Techniques for Hysteroscopic Myomectomy

Linda D. Bradley M.D.
Professor of Surgery
Vice Chair Obstetrics & Gynecology, Women’s Health Institute
Director Center for Menstrual Disorders, Fibroids and Hysteroscopic Services
Cleveland Clinic
Cleveland, Ohio
bradlel@ccf.org
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Learning Objectives

• Discuss improved techniques for the performance of operative hysteroscopy

• Describe the benefits and limitations of resectoscopy and hysteroscopic morcellation techniques

• Review methods to decrease complications of operative hysteroscopy

• Utilize extensive video to demonstrate ways to improve safety and increase long-term outcomes of operative hysteroscopy
The FIGO classification of causes of abnormal uterine bleeding in the reproductive years

Malcolm G. Munro, M.D.,a Hilary O. D. Critchley, M.D.,b and Ian S. Fraser, M.D.,c for the FIGO Menstrual Disorders Working Group

a Department of Obstetrics and Gynecology, David Geffen School of Medicine at UCLA and Kaiser Permanente, Los Angeles Medical Center, Los Angeles, California; b Department of Obstetrics and Gynecology, University of Edinburgh and the Royal Infirmary, Edinburgh, United Kingdom; and c Department of Obstetrics and Gynecology, University of Sydney Australia, and the Royal Prince Alfred Hospital, Sydney, New South Wales, Australia
Leiomyoma (AUB-L)

- Benign fibromuscular tumors of the myometrium are known by several names, including “leiomyoma,” “myoma,” and “fibroid”
- Most fibroids are asymptomatic, and frequently are not the cause of the complaint of AUB
- The FIGO primary classification system reflects the presence or absence of 1 or more fibroids by ultrasonography
- The FIGO system accounts for areas of sub classification as well
Leiomyoma (AUB-L)

Leiomyoma Subclassification System

<table>
<thead>
<tr>
<th>SM - Submucosal</th>
<th>0</th>
<th>Pedunculated Intracavitory</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>&lt;50% Intramural</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>≥50% Intramural</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>O - Other</th>
<th>3</th>
<th>Contacts endometrium; 100% Intramural</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4</td>
<td>Intramural</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>Subserosal ≥50% Intramural</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>Subserosal &lt;50% Intramural</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>Subserosal Pedunculated</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>Other (specify e.g. cervical, parasitic)</td>
</tr>
</tbody>
</table>

Hybrid Leiomyomas (impact both endometrium and serosa)

Two numbers are listed separated by a hyphen. By convention, the first refers to the relationship with the endometrium while the second refers to the relationship to the serosa. One example is below:

- 2-5: Submucosal and subserosal, each with less than half the diameter in the endometrial and peritoneal cavities, respectively.
Importance of Pre-Operative Assessment

- To exclude malignancy and predict likely pathology
- Provide excellent informed consent
- To help decide what technology is appropriate
- To determine whether a hysteroscopic resectoscopy or hysteroscopic morcellation (tissue removal system should be used)
Why is Surgical Classification Important?

- Myometrial wall involvement and extension determines difficulty of surgical procedures
- Determines choice of hysteroscopic equipment and fluid medium
- Determines whether hysteroscopic morcellation is an option
- Determines likelihood of a one stage hysteroscopic procedure
- Risks of complications
Endometrial Surveillance Techniques

- Endometrial Biopsy
- Dilation & Curettage
- Transvaginal Ultrasound
- Saline Infusion Sonogram
- Office Hysteroscopy
- MRI pelvis
Hysteroscopic Classification System
Uterine Fibroid Classification

• **STEP-W Classification***
  
  - New classification presented in 2010 that rates complexity and lists potential therapeutic options
  
  - Takes into account additional factors
    - **Size**
    - **Topography**
    - **Extension of base**
    - **Penetration into cavity**
    - **Wall** (lateral)
  
  - Becoming more recognized but not utilized as often as the ESGE Classification

Indications for Hysteroscopic Myomectomy

- Heavy or irregular menses
- Dysmenorrhea
- Recurrent pregnancy loss
- Stubborn bleeding on hormone replacement therapy
- Pelvic pain
- Constant discharge/leukorrhea
- Evaluation of uterine cavity after vaginal myomectomy
- Infertility
Indications for Polypectomy

