Surgical Tutorial 6:
Surgical Management of Fibroids

PROGRAM CHAIR
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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
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Surgical Tutorial 6: Surgical Management of Fibroids
Malcolm G. Munro, Chair
Faculty: Keith B. Isaacson, Olav Istre, Charles E. Miller

This session provides an opportunity for attendees to gain insight into the contemporary issues around myomectomy and to discover “pearls” that will help them provide safer, more effective surgical management of women afflicted with leiomyomas. The faculty participating in this surgical tutorial all have extensive experience with such patients and their operative management via the hysteroscopic, laparoscopic, and laparotomic approaches. The essential steps in patient assessment will be reviewed, with a particular emphasis on uterine imaging and the features that help determine the most appropriate route of removal. Hysteroscopic morcellators have been positioned as replacements for the uterine resectoscope – the advantages and limitations of each of these devices will be discussed and demonstrated. The preferred abdominal approach to myomectomy is laparoscopic, but there are a number of instances where laparotomy still has a major role. Identification of which patients are most appropriate for which technique will be covered, and, for each approach, key surgical techniques will be covered by the faculty using presentation graphics and videos. Such techniques include laparoscopic port selection, management of multiple leiomyomas, and laparoscopic extraction options. Attendees will have an opportunity to ask questions at the end of the session.

Learning Objectives: At the conclusion of this course, the clinician will be able to: 1) Evaluate patients for the appropriate route of myomectomy, and describe key elements in the performance of hysteroscopic, laparoscopic, and laparotomic removal of uterine leiomyomas.

Course Outline

2:15  Welcome, Introductions and Course Overview          M.G. Munro
2:20  Conserving the Uterus: Options, Evaluation, and Patient Selection  M.G. Munro
      • Description of the Spectrum of Options
      • Identification of Patient Goals
      • Evaluation – Imaging, Imaging, Imaging (FIGO-based Evaluation)
      • Creating the Menu of Options
2:30  Hysteroscopic Management – The Most Minimally Invasive Surgical Approach  K.B. Isaacson
      • Resectoscope or Electromechanical Morcellator?
2:40  Abdominal Management – Laparoscopic Management Techniques  C.E. Miller
      • Port Placement
      • Techniques for Enucleation and Multiple Myomectomy
      • Uterine Wound Closure
      • Extraction of Leiomyomas from the Peritoneal Cavity
2:50  Abdominal Management – The Very Large Uterus  O. Istre
      • Factors That Make Laparotomy the Preferred Approach
      • Ancillary Techniques to Facilitate Surgery on the Very Large Uterus
      • Techniques for Laparoscopic Approach to the Very Large Uterus
3:00  Questions & Answers  All Faculty
3:15  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).
Art Arellano, Professional Education Manager, AAGL*
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Erica Dun*
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Linda Michels, Executive Director, AAGL*
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Olav Istre*
Charles E. Miller
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Speakers Bureau: Ethicon Endo-Surgery, Intuitive Surgical, Smith & Nephew Endoscopy
Royalty: Thomas Medical
Malcolm G. Munro
Consultant: Aegea Medical, Bayer Healthcare Corp., Boston Scientific, Gynesonics, Hologic, Idoman Teoranta

Asterisk (*) denotes no financial relationships to disclose.
Conserving the Uterus with Fibroids: Options, Evaluation & Patient Selection

**Objectives**

- Describe the surgical alternatives to hysterectomy for symptoms associated with uterine leiomyomas
- Discuss the approach to evaluation of patients with uterine leiomyomas
- Counsel women with symptoms thought to be related to leiomyomas considering their reproductive, cosmetic and economic goals

**Agenda**

- Leiomyma manifestations
- The spectrum of options
- Identification of patient goals
- Evaluation
- Creating the menu of options

**Manifestation**

- Asymptomatic
- Abnormal Uterine Bleeding
- Bulking pressure symptoms
- Infertility
- Recurrent Pregnancy Loss
- Other
Conserving the Uterus with Fibroids: Options, Evaluation & Patient Selection

Agenda
- Leiomyoma manifestations
- The spectrum of surgical options
- Identification of patient goals
- Evaluation
- Creating the menu of options

Options for Leiomyoma-Associated Symptoms

Medical Therapy
- AUB
- Bulk Symptoms

Endometrial Ablation
- AUB

Myomectomy
- AUB
- Bulk Symptoms
- Infertility
- Recurrent Pregnancy Loss

Image Guided Therapy
- AUB
- Bulk Symptoms
- Infertility?
- Recurrent Pregnancy Loss?

