

# **A History of and Future for Endometriosis Surgery**

*What I wish I had known in 1979*



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**Scientific and Medical Director  
Endometriosis Foundation of America**

**Professor Emeritus  
University of Tennessee Health Science Center**

# LEARNING OBJECTIVES

At the conclusion of this presentation, participants should be able to:

- Discuss the surgical treatment of endometriosis
- Contrast visualization and palpation
- Compare coagulation, vaporization, ablation, and excision

[www.danmartinmd.com/2021.html](http://www.danmartinmd.com/2021.html)

# DISCLOSURE



- Financial - None
- Use of lab equipment - Lumenis CO<sub>2</sub> Lasers
- Received digital educational and marketing material from Ethicon Endo-Surgery, Lumenis CO<sub>2</sub> Lasers, Applied Medical, AbbVie

[www.danmartinmd.com/2021.html](http://www.danmartinmd.com/2021.html)

**IVF is a “laparoscopy bypass.”**

*Avner Hershlag and Jacob Markovitz. Fertil Steril. 2005, 84(6):1585-6*

*G. David Adamson. Fertil Steril. 2005, 84(6):1582-4*

**Endometriosis is more  
than pain or infertility.**

[www.danmartinmd.com/2021.html](http://www.danmartinmd.com/2021.html)

Taylor HS. Endometriosis: a complex systemic disease with multiple manifestations. *Fertil Steril* 2019 112(2):235-236

Martin DC. Endometriosis Concepts and Theories. 2021 <http://www.danmartinmd.com/files/endotheory.pdf>

**Be Prepared**

# Planning for the Future



# UTHSC Neurosurgery Laser Lab



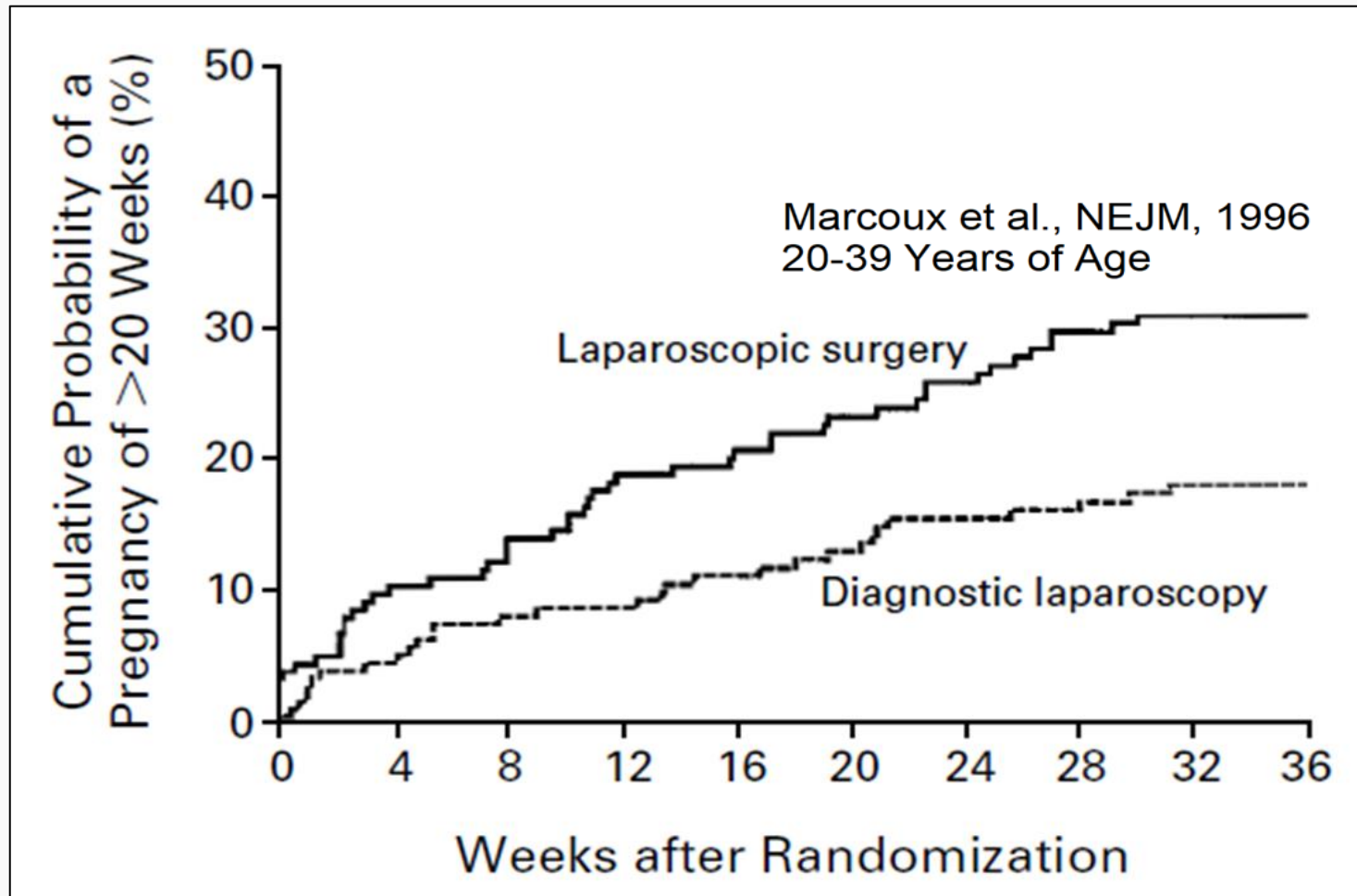
# Baptist Memorial Hospital

- 2,300 Beds
- 54 Operating Rooms
- 1,200 Physicians
- 27 Pathologists and Several Residents
- Research Protocols

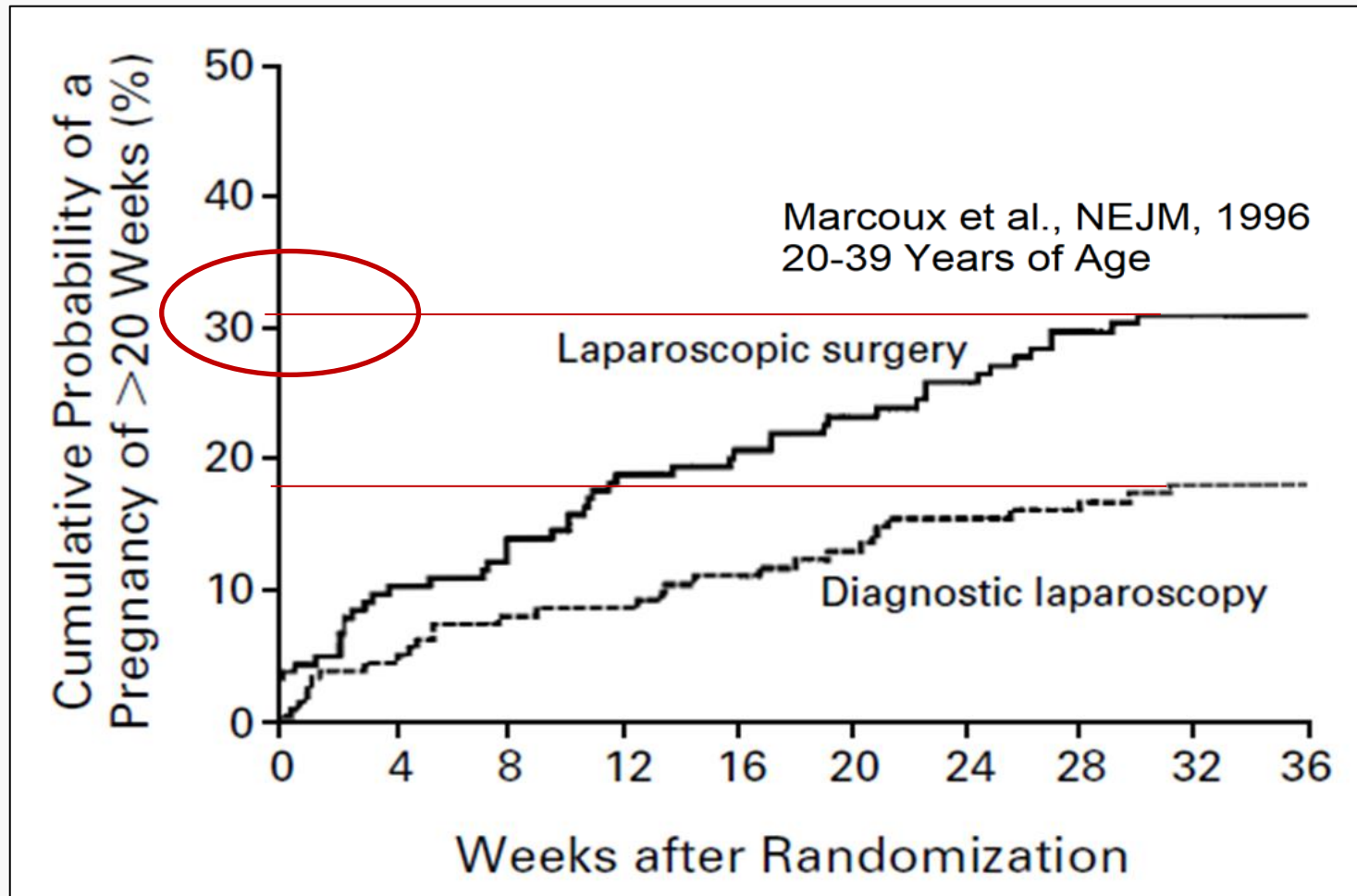


# **Laparoscopy Routine For Infertility**

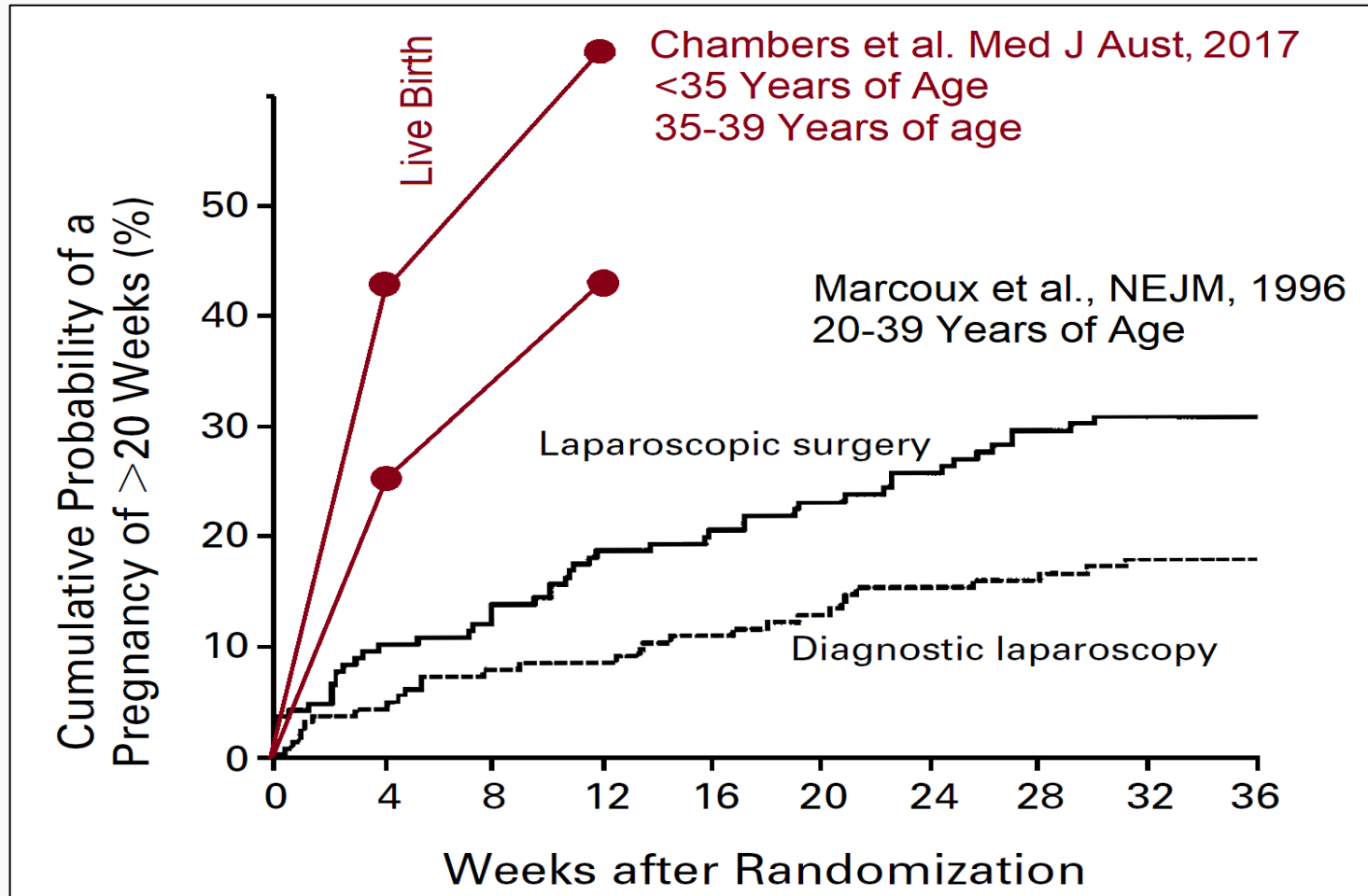
# Laparoscopy



# Laparoscopy



# IVF versus Laparoscopy



# Laparoscopy Bypass

- 1989 – ART “*alternative for infertility associated with endometriosis*”
- 1997 – HSG and MRI as alternative to laparoscopy
- 2005 – IVF is a “*laparoscopy bypass*” for infertility

*Damewood Obstet Gynecol Clin North Am. 1989, 16(1):179-91*

*Ayida et al. Hum Reprod. 1997, 12(7):1436-9*

*Hershlag and Markovitz. Fertil Steril. 2005, 84(6):1585-6*

# Endometrial BCL6 expression

- Unexplained infertility planning embryo transfer
- Positive endometrial BCL6 expression
  - GnRHa for two months – 50% live birth rate
  - Laparoscopic ablation or excision – 52% live birth rate
  - Controls – 7.4% live birth rate
- 100% (21 of 21) with + BCL6 who had laparoscopy had endometriosis.
- 96% (72 of 75) in Nezhat et al. 2020

*Likes CE, et al. J Assist Reprod Genet. 2019, 36(3):483-490*

*Nezhat et al. JSLS. 2020, 24(4):e2020.00064*



# Concerns

- Progressive and severe disease if left untreated

*Brosens I, et al. Endometriosis in adolescents is a hidden, progressive and severe disease that deserves attention, not just compassion. Hum Reprod. 2013, 28(8):2026-31*

# Ovarian Cancer

## Risk of Ovarian Cancer

- 1.3% in general population
- 2.5% in endometriosis patients

**Is Treatment Necessary?**

# Moen et al. 1987, 1991, 2002

Tubal ligations (fertile women with no major symptoms)

- 39 (20%) of 196 women had endometriosis
- 32 followed 12 to 14 years
  
- No significant differences c/w controls
- Pelvic pain was more frequent in controls

Moen MH. Endometriosis in women at interval sterilization. Acta Obstet Gynecol Scand. 1987

Moen MH, Muus KM. Endometriosis in pregnant and non-pregnant women at tubal sterilization. Hum Reprod. 1991

Moen MH, Stokstad T. A long-term follow-up study of women with asymptomatic endometriosis diagnosed incidentally at sterilization. Fertil Steril. 2002.

