Ultrasound in endometriosis

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Background

- 5% - 60% of women of reproductive age:
  - Asymptomatic - 2 to 50%
  - Dysmenorrhea – 40 - 60%
  - Subfertility - 20 to 30%
- Functional endometrial glands and stroma in sites outside the uterine cavity
- Diagnosis may be delayed by up to 8 years

Pathogenesis

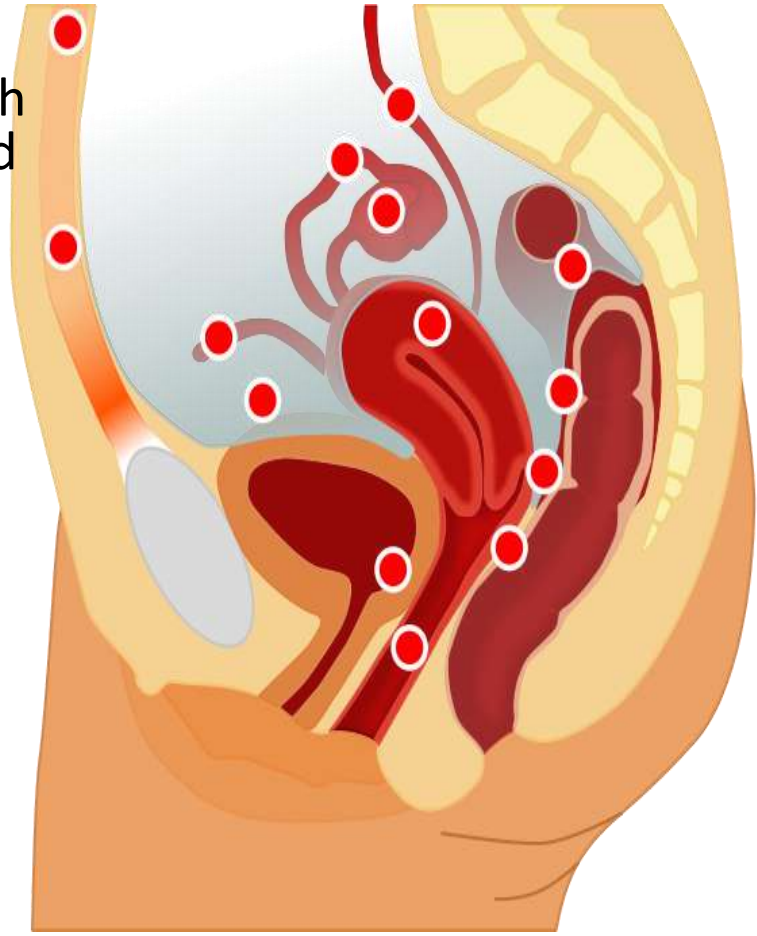
- Retrograde menstruation
- Implantation on peritoneal surfaces
- Inflammatory response
- Angiogenesis, adhesions, fibrosis, scarring, neuronel infiltration
- Anatomic distortion
- Pain and infertility

Risk factors

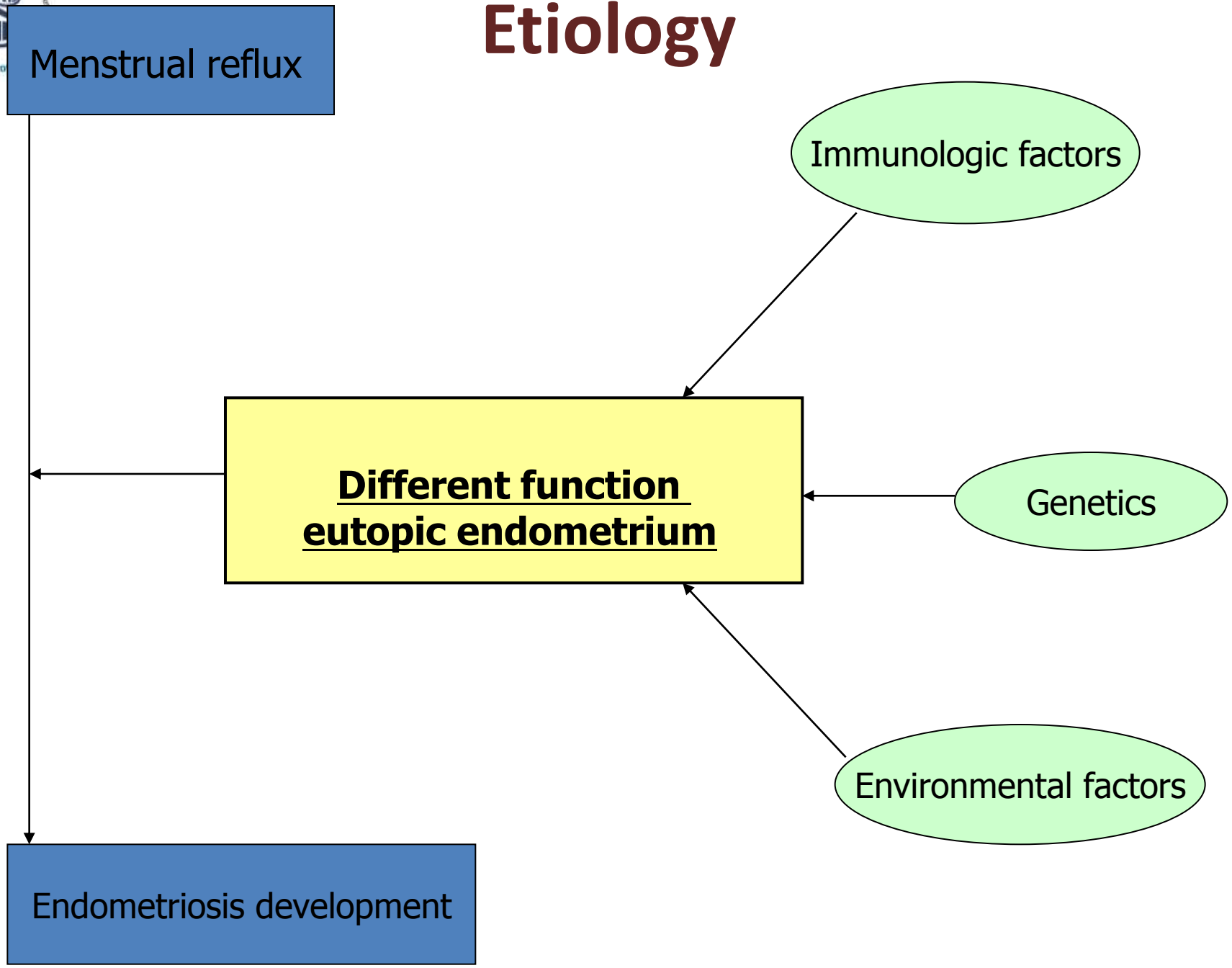
- Obstruction of menstrual outflow (mullerian anomalies)
- DES exposure
- Prolonged exposure to endogenous estrogen (early menarche, late menopause, or obesity)
- Short menstrual cycles
- Low birth weight
- Exposure to endocrine-disrupting chemicals
- Genetic component
- Consumption of red meat and trans fat

Theories of pathogenesis

- Retrograde menstruation (*Sampson's Theory*)
  - Endometrial fragments transported through fallopian tubes at time of menstruation and implanted at intraabdominal sites
- Müllerian (Coelomic) metapalasia (*Meyer's Theory*)
  - Metaplastic transformation of pelvic peritoneum during embryonal organogenesis
- Lymphatic spread (*Halban's Theory*)
  - Substances released/shed from endometrium induce formation of endometriosis



Etiology

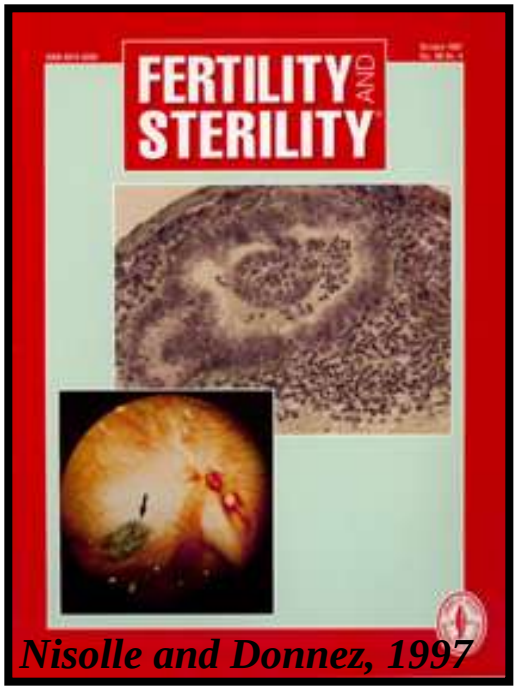

Menstrual reflux
Immunologic factors
Different function eutopic endometrium
Genetics
Environmental factors
Endometriosis development

Etiology

- Peritoneal endometriosis – retrograde menstruation
- Ovarian endometriosis – coelomic metaplasia
- Rectovaginal septum – mullerian remnants