Options for Leiomyoma-Associated Symptoms

Procedural Options

Abdominal
- Myomectomy
  - Laparoscopic
  - Laparotomic
- Uterine Artery Occlusion
- Leiomyoma Ablation

Intrauterine
- Myomectomy
- Leiomyoma ablation
- Endometrial ablation

Interventional Radiology
- Uterine Artery Embolization
- MR-guided Focused Ultrasound

Conserving the Uterus: Options, Evaluation & Patient Selection
Conserving the Uterus: Options, Evaluation & Patient Selection

Procedural Options

**Abdominal**
- Myomectomy
  - Laparoscopic
  - Laparotomic
- Uterine Artery Occlusion
- Leiomyoma Ablation

**Intrauterine**
- Myomectomy
- Leiomyoma ablation
- Endometrial ablation

**Interventional Radiology**
- Uterine Artery Embolization
- MR-guided Focused Ultrasound

Conserving the Uterus: Options, Evaluation & Patient Selection

Agenda

- Leiomyoma manifestations
- The spectrum of surgical options
- Identification of patient goals
- Evaluation
- Creating the menu of options

Conserving the Uterus: Options, Evaluation & Patient Selection

Identification of Patient Goals

**Manifestation**
- AUB
- Bulk/pressure symptoms
- Infertility
- Recurrent Pregnancy Loss
- Other

**Goal(s)**
- Symptom control
- Fertility
  - Preserve or enhance
  - No desire for future fertility
- Cosmetic result
- Minimizing economic impact of intervention

Conserving the Uterus: Options, Evaluation & Patient Selection

Evaluation of Patients with Leiomyomas

- Are the symptoms related to the leiomyomas?
- Is surgery the most appropriate intervention?
- Determination of:
  - FIGO Type(s)
  - Location (anterior, posterior, fundal, lower segment)
  - Size or volume
  - Number
- List of options compatible with patient goals

**FIGO Classification System for Causes of Abnormal Uterine Bleeding in the Reproductive Years**

- Polyp
- Adenomyosis
- Leiomyoma
- Malignancy & Hyperplasia
- Coagulopathy
- Ovulatory Dysfunction
- Endometrial
- Intragenic
- Not Yet Classified

Munro et al Int J Gynaecol Obstet. 2015;132:3-13
**Classification, Size, Myoma free Margin:**

Uterine Imaging Options

- Ultrasound
  - Transvaginal 2D
  - Contrast sonography 2D
  - 3 - D
- MRI
  - No contrast
  - Limited series
- Hysteroscopy

**Evaluation of Women with AUB**

Evaluation of Endometrial Cavity Structure

1. Transvaginal ultrasound
2. Infusion sonography
3. Hysteroscopy

**Evaluation of Women with Leiomyomas**

Evaluation of the Myometrium

1. Sonography
2. MRI

Goals of Myometrial Assessment

1. Identify and characterize leiomyomas
   a. FIGO type
   b. Dimensions
   c. Location
   d. Margin between myoma and serosa
2. Identify and characterize adenomyosis
3. Distinguish adenomyomas from leiomyomas

Conserving the Uterus: Options, Evaluation & Patient Selection

**Agenda**

- Leiomyoma manifestations
- The spectrum of surgical options
- Identification of patient goals
- Evaluation
- Creating the menu of options

**Manuscript Content**

**Manifestation**
- AUB
- Bulk symptoms
- Infertility
- Recurrent Pregnancy Loss
- Other

**Goal(s)**
- Symptom control
- Fertility
  - Preserve or enhance
  - No desire for future fertility
- Cosmetic result
- Minimizing economic impact of intervention
Submucous Leiomyomas
Does not wish to retain fertility

Endometrial Ablation ± Myoma Resection
provided endometrial cavity within limits

Loffer FD. J. Min Invasive Gynecol 2012;12:254-60

Multiple and/or Large Leiomyomas
Infertility, RPL or wishes to retain fertility

• Myomectomy
• Laparotomic
• Laparoscopic?
• UAE?