# Fuentes et al. 2014

- 15 tubal ligation studies
- Asymptomatic and unstated symptoms
- 5.7% (558 of 9,811 fertile women) had endometriosis

*Fuentes A, Escalona J, Céspedes P, Espinoza A, Johnson MC, [Prevalence of endometriosis in 287 women undergoing surgical sterilization in Santiago Chile]. [Article in Spanish] Rev Med Chil. 2014 Jan;142(1):16-9. doi: 10.4067/S0034-98872014000100003. PMID: 24861109*

# Williams and Pratt 1977

- 6% in a retrospective study
- 50% in a prospective study

*Williams TJ, Pratt JH. Endometriosis in 1,000 consecutive celiotomies: incidence and management. Am J Obstet Gynecol. 1977, 129(3):245-50. doi: 10.1016/0002-9378(77)90773-6. PMID: 900194.*

# Focused vs Case-Control Studies in Fuentes et al. 2014



## Retrospective Case-Control

- 2.3% (183 of 7,897 patients) in five tubal ligation studies

*Hasson 1976; Sangi-Haghpeykar and Poindexter 1995; Talbot and Leeton 1974; Strathy et al. 1982; Wheeler 1989*

## Surgical Protocol and Symptomatology Stated

- 16.9% (269 of 1,590 patients) in six tubal ligation studies

*Balasch et al. 1996; Hemmings et al. 2004; Moen 1987; Moen and Muus 1991; Rawson 1991; Trimbos et al. 1990*

# Progressive?

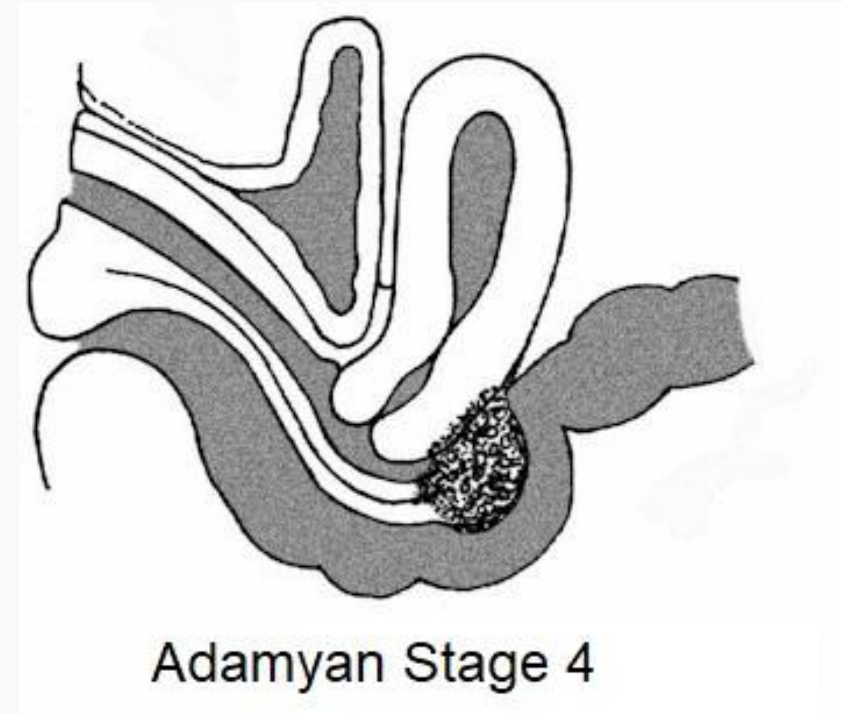
Control groups in 7 randomized studies

- 42% regressive
- 29% stable
- 29% progressive

*Evers JLH. Is adolescent endometriosis a progressive disease that needs to be diagnosed and treated?  
Hum Reprod. 2013, 28(8):2023. doi: 10.1093/humrep/det298, PMID: 23861497*

# Adamyman Stage 4

- 4-cm asymptomatic rectovaginal nodule in the posterior vaginal fornix visually recognized at Pap smear.
- No change on exam or MRI over 7 years.
- She moved to North Carolina.



# Untreated Rectovaginal Endometriosis

- Eighty-eight asymptomatic patients
- Followed for 1 to 9 years
- Six (6.8%) with progression (symptomatology or growth).

## ➤ 2.5% risk of ovarian cancer for all endometriosis

*Kvaskoff et al. Int J Gynaecol Obstet. 2021, 153(3):556-557*

## ➤ Data on long-term management of endometriomas

- Examination & ultrasound every 6 months

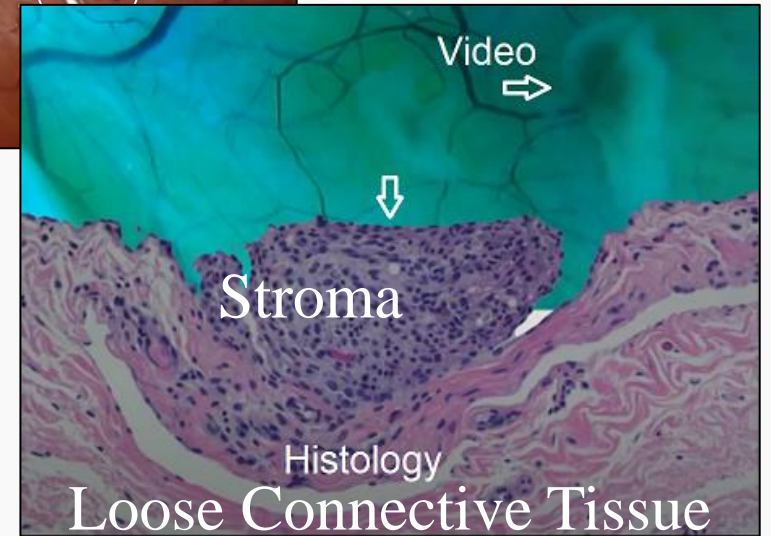
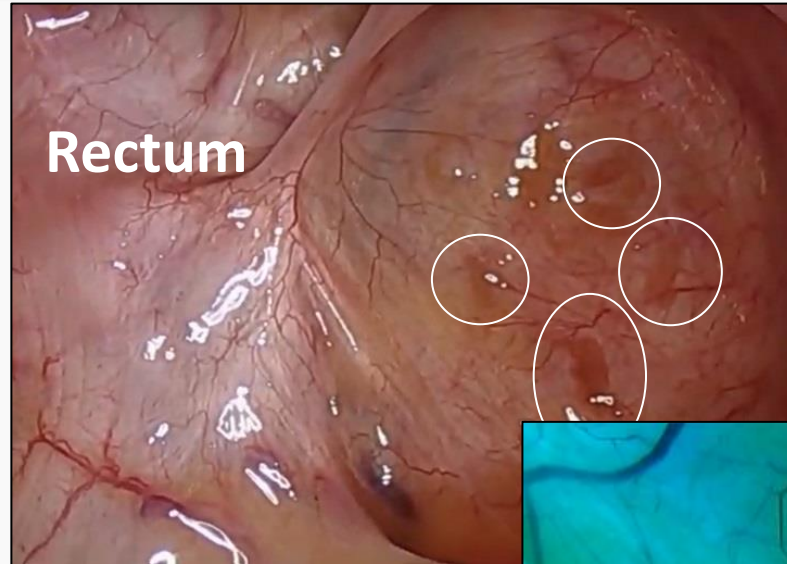
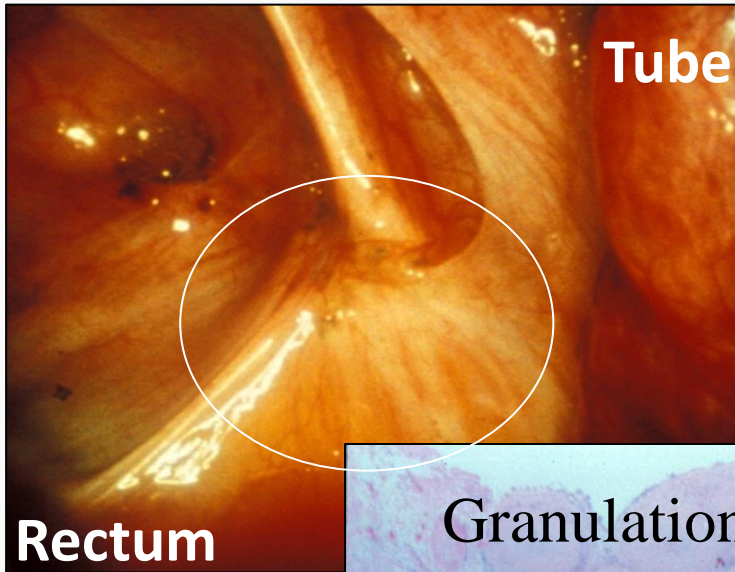
*Levy and Barbieri. Endometriosis: Management of ovarian endometriomas. 2021. UpToDate*

- Cystectomy
- BSO



# Repeat Surgery

# Persistence or Recurrence



Martin DC. 1988. <https://www.danmartinmd.com/files/lae1988.pdf>

Seckin T. 2019. <https://youtu.be/kre6pug3i4c>.

# Reoperation by Age Range

	Age Range	2 Years	7 Years
Martin, 1981-1990s*	≤ 18	80%	
Yeung et al. 2011**	12–19	47%	
Shakiba et al. 2008	19-29	36%	72%
Shakiba et al. 2008	30-39	12%	56%
Shakiba et al. 2008	≥ 40	14%	24%
Martin, 1981-1990s*	≥ 42		15%

\* Martin (1981-1990s) changed from resecting individual “dark scarred” lesions to subtle lesions and added margins.

\*\* Yeung (1999-2007) resected all visible disease and abnormal peritoneum using near-contact laparoscopy.

# Reoperation, All Ages

	2 Years	6.5+ Years
Redwine, 1991	21.7%	55%
Shakiba et al., 2008	20.5%	55.1%

# Rectovaginal Endometriosis

Age	Recurrence of pain	Reoperation or GnRHa treatment
<25	56%	54%
26-30	35%	23%
31-35	40%	13%
>35	0	0

# Progression

## Ten Years

- Karnaky KJ. Arizona Med 1969, January:37-41
- Redwine DB. Fertil Steril 1987, 48:1062-1063

## Twenty Years

- Koninckx et al. Fertil Steril 1991, 55:759-765



# Palpation

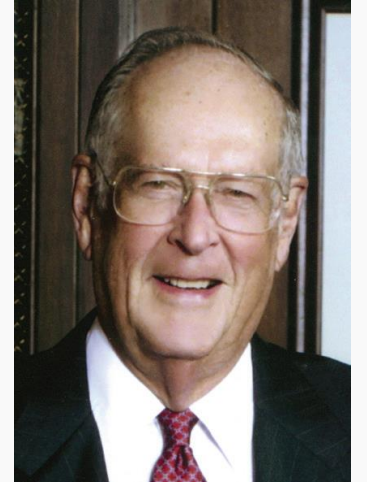
# One-Finger Pelvic Exam

For a pelvic nodule that is palpated in the office:

- **Before** excision to localize the lesion
- **During** excision to push the lesion into the field
- **After** excision to complete confirm removal

Continue excision if the nodule is still present and then repeat the exam until no palpable residual.