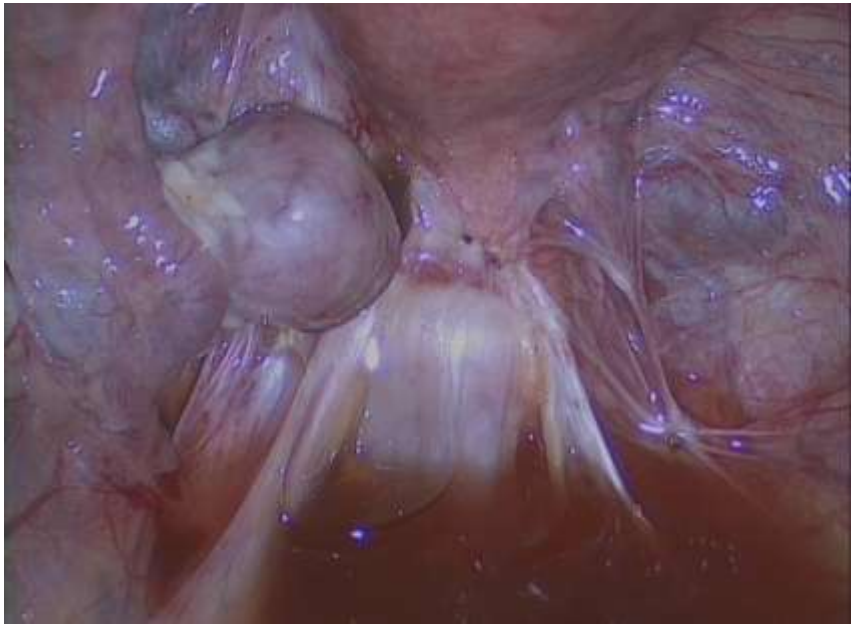
are

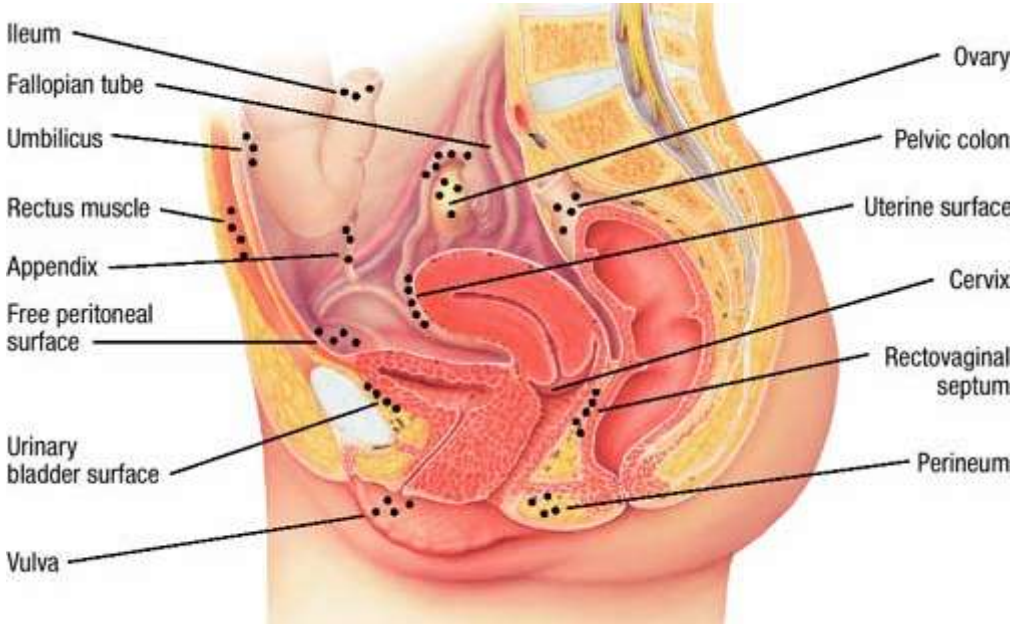
3 DIFFERENT ENTITIES



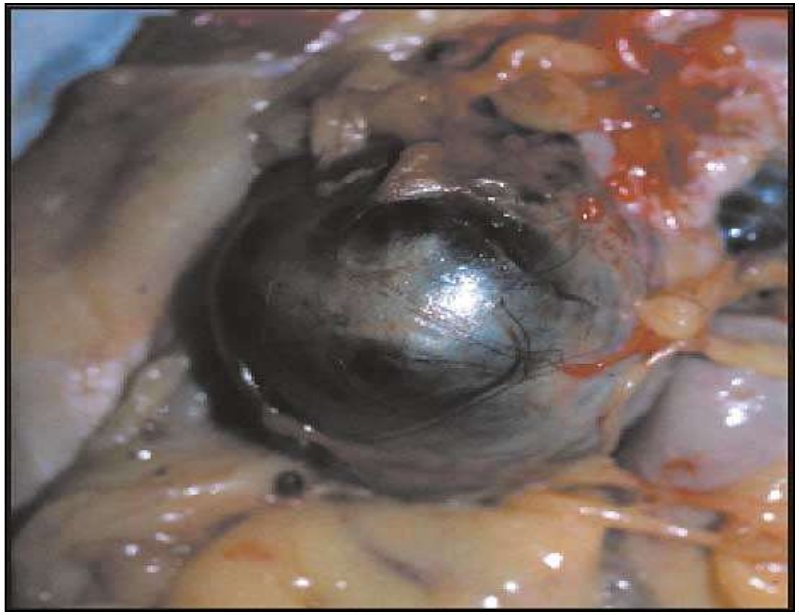
Nisolle and Donnez, 1997

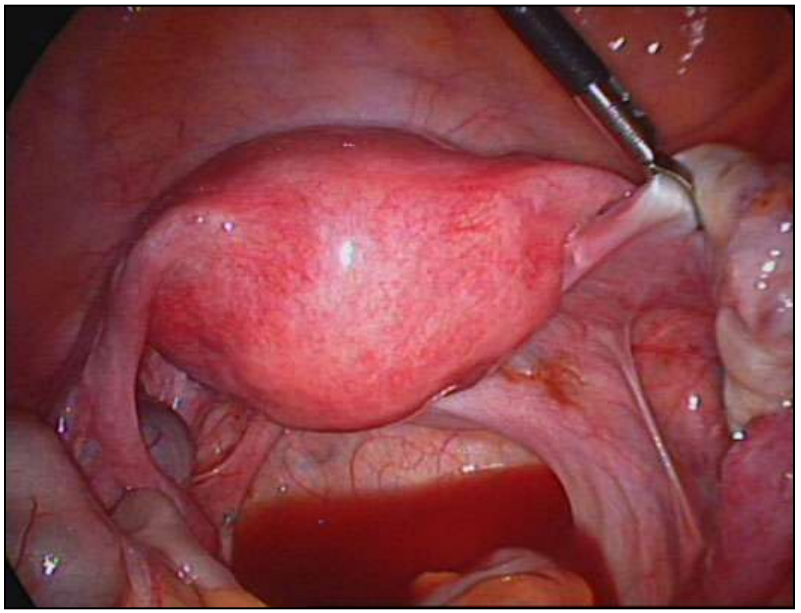
Disease locations

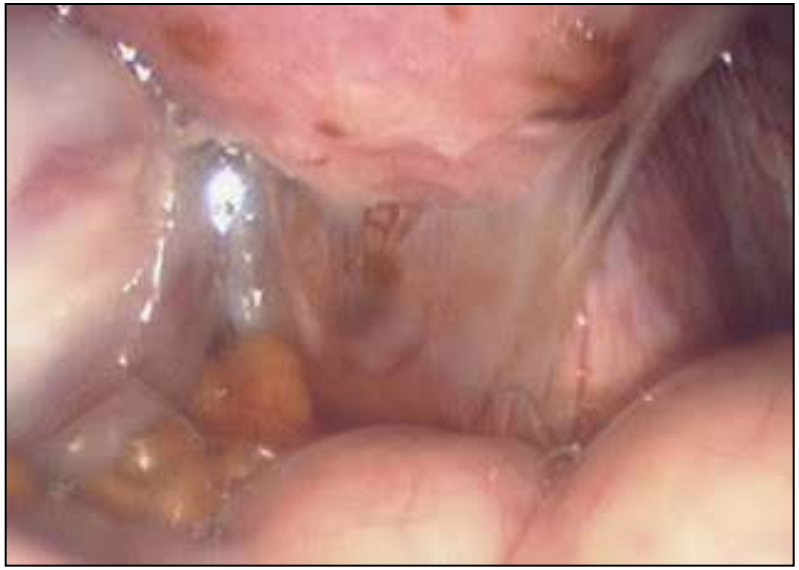


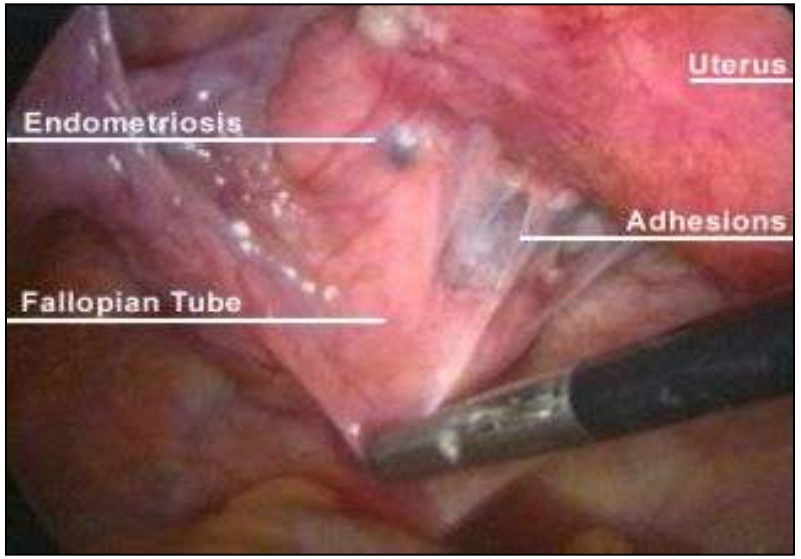


Surgical findings

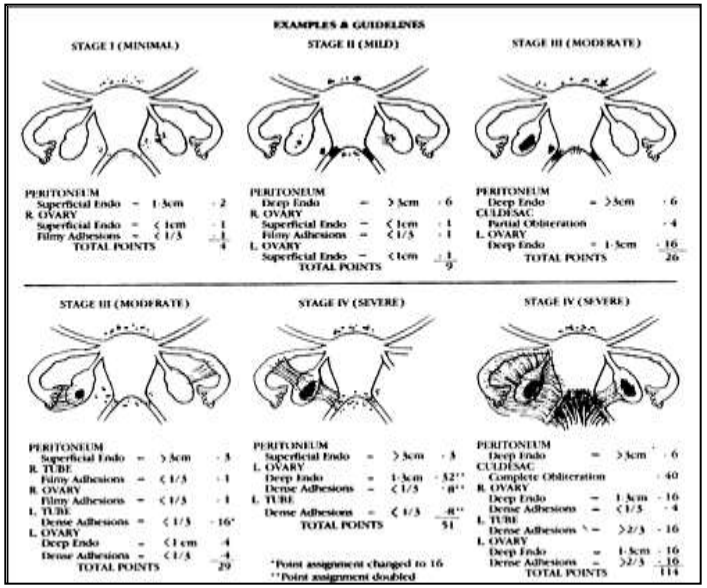








Staging (AFS)



EXAMPLES & GUIDELINES

STAGE I (MINIMAL)

PERITONEUM
Superficial Endo – 1-3cm · 2
R. OVARY
Superficial Endo – <1cm · 1
Filmy Adhesions – <1/3 · 1
TOTAL POINTS 4

STAGE II (MILD)

PERITONEUM
Deep Endo – >3cm · 6
R. OVARY
Superficial Endo – <1cm · 1
Filmy Adhesions – <1/3 · 1
L. OVARY
Superficial Endo – <1cm · 1
TOTAL POINTS 9

STAGE III (MODERATE)

PERITONEUM
Deep Endo – >3cm · 6
CULDESAC
Partial Obliteration · 4
L. OVARY
Deep Endo – 1-3cm · 16
TOTAL POINTS 26

STAGE III (MODERATE)

PERITONEUM
Superficial Endo – >3cm · 3
R. TUBE
Filmy Adhesions – <1/3 · 1
R. OVARY
Filmy Adhesions – <1/3 · 1
L. TUBE
Dense Adhesions – <1/3 · 16*
L. OVARY
Deep Endo – <1cm · 4
Dense Adhesions – <1/3 · 4
TOTAL POINTS 29

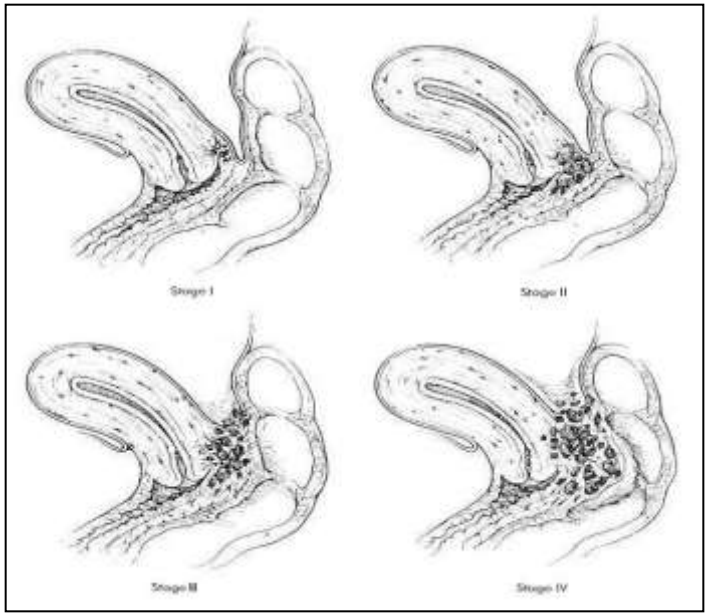
STAGE IV (SEVERE)

PERITONEUM
Superficial Endo – >3cm · 3
L. OVARY
Deep Endo – 1-3cm · 32**
Dense Adhesions – <1/3 · 8**
L. TUBE
Dense Adhesions – <1/3 · 8**
TOTAL POINTS 51

*Point assignment changed to 16
**Point assignment doubled

STAGE IV (SEVERE)

PERITONEUM
Deep Endo – >3cm · 6
CULDESAC
Complete Obliteration · 40
R. OVARY
Deep Endo – 1-3cm · 16
Dense Adhesions – <1/3 · 4
L. TUBE
Dense Adhesions – >2/3 · 16
L. OVARY
Deep Endo – 1-3cm · 16
Dense Adhesions – >2/3 · 16
TOTAL POINTS 114



AMERICAN SOCIETY FOR REPRODUCTIVE MEDICINE
REVISED CLASSIFICATION OF ENDOMETRIOSIS

Patient's Name _____ Date _____

Stage I (Minimal) - 1-5
Stage II (Mild) - 6-15
Stage III (Moderate) - 16-40
Stage IV (Severe) - >40
Total _____

Laparoscopy _____ Laparotomy _____ Photography _____
Recommended Treatment _____
Prognosis _____

	ENDOMETRIOSIS	<1cm	1-3cm	>3cm
PERITONEUM	Superficial	1	2	4
	Deep	2	4	6
OVARY	R Superficial	1	2	4
	Deep	4	16	20
	L Superficial	1	2	4
	Deep	4	16	20

	POSTERIOR CULDESAC OBLITERATION	Partial	Complete
		4	40

	ADHESIONS	<1/3 Enclosure	1/3-2/3 Enclosure	>2/3 Enclosure
OVARY	R Filmy	1	2	4
	Dense	4	8	16
	L Filmy	1	2	4
	Dense	4	8	16
TUBE	R Filmy	1	2	4
	Dense	4*	8*	16
	L Filmy	1	2	4
	Dense	4*	8*	16

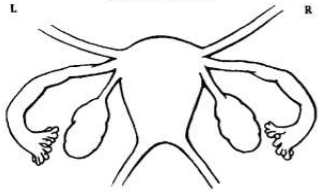
*If the fimbriated end of the fallopian tube is completely enclosed, change the point assignment to 16.

Denote appearance of superficial implant types as red [(R), red, red-pink, flamelike, vesicular blobs, clear vesicles], white [(W), opacifications, peritoneal defects, yellow-brown], or black [(B) black, hemosiderin deposits, blue]. Denote percent of total described as R___%, W___% and B___%. Total should equal 100%.

Additional Endometriosis: _____

Associated Pathology: _____

To Be Used with Normal Tubes and Ovaries

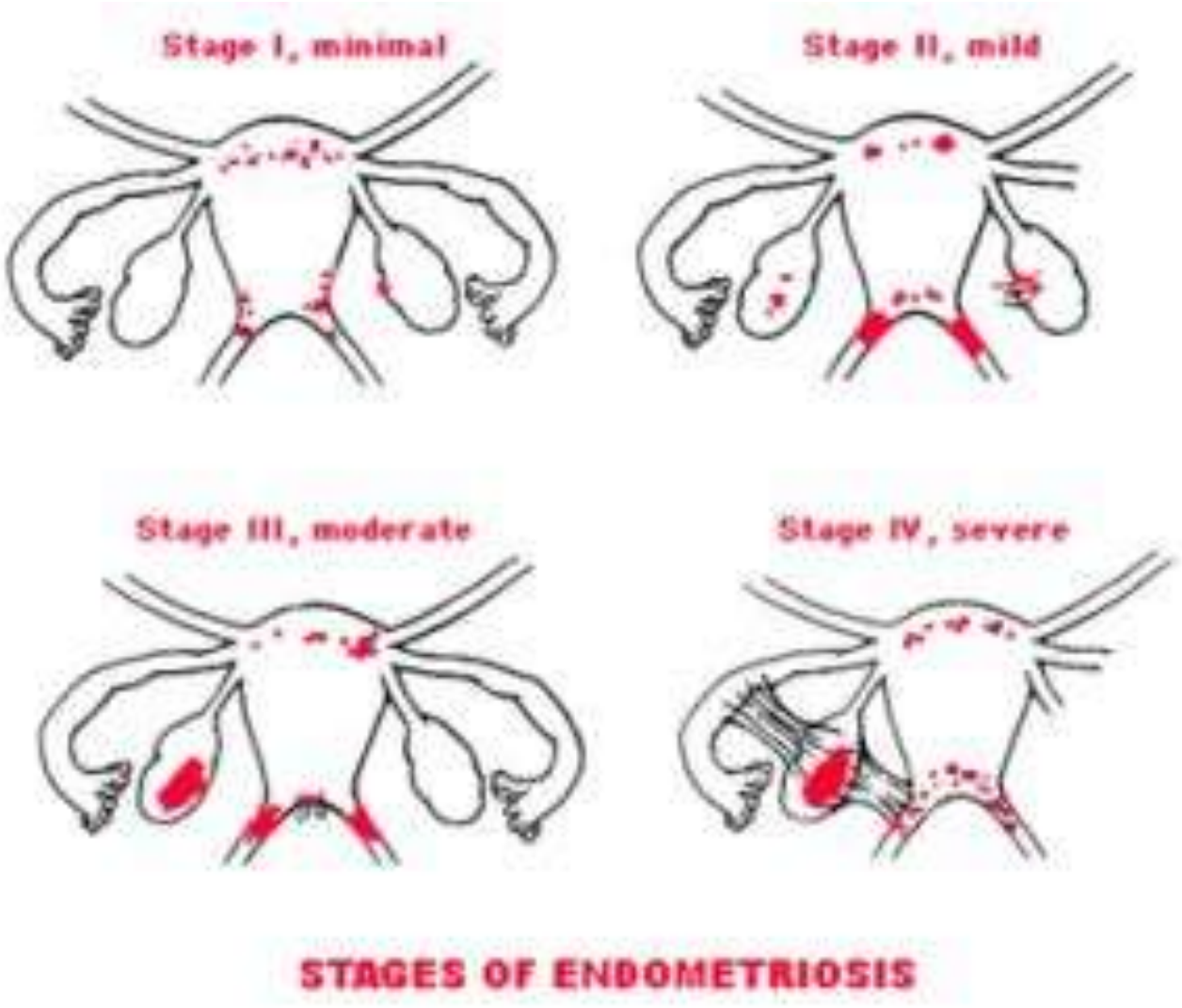


To Be Used with Abnormal Tubes and/or Ovaries

Vol. 67, No. 5, May 1997 **American Society for Reproductive Medicine** *Revised ASRM classification: 1996*