• Metrorrhagia
• Post coital bleeding
• Intermenstrual staining
• Leukorrhea
• IVF candidates
• Found coincidentally with intra-cavitary fibroids
Polypectomy

- Complete resection essential
- Remnants may be associated with continued menstrual irregularity
- Low risk of malignancy (<2%) in pre-menopause
- Up to 5% of polyps may have malignancy in symptomatic post menopausal bleeding patients
- May co-exist with other pathology
Retained Products of Conception

- Newer methods of pregnancy termination
  - Mifeprisone (RU 486)
  - Misoprostol (Cytotec)

- Failure rates after medically induced abortions
  - 2%-5%

- Can failures be predicted?
  - Pain
  - Massive bleeding
  - Retained intrauterine pregnancy
  - Ultrasound
Retained Products of Conception (RPOC)

- In symptomatic patients RPOC was reliably detected when TVUS > 15 mm
- TVUS criteria had a 100% sensitivity and a 98.7% specificity for recognition of RPOC.
- Positive and negative predictive factors were 91.3% and 100%
- Suspected RPOC found in 4% of asymptomatic patients and confirmed by diagnostic hysteroscopy in 86%

Placental Remnants

• May occur after any pregnancy:
  – Miscarriage
    – Incomplete
    – Missed
    – Anembryonic first-trimester miscarriage
  – Termination of pregnancy
  – Vaginal delivery
  – C/Section
  – Manual removal of placenta

• Expectant management successful in 81%

• One out of 5 patients will have placental remnants after 4 weeks of expectant management

Operative Hysteroscopy in Women with Retained Products of Conception

• Same principles as hysteroscopic resection/morcellation of myomas/polyps
  – Selective removal of RPOC advisable

• Often products of conception are necrotic and friable

• The wire loop (without electrocautery) or morcellator can be used to visually curette retained products of conception

• Excellent direct visualization with this technique

• Targeted removal is possible

• Consider intracervical vasopressin to decrease bleeding
Operative Hysteroscopy in Women with Retained Products of Conception

- When compared to ultrasound-guided curettage using a metal curette, hysteroscopic resection (without electrical cautery) was associated with lower rate of intrauterine adhesions at second-look hysteroscopy.

- In one study, 94% of patients treated with hysteroscopic morcellation had complete removal of RPOC

Benefits and Caveats of Hysteroscopic Morcellation Removal of RPOC

- Be mindful of softer uterine myometrium to decrease risk of perforation
- Fluid monitoring still critical
- Less need to insert and replace hysteroscopic to collect chips
- Cervix may be patulous and need to close with Gimpelson tenaculum or 2 double toothed tenaculum
- When RPOC > 4 cm, may have incomplete retrieval due to longer surgical time and halting procedure due to fluid limitations
- Theoretic inability to coagulate if bleeding (use Vasopressin)
- Consider post op office hysteroscopy to evaluate for adhesions
Chinese IUD

Circular IUD

Removal with Hysteroscopic Graspers
Embedded IUD With Intracavitary Polyp
Hysteroscopic Myomectomy Contraindications

- Inexperienced surgeon
- Pregnancy
- Physician unfamiliar with equipment
- Acute pelvic infection
- Genital tract malignancy
- Lack of informed consent
- Completely intramural or subserosal
- Myoma >3 cm and > 50% within the myometrium
- If a large portion of the endometrial cavity will be removed in a patient desiring fertility
What Else Do I Want to Know On the Day of Hysteroscopic Surgery?