*A probe can be useful during surgery (Reich, Martin, Arrington, Griffiths).*



Pete Hollis, 1927 - 2021

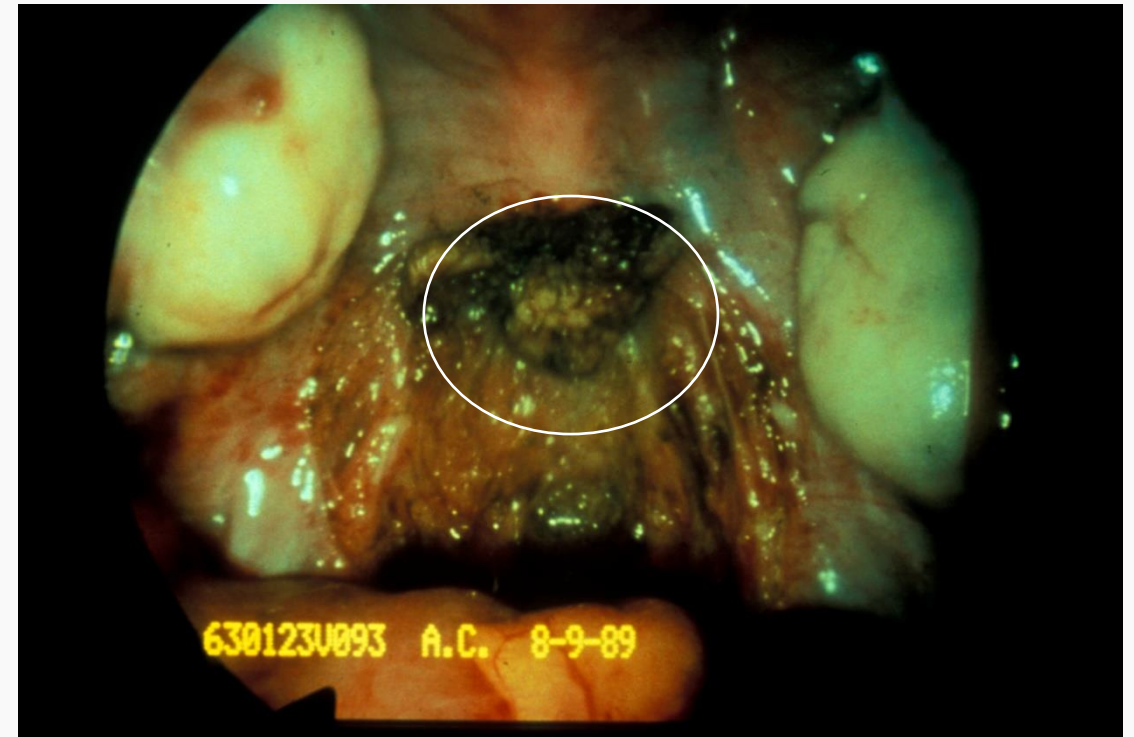
# Retroperitoneal Endometriosis



Koninckx & Martin. Fertil Steril. 1992, 58:924-928

Koninckx & Cornillie. 1993, Atlas of Endometriosis, ISBN 1563755475

# Retroperitoneal Endometriosis



Koninckx & Martin. Fertil Steril. 1992, 58:924-928

Koninckx & Cornillie. 1993, Atlas of Endometriosis, ISBN 1563755475

# Hidden Endometriosis

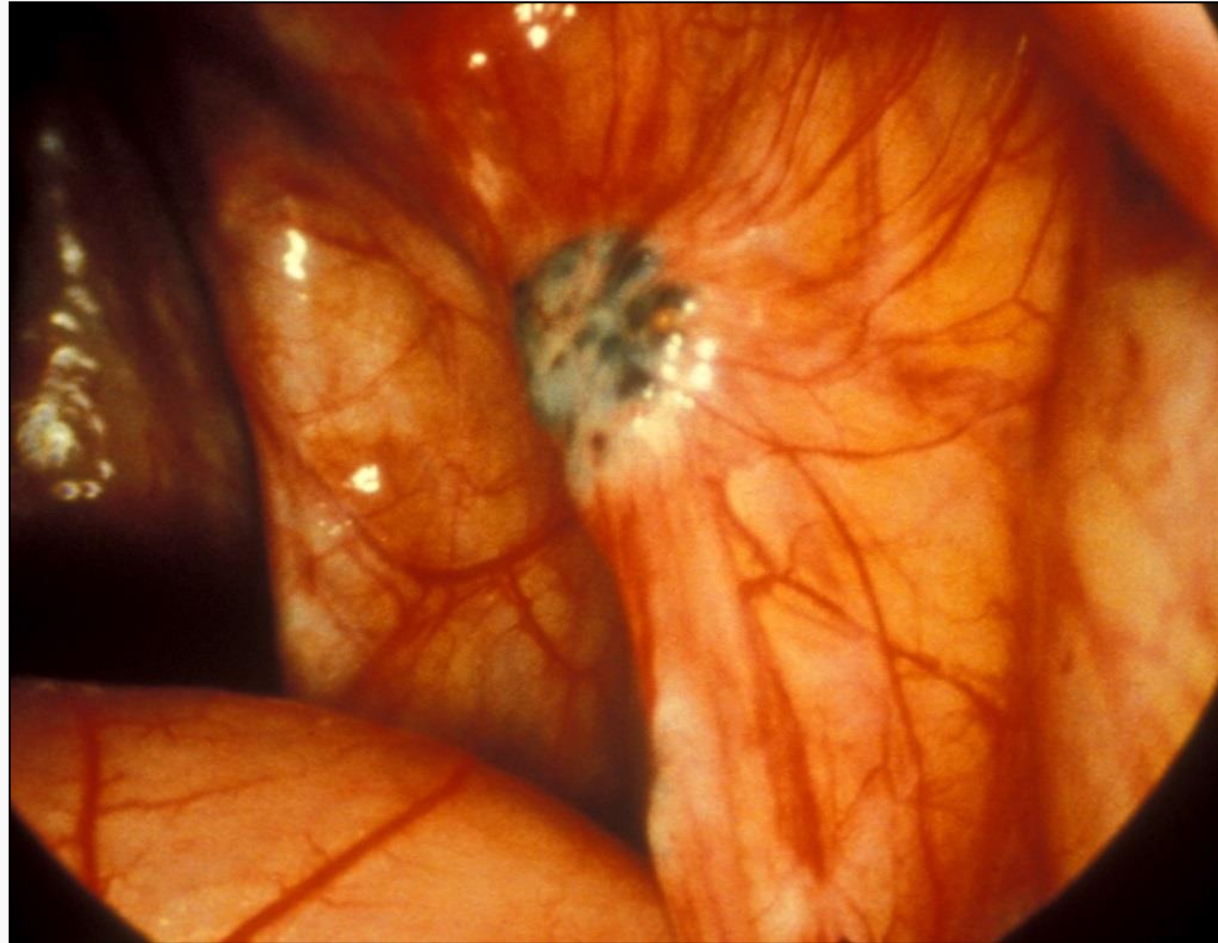
- **Retroperitoneal**
- **Rectum, Sigmoid, Ilium**
- **Appendix**
- **Mesentery**
- **Adhesions**
  
- **Ovary**
- **Tubes**
- **Cryptic Pockets**
- **Nodes**

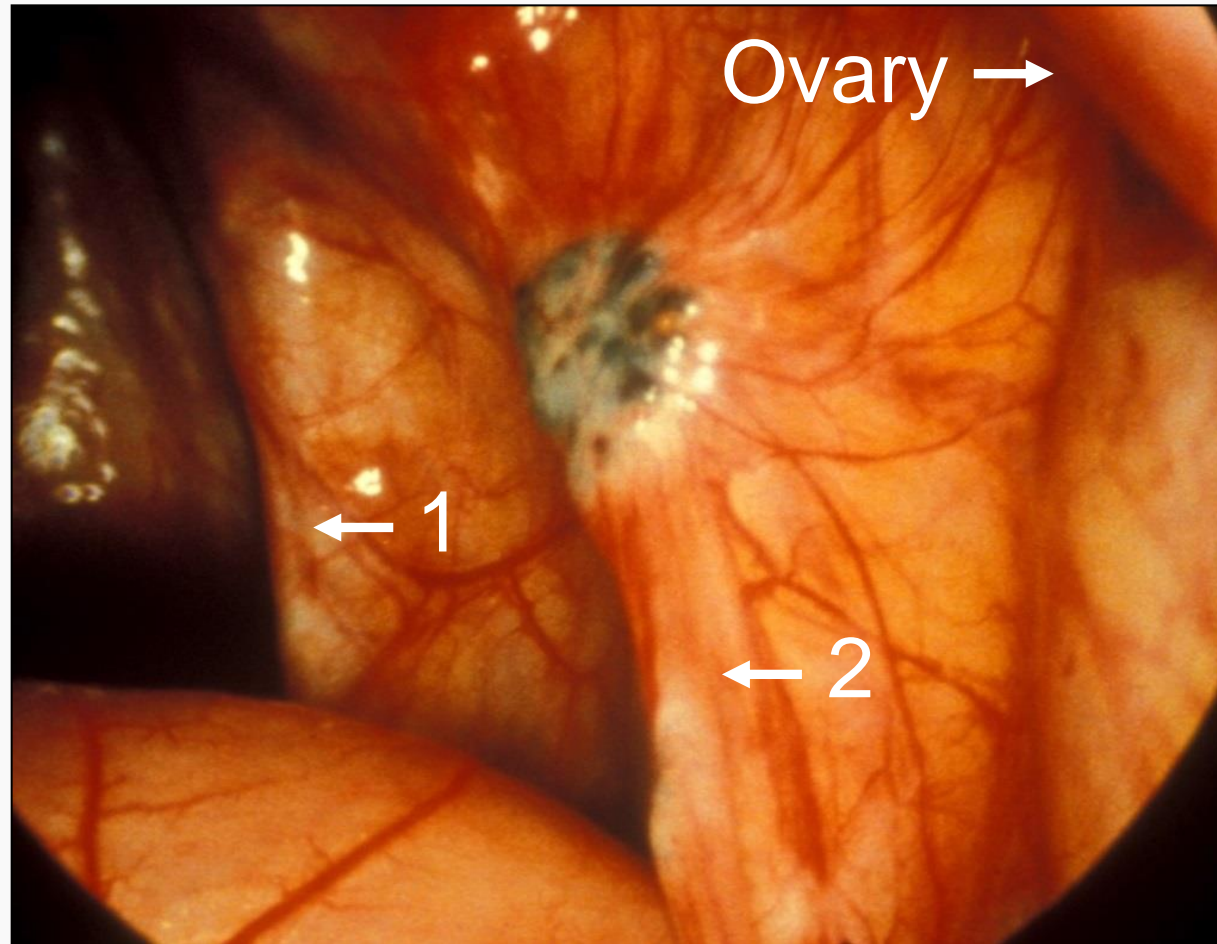
Martin DC. Endometriosis Concepts and Theories. 2021 <http://www.danmartinmd.com/files/endotheory.pdf>

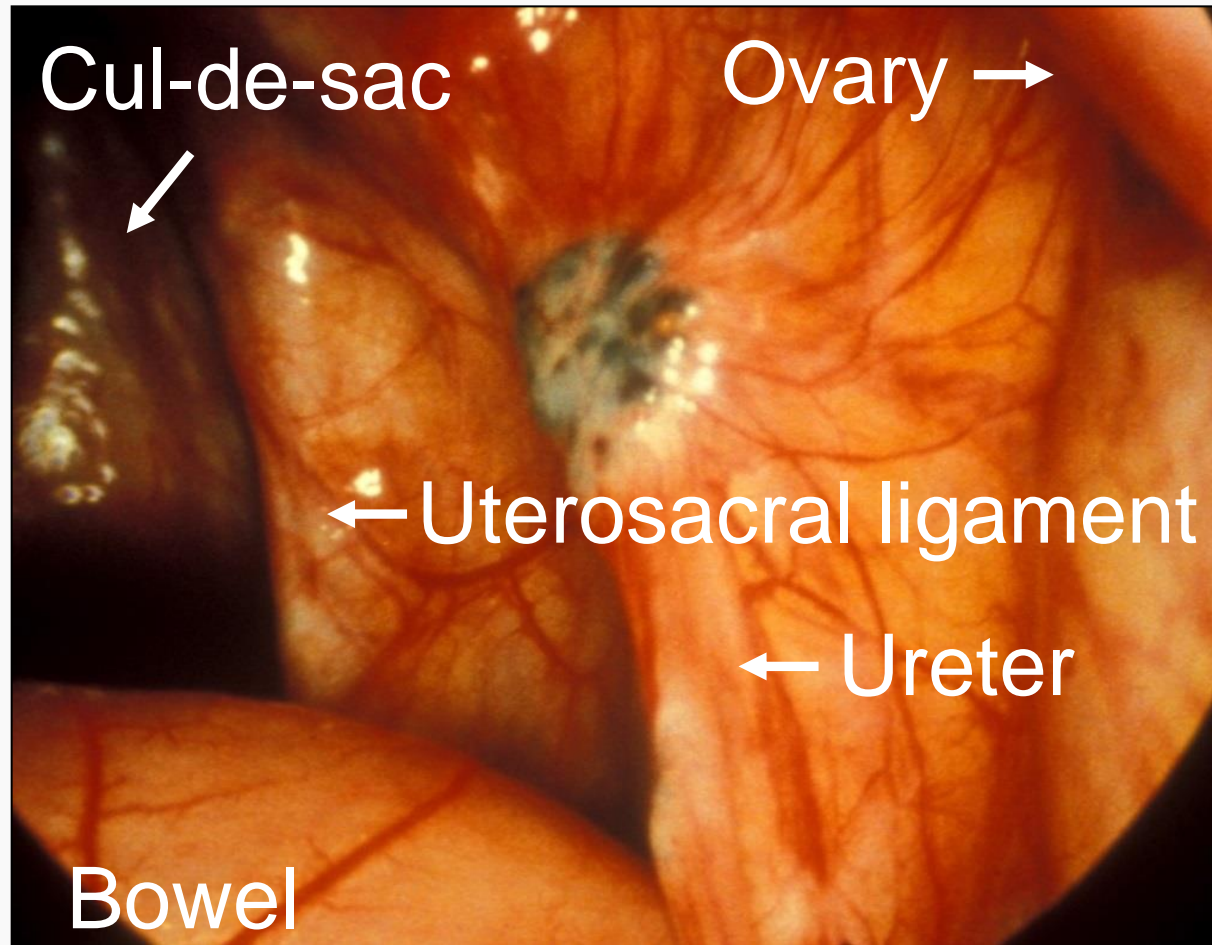


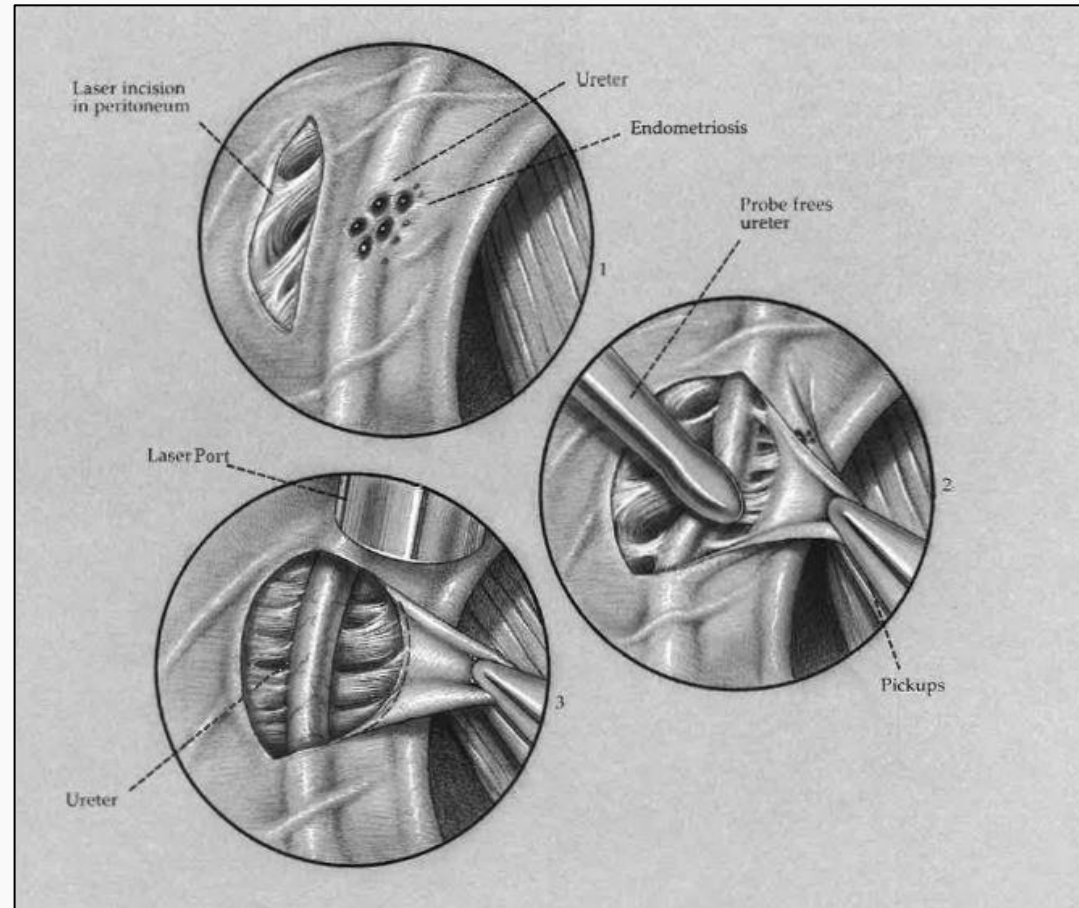
# Infiltration

# Superficial or Deep? Coagulate or excise?





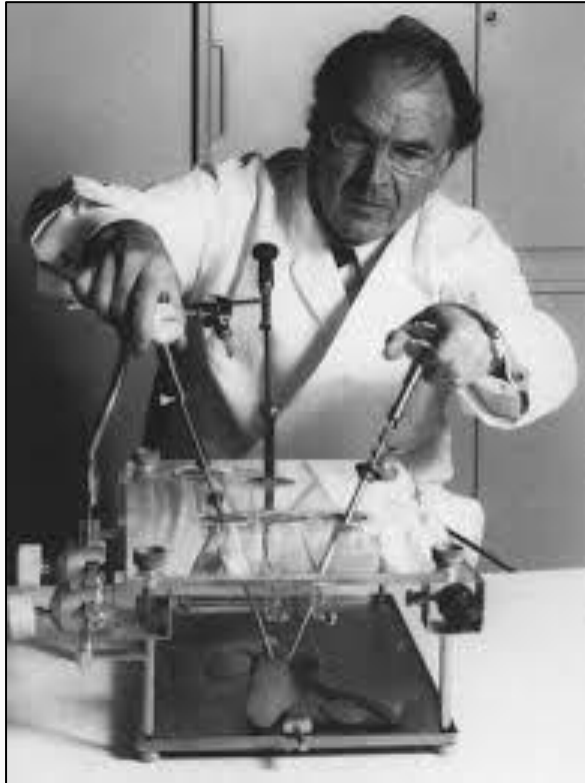




Martin DC, Rock JA. Laparoscopic excision of infiltrating pelvic endometriosis. OB-GYN illustrated: LTI Medica (Upjohn) 1992