References
Loffer FD. J. Min Invasive Gynecol 2012;12:254-60
Hysteroscopic Management – The Most Minimally Invasive

Keith Isaacson MD
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Objective
Discuss Hysteroscopic Management – The Most Minimally Invasive

Hysteroscopic Energy

- Laser
- Radiofrequency
  - Monopolar
  - Bipolar
- Morcellation
  - Morcellation with bipolar energy

Disclosures
- I have no financial relationships to disclose

1970 – 1995
Monopolar Hysteroscopy

Electrosurgery = Secondary Thermodynamic Change

\[ \text{Na}^+ \quad \text{Cl}^- \quad \text{Na}^+ \quad \text{Cl}^- \]

\[ \text{HEAT} \]

\[ \text{Ion Movement} \]
**Conventional Monopolar Electrosurgery**
requires non-conductive media
and adequate current density

- Non-conductive media: $\Omega = \infty$
- Current flows through the tissue

Tissue Impedance = 100 $\Omega$

**Non-Electrolyte, Non-Conductive Solutions**
for Monopolar Resectoscopic Surgery

- 3% Sorbitol
- 1.5% Glycine
- 5% Mannitol

**Potential Risks of Monopolar Electrosurgery**

- Direct Coupling
- Capacitive Coupling
- Insulation Failure
- Surgical Fires
- Alternate Site Burn (Injury)
- Grounding / Return Pad Failure

**Saline: What's the problem?**

**Conventional Monopolar Electrosurgery**
- In Normal Saline -

- Current flows through saline
following path of least resistance to return electrode

Saline Impedance = 25 $\Omega$

Tissue Impedance = 100 $\Omega$
**Current Hysteroscopic Bipolar Technology**

**Myoma Resection With VERSAPoint Electrode**

**Bipolar resection type II**

**Monitoring Venous Air Embolism**

- Doppler, TE echo 0.1 - 0.25
- End title CO2 or 0.25 - 0.5
- Nitrogen tension 0.05 - 0.75
- CVP and Pulmonary artery P increase 0.75 - 1.25
- Mean Art P decrease 1.25
- Ventricular dysrhythmias 1.5
- Mill-wheel murmur 1.5
- Cardiovascular collapse 2.0

Sensitivity mL/Kg/min air entrapment

**Hysteroscopic Mechanical Morcellation**

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11
The TRUCLEAR™ 5.0 System*

offers many benefits

- 1925mm working length provides access to entire uterus
- J-snap locking mechanism for one-handed control of sheath
- Patented dual outflow allows clear visualization
- 2.9 mm close cutting edge resects pathology down to base
- Distal marking ideal for blade orientation
- Proximal marking indicates blade has reached distal end of scope
- 5.0 Scope and 5.6 Sheath allows procedure with limited to no dilation

Inflow from Fluid Mgmt.System or Pressurized Saline Bag

3.1mm diameter working channel allows 9 Fr instruments

Pathology Removal with MyoSure® Tissue Removal System is Fast and Effective

- 1869 Pantaleoni credited with 1st hysteroscopic procedure in uterine cavity
- 1925 Rubin utilized CO₂ to distend the uterine cavity
- 1927 Silander introduced a hysteroscope with a latex balloon for distention
- 1962 Edstrom & Fernstrom used dextran for distention
- 1970 Distention & Visualization
- 1976 Neuwirth & Amin first resectoscope hysteroscopic resection of submucous myoma
- 2005 Smith & Nephew’s Truclear™ System Introduced (mechanical cutting)
- 2009 Hologic’s MyoSure™ System Introduced (mechanical cutting)
- 2014 Boston Scientific’s Symphion™ System Introduced (closed-loop, RF bipolar resection)