Source: Schorge JO, Schaffer JI, Halvorson LM, Hoffman BL, Bradshaw KD, Cunningham FG: *Williams Gynecology*: http://www.accessmedicine.com

Stages of pelvic disease



Imaging and endometriosis

- Transvaginal ultrasonography
- Magnetic Resonance Imaging
- Rectal endoscopic ultrasound
- Helicoidal CT scan
- Rectosigmoidoscopy
- Barium enema (double contrast)

- Principles:
  - Make the most accurate pre operative diagnosis:
    - Keep number of additional investigations to minimum
    - Place emphasis on least costly, least invasive if comparably efficient (Chapron 2004)

Current status of US diagnosis

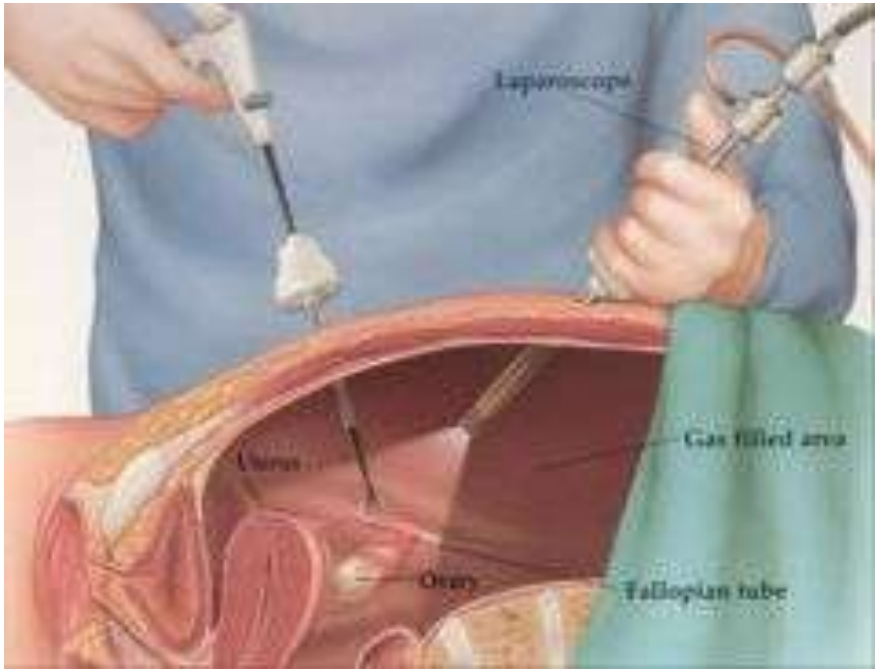
- Diagnosis of endometriomas:
  - Typical and atypical findings
  - Diagnostic accuracy for endometriomas – 97% spec., 90% sens.

    (Guerriero 1998, Raine-Fenning 2008, Alcazar 2010, Van Holsbeke 2010)
- Severity in deep endometriosis:
  - Organ oriented sonography
  - Pelvic adhesions (Guerriero 2009)
  - "Tenderness guided" transvaginal sonography - spec. 95%, sens. 90% (Guerriero 2007, Guerriero 2008)
  - Bowel preparation (Pereira 2009)
  - Rectovaginal and rectosigmoid nodules (Goncalves 2009, Pascual 2010)
  - US is first line imaging examination (Piketty 2009)
- 3D ultrasound capabilities (Guerriero 2009, Pascual 2010)

Heavily operator dependent

Ultrasound to optimize endometriosis surgery

- How does US add information for the surgeon?
- Preparation for surgery
- Plan multidisciplinary surgical involvement



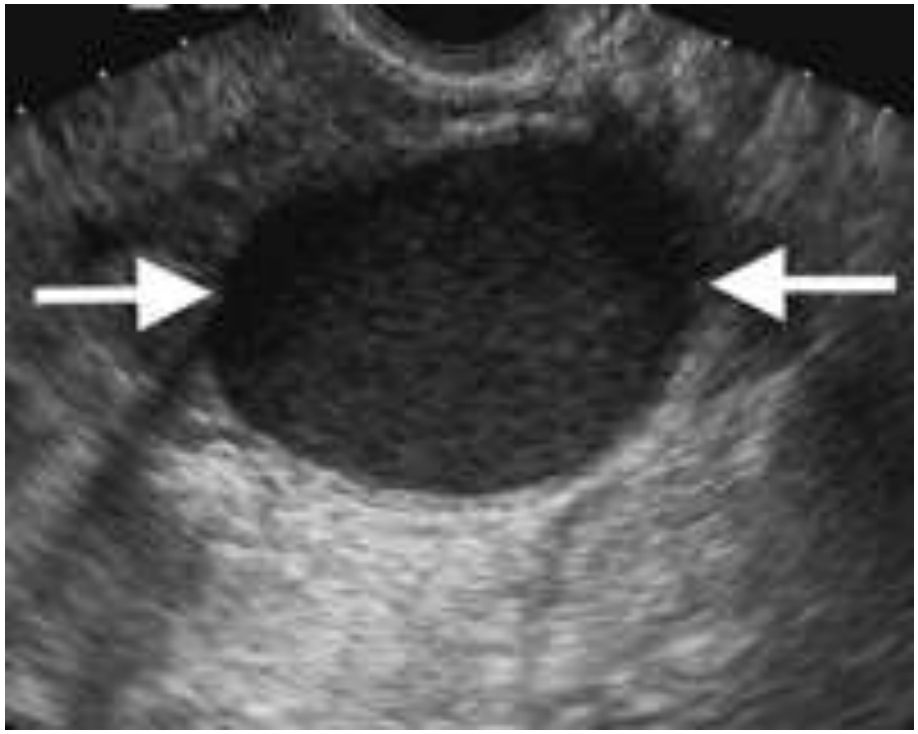
Ovarian endmetriosis: Endometriomas

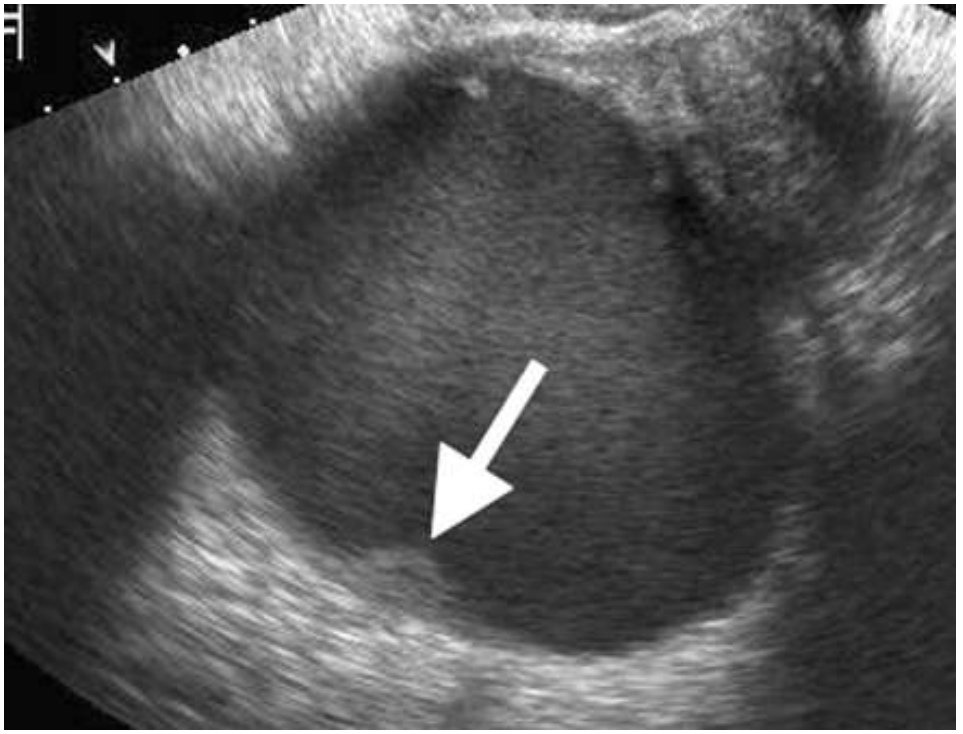
Optimal rule for endometriomata

- “adnexal mass in a premenopausal patient with ground glass echogenicity of the cyst fluid, one to four locules, without a solid component”
- When tested on the whole IOTA dataset, this rule gave a specificity of 98%

Van Holsbeke UOG 2011

Typical endometriomas



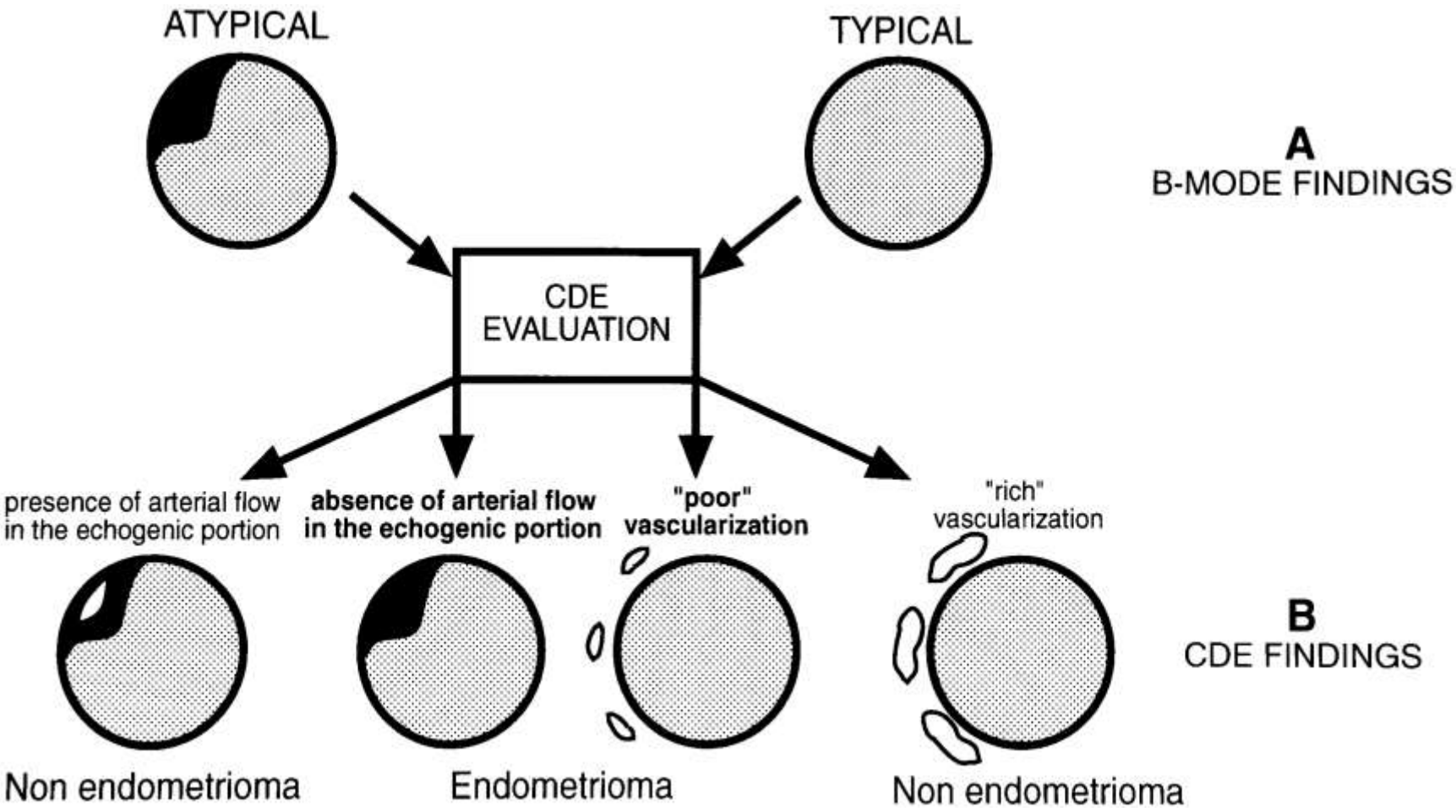


- Wall nodularity – 20%
- Hyperechoic wall foci result from cholesterol crystals break-up from chronic hemorrhage - 30% (old cysts)

Typical vs. atypical Endometrioma

- Typical endometrioma:
  - Unilocular
  - Ground glass (homogenous)
  - +/- wall nodularity
- Atypical endometrioma:
  - Bi or multilocular
  - Not ground glass
  - Retracted blood clots
  - Calcifications
  - Papillary projections with vascularization in pregnancy, calcified
  - Completely atypical
- Malignization: 0.3-0.8%

Color Doppler in endmetriomas

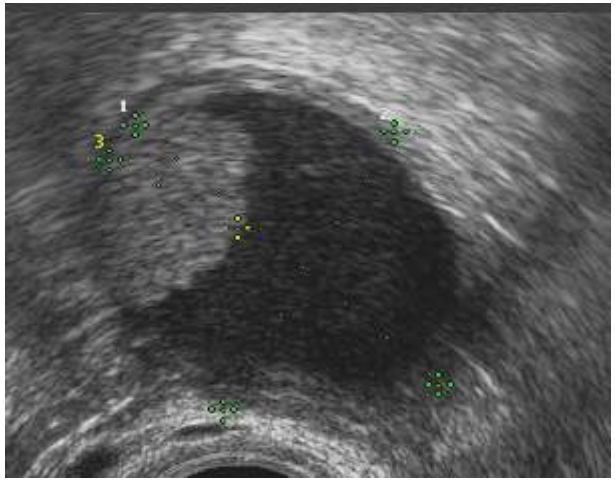


Endometrioma = round-shaped homogeneous hypoechoic 'tissue' of low-level echoes without papillary proliferations was visualized (**A)**

