<td></td>
</tr>
<tr>
<td>Foley catheter</td>
<td></td>
</tr>
<tr>
<td>Evacuation</td>
<td></td>
</tr>
</tbody>
</table>
Time required for nonhymenal genital injuries to heal

<table>
<thead>
<tr>
<th>Type of injury</th>
<th>Time of resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abrasions</td>
<td>2-3 days</td>
</tr>
<tr>
<td>Edema</td>
<td>5 days</td>
</tr>
<tr>
<td>Ecchymoses</td>
<td>2-18 days</td>
</tr>
<tr>
<td>Labial hematoma</td>
<td>2-4 weeks</td>
</tr>
<tr>
<td>Petechia</td>
<td>24 hours</td>
</tr>
<tr>
<td>Blood blisters</td>
<td>30 days</td>
</tr>
<tr>
<td>Superficial laceration</td>
<td>2 days</td>
</tr>
<tr>
<td>Deep lacerations</td>
<td>Surgical repair</td>
</tr>
</tbody>
</table>


Physiological signs suggestive of sexual abuse

- Normal variants
  - Perivulvar bands
  - Intravaginal ridges
  - Hymenal mound/loops
  - Anterior hymenal notching
  - Septate hymen
  - Urethral dilation with labial traction

- Non-specific findings
  - Erythema of the vestibule
  - Increased vascularity of vestibule
  - Labial adhesions
  - Friability of posterior fourchette
  - Excoriations
  - Petechiae
  - Anal fissures

- Highly suspicious findings
  - Deep posterior hymenal notching
  - Anogenital warts
  - Vesicular lesions or ulcers
  - Zonal anal dilation
  - Acute laceration or ecchymosis
  - Absence of posterior hymenal tissue
  - Culture confirmed STI
  - Pregnancy
  - Sperm

American Academy of Pediatrics
Committee on Child Abuse and Neglect
Guidelines for the evaluation of sexual abuse of children

<table>
<thead>
<tr>
<th>History</th>
<th>Exam</th>
<th>Labs</th>
<th>Level of concern</th>
<th>Reporting</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>Normal</td>
<td>None</td>
<td>Low</td>
<td>None</td>
</tr>
<tr>
<td>Behavior</td>
<td>Normal</td>
<td>None</td>
<td>Intermediate</td>
<td>Possibly</td>
</tr>
<tr>
<td>None</td>
<td>Specific</td>
<td>None</td>
<td>High</td>
<td>Report</td>
</tr>
<tr>
<td>Clear</td>
<td>Normal</td>
<td>None</td>
<td>Intermediate</td>
<td>Possibly</td>
</tr>
<tr>
<td>None</td>
<td>Specific</td>
<td>None</td>
<td>High</td>
<td>Report</td>
</tr>
<tr>
<td>None</td>
<td>Nonspecific</td>
<td>Positive</td>
<td>High</td>
<td>Report</td>
</tr>
</tbody>
</table>

Forensic Evidence Collection

- Clothing and debris collected
- Head and pubic hair combings
- Describe hematomas, ecchymoses, lacerations
- Scrape or swab dried secretions
- Bluemaxx lamp detection of semen
- Fingernail scrapings
- Wet prep and urine for sperm, trichomons
- Serology for syphilis, HIV, hepatitis B
- Vaginal, rectal and throat cultures
- Urine or blood toxicology
Prophylactic treatment for alleged acute sexual assault

- Ceftriaxone 125mg IM
- Metronidazole 2g PO
- Azithromycin 1g PO
- Hepatitis B vaccine
- Tetanus toxoid
- Levonorgestrel 0.75mg PO q12h X 2 doses

Vaginal Bleeding

- Hormonal
- Non gynecologic
- Dermatologic
- Traumatic
- Infectious
- Structural

Foreign body

- Cervical or vaginal polyps
- Hemangioma
- Urethral prolapse
- Sarcoma botryoides
Urethral prolapse
- Painless bleeding vulvar nodule
- Caused by repetitive valsala maneuvering
- Treat with topical estrogen cream
- Do NOT biopsy!

Lichen sclerosis
- White, atrophic, parchment like skin, subepithelial hemorrhage
- Loss of demarcation of the labial structures, scarring of the clitoral hood, hour glass configuration involving the anus
- Symptoms including pruritis, bleeding, soreness, irritation, dysuria, dyschezia, constipation
- Treat with clobetasol 0.05% ointment bid
- 5% lifetime risk of squamous cell carcinoma
**Vulvar ulcers**

- Viral syndrome
- Beçhets
- Crohn’s disease
- Infectious ulcers

**Vulvovaginitis**

- Poor hygiene
- Vagina and anus in close proximity
- Lack of protective hair
- Lack of estrogenization
- Urinary reflux

**Staph infections**

**Assessment and treatment for vulvovaginitis**

- Vulvovaginal culture
- Wet mount
- Augmentin 40mg/kg/d divided tid X 10 days
- Clindamycin 25mg/kg/d divided tid X 10 days

**Candida**

**Vaginal Bleeding**

- Hormonal
- Non gynecologic
- Dermatologic
- Traumatic
- Infectious
- Structural
Endometrial response to estrogen

Estrogen withdrawal bleeding in the neonate

Physiologic neonatal ovarian cysts
- Functional neonatal ovarian cysts develop in utero in response to maternal hormones
- Clinically significant ovarian cyst occur in 1/2,500 live female births
- Rupture can result in estrogen withdrawal bleeding

Physiologic neonatal ovarian cysts

True precocious puberty
- Activation of the HPO axis
- Includes secondary sexual characteristics
- Idiopathic
- Cerebral lesions
- Primary hypothyroidism

Precocious pseudopuberty
- Gonadotropin-independent
- Ovarian tumors
- Adrenal tumors
- Congenital adrenal hyperplasia
- McCune-Albright syndrome
- Exogenous estrogens
- Premature menarche

Normal menstrual cycle
- Estrogen causes proliferation of the endometrium
- Progesterone stabilizes the endometrium
- Hormonal withdrawal causes lysosomal membrane destabilization and leakage
- Prostaglandins, proteases, and collagenases cause tissue breakdown and vasoconstriction of blood vessels
- Thrombin plugs spontaneously form

Dysfunctional uterine bleeding: The hormonal imbalance of adolescence

- Estrogen breakthrough bleeding
  - Estrogen causes proliferation of the endometrium
  - Anovulation results in persistent estrogen and excessive growth of the endometrium
  - Disorganized destabilization of the endometrial lining
  - Dysfunctional bleeding

Diagnostic tools

- History and physical exam
- βHCG
- CBC with platelets
- PT/PTT
- Liver and renal function tests
- TSH/Prolactin
- Pelvic ultrasound

Dysfunctional uterine bleeding

- Estrogen breakthrough bleeding
- Estrogen withdrawal bleeding
- Progesterone breakthrough bleeding
- Progesterone withdrawal

Estrogen breakthrough bleeding

- Anovulation
- Continuous OCPs

Treatment for dysfunctional bleeding

- Consider blood transfusion
- Short term estrogen therapy
  - High dose conjugated estrogen 25mg IV q4h X 24 hours OR
  - Conjugated estrogen 1.25mg or 2.0mg po qd X 7 days
- OCP taper 4X4, 3X3, 2X2, 1X1
- Withdrawal
- Maintain on OCPs or cyclic progestins

Anovulation

- Adolescence
- Obesity
- Polycystic ovaries
- Congenital adrenal hyperplasia
- Hypothalamic dysfunction
- Hyperprolactinemia
- Hypothyroidism
- Medications
Dysfunctional uterine bleeding: The hormonal imbalance

- Estrogen breakthrough bleeding
- Estrogen withdrawal bleeding
- Progesterone breakthrough bleeding
- Progesterone withdrawal

Estrogen withdrawal

- Metabolism of maternal hormones
- Ruptured ovarian cyst
- Missed OCPs

Treatment for estrogen withdrawal

- Add back estrogen
  - high dose conjugated estrogen 25mg IV q4h X 24hours OR
  - Conjugated estrogen 1.25mg or 2.0mg po qd OR
  - low dose estrogen 0.625mg po qd
- Progestin maintenance or combined estrogen/progesterone maintenance

Dysfunctional uterine bleeding: The hormonal imbalance

- Estrogen breakthrough bleeding
- Estrogen withdrawal bleeding
- Progesterone breakthrough bleeding
- Progesterone withdrawal

Treatment for progesterone breakthrough bleeding

- Estrogen therapy
  - Conjugated estrogen 1.25mg or 2.0mg po qd OR
  - low dose estrogen 0.625mg po qd
- Progestin
- Withdrawal
- Monophasic 30-35µg OCPs maintenance

