Cleveland Clinic

The Minimally Invasive Revolution: Operative Hysteroscopy in Modern Practice

Linda D. Bradley M.D.

Professor, Obstetrics, Gynecology and Reproductive Biology

Director, Hysteroscopic Services

Cleveland Clinic

Cleveland, Ohio

Disclosures

- Royalties for textbook, Hysteroscopy: Office Evaluation and Management of the Uterine Cavity, published by Elsevier
- Royalties for Up to Date chapters on Operative Hysteroscopy, and Hysteroscopic Fluid Management
- Royalties for Operative Techniques in Gynecologic Surgery, published by Wolters Kluwer
- Medical Director American Association of Gynecologic Laparoscopy (AAGL)

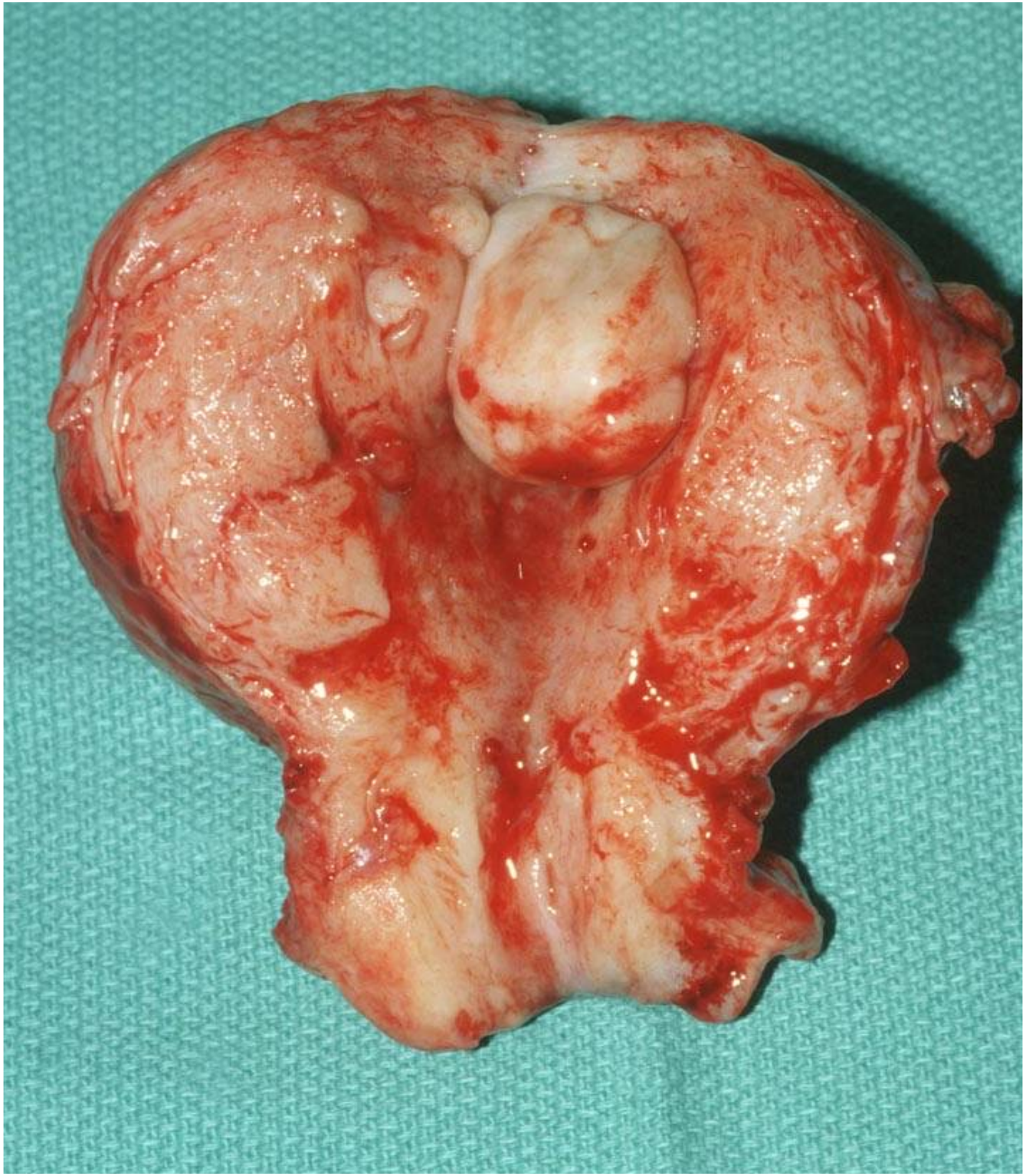
Objectives

- Outline how operative hysteroscopy has transformed the management of intrauterine pathology in clinical practice
- Identify candidates for operative hysteroscopy and apply evidence-based techniques-including tissue-removal systems, electrosurgical methods, and fluid management to enhanced precision and safety
- Evaluate clinical outcomes, complications, and recovery benefits

“When you know better

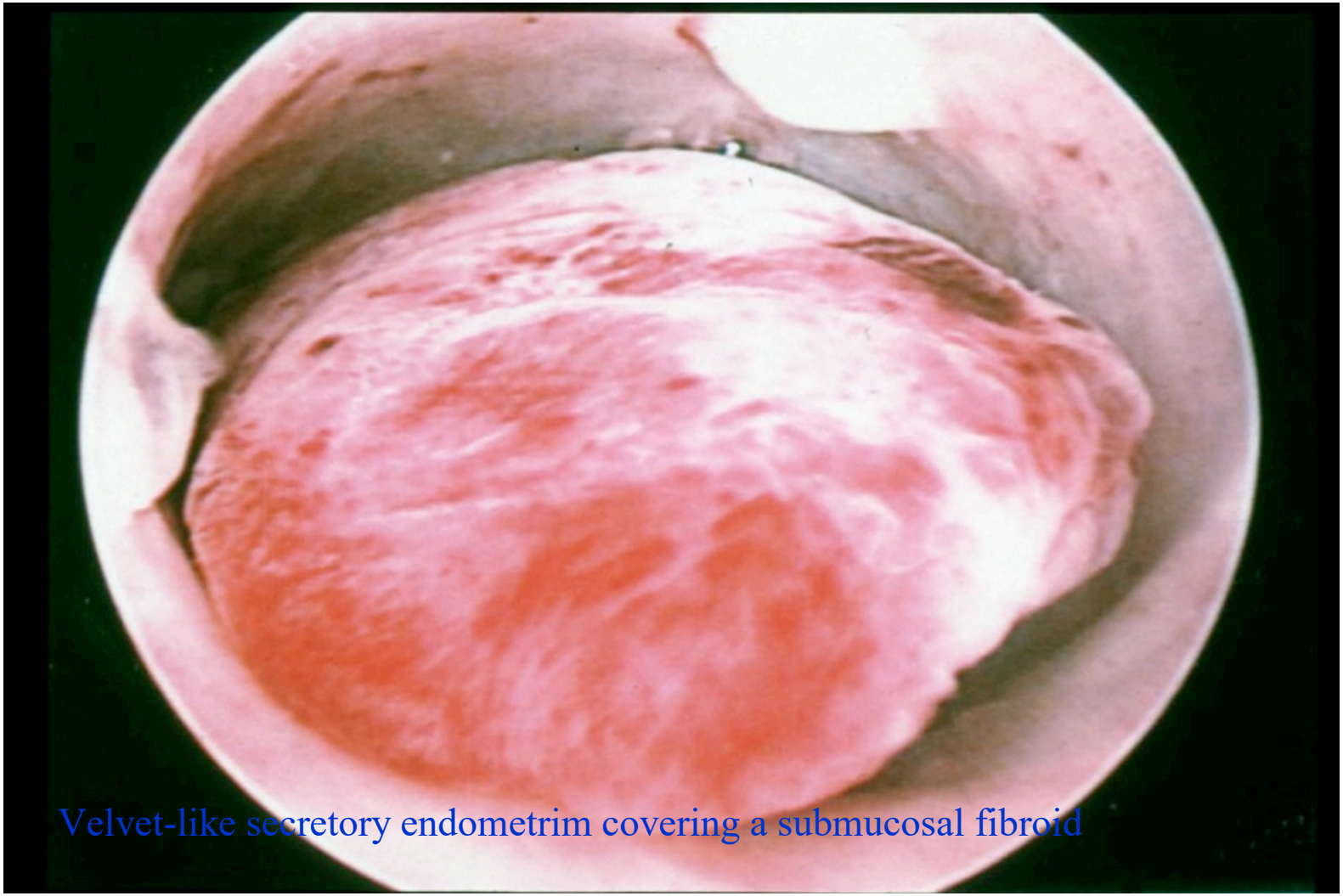
You do better”
and
“When You Learn You Teach
and
When you get—you give
Maya Angelou

Was Hysterectomy Necessary for These Patients?



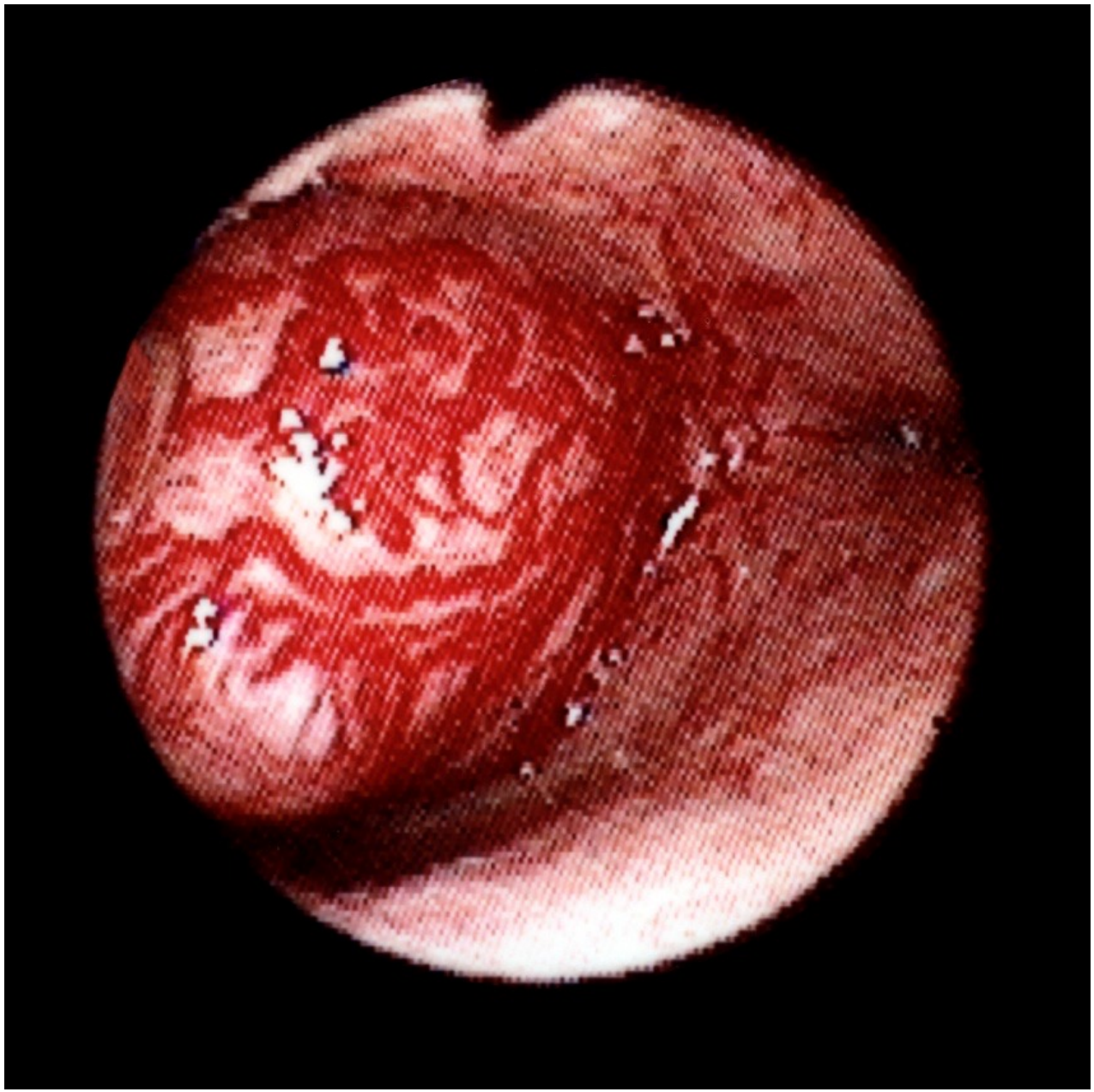

METRIC
INCHES
DEVON INDUSTRIES, INC.
1-800-DEVON P.O.
MADE IN U.S.A.

Hysteroscopic View



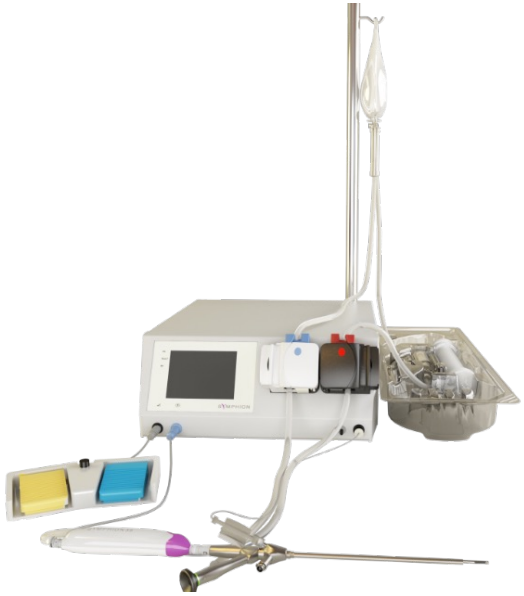
Velvet-like secretory endometrim covering a submucosal fibroid

Pre Op Work Up Improves Surgical Outcomes

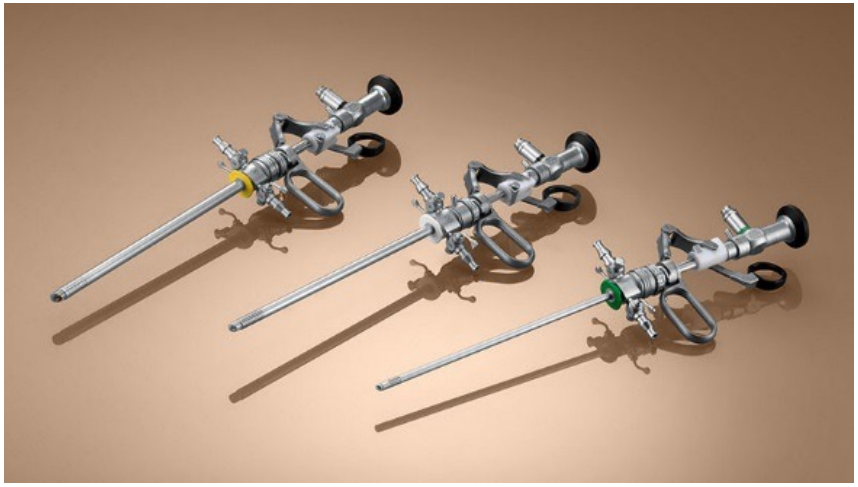


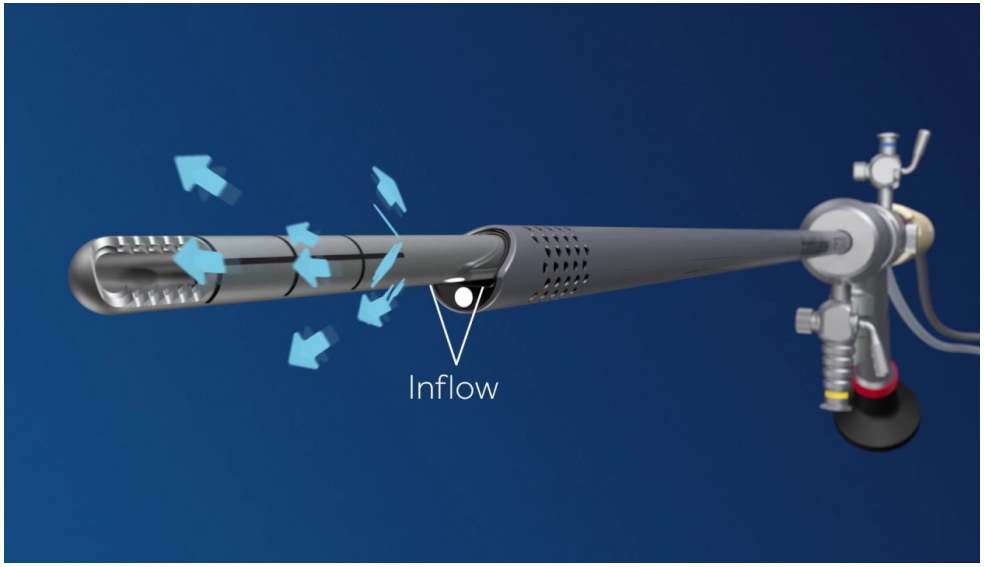
Welcome to the Revolution—The Evolution of Operative Hysteroscopy

- Improved optics
- Improved pre-operative evaluation tools
  - Office hysteroscopy
  - Saline infusion sonography 2D and 3D ultrasound
  - MRI
- Improved design of sheaths
- A variety of loops and cutting devices available
- Safer options for fluid distention media (saline) and automated fluid media pumps for all cases
- Increased request for minimally invasive surgery by patients and payors
- Successful outcomes and safety of operative resectoscopy and tissue retrieval systems

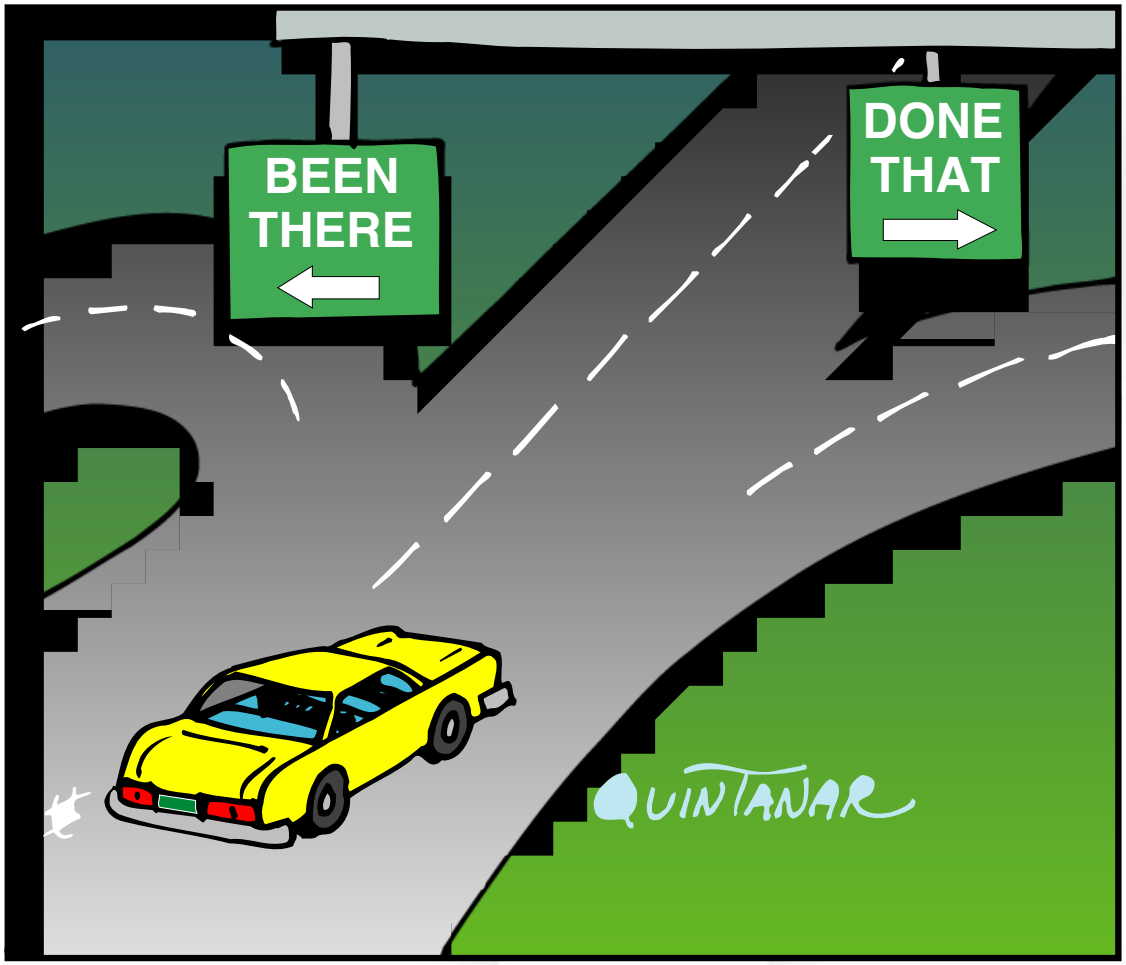


Many Choices for Operative Hysteroscopy





Cleveland Clinic

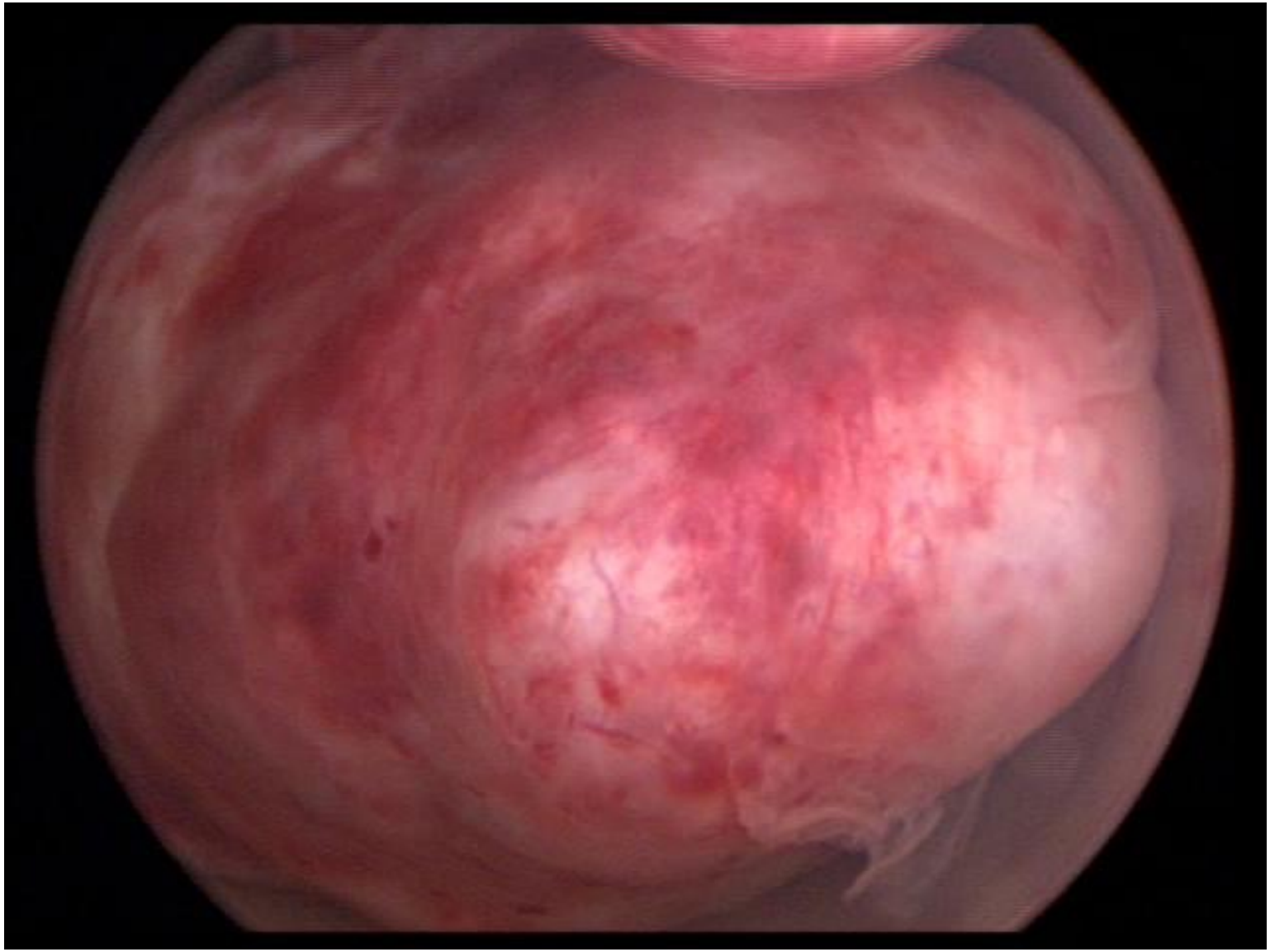


My Philosophy

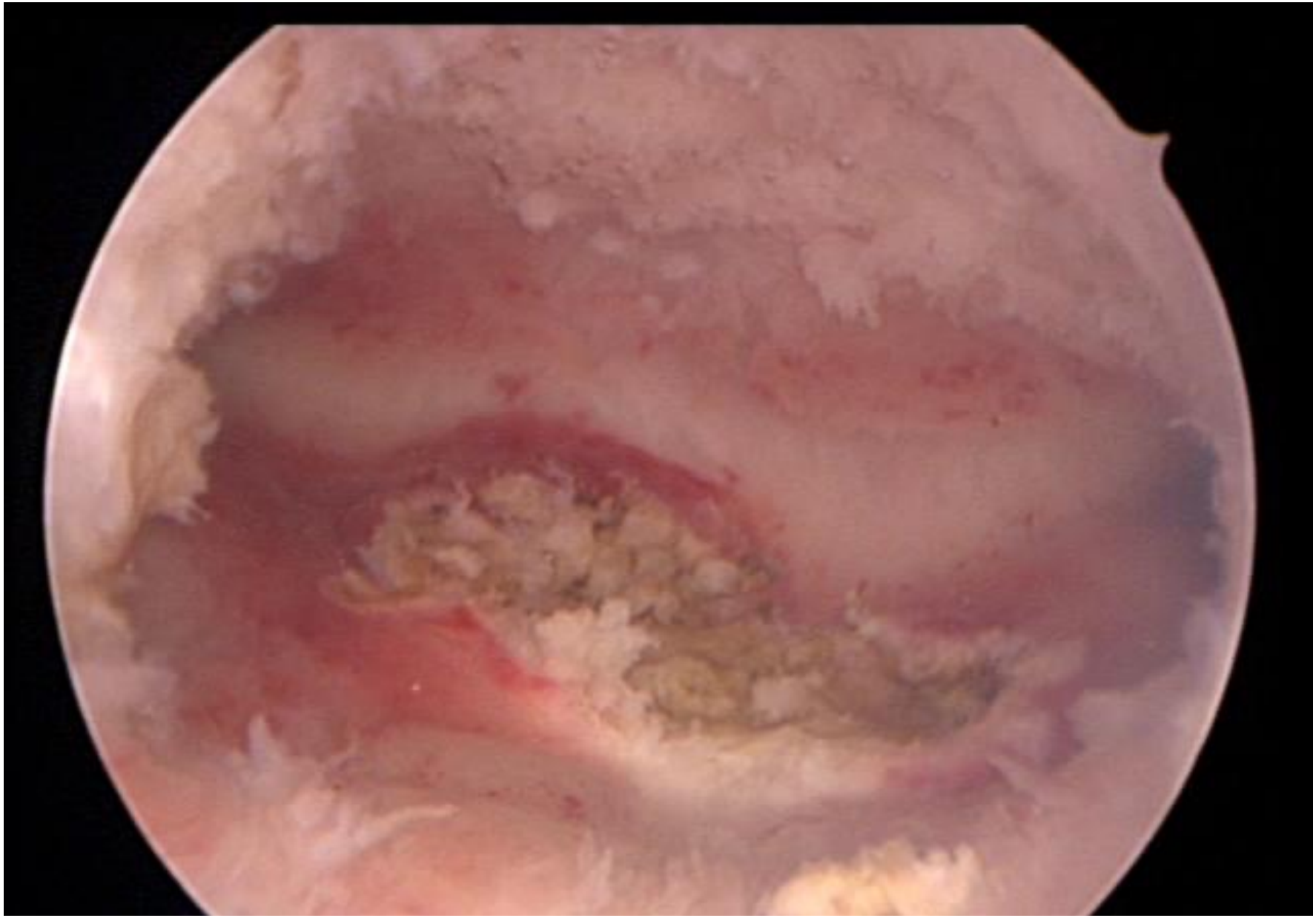
- Uterus is a unique organ
- Reproductive plans of patients may determine choice of surgical instrumentation
- Size, number, location, depth of penetration determine ease and difficulty of removal of fibroids
- Likewise, polyp size, number, and location including proximity tubal ostia may influence device choice
- One technique/device does not provide all surgical approaches for removal of intracavitary pathology
- Multifaceted tools = a multifaceted surgeon