- Last menstrual period
- Herpes prodrome?
- Did she remember to take Cytotec?
- Does she plan on having children?
- Surgical Time Out?
  - Right patient?
  - Right procedure?
  - Instruments needed all present?
  - Informed consent and complications reviewed with patient
- Anesthesiologist
Helpers In the OR?
FLEXIBLE HYSTEROSCOPE
TRANSABDOMINAL U/S
LEEP MACHINE
INTRA-UTERINE FOLEY
CATHETER
½ SIZE HEGAR DILATORS
Cytotec: Use It

- Misoprostol (cytotec)
  - Synthetic methyl analogous of PGE$_2$
  - Acts on cellular matrix, dissolving collagen, increases hyaluronic acid, increased cervical water by increasing vascularity permeability
  - Interleukin-8 is affected, increasing collagenase and thus cervical softening
  - Activates smooth muscle contractions
    - Sometimes the fibroid or large polyps will prolapse through the cervix

Use Cytotec: It Works

• Options
  – Cytotec 200-400 mcg by mouth or intra-vaginally at bedtime prior to procedure
  – If very tight cervix suspected, then begin above regimen 2 days before procedure as well as at bedtime prior to procedure

• Benefits
  – Facilitates dilation
  – Less cervical tears and false tracks
  – Myometrial contractions

Consider Vasopressin

• Preparation: 20 u/200 saline = 0.21u/cc

• Direct intra-cervical stromal injection of 5 mL at 11, 2, 4 and 8 o’clock
  – Alert anesthesiologist
  – Aspirate before injection
  – Administer 5 cc/quadrant = 2 units
  – Assess for cardiovascular response before second injection
**Operative Hysteroscopy**

**Intracervical Vasopressin**

*Effects During Operative Hysteroscopy*


\[ N=106 \]

<table>
<thead>
<tr>
<th>Measurement</th>
<th>p value</th>
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<tbody>
<tr>
<td>BLOOD LOSS</td>
<td>&lt; .05</td>
</tr>
<tr>
<td>INTRAVASATION</td>
<td>&lt; .05</td>
</tr>
<tr>
<td>OPERATING TIME</td>
<td>&lt; .05</td>
</tr>
</tbody>
</table>

And facilitates cervical dilation
Operative Hysteroscopy: Technical Considerations

• Operate during early proliferative phase or with endometrial thinning
• Attempt resection of Type 0 and 1 fibroids only
• Always advance the electrode towards yourself

• Visualize all landmarks throughout the case
• Restrict resection to endometrial surfaces
  – if deep intramural lesion noted--be patient!! Often once the pseudocapsule is breached, the uterus will contract and expel the myoma into the field
  – intermittently decrease intra uterine pressure to prevent “disappearing phenomenon”

• Beware of progressive myometrial eversion
• End resection at capsular level
• Uterine decompression , remove hysteroscope a few minutes, be patient, wait and reinspect
General Principles of Operative Hysteroscopic Myomectomy

• Deflate the endometrium as you resect
• Uterine massage
• Reinspect endometrial cavity 2-3 minutes after removing hysteroscope
• Endometrial suppression not needed, try to schedule post-menses or early proliferative phase
• Sharp curettage can be performed if copious endometrial debris, blood, or copious endometrium

• Consider post op office hysteroscopy in patients desiring fertility within 7-10 days
  – Consider estrogen therapy to aid in re-epithealization of endometrium in patients desiring fertility
  – Or placement of a 5 mL-30 mL intrauterine foley catheter
Intrauterine Surgical Techniques

• Resectoscopic Myomectomy
  – consider oral, vaginal misoprostol or laminaria in nulliparous, multiple C/S, menopausal, or those with prior cone biopsies, since cervix must be dilated to 22F-31 F with hysteroscope
  – use concomitant laparoscopy if concerned about perforation
  – use of dilute solution of pitressin intracervically (to decrease absorption of fluid and facilitate cervical dilation) 20u/200ml saline
Intrauterine Surgical Techniques

• Resectoscopic Myomectomy
  – most physicians currently using electrical energy (monopolar or bipolar), wire loop,
  – morcellator resectoscopy technology
  – Radiofrequency morcellators available

• Shave to level of the endometrial cavity
• Avoid transection of fibroid from the base
• Endometrial suppression not needed, try to schedule post-menstrual or early proliferative phase
• Sharp curettage can be performed if copious endometrial debris, blood, or copious endometrium
Intrauterine Surgical Techniques

- Know your landmarks
- Movement
  - Move wrists
  - Move your hysteroscope
- Vary the intrauterine pressure
- Open and close outflow valve when needed
- Remove clots and debris when poor visualization occurs
- Know your fluid deficit
Remember to Deflate the Uterus
Operative Hysteroscopy: Toolkit