Dysfunctional uterine bleeding: The hormonal imbalance

- Estrogen breakthrough bleeding
- Estrogen withdrawal bleeding
- Progesterone breakthrough bleeding
- Progesterone withdrawal
Progesterone withdrawal bleeding
- Normal menstrual cycle
- Provera challenge
- OCPs

Alternate treatments for menorrhagia
- Plasminogen activator inhibitors reduce menstrual blood flow by 40-50%
- Hemostatic agents that correct abnormal platelet function reduce capillary bleeding
- Levonorgesterol IUD
- Antifibrinolytics

Pregnancy
- Spontaneous abortion
- Incomplete abortion
- Threatened abortion
- Ectopic pregnancy
- Subchorionic hematoma
- Implantation

Vaginal Bleeding
- Hormonal
- Non gynecologic
- Dermatologic
- Traumatic
- Infectious
- Structural

Systemic diseases
- Blood dyscrasias
- Liver disease
- Chronic renal disease
- Systemic lupus erythematosus
- endocrinopathies
- Infection

Bleeding dyscrasias
- Von Willebrand’s disease
- Prothrombin deficiency
- Platelet aggregation disorders
- Leukemia
- Idiopathic thrombocytopenic purpura
- hypersplenism
Screening for coagulation disorders

- History
- Physical exam
- CBC
- Platelet count
- Complete metabolic panel
- Fibrinogen level
- Platelet function
- PT/PTT
- Factor VIII level, vWF level, and ristocetin cofactor

Medications contributing to abnormal uterine bleeding

- Anticoagulants
- Steroids
- Hormonal therapy
- Herbal medications/natural supplements

Adnexal masses

- Paraovarian cyst
- Dermoid cysts
- Adnexal torsion
- Simple cyst
- Malignancy

Twisting of the ovary on its ligamentous supports results in impedance of blood supply
Factors predisposing to adnexal torsion in children

- Ovarian masses
- Elongated utero-ovarian ligament in prepubertal girls
- Persistant neonatal ovarian cyst
- Müllerian anomalies

Ovarian and fallopian tubal torsion

- 94% of cases associated with ovarian cyst or neoplasm, although normal ovaries may also tort
- May be associated with strenuous exercise or sudden increase in abdominal pressure
- Neonates present with abdominal mass, feeding intolerance, vomiting, abdominal distension and irritability

Incidence and Trends of Pediatric Ovarian Torsion Hospitalizations in the US, 2000-2006

- Incidence of ovarian torsion in age group 1-20 yo is 4.9/100,000
- 58% of cases of ovarian torsion in children are associated with benign masses
- Less than 0.5% of ovarian torsion cases were associated with malignant neoplasm
- There were no cases of venous thromboembolism

Symptoms associated with ovarian torsion

- Stabbing pain (70%)
- Nausea and vomiting (70%)
- Sudden and sharp pain in the lower abdomen (59%)
- Pain radiating to back, flank, or groin (51%)
- Peritoneal signs (3%)
- Fever (<2%)

Transabdominal pelvic ultrasound

- Peripheral follicles with stromal edema
- Heterogenously enlarged ovaries
- Free fluid in the cul-de-sac
- A ratio of torsed adnexal volume to the normal adnexal volume greater than 20 is predictive of a mass inside the ovary
- Color flow Doppler can be appreciated in a torsed ovary
- Color flow Doppler can be absent in normal ovaries

The role of ultrasound in ovarian torsion
The role of inflammatory markers in ovarian torsion

![Graph showing inflammatory markers in ovarian torsion](image)


Ovarian torsion

- Surgical emergency to preserve ovarian functioning
- Must have high clinical index of suspicion in patients with acute and/or intermittent, variable abdominal pain and nausea/vomiting

Surgical management of ovarian torsion

- Diagnostic and therapeutic laparoscopy
- Exploratory laparotomy
- Ovarian preservation
- Detorsion of ovary
- Cystectomy
- Detorsion with second procedure cystectomy
- Cyst aspiration
- Ovarian bivalving
- Oophoropexy
- Oophorectomy

What should you do with the purple, black, and ugly ovary?

DETORT THE OVARY!

Assessing ovarian viability

- Color flow Doppler is not a reliable measure of ovarian viability
- Leukocytosis, fever, and signs of peritonitis may indicate irreversible damage to the ovary
- Macroscopic appearance is not a good indicator of viability
Detorsion of the Ovary

<table>
<thead>
<tr>
<th>Study</th>
<th>% recovery of ovarian function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oelsner et al. (1993)</td>
<td>91% (85/92)</td>
</tr>
<tr>
<td>Mage et al., (1989)</td>
<td>94% (16/17)</td>
</tr>
<tr>
<td>Shalev et al. (1995)</td>
<td>94% (49/52)</td>
</tr>
<tr>
<td>Rody et al. (2002)</td>
<td>100% (2/2)</td>
</tr>
<tr>
<td>Azziz et al., (2004)</td>
<td>100% (14/14)</td>
</tr>
<tr>
<td>Celik et al. (2005)</td>
<td>92% (13/14)</td>
</tr>
<tr>
<td>Rousseau et al.</td>
<td>100% (19/19)</td>
</tr>
<tr>
<td>Levy et al.</td>
<td>100% (3/3)</td>
</tr>
<tr>
<td>Pansky et al.</td>
<td>88% (7/8)</td>
</tr>
<tr>
<td>Cohen et al. (1996)</td>
<td>100% (7/7)</td>
</tr>
<tr>
<td>TOTAL</td>
<td>93% (211/227)</td>
</tr>
</tbody>
</table>

How long is too long to wait to detorse the ovary?

- The adnexa of rats were twisted for 36 hours or until they became bluish-black in appearance.
- Any ovaries that were torsed under 24 hours showed no immediate or delayed evidence of necrosis on histologic evaluation.
- Ovaries torsed for 36 hours showed immediate and delayed adnexal necrosis.

Is there a role for post operative ultrasound?

- Rule out malignancy
- Assess viability
- Serial ultrasounds are not indicated

How do we prevent recurrence?

Oophoropexy

- Utero-ovarian ligament at the ovarian insertion is attached to the ipsilateral uterosacral ligament using permanent suture
- Plication of the utero-ovarian ligament
- Ovary can be sutured to the pelvic sidewall

Oophoropexy

Pros
- May prevent recurrent torsion of a detorsed ovary
- May prevent torsion with polycystic ovaries
- Elongated utero-ovarian ligaments likely pose a higher risk of recurrence
- May be prophylactically useful for the contralateral ovary following unilateral oophorectomy

Cons
- Theoretical risk of impaired blood supply
- Theoretical risk of peritubal adhesions
- Insufficient data on future fertility functioning

Ovarian torsion key points

- Early intervention for ovarian torsion results in preservation of ovarian function, despite the gross appearance of the ovary
- Ultrasonographic appearance of the ovary is a useful tool for managing ovarian torsion, but color flow Doppler is not reliable
- Oopheropexy of the detorsed adnexa or the contralateral ovary may be appropriate

Obstructed Müllerian Anomalies

Obstructed Müllerian Anomalies

- Segmental vaginal agenesis
- Imperforate hymen
- Transverse vaginal septum
- Functional rudimentary uterine horn
- OHVIRA
- Cervical agenesis
- Cyclic abdominal pain and Pelvic Mass in Adolescents

Think Mullerian Anomaly

Developmental embryology of the reproductive tract

- Gonads
- Paramesonephros
- Mesonephros
- Metanephros
- Urogenital sinus
- Sinovaginal bulbs

Müllerian Duct Development

- The 2 müllerian ducts are initially composed of solid tissue and lie side by side.
- Internal canalization of each duct produces 2 channels divided by a septum that is resorbed in a cephalad direction by 20 weeks.
- The cranial, unfused portions develop into the fimbria and fallopian tubes.
- The caudal, fused portions form the uterus and upper vagina
Cyclic pelvic pain and amenorrhea

- Imperforate hymen
- Transverse vaginal septum
- Segmental vaginal agensis

Cyclic pelvic pain with normal menses

OHVIRA
- Uterine didelphys
- Obstructed hemivagina
- Ipsilateral renal agenesis

Functional Rudimentary horn
- Unicornuate uterus
- Contralateral cervical and vaginal agenesis

Obstruction to menstrual egress

- Pelvic pain
- Hematometria/hematocolpos
- Pyometria/pyosalpinx
- Endometriosis

What should you do?