Colour Doppler = typical B-mode findings associated with 'poor' vascularization or B-mode findings with an echogenic portion without arterial flow

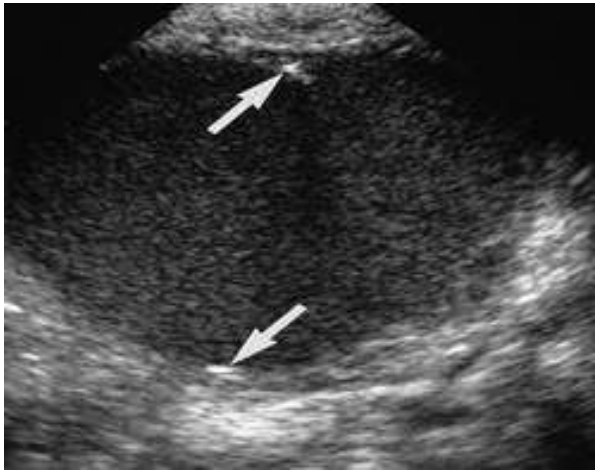
Guerriero 1998

Additional characteristics



Intracystic solid projections

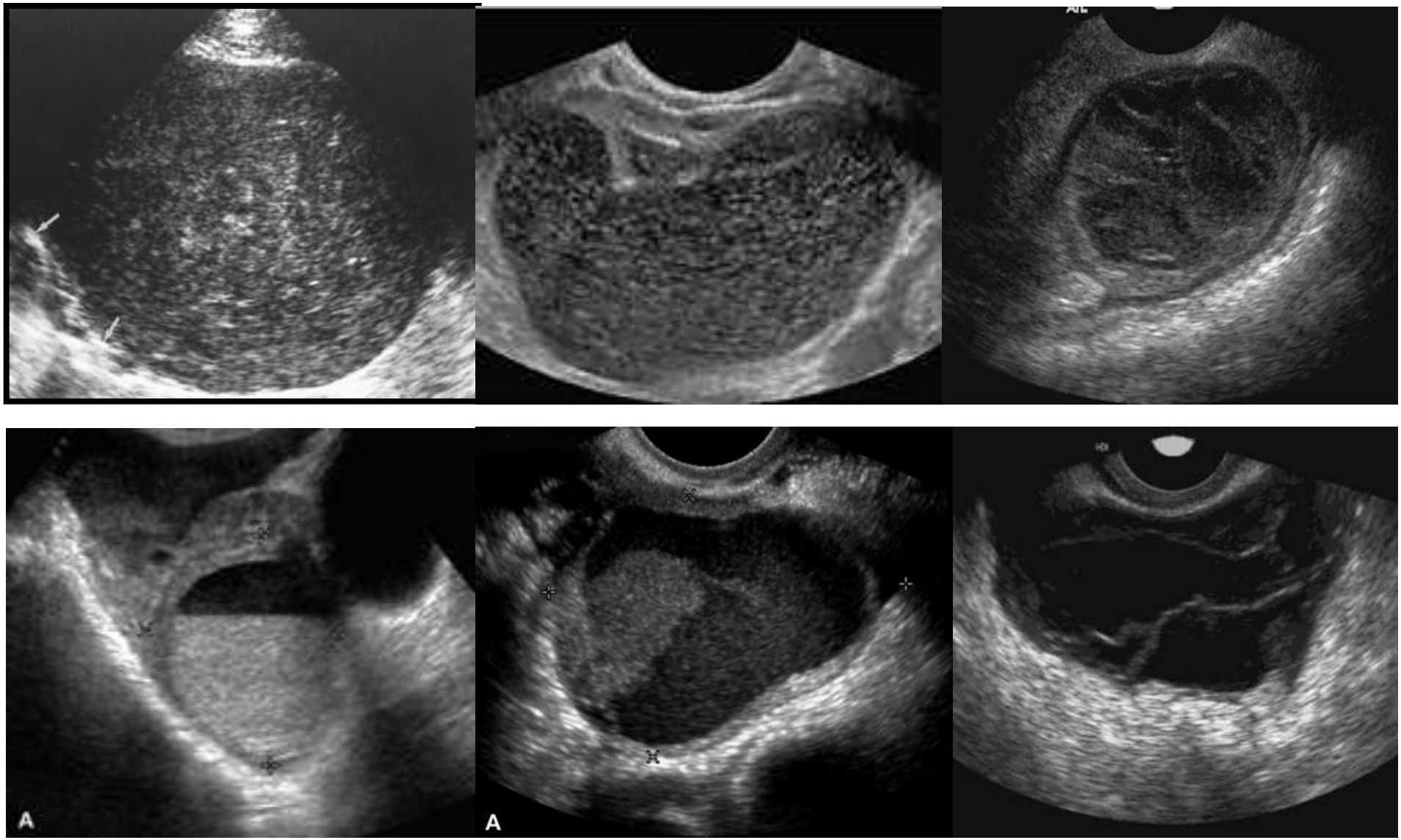
Thin septations



Low level internal echoes

Low-level echogenicity, thick septations, and a soft-tissue component caused by clot formation, multilocularity

Atypical endometriomas



Differential diagnosis

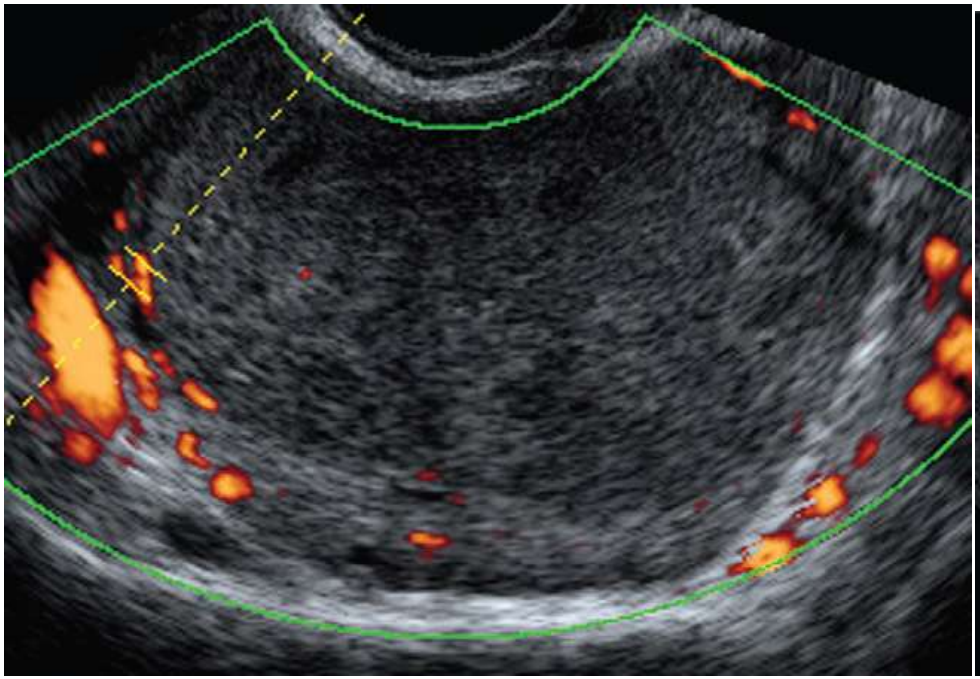
- Luteal cysts
- Cystadenomas
- Pyosalpinges
- Dermoids
- Ovarian cancers

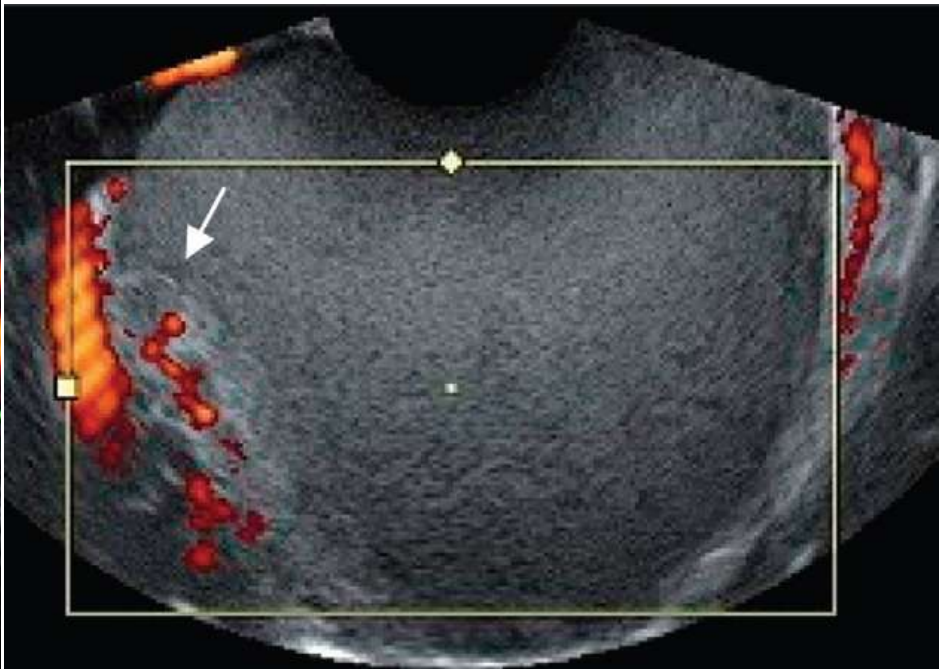
All may have low level echoes

Pattern recognition enables diagnosis by experienced sonographers (IOTA)

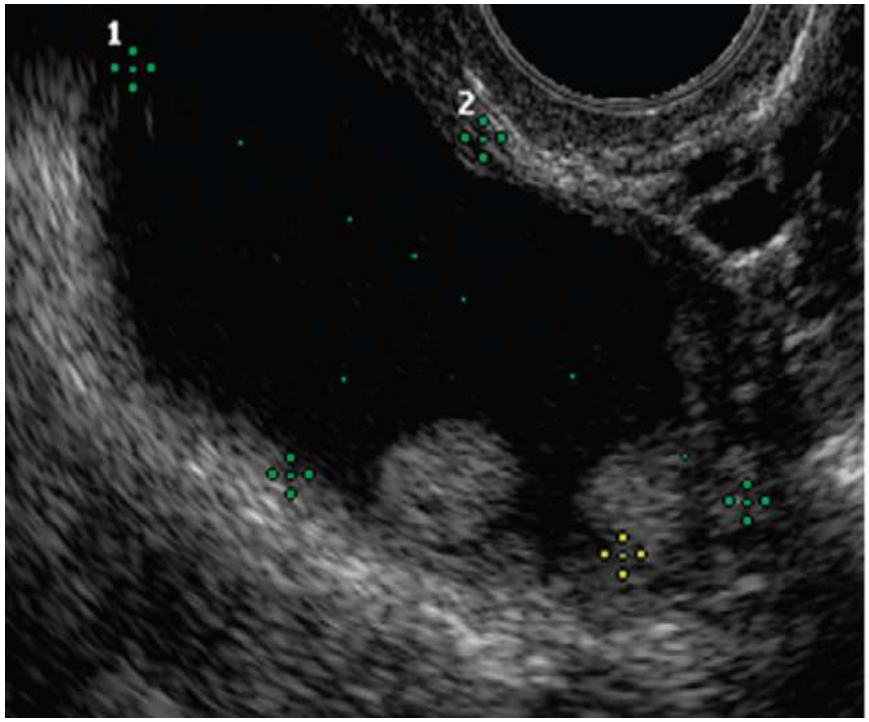
Endometriomas in pregnancy

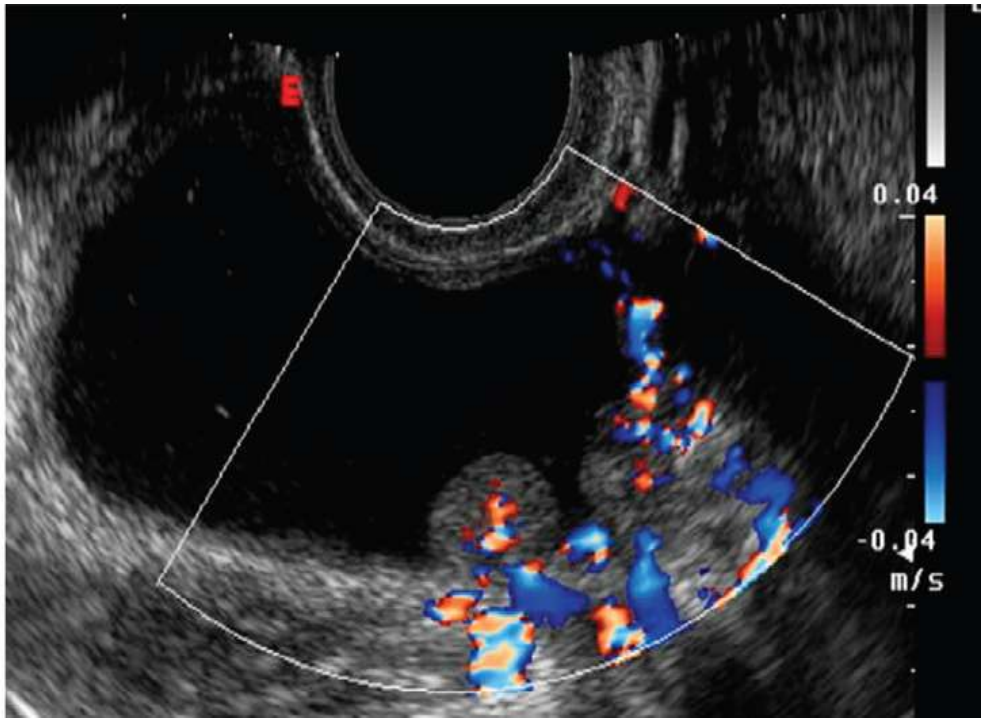
- Most decidualized endometriomas (82%) - vascularized rounded papillary projections with a smooth contour in an ovarian cyst with one or a few cyst locules and ground-glass or low-level echogenicity of the cyst fluid





Endometriomas in pregnancy





Previously known endometrioma
Round pearly papillation

Endometriomas and malignancy

- Subjective impression – misclassification of malignancies as endometriomas in 0.2-0.9%
- Characteristics differ in pre-menopausal and post-menopausal women
- Postmenopausal with ground glass – high malignancy risk
- Precursors of endometrioid BOT which may progress to low-grade invasive carcinoma
- Associated clear-cell BOT