- Ovum forceps
- Polyp forceps
- Ring forceps
- Myoma (Corson) graspers
- Suction curette
- Sharp curette
- Cutting loop
Intra-operative safety precautions

- Flat
  - Do not use Trendelenberg
  - This decreases the risk of air emboli

- Position legs in Allen stirrup’s with PAS stockings

- Collect fluids with drapes/pouches

- Measure any fluid on the floor
  - Mat collector
  - Puddle vac

- Do not put blankets on the floor to absorb spilled fluids
Fluid Pumps: Use Them!!!
Fluid balance is an important issue during hysteroscopy!

But it's really difficult to track!

...especially the amount on the floor.
Tracking Fluid Irrigation Fluid Intra-operatively

• When asked to estimate amount of fluid on the floor, experienced OR nurses had a difficult time, commenting:

  • “We are totally unable to estimate the amount of fluid on the floor”
Puddle Vac  AKA “Sucky Ducky”
Hysteroscopic Instrumentation

- Telescope
- Sheath System
  - Hysteroscope
    - Diagnostic
    - Operative
  - Resectoscope
    - Monopolar
    - Bipolar
- Tissue Removal Systems
  - Smith Nephew
  - Hologic
  - Symphion
Interlacing myometrial fascicles
Gyne-Pro™
Hysteroscopy Electrodes

Coagulating Resector

Perforated Roller
Remember to Deflate the Uterus
Chips: The Most Frustrating Part of the Procedure

- Consider direct removal under direct visualization with resectoscope
- Use a morcellator to decrease frequency of chip formation
- Blind removal with polyp forceps
  - Be careful
- Suction curettage
- Curette
Richard Wolf Chip E Vac System Components

- Very similar to current resectoscope
- Bipolar device

- For each “strip” of myoma or polyp resected, it is suctioned into hysteroscope and does not remain floating in the field
Smith Nephew Morcellator

- Saline environment
- Resection of polyps
- Resections of fibroids
- Removal of retained products of conception
- Visually directed dilation and curettage
- Continuous flow hysteroscope
- No electrical energy used
- Uses its own fluid management system
- Must still adhere to fluid management guidelines
TRUCLEAR™ Hysteroscopic Morcellator

- Control Unit
- Continuous Flow Hysteroscope
- Myoma Blade
- Polyp Blade
MyoSure® Tissue Removal System
No Energy So What About Bleeding with Morcellators?

• Typically the bleeding with hysteroscopic morcellation is similar or less

• Continuous flow during procedure keeps the image clear

• Post procedure contraction of the uterus stops most significant bleeding

• Intrauterine pressure of pump can be increased to help tamponade any oozing
Symphion™ System Components

- One 3-L Bag of Saline
- Controller
- Footswitch
- 3.6mm OD Resecting Device
- 6.3mm OD Endoscope
- Fluid Management System
Symphion™ System Highlights

• Modular set-up

• Bi-Polar RF tissue resection

• Bi-Polar RF spot coagulation capability

• Dual (front & back) force chip transport

• Closed-loop integrated fluid management
  – Normal saline for distention media
  – Re-used after undergoing filtration

• Automatic pressure monitoring and flow control
  – Consistent visualization

• Convenient chip collection and storage
Clog Prevention

- Ceramic plunger pushes tissue past electrode tube and into larger inner tube
- Explosive vaporization
  - Active electrode at distal tip vaporizes saline
  - Vaporized saline turns into steam and expands 1200 times
- This rapid expansion shoots the tissue down the inner tube similar to a steam engine
Remember Volume

- $4/dr^3$
- $1\,\text{cm} = 1/2\,\text{cubic cm tissue}$
- $2\,\text{cm} = 4\,\text{cubic cm tissue}$
- $3\,\text{cm} = 14\,\text{cubic cm tissue}$
- $4\,\text{cm} = 33\,\text{cubic cm tissue}$

As you increase the size of the lesion for operative hysteroscopy, the volume of Resected tissue dramatically increases.