Do
- Suppress menses
- Provide analgesia
- Decompress the bladder for urinary retention
- Refer to specialist for surgical intervention

Don’t
- Perforate the dilated structure
- Attempt drainage
- Operate before the anatomy is clearly defined
Endometriosis in Adolescents –
The Beginning of the Story

Marc R. Laufer, M.D.
Chief of Gynecology
Children’s Hospital Boston
Center for Reproductive Medicine Brigham &
Women’s Hospital
Director, Boston Center for Endometriosis
Harvard Medical School

Disclosure
I have no financial relationships to disclose.

Objectives
• At the conclusion of this presentation the participant will be able to:
  – identify common adolescent endometriosis lesions
  – Recommend treatment options for adolescents with endometriosis

15 year old with pelvic pain
• Pain for 6 months
• Worse with period
• Missing school
• Called your office with increased pain
• Sent to EW and found to have 6cm ovarian cyst
• Asked to follow up in Gyn
• Seen in Gyn 2 days after EW visit
• Asked to start OCP for dysmenorrhea and ovarian cyst suppression
• US 4 weeks later: normal
• Pain persists

Dysmenorrhea
• Accompanies 20 - 90% of adolescent menstrual cycles
• Dysmenorrhea that significantly interferes with function 1 - 3 days/month affects 5- 42% of adolescents
• More likely be primary than secondary in origin

Medical Management of Pelvic Pain/Dysmenorrhea
• Combined oral contraceptives (COC’s)
  – Numerous overall benefits
• Progestin-only OC’s may also be beneficial is special circumstances
• If there is a persistence of pain on COC and NSAIDS then we need to proceed with a diagnosis
How do we decide when it is no longer dysmenorrhea and further evaluation is required?

Don’t “normalize” symptoms

- Dysmenorrhea that fails to respond to conventional treatment is not a “normal” occurrence
- Women should not be led to believe that they simply have to endure pelvic pain because it is their lot in life to do so.

A young woman’s dreams

Costs of Endometriosis

- Yearly total (direct & indirect)
  - Europe: 30 billion Euros
  - US: 22 billion dollars


Data From the International Endometriosis Association

- Registry of 4000 women with endometriosis
- Most women see approximately 9 health care providers prior to diagnosis
- Most women have had symptoms that they associate with endometriosis since adolescence
  - 21% had severe pain under age 15
  - 17% age15-19
  - 12% age 20-24
  - 50% 24 or younger

Endometriosis: Etiologies

- Sampson’s theory: retrograde menstruation
- Hematogenous and/or lymphatic spread of endometrial tissue
- Metaplastic transformation
- Immune system abnormality to ectopic endometrium
- Environmental exposures [Dioxin]
- Genetic predisposition
Endometriosis: Symptoms

- None
- Pain: dysmenorrhea; localized pain; dyspareunia; noncyclic pain
- GI: constipation, diarrhea, hematochezia, melena
- GU: hematuria, dysuria, frequency, urgency
- Pelvic Mass/Cyst [not usually seen prior to age 22]
- Subfertility/Infertility: Stage I to Stage IV

Endometriosis: Co-Occurrences

- Interstitial Cystitis
- IBS
- Kidney/uteral stones
- Temporo-mandibular disorders
- Migraines
- Fibromyalgia
- Vulvodynia

Adolescent Physical Exam

- What is the goal?
  - Rule out:
    - Obstructive anomaly
    - Ovarian mass
  - Bimanual
    - May not be possible
    - Q-tip test
    - Recto-abdominal
  - Unlikely findings
    - Uterosacral nodularity
    - Endometrioma

Adoelscent Endometriosis: Diagnosis

- No diagnostic blood test
- No diagnostic imaging study
- History
- Physical Exam- A pelvic exam should not be barrier for evaluation [patency, ? Mass]
- Trial of NSAIDs & CHT
- Laparoscopy for diagnosis AND surgical management

Incidence of Endometriosis in Adolescents With Pelvic Pain Diagnosed by Laparoscopy

- 69% – Laufer (1997)*
- 97% – Laufer (2012)

*data from early '90s, optics now better, ie higher rates

Characteristics of Subjects With & Without Endometriosis


<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Patients with Endometriosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Presenting Symptoms</td>
<td>N=32, Number (Percent)</td>
</tr>
<tr>
<td>Acyclic and cyclic pain</td>
<td>20 (62.5)</td>
</tr>
<tr>
<td>Acyclic pain</td>
<td>9 (28.1)</td>
</tr>
<tr>
<td>Cyclic pain</td>
<td>3 (9.4)</td>
</tr>
<tr>
<td>Gastrointestinal pain</td>
<td>11 (34.4)</td>
</tr>
<tr>
<td>Urinary symptoms</td>
<td>4 (12.5)</td>
</tr>
<tr>
<td>Irregular menses</td>
<td>3 (9.4)</td>
</tr>
<tr>
<td>Vaginal discharge</td>
<td>2 (6.3)</td>
</tr>
</tbody>
</table>
Data From the International Endometriosis Association

- Registry of 4000 women with endometriosis
- Most women see approximately 9 health care providers prior to diagnosis
- Most women have had symptoms that they associate with endometriosis since adolescence
  - 21% had severe pain under age 15
  - 17% age 15-19
  - 12% age 20-24
  - 50% 24 or younger

What’s the delay? A qualitative study of women’s experiences of reaching a diagnosis of endometriosis
Ballard K, Lowton K, Wright J

- Significant delay in diagnosis [11.8y in US, 6.7 in UK]
- Diagnostic laparoscopy after failure of first line
- Women suffer at physical, emotional and social levels when they remain undiagnosed

Patients’ report on how endometriosis affects health, work, and daily life

- 108 patients in Puerto Pico
- Majority had symptoms starting 11-19 year of age
- Mean delay in diagnosis was 8.9 years
- Many patients consulted 5 or more physicians prior to diagnosis
- Endometriosis impairs health-related quality of life

There is no correlation between amount of disease and pain.

ASRM Staging Relates to Fertility Potential, Not Pain

Staging and Pain Are Unrelated

<table>
<thead>
<tr>
<th>Incidence</th>
<th>Stage I:</th>
<th>40%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Stage II:</td>
<td>24%</td>
</tr>
<tr>
<td></td>
<td>Stage III:</td>
<td>24%</td>
</tr>
<tr>
<td></td>
<td>Stage IV:</td>
<td>12%</td>
</tr>
</tbody>
</table>

Endometriosis in adolescents is a hidden, progressive and severe disease that deserves attention, not just compassion

<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>Subjects</th>
<th>Age Range</th>
<th>St I %</th>
<th>St II %</th>
<th>St III %</th>
<th>St IV %</th>
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<tr>
<td>Goldstein et al</td>
<td>1980</td>
<td>66</td>
<td>10-19</td>
<td>58</td>
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<td>2005</td>
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<td>4</td>
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<td>Stavropoulou et al</td>
<td>2006</td>
<td>11</td>
<td>13-20</td>
<td>45*</td>
<td>55*</td>
<td>0</td>
<td>0</td>
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<tr>
<td>Viciano et al</td>
<td>2010</td>
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<td>15-21</td>
<td>18</td>
<td>15</td>
<td>34</td>
<td>34</td>
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<tr>
<td>Roman</td>
<td>2010</td>
<td>20</td>
<td>14-20</td>
<td>40</td>
<td>45</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>Yang</td>
<td>2012</td>
<td>63</td>
<td>12-20</td>
<td>8</td>
<td>3</td>
<td>52</td>
<td>37</td>
</tr>
</tbody>
</table>

* = St 1&2, ^=St 3&4

---

**Endometriosis: Types of Lesions and Pain**

- Clear 76%
- Red 84%
- White 44%
- Black 22%
- Pain perception 1-27 mm from lesion

---

**Different appearances of endometriotic implants**
Identification of Clear Lesions
- use of liquid medium to improve visualization
- improve magnification
- 3-dimensional effect

Surgical Approaches
- Laparoscopy (laparotomy is not a failure)
- Open laparoscopy vs. direct insertion
- Resection or Ablation
- Laser, scissors, harmonic scalpel, electrosurgery
- Hysterectomy
- Hysterectomy with bilateral oophorectomy

Surgical Excision vs Ablation
- Randomization at initial laparoscopy for CPP if Stage I or II diagnosed: ablation with cautery or excision
- 24 patients with 12 in each group with 6 month follow up
- Significant improvement in pain in both groups
- No difference in either group
- 1 patient in each group had worsening of symptoms

Clear lesions & destruction
Plaque lesions & destruction

Surgical Outcomes in Adults
Now we have published follow up in adolescents!