# Surgical Techniques

1981



Kurt Semm (1927 – 2003)

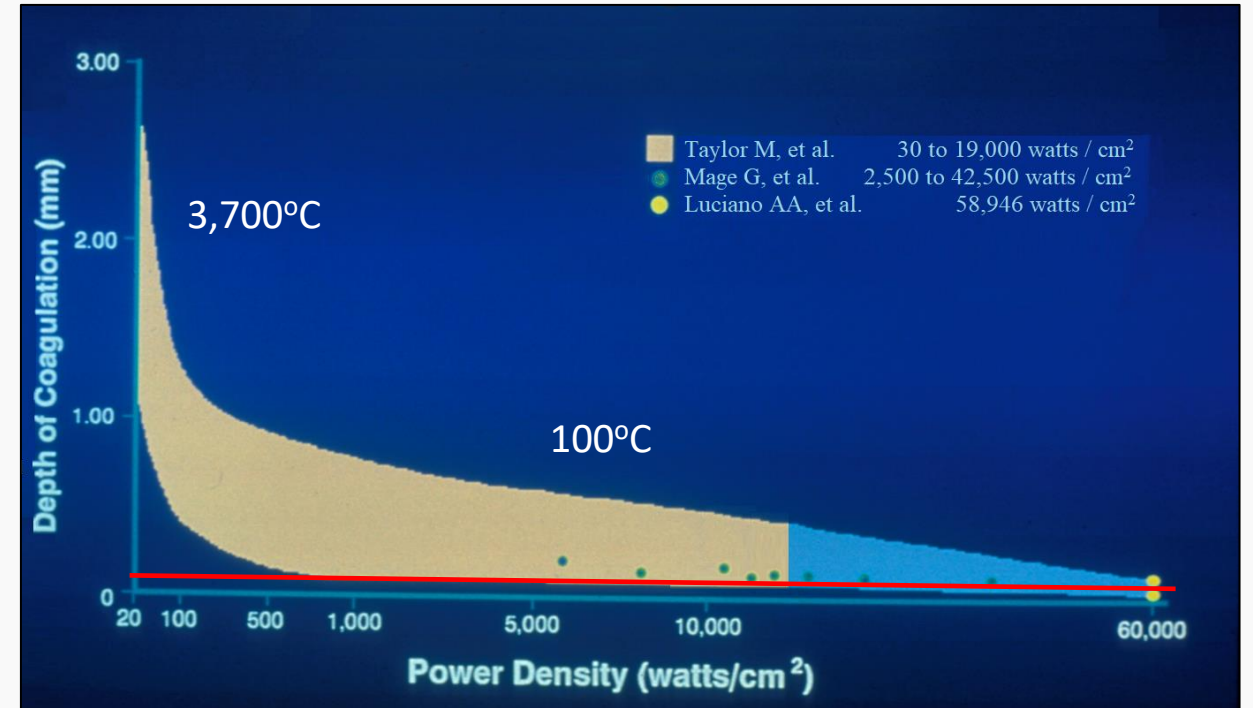


Maurice Bruhat (1934 – 2014)

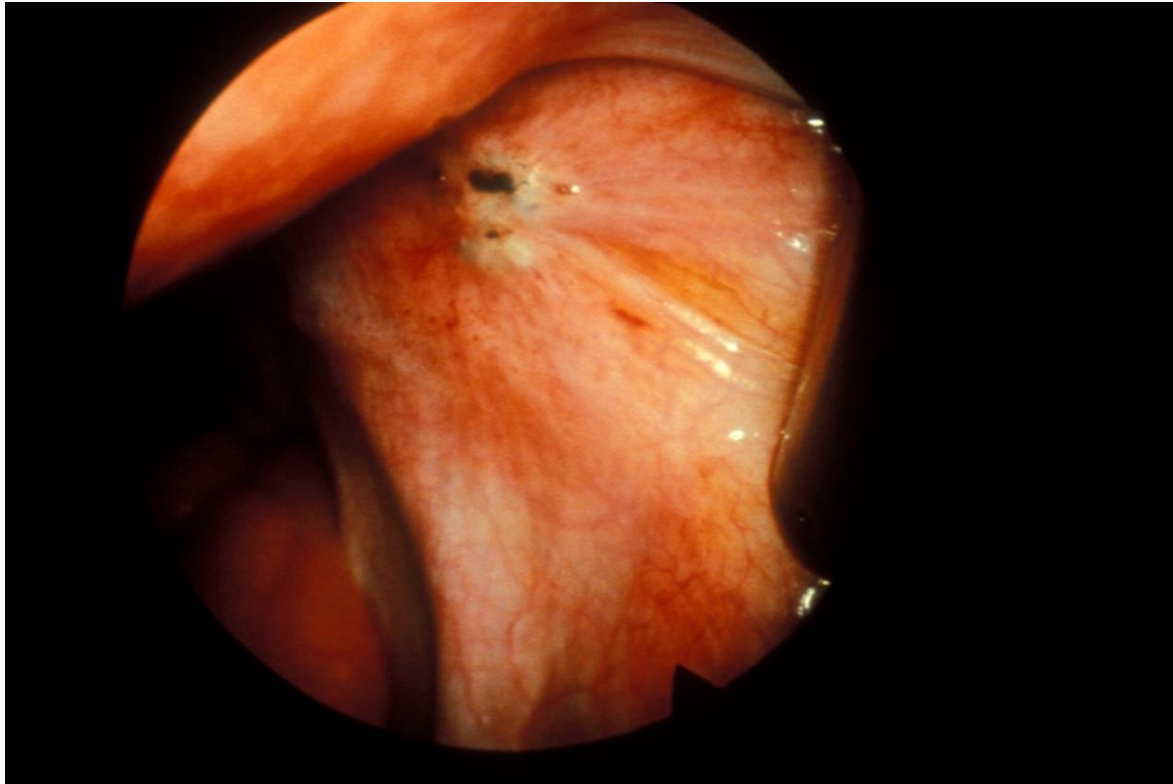
# Semm 1980

- Coagulation is adequate for surface endometriosis.
- Partial excision and then coagulation is used for nodules

# Thermal Damage

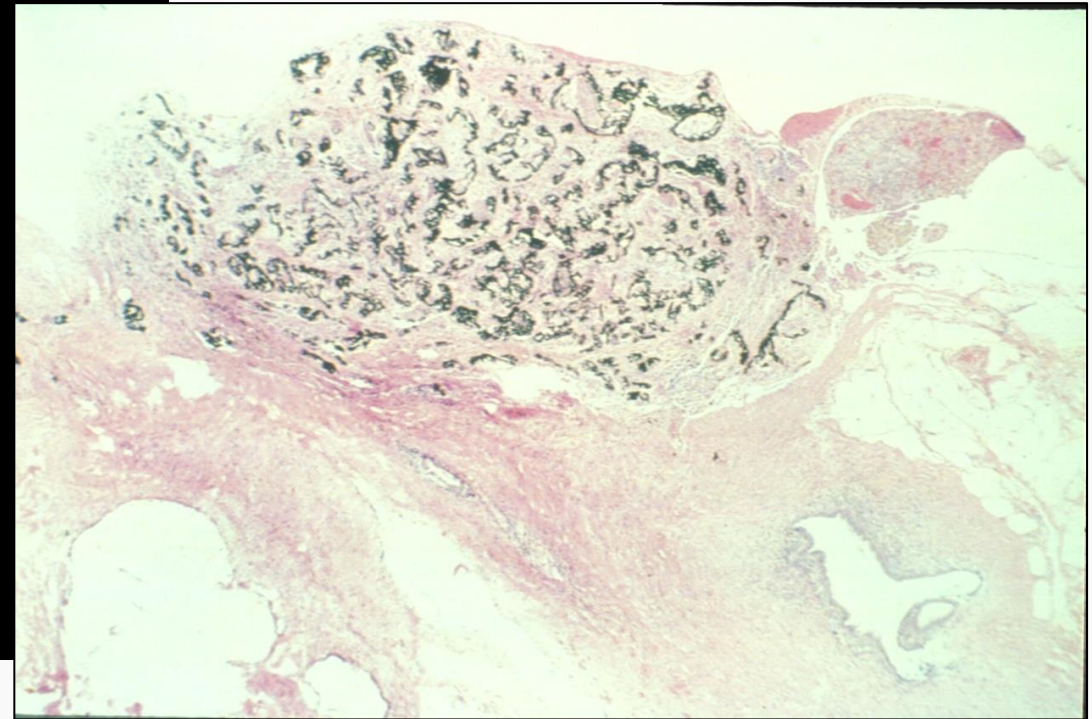
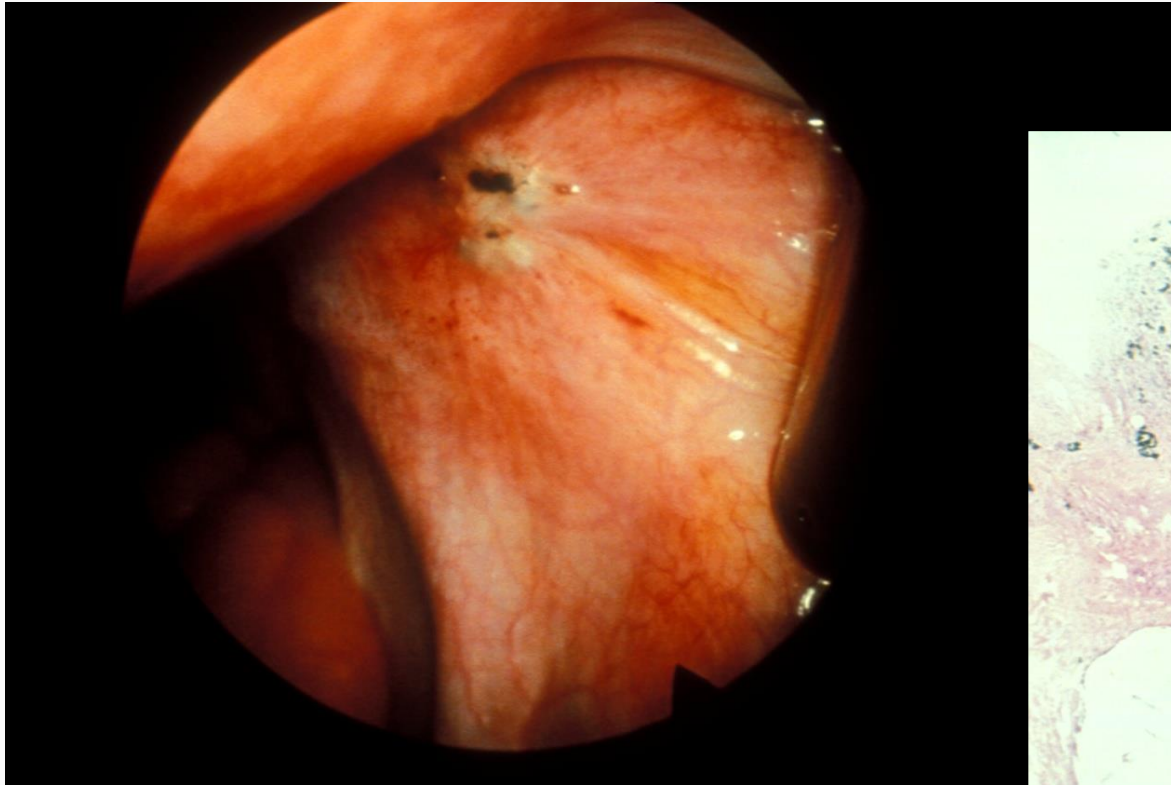