Testa 2011, Van Holsbeke 2010, Lalwani 2010

Endometriomas and malignancy

- Vascularized solid component
- In pregnancy difficult differentiation between BOT and decidualised endometriotic cysts
- Decidualised endometriomas – 82% vascularised rounded papillary projections with a smooth contour in an ovarian cyst with one or more cyst locules and ground glass or low level echogenicity of the cyst fluid

Fruscella 2004, Mascilini 2014 online

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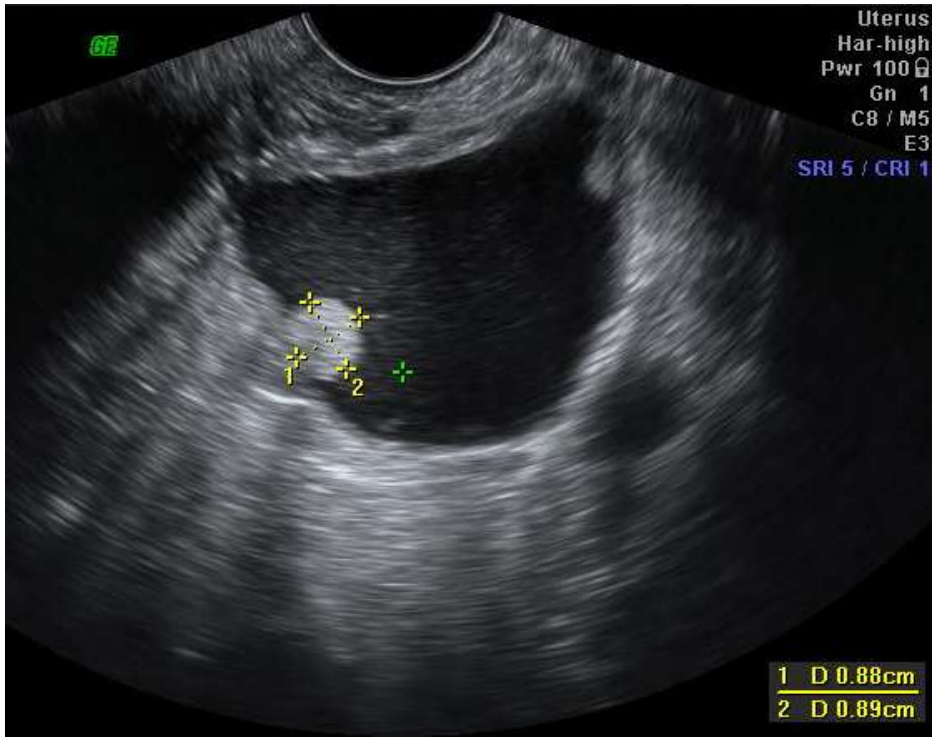
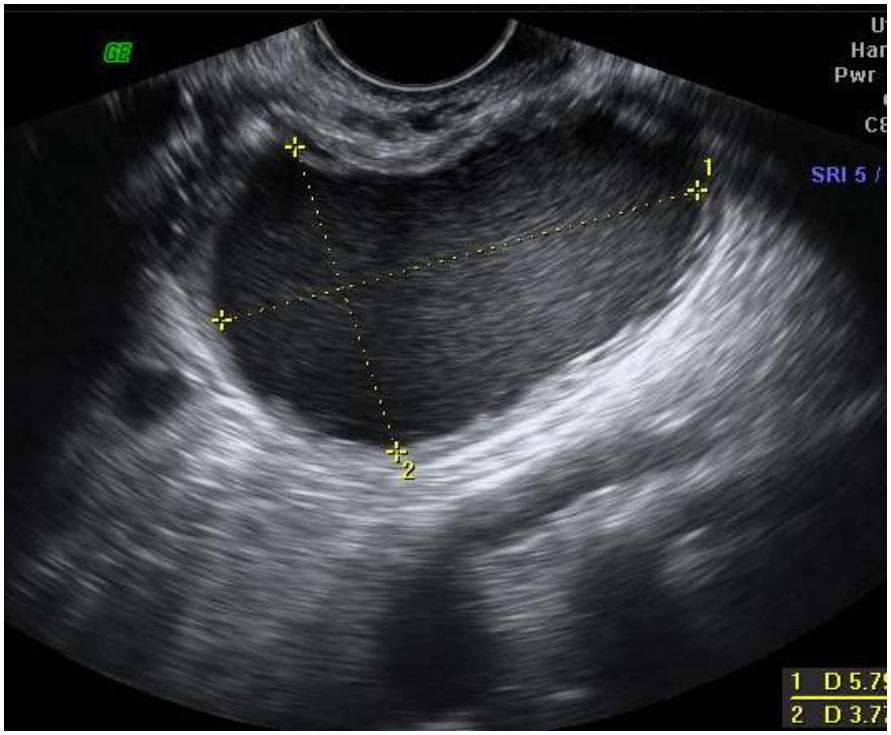
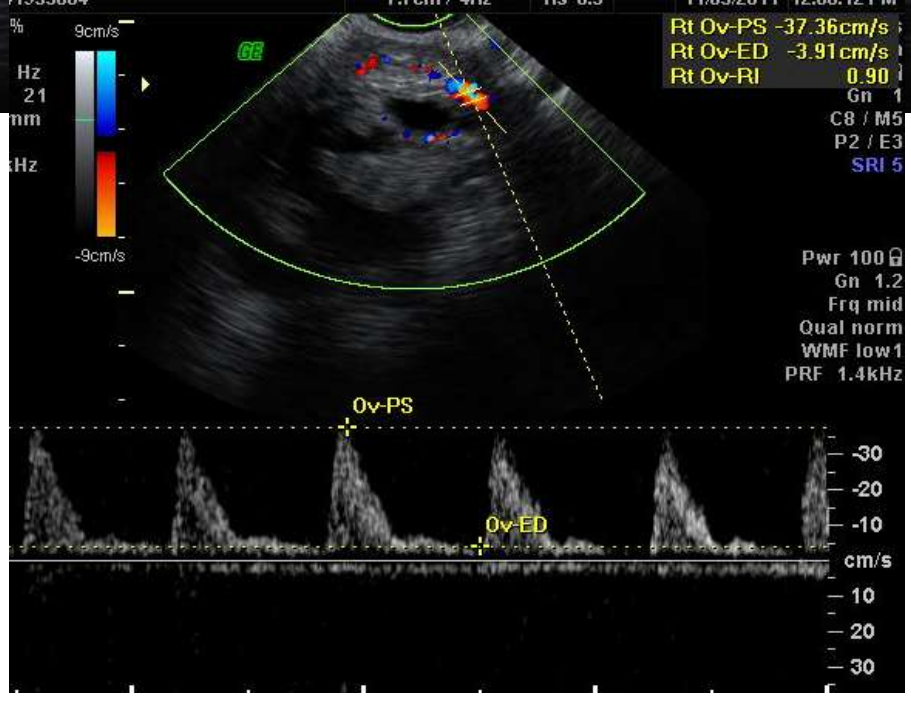

GE
Uterus
Har-high
Pwr 100
Gn 1
C8 / M5
E3
SRI 5 / CRI 1
1
2
1 D 0.88cm
2 D 0.89cm


GE
1
2

BOT serous

?



Endometrioma

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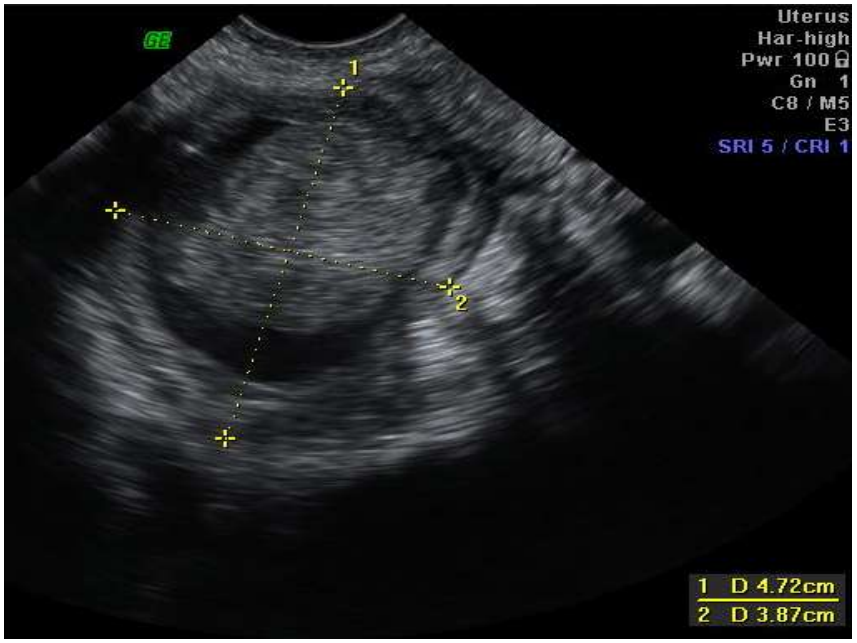
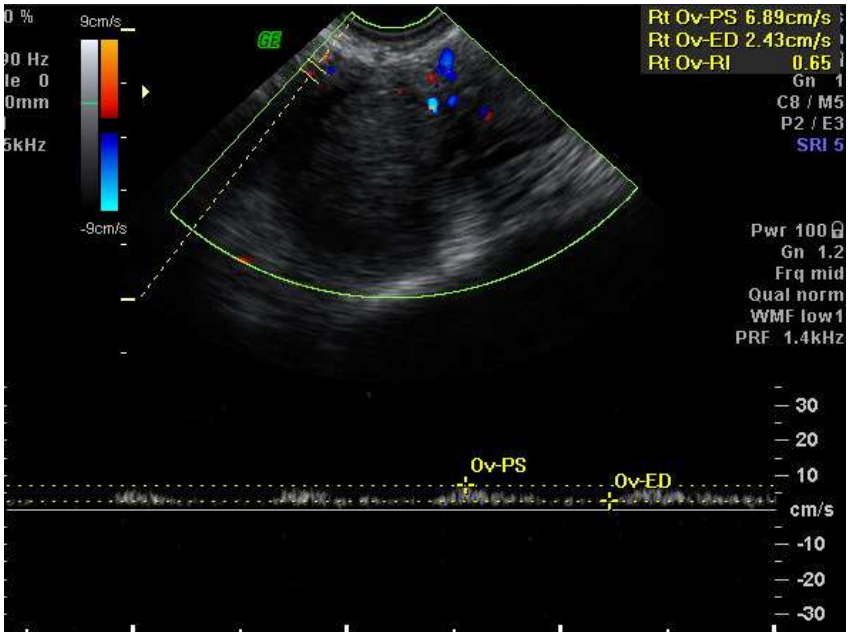
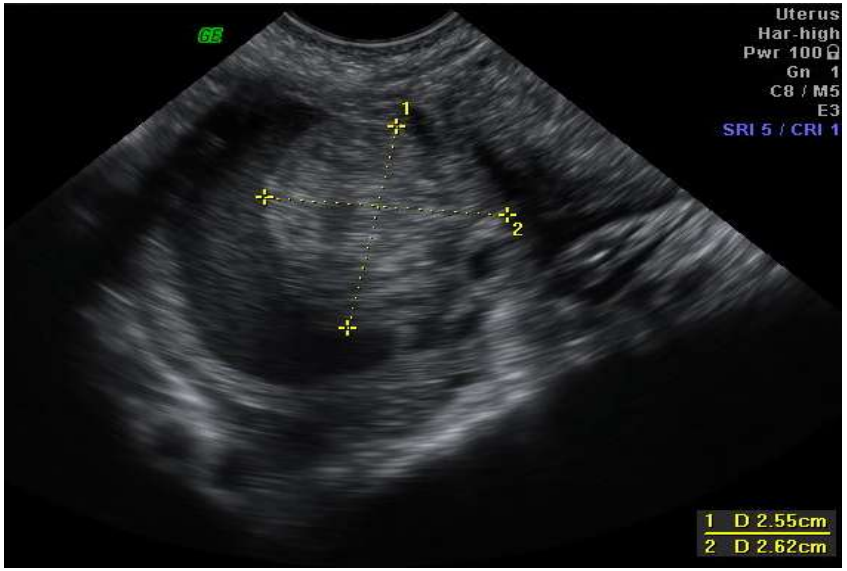
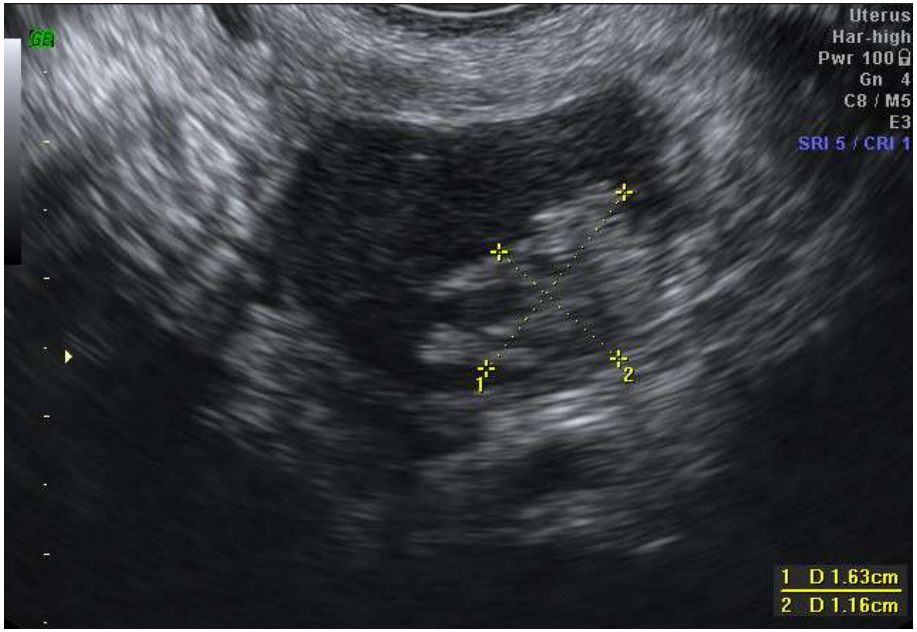