Medical Treatment for All Patients
- No surgical cure of endometriosis
- Treatment until childbearing is complete or fertility is no longer desired
- Limit the life-time surgical procedures
- Hysterectomy should not be a recommendation for an adolescent

Medical Treatment Options in Adults
- Estrogen/Progestin
  - Continuous [OCPs/Ring]
- Progestins
  - Depo-Provera
  - Aygestin [5-15mg/day]
- Danazol
- GnRH agonists with add-back
  - Aygestin [5mg]
  - PremPro [.625/2.5]
  - Do Not Use OCPs for Add-back
- GnRH-antagonists with add-back
- Anti-estrogens or anti-progestins

Continuous Combination Hormonal Therapy
Monophasic progestin dominant pill-21
Disp: 4 packs [3 months]
Sig: 1 po q D without breaks or placebos for Rx of endometriosis

Progestins and Endometriosis
- +/- ovulation inhibition
- Decidualization
- Decreased menstrual flow
- Formulations
  - progestin only pill
  - Norethindrone acetate [5-15mg]
  - Depo-provera
Use of norethindrone acetate alone for postoperative suppression of endometriosis symptoms

- 194 patients with surgically confirmed endometriosis
- Median age 18.9 years [10.2 – 41.9]
- 92.2% had Stage I or II disease
- Pain 0-10 severity scale
- Bleeding 0-4
  0 = no bleeding, 1 = spotting, 2 = irregular bleeding once monthly, 3 = weekly bleeding, 4 = daily bleeding
- FDA approved dose: 5-15mg
- Self-titrate to amenorrhea and decreased pain

Results

- 55.2% had no SE
  -16.1% wt gain
  -9.9% acne
  -8.9% mood swings
- 64.7% reported lower pain scores
- 58.1% reported reduced bleeding

Bone Density in Adolescents Treated with a GnRH Agonist and Add-Back Therapy for Endometriosis
DiVasta AD, Laufer MR, Gordon CC

- BMD at the hip normal in most adolescents with endometriosis receiving leuprolide and add-back therapy with norethindrone acetate
- 1/3 of subjects had clinically significant skeletal deficits (Z-score ≤ -1.0) at the spine
  - Greater than expected in normal population
  - Likely due to GnRH-a induced low-estrogen state
- Duration of treatment not associated with BMD at hip or spine

Outcomes in Adolescents

The Effect of Standard Surgical-Medical Intervention on the Progression of Endometriosis

- 90 patients age 12-24
- Laparoscopy for diagnosis & surgical treatment
- Medical treatment
  - Continuous E/P [91%]
  - LA + NA or Prempro [78%]
  - P only [12%]
- 2nd laparoscopy due to pain
- Trend towards disease progression not seen
- Standard surgical-medical management retards disease progression

Necessity of Post-op medication?

- 20 prospectively enrolled ages 12-19
  - Pre-op questionnaire
  - Laparoscopy with “complete excision of endometriosis”
  - F/u questionnaire @ 1-2 yr intervals (median Cu 23 months)
- No specific post surgical recommendation made to participants regarding hormonal therapy
  - May use for contraception or suppression “patient's choice”
Results

- 6/17 subjects OCP
  - Duration 10-22 months
- 1/17 subjects utilized GnRHa
  - Duration 6 months
- 8/17 subjects had recurrent pain and underwent repeat laparoscopy. No endometriosis appreciated [visually or histologically]

Conclusions

- Author’s conclusions
  - “Careful/complete excision of endometriosis” improves quality of life
  - Pain relief from surgery persist without medical therapy (up to 2 years)
- Problems:
  - Pain persisted in 50% of patient regardless of operative findings
  - 50% of patients required a 2nd operation within 2 years due to pain
  - Does not address fertility concerns

Adolescent Endometriosis Management

- Need for Diagnosis/surgery
  - ACOG: “After a comprehensive evaluation and an adequate trial of hormone therapy and NSAIDs, laparoscopy should be offered for diagnosing and treating presumed endometriosis”
- Surgical Treatment: excision/ablation of all visible lesions
  - Importance of adolescent lesions
- Since there is no cure for the disease, post-operative medical therapy until child bearing is complete

Endometriosis in adolescents is a hidden, progressive and severe disease that deserves attention, not just compassion


- Importance of early diagnosis
- Early intervention to avoid progression

Boston Center for Endometriosis

- Biorepository and Clinical Database
  - $3 million gift - J. Willard & Alice S. Marriott Foundation
  - Additional $1.5 million for research
- Development of a non-invasive diagnostic
- New treatments on the way to a cure
- Life long endometriosis data base from adolescence through adulthood [BCH & BWH]
  - Genetic predisposition, Environmental exposure, Diet, Long term follow up [% need for additional surgery, future fertility]
**Current Research: Biorepository**
- Collect blood, urine, saliva, fluid from the pelvic cavity, and tissue from adolescents and adult women with endometriosis
- Development of a non-invasive diagnostic
- New treatments on a way to a cure

---

**Clinical Data Base**
- Life long endometriosis data base
  - Genetic predisposition
  - "Fast track" evaluation and treatment
  - How should we manage the daughter of a woman with a history of infertility, Stage IV endometriosis, and no pelvic pain?
  - Associated diseases
  - Environmental exposure
  - Long term follow up [% need for additional surgery, future fertility]

---

**The Importance of Awareness**
- If adolescent endometriosis can be kept from progressing with surgical destruction followed by medical therapy
- And if early diagnosis can save a woman’s fertility and prevent extreme physical and emotional pain
- Need to improve awareness
  - www.endometriosisassn.org
  - www.youngwomenshealth.org
  - www.bostoncenterendometriosis.org

---

**Education and Life Long Support**

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**Educating Professionals**
Conclusions

- Endometriosis does occur in adolescents
- Early diagnosis to decrease pain & progression
- Education and awareness is the key to decreasing pain, suffering and infertility

References

Surgical approach to Müllarian Anomalies and vaginal agenesis

Prof. Dr. S. Brucker

Frauenklinik

Disclosure

I have no financial relationships to disclose.

Congenital Vaginal Agenesis

- Mayer - Rokitansky - Kuster - Hauser – Syndrom (Incidence 1: 4000 -5000)
- AIS = Androgen Insensitivity Syndrom (Incidence 1: 25000)

as complex as misleading

Oppelt, Brucker: Hum Reprod. 2006 Mar
Malpractice (n=163)

<table>
<thead>
<tr>
<th>Condition</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Imperforate hymen</td>
<td>15.4%</td>
</tr>
<tr>
<td>Hymen incision</td>
<td>8%</td>
</tr>
<tr>
<td>Ovarian Insufficiency</td>
<td>25.3%</td>
</tr>
<tr>
<td>TOTAL</td>
<td>40.9%</td>
</tr>
</tbody>
</table>

3 „A“: asymptomatic, amenorrhoe, aplasia


Diagnostic:
- History
- Rectal / introitus ultrasound
- Digitale Palpation (vaginal, rectal)
- Chromosome-analyses
- hormone profile
- Uro-MRT
- diag. laparoscopy

Different methods of creation of neovagina

Non-operative:
- Dilatation of pseudohymenal membrane with dummies (Frank)
  Disadvantages: painful, duration, compliance, prolaps of neovagina

Operative creation of neovagina
- with transplantation
  - free skin / mash-graft (Mc.Indoe)
  - bowel (sigmoid, ileum, rectum: Schmid, Baldwin, Bryan)
  - peritoneum (Ravdin)
  Disadvantages: big operative-technical deal, wound healing problems, shrinking, scars, need for lubrication, smelling discharge
- without transplantat: minimal-invasive surgical method

Prolaps after self-dilatation

McIndoe procedure with mash-graft
Laparoscopic-assisted creation of neovagina

Prolaps after Sigmoid-vagina

Management of vaginal agenesis (Tübingen)

Vaginal agenesis

Pre-operative procedure

Oncological Operation

No

Yes

Lsc.-ass. Neovagina

Mc Indoe

Sigma

Brucker: Geburtsh Frauenheilk 2005 Nov

Laparoscopic-assisted Neovagina: Optimizing due to new traction device and vagino-abdominale Perforation without dissection of vesico-rectale space

Surgical steps

- 1. laparoscopic step:
  Recto-vaginale palpation, simultaneously cystoscopy + laparoscopy (=diaphanoscopy), laparoscopic decision of the perforation point

- vaginal step:
  perforation of vaginale membrane without dissection

- 2. laparoscopic step:
  retroperitoneal guidance of threads

- Fixation of traction device

Gauwerky, Wallwiener: Arch Gynecol Obstet 1992; 252

Laparoscopic-assisted Neovagina: Application - Instruments

Thread Guide

- straight Thread Guide
- two Curved Thread Guides - peritonealization

Pluggable segmented dummy

- central hole for flowing off secretion
- determine of the exact length of the neovagina
- suprapubic catheter