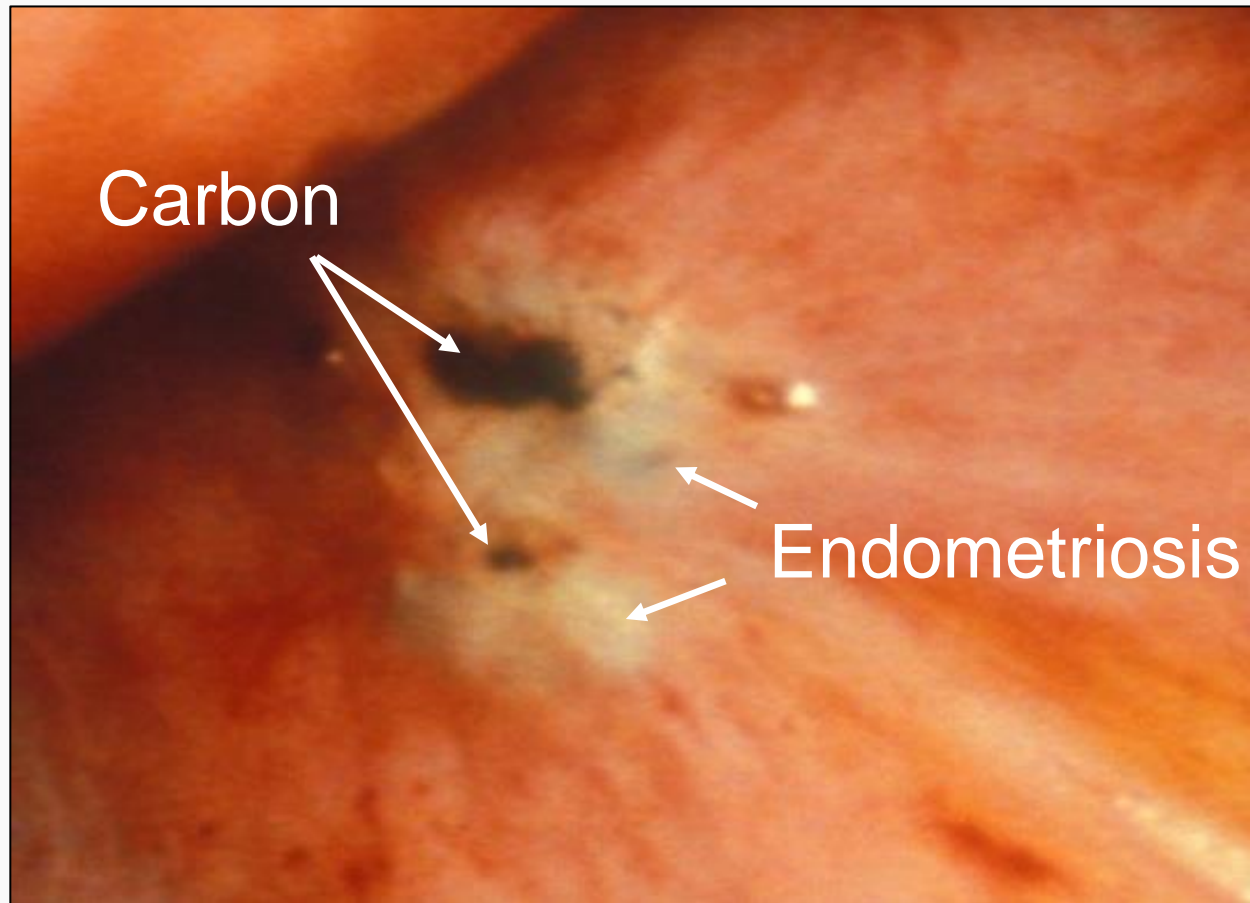
# Laser Vaporization



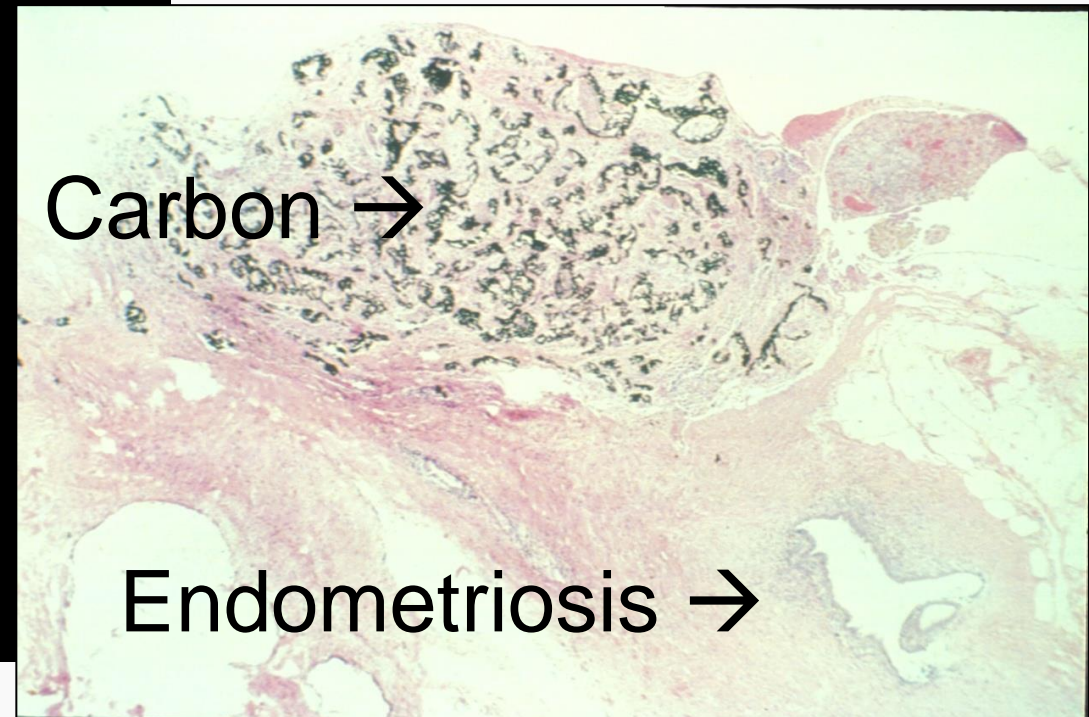
# Charcoal Briquette

# Laser Vaporization



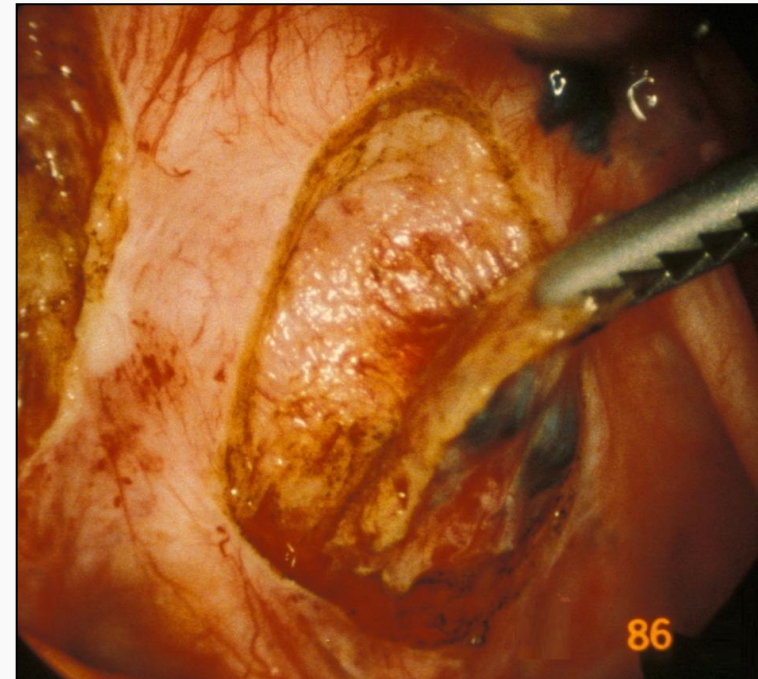
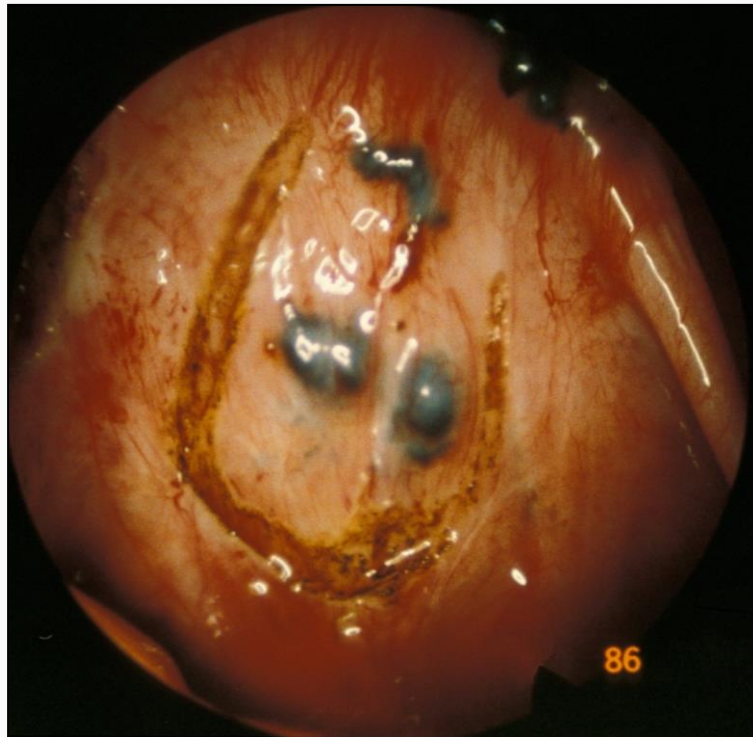