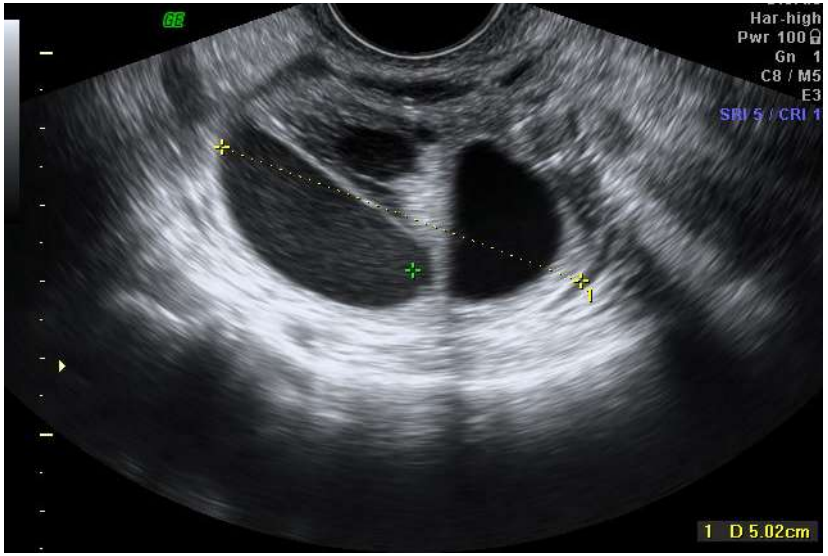


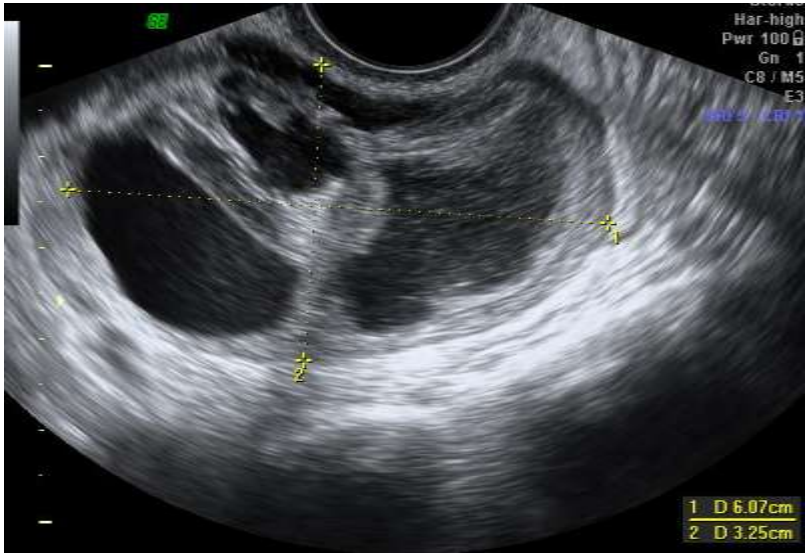
Endometrioma

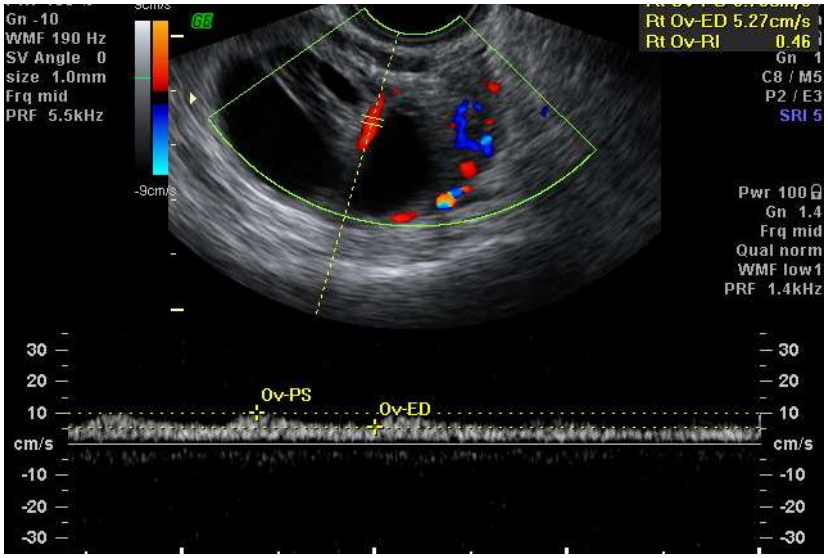
?

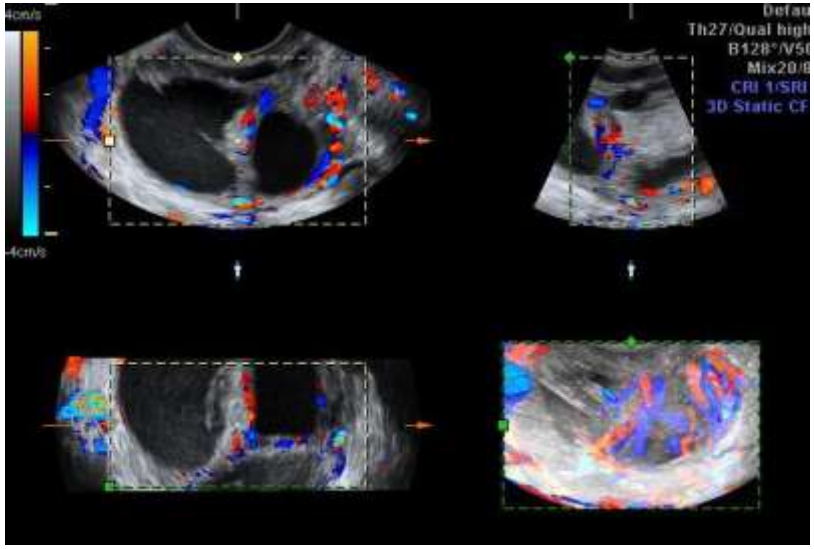


Invasive micropapillary serous Ca arising in BOT serous







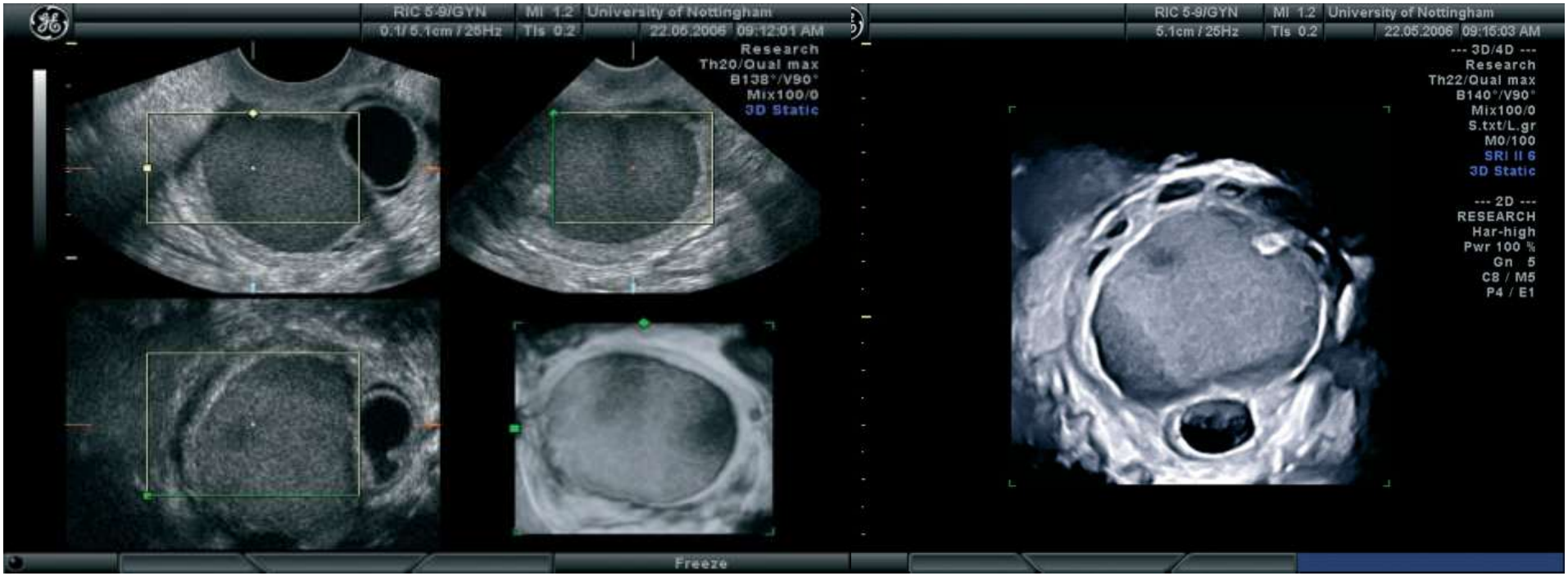


44 years old, long standing endometriosis, S/P breast cancer BRCA neg, tamoxifen Rx

Multilocular solid tumor, color score 2-3

Pathology: endometriosis

3D characteristics of endometriomas



3 D of an endometrioma:
classic morphological characteristics: consistent smooth texture within the body of the cyst, thickened fibrotic capsule and an echodense nodule within the wall of the cyst.

Raine-Fenning, 2008

Can ultrasound diagnose more than just endometriomata?

Superficial endometriosis

- Almost 100% of patients with endometriomas have superficial disease elsewhere

- Up to 15% of normal asymptomatic healthy women

- Not visible by imaging?
- But in the absence of endometrioma?

Pelvic adhesions

- Diagnostic challenge
- Peritoneal disease and adhesions are more common than endometriomas
- Particularly in women with infertility or chronic pelvic pain without endometriomas
- Evaluate mobility
- Site-specific tenderness
- Loculated peritoneal fluid

Soft markers and hard markers

- On transvaginal ultrasound - these markers are in correlation with endometriosis and adhesions at laparoscopy
- Soft markers:
  - Site specific tenderness
  - Reduced ovarian mobility
- Hard markers:
  - Endometrioma
  - Hydrosalpinx

Soft marker analysis Improves sensitivity for peritoneal endometriosis From 34-87%, NPV 84%

Okaro 2006

Consensus

Ultrasound Obstet Gynecol 2016
Published online in Wiley Online Library (wileyonlinelibrary.com). DOI: 10.1002/uog.15955

Systematic approach to sonographic evaluation of the pelvis in women with suspected endometriosis, including terms, definitions and measurements: a consensus opinion from the International Deep Endometriosis Analysis (IDEA) group

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Procedure

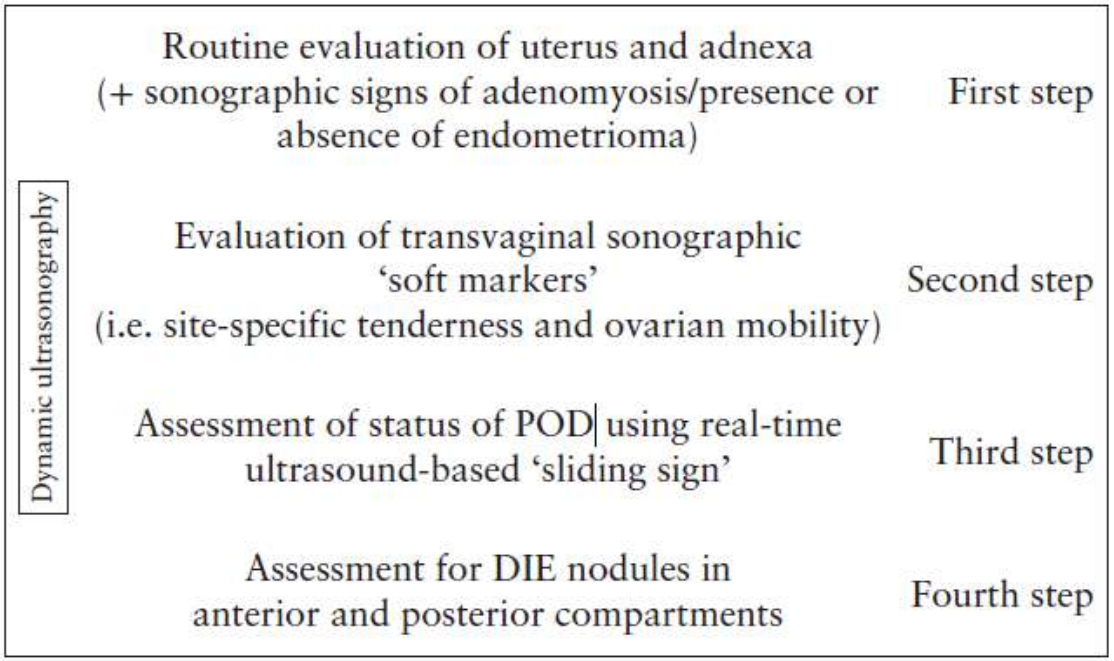
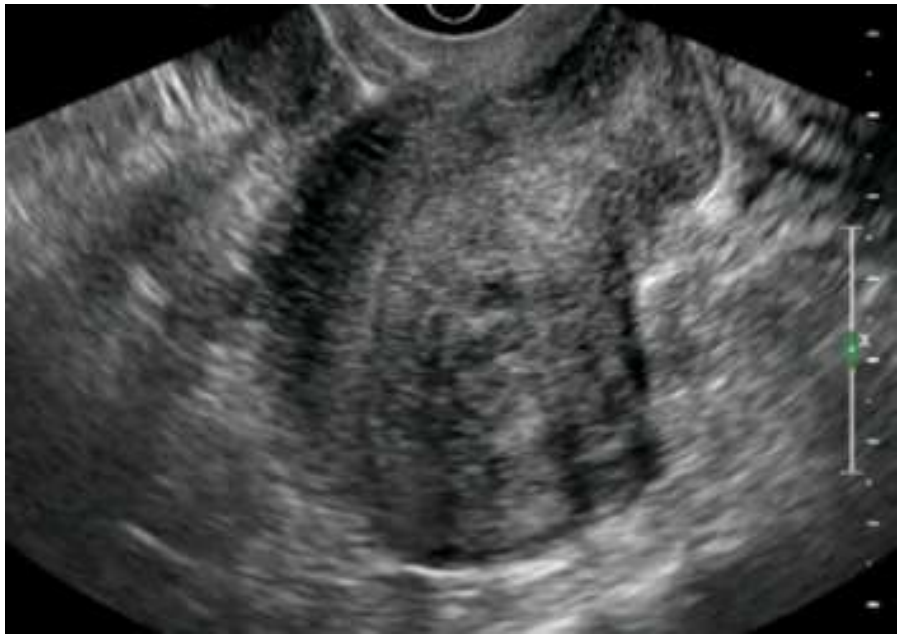
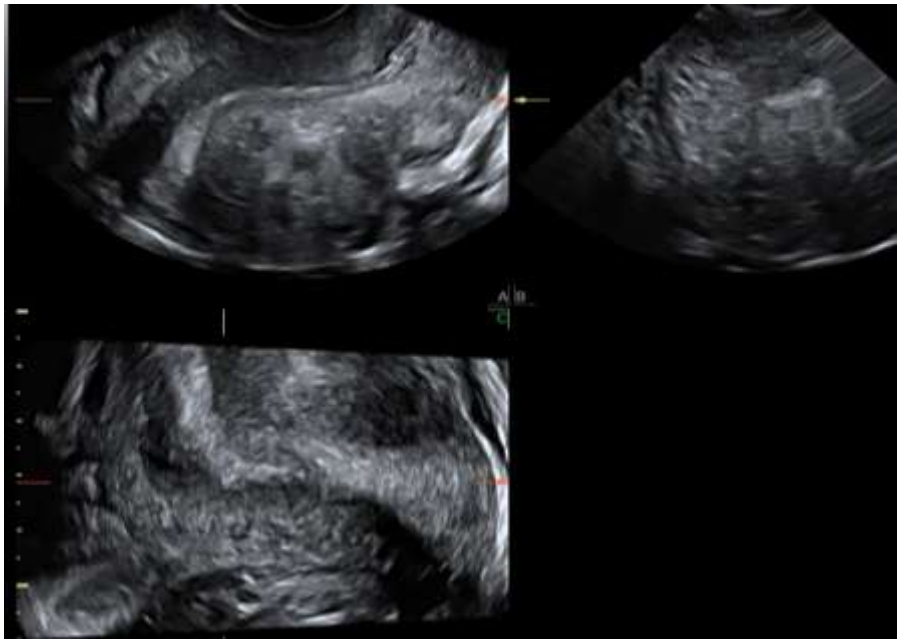
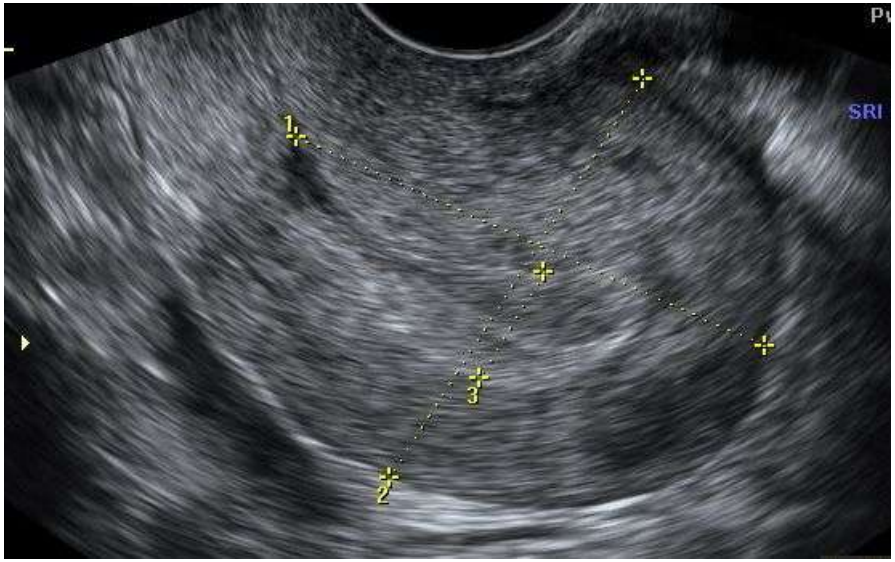