Traction device

- no ripping off of the threads
- stable direction of the tension
- possibility of tighten equally both traction threads
- no unintentional opening
- smooth surface

Dummies

- postoperative dummies, different sizes for individually use
  (length 10 cm or 12 cm; diameter 2, 2,5 and 3 cm)


Placement of traction device

Results: optimized vs. conventional armentarium

<table>
<thead>
<tr>
<th></th>
<th>new set (n = 122)</th>
<th>old set (n = 50)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ripping of threads</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td>slipping of traction device</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>skin lesions</td>
<td>non</td>
<td>10</td>
</tr>
<tr>
<td>Luxation of dummy</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Dehiszenz Neovagina</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Time of tension (days)</td>
<td>4.8*</td>
<td>7.5*</td>
</tr>
</tbody>
</table>

Infinitely variable and equally tighten of both traction threads
* no tearing of the neovagina

Results n=180:
Vagino-abdominale Perforation with vs non dissection of vesico-rectal space

<table>
<thead>
<tr>
<th>Results:</th>
<th>With vrD (n = 12)</th>
<th>No vrD Old Set (n = 18)</th>
<th>No vrD New Set (n = 170)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operation Time (min)</td>
<td>113* (75 - 155)</td>
<td>93.5* (55 - 150)</td>
<td>47.5* (20 - 114)</td>
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<tr>
<td>passagere intraoperative Via falsa: bladder (rectum)</td>
<td>1 (0)</td>
<td>1 (0)</td>
<td>2 (0)</td>
</tr>
<tr>
<td>Injury of A. Iliaca externa</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Bleeding after removing device</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Post-op. length neovagina (cm)</td>
<td>8.9* (6 - 12)</td>
<td>7.8* (6 - 12)</td>
<td>9.8* (6 - 12.5)</td>
</tr>
<tr>
<td>Time of tension (Days)</td>
<td>11.7* (7 - 15)</td>
<td>7.5* (4 - 13)</td>
<td>4.8* (2 - 7)</td>
</tr>
</tbody>
</table>

Satisfaction (FSFI)

- Sexual intercourse
- no-sexual intercourse

Interventional Trail in Health Care Research
BMBF-FKZ: 01GY1125

Rate of regular intercourse

Vaginal mucosa: normal in thickness.
PAS-reaction: broad intermediate cell zone with abundant cytoplasmic glycogen and a covering layer of narrow, superficial cells.
IH reaction (cytokeratin 13): normal epithelial cells, squamos differentiations
Translational research: Cause of MRKH-Syndrome

- Detection of endometrium
- Defect of estrogen-receptor (Ki-67-expression)
- Epigenetic factors: Overexpression ER-1

Congenital malformation of the vagina

- Labia synechia
- Septated hymen
- Imperforate hymen
- Vertical / longitudinal vaginal septum
- Vaginal aplasia
  - Mayer-Rokitansky-Kuester-Hauser-Syndrome
  - AIS
Laparoscopic-assisted creation of neovagina

**Congenital malformation of the vagina**

- labia synechia
- septated hymen
- **imperforate hymen**
- vertical / longitudinal vaginal septum
- vaginal aplasia
  - Mayer-Rokitansky-Kuster-Hauser-Syndrome
  - AIS

Laparoscopic-assisted creation of neovagina

**Mucolpos**

Laparoscopic-assisted creation of neovagina

**Haematocolpos**

Laparoscopic-assisted creation of neovagina

**Haematocolpos**

Laparoscopic-assisted creation of neovagina

**Congenital malformation of the vagina**

- labia synechia
- septated hymen
- imperforate hymen
- **vertical / longitudinal vaginal septum**
- vaginal aplasia
  - Mayer-Rokitansky-Kuster-Hauser-Syndrome
  - AIS
Laparoscopic-assisted creation of neovagina

Vaginal septum
- Longitudinal septum reaching the introitus
- Problems with vaginal delivery / sex, intercourse
- Septum in the upper third of vagina = lower birth rate (only 20%)
- High incidence of endometrioses due to retrograde monthly bleeding
- "paravaginal tumor" due to second rudimentary vagina

Haematokolpos - vertical vaginal septum

Cervical aplasia and vaginal vertical septum

Uterine malformations

Uterus bicornis
- Inhibitory malformation of Müllerian duct → 2 separated uteri
- Uterus bicornis combined with cervix duplex = Uterus didelphys
- Often combined with vaginal septum
- Strassmann - metroplastic
  - Patients with symptoms: abortion, premature birth

Uterus bicornis and myomectomy

Cervical aplasia in 1 rudiment with haematometra
Laparoscopic-assisted creation of neovagina

Surgical approach to Müllerian Anomalies and vaginal agenesis

Prof. Dr. S. Brucker
**Pediatric Gynecologic Oncology**

Robert K. Zurawin, MD
Associate Professor
Director Minimally Invasive Gynecologic Surgery
Baylor College of Medicine
Houston, Texas

---

**Ovarian Cysts**

- Functional
- Hemorrhagic Corpus Luteum
- Non-functional
  - Benign
  - Malignant

**Diagnostic tests**

- Ultrasoundography
- If solid tumor:
  - hCG, α-fetoprotein, CA-125
  - FSH, LH
  - testosterone
- If malignancy suspected:
  - CXR, CT, LFT

---

**Incidence/Adolescent Genital Tumors**

- Incidence increased due to greater detection rate
- All tumors seen in adults are seen in children BUT the relative incidence is different
- Anovulatory cycles ⇒ functional cysts
- Germ cell tumors > epithelial tumors
- 1/10 ovarian tumors during childhood and adolescence are malignant
- 25-40 percent of ovarian cancers in children are germ cell tumors

---

**Pediatric/Adolescent**

- Most masses are large when first detected because children/adolescents do not have pelvic exams
- Abdominal presentation due to small pelvic size
- Smaller lesions are usually detected only as an incidental finding in the work-up of pain
- These are almost always functional
- A solid ovarian mass in childhood is malignant until proven otherwise

---

**Disclosure**

- Consultant: Conceptus Incorporated, Ethicon Endo-Surgery, Hologic

---

References:

**Pediatric/Adolescent**

- Rupture
- Torsion
- Hemorrhage
- Compression of bladder or bowel
- Bowel infiltration
- Peritoneal irritation

**Symptoms**
- Hemorrhage
- Ascites
- “Malignant” behavior
- Precocious puberty
- Virilization
- Menstrual irregularities

Only benign ovarian tumors are candidates for minimally invasive surgery.

- **Genital Tumors**
  - Rare tumors of the uterus (sarcomas) are not suitable for minimally invasive surgery, except for diagnostic purposes.
  - Rhabdomyosarcoma of the vagina (sarcoma botryoides) may be diagnosed and treated using vaginoscopy.
  - Solid tumors (especially those >3 cm) should not be approached laparoscopically.

**Rules of Thumb**
- Simple and small is good
- Complex and large is bad

**“Tumor markers”**

<table>
<thead>
<tr>
<th>Marker</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>AFP</td>
<td>Endodermal sinus tumors, embryonal carcinomas, mixed germ cell tumors</td>
</tr>
<tr>
<td>CA-125</td>
<td>All epithelial tumors, especially serous endometriosis, infections</td>
</tr>
<tr>
<td>HCG</td>
<td>Choriocarcinoma, embryonal carcinoma, mixed germ cell tumors</td>
</tr>
</tbody>
</table>

**“Tumor markers”**

- LDH: Dysgerminoma, mixed germ cell tumors
- Testosterone: Sertoli cell tumors, Leydig (hilus) cell tumors
- Estradiol: Adult granulosa cell tumors, thecomas

**“Surgical Evaluation”**

- Premenopausal Ovarian Mass
- Exclude Non-gynecologic Problem
- Simple on US, AND < 6 cm, AND Normal CA-125 OR Solid or Complex on US, OR > 6 cm, OR Elevated AFP/hCG/LDH, OR Elevated CA-125
- Observation for 6-8 weeks and Gonadotropin Suppression (OCP)
- Persistent on US
- Surgical Evaluation
Criteria for Minimally Invasive Surgical Approach

- Negative tumor markers
- No free peritoneal fluid
- Unilocular – BUT remember that corpus luteum cysts can appear complex on U/S
- Smooth capsule, no excrescences
- Controversy about dermoids – they have complex radiographic appearance, but may be approached laparoscopically

Gynecological Operations

- Congenital Abnormalities
- Foreign body
- Trauma
- Ovarian cysts
- Pelvic Pain/Endometriosis
- Malignancies
- Pelvic Inflammatory Disease
- Ectopic pregnancies