This affects length of surgery, amount of fluid used, and ability to complete the surgery.
Size of Intracavitary Lesion Determines Surgical Time

As diameter of myoma increases, volume increases cubically ($v = \frac{4}{3} \pi r^3$), increasing operating time.

Surgeons should be aware of this dynamic and plan accordingly for overall procedure time.

* Emanuel, MH. (2005). Presentation to Smith & Nephew
Intra Operative Surgical Techniques for Polypectomy

• If blind procedure is performed, look with hysteroscope to determine that full resection is completed
• Resect to the endometrium
• Remove and send all portions of polyp for pathology
• Determine if other pathology is present
• Final inspection to determine that full resection occurred
  – Check the endocervix and endometrial canal…don’t miss co-existing lesions
Hysteroscopic Myomectomy Surgery: Outcome Measures

• Effect on menstruation
  – 80-90% note improved menorrhagia
  – recurrence in 20%
  – improved dysmenorrhea if cramping noted with days of heavy flow
MENSTRUAL FLOW BEFORE AND AFTER HYSTEROSCOPIC RESECTION OF MYOMAS

Indman PD. Obstet Gynecol 1993; 81(5):716-20
MEASURED MENSTRUAL BLOOD LOSS IN FOUR PATIENTS UNDERGOING HYSTEROSCOPIC MYOMECTOMY

# SUBMUCOUS MYOMAS

Sparne Hospital, Haarlem, NL

## Results

<table>
<thead>
<tr>
<th></th>
<th>Free of repeat surgery</th>
<th>Free of hysterectomy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>266 patients</td>
<td>266 patients</td>
</tr>
<tr>
<td></td>
<td>2 yrs. 91%</td>
<td>2 yrs. 95%</td>
</tr>
<tr>
<td></td>
<td>5 yrs. 80%</td>
<td>5 yrs. 89%</td>
</tr>
<tr>
<td></td>
<td>8 yrs. 73%</td>
<td>8 yrs. 89%</td>
</tr>
</tbody>
</table>

including larger uterus and > 2 myomas

Kees Wamsteker, MD, PhD  2003 personal communication
### Number, Type, Weight of Fibroids and Operative Complications

<table>
<thead>
<tr>
<th>Number of fibroids</th>
<th>Number</th>
<th>Operative complications</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>175 (74.5%)</td>
<td>2</td>
<td>1.4</td>
</tr>
<tr>
<td>2</td>
<td>41 (17.4%)</td>
<td>3</td>
<td>7.3</td>
</tr>
<tr>
<td>3 or more</td>
<td>19 (8%)</td>
<td>1</td>
<td>5.3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type of fibroids*</th>
<th>Number</th>
<th>Operative complications</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>26 (11%)</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>1</td>
<td>45 (19%)</td>
<td>2</td>
<td>4.4</td>
</tr>
<tr>
<td>2</td>
<td>164 (70%)</td>
<td>4</td>
<td>2.4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Weight of fibroids (g)</th>
<th>Number</th>
<th>Operative complications</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;3</td>
<td>137 (58.3%)</td>
<td>2</td>
<td>1.5</td>
</tr>
<tr>
<td>3-10</td>
<td>81 (34.5%)</td>
<td>3</td>
<td>3.7</td>
</tr>
<tr>
<td>&gt;10</td>
<td>11 (4.7%)</td>
<td>1</td>
<td>9.1</td>
</tr>
<tr>
<td>&gt;15</td>
<td>6 (2.5%)</td>
<td>0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

*The Classification is based on the fibroid with the deepest intramural extension.  n = 235

Percentage of Patients Treated with Hysteroscopic Myomectomy Stratified by Intramural Extension and Completeness of Removal

Van Dongen H, et al., Acta Obstet et Gynecologica, 2006;85: 11463-1467
Characteristics of Hysteroscopic Surgery of Incomplete Removal of Fibroids