Figure 1 Four basic sonographic steps for examining women with clinical suspicion of deep infiltrating endometriosis (DIE) or known endometriosis. All steps should be performed, but not necessarily in this order. Note, bladder should contain small amount of urine. Dynamic ultrasonography is when the operator performing the ultrasound examination assesses both the pelvic organs and their mobility in real-time. POD, pouch of Douglas.

Abnormal uterine direction



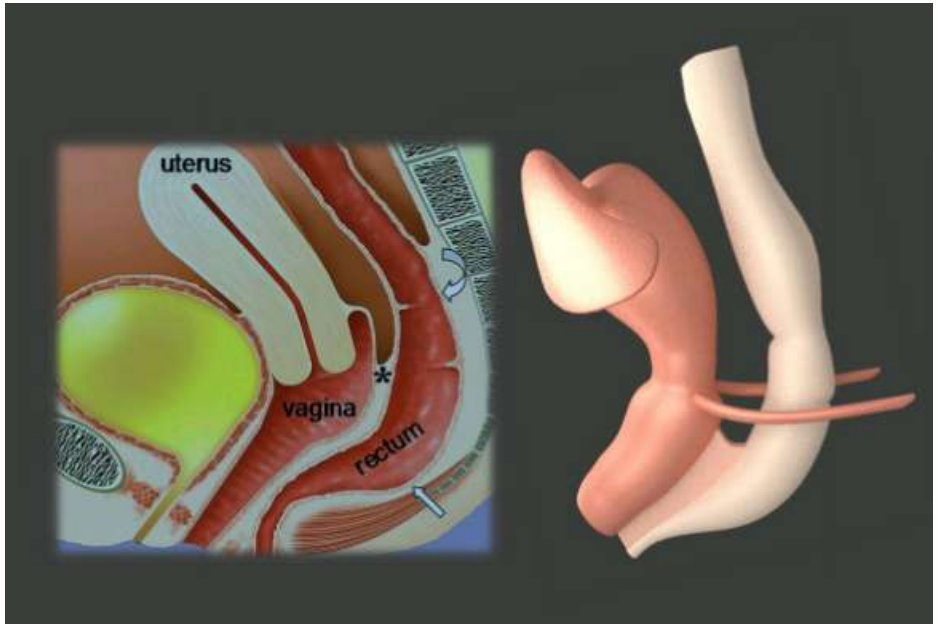




Sliding sign and POD obliteration

- Sliding sign – anterior rectum glides over posterior aspect of cervix and posterior vaginal wall
- Prediction of POD obliteration

  - Increased risk for bowel endometriosis
  - DIE of rectum
    - Sensitivity 83.3-85%
    - Specificity 96-97.1%
    - Accuracy 93.1%
  - Anterior sliding sign – gliding over anterior plica



Guerriero 2010, Okaro 2006, Holland 2010, Hudelist 2013, Reid 2013

Sliding sign

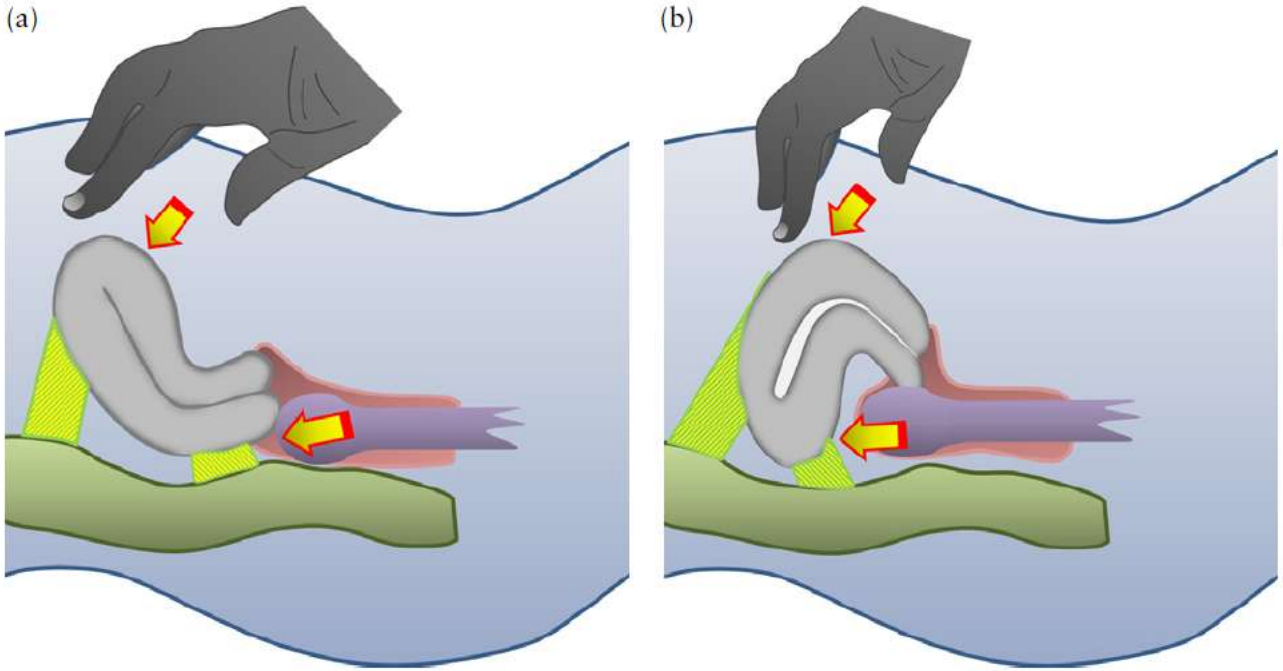
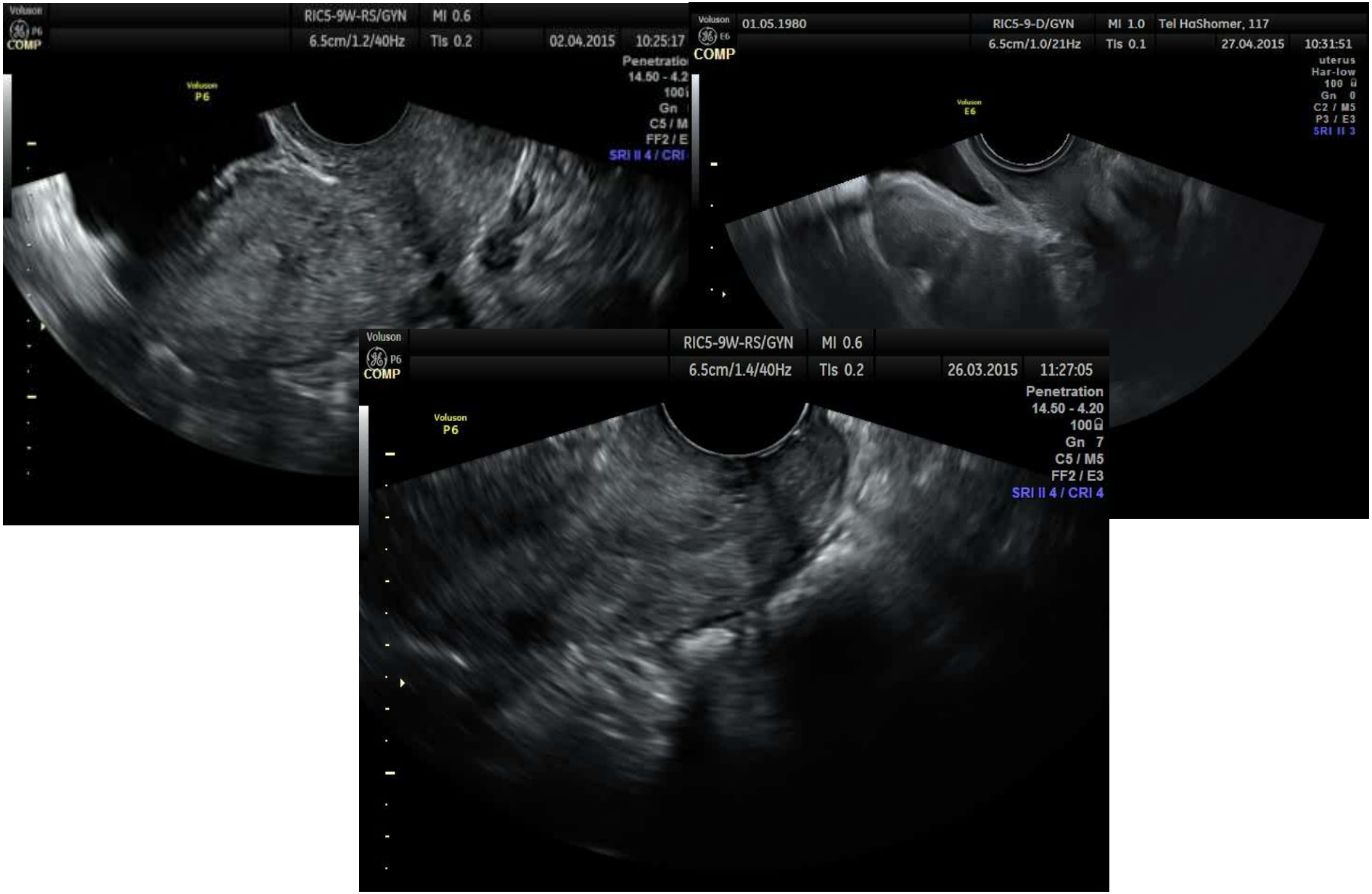
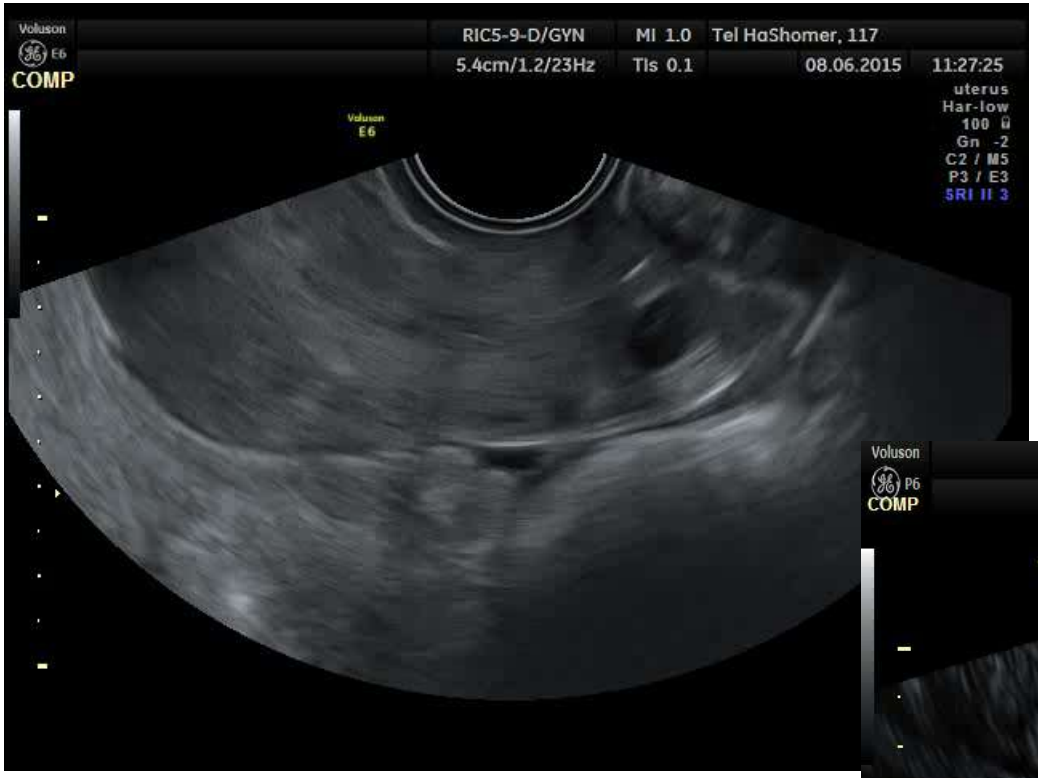