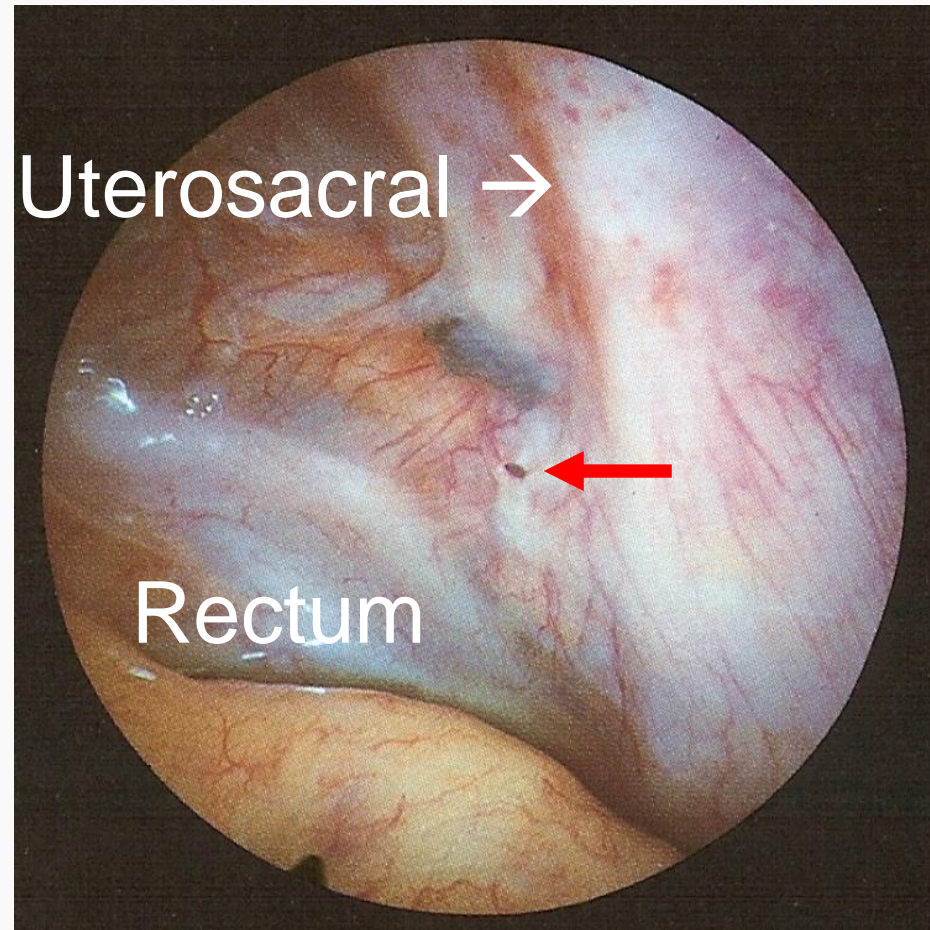
# Laser Vaporization



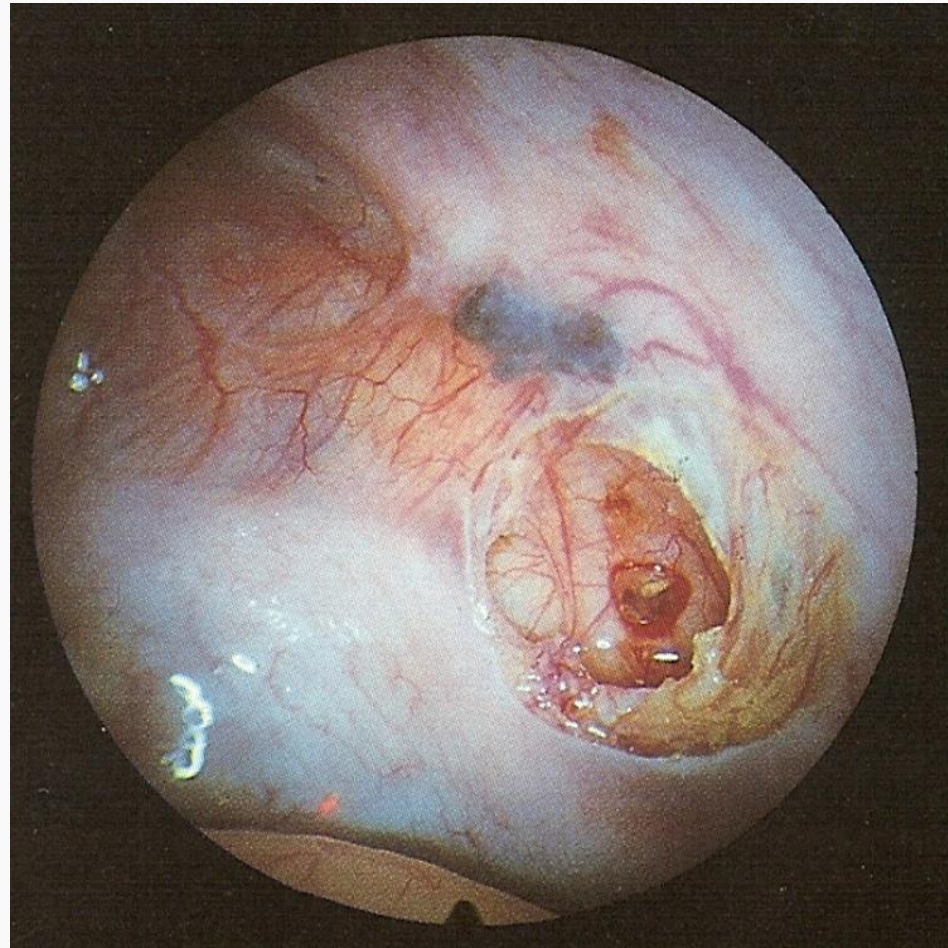
# Excision

# CO2 Laser as a Hot Knife

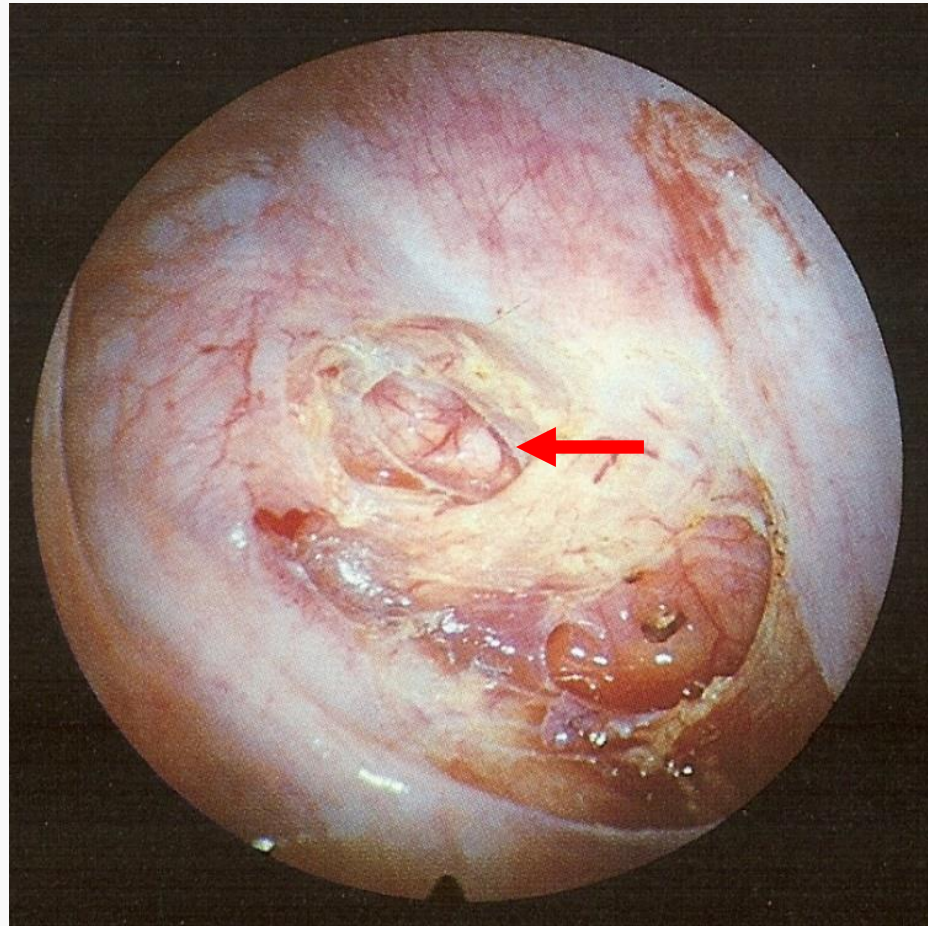




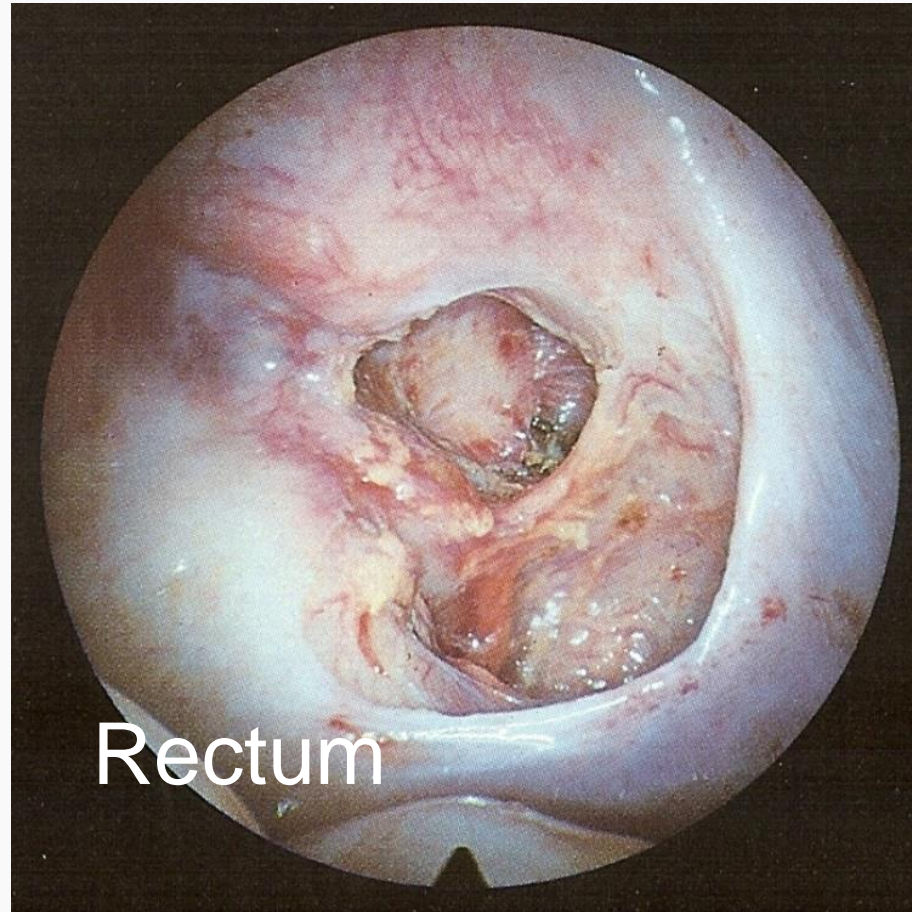
Martin DC, Rock JA. Laparoscopic excision of infiltrating pelvic endometriosis. OB-GYN Illustrated: LTI Medica (Upjohn) 1992



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Rectum

# Tender Nodules

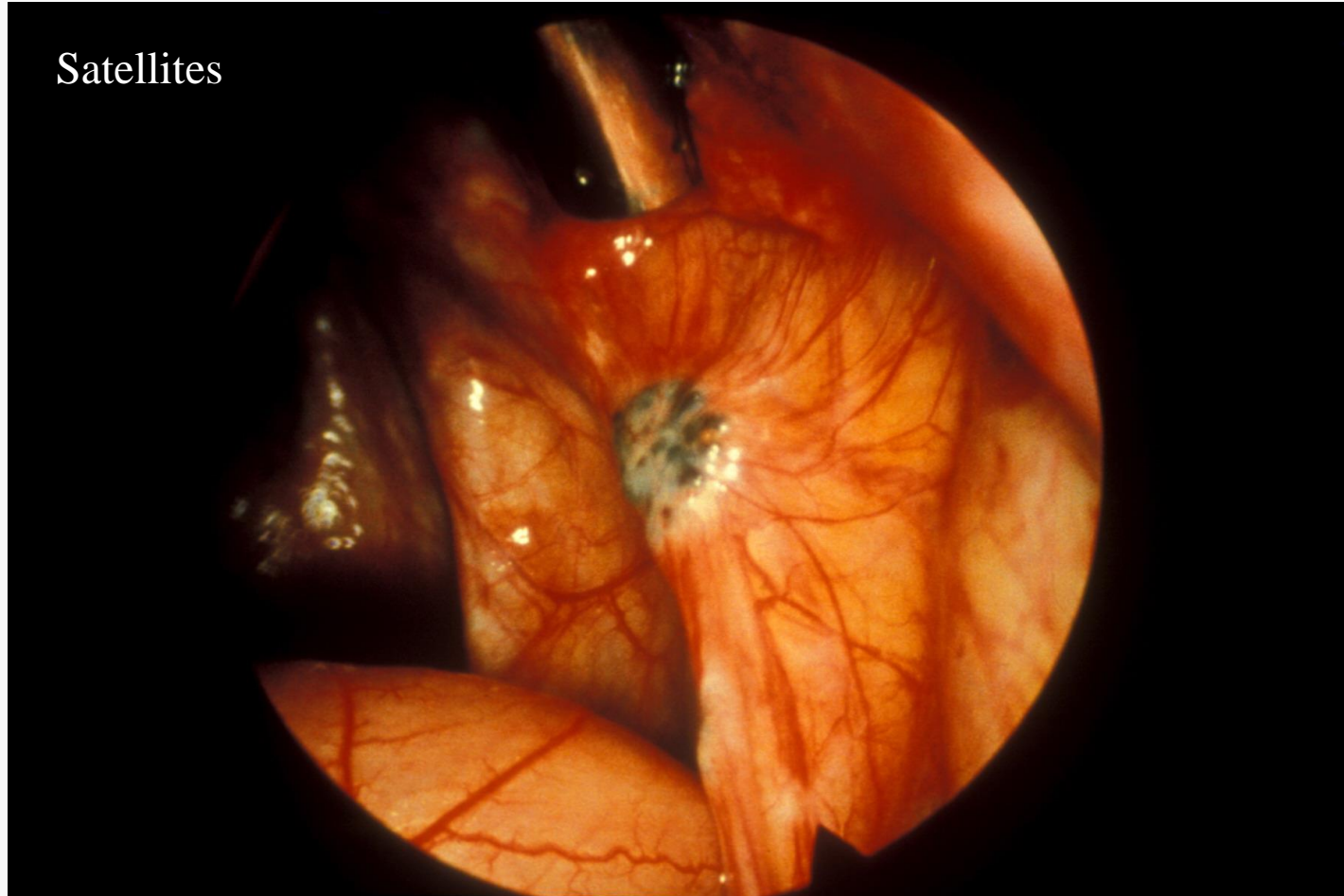
# Tender Nodules Respond to Surgery

- Correlation
- Patients who had temporary colostomies were appreciative when they had pain relief.