Dysgenetic Ovaries

- Turner’s syndrome/mosaic
- Any Y-chromosome

Principles of Excision

- Streak ovaries can be very attenuated
- Endo-loop usually not practical – streak ovaries are not pedunculated
- Proximity to pelvic sidewall and ureter requires careful avoidance of collateral injury during dissection
- Attention to hemostasis
Ovarian Malignancies

- Teratomas
  - Usually smooth with no excrescences
  - Challenging to differentiate from benign tumors radiographically
  - Rare free fluid
  - Tumor markers variable
  - False negative pathologic diagnosis is common
  - Preponderance of neural elements suggestive of increased malignancy

Dysgerminoma

Neuroblastoma

Wilms’ tumor

Rhabdomyosarcoma

Lymphoma

Leukemia

Other nongenital tumors of the pelvis

Grading of Immature Teratomas

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Contains only mature elements.</td>
</tr>
<tr>
<td>1</td>
<td>Immature neuroepithelium present on any one slide occupied up to one low-power microscopic field but did not exceed one low-power field.</td>
</tr>
<tr>
<td>2</td>
<td>Immature neuroepithelium present on any one slide occupied more than one low-power field but did not exceed three low-power microscopic fields.</td>
</tr>
<tr>
<td>3</td>
<td>Immature neuroepithelium present on any one slide exceeded three low-power microscopic fields.</td>
</tr>
</tbody>
</table>

Vaginal Rhabdomyosarcoma (Sarcoma Botryoides)
- Most common soft tissue sarcoma in children
- Genitourinary sites = 20% of primaries
- Usually localized to anterior vaginal wall
- Present as painless vaginal bleeding in pre-pubertal girls
- Poorer prognosis if extends to the cervix.
- MRI essential for adequate staging


Radiologic Appearance

Intergroup Rhabdomyosarcoma Staging System

<table>
<thead>
<tr>
<th>Group</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1</td>
<td>Localized tumor, completely resected, no nodal involvement</td>
</tr>
<tr>
<td>A. confined to muscle of origin</td>
<td></td>
</tr>
<tr>
<td>B. contiguous involvement beyond muscle of origin, negative surgical margins</td>
<td></td>
</tr>
<tr>
<td>Group 2</td>
<td>Growth resected with evidence of regional spread</td>
</tr>
<tr>
<td>A. complete gross resection with positive surgical margins</td>
<td></td>
</tr>
<tr>
<td>B. complete resection with positive regional nodes</td>
<td></td>
</tr>
<tr>
<td>C. positive regional nodes with positive surgical margins</td>
<td></td>
</tr>
<tr>
<td>Group 3</td>
<td>Incomplete surgical resection with gross residual disease</td>
</tr>
<tr>
<td>Group 4</td>
<td>distant metastatic disease at presentation</td>
</tr>
</tbody>
</table>
Summary

- Preserve reproductive and sexual function if possible
- If malignancy is suspected, perform a unilateral salpingo-oophorectomy
- This may be performed laparoscopically if specimen can be removed intact
- Pursue staging and metastatic workup based on final permanent pathology
Gynecologic Outcomes of Bariatric Surgery in Pediatric Adolescent Gynecologic Patient

Joseph S. Sanfilippo, MD, MBA
University of Pittsburgh
Magee-Womens Hospital

BMI Categories:
Underweight = <18.5kg/m2
Normal weight = 18.5–24.9
Overweight = 25–29.9
Obesity = BMI of 30 or greater
Candidates for Gastric Surgery:
BMI > 40 with co-morbidity (DM-Obstructive Sleep Apnea-HTN-Pseudotumor Cerebri
BMI > 50

What is Obesity?

*BMI (Body Mass Index): A measurement of an individual's weight in relation to height (kg/m2)
LEPTIN = satiety hormone
- Produced by adipose tissue, regulates food intake / energy expenditure
- Increased production and secretion correlates w/ amount of fat tissue
- Targets CNS to reduce appetite and food intake
- Deficiencies in leptin signaling / functioning → obesity
- Obesity = leptin resistance / dysfunctional energetic state

Health Consequences of Obesity

Major Health Consequences:
- Type 2 diabetes
- Hypertension
- Sleep apnea
- High cholesterol
- Heart disease

Other Health Consequences:
- Asthma
- Acid reflux (GERD)
- Degenerative arthritis
- Polycystic ovarian syndrome (infertility)
- Stress incontinence
- Depression/anxiety
- Gallstones
- Some cancers

Who is "Predisposed" to Eating Disorders?
- Assess Family Environment-School Environment Social Support
- Abuse- Post traumatic Stress Disorder
- Smoking Substance Abuse
- Mood Disorders
Epidemic Rates Continue to Increase in the United States

Comorbidities in adolescents seeking bariatric surgery

<table>
<thead>
<tr>
<th>% of patients (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hyperinsulinemia</td>
</tr>
<tr>
<td>Sleep apnea</td>
</tr>
<tr>
<td>Dyslipidemia</td>
</tr>
<tr>
<td>Hypertension</td>
</tr>
<tr>
<td>Polycystic ovary disease</td>
</tr>
<tr>
<td>Diabetes</td>
</tr>
</tbody>
</table>

Goals of Psychological Evaluation Pre-Operatively

- Ability to Consent-Family Agreement/Support vs. Coercion
- Motivation-Compliance
- Knowledge regarding procedure(s)
- Post-operative Expectations
- Homework Between Appointments
- Psychological Factor Analysis Ahead of Time

The Health Burden of Obesity

Adolescents should:

- Have failed at least 6 months of organized, physician-supervised conventional attempts at weight management and;
- Have attained or, depending on the severity of co-morbidity, nearly attained physiologic maturity and;
- Be very severely obese (BMI > 40) with serious obesity related co-morbidities and;
- Demonstrate commitment to comprehensive medical and psychological evaluation both before and after surgery and agree to avoid pregnancy for one year post-operatively, and;
- Provide informed consent to surgical management.

### Important Prerequisites

- **Preop Eval.**
  - TSH T4 CMPAN PTH 25-OH Vit D
  - Anthropometrics: Age onset of "Overweight"
  - Medical Co-morbidities
  - Psychological Measures
  - Family History of Obesity Especially with co-morbidities: First & Second degree relatives
  - Surgical Procedure(s) Discussion
  - Risks-Benefits-Alternatives
  - Post-op Recovery Time and Setting

### Bariatric Surgery Options - Adjustable Gastric Banding

**Advantages:**
- No stomach stapling, cutting, or intestinal rerouting
- Low postoperative complication rates
- Low malnutrition risk
- Adjustable/customized for each patient
- Reversible
- Minimally invasive approach for all patients
- Hospital stay is 1 day and 1 night

**Disadvantages:**
- Slower initial weight loss than gastric bypass
- Regular follow-up critical for optimal results
- Requires implanted medical device
- Less experience in the United States

### Risks of Bariatric Surgery

**Adjustable Banding Risks:**
- Band erosion
- Band slippage
- Infection of the band and/or port
- Conversion to open procedure for bleeding of other organ injury
- Blood clots
- Bleeding

### Laparoscopic Adjustable Gastric Banding

### Bariatric Surgery Options – Adjustable Gastric Banding

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82
All of the following are contraindications to adolescent bariatric surgery, except:

A. Patient has not attained Tanner stage III.
B. Substance abuse or psychological disorders that are likely to interfere with long-term adherence to medical surveillance and nutritional recommendations.
C. Female adolescent who is pregnant, breastfeeding, or planning for pregnancy within 12-18 months after surgery.
D. BMI > 40 kg/m² with serious comorbidities, which can include diabetes mellitus, pseudotumor cerebri, and obstructive sleep apnea.
Where Do We Draw the Line?