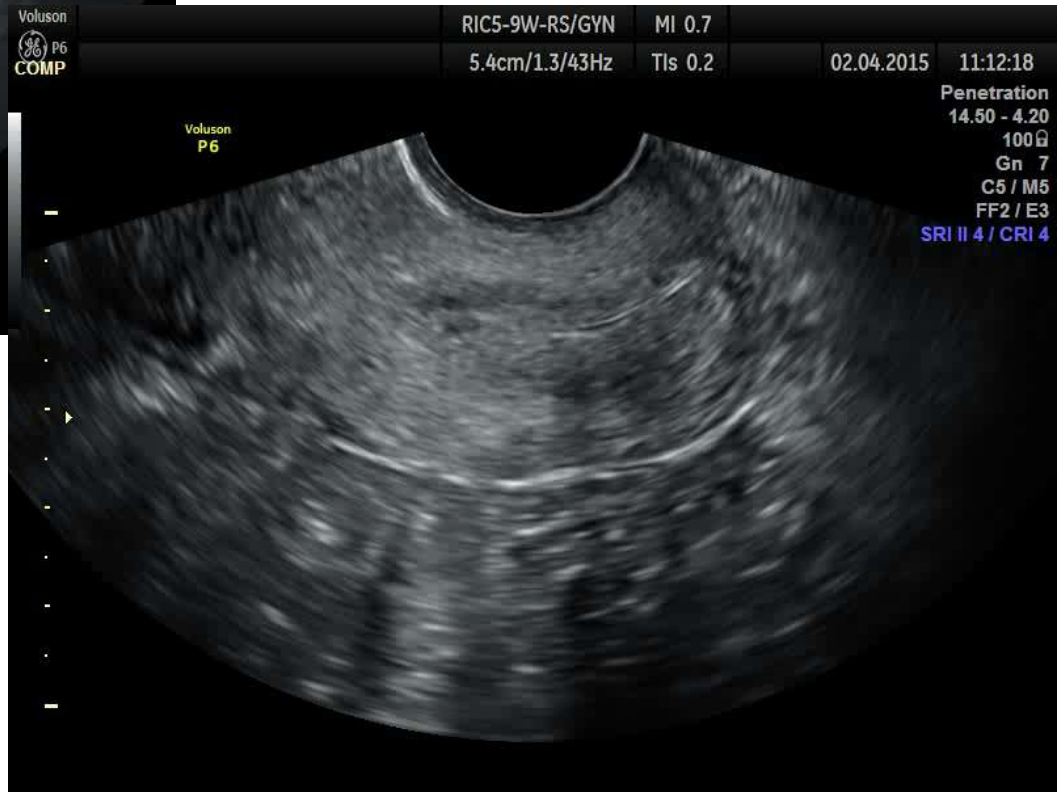
Figure 2 Schematic drawings demonstrating how to elicit the 'sliding sign' in an anteverted uterus (a) and a retroverted uterus (b).

Anterior sliding sign



Posterior sliding sign



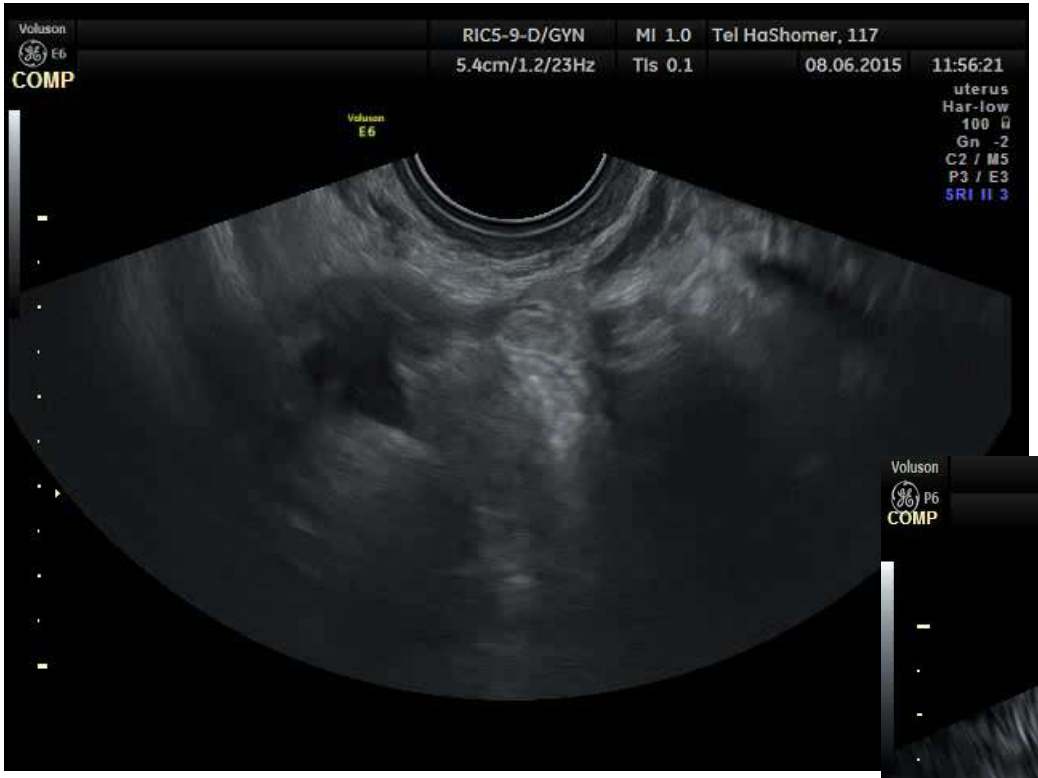


Adhesions to the ovaries

- Applying pressure between the uterus and ovary:
- 3 features are suggestive of ovarian adhesions:
  - Blurring of the ovarian margin
  - Inability to mobilize the ovary on palpation (fixation)
  - Increased distance from the probe
- Sensitivity and specificity of 89% and 90%, fixation of the ovaries to the uterus

Guerriero 2010

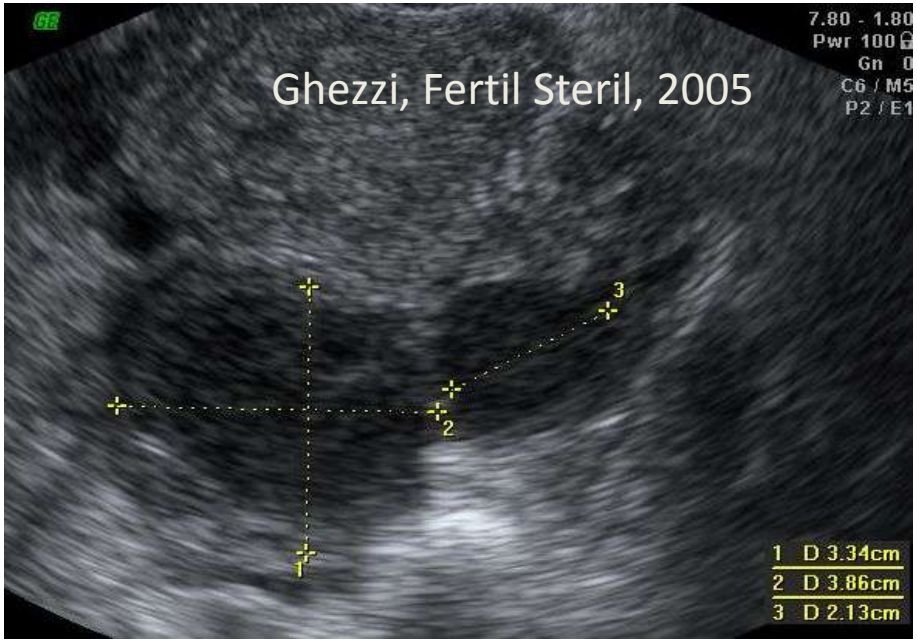
Adhesions to the ovaries



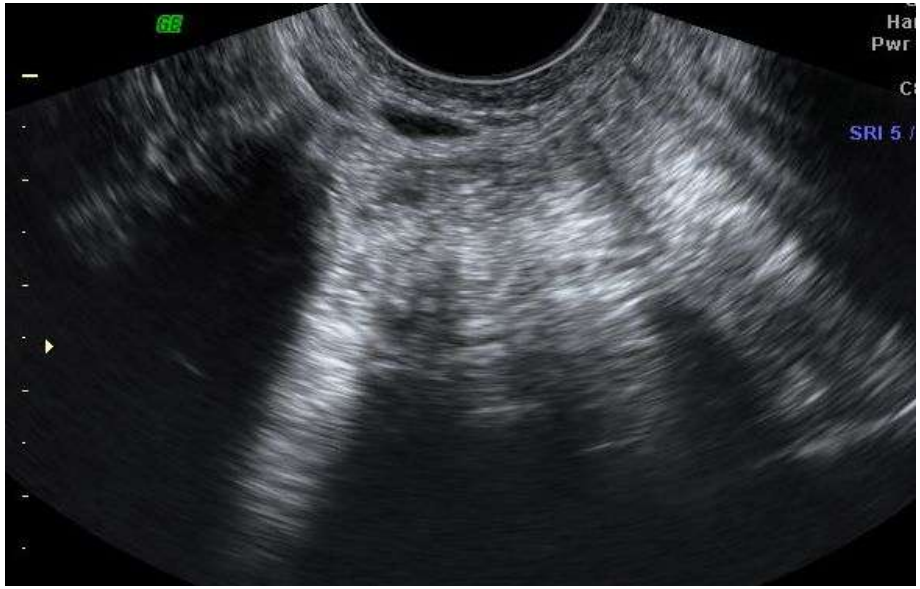
Adhesions to the ovaries

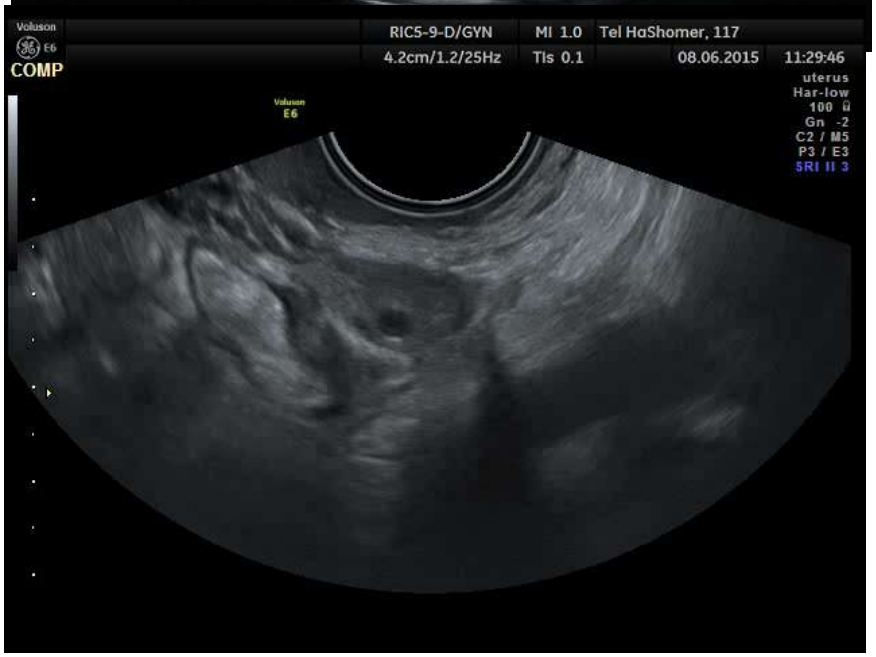
Kissing ovaries

Criteria	Kissing ovaries	Non kissing ovaries
Bowel involvement	18.5	2.5
Fallopian tube obstruction	80	8.6
AFS score	74	35
Operating time	115 min	50 min



Intestinal adhesions



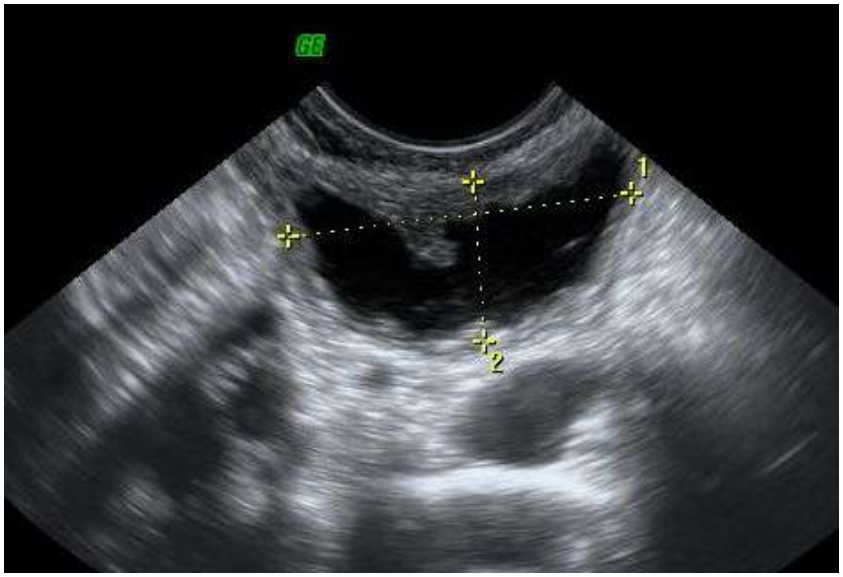