RF Bi-Polar Resection Process

- Tissue hydraulically drawn into resecting window
- Bipolar current switches to internal path
- Vaporized tissue & fluid help to remove resected fragments
- Cleans electrodes surface to eliminate tissue sticking to electrode surface

Histological perspective

Distention & Visualization

Visualization & Intervention

Histological perspective

Hysteroscopic Morcellation

Patient Selection
Follow-up after incomplete hysteroscopic removal of uterine fibroids
Van Dongen H, Emanuel MH, Smeets J, Trimbos, B and Jansen FW

- 528 Hysteroscopic myomectomies
- 91 Incomplete resections (17%)
  - 37 repeated immediately for fertility
  - 41 observed for menorrhagia

Acta Obstetricia et Gynecologica. 2006; 85: 1463–1467

Incomplete myoma resection
55% required additional surgery within 3 years
Abdominal Management – Laparoscopic Management Techniques

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Contracted/Research:
- AbbVie, Actavis, Aegea Medical, Bayer Healthcare Corp., Covidien, Gynesonics, Intuitive Surgical
- Consultant: AbbVie, Covidien, Ethicon Endo-Surgery, Gynesonics, Halt Medical, Intuitive Surgical, Pfizer Pharmaceuticals
- Speakers Bureau: Ethicon Endo-Surgery, Intuitive Surgical, Smith & Nephew Endoscopy
- Royalty: Thomas Medical

Abdominal Management – Laparoscopic Management Techniques

At the end of this discussion, the physician will be able to:

1. List two different energy sources for fibroid enucleation.
2. List two advantages of barbed vs. monofilament suture.
3. Explain how morcellation in a bag minimizes the risk of tissue spread at time of myomectomy.

Strategies in the Laparoscopic Management of the Large Myomatous Uterus

Surgery Preparation

- Cycle timing – early follicular phase
  - Capill 6-12
- OCP's
  - Anytime
- GnRH agonists
  - Anytime
  - Fibroid degeneration can cause loss of myoma planes
  - Try to avoid unless severely anemic
- General endotracheal anesthesia
- Place Foley catheter
- Perform hysteroscopy to identify and treat submucosal fibroids, polyps, intramural adhesions
- Place uterine manipulator that enables anterior-posterior and lateral mobility
  - Valchek
  - Princis
  - Roux
  - Jarcho
  - V-Care
  - Fontasse

References

Strategies in the Laparoscopic Management of the Large Myomatous Uterus

Port Placement

- 10-12mm trocar at umbilicus
  - Even if uterine mass is 18+ weeks' size, generally the umbilicus is the easiest option for insufflation
  - Alternatively, consider left upper quadrant access
- Place secondary ports lateral and cephalad to uterus/fibroid(s)
  - 5-mm lateral ports are advantageous
    - Cosmetic
    - Fascia closure not required
    - Less risk of post-op hernia
    - Requires morcellation through umbilicus with lateral 5-mm port camera

Large Uterus Port Placement

- 10-12mm trocar at umbilicus
- Even if uterine mass is 18+ weeks' size, generally the umbilicus is the easiest option for insufflation
- Alternatively, consider left upper quadrant access
- Place secondary ports lateral and cephalad to uterus/fibroid(s)
  - 5-mm lateral ports are advantageous

Myomectomy (laparoscopic and robotic assisted)

Enucleation

- Dilute Vasopressin
  - 30 units diluted in 100cc normal saline
  - Half-life = 10-20 minutes
  - 18G spinal needle with controlled syringe
    - Inject into myometrium near fibroid aiming for myoma capsule
    - Maximize cut to minimize tissue desiccation
    - Risk of uterine rupture during pregnancy
- Instrumentation
  - Toothed instruments
    - Single-toothed spoon
    - Claw
    - Myoma screw
  - Traction/countertraction