### Characteristics of surgery

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean size (diameter) of fibroid in cm (SD)</td>
<td>3.6 (1.2)</td>
</tr>
<tr>
<td>Mean volume of fibroid in cm (SD)</td>
<td>35.5 (31.4)</td>
</tr>
<tr>
<td>Type of fibroid (%)</td>
<td></td>
</tr>
<tr>
<td>Type 0</td>
<td>4 (9.8)</td>
</tr>
<tr>
<td>Type 1</td>
<td>14 (34.1)</td>
</tr>
<tr>
<td>Type 2</td>
<td>23 (56.1)</td>
</tr>
<tr>
<td>Median percentage residue (range)</td>
<td>27.5 (10-60)</td>
</tr>
<tr>
<td>Median operating time in min (range)</td>
<td>45.0 (20-80)</td>
</tr>
<tr>
<td>Median fluid deficit in ml (range)</td>
<td>1600 (900-2500)</td>
</tr>
<tr>
<td>Sorbitol in ml (range)</td>
<td>1500 (900-2300)</td>
</tr>
<tr>
<td>Saline in ml (range)</td>
<td>2100 (1600-2500)</td>
</tr>
</tbody>
</table>

Van Dongen H, et al., Acta Obstet et Gynecologica, 2006;85: 11463-1467

SD, standard deviation
Results of Hysteroscopic Fibroid Resection

<table>
<thead>
<tr>
<th>Results</th>
<th>Number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Success</td>
<td>186</td>
<td>94.4</td>
</tr>
<tr>
<td>Failure</td>
<td>11</td>
<td>5.6</td>
</tr>
<tr>
<td>Repeat myomectomy</td>
<td>4</td>
<td>2.0</td>
</tr>
<tr>
<td>Hysterectomy</td>
<td>4*</td>
<td>2.0</td>
</tr>
<tr>
<td>Recurrence of symptoms</td>
<td>4</td>
<td>2.0</td>
</tr>
</tbody>
</table>

Mean follow-up period = 3.3 years (40 months). *Hysterectomy performed for obstetrical reason was not considered as a failure. n = 235

Operative Hysteroscopic Myomectomy: Avoidance of Future Surgery

- Hart 4 yrs (n=194) 79%
- Derman 9 yr f/u (n=94) 84%
- Emanuel 10 yr f/u (282) 74%
Post Operative Complications: Be Aware!!

- Malodorous discharge
- Persistent temp >100.5F
- Persistent nausea, vomiting, constipation, abdominal pain
- If symptoms are not improving
- Worsening pain, new onset fever
Don’t Play Peek a boo or Telephone Medicine

• See and examine the patient
• Order appropriate laboratory testing
• Don’t hope the problem away
• Re-assess until the problem has resolved
Informed Consent

- Fluid Overload
- Thermal injury
- Infertility
- Adhesions
- Bleeding
- Infection
- Uterine perforation
- Infectious morbidity
- Positional issues

- Symptomatic hyponatremia
- Early termination
- Incomplete resection
- Hematometria
- Conversion:
  - Laparoscopy
  - Laparotomy
- Hysterectomy
- Death
Complications of Operative Hysteroscopy

- Jansen et
  - Tabulation of complications from 82 hospitals, 1997
  - 100% response rate
  - 13,600 procedures
    - Diagnostic and operative
    - Adhesiolysis (4.5%)
    - Endometrial resection (0.8%)
    - Myomectomy(0.75%)
    - Polypectomy(0.35%)
  - 38/13,600 procedures 0.28%
- Diagnostic procedures had lower complications than operative procedures (0.13% vs 0.95%)
- Fluid overload 0.20%
- Uterine perforation 0.76%
  - 18/33 with cervical dilation
  - 0.16% had bleeding with perforation

Jansen FW. Obstet Gynecol 2000;96:266-270
Avoiding Complications of Hysteroscopy

• Careful history and physical examination
• Pre operative assessment of intracavitary abnormalities with
  – office hysteroscopy
  – saline infusion sonography (SIS)
• Advance hysteroscope in a clear view
• Strict adherence to fluid deficits
• Stop and reschedule surgery if fluid deficit is reached or if full resection can not be completed
Mechanisms of Fluid Absorption

• Intravascular
• Trans tubal
• Peritoneal
• Surgery is associated with increased endogenous arginine vasopressin causing retention of water
6 Factors Which Increase Risk of Fluid Overload