Morbidly Obese 2 Year Old

- Saudi Arabia 2 y/a Failed Multiple Diets
- Sleep Apnea
- International J of Case Reports 2013
- Surgery Successful
  - Dropped from 72 lbs to 52 lbs

Morbidly Obese 2 Year Old

OBSTETRIC COMPLICATIONS

- Obesity increases risk of many complications of pregnancy
- Greatest among morbidly obese
- Remains significantly increased for all women with BMI ≥ 30

<table>
<thead>
<tr>
<th>Risk of pregnancy-related complications for women with a BMI ≥ 42 kg/m² (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Condition</td>
</tr>
<tr>
<td>Hypertensive</td>
</tr>
<tr>
<td>Gestational diabetes</td>
</tr>
<tr>
<td>Gestational diabetes-age infant</td>
</tr>
<tr>
<td>Daily maternal death</td>
</tr>
<tr>
<td>Nausea</td>
</tr>
<tr>
<td>Early delivery</td>
</tr>
<tr>
<td>Multiple congenital anomalies</td>
</tr>
<tr>
<td>Mean birth weight</td>
</tr>
<tr>
<td>Chorionic villus</td>
</tr>
<tr>
<td>Fetal distress</td>
</tr>
</tbody>
</table>

Note: OR = odds ratio; CI = confidence interval; OR = odds ratio

OBSTETRIC COMPLICATIONS

- Recommendation for weight loss before pregnancy prudent for young women
- Some urge that BMI < 35 should be reached prior to conception
- Women in later reproductive years, postponing pregnancy to achieve weight loss must be balanced against risk of declining fertility with increasing age

TREATMENT OF OBESITY TO IMPROVE REPRODUCTIVE OUTCOMES

- Dietary and Lifestyle Changes
  - First option for obese women with infertility
    - Intentional weight loss > 20lbs associated with 25% reduction in
      - All-cause mortality
      - CV mortality
      - Cancer mortality
  - Improvement in menstrual cycle regularity
  - Ovulatory function returns in majority of obese anovulatory women with PCOS after 5-10% reduction
  - Improves insulin resistance
  - Androgen levels, SHBG

- Anti-Obesity Drugs
- Surgery
SURGICAL CORRECTION

• Musella et al. Effect of bariatric surgery on obesity-related infertility
  – Retrospective study, 110 obese infertile women
  – Evaluated effectiveness of bariatric surgery in improving fertility, assessing influence of age, surgical technique, co-morbidities (HTN, DM), weight loss, BMI (pre / post surgery)
  – BMI > 40 or BMI > 35 with serious co-existing medical conditions
  – Procedures = gastric balloon placement, adjustable gastric banding, sleeve gastrectomy, gastric bypass (laparoscopic)
  – Followed for ≥ 2.5 years

SURGICAL CORRECTION

<table>
<thead>
<tr>
<th>Results and their effect on pregnancy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variable</td>
</tr>
<tr>
<td>Technique</td>
</tr>
<tr>
<td>Bariatric surgery</td>
</tr>
<tr>
<td>LAGB (15 patients)</td>
</tr>
<tr>
<td>LSG (14 patients)</td>
</tr>
<tr>
<td>OB (9 patients)</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
</tr>
<tr>
<td>Before surgery</td>
</tr>
<tr>
<td>After BMB</td>
</tr>
<tr>
<td>After LAGB</td>
</tr>
<tr>
<td>After LSG</td>
</tr>
<tr>
<td>After OB</td>
</tr>
</tbody>
</table>
| Patients with weight loss ≥ 5
  Bariatric surgery        |                   | 4/10 (40%)             | .001    |
| After BMB                | 14/14 (100%)      | 20/48 (41.7%)          |         |
| After LAGB               | 20/20 (100%)      | 26/48 (54.2%)          |         |
| After LSG                | 25/25 (100%)      | 23/48 (47.9%)          |         |
| After OB                 | 5/5 (100%)        | 29/48 (60.4%)          |         |

• 69/110 (62.7%) achieved pregnancy
• 41/110 (37.3%) did not
• BMI of women who became pregnant significantly lower than BMI among who did not conceive (p=0.001)
• Weight loss of ≥ 5 BMI strong predictor of pregnancy (OR 20.2)

OBESITY AND ART

• Koning et al. 2012. Complications and outcome of assisted reproductive technologies in overweight and obese women.
  – Overweight / obese women seeking help for subfertility increasing
  – Overweight / obese women receive least fertility related services
  – New Zealand: BMI > 32 excluded from any fertility treatment
  – UK: almost all clinics with cutoff, but wide-ranging (25-40)
  – UK national guidelines: BMI > 28 to be informed about fewer pregnancy chances, but no official cutoff point for treatment

FAST FACTS

Issues of Concern

1. Lasting consequences of bariatric surgery in adolescents are not fully understood due to a paucity of long-term data.
2. Benefits of bariatric surgery in younger populations include fewer co-morbidities going into surgery and life-changing psychosocial improvements.
3. Experts encourage long-term follow-up and assessment of adolescents who undergo these procedures.
LAPAROSCOPIC SURGERY BENEFITS AND DISADVANTAGES

**BENEFITS**
- Faster recovery
- Less Pain
- Quicker return to work
- Shorter Hospital stay
- Less chance of hernias and wound infections
- Better Visualization
- Decreases stress on the immune system
- Better cosmetic result
- Minimal restrictions on activity

**DISADVANTAGES**
- Long specialty training required by the surgeon
- Most surgeons cannot perform the advanced procedures safely
- Complex procedures require hundreds of cases before expertise develops
- Most surgeons trained in advanced laparoscopy were never trained in bariatric surgery

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**Candidates for bariatric surgery**

- BMI ≥ 40 or ≥ 35 with comorbidities
- Understands and accepts risks
- Willing and able to comply with diet, vitamins, & follow-up

NIH Consens Statement 1991:9

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**Bariatric Surgery Efficacy for Resolution of T2DM**

<table>
<thead>
<tr>
<th>Study</th>
<th>Procedure</th>
<th>Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pories et al 1995</td>
<td>Gastric Bypass</td>
<td>89%</td>
</tr>
<tr>
<td>Torquati et al 2005</td>
<td>Gastric Bypass</td>
<td>74%</td>
</tr>
<tr>
<td>Schauer et al 2003</td>
<td>Gastric Bypass</td>
<td>82%</td>
</tr>
<tr>
<td>Sugerman et al 2003</td>
<td>Gastric Bypass</td>
<td>86%</td>
</tr>
<tr>
<td>Dixon et al 2003</td>
<td>Lap Band</td>
<td>64%</td>
</tr>
<tr>
<td>Gagner (unpublished)</td>
<td>Sleeve Gastrectomy</td>
<td>65%</td>
</tr>
</tbody>
</table>

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“Questions”
Fertility preservation methods

Sara Brucker
Universitäts-Frauenklinik Tübingen

Disclosure
I have no financial relationships to disclose.

Problem situation
Successful, aggressive treatments with very good prognoses for young cancer patients

Desire to conceive and cancer
Cancer has no effect on fertility in 71% of female patients and 68% of male patients. (Shover 1999 und 2002; Zanagnolo 2005)

29% of breast cancer patients stated that the fear of a possible loss of fertility affected their decisions regarding their treatment. (Partridge 2004)

DNA-damage by chemotherapy?
- In 508 children of 235 patients who had received chemotherapy with alkylating agents and/or radiotherapy in the abdominal area: no significant increase in genetic disorders
- However: because of low patients numbers, an increase in the risk of genetic disease cannot be statistically excluded. (Meistrich et al., 2002, Ann. J Hum Genet)

⇒ Desire to conceive: wait 6 - 12 months as folliculogenesis takes ca. 6 months

Effective use of fertility preservation methods in Germany
Establishment of Fertiprotekt 2006

- Annual workshops
- Definition of treatment recommendations
- Recording of treatments
- Expert evaluations
"Life cycle" of the ovary

- From 8 weeks of embryonic development: ca. 10,000,000 germ cells migrate into the undifferentiated gonads from the yolk sac and become embedded in the gonadal cortex (= primordial follicle). Germ cells cease at this stage of development.
- At birth, around 90% of these primordial follicles have perished.
- At puberty: still ca. 100,000 primordial follicles = reserve for the reproductive phase
- Within ca. 40 years, between 400 and 500 egg cells are ovulated, the rest degenerate by apoptosis


What happens to the ovary during chemotherapy?

- Chemotherapy causes atresia of the follicle which has just entered the growth phase or is in the early stages of gonadotrophin stimulation.
- Risk of development of ovarian insufficiency is dependent on the number of follicles present in the ovary and therefore on the patient’s age.

Which option for which patient?