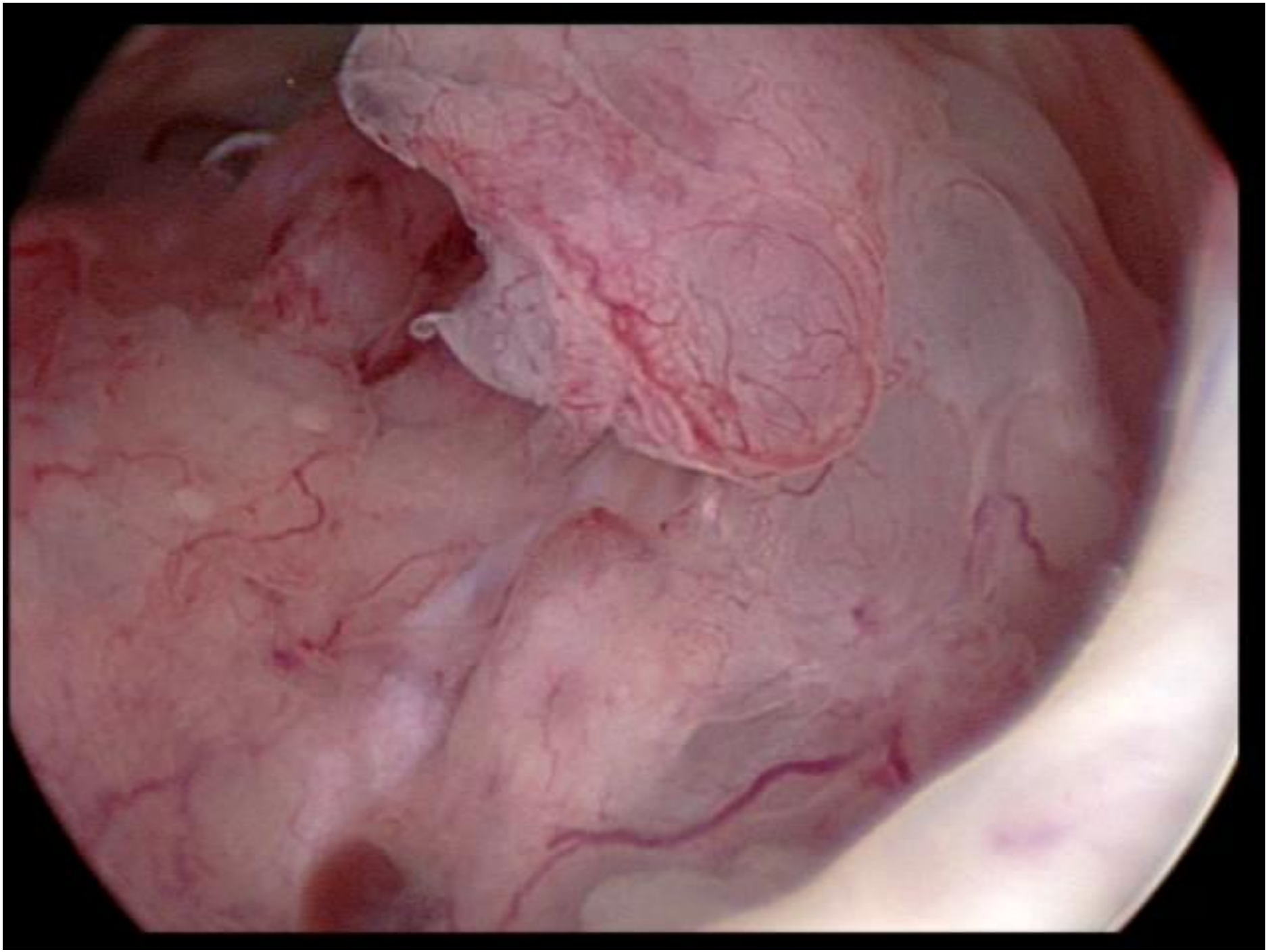
Dual Skills. True Mastery

How This Hysteroscopy Zealot Would Remove This Fibroid



Techniques That I Employ





What's In Your Toolbox
Resectoscope?
Tissue Retrieval Device?

It's Both

Experts Need Both

Two skills.
One surgeon

YOU ARE A GOOD SURGEON

WHEN YOU KNOW WHEN TO DO IT

BUT YOU ARE A BETTER SURGEON

WHEN YOU KNOW NOT TO DO IT

AND YOU ARE THE BEST SURGEON

WHEN YOU KNOW

HOW TO DO IT

Indications of Operative Hysteroscopy

- Removal of FIGO 0, 1 and some type 2 leiomyoma
- Removal of endometrial polyps
- Retained products of conception
- Removal of imbedded foreign bodies
- Treatment of mullerian anomalies (uterine septum)
- Treatment of C/Section isthmocele
- Removal of endocervical lesions
- Removal of intrauterine stalk of prolapsing leiomyoma or polyp

Contraindications of Operative Hysteroscopy

- **Absolute Contraindications**
  - Cervical Cancer
  - Acute Pelvic Inflammatory Disease
  - Pyometria
  - Inadequate Operative Experience
  - Inadequate Instrumentation
  - Prodromal or active herpes outbreak
  - Viable pregnancy

Complete removal of intracavitary leiomyomas, polyps, and retained products of conception is crucial to improve clinical outcomes

Great Operative Hysteroscopy Starts Before You Begin

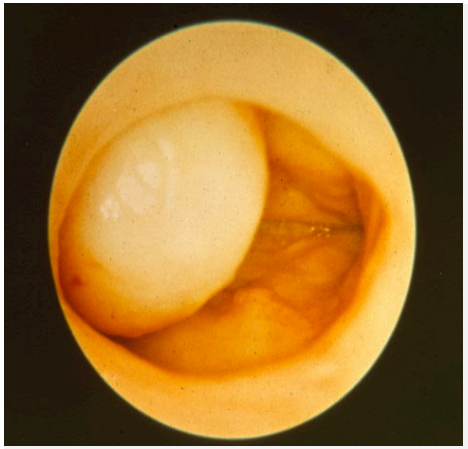
- Office Hysteroscopy
- Saline infusion sonography
- MRI female pelvis (rarely needed)

Do Not Rely Solely on:

- Endometrial biopsy
- Dilation and Curettage
- Transvaginal Ultrasound alone

“A VIGILENT EYE IN THE UTERINE
CAVITY IS MUCH BETTER THAN A
HANDFUL OF BLIND INSTRUMENTS”

Prof. Hans J Lindman



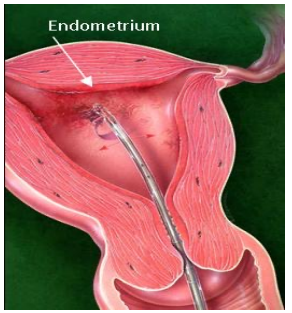
Dilation and Curettage: Sobering Statistics

- Samples less than 75% of the uterine cavity in 84% cases
- Samples less than 50% of the uterine cavity in 60% cases
- In 16%, less than 1/4th of cavity was curetted
- 4-20% yield specimens with inadequate tissue for histology
- Submucosal fibroids and polyps often not sampled, missed, or incompletely removed
- 10-15% lesions not retrieved
- Risk of uterine perforation

Stock RJ, Kanbour A. Prehysterectomy curettage. Obstet Gynecol 1975;45:537-541.

Endometrial Pipelle Biopsy: Sobering Statistics: 2.2 million performed yearly in USA

- 25-100% sensitive in detecting endometrial cancer
- Insufficient tissue detected in 15-25%
- 44% sensitive for detecting benign disease
- 10% cervical stenosis
- Often misses focal diseases including polyps, fibroids, and focal malignancy
- Accuracy related to uterine size, size of lesions, or malformations



Endometrial Pipelle Biopsy: Sobering Statistics

- *Size of lesion matters*
- If pipelle biopsy reveals cancer, then you have made the diagnosis. But if it doesn't what could you miss?
- Pipelle samples on average 4% (range 0-12%) of endometrium vs 41% for Vabra biopsy.
- What does a negative biopsy really mean? It might mean that you have missed a focal lesion.

OBSTETRICS & GYNECOLOGY

CONTENTS: CLINICAL EXPERT SERIES

Implementation of Office Hysteroscopy for the Evaluation and Treatment of Intrauterine Pathology

Orlando, Megan S. MD; Bradley, Linda D. MD

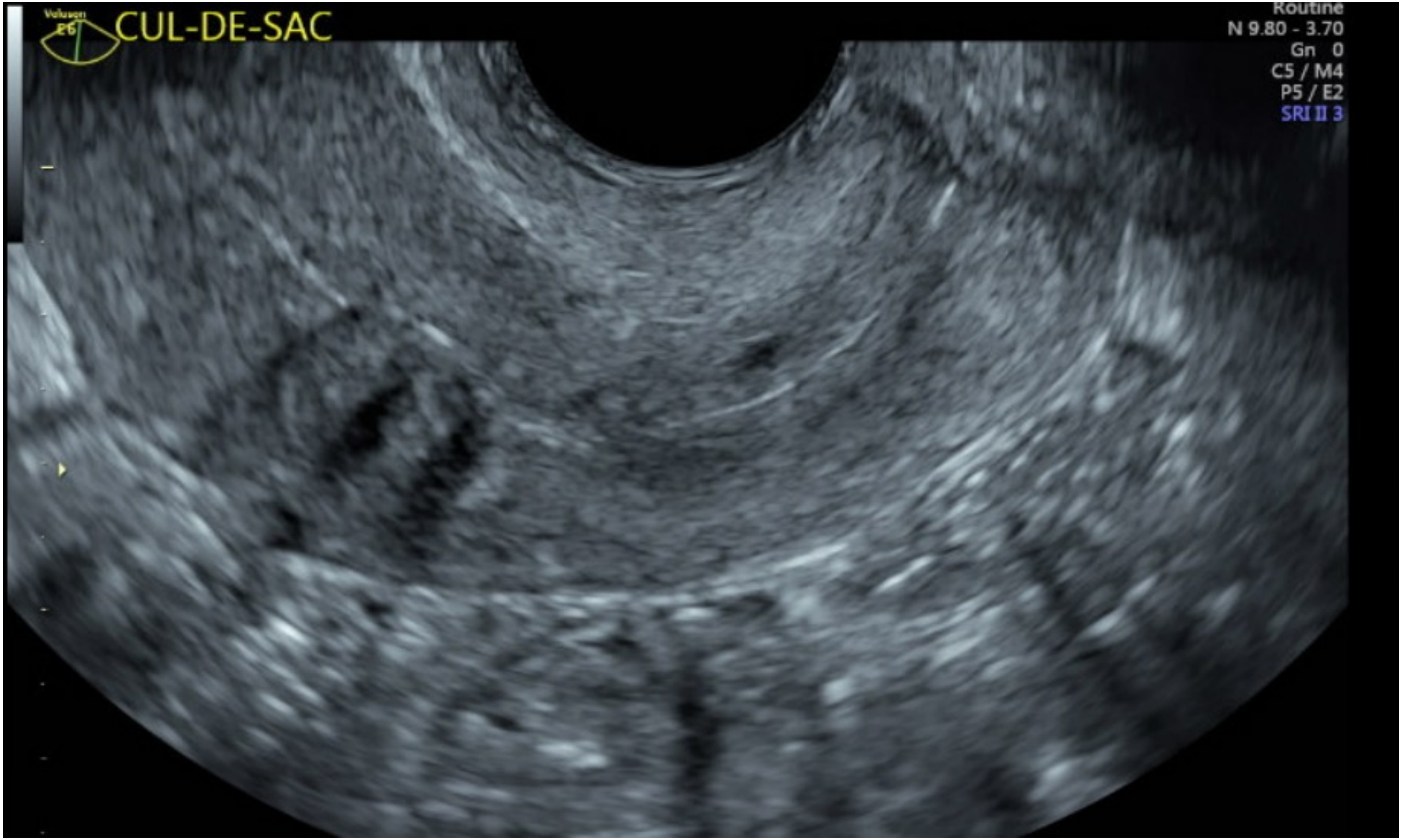
Author Information

Obstetrics & Gynecology: September 2022 - Volume 140 - Issue 3 - p 499-513

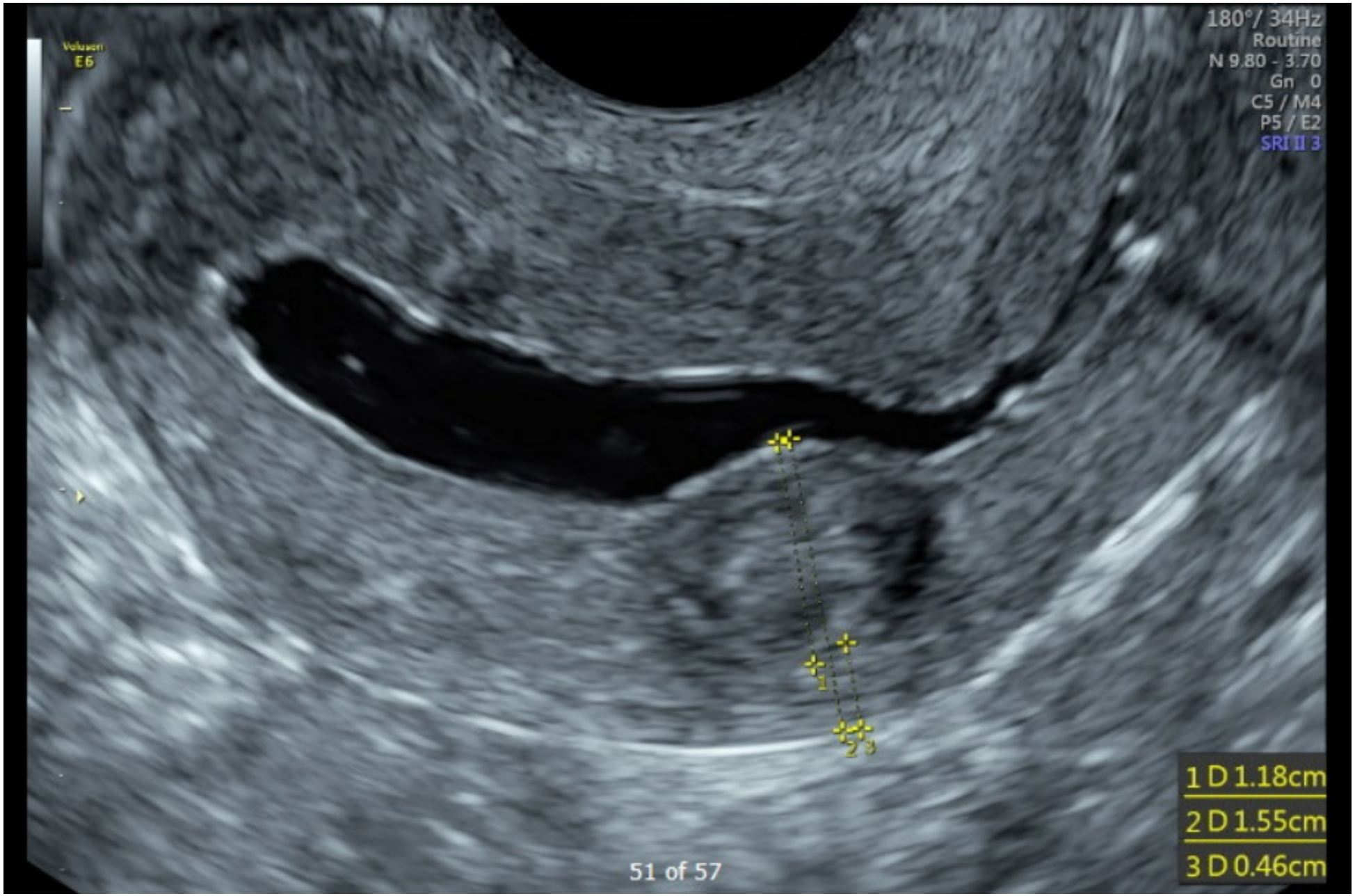
Abstract In Brief

Hysteroscopy provides a minimally invasive strategy to evaluate intrauterine pathology and manage conditions such as abnormal uterine bleeding, infertility, intrauterine adhesions, müllerian anomalies, and intrauterine foreign bodies. Increasing access to hysteroscopy procedures in the office has the potential to improve patient care by minimizing financial and logistical barriers, aiding in streamlined diagnosis

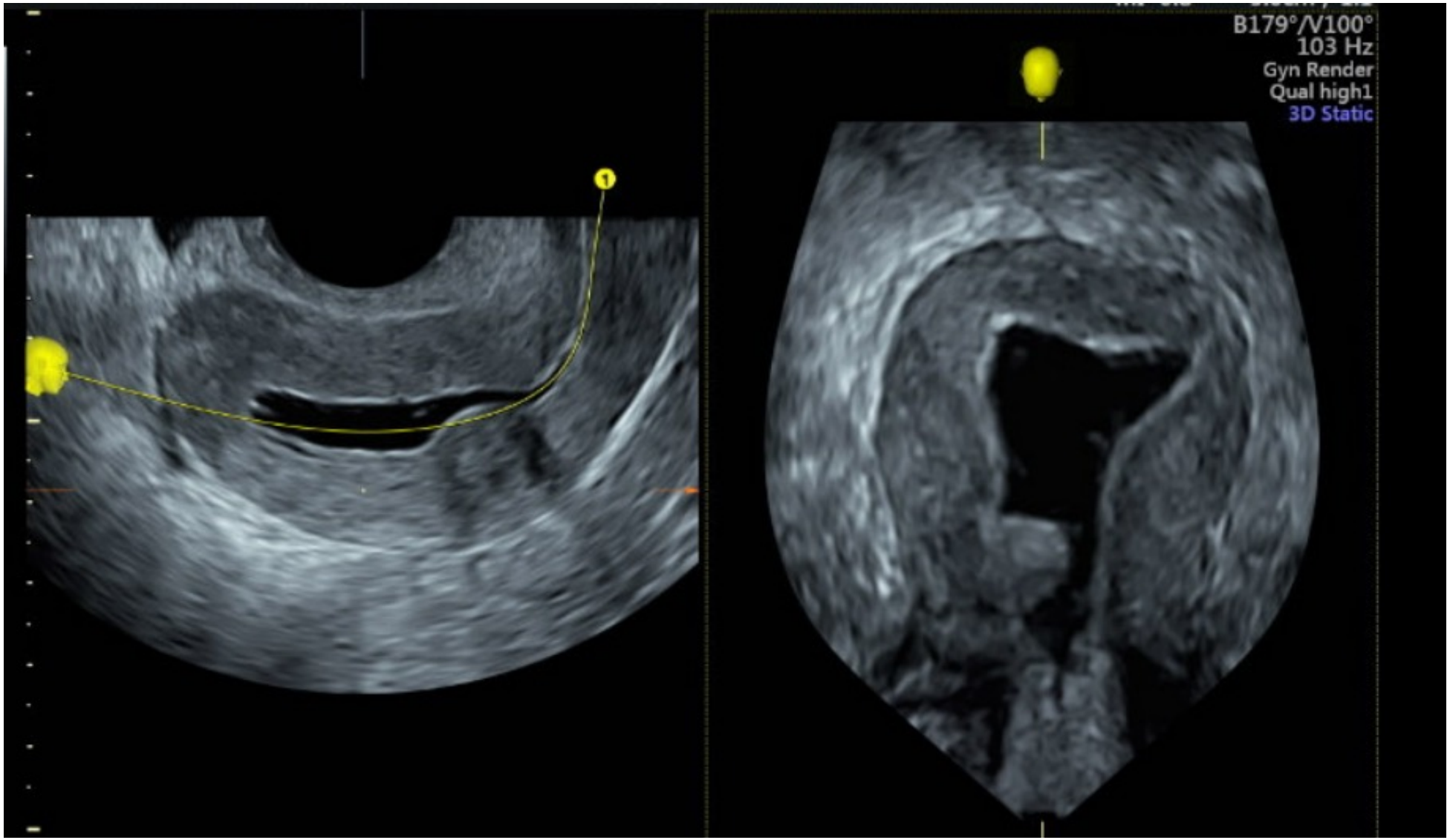
Transvaginal US



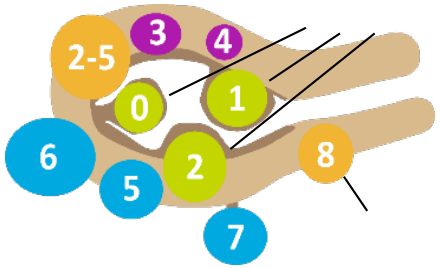
SIS


Voluson
E6
180°/ 34Hz
Routine
N 9.80 - 3.70
Gn 0
C5 / M4
P5 / E2
SRI II 3
1
2
3
51 of 57
1 D 1.18cm
2 D 1.55cm
3 D 0.46cm

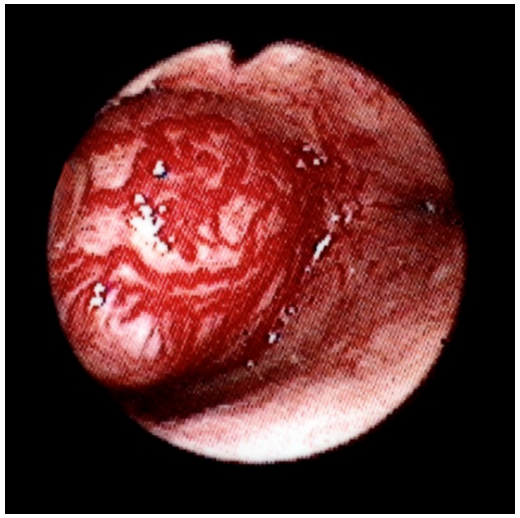
3 D SIS Rendering

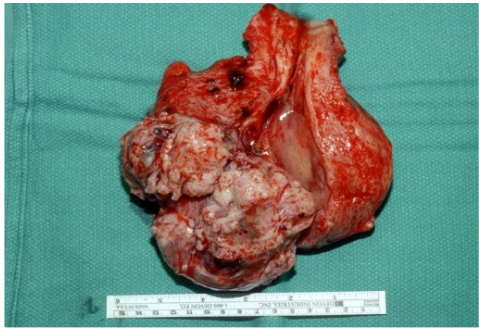


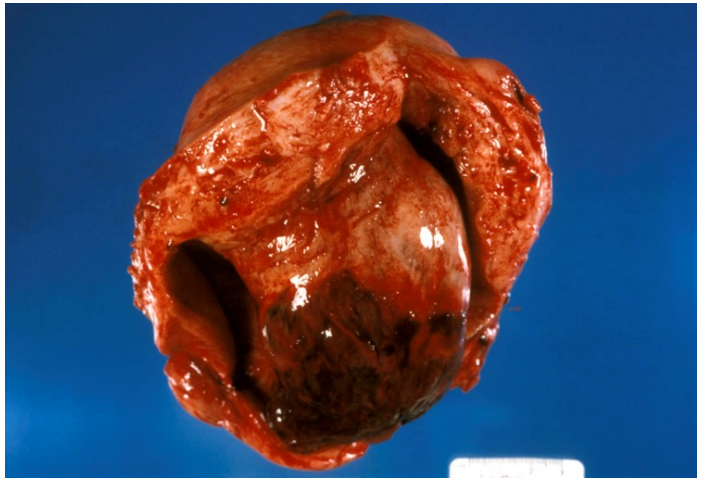
Operative Hysteroscopy: Your Tool Depends Upon Size, Number, and Location of Uterine Fibroids: Know Before You Schedule

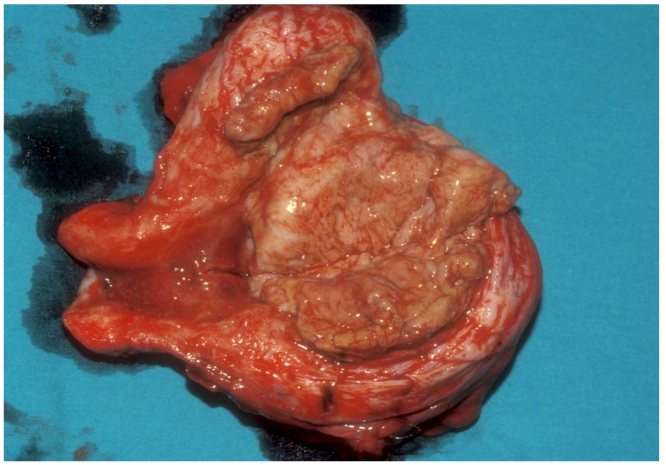


FIGO Classification









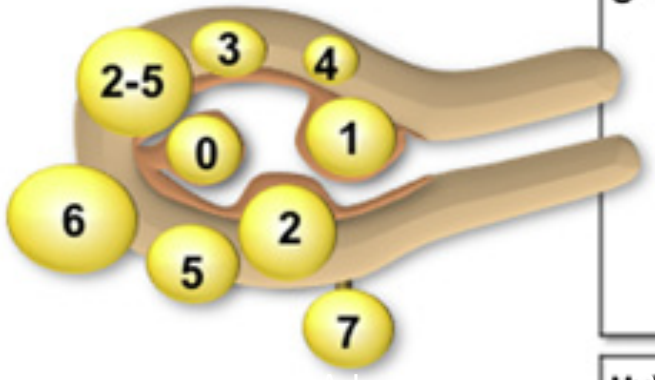
Leiomyoma (AUB-L)

Polyp
Adenomyosis
Leiomyoma
Malignancy & hyperplasia

Submucosal
Other

Coagulopathy
Ovulatory dysfunction
Endometrial
Iatrogenic
Not yet classified

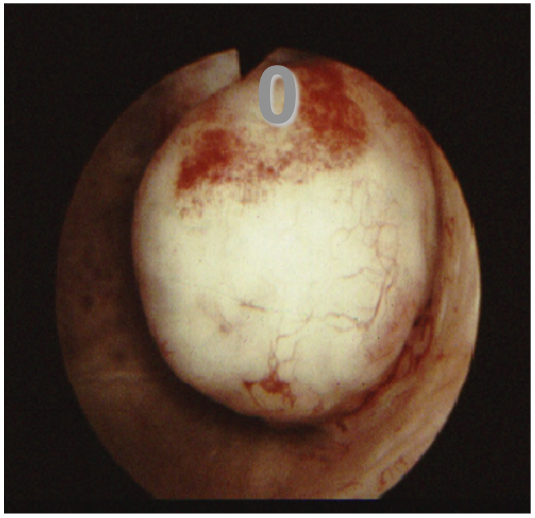
Leiomyoma Subclassification System

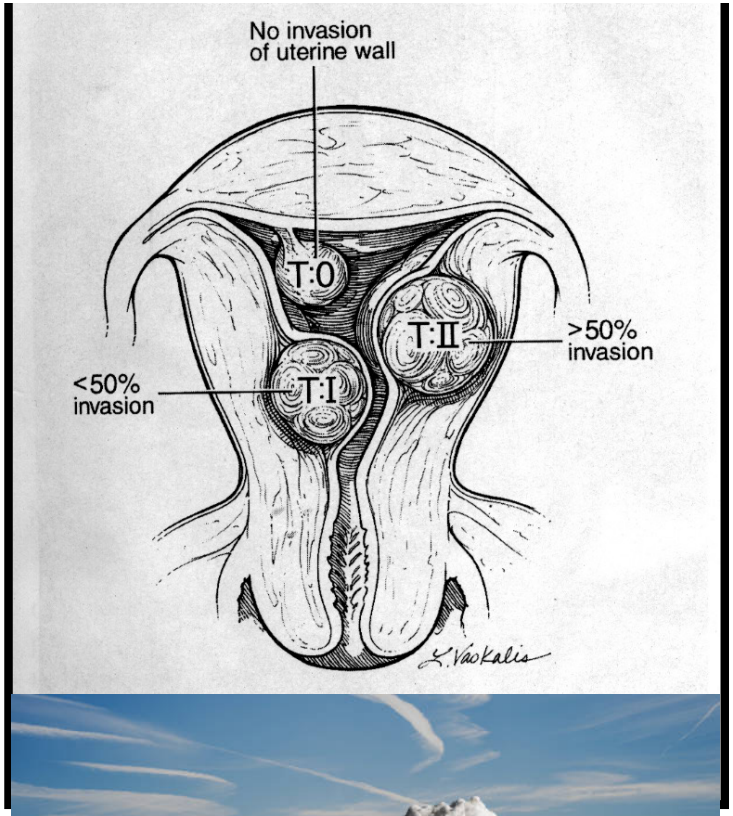


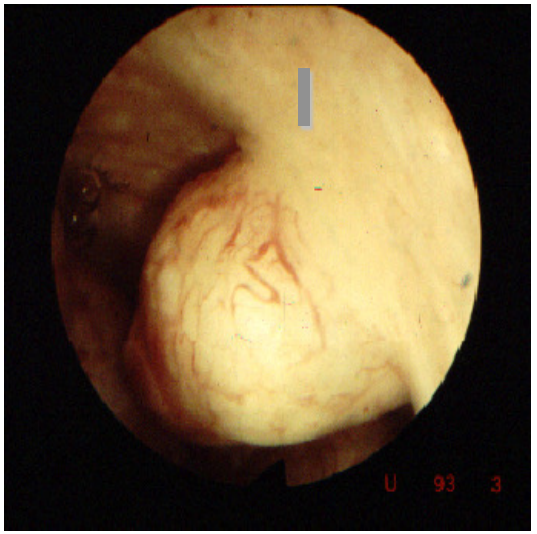
SM- Submucosal	0	Pedunculated Intracavitary
	1	<50% Intramural
	2	≥50% Intramural
O - Other	3	Contacts endometrium; 100% Intramural
	4	Intramural
	5	Subserosal ≥50% Intramural
	6	Subserosal <50% Intramural
	7	Subserosal Pedunculated
	8	Other (specify e.g. cervical, parasitic)

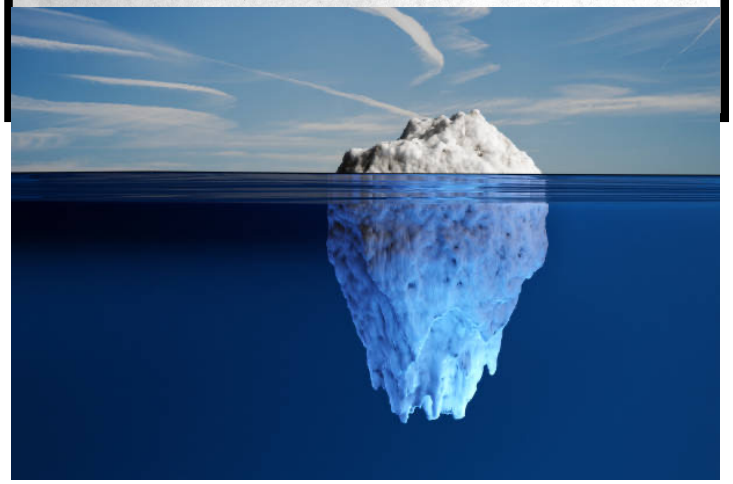
Hybrid Leiomyomas (impact both endometrium and serosa)	Two numbers are listed separated by a hyphen. By convention, the first refers to the relationship with the endometrium while the second refers to the relationship to the serosa. One example is below	
	2-5	Submucosal and subserosal, each with less than half the diameter in the endometrial and peritoneal cavities, respectively.