- Cervical lacerations
- Intrauterine pressure
- Degree of damage to endometrium
- Preparation of the endometrium
- Depth of myometrial resection
- Open vascular sinuses with deep myometrial resection
Fluid Guidelines

- If using Glycine or Sorbitol solutions
  - Halt procedure when deficit is 1000 mL and order stat sodium and potassium level.
    - If normal proceed and completely stop procedure with total deficit of 1500 mL, recheck electrolytes and consider empiric diuresis with Lasix 20 mg IV
    - Monitor clinical symptoms if Na < 132

- If Normal Saline is used, more latitude
  - Halt procedure when deficit is 2,500 -3000 mL
    - Diuresis with Lasix, assess for pulmonary edema

- Place foley catheter and measure I’s/O’s
## Difference Between Preoperative & Postoperative Serum Sodium vs. Glycine Deficit, Total Glycine Consumption, & Operation Time in Relation to Nausea

<table>
<thead>
<tr>
<th></th>
<th>Nausea (N = 34)</th>
<th>No Nausea (N = 67)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Difference in serum sodium</td>
<td>5.0 (0-25)</td>
<td>2.0 (0-10)</td>
<td>.001</td>
</tr>
<tr>
<td>Glycine deficit (L)</td>
<td>0.5 (0-2.7)</td>
<td>0.2 (0-1.0)</td>
<td>.004</td>
</tr>
<tr>
<td>Total glycine consumption (L)</td>
<td>5.8 (1.8-21.6)</td>
<td>4.6 (1.5-15.5)</td>
<td>.1</td>
</tr>
<tr>
<td>Operation time (min)</td>
<td>25 (10-70)</td>
<td>30 (10-60)</td>
<td>.8</td>
</tr>
</tbody>
</table>

Data are presented as mean (range).

*Changes in Serum Electrolytes After Transcervical Resection of Endometrium and Submucous Fibroids With Use of Glycine 1.5% for Uterine Irrigation.* Olav Istre, M.D. et al, Obstetrics & Gynecology, Vol. 80, No. 2, August 1992
Signs and Symptoms of Hyponatremia

- Headache
- Confusion
- Lethargy
- Fatigue
- Appetite loss
- Nausea and vomiting
Signs and Symptoms of Hyponatremia

- Loss of consciousness
- Restlessness
- Irritability
- Seizures
- Muscle weakness, cramps, spasms
Intra-Operative Management of Uterine Perforation
To Scope or not to Scope?

Observation

• “Most uterine perforations do not require treatment” 9

• No use of suction device
• No use of electrosurgical energy source
• Pelvic ultrasound may be used to estimate the level of intra-peritoneal fluid.1,2

Give very clear and specific discharge teaching and written instructions1.

9. Glasser MG. OBG management 2005
To Scope Or Not to Scope?

• **Surgical intervention** $^{1,2,4}$
  
  — Signs of severe uterine bleeding or vascular or visceral injury are suspected
  
  — Electrosurgical energy $^{10}$, morcellation, or suction curettage utilized
  
  — Foreign body, intrauterine device, tubal sterilization device entered cavity

Laparoscopy preferred over laparotomy unless hemodynamically unstable

• “Laparoscopy may be useful to determine the extent of damage, including the existence of bowel or bladder injury.” $^7$

4. ACOG. Technology assessment no. 7. 2011
5. Loffer FD. *J Am Assoc Gynecol Laparosc*; 1995
Avoiding Complications

- Do not exceed recommended infusion pressures
- Monitor input/output frequently
- Recognize signs & symptoms of fluid overload and hyponatremia
Discharge instructions

- Expect serous discharge 1-2 weeks
- Bloody discharge 7-21 days
- Cramping 24-48 hours
- No intercourse for one week
- Call if persistent pain or fever
Summary

• Excellent pre-operative evaluation is essential to determine, size, number and location of fibroids

• Excellent hysteroscopic skills with attention to fluid management is necessary

• Traditional operative hysteroscopy and hysteroscopic morcellators are excellent for the removal of uterine polyps, retained products of conception, and Type 0 and some Type 1 leiomyomas

• Superb clinical outcome and minimal complications noted with operative hysteroscopy