- Oncological treatment
- Partner status
- Time until first chemotherapy
- Age < 35 versus ≥ 35 years
- Likelihood of ovarian metastases
- Hormone receptor status in breast cancer
- Costs

Fertility preservation methods

- Cryoconservation of fertilised egg cells after ICSI
- Cryoconservation of unfertilised egg cells
- Cryoconservation of ovarian tissue
- Ovarian protection using GnRH-analogues

Observation: Chemotherapy during prepubescence in girls does not always lead to subsequent POF

Ovarian protection by downregulation of the ovaries before starting chemotherapy
GnRH-cover for ovarian protection

Chemo-therapy

Increased recruitment of primordial follicles

Estradiol

Inhibin

GnRH-analogue

Ovarian protection using GnRH analogues:

Recommendation:
- Start: 2 weeks before chemo (Flare-up effect)
- For early chemo start – additional use of an antagonist
- End: 3 – 4 weeks after chemo

Effectiveness of GnRH-cover:

<table>
<thead>
<tr>
<th>Studies with proven effect</th>
<th>Studies with no proved effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beck-Fruchter et al. 2008: 12 studies (only 2 randomised):</td>
<td></td>
</tr>
<tr>
<td>- Chemo without GnRH-cover: POF in 59% of cases</td>
<td></td>
</tr>
<tr>
<td>- Chemo with GnRH-cover: POF in 9% of cases</td>
<td></td>
</tr>
<tr>
<td>ZORO study: no reduction in the amenorrhoea rate with GnRH use</td>
<td></td>
</tr>
<tr>
<td>Blumenfeld und von Wolff 2008</td>
<td></td>
</tr>
<tr>
<td>- Meta-analysis:</td>
<td></td>
</tr>
<tr>
<td>- POF rate 55.5% versus 11.1%</td>
<td></td>
</tr>
<tr>
<td>Blumenfeld und von Wolff 2008</td>
<td></td>
</tr>
<tr>
<td>- Prospective study (Badawy et al. 2009) in 80 breast cancer patients:</td>
<td></td>
</tr>
<tr>
<td>- After 8 months menstruation in the GnRHa-group 89.6% of patients, in the control group 33.3%</td>
<td></td>
</tr>
</tbody>
</table>

Risks of GnRH-administration:

- Menopausal side-effects
- Reduction in bone density when GnRH analogues are used for >6 months
- Reduction in oncological treatment effects with GnRH analogue use in estrogen receptor positive breast cancers.
- However: no conclusive evidence for or against these hypotheses

Recommendation "AGO Mamma": no GnRH in HR-pos. breast cancer

Fertility preservation methods

Cryoconservation of fertilised egg cells after ICSI

Cryoconservation of unfertilised egg cells

Cryoconservation of ovarian tissue

Ovarian protection using GnRH-analogue

Fertilisation (ICSI)

Fertilised egg cell

Cryoconservation
**Classic** antagonist protocol

FSH / hMG 225 IE / day from day 2 of cycle

18mm US

Follicle puncture

GnRH-antagonists from day 6 of stimulation

GnRH-antagonist daily, 0.25 mg/day

**Antagonist protocol for stimulation start in the second half of cycle**

Recombinant FSH 225 IE / day

18mm US

Follicle puncture

GnRH-antagonist daily 0.25 mg/day

**Patient information before hormonal stimulation for ISCI**

- Time required: ca. 14 days
- Effect of hormonal stimulation with short-term high estradiol levels on breast cancer is unclear; probably no negative effect
- Chances of pregnancy the same as for conventional IVF/ISCI methods
- Cryoconserved fertilised egg cells can only be transferred with the partner’s consent
- If overstimulation occurs, the start of chemotherapy must be postponed if necessary
- Possibility of low response
- Information about the risks of follicular puncture
- Financial situation (Letter can be provided for health insurance company)

**Fertility preservation methods**

- Cryoconservation of fertilised egg cells after ISCI
- Cryoconservation of unfertilised egg cells
- Cryoconservation of ovarian tissue
- Ovarian protection using GnRH-analogues

**Hormonal stimulation**

Follicular puncture

Unfertilised oocyte

Cryoconservation

Disadvantage: Significantly poorer pregnancy rates with cryoconserved unfertilised cells

**Fertility preservation methods**

- Cryoconservation of fertilised egg cells after ISCI
- Cryoconservation of unfertilised egg cells
- Cryoconservation of ovarian tissue
- Ovarian protection using GnRH-analogues
Cryoconservation of ovarian tissue

8 reported pregnancies after retransplantation of ovarian tissue up to now

Problems:
- Risk of retransplantation of malignant cells – currently no retransplantation for leukaemia cases; future: in-vitro maturation of removed ovarian tissue possible?
- Transplantation site: follicular genesis is disturbed in heterotopic transplantation; therefore orthotopic transplantation is preferable (spontaneous pregnancies are thereby possible)

Method:
LSK: Atraumatic (no electrosurgical) resection of 1/3 – ½ of the ovary, important: ovarian cortex (Storage in Bonn)

IVF Centre Tuebingen University Hospital for Women
Appointment for counselling on fertility preservation

Counselling on fertility preservation methods depending on tumour type, oncological treatment necessary and patient’s wishes

GnRH protection
Hormonal stimulation for egg cell retrieval
Ovarian tissue for cryoconservation

Individual therapy, incorporated into the oncological treatment concept

Tuebingen counselling results

>80 patients aged <40 years were counselled between November 2006 – Jan 2013

<table>
<thead>
<tr>
<th>Age group</th>
<th>21-30 years</th>
<th>31-40 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>37</td>
<td>52</td>
</tr>
</tbody>
</table>

(Age distribution of the counselled patients)

<table>
<thead>
<tr>
<th>Hormone receptors</th>
<th>HR-positive</th>
<th>HR-negative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>68</td>
<td>18</td>
</tr>
</tbody>
</table>

Tuebingen counselling results

GnRH
Hormonal stimulation for oocyte retrieval
Ovarian tissue removal for cryoconservation
Combination of methods
No treatment

<table>
<thead>
<tr>
<th></th>
<th>GnRH</th>
<th>Hormonal stimulation for oocyte retrieval</th>
<th>Ovarian tissue removal for cryoconservation</th>
<th>Combination of methods</th>
<th>No treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>20</td>
<td>15</td>
<td>24</td>
<td>18</td>
<td>16</td>
</tr>
</tbody>
</table>

Therapeutic decision after counselling

Method overview

<table>
<thead>
<tr>
<th>Method</th>
<th>Time needed</th>
<th>Achievable pregnancy rates</th>
</tr>
</thead>
<tbody>
<tr>
<td>In vitro fertilisation (IVF/ICSI)</td>
<td>ca. 2 weeks</td>
<td>ca. 40%</td>
</tr>
<tr>
<td>Cryoconservation of unfertilised oocytes</td>
<td>ca. 2 weeks</td>
<td>ca. 40%</td>
</tr>
<tr>
<td>Autologous transplantation of conserved ovarian tissue (experimental)</td>
<td>ca. ½ week</td>
<td>2 births</td>
</tr>
<tr>
<td>GnRH-analogue</td>
<td>not applicable</td>
<td></td>
</tr>
</tbody>
</table>

Take-home messages

- Treatment options are available
- Accurately timed planning is necessary
Thank you for your attention!
CULTURAL AND LINGUISTIC COMPETENCY

Governor Arnold Schwarzenegger signed into law **AB 1195** (eff. 7/1/06) requiring local CME providers, such as the AAGL, to assist in enhancing the cultural and linguistic competency of California’s physicians (researchers and doctors without patient contact are exempt). This mandate follows the federal Civil Rights Act of 1964, Executive Order 13166 (2000) and the Dymally-Alatorre Bilingual Services Act (1973), all of which recognize, as confirmed by the US Census Bureau, that substantial numbers of patients possess limited English proficiency (LEP).

**California Business & Professions Code §2190.1(c)(3)** requires a review and explanation of the laws identified above so as to fulfill AAGL’s obligations pursuant to California law. Additional guidance is provided by the Institute for Medical Quality at [http://www.imq.org](http://www.imq.org).

**Title VI of the Civil Rights Act of 1964** prohibits recipients of federal financial assistance from discriminating against or otherwise excluding individuals on the basis of race, color, or national origin in any of their activities. In 1974, the US Supreme Court recognized LEP individuals as potential victims of national origin discrimination. In all situations, federal agencies are required to assess the number or proportion of LEP individuals in the eligible service population, the frequency with which they come into contact with the program, the importance of the services, and the resources available to the recipient, including the mix of oral and written language services. Additional details may be found in the Department of Justice Policy Guidance Document: Enforcement of Title VI of the Civil Rights Act of 1964 [http://www.usdoj.gov/crt/cor/pubs.htm](http://www.usdoj.gov/crt/cor/pubs.htm).

**Executive Order 13166, “Improving Access to Services for Persons with Limited English Proficiency”,** signed by the President on August 11, 2000 [http://www.usdoj.gov/crt/cor/13166.htm](http://www.usdoj.gov/crt/cor/13166.htm) was the genesis of the Guidance Document mentioned above. The Executive Order requires all federal agencies, including those which provide federal financial assistance, to examine the services they provide, identify any need for services to LEP individuals, and develop and implement a system to provide those services so LEP persons can have meaningful access.

**Dymally-Alatorre Bilingual Services Act** (California Government Code §7290 et seq.) requires every California state agency which either provides information to, or has contact with, the public to provide bilingual interpreters as well as translated materials explaining those services whenever the local agency serves LEP members of a group whose numbers exceed 5% of the general population.

~