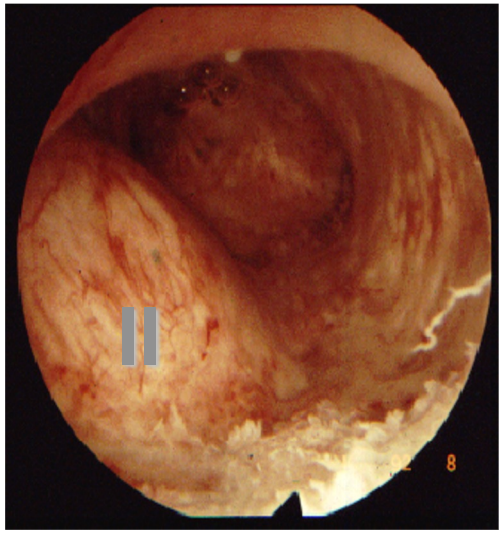
Hysteroscopic Classification System











Lasmar STEP Uterine Fibroid Classification

- **STEP-W Classification**

Parameters	Escore	0	1	2
S		≤ 2	2 a 5	> 5
T		low	mid	upper
E		≤ 1/3	1/3-2/3	> 2/3
P		0	≤ 50%	> 50%
W		a / p	lateral	

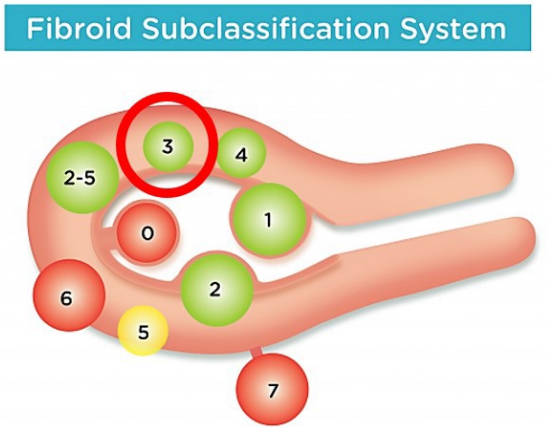
- New classification that rates complexity and takes into account additional factors:
  - **S**ize
  - **T**opography
  - **E**xtension of base
  - **P**enetration into cavity
  - **W**all (lateral)
- Becoming more recognized as additional considerations for complexity of hysteroscopic myomectomy

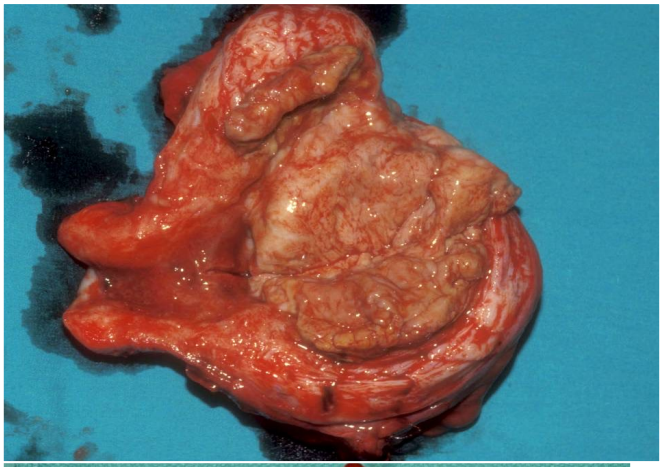
Score	Group	Indication
0 a 4	I	Low complexity hysteroscopic myomectomy.
5 a 6	II	High complexity hysteroscopic myomectomy. GnRH? Two-step hysteroscopic myomectomy.
7 a 9	III	Hysteroscopic myomectomy is not indicate

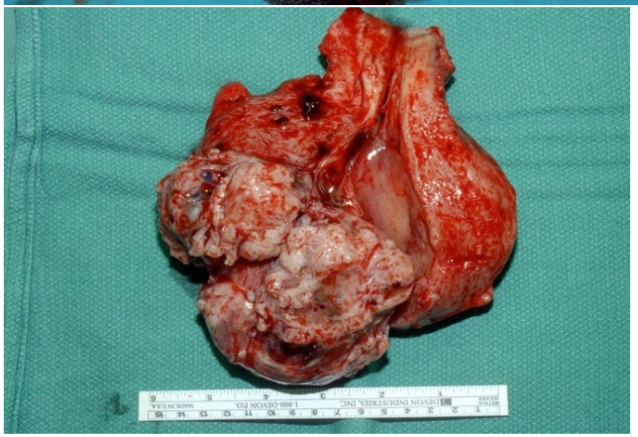
Lasmar R, et al. Feasibility of a new system of classification of submucous myomas: a multicenter study. Fert Steril 2011;95(6):2073-2077. 95(6):2073-7

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

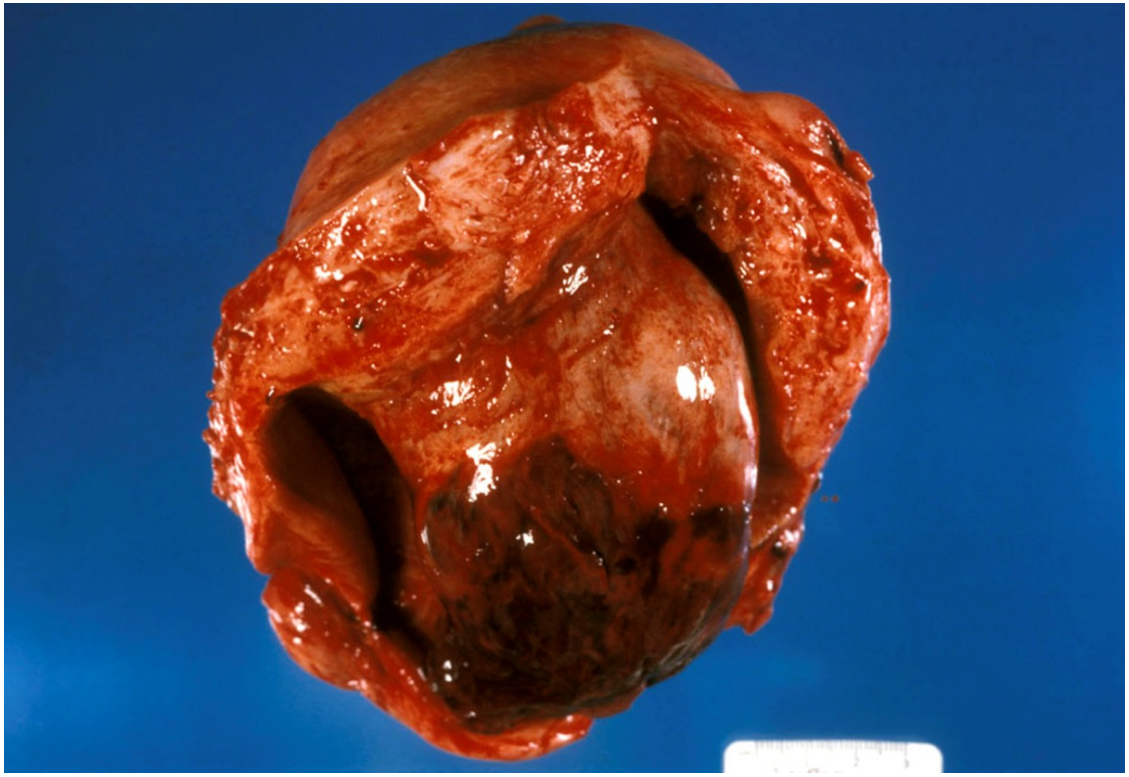






How Big of an Intracavitary Fibroid Can You Tackle?

- **Issues**
  - Fluid absorption
  - Time
  - Chip management
  - Visualization
  - Navigation within the uterine cavity
  - Uterine walls collapsing
  - Cervix



Size of Lesions Matter (0.5cm cm3/min)

- 2 cm → 8.4 minutes
- 3 cm → 28 minutes
- 4 cm → 67 minutes

Volume Is More than Size

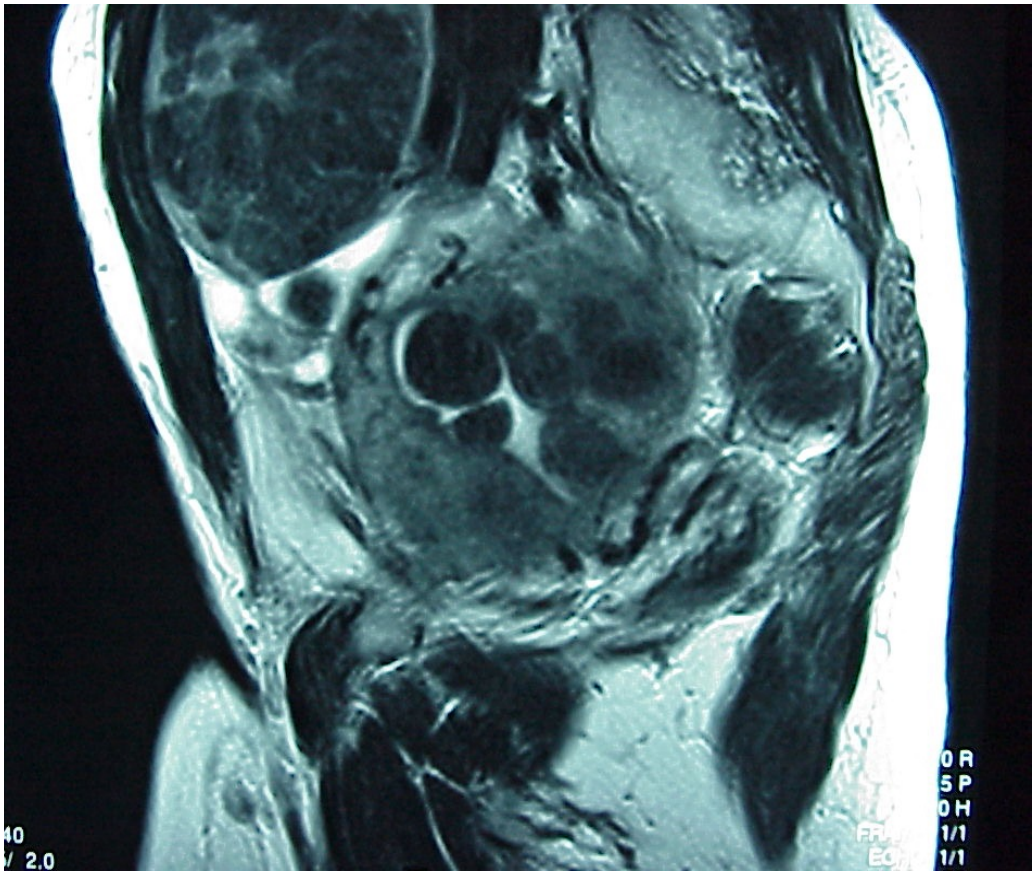
Hysteroscopic myomectomy of 9 cm FIGO 0

Fluid Absorption

Remember Volume

- $4/dr^3$
- 1 cm =1/2 cubic cm tissue
- 2 cm = 4 cubic cm tissue
- 3 cm = 14 cubic cm tissue
- 4 cm = 33 cubic cm tissue

Pre Operative Mapping Critical



MRI is needed when:

- **Uterine cavity can not be distended with hysteroscopyor SIS**
- **Or if SIS is equivocal**
- **Especially after incomplete resection**
- **With larger uteri, can more accurately determine FIGO classification, size, and number of fibroids**
- **Determine candidacy for hysteroscopic approach**

The Room Doesn't Make the Outcome Preparation and Readiness Does

How I Increased My Hysteroscopic Acumen (and stayed out of trouble)

- Excellent pre-operative evaluation
- Pre op cytotec
- Utilize intracervical vasopressin throughout my cases
- Know your team and their distinct roles
  - Have a conversation with anesthesia
  - Have a conversation with Nursing team
- Keep a clear view
- Alternating Fluid Distention/Fluid Management System
- Do not put anything blindly in the uterus.
- Look for the "black hole"
- Adherence to Fluid Management Guidelines
- Techniques for Chip Removal
- Keep your orientation
- Patience
- Know when to stop
- Detailed Operative note including amount of fluid used
- Recognize intra operative and post op complications immediately
- Don't be in denial
- Clear post op instructions
- Post op hysteroscopy when indicated

Use Misoprostol: It Works

- Options
  - Misoprostol 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
  - Decreases risk of intrauterine perforation
  - Less cervical tears and false tracks
  - Myometrial contractions
  - Pushes deep myometrial lesions to endometrium facilitating complete resection

The efficacy of evening primrose oil as a cervical ripening agent for gynecologic procedures: A single-blinded, randomized controlled trial*

Rusienne Mae A. Verano, MD and Mary Girlie Veloso-Borromeo, MD, FPOGS
Department of Obstetrics and Gynecology, Cebu Doctors Hospital

ABSTRACT

Background: Evening Primrose Oil (EPO) is one of the most commonly prescribed cervical ripening agents. Cervical ripening is the softening, effacement, and dilation of the cervix that occur prior to active labor, and is an intervention that is used for certain indications, such as postdates pregnancy. There are gynecologic cases wherein the cervix is closed and dilatation has not occurred making the procedure difficult. In studies, EPO works by softening and ripening the cervix in the pregnant woman. More likely it has the same effects in a non-pregnant patient with regards to softening and dilating the cervix during gynecologic procedures.

Methods: The study was conducted in a tertiary hospital. Patients scheduled for gynecologic procedures were randomly grouped under the control and study group. Both groups had an internal examination during admission. The study group, in addition, were given EPO 4 capsules intra-vaginally, 6 hours prior to the contemplated procedure. Cervical characteristics were assessed initially on admission and pre-proedure. Consistency were assessed using the Consistency Index (CI) and graded as firm=1, medium=2 and soft=3 . Dilatation were assessed using the Dilatation Index (DI) and graded as closed=1, admits tip =2 , >1cm= 3. Pre-procedure, cervical characteristics and the CDI of both groups were assessed. Hegars dilators were used to assess the degree of dilatation, noting the diameter of dilator that can be introduced freely, and to what diameter the cervix can be maximally dilated.

Results: 80 patients were enrolled in the study; 39 patients were assigned in the control group and 38 patients were assigned in the study group (3 were excluded). In the study group, their DI improved by 36.2% (pre = 1.53+/-0.51 to post = 2.08+/-0.49) ($p<0.001$), CI increased by 115.9% (pre=1.16+/-0.37 to post = 2.50+/-0.65) ($p<0.001$), and their CDI changed by 70.6% (pre=2.68+/-0.74 to post = 4.58+/-0.95) ($p<0.001$). The changes of scores in all the cervical parameters in the study group were statistically significant.

Conclusion: EPO 4 capsules punctured and administered intra-vaginally 6 hours prior to contemplated gynecologic procedure can promote cervical ripening as exhibited by the improvement of the CDI from initial assessment to pre-procedure assessment.
Keywords: Evening Primrose Oil, EPO, Cervical Ripening Agents

Operative Hysteroscopy Safety Checklist

Critical Safety Steps for Every Procedure

PRE-OPERATIVE

- ☐ Verify patient identity, procedure, and site
- ☐ Confirm pregnancy test negative (if applicable)
- ☐ Review imaging (ultrasound/MRI) for pathology location
- ☐ Assess cervical preparation needs (nulliparous, stenosis)
- ☐ Verify antibiotic prophylaxis if indicated
- ☐ Confirm consent includes specific risks and alternatives

INTRA-OPERATIVE

- ☐ Dedicated personnel assigned to fluid monitoring
- ☐ Audible alert to surgeon for name of fluid hung
- ☐ Vary the intrauterine pressure to maintain visibility
- ☐ Visualize ENTIRE cavity before resection
- ☐ Monitor fluid with automated fluid pump
- ☐ Stop at threshold: 2500 mL (saline in healthy pt)

POST-OPERATIVE

- ☐ Final fluid deficit documented in chart
- ☐ Tissue sent to pathology (label correctly)
- ☐ Monitor vitals if deficit >2500mL
- ☐ Provide clear discharge instructions
- ☐ Schedule follow-up and pathology review

STOP IMMEDIATELY IF:

- ⚠ **Fluid deficit exceeds threshold**
- ⚠ **Perforation suspected (loss of distension, bowel)**
- ⚠ **Uncontrolled bleeding despite intervention**
- ⚠ **Patient develops symptoms decrease o2 saturation**
- ⚠ **Equipment malfunction compromising safety**

What Else Do I Want to Know On the Day of Hysteroscopic Surgery?

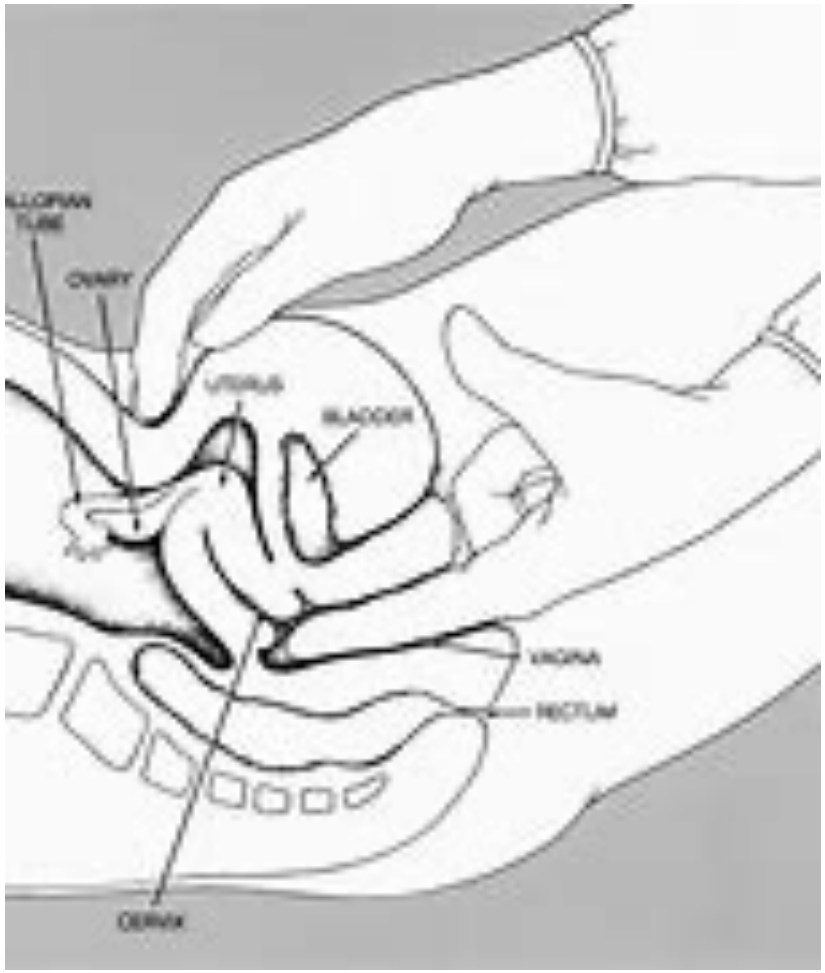
- Last menstrual period
- Herpes prodrome?
- Did she remember to take Misoprostol?
- Does she plan on having children?
- Surgical Time Out?
  - Right patient?
  - Right procedure?
  - Instruments needed are all present?
  - Informed consent and complications reviewed with patient
- Anesthesiologist
- Nursing Team Engagement
- Tylenol 1000 mg in pre-op
- IV $MgSO_4$
- IV Toradol

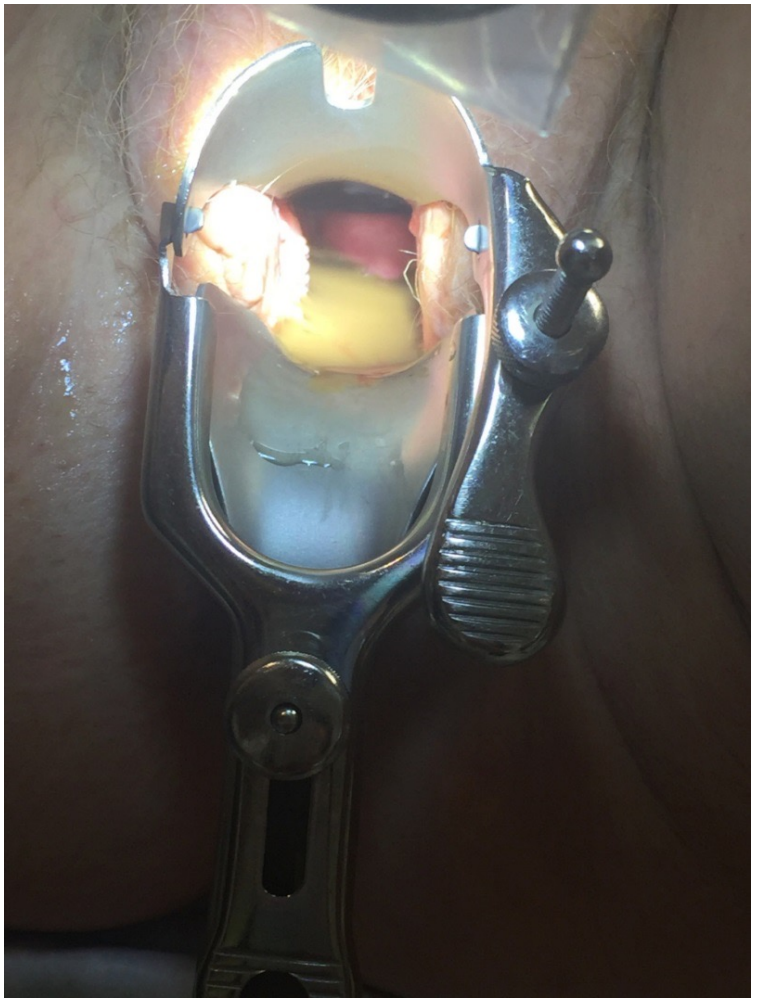
Keeping Lawyers And Lifeguards Out Of Your OR

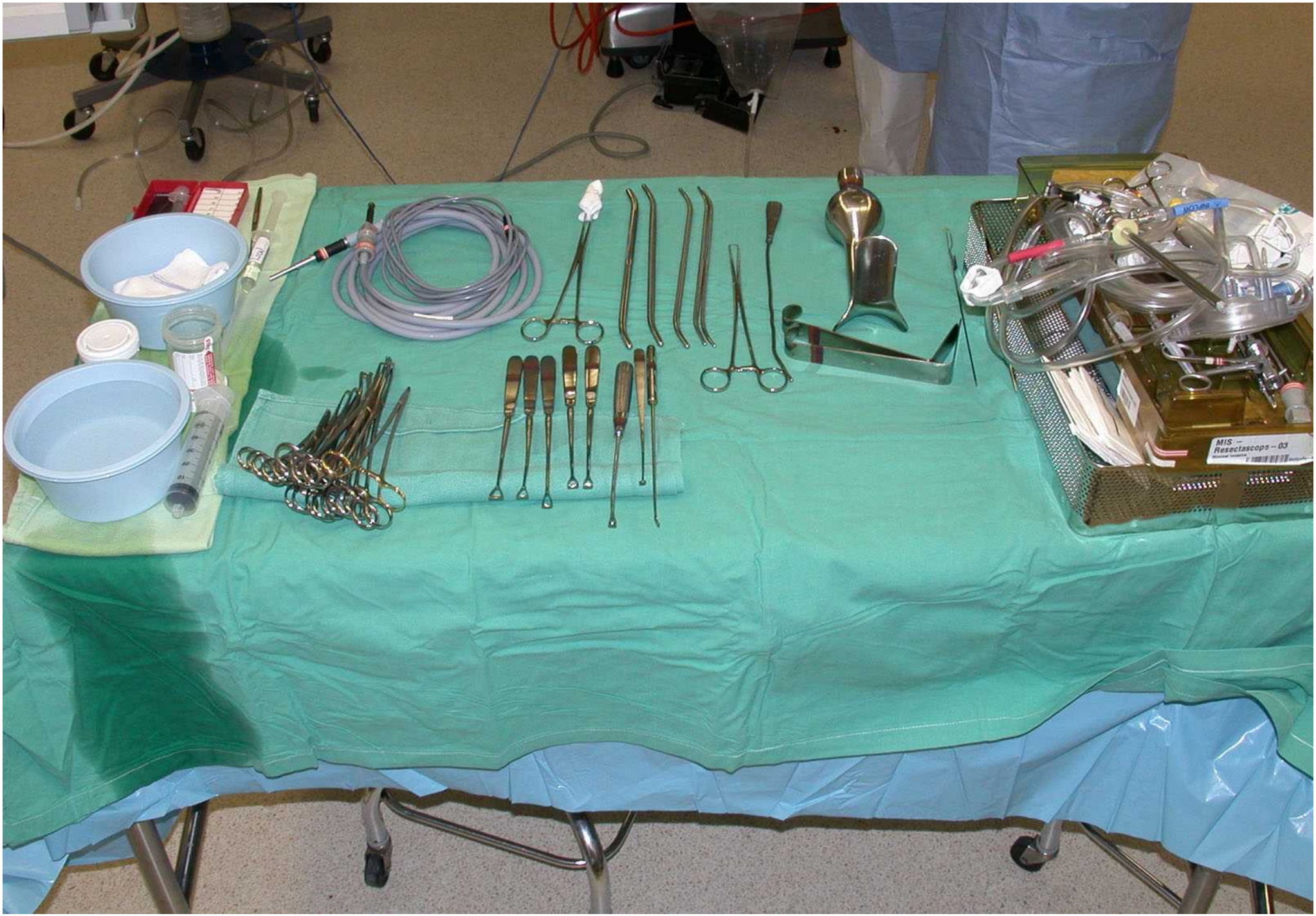
Informed Consent: Keeping Lifeguards and Lawyers Out Of Your Operating Room