**Satellites**

Satellites

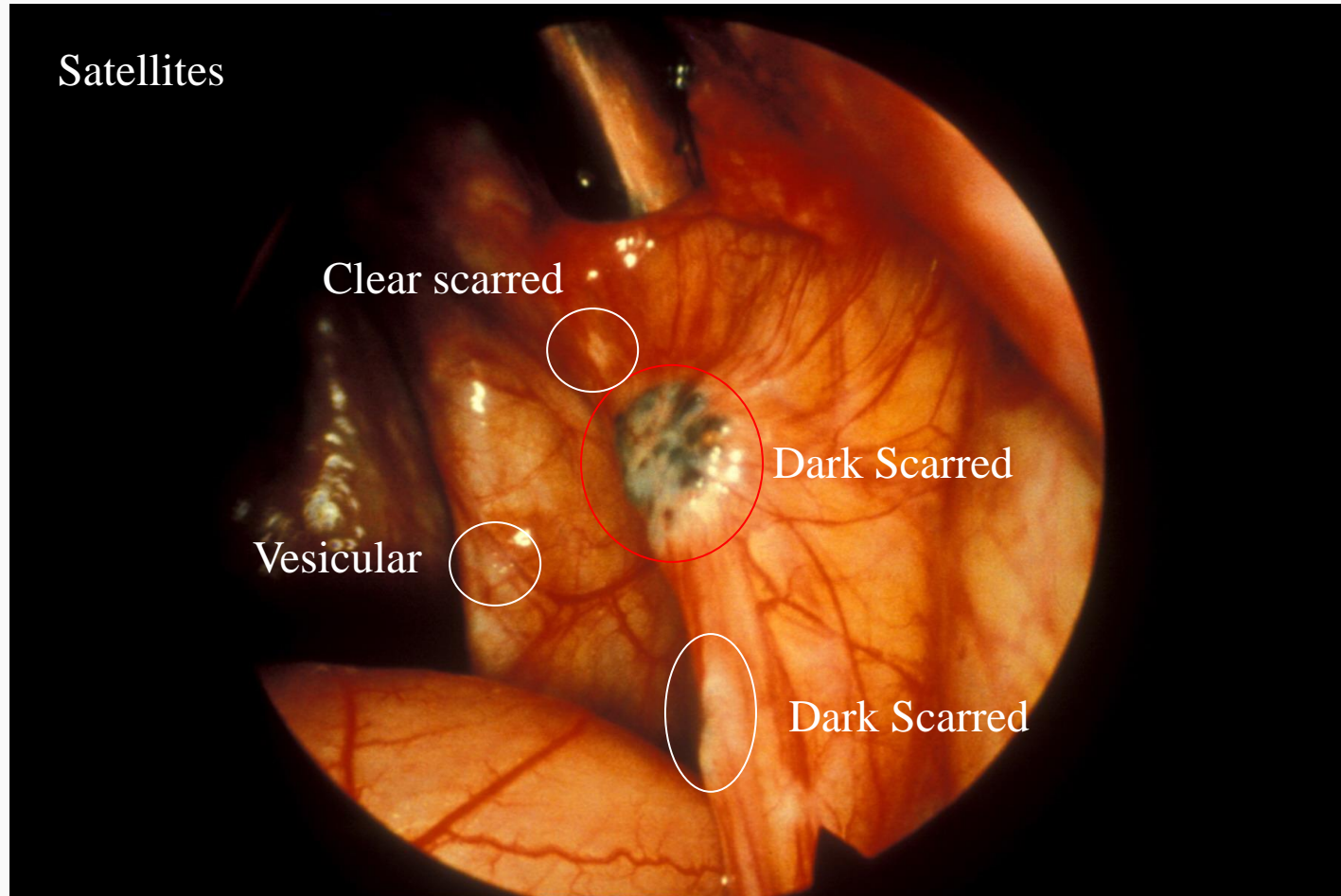


1

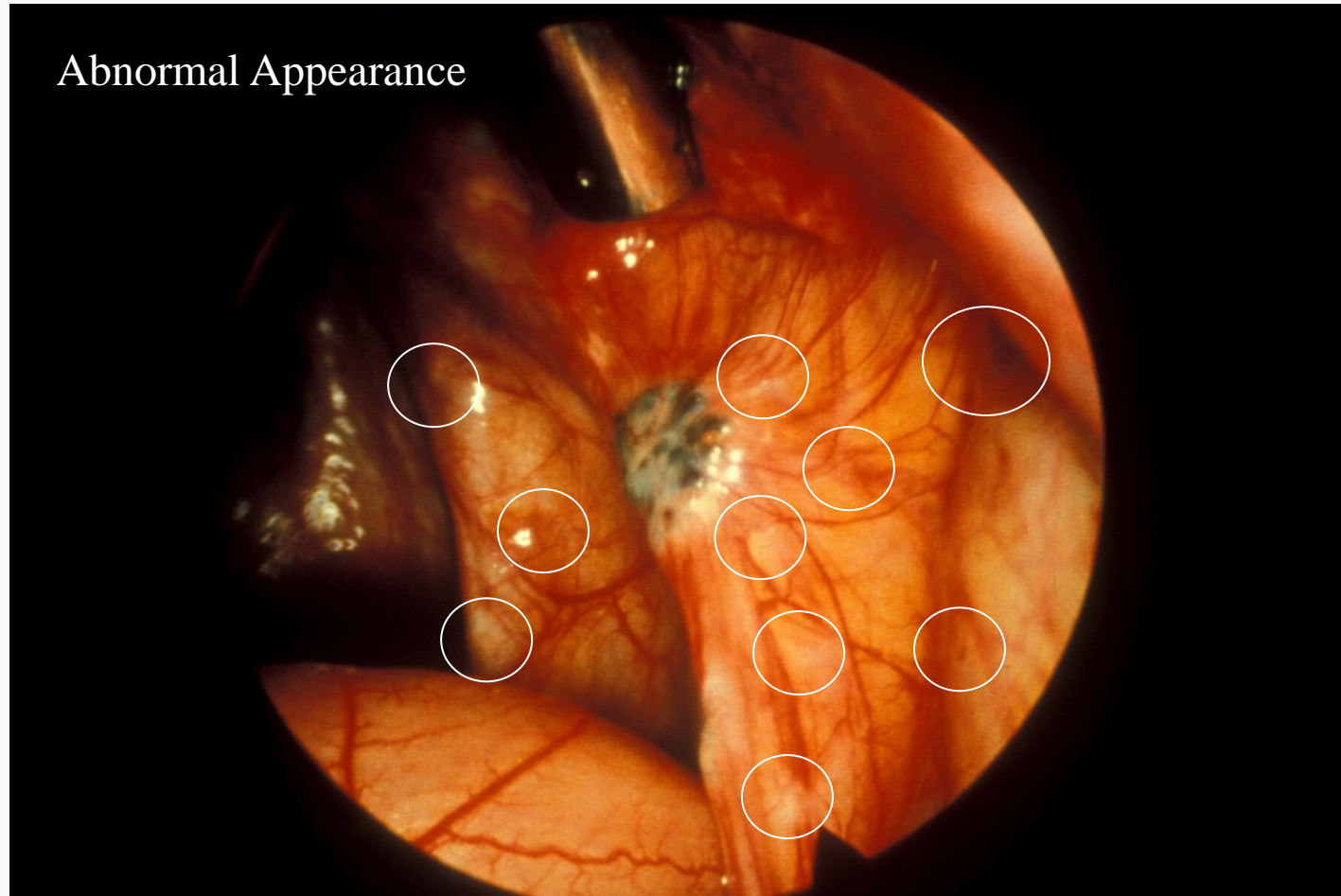
2

3

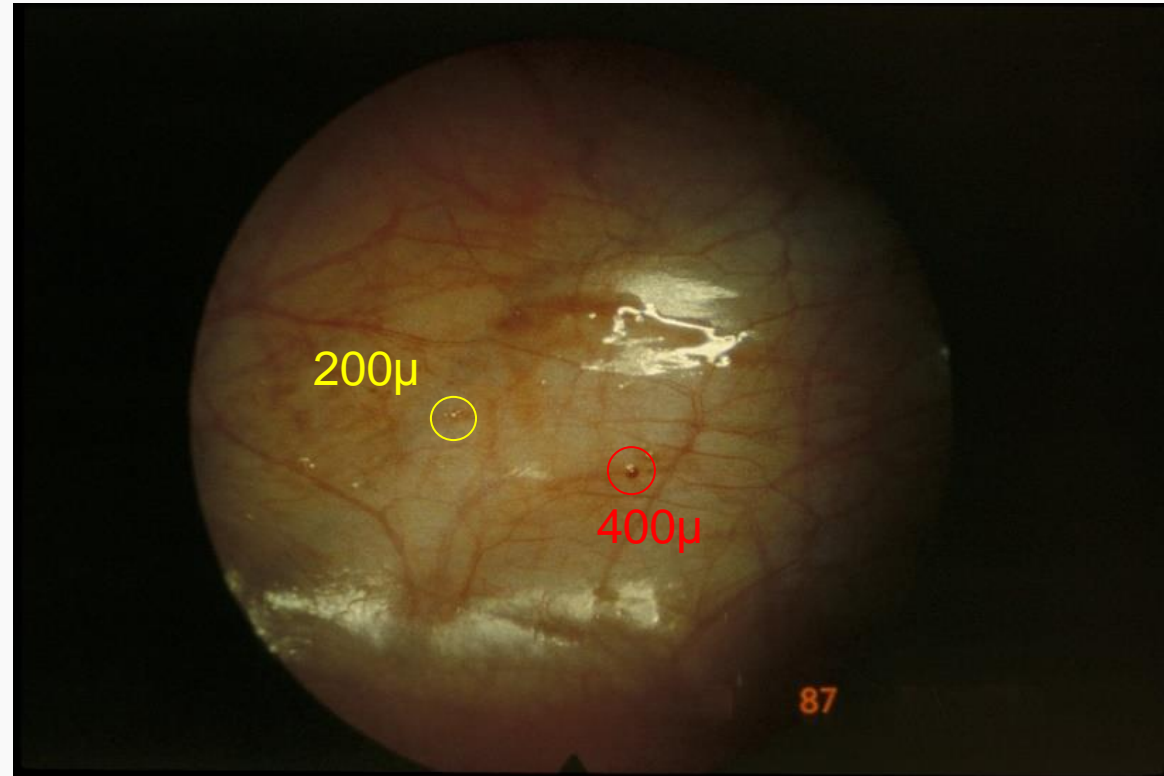
4+



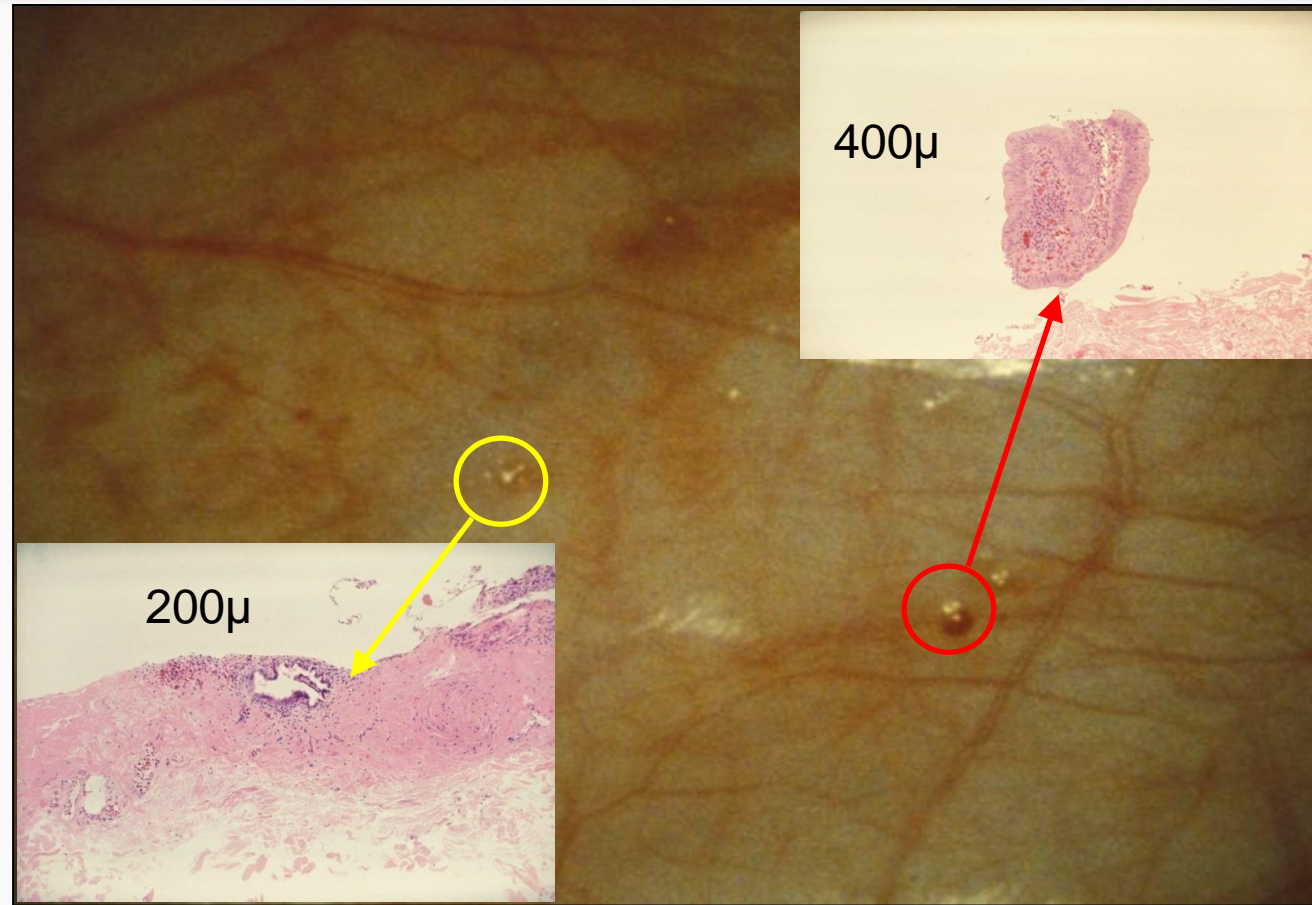
## Abnormal Appearance



# Teenage Endometriosis

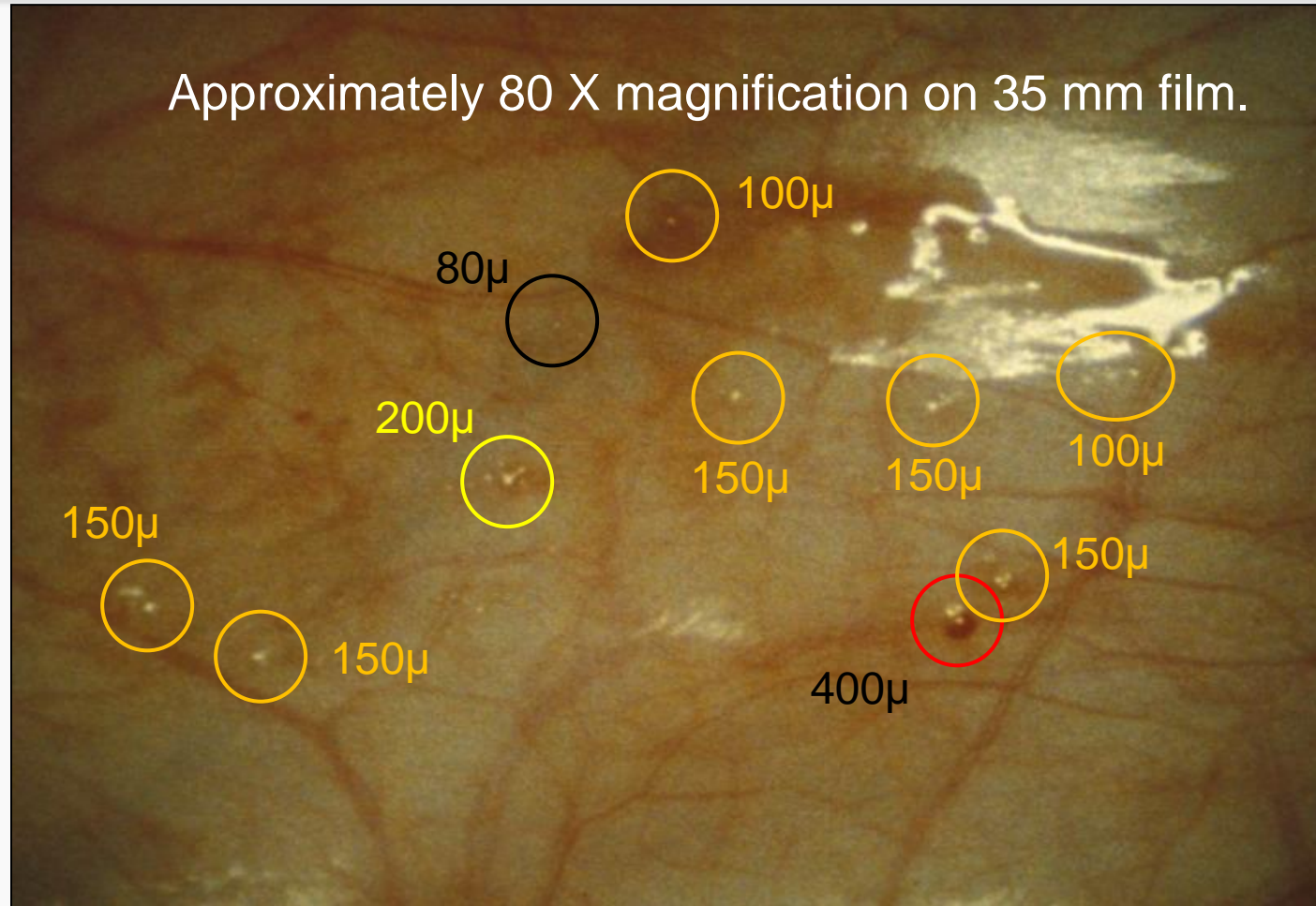


# Teenage Endometriosis



Martin DC. <https://www.danmartinmd.com/files/lae1988.pdf>

# Teenage Endometriosis



# Non-visualized

## Rectosigmoid resections

- 100% nonvisualized 0.1 mm to 10 mm
- Up to 5 cm from recognized nodule

*Badescu et al. Fertil Steril. 2016, 105(2):430-4.e26*

- 25% with nonvisualized but palpable 2 mm to 10 mm
- 14% were past the planned stapler line up to 6 cm

*Roman et al. Hum Reprod. 2021, 36(3):656-665*

## Repeat Surgery with Positive Margins

- Any surgery 1% - 16%
- Bowel repeat 1% - 4%

*Roman et al. Hum Reprod. 2021, 36(3):656-665*

*Nirgianakis et al. Acta Obstet Gynecol Scand 2014, 93: 1262-1267*

# Adequate Margins

## ➤ *“whatever surgical margins might typically be chosen”*

*Redwine and Hopton. Bowel invisible microscopic endometriosis: Leave it alone.*

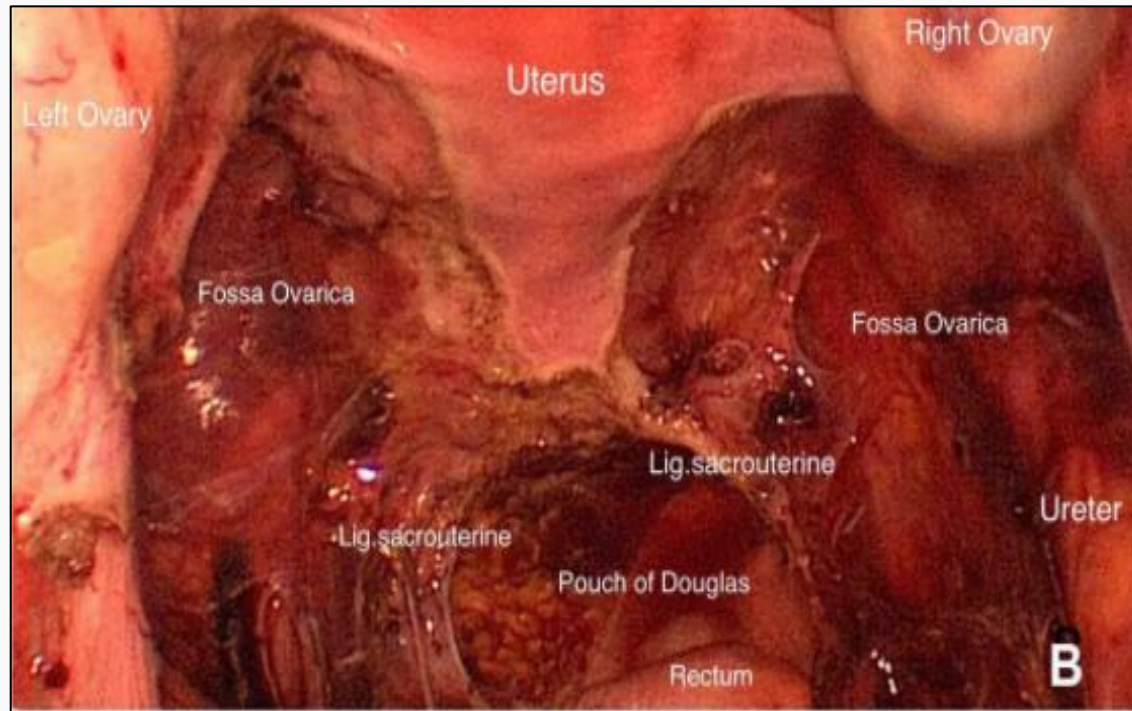
*J Minim Invasive Gynecol. 2018, 25(3):352-355*