Tissue Reapproximation

- Suture type
  - Absorbable
  - Taper needle
- Multi-layer closure
  - Hemostasis
  - Avoid use of energy to reduce tissue desiccation
  - Eliminate "dead" space
  - Reduce risk of uterine rupture during pregnancy

Energy options for myomectomy

- Monopolar hook or scissors
- Ultrasonic scalpel
  - Absence of tissue desiccation
  - Risk of uterine rupture during pregnancy
Abdominal Management – Laparoscopic Management Techniques

Myomectomy (laparoscopic and robotic assisted)

**Barbed Suture**
- Stratafix™, Quill™, and V-Loc™ wound closure device
  - The barbs grasp tissue at numerous points providing distribution of tension across the wound
  - Eliminates the need for tying knots

Myomectomy (laparoscopic and robotic assisted)

**Adhesion Prevention**
- Minimize energy
- Avoid multiple surgical incisions
- Serosal closure – minimize suture exposure
- Adhesion barriers

Traditional Laparoscopic Myomectomy With Covidien V-Loc™ Advanced Wound Closure Device

Electromechanical Power Morcellation in a Bag

GelPOINT Power Morcellation in a Bag
Abdominal Management – The Very Large Uterus

Olav Istre, MD, PhD
Professor in MIGS
Aleris private Hospital
And
University of Southern Denmark

• I have no financial relationships to disclose

To compare surgical approach and technique
• Discuss minimal invasive gynecological techniques
• Describe pathology that interferes with function
• Improve the quality of life

Complication between abdominal or laparoscopic approach
• Net difference in the incidences for complications
  – Adhesions +50.1% (midline double the incidence)
  – hernia +10.7%
  – surgical site infection +4.8%
  – small bowel obstruction +2.8%
  – venous thromboembolism +2%

Limitation of surgical approach
• The goal is laparoscopic approach
• Dependent on
  – Number of fibroids
  – Size of fibroid
  – Previous surgery
  – Patients wish
Open surgery with midline Incision, 1998

Multiple (57) Large fibroids >1200 g

Phannenstiel (morcellation with knife in bag, )

• 41 patients leiomyosarcomas morcellated
• Prognosis was significantly worse in these patients
• 1 of these 41 patients had laparoscopic morcellation.
• The other 40 patients had the specimen morcellated using a cold knife through a minilaparotomy (n=17), transvaginally (n=19), or hysteroscopically (n=4).²


• The fibroid/Sarcoma debate
• 42 year old women
• Previous 5 IVF
• Missed abortion with D&C March 2015
• Ca 125 =280, CEA =1
• Abdominal tumor 11 cm

Sarcoma issue

Fibroid / sarcoma issue

• CT scan suspension of sarcoma
• PET scan = PET positiv (FDG uploading in the periferi of the tumor) with central necrosis
• FDG (deoxyglycose) is obtained in cells with increased metabolism
Fibroid / sarcoma issue

- Rapid Growth
- Recommendation from Gynecology Oncology clinic and sarcoma group (12 doctors)
- Recomendation:
  - Midline incision, Removal of tumor including Hysterectomy

She has seen at 3 different University Hospitals

- She wants second opinion
- She wants to be sure

Fibroids

- Composed of smooth muscle and varying amount of fibrous connective tissue
- As leiomyomas enlarge, they may outgrow their blood supply resulting in various types of degeneration: 2/3 shows degeneration
  - Hyaline or myxoid degeneration (75%)
  - Calcification (10%)
  - Cystic degeneration (10%)
  - Fatty degeneration

Abdominal Tumor
• Histology:
• Examination number: 15SH1154-1
• 1. Myometrium
  • 
    leiomyoma  -
  • -
    necrosis   -
  • -
Cultural and Linguistic Competency

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

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

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

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

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

~

If you add staff to assist with LEP patients, confirm their translation skills, not just their language skills. A 2007 Northern California study from Sutter Health confirmed that being bilingual does not guarantee competence as a medical interpreter. http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=2078538.