- Fluid Overload
- Thermal injury
- Infertility
- Adhesions
- Bleeding
- Infection
- Uterine perforation
- Infectious morbidity
- Positional issues
- Incomplete procedure
- Air embolism
- Early termination
- Incomplete resection
- Hematometria
- Conversion:
  - Laparoscopy
  - Laparotomy
- Hysterectomy
- Death

Don’t Forget to Examine The Patient Under Anesthesia





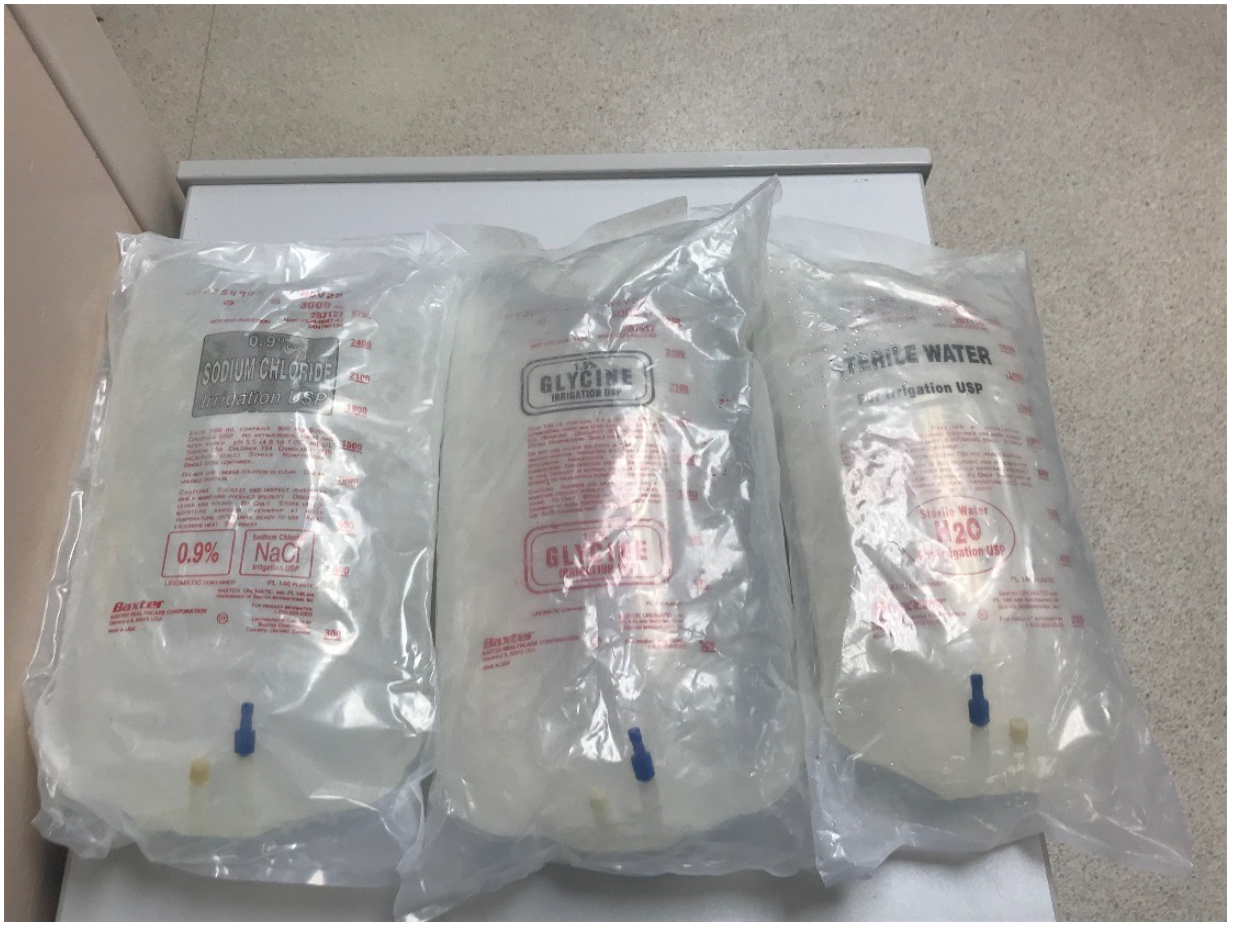

MIS
Resectascope – 03

Helpers In the OR?

11 SCALPEL
LEEP MACHINE
PIPELLE
½ SIZE HEGAR DILATORS
TISSUE RETRIEVAL SYSTEM
FLEXIBLE HYSTEROSCOPE
INTRA-UTERINE FOLEY CATHETER
TRANSABDOMINAL U/S

It Was Serendipity: A SERS Report Was Filed

Nurse to verbalize name of subsequent fluids being hung



Intra-operative Safety Precautions

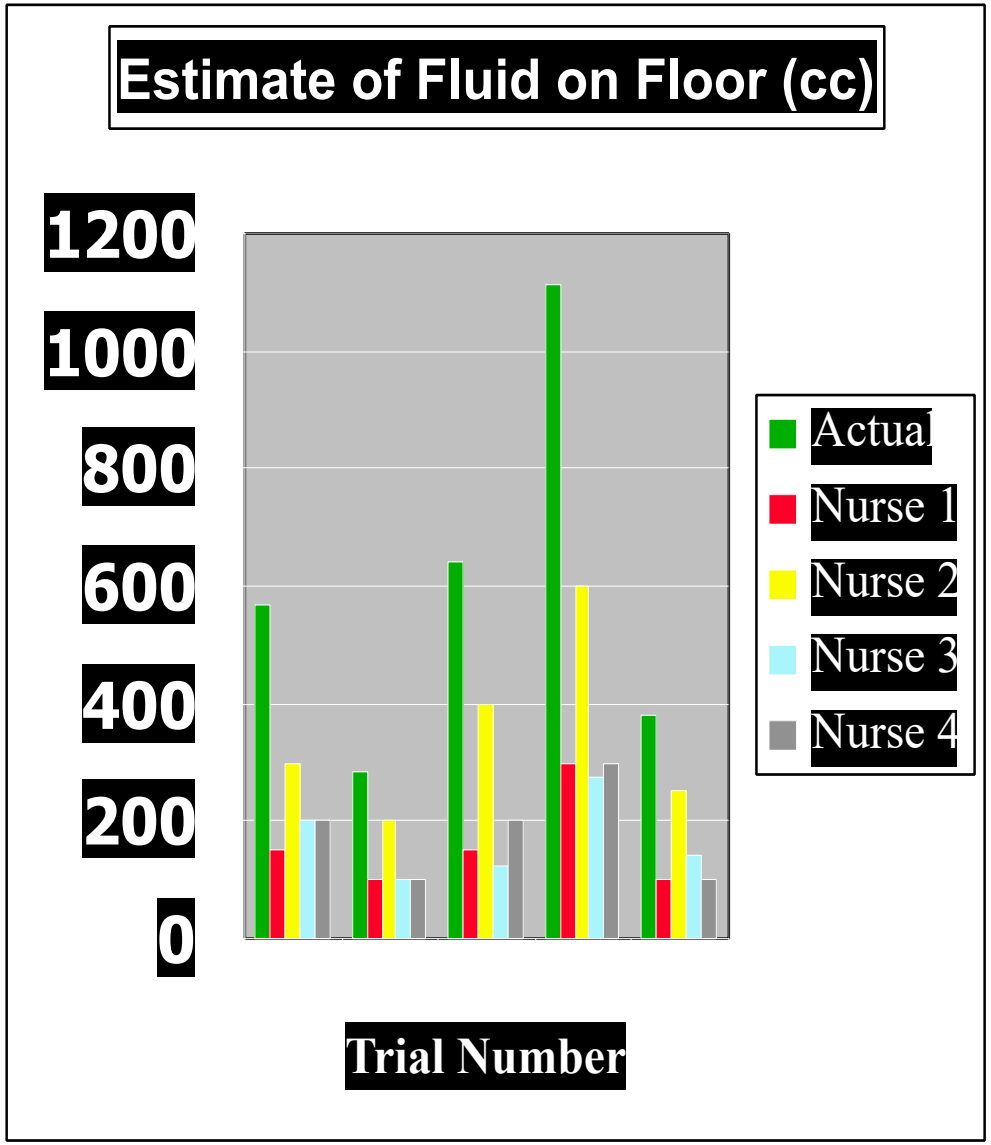
- Flat
  - Do not use Trendelenburg
  - This increases the risk of air emboli
- Position legs in Allen stirrups with PAS stockings
- Collect fluids with drapes/pouches
- Instruct the nurse to inform you of the type of distension media each time she changes fluid
- Measure any fluid on the floor with
  - Mat collector
  - Puddle vac
- Do not put blankets on the floor to absorb spilled fluids

Don’t Guess Your Fluid Deficit

Tracking Fluid Irrigation Fluid Intra-operatively

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

- **"*<u>We are totally unable to estimate the amount of fluid on the floor</u>*"**

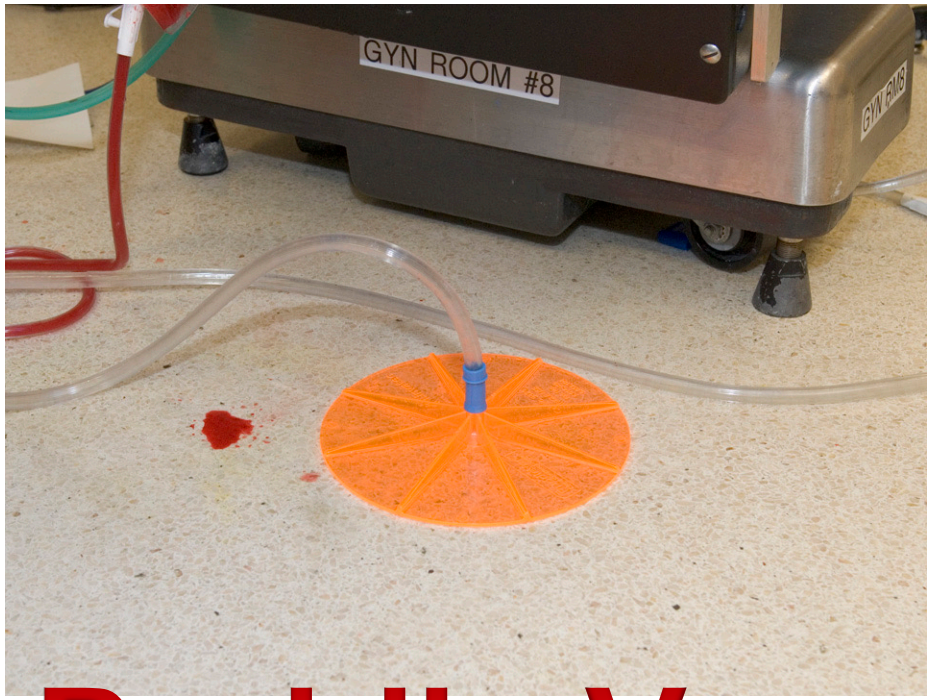


Intraoperative Etiquette: For Your Circulating Nursing Staff

Don't Do This

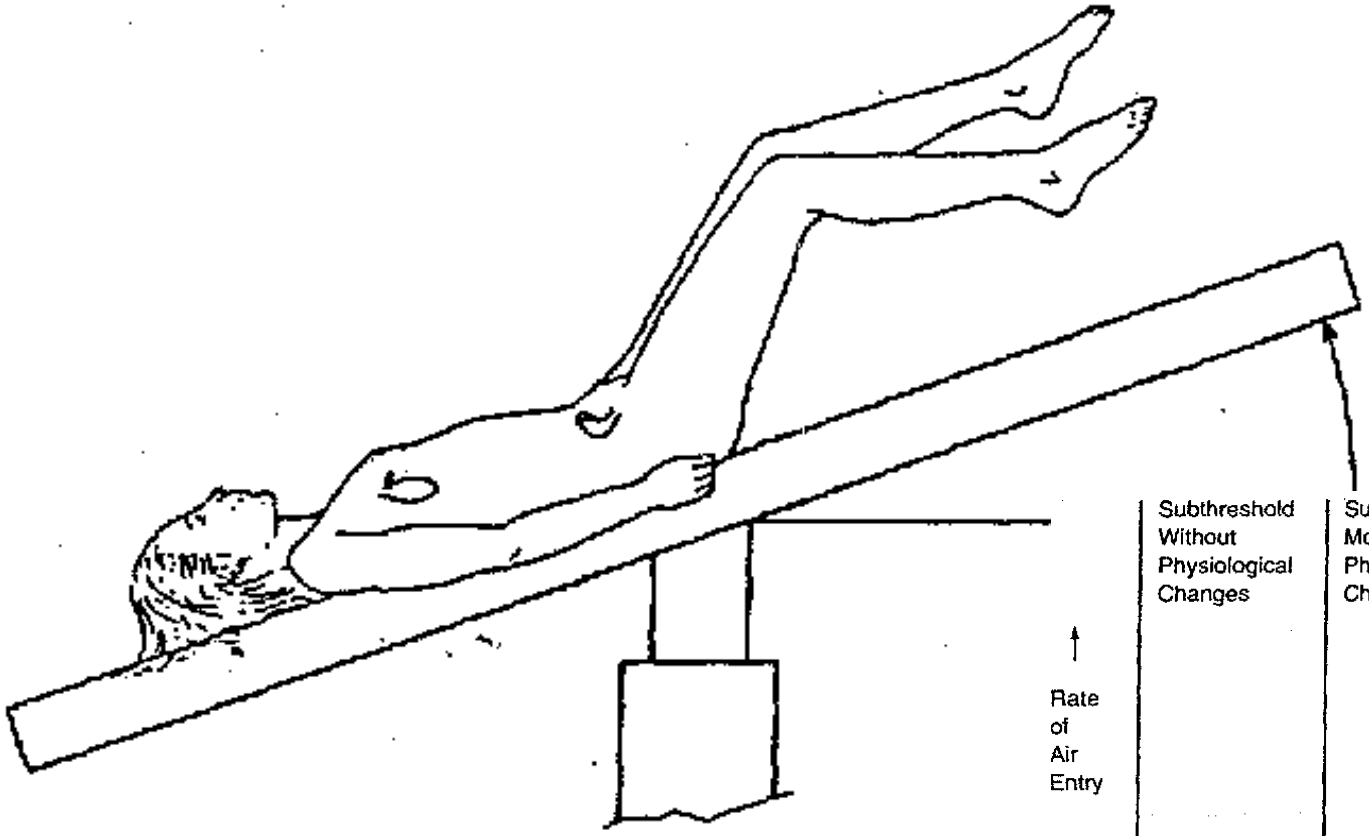
No blankets or towels on the floor

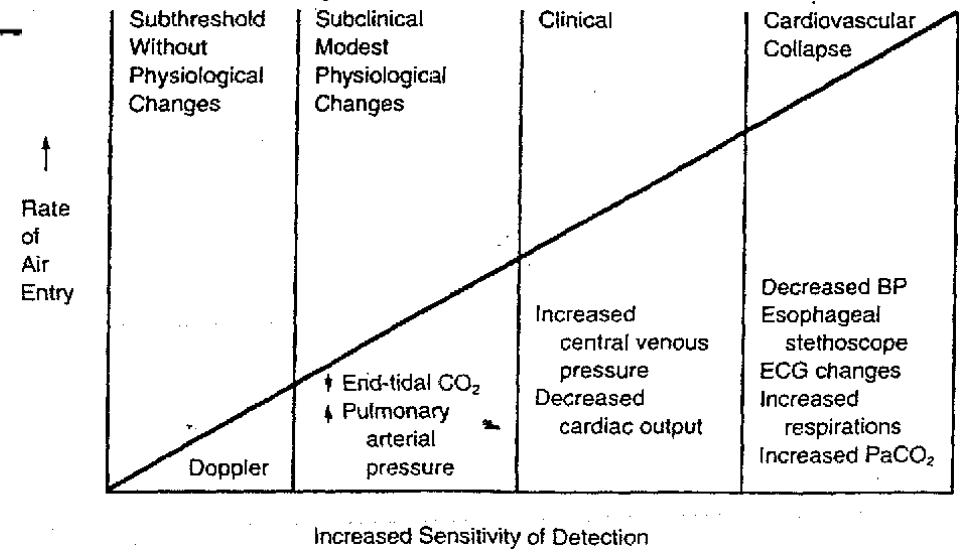
Do This



Puddle Vac

Never Place the Patient in Trendelenburg Position (increases risk of venous air





Clinical Pearls

Practice Intermittent Uterine Deflation

Always Use an Automated Fluid Management System

For Uterine Fibroids > FIGO 0, remove the hysteroscope to allow uterus to contract Pushing the fibroid from its pseudocapsule

Operative Hysteroscopy

Intracervical Vasopressin

Effects During Operative Hysteroscopy

Adapted from Phillips D et al. *Obstet Gynecol*. 1996; 88:761-766.

N=106

Measurement	p value
BLOOD LOSS	< .05
INTRAVASATION	< .05
OPERATING TIME	< .05

Facilitates Cervical Dilation
Myometrial Contractions
Fewer False Tracks
Fewer Cervical Tears

Consider Vasopressin

- **Preparation: 10 units/100 saline = 0.1u/cc**
- **Direct intra-cervical stromal injection of 5 mL at 11, 2, 4 and 7 o'clock**
  - **Alert anesthesiologist**
  - **Aspirate before injection**
  - **Administer 5 cc/quadrant will equal 2 units**
  - **Assess for cardiovascular response before second injection**
  - **½ life 20-30 minutes**

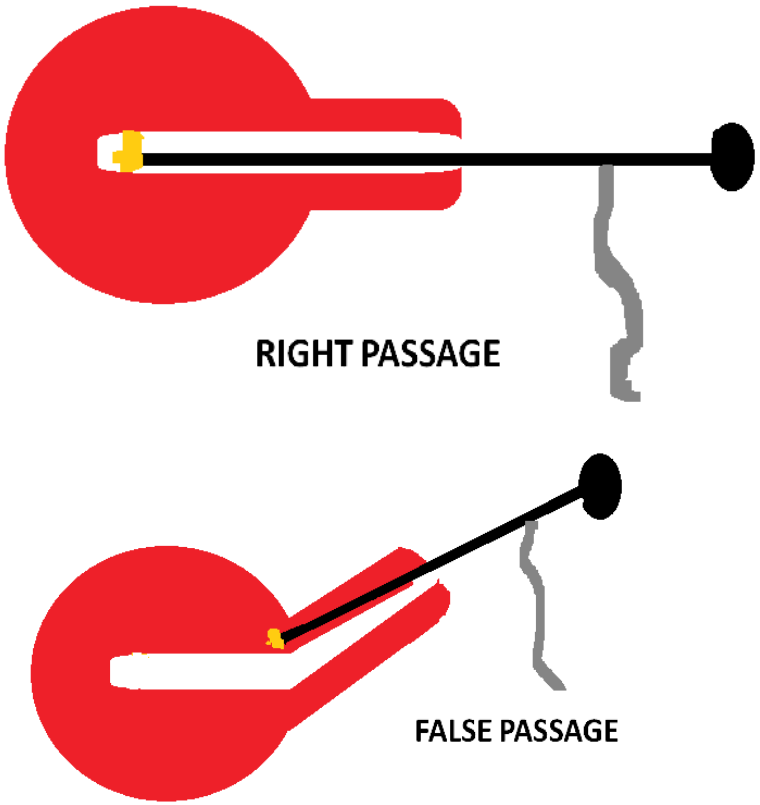
Intrauterine Surgical Techniques

- Know your landmarks
- Find your pseudocapsule
- 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
- Learn “chip” management
- Put nothing blindly in the uterus--EVER

Getting Started
What Can You Do
If you encounter cervical stenosis?

Overcoming Cervical Stenosis

- Anticipation
  - History
  - Physical Exam
- Medications (Pre-op)
  - Cytotec
  - Primrose Oil
  - Intravaginal Estrogen
    - 4-6 wks before surgery
- Medications (Intra-op)
  - Dilute intracervical vasopressin
  - Sterile saline intracervically



Tips and Tricks to Minimize Complications of Operative Hysteroscopy: Cervical Stenosis

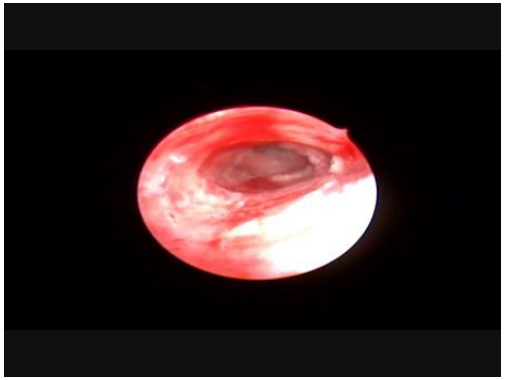
- # 11 scalpel
- Dilate ectocervix
- Pipelle
- Os dilators
- Tissue retrieval system
- Transabdominal imaging intra-operatively
- Mini-LEEP procedure

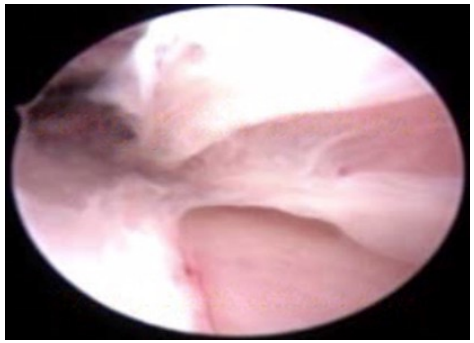
Cervical Stenosis

- Ectocervical stenosis
  - Try dilute solution of vasopressin
    - 10 units of vasopressin in 100 cc of saline
    - Inject 5 ml at the 10, 2, 4, 7 o'clock position in cervical stroma
  - Use # 11 scalpel to identify dimple
  - Use ½ size hegar dilators or os finders
  - Use pipelle to guide "sounding"—don't use metal dilator

False Cervical Passage

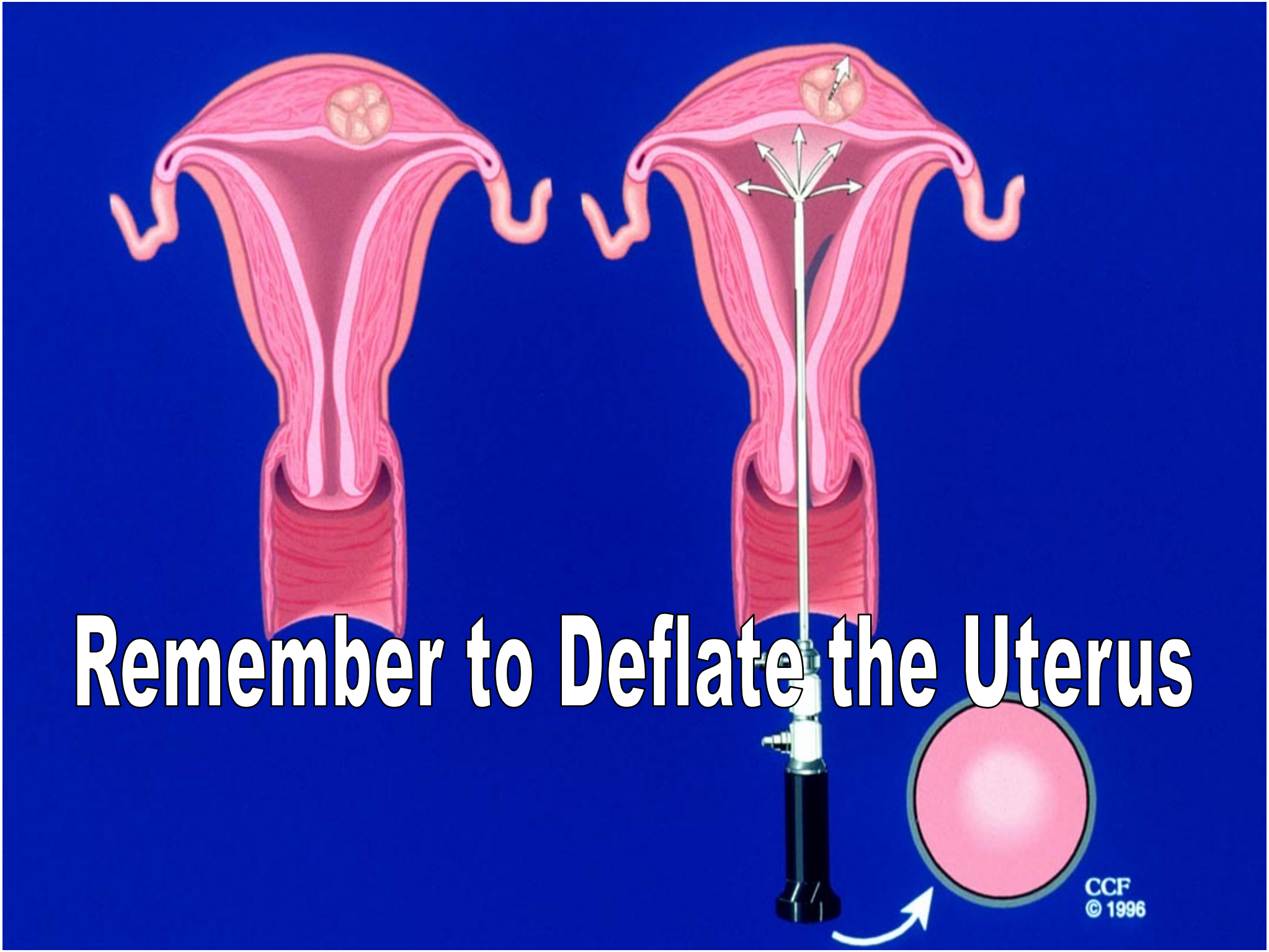
- A false passage increases absorption of the distending medium, especially when tunneled inside the myometrium , opening bigger vascular channels.





- Associated with higher fluid absorption if unrecognized
- Inserting the scope further could cause uterine perforation with all complications related to it, such us bowel injury or copious bleeding (intraoperative and post operative)

Cleveland Clinic

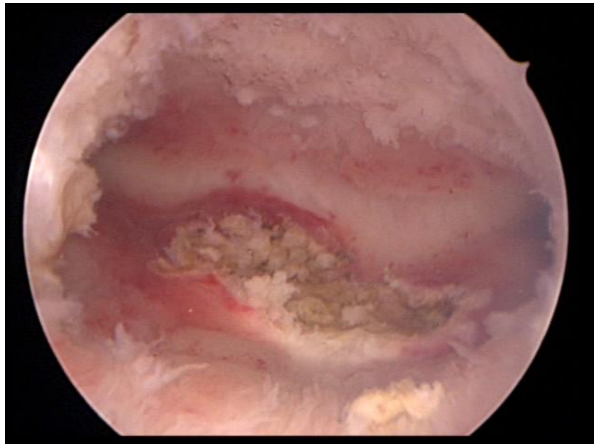

Remember to Deflate the Uterus
CCF
© 1996

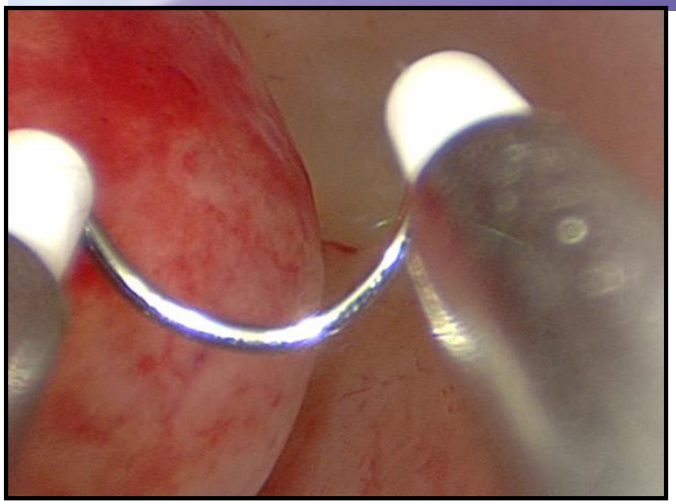
Fluid Pumps: Use Them!!!

Set Audible Alerts

Keep all fluid bags together until the end of case

Hysteroscopic Myomectomy Resection (resectoscopy)





Operative Hysteroscopy: Resectoscopes

- Vaporization electrodes, which eliminate the need for chip removal (removing the need for multiple resectoscope reinsertions and designed for procedural efficiency).

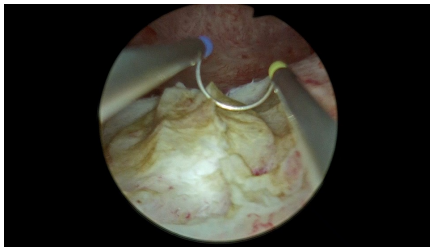
  Variety of loop sizes for resection and coagulation of polyps, myomas and the endometrium, which allows for fewer cuts, thereby enabling quicker resection and operating time.
- Needle electrode for septum removal.

Gyne-Pro™ Hysteroscopy Electrodes

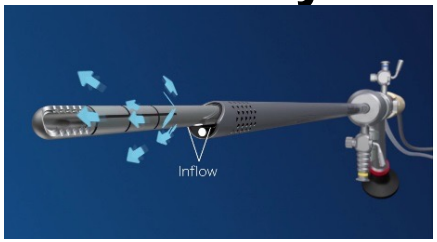
Coagulating Resector

Perforated Roller

Operative Hysteroscopy



- Outpatient transvaginal procedure to remove usually Type 0, 1 and some Type 2 leiomyomas
- Complete removal of intracavitary pathology results in rapid return to work (48 hrs), no narcotics for post-op pain management, and excellent resolution of heavy menstrual bleeding, resume sexual activity in 7 days
- Reintervention rates <7% at 60 months
- Low surgical complication rates (1-3%)
- Requires expert pre-operative evaluation to determine appropriate candidate for surgery
- Operative hysteroscopic technology includes: bipolar hysteroscopy and tissue retrieval systems

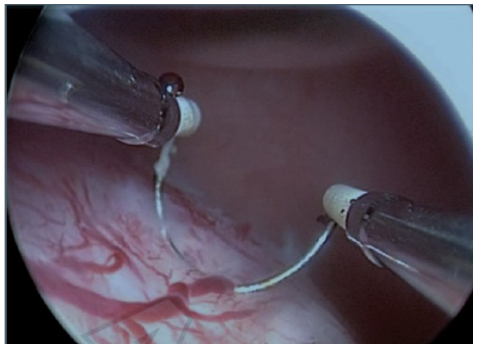


Advantages of the Gynecologic Resectoscope

- Excellent cutting of dense, calcified tissue
- On-demand coagulation to minimize bleeding
- Electrode loops do not dull—loops can be shaped to fit location of lesion
- Electrodes less expensive and more environmentally friendly than disposable tissue retrieval devices
- Can perform multiple concomitant procedures in same patient (polypectomy, myomectomy, EMR, retained products of conception, targeted biopsy, releasing incisions for embedded IUD's, lysis of adhesions)
- Able to remove Type 0, 1, and 2 leiomyomas
- Easy to remove fundal and cornual lesions
- Amenable to variable and large lesions
- Multiple insertions facilitate myometrial contractility further extruding deeper leiomyoma

Advantages of the Gynecologic Resectoscope

- Today bipolar technology is recommended
- Resectoscope dimensions from 5 Fr-9 Fr
- Wide variety of loop sizes
- Angle of view of scope can range between 12 or 30 degrees
- The variety of loop sizes and configuration permits management of a variety of lesions and intrauterine locations
  - May be able to enucleate from the pseudocapsule
- Loop configurations between 90 and 180 degrees and well suited to remove lesions anywhere within the uterine cavity

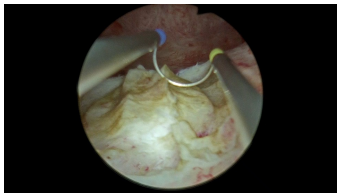


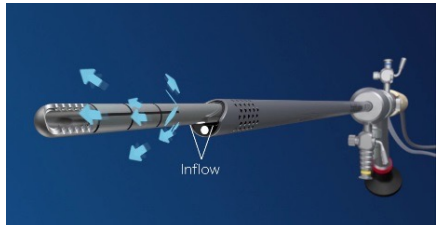
Advantages of the Gynecologic Resectoscope

- Insertion and removal of the hysteroscope is a distinct advantage—because increased myometrial contractility helps expel leiomyoma from myometrium
- Not a disadvantage

Operative Hysteroscopy

- Complete removal of intracavitary pathology results in rapid return to work (48 hrs), no narcotics for post-op pain management
- Excellent resolution of heavy menstrual bleeding, resume sexual activity in 2-3 days
- Reintervention rates <7% at 60 months
- Low surgical complication rates (1-3%)
- Requires expert pre-operative evaluation to determine appropriate candidate for surgery
- Operative hysteroscopic technology includes: bipolar hysteroscopy and tissue retrieval systems



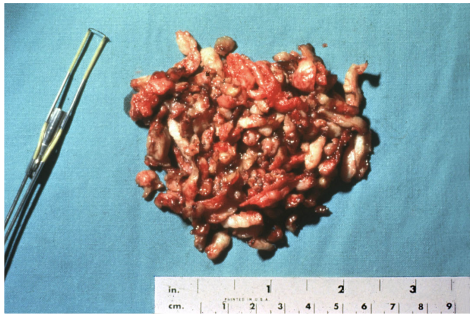


Advantages of Bipolar Hysteroscopy

- **May use electrolyte-containing distending media**
  - **saline or ringer's lactate**
  - **isotonic, non-hemolytic, nonconductive, nontoxic, and rapidly cleared**
  - **a higher allowable amount of fluid absorption**
  - **Maximum absorption/intravasation of 2,500 ml in healthy patient with normal renal, pulmonary, and cardiovascular history**

Disadvantages of Resectoscopy

- Poor visualization if “tissue chip” management is not mastered
- Loss of orientation when uterine cavity is filled with chips
- Requires a cervix that easily dilates in order to remove chips
  - A stenotic cervix will limit and hinder easy repetitive placement of the hysteroscope
  - Cervical prep with misoprostol, Primrose Oil, and intracervical vasopressin recommended
- Requires multiple insertions and removal of the hysteroscope which could increase risk of uterine perforation—but your expertise diminishes this risk
  - Advantage because increased myometrial contractility to help expel leiomyoma from myometrium

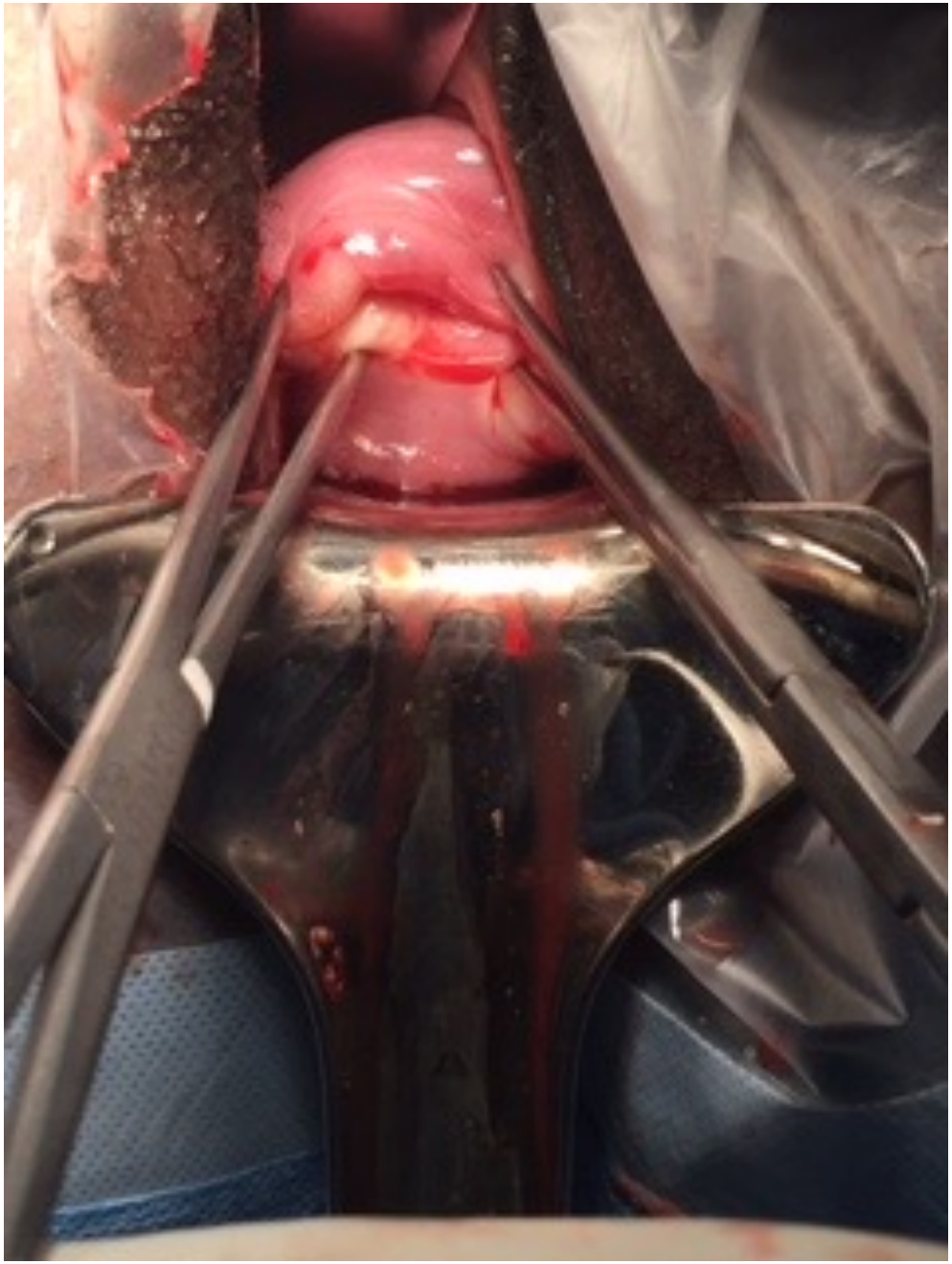


Disadvantages of Resectoscopy

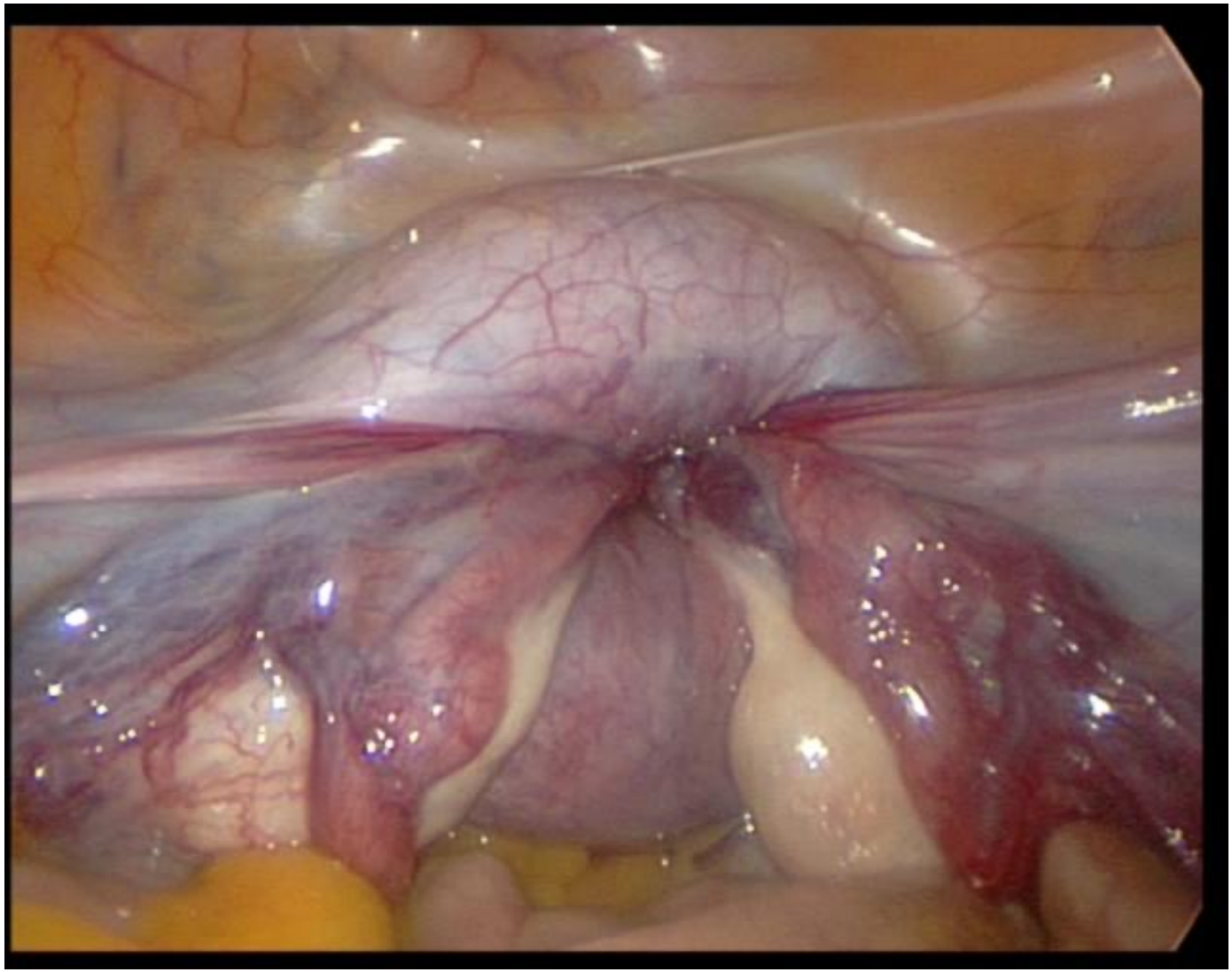
- Retrieval of tissue fragments is often performed blindly which increases the risk of perforation—don't retrieve tissue fragments blindly
- Blind techniques include:
  - Polyp forceps
  - Dilation and curettage
  - Suction curettage
- Rather
  - Direct visualization and removal with hysteroscopic loop
  - Tumble out of uterine cavity thru endocervix

Vaginal Myomectomy Followed By Operative Hysteroscopy

- Remove prolapsing leiomyoma
- Surgeon should inspect endometrial cavity with hysteroscopy to removal additional intracavitary leiomyoma

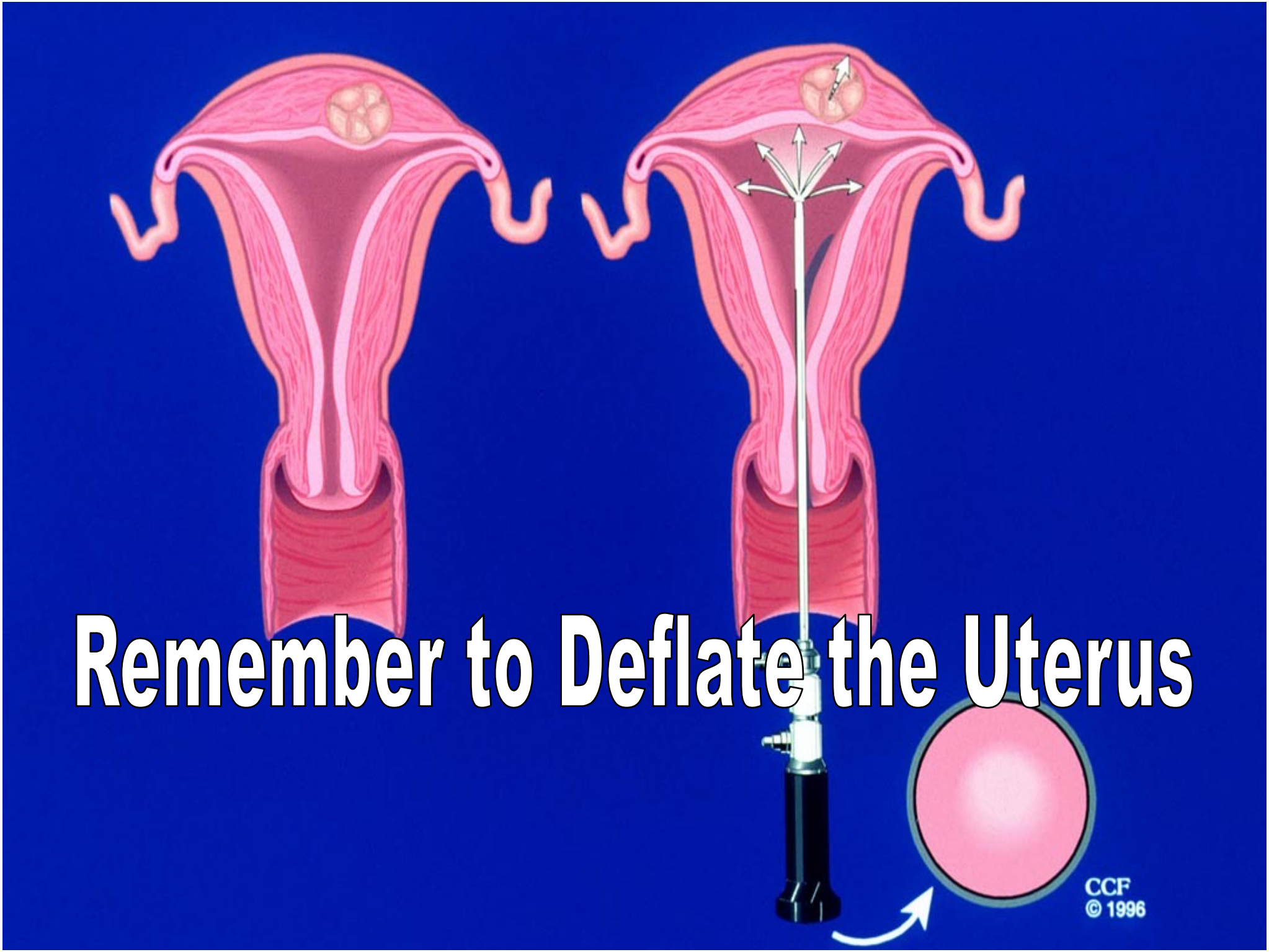


Be Careful !!



Technique of Resectoscopy

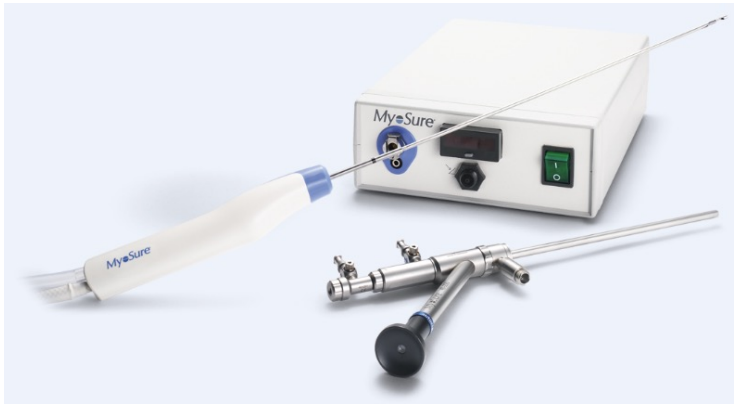
- Always flush tubing of air
- Insert resectoscope under direct visualization
- Utilize fluid pressure that permits excellent visualization and monitor fluid deficit
- The wire loop should be placed behind the lesion and drawn toward surgeon
- Continuing until lesion and pseudocapsule is reached
- Vary intrauterine pressure throughout case


Remember to Deflate the Uterus
CCF
© 1996

Plasma RF Energy: Defining the Pseudo Capsule

Tissue Retrieval Systems

Tissue Retrieval Systems



- Saline environment
- Treatment of endometrial polyps
- Treatment of FIGO 0,1 fibroids of fibroid generally less than 3 cm
- No electrical energy used
- Some TRS use RF energy

Features of Hysteroscopic Morcellators

- O degree operative hysteroscope
- Disposable mechanical morcellator
- Mechanical continuous aspiration
- Have a side cutting window
- Does not create bubbles
- May use a proprietary fluid-management system
- Do not require repetitive insertion for cutting and removal of tissue
- No risks from electrosurgical burns (endometrium and perineum)
- Rapid learning curve

Pros of Hysteroscopic Morcellation

- Obviates the theoretic risks of electrosurgery
- Utilizes low viscosity anionic distention media
- Decreases the need for repetitive removal of hysteroscope for tissue removal
- Can perform visual dilation and curettage
- May be able to visually dilate a stenotic cervix
- Easily aspirate blood filled cavity at beginning of procedure
- Can utilize smaller diameter hysteroscope for operative procedures
- No tissue fragments “chips”
- Theoretically safer for removal of polyps near tubal ostia and obviates thermal injury especially for patients desirous of pregnancy
- No bubbles
  - Decreased risk of gas and air emboli

Must Still Perform Hysteroscopic To Determine if Residual Lesions are Present

Disadvantages of Hysteroscopic Morcellators

- Utilizes an "offset" operative hysteroscope with a zero-degree lens
- Limited range of diameters
- Expensive and disposable
- May be slightly more difficult to remove lesions at fundus and uterine cornua due to side cutting window (however possible with several maneuvers)
- More difficult to remove Type 1 and Type 2 leiomyomas and leiomyoma > 3 cm
- More fluid absorption
- May dull during resection of dense myoma or large myoma treatment—requiring additional morcellators
- Can only use for tissue removal
  - Can't use to perform ancillary procedures such as endometrial ablation or endomyometrial resection

Techniques for Tissue Retrieval Systems

- Flush all air from tubing
- Insert under direct visualization
- Inspect uterine cavity and endocervix
- Place the cutting window on the largest part of the lesion and begin cutting
- Avoid cutting the base of a lesion initially because it will detach and float
- Intermittent uterine pressure to reach lesions that are fundal

Features of Hysteroscopic Tissue Retrieval System

- O degree operative hysteroscope
- Disposable mechanical tissue retrieval system
- Mechanical continuous aspiration
- Have a side cutting window
- Does not create bubbles
- May use a proprietary fluid-management system
- Do not require repetitive insertion for cutting and removal of tissue
- No risks from electrosurgical burns (endometrium and perineum)
- Rapid learning curve

Pros of Hysteroscopic Tissue Retrieval System

- Obviates the theoretic risks of electrosurgery
- Utilizes low viscosity anionic distention media
- Decreases the need for repetitive removal of hysteroscope for tissue removal
- Can perform visually directed dilation and curettage
- May be able to visually dilate a stenotic cervix
- Easily aspirate blood filled cavity at beginning of procedure
- Can utilize smaller diameter hysteroscope for operative procedures
- No tissue fragments “chips”
- Theoretically safer for removal of polyps near tubal ostia and obviates thermal injury especially for patients desirous of pregnancy
- No bubbles
  - Decreased risk of gas and air emboli

Disadvantages of Hysteroscopic Tissue Retrival

- Utilized an “offset” operative hysteroscope with a zero degree lens
- Limited range of diameters
- Expensive and disposable
- May be slightly more difficult to remove lesions at fundus and uterine cornua due to side cutting window (however possible with several maneuvers)
- More difficult to remove Type 1 and Type 2 leiomyomas

Outcomes

Rubino J., Lukes AS.

Their conclusions:

- **Endometrial polyps are easier to remove due to soft endometrial tissue**
- **Fibroids are more dense**
- **Longer resection time with fibroids may be associated with increased fluid absorption and therefore potential early termination of procedure**
  - **Trend towards increased fluid deficit for patients with incomplete resection**

Uterine Polyps and Myomas in an Office or Ambulatory Surgical Center.
J Minimal Invasive Gynecol: 2015:22(2): 285-290.

Outcomes For Hysteroscopic Morcellation

Conclusions

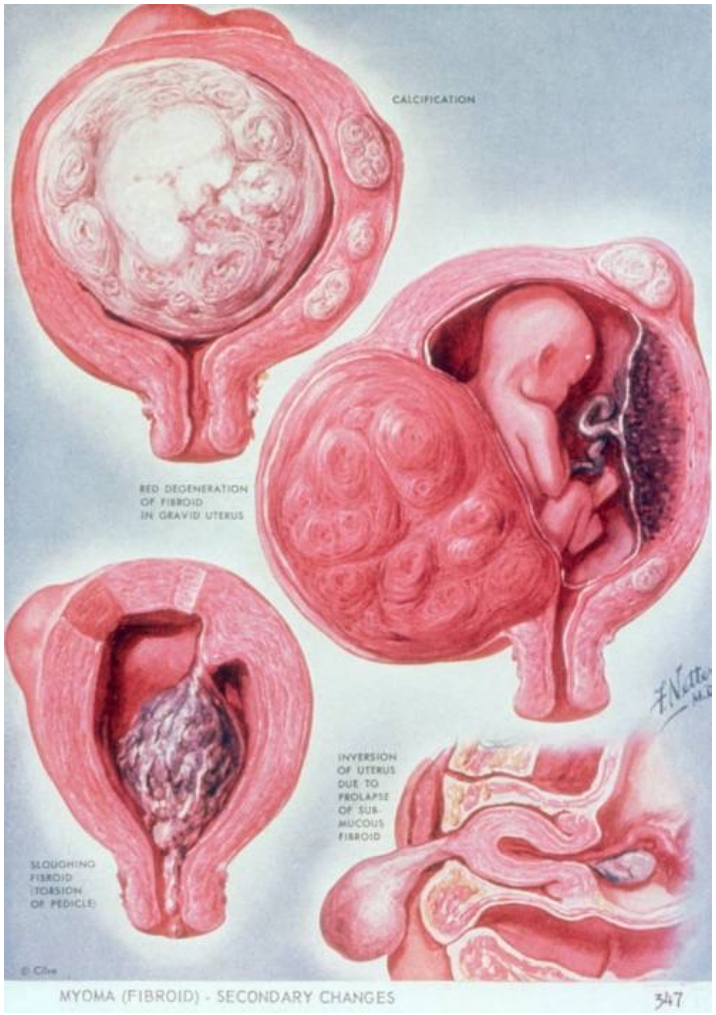
- Percentage of myomas completely removed was less than polyps (96% vs 63.6%)
- Majority of fibroid removed but residual remained
- More profound disparity when comparing office based procedure vs ASC (96% of polyps removed and 52% of fibroids)

Rubino RJ. Lukes AS. Twelve-Month Outcomes for Patients Undergoing Hysteroscopic Morcellation of UterinePolyps and Myomas in an Office or Ambulatory Surgical Center. J Minimal Invasive Gynecol: 2015:22(2): 285-290.

Frequency of Retained Products of Conception (RPOC)

- RPOC occur in 0.5% of surgical 1st trimester abortions
- RPOC occur in 1% of term pregnancies
- RPOC occur in 5% of medical management of spontaneous abortion or medically induced abortion
- Easily visualized hysteroscopically

Differential Diagnosis Pregnancy Related Causes of Bleeding



- Pregnancy is a common cause of bleeding
  - More than one-third of women experience bleeding during the first 20 weeks
  - 15%-25% of pregnancies end in miscarriage
- Pregnancy-related conditions:
  - Ectopic pregnancy
  - Trophoblastic disease
  - Miscarriage
    - incomplete, threatened, or missed abortion
- Retained products of conception following C/S, TAB, misoprostol, NSVD, incomplete &missed AB

Symptoms

- Irregular uterine bleeding--heavier and longer than 3 weeks
- Pelvic pain and uterine tenderness
- Infertility
- Amenorrhea
- Fever / sepsis (prone to infection by vaginal flora)

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%

Original Article

Hysteroscopic Morcellation Versus Loop Resection for Removal of Placental Remnants: A Randomized Trial

Tjalina W. O. Hamerlynck, MD*, Huib A. A. M. van Vliet, MD, PhD, Anne-Sophie Beerens, MD, Steven Weyers, MD, PhD, and Benedictus C. Schoot, MD, PhD

From the Women's Clinic, Ghent University Hospital, Ghent, Belgium (Drs. Hamerlynck, Weyers and Schoot), Department of Obstetrics and Gynecology, Catharina Hospital, Eindhoven, The Netherlands (Drs. van Vliet and Schoot), and Department of Pathology, Ghent University Hospital, Ghent, Belgium (Dr Beerens).

ABSTRACT **Study Objective:** To compare hysteroscopic morcellation with loop resection for the removal of placental remnants in terms of procedure time, adverse events, tissue availability, histology results, short-term effectiveness, and postoperative adhesions.
Design: A randomized controlled trial (Canadian Task Force classification I).
Setting: A teaching and university hospital.
Patients: Women with placental remnants.
Interventions: Hysteroscopic morcellation with the TRUCLEAR 8.0 Tissue Removal System (Smith & Nephew, Inc, Andover, MA) or loop resection with a rigid 8.5-mm bipolar resectoscope (Karl Storz GmbH, Tuttlingen, Germany).
Measurements and Main Results: Forty-six and 40 women were included in the hysteroscopic morcellation and resection groups, respectively. The median operating time was significantly shorter for hysteroscopic morcellation compared with loop resection (6.2 minutes [interquartile range, 4.0–11.2 minutes] vs 10.0 minutes [5.8–16.4 minutes], p = .023). Both operating time and total procedure time, corrected for the diameter of the placental remnants, were significantly reduced for hysteroscopic morcellation compared with loop resection, by 40% (95% confidence interval, 15%–58%; p = .005) and 22% (95% CI, 5%–37%; p = .014), respectively. No adverse events occurred during hysteroscopic removal. Perforation at dilation in 8 cases of the hysteroscopic morcellation group resulted in 2 procedure discontinuations and 1 incomplete procedure. Incomplete removal was found in 1 uncomplicated hysteroscopic morcellation procedure and 2 resection procedures. Pathology results confirmed the presence of placental remnants in 27 of 40 (67.5%) and 26 of 37 (70%) patients in the hysteroscopic morcellation and resection groups, respectively. Second-look hysteroscopy showed de novo intrauterine adhesions in 1 of 35 patients (3%) in the hysteroscopic morcellation group and 1 of 30 (3%) patients in the resection group.
Conclusion: Hysteroscopic morcellation is a faster alternative than loop resection. Both techniques are safe and show high rates of complete removal and tissue availability and low rates of de novo intrauterine adhesions. Journal of Minimally Invasive Gynecology (2016) 23, 1172–1180 © 2016 AAGL. All rights reserved.

Keywords: Hysteroscopic morcellation; Intrauterine adhesions; Loop resection; Placental remnants; Randomized controlled trial

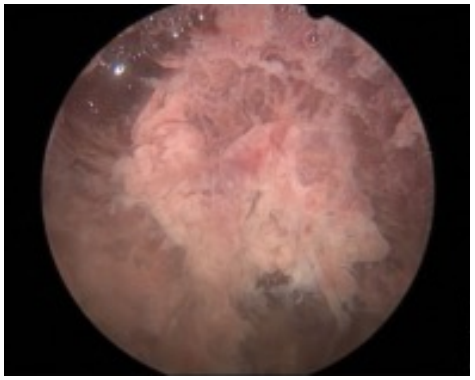
Benefits of Tissue Retrieval Systems

- Minimal dilation
- Fewer insertions and removal of hysteroscopes with theoretically diminished risks of infection, bleeding, or perforation
- Easy set up
- May be used in OR or office
- Simultaneously remove and extract tissue
- Design of resection blade permits removal of only necessary pathology with minimal trauma to surrounding normal endometrium

Hysteroscopic Removal of POCs

Tissue Removal Devices

- **Potential benefits**
  - **Direct visualization**
  - **No need for ultrasound guidance**
  - **Complete removal**
  - **Decreased risk of uterine perforation**
  - **Localized treatment reduces endometrial damage**
  - **Less risk of adhesion formation**



*Hamerlynck, T. , et al. An Alternative Approach for Removal of Placental Remnants: Hysteroscopic Morcellation. JMIG 2013 December; 20(6):796-802.

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

Hamerlynck T Jansen FW. An alternative Approach for Removal of Placental Remnants: Hysteroscopic Morcellation . J Minimally Invasive Gynecology, 2013:20 (6): 796-802.

Operative Hysteroscopy in Women with Retained Products of Conception

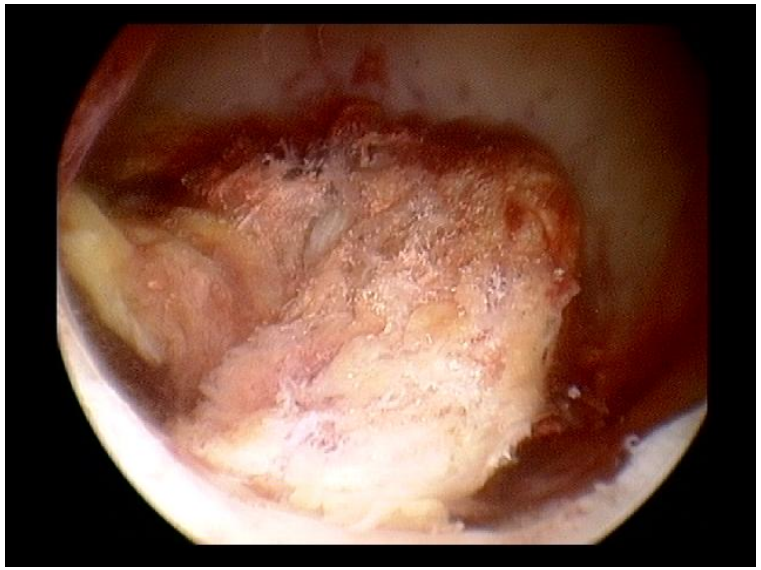
- Same principles as hysteroscopic resection/morcellation of myomas/polyps
  - Selective removal of RPOC advisable WITH TARGETED REMOVAL ONLY. AVOID NORMAL ENDOMETRIAL TISSUE
- Often products of conception are necrotic and friable
- The wire loop (without electrocautery) or tissue retrieval device can be used to visually curette retained products of conception
- Excellent direct visualization with this technique
- Consider dilute intracervical vasopressin to decrease bleeding
- Consider IV Tranexamic Acid intra-operatively and post op oral

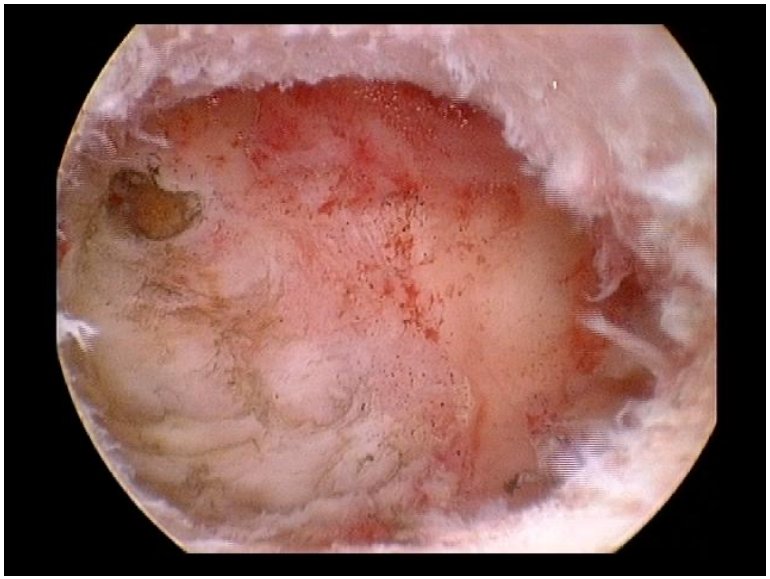
Do not use a curette afterwards

Benefits and Caveats of Hysteroscopic Morcellation Removal of RPOC

- Be mindful of softer uterine myometrium to decrease risk of perforation
- Utilize intracervical dilute vasopressin 10u/100 mL saline
- 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), may need to switch to bipolar
- Consider post op office hysteroscopy to evaluate for adhesions

7-month History of Abnormal Bleeding after Delivery and D&C for post partum hemorrhage: Placenta Accreta





Cold Loop Hysteroscopy for Retained Products of Conception

If densely adherent may need to activate loop to resect and coagulate the base of the retained products

If mechanical device is use and bleeding occurs—will need to use coagulation to halt bleeding

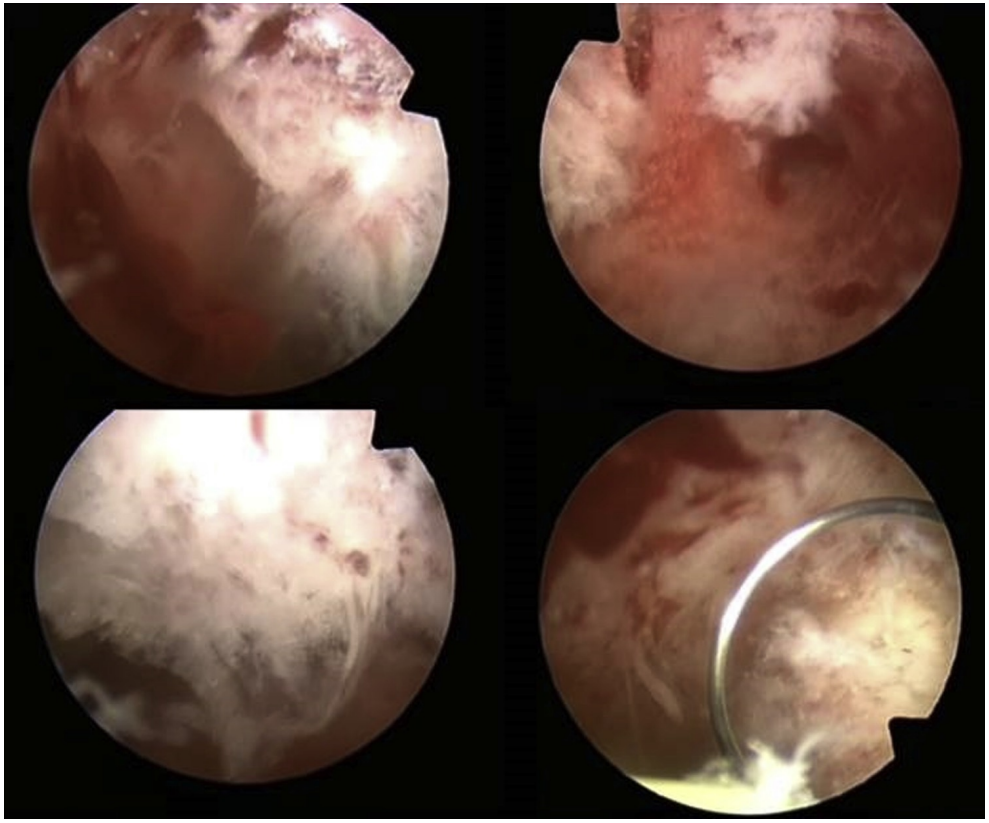
Cold Loop Hysteroscopy for Retained Products of Conception

Cold loop resectoscopy can be used when attachment of RPOC is non adherent and fragile

If RPOC base is bleeding may coagulate

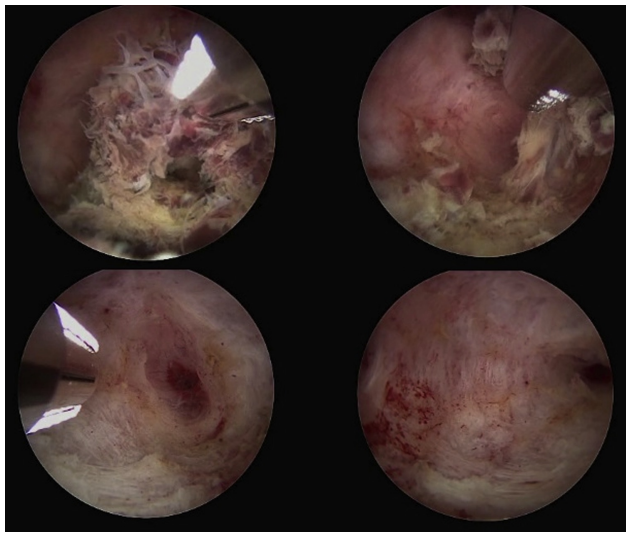
Cold Loop Resection of Placental Remnants

- Average number of insertion of hysteroscope was 3
- 10% of cases (4 of 39) the resectoscope loop was activated due to adherent tissue
- Incomplete removal in 2/39 (5%) cases at second look



Hamerlynck TW; van Vliet HA; Beerens AS; Weyers S; Schoot BC. Hysteroscopic Morcellation Versus Loop Resection for Removal of Placental Remnants: A Randomized Trial. Journal of Minimally Invasive Gynecology. 2016: 23(7):1172-1180.

Hysteroscopic Tissue Retrieval



- Study utilized Tru Clear vs Karl Storz 8.5 mm bipolar hysteroscope
- Operating time significantly shorter for morcellation vs resectoscope
  - 6.2 min vs 10 min
- Total operating time and procedure time was less with morcellation
- Number of insertions of instruments was 1

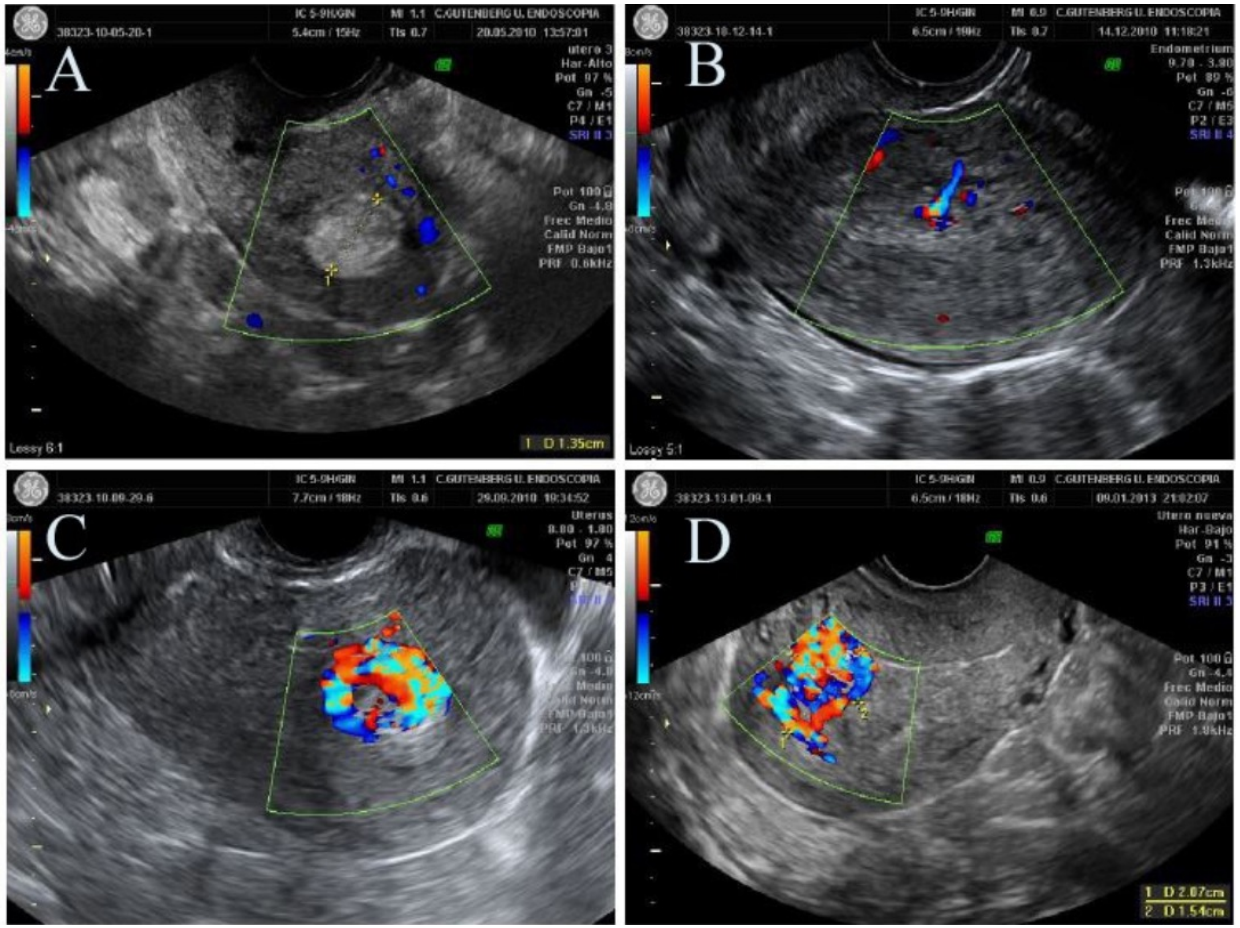
- Complete removal of placental remnants noted in 94%
- Conversion to another technique in 3/44 (7%) pts.
- Second look hysteroscopy revealed de novo intrauterine adhesions in 3%
- Of note 35% of patient had preceding manual removal or curettage

Gutenberg classification

Type 0: Hyperechogenic avascular mass
Type 1: Different echoes with minimal or no vascularity
Type 2: Highly vascularized mass confined to the cavity
Type 3: Highly vascularized mass with highly vascularized myometrium

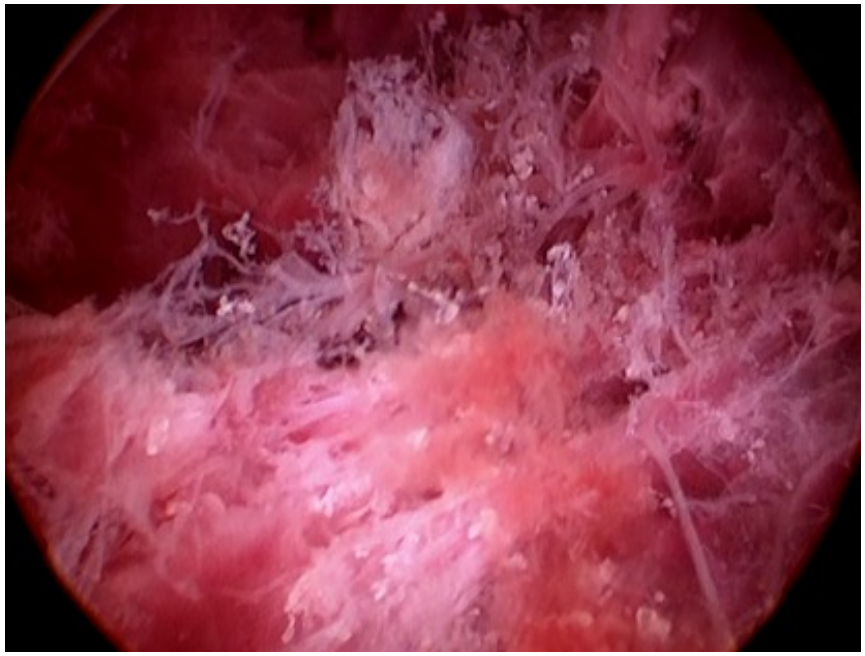
Alonso Pacheco L, Timmons D, Saad Naguib M, Carugno J. Hysteroscopic management of retained products of conception: A single center observational study. Facts Views Vis Obgyn. 2019 Sep;11(3):217-222

Hysteroscopic patterns of RPOC. Gutenberg classification



Hysteroscopic patterns of RPOC. Gutenberg classification. A- Type 0: white mass in with no clear
Hysteroscopic patterns of RPOC. Gutenberg classification. A- Type 0: white mass in with no clear structures. B- Type 1: well-defined avascular chorionic villi. C- Type 2: Well Vascularized chorionic villi. D- Fig 4: Aneurism over myometrium in the implantation area.ures. B- Type 1: well-defined avascular chorionic villi. C- Type 2: Well Vascularized chorionic villi. D- Fig 4: Aneurism over myometrium in the implantation area.

Retained Products of Conception



Retained Products of Conception: The Benefits of Utilizing Tissue Retrieval Systems

- **Genetic Testing of RPOC**
  - **Genetic testing determines if a couple has a normal complement of chromosomes. If genetic testing is normal, then genetic testing of RPOC may detect genetic abnormalities**
  - **In 70% of cases there may be abnormal chromosomal makeup**
- **Great advantage to do direct testing of DNA from POC**
  - **Avoids the need to culture fetal cells (accidentally getting maternal cells)**
  - **Avoids insufficient tissue**
  - **Higher likelihood of obtaining genetic material**
- **Most often performed after second loss**

Summary of Benefits of Hysteroscopic Morcellation Retrieval of Placental Remnants

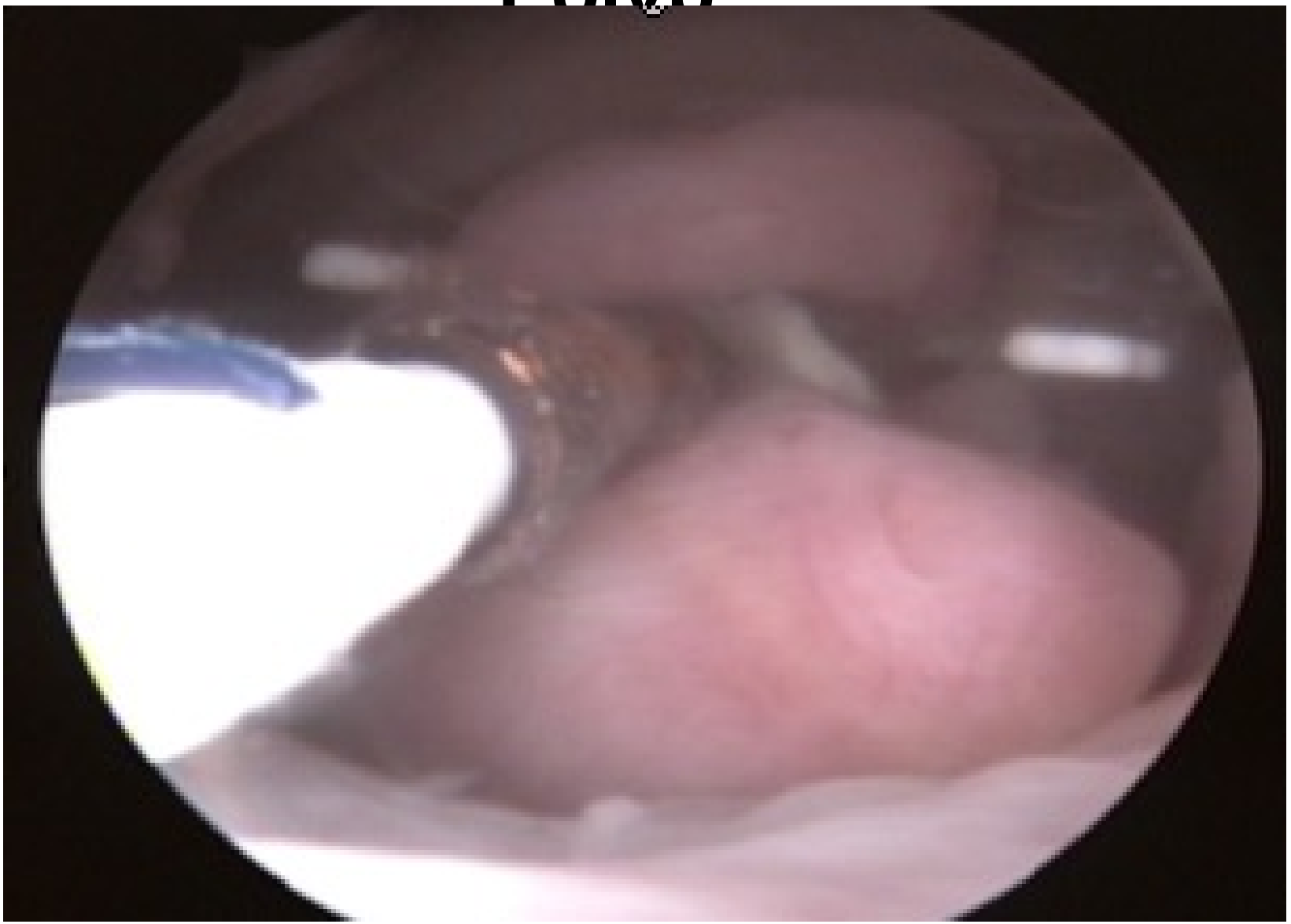
- Faster procedure
- Fewer insertions of hysteroscope
- Shorter procedure and small diameter scope may facilitate an office-based treatment option
- Faster procedure may decrease the threshold for performing blind suction dilation and curettage
- Decreased intrauterine adhesions
- Future cost-effective studies are needed

Foreign Bodies Can Be Removed With Operative Hysteroscopy

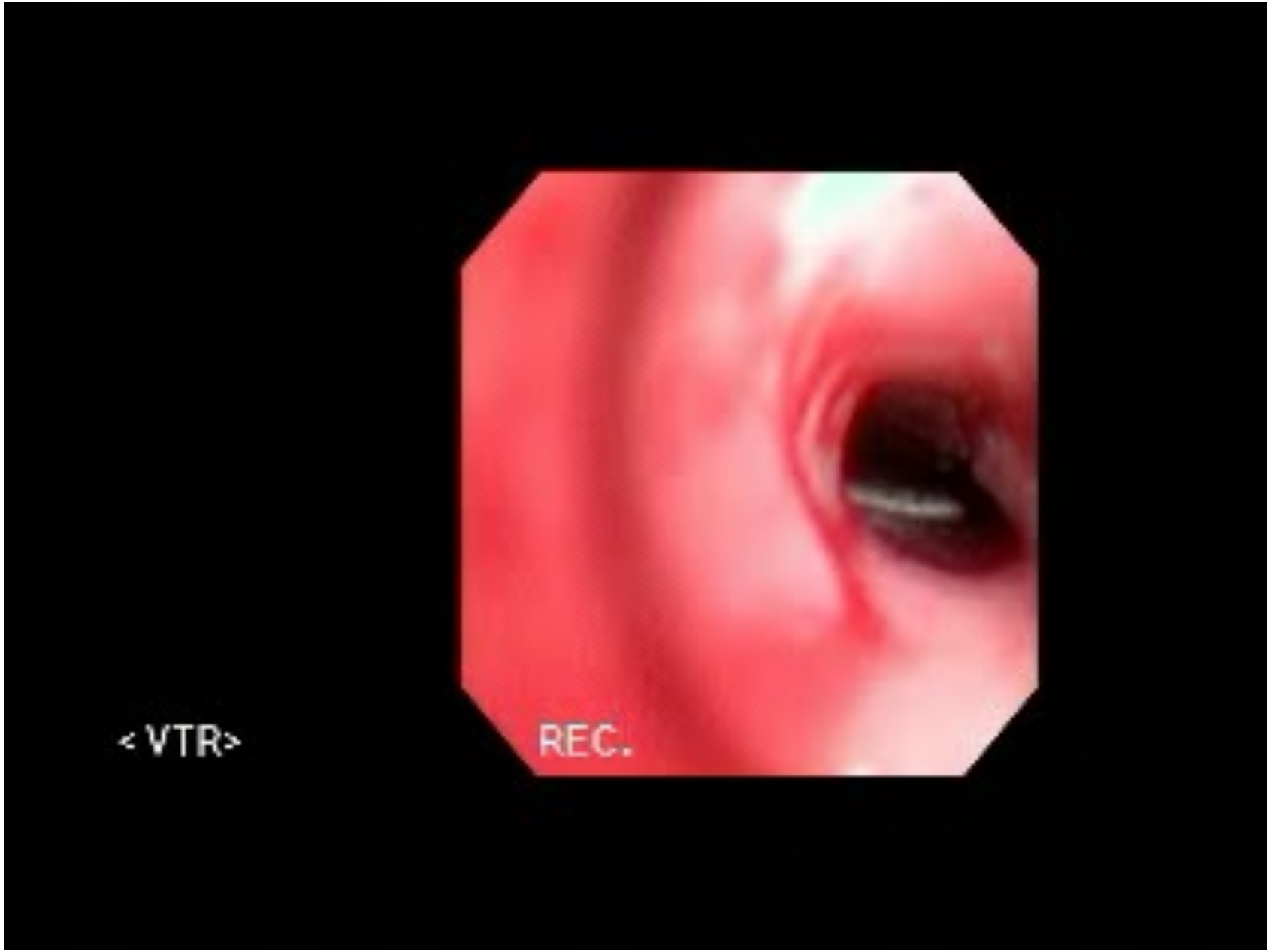
- Imbedded intrauterine devices
- Hysteroscopic Sterilization device (sometimes with > 10 coils seen)
- Bony Ossification Lesions
- Suture

Targeted Biopsy Is Possible or Removal of Foreign Bo

Embedded IUD With Intracavitary Polyp



Intrauterine device from China



Intrauterine Device

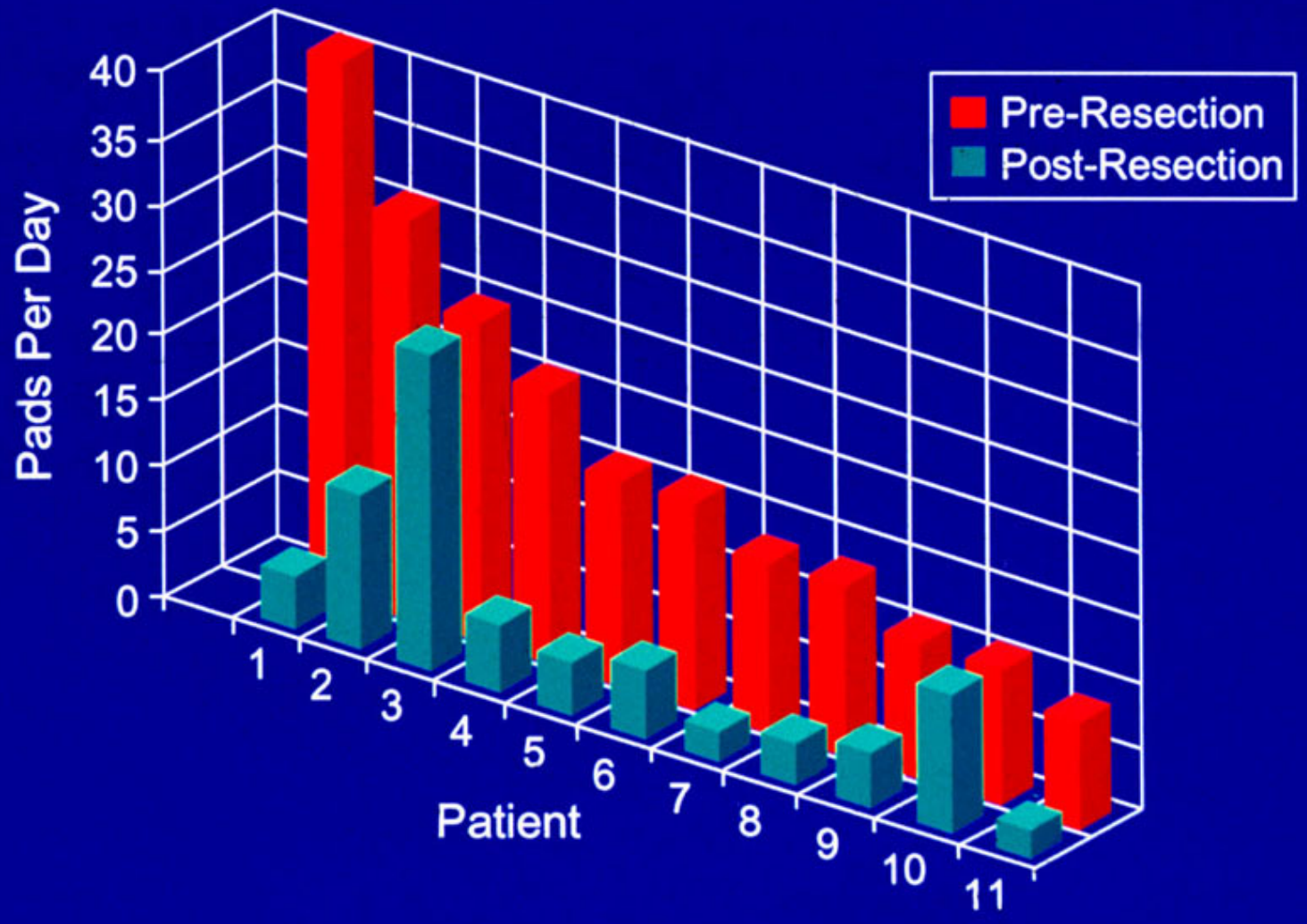
Clinical Outcomes by FIGO Classification

Submucosal Fibroid Resection Outcomes

Outcome Measure	FIGO Type 0 (100% intracavitary)	FIGO Type I (≥50% intracavitary)	FIGO Type II (<50% intracavitary)
Complete Resection Rate	**95-98%**	**85-92%**	**70-78%**
Bleeding Resolution at 12 months	90-95%	85-88%	75-82%
Mean Operative Time	15-20 min	25-35 min	40-55 min
Overall Complication Rate	0.5-1.2%	1.5-2.5%	3.0-5.5%
Uterine Perforation	0.3%	0.8%	2.5%
Hemorrhage (>500mL)	0.2%	0.7%	2.2%
Fluid Overload (>1000mL deficit)	0.1%	0.8%	2.8%
Patient Satisfaction	**95-98%**	**92-95%**	**88-92%**
Same-Day Discharge Rate	98%	95%	85%
Need for Repeat Procedure	2-5%	8-15%	22-30%
Recommended Approach	Single-stage Tissue removal system	Single-stage Bipolar resection	Two-stage with GnRH Bipolar resection

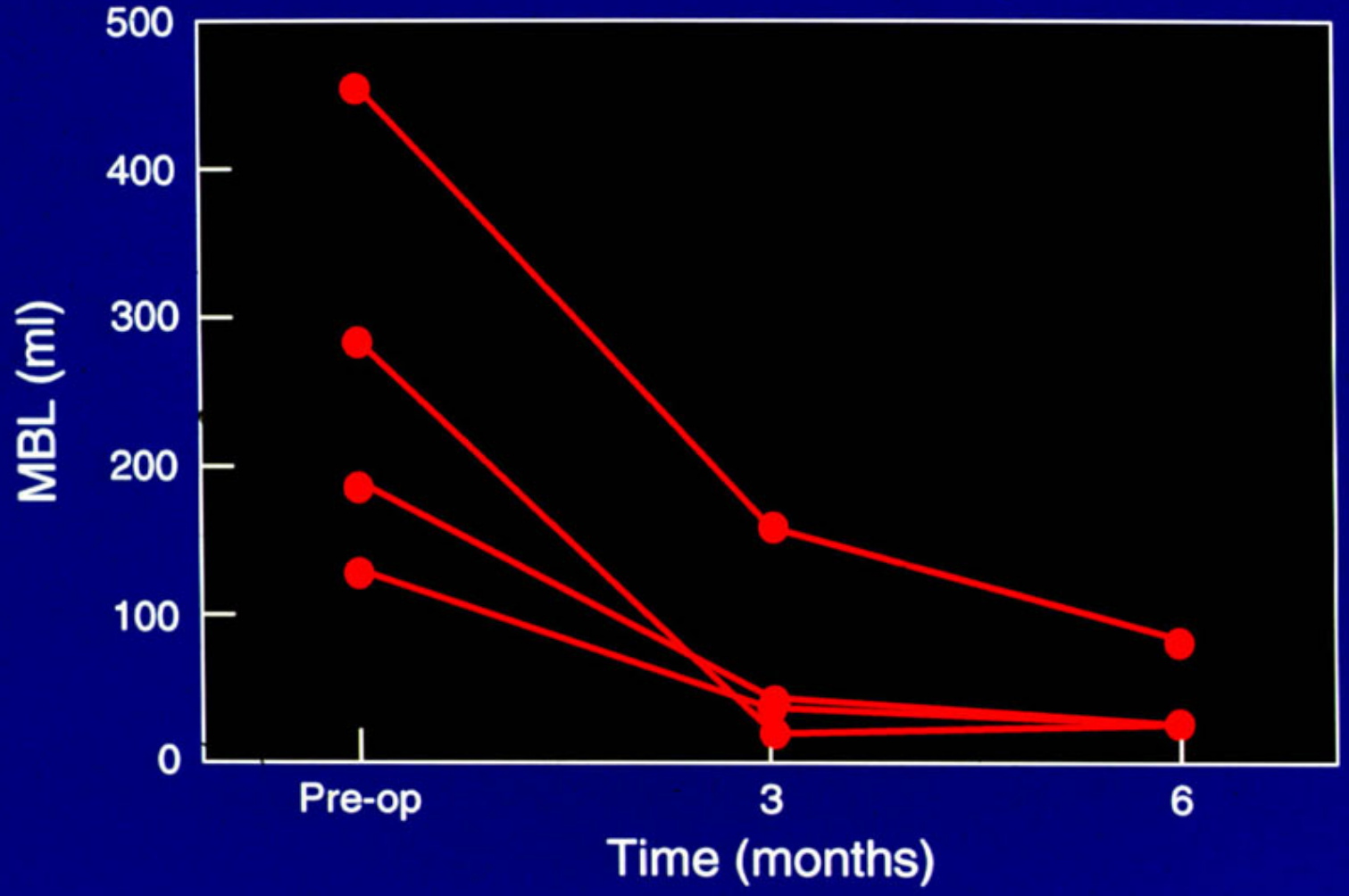
Sources: AAGL Practice Report 2023, JSLS 2021, J Minim Invasive Gynecol 2022

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



Broadbent JAM, Magos AL. Menstrual blood loss after hysteroscopic myomectomy. Gynecologic Endoscopy 1995 (4): 41-44.

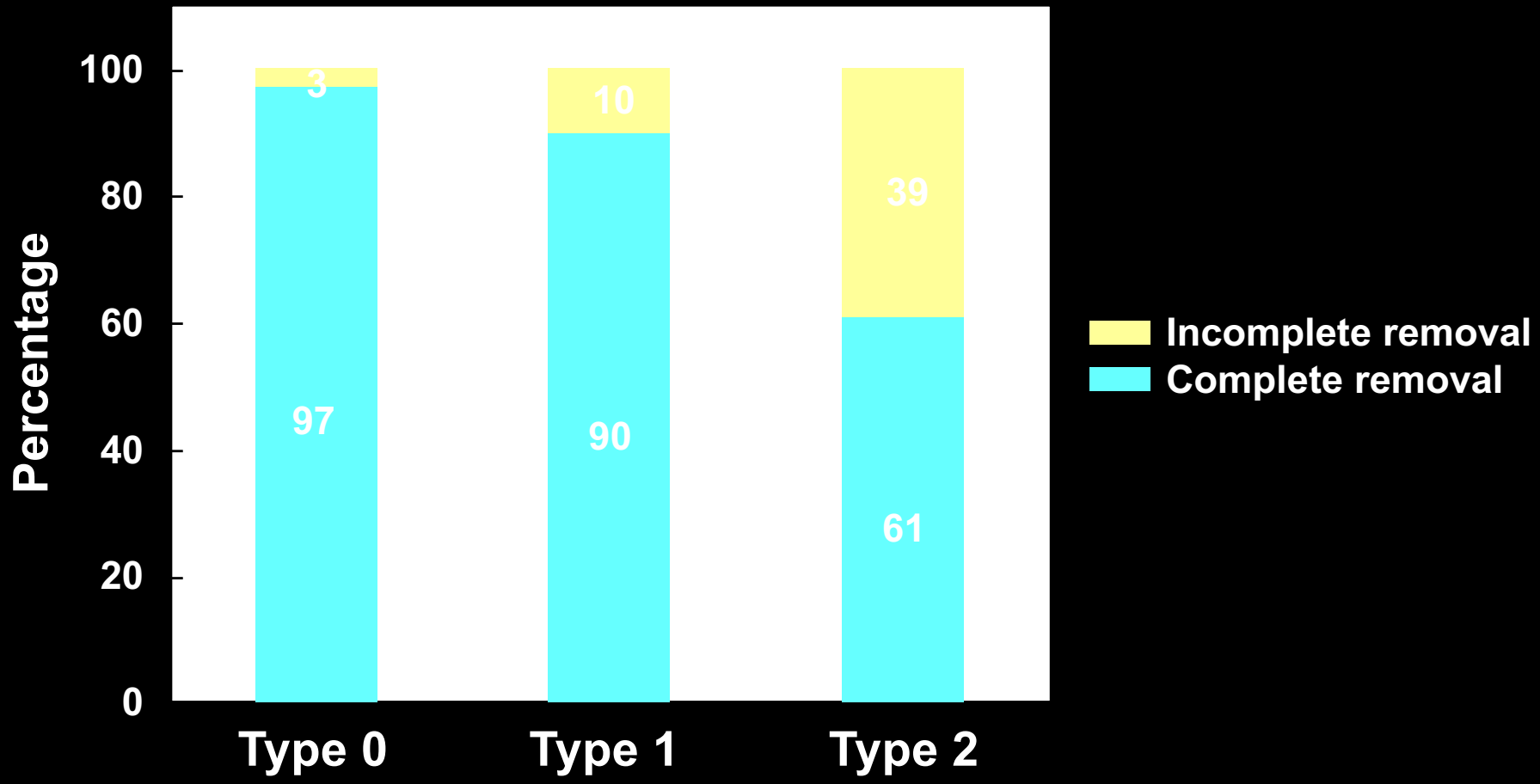
Number, Type, Weight of Fibroids and Operative Complications

Number of fibroids	Number	Operative complications	%
1	175 (74.5%)	2	1.4
2	41 (17.4%)	3	7.3
3 or more	19 (8%)	1	5.3
Type of fibroids*			
0	26 (11%)	0	0.0
1	45 (19%)	2	4.4
2	164 (70%)	4	2.4
Weight of fibroids (g)			
<3	137 (58.3%)	2	1.5
3-10	81 (34.5%)	3	3.7
>10	11 (4.7%)	1	9.1
>15	6 (2.5%)	0	0.0

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

Polena V, et al., Science Direct, EJOG, 130 (2007) 232-237.

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

Hysteroscopic Myomectomy for Abnormal Uterine Bleeding

Polena et al.	235	84	40	94.4
Wamsteker et al.	51	93.3	20	93.3
Emanuel et al.	285	94	46	85.5
Cravell et al.	196	86.2	73	82.2
Marziani et al.	84	97	36	80.9
Kuzel et al.	45	100	48	100
Hart et al.	194	100	27	79
Munoz et al.	120	100	36	88.5
Brooks et al.	90	100	6	91
Derman et al.	177	100	108	83.9

Fertility Rates after Hysteroscopic Myomectomy

Ubaldi et al.	134	NA	NA	58.9
Goldenberg et al.	15	12	100	47
Shokeir	29	24	100	72.4
Bernard et al.	31	24	100	35.5
Giatras et al.	41	24	100	60.9

SUBMUCOUS MYOMAS

Spaarne Hospital, Haarlem, NL

Results

Free of repeat surgery

266 patients

- **2 yrs. 91%**
- **5 yrs. 80%**
- **8 yrs. 73%**

Free from hysterectomy

266 patients

- **2 yrs. 95%**
- **5 yrs. 89%**
- **8 yrs. 89%**

including larger uterus and > 2 myomas

Endometrial Polyp Treatment Outcomes

Comparison of Treatment Modalities

Outcome	Tissue Removal System	Bipolar Resection	Blind D&C (Historical)
Complete Removal Rate	**97-99%**	**93-96%**	40-65%
Mean Procedure Time	8-12 min	15-20 min	10-15 min
Bleeding Resolution (12 mo)	**85-92%**	78-85%	55-70%
Office-Based Feasibility	95%	70%	N/A
Complication Rate	0.3-0.8%	0.8-1.5%	2.5-4.0%
Patient Satisfaction	**96-98%**	92-95%	70-80%
Recurrence Rate (5 years)	12-18%	15-22%	40-55%
Same-Day Discharge	99%	95%	90%
Recommendation	**First-line Office-based**	Alternative for large polyps	No longer recommended

Sources: Clark et al. Health Technol Assess 2021, Dealberti et al. JMIG 2020, Vitale et al. EJOGRB 2023

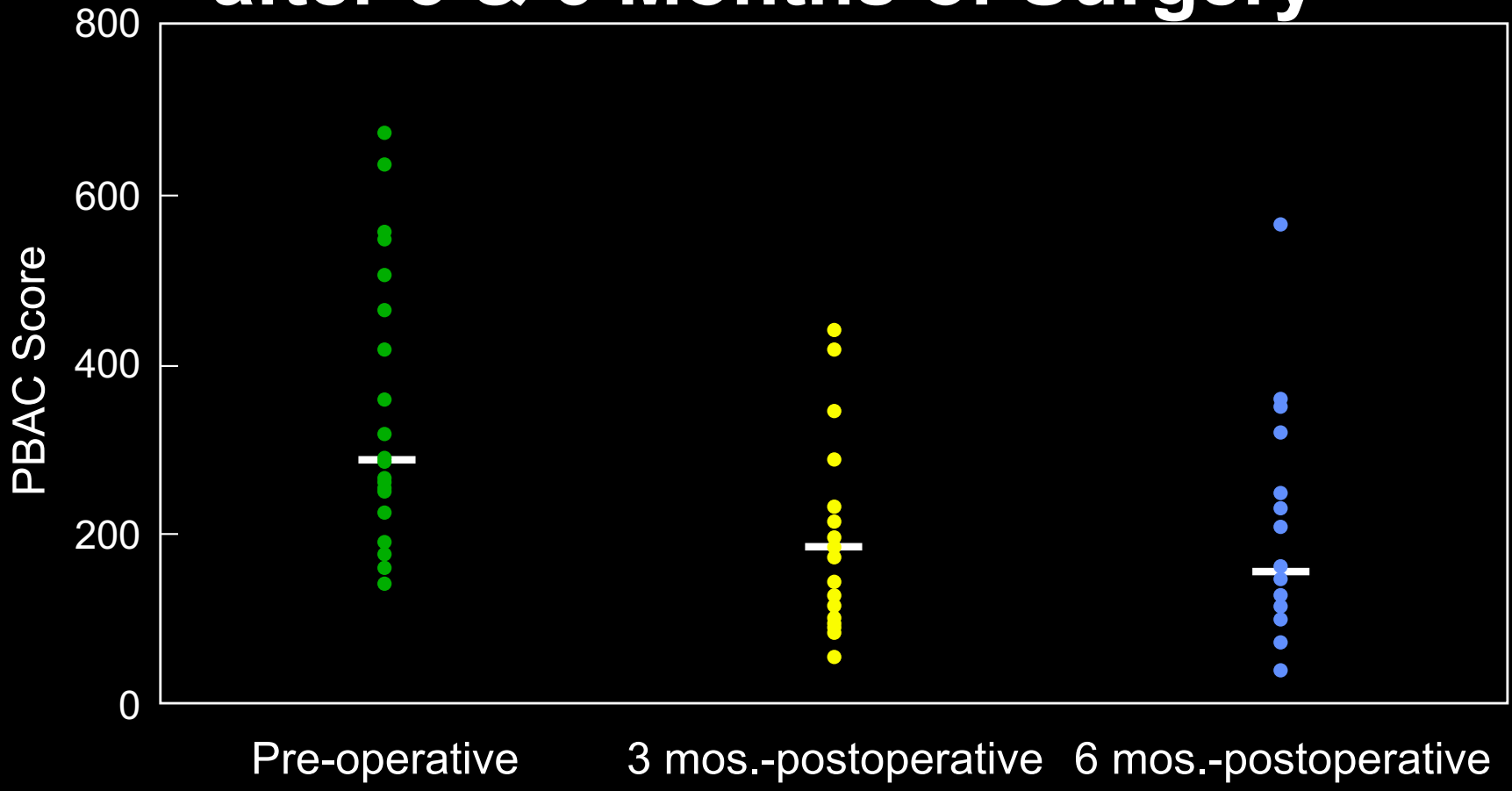
Operative Hysteroscopy Outcome Measures - Myosure Morcellator

Pathology Type	Polyps	Myomas (Type 0)	Myomas (Type I)	Myomas (
No. of abnormalities	14 (70%)	2 (10%)	3 (15%)	1 (5%)
Size of intrauterine abnormality, diameter (mm)	9.6 (5-30;5)	22.5 (15-30;22.5)	31.7 (20-40;35)	50.0
No. of treatment sessions per subject	1	1	1	1
% tissue removed	100%	100%	100%	50%
Weight of removed tissue (g)	1.9 (0.4-4.3;1.8)	9.6 (4.3-14.9;9.6)	20.8 (4.5-45.3;12.5)	11.7
Morcellation time (min:sec)	0.37 (0:14-0:580:40)	2.19 (0:38-4:00;2:19)	9.10 (0:14-22:38;4:39)	11.49
Total distension fluid (mL)	2,382.5 (600-6,730;1,000)	3,400 (1,500-5,300;3,400)	11,153.3 (4,670-24,000;4,790)	1,700
Fluid deficit (mL)	190.8 (30-460;150)	205.0 (200-210;205)	1,300 (500-1,900;1,500)	Not recorded

Menstrual Pattern Before and After Polyp Removal

Menstrual pattern				
Regular	15 (71.4%)	20 (95.2%)	14 (66.7%)	0.058†
Intermenstrual bleeding	16 (76.2%)	3 (14.3%)	4 (19.1%)	0.000†
Days of period (range)	7 (4-12)	6 (4-9)	6 (4-9)	0.028‡
Menstrual chart score (range)*	288 (142-670)	185 (56-439)	155 (39-560)	0.000‡
VAS on dysmenorrhoea (range)	4 (0-8)	3 (0-8)	2 (0-8)	0.001‡
VAS on quality of life (range)	4 (0-9)	2 (0-8)	3 (0-7)	0.008‡

Individual Pictorial Blood Assessment Chart (PBAC) Scores before Hysteroscopic Polyp Removal and after 3 & 6 Months of Surgery



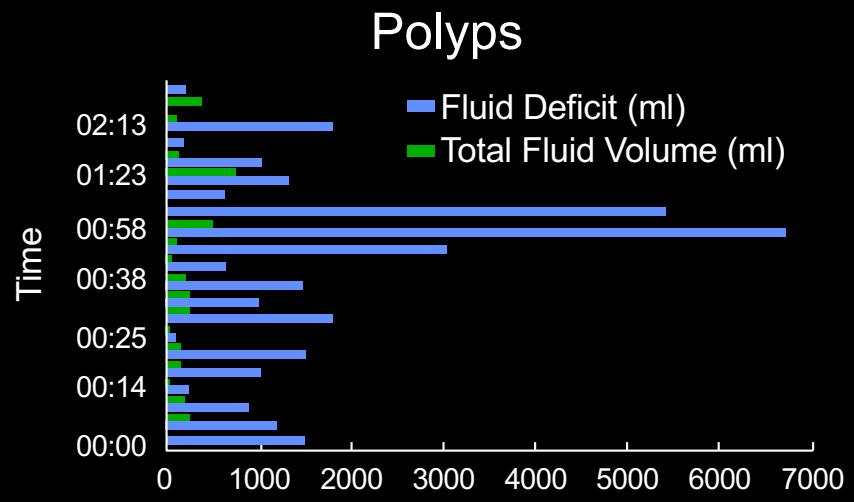
van Dongen H. et al., *BJOG* 2009;116:1387-1390.

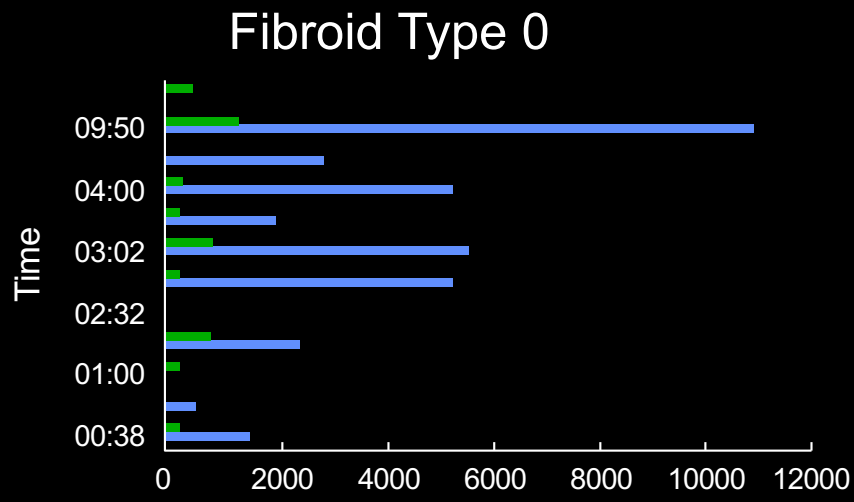
Treatment Outcomes vs. Pathology Type & Size

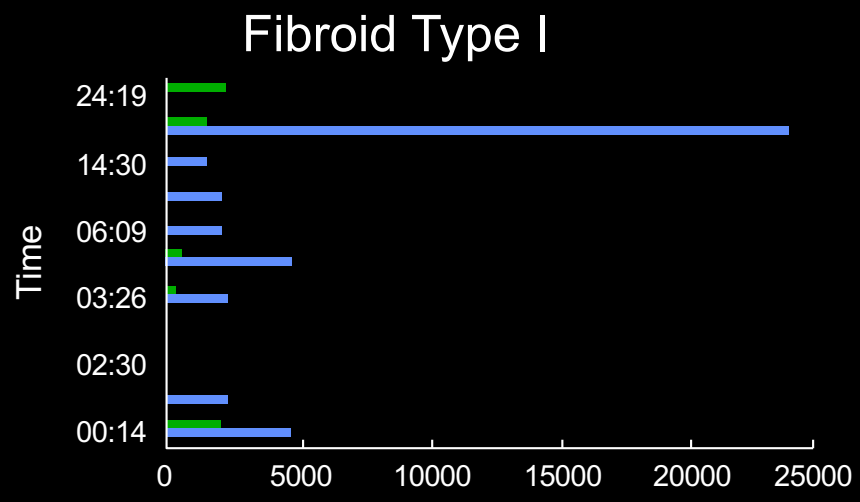
Pathology Type	Size (cm) [Mean; range]	Treatment Time (min:sec) [Mean; range]	% Tissue Removed	Wt. Tissue Removed (g) [Mean; range]
Polyps	1.2; .3-3.0	00:54; 00:03-03:07	100%	2.0; 0.2-6.0
Type 0 Myomas	2.2; 1.0-3.0	04:19; 00:38-13:10	99%	7.6; 1.4-18.9
Type I Myomas	2.9; .7-5.0	08:11; 00:14-24:19	96%	20.5; 1.8-59.5
Type II Myomas	4.9; 1.0-315.0	07:47; 03:07-15:00	66%	12.5; 1.8-43.7

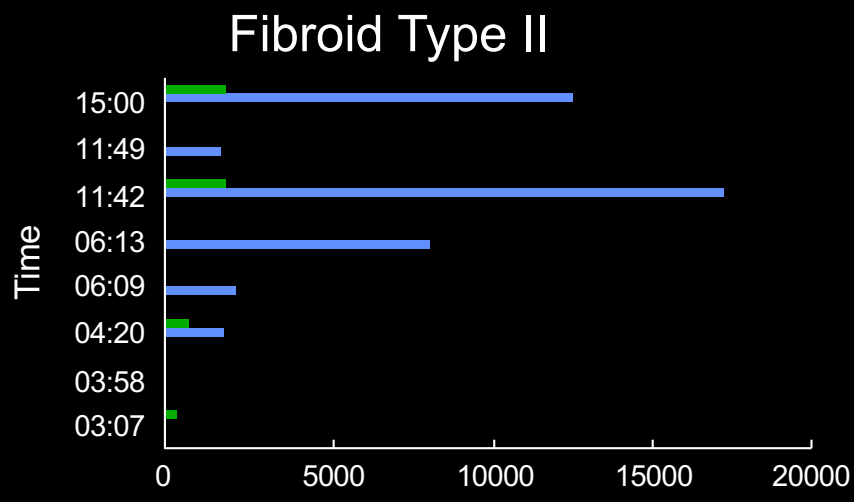
Miller C. et al., Clinical Evaluation of a 1st Generation Interlace Medical Hysteroscopic Tissue Removal System, Abstract

Fluid Volumes & Fluid Deficit vs. Pathology Type & Treatment Time









Miller C. et al., Clinical Evaluation of a 1st Generation Interlace Medical Hysteroscopic Tissue Removal System, Abstract

Retained Products of Conception: Treatment Outcomes

Hysteroscopic Management vs. Traditional Approaches

Outcome	Hysteroscopic Resection	Ultrasound-Guided D&C	Expectant Management
Complete Evacuation Rate	**95-98%**	85-92%	70-80%
Uterine Perforation	0.2%	1.5-2.5%	N/A
Intrauterine Adhesion Formation	3-8%	15-25%	2-5%
Need for Repeat Procedure	2-5%	8-15%	25-35%
Hemorrhage Risk	0.5-1.0%	2.0-4.0%	5-10%
Time to Normal Menses	4-6 weeks	4-8 weeks	8-12 weeks
Infection Rate	0.3%	1.5%	2.5%
Patient Satisfaction	**93-97%**	85-90%	65-75%
Best Used For	Large or adherent RPOC	Standard management	Asymptomatic small RPOC

Sources: ACOG Practice Bulletin 2018, J Ultrasound Med 2020, Fertil Steril 2021

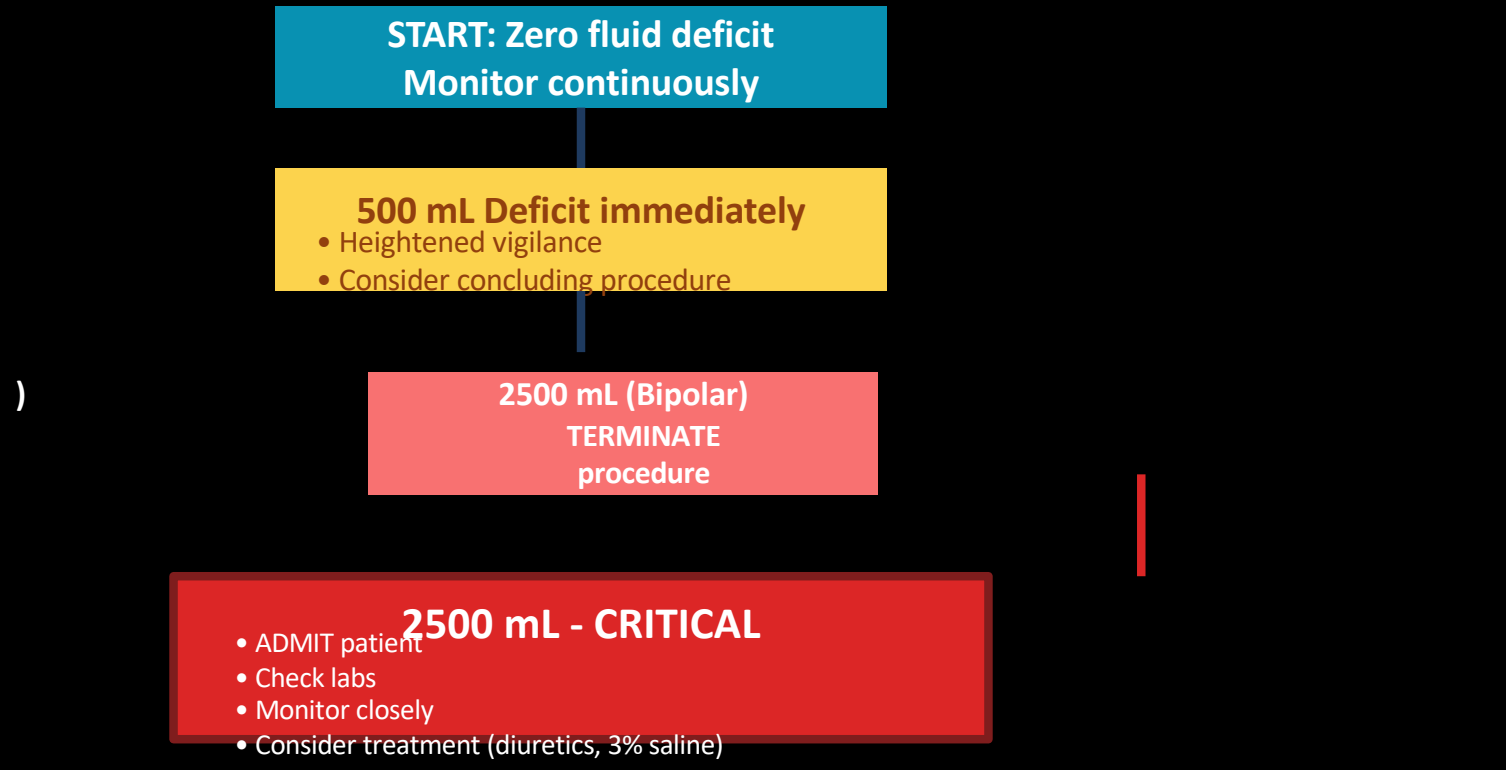
Tissue Removal Systems: Comparative Outcomes

MyoSure vs. Traditional Resectoscope - Meta-Analysis Data

Sources: Moawad et al. JMIG 2022 (Meta-analysis of 15 RCTs, n=2,847 patients)

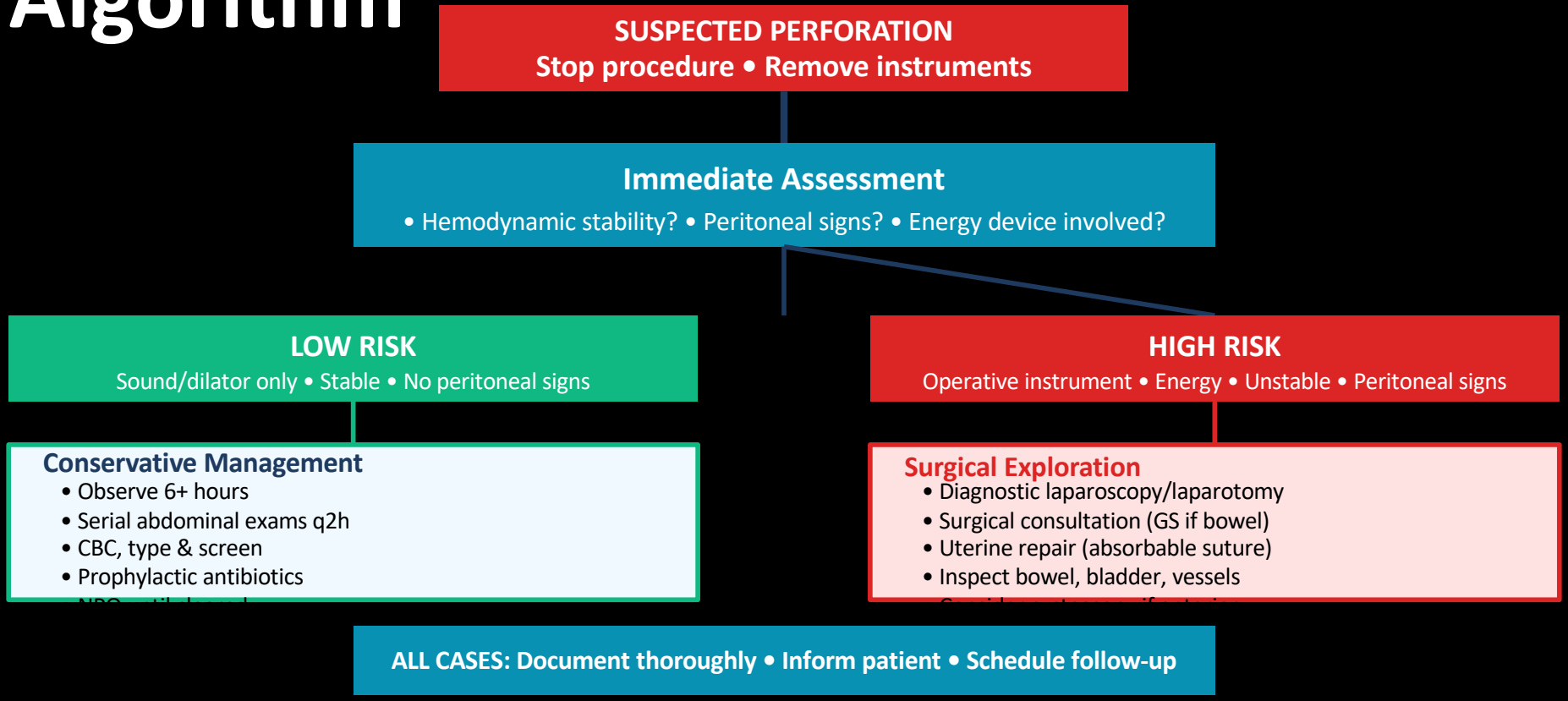
Parameter	Tissue Removal System (TRS)	Bipolar Resectoscope	P-value / Significance
Mean Operative Time (min)	**14.2 ± 5.3**	22.8 ± 8.1	**p < 0.001**
Fluid Deficit (mL)	**285 ± 142**	658 ± 298	**p < 0.001**
Complete Resection (%)	**97.2%**	92.5%	**p = 0.008**
Perforation Rate (%)	**0.4%**	1.8%	**p = 0.012**
Post-op Pain (VAS 0-10)	**2.1 ± 1.2**	3.8 ± 1.7	**p < 0.001**
Hospital Stay (hours)	2.3 ± 0.8	4.2 ± 1.5	**p < 0.001**
Return to Normal Activity (days)	2.1 ± 0.9	4.8 ± 2.1	**p < 0.001**
Cost per Procedure (USD)	$2,850	$4,200	**32% reduction**
Overall Advantage	**Superior across all metrics**	Still valuable for complex cases	**TRS preferred when available**

Fluid Management Decision Algorithm



KEY: Document deficit with automated fluid pump • Lower thresholds for longer procedures

Uterine Perforation Management Algorithm



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

Tips and Tricks to Minimize Complications of Operative Hysteroscopy: Intravasation

- Length of surgery
- Depth of myometrial dissection
- Cervical Lacerations
- Partial perforation-false passage
- Surgery that opens into myometrium opening larger vascular channels-myoma resection or division
- Monitor intrauterine pressure electronically
- If fluid overload is expected use foley catheter and Lasix 20 mg IV before fluid maximum reached
- Halt proceed when fluid maximum is reached

6 Factors Which Increase Risk of Fluid Overload: Keeping Lifeguards Out of Your OR

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

Tips and Tricks to Minimize Complications of Operative Hysteroscopy: Electrosurgery

- Keep foot pedals by the surgeon to prevent inadvertent activation
- Advance electrode under direct visualization
- Use new electrodes for each case and avoid electrodes with damaged insulation
- Do not over dilate the cervix
- Activate electrode when in contact with tissue to prevent current diversion

Tips and Tricks to Minimize Complications of Operative Hysteroscopy: Intravasation

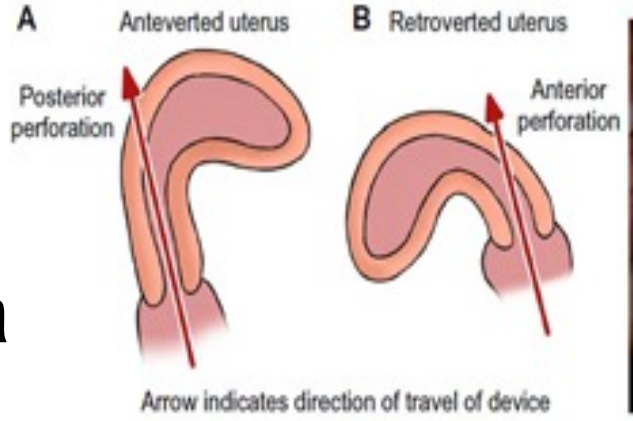
- Length of surgery
- Depth of myometrial dissection
- Cervical Lacerations
- Partial perforation-false passage
- Surgery that opens into myometrium opening larger vascular channels-myoma resection or division
- If fluid overload is expected use foley catheter and Lasix 20 mg IV before fluid maximum reached
- Halt proceed when fluid maximum is reached

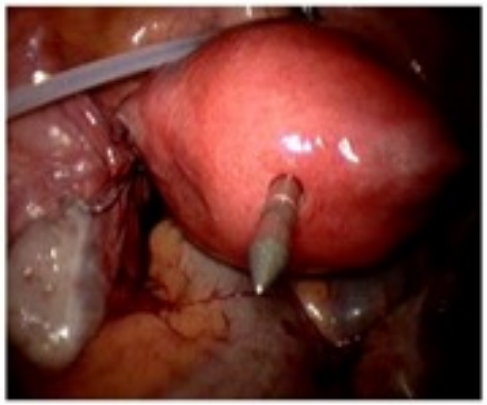
Complications of Operative Hysteroscopy

- Jansen et al
  - 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

Complications: Access of Uterine Cavity

- **Perforations**
  - **Uterus**
  - **Adjacent structures (bowel. bladder. vascular)**
- **Cervical Trauma**





Uterine perforation as seen through laparoscope

Diagnosis of Uterine Perforation

- **Intra-operatively**
  - **<u>Direct visualization</u>**
    - **A hole in the uterine wall**
    - **Omentum , adipose tissue, bowel is visible through myometrium/endometrial cavity or in a suction instrument**
    - **Adipose tissue present in curettage specimen**

Diagnosis of Uterine Perforation

- Intra-operatively
  - Operating instrument goes beyond the expected length of uterus
  - Sudden loss of uterine distension/visualization
  - Abrupt fluid deficit [1-4]
  - Excessive bleeding
    - Retroperitoneal or intra-abdominal
    - Peri-operative hypotension

Diagnosis of Uterine Perforation

- **Post-operatively**
  - **Hypotension**
  - **Persistent or worsening pelvic or abdominal pain (most commonly)[5,6]**
  - **Abdominal distension**
  - **Heavy or persistent vaginal bleeding**
  - **Fever**
  - **Hematuria**
- **For thermal injury to the intestine or ureter symptoms may not occur**
  - **for several days to two weeks.[7]**

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 instructions[1].

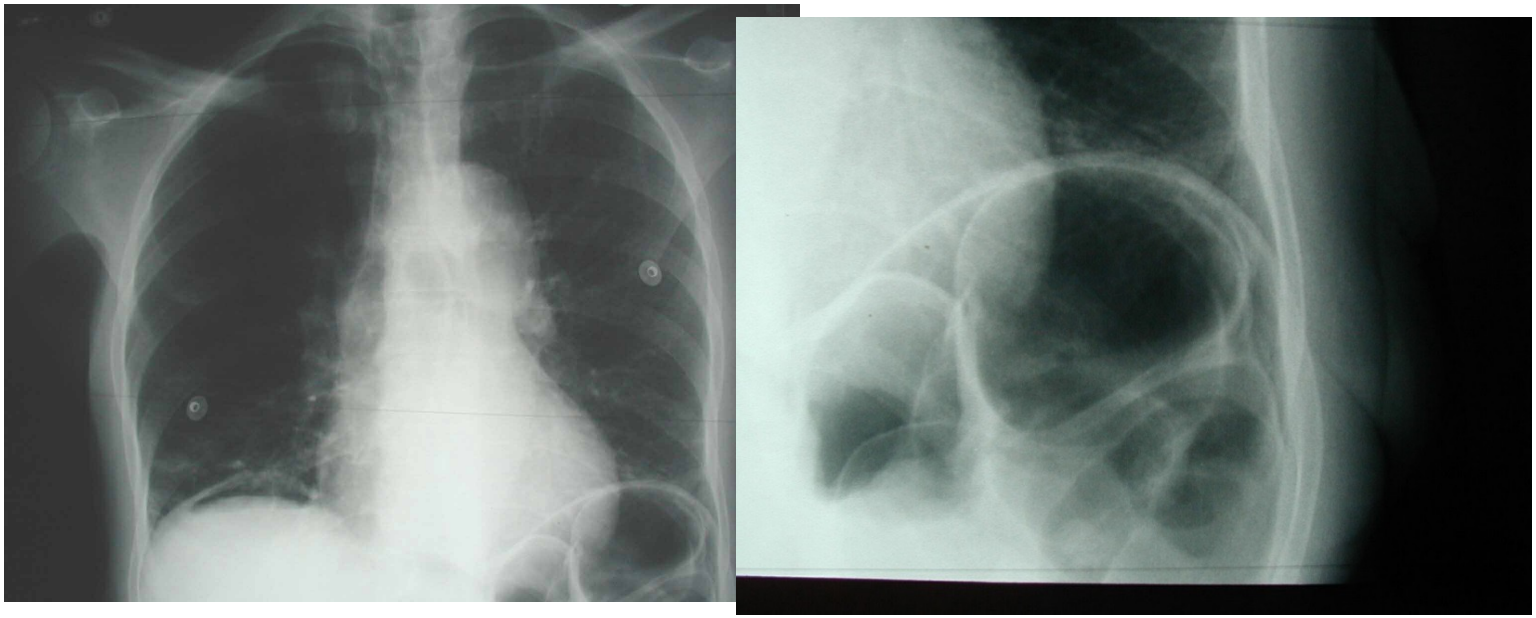
To Scope Or Not to Scope?

- **Surgical intervention [1,2,4]**
  - **Signs of severe uterine bleeding,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]**

Abdominal Pain, Fever and Nausea following Operative Hysteroscopy

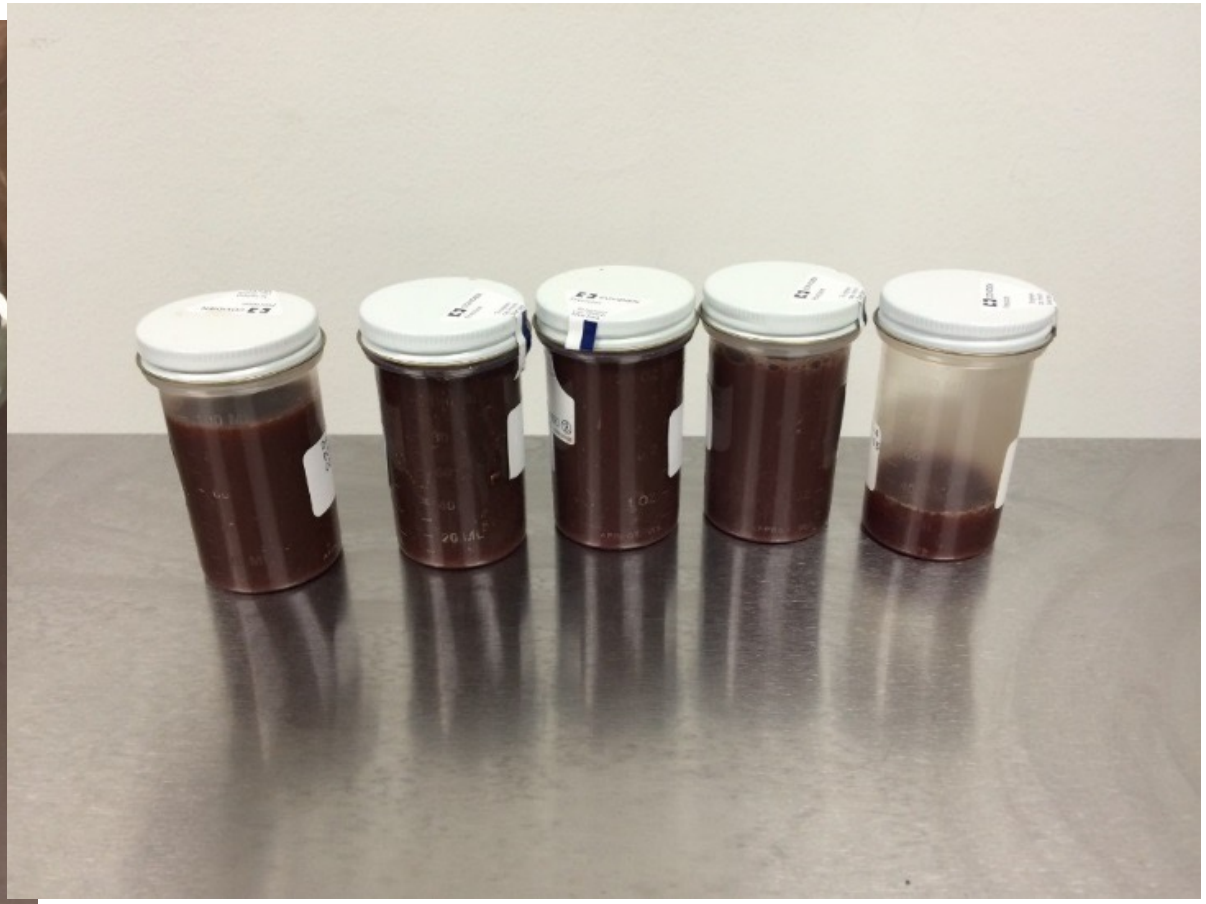


What Do You See?


H
*10/29/69;34Y
11:27:31 AM
5 IMA 11 / 20
Symphony
MR 2002B
HFS
+LPH
BRADLEY LINDA
R
10cm
MF 0.99
TR 5300.0
TE 111.0
TA 03:58
BW 195.0
M/ND
A3
BO1,2;SP2,3,4,5,6
*tse2d1_23 / 180
12886978
D
SP A28.9
SL 5.0
FoV 300*300
256*256
Cor
W 386
C 163


A
*10/29/69;34Y
STUDY 11646703
11:23:20 AM
4 IMA 6 / 20
R
MF 0.99
TR 5060.0
TE 104.0
TA 03:32
BW 195.0
M/ND
A3/SAT1
BO1,2;SP2,3,4,5,6
*tse2d1_23 / 180
12886978
10cm
FoV 225*22
256*256

Hematometra



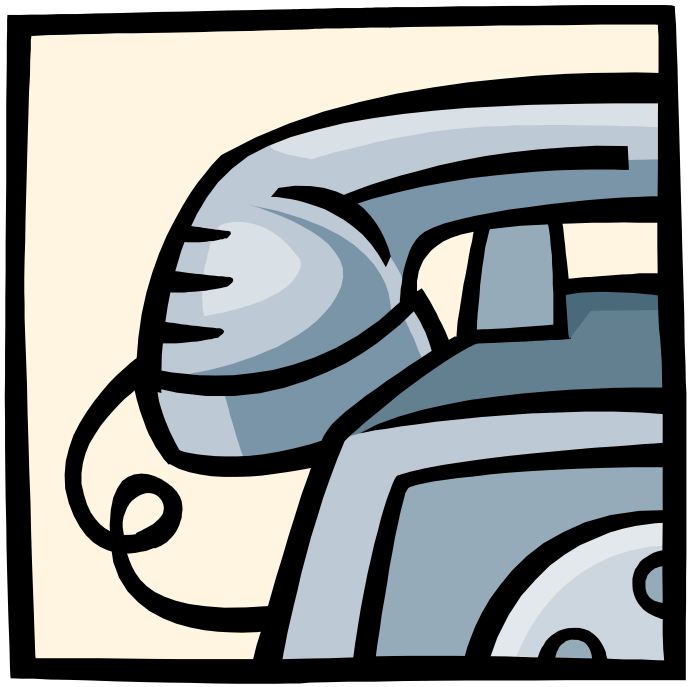
Avoiding Complications of Hysteroscopy

- 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

Tips and Tricks to Minimize Complications of Operative Hysteroscopy

- Use saline as distension medium
- Maintain a clear hysteroscopic view.
  - Begin the intrauterine pressure greater than the MAP, then lower and vary the pressure to enable visualization
  - Monitor fluid deficit
- Master vaginoscopy as it will be used during surgery if not employed initially to remove tissue fragments

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

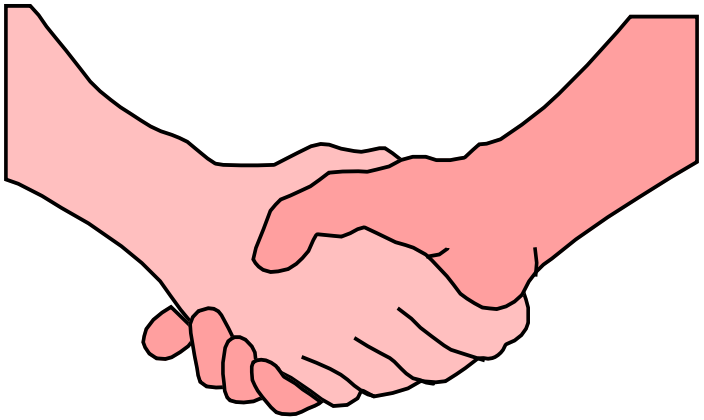
Summary

- Pre-operative evaluation is essential to determine, size, number and location of fibroids
- Excellent hysteroscopic skills with attention to fluid management is essential
- Vary intra-uterine pressure throughout surgery
- Superb clinical outcomes, complete fibroid removal and minimal complications occur with adherence hysteroscopic surgical principles

Cleveland Clinic

Every life deserves world class care.

Discharge instructions



- expect serous discharge 1-2 weeks
- mild cramping 24-48 hours
- may shower/bathe immediately
- no intercourse for one week
- call if persistent pain or fever
- Limit number of narcotic pills at discharge
- Utilize NSAIDs routinely

Key References

Recent Evidence (2020-2026)

1. AAGL Practice Report: Practice Guidelines for the Management of Hysteroscopic Distending Media. J Minim Invasive Gynecol. 2023;30(5):417-434.
2. ACOG Practice Bulletin No. 228: Management of Abnormal Uterine Bleeding Associated with Ovulatory Dysfunction. Obstet Gynecol. 2023;142(5):1289-1305.
3. Vitale SG, Haimovich S, Laganà AS, et al. Endometrial polyps: An evidence-based diagnosis and management guide. Eur J Obstet Gynecol Reprod Biol. 2023;283:143-150.
4. Moawad GN, Tyan P, Paek J, et al. Comparison Between Hysteroscopic Morcellation and Resection for Treating Intrauterine Pathology: A Systematic Review and Meta-analysis. J Minim Invasive Gynecol. 2022;29(4):527-541.
5. Di Spiezio Sardo A, Calagna G, Guida M, et al. Hysteroscopy and treatment of uterine pathologies. Best Pract Res Clin Obstet Gynaecol. 2022;84:3-13.
6. Clark TJ, Middleton LJ, Cooper NAM, et al. A Randomised Controlled Trial of Outpatient versus Inpatient Polyp Treatment for Abnormal Uterine Bleeding: The HTA Health Technology Assessment Programme. Health Technol Assess. 2021;25(26):1-192.
7. Dealberti D, Riboni F, Cosma S, et al. Feasibility and Acceptability of Office Hysteroscopic Polypectomy: A Systematic Review and Meta-analysis. J Minim Invasive Gynecol. 2020;27(6):1229-1240.
8. Carugno J, Vidali A, Di Spiezio Sardo A, et al. Updated AAGL Practice Report on the Diagnosis and Management of Submucous Leiomyomas. J Minim Invasive Gynecol. 2023;30(1):4-27.
9. Bosteels J, Weyers S, Kasius J, et al. Anti-adhesion therapy following operative hysteroscopy for treatment of female subfertility. Cochrane Database Syst Rev. 2021;11:CD011110.

Historical & Landmark Studies

10. Munro MG, Critchley HOD, Fraser IS. The two FIGO systems for normal and abnormal uterine bleeding symptoms and classification of causes of abnormal uterine bleeding in the reproductive years: 2018 revisions. Int J Gynaecol Obstet. 2018;143(3):393-408.
11. Nathani F, Clark TJ. Uterine polypectomy in the management of abnormal uterine bleeding: A systematic review. J Minim Invasive Gynecol. 2006;13(4):260-268.
12. Emanuel MH, Wamsteker K. The Intra Uterine Morcellator: a new hysteroscopic operating technique to remove intrauterine polyps and myomas. J Minim Invasive Gynecol. 2005;12(1):62-66.
13. Valle RF, Baggish MS. Hysteroscopic myomectomy. In: Baggish MS, Valle RF, Guedj H, editors. Hysteroscopy: Visual Perspectives of Uterine Anatomy, Physiology, and Pathology. 3rd ed. Philadelphia: Lippincott Williams & Wilkins; 2007.

Cleveland Clinic

Thank You Is Not A Big Enough Word