## ➤ *Non-visualized palpable lesions at 6-cm*

*Roman et al. Nonvisualized palpable bowel endometriotic satellites.*

*Hum Reprod. 2021, 36(3):656-665*

# Peritonectomy / Peritoneal Stripping



# Limiting Resection

Wattiez limits “*the resection to that part of the bowel containing the nodule*”

# Laparotomy

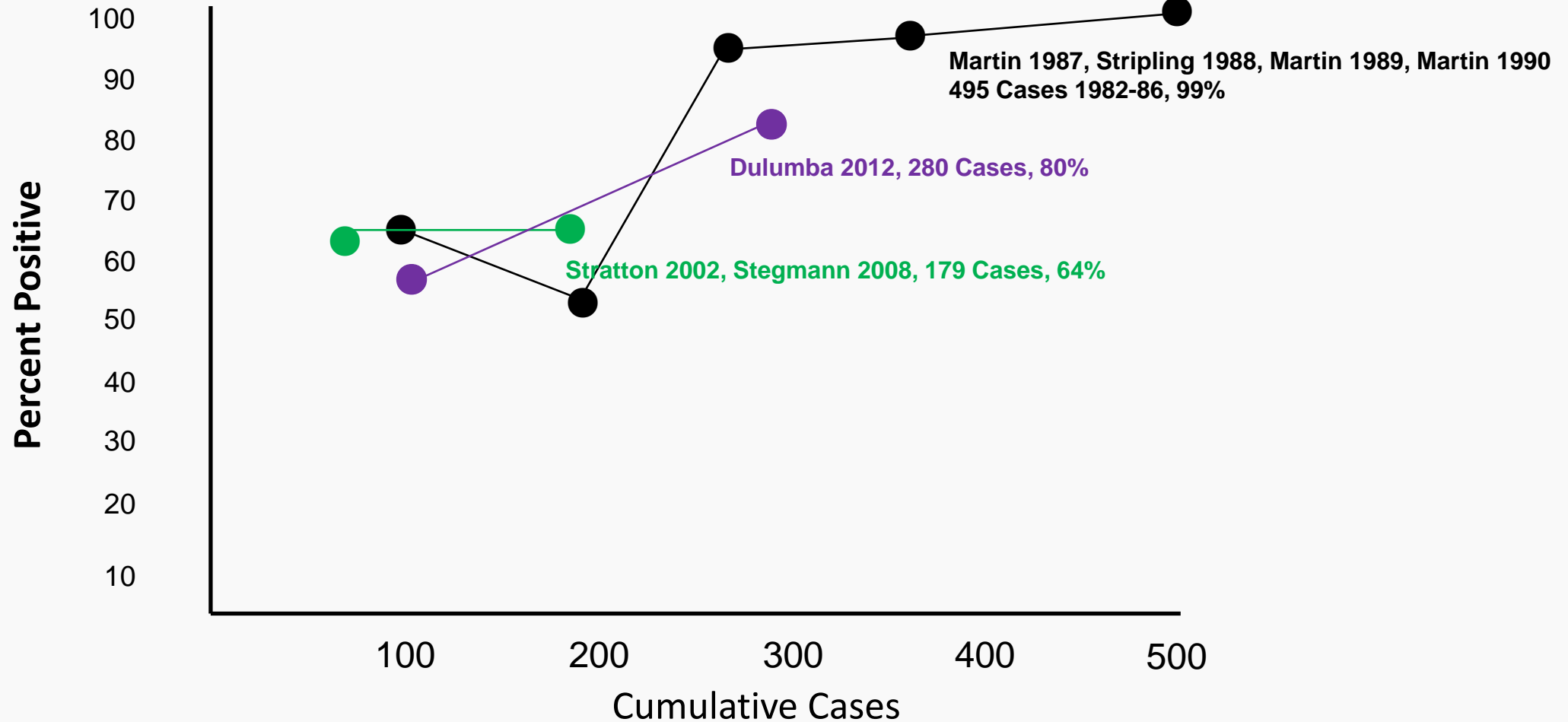
When is wide resection indicated?

When is laparotomy indicated for palpation?

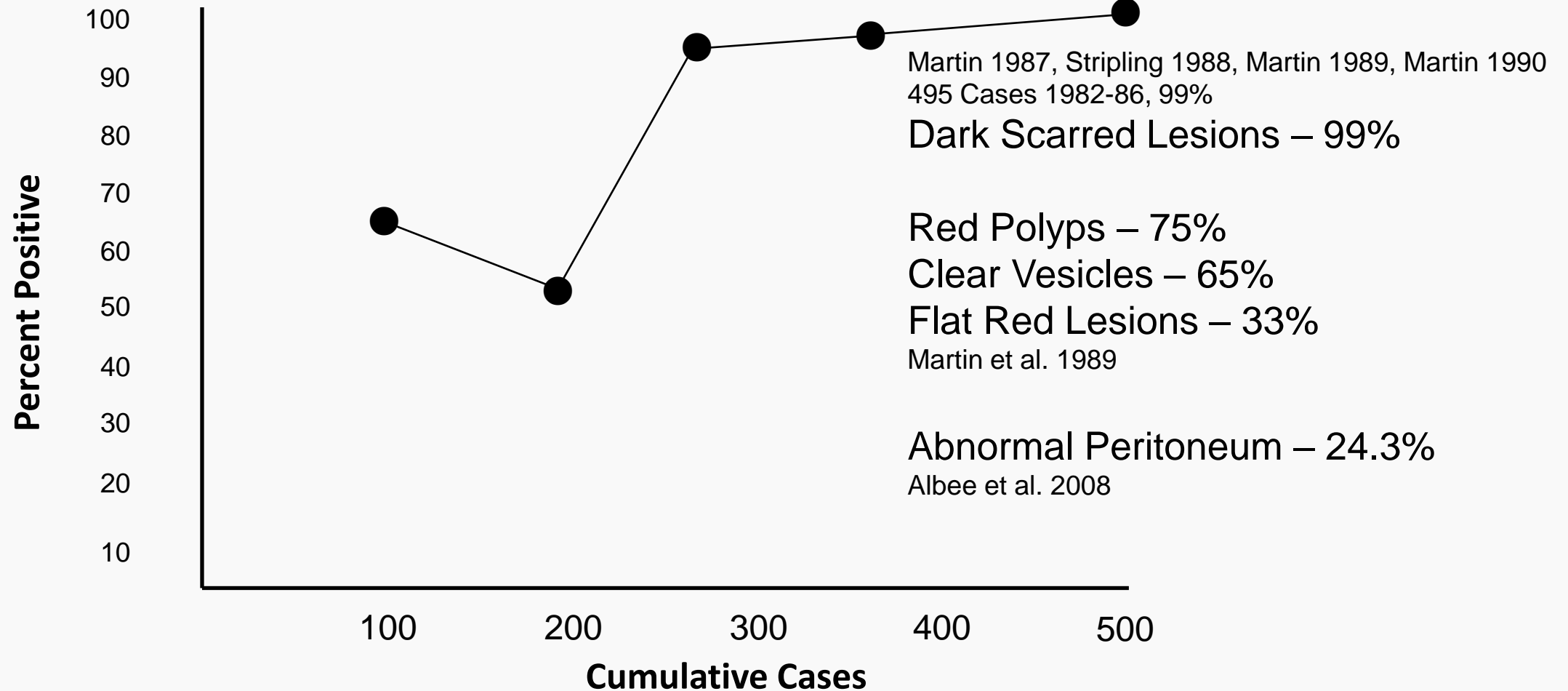


**Diagnosis**

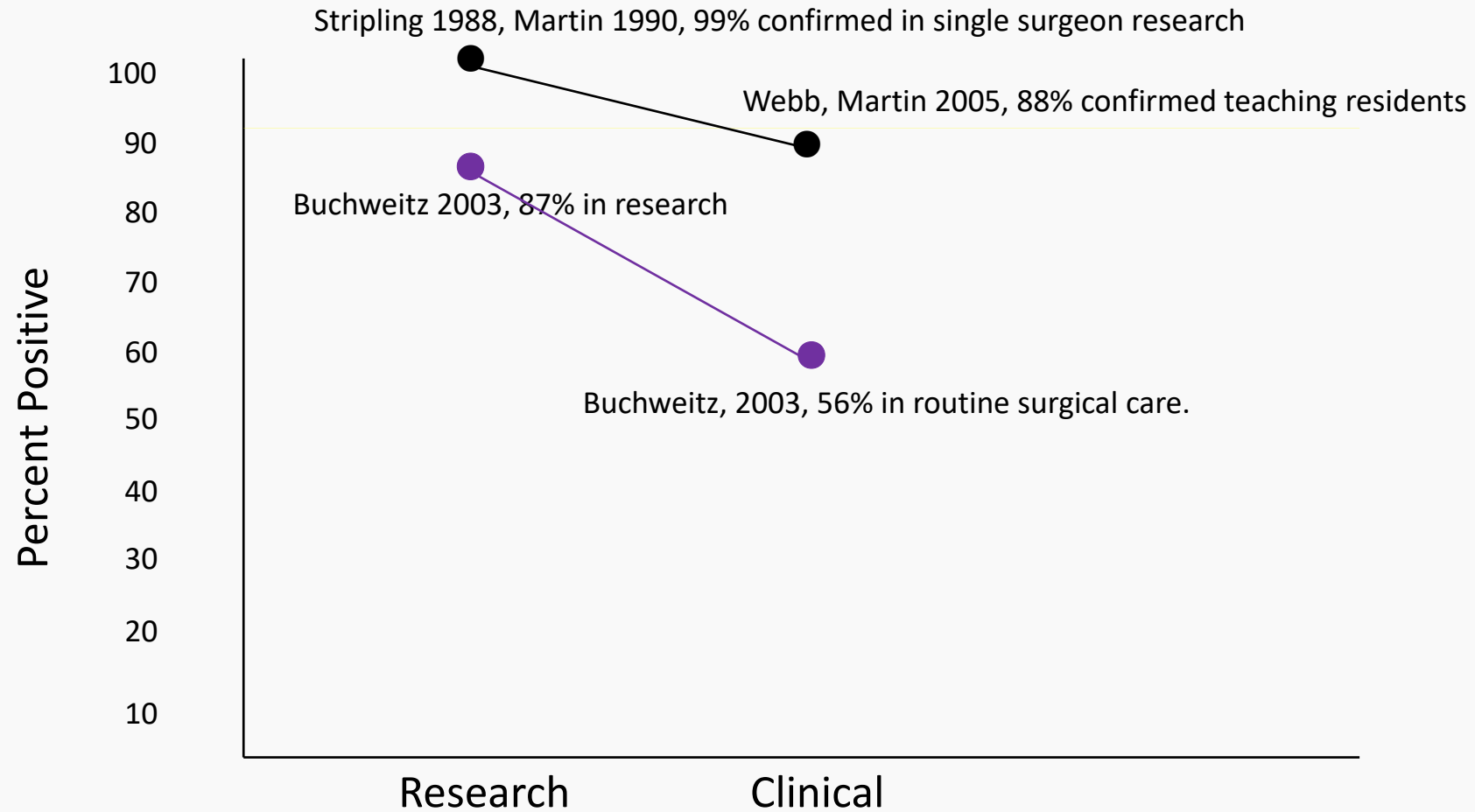
# Research Confirmation – Case Intervals



# Research Confirmation – Case Intervals



# Research versus Clinical Confirmation



# Research Confirmation 1982-86

*My work began as clinical use, changed to laser research, then cancer surveillance, and finally endometriosis confirmation. The protocol changed intermittently.*

*STARD was not a concern until 2002. The items in red are incompatible with STARD.*

- *Coagulation was accepted until 1981*
- *My expectation of appearance changed between 1982 and 1984.  
My descriptive types increased from one in 1982 to 20 in 1987.  
ASRM increased from one to eight (three groups) in 1997.  
Albee needed one (not normal) in 2008 (JMIG 15:32–37, 2008)*
- *Excisional techniques changed to 5000+ w/cm<sup>2</sup> CO<sub>2</sub> LASER cutting by 1986.  
Compare with 800 w/cm<sup>2</sup> for conization and 60,000 w/cm<sup>2</sup> in research (Taylor 1986, Luciano 1989)*
- *Additional punctures and equipment were needed for additional control.*
- *Signal to noise ratio*
- *Tagging the specimen location*
- *Notations on pathology request*
- *Cell block were used for small specimens*
- *Processing was sometimes done by the surgeon*
- *Communicated with the cutters on occasional cases*
- *Communicated with the pathologist on occasional cases*
- *Re-cutting specimens for non-specific findings e.g., stroma only*
- *Changed to requirement of histologic description compatible with surgical findings. “No evidence of endometriosis” is unacceptable.*
- *Reviewing slides in confusing cases*

# Confirmation at a Research Level

- The protocol needs to be standardized to be compatible with STARD.  
*The protocol items in red below are not compatible with STARD*
- Surgeon experience clarified
- No expectation of appearance (any abnormality needs histology)  
“Absence of Normal Appearance” vs. “Appearance of Endometriosis”
- Biopsy/excision techniques (micro-scissors, trim large specimens, micro-point monopolar electro-surgery, or 5000+ w/cm<sup>2</sup> CO<sub>2</sub> laser)
- Additional punctures and equipment for additional control
- Adequate number of biopsies
- Signal to noise ratio (trim specimens)
- Tag the specimen location on large specimens
- Mark the specimen side
- Clear notations on the pathology request (i.e., 1 mm lesion, 19+ from 1986, other?)
- Uniform specimen size in container
- Cell block
- Transferring the specimen to container and then to cassette
- *Processing by the surgeon*
- *Non-protocol communications with the cutters*
- *Non-protocol communications with the pathologist*
- Re-cutting specimens
- Require a histology description compatible with surgical findings.  
A 1 mm lesion requires histology compatible with a 1 mm lesion.  
“No evidence of endometriosis” is unacceptable.
- Histologic criteria (Batt 1989)
- Infectious disease cultures, NNA, DDA, titers, etc. in pain studies
- Routine or selective iron stains (hemosiderin, other iron forms and steroid pigment)
- Routine or selective trichrome staining for collagen and muscle
- Routine or selective histochemical stains (CD10, Ber-EP4, Ki-67, CD34...)
- *Review of slides by the surgeon*

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- *Review of slides by the surgeon*

**There is no documentation  
that this is useful in a  
clinical setting.**

# \$200 Reward

Biopsies and histology are useful in ruling out other pathology.

The \$200 reward is for a citation to an article that documents a difference in clinical outcomes for endometriosis treatment based on histologically positive and histologically negative endometriosis.

This reward has been online since a \$100 reward was posted in 2007.

<https://www.danmartinmd.com/reward2007.html>

**Conclusion**

# Conclusions

- Long-term data on observation of asymptomatic endometriomas
- Laparotomy
- Primary care data
- Recognition
  - Microscopic
  - Visual at laparoscopy – 200 $\mu$
  - Palpable at laparotomy – 2 mm
  - Imaging – 10 mm

**Thank you!**



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[www.danmartinmd.com/2021.html](http://www.danmartinmd.com/2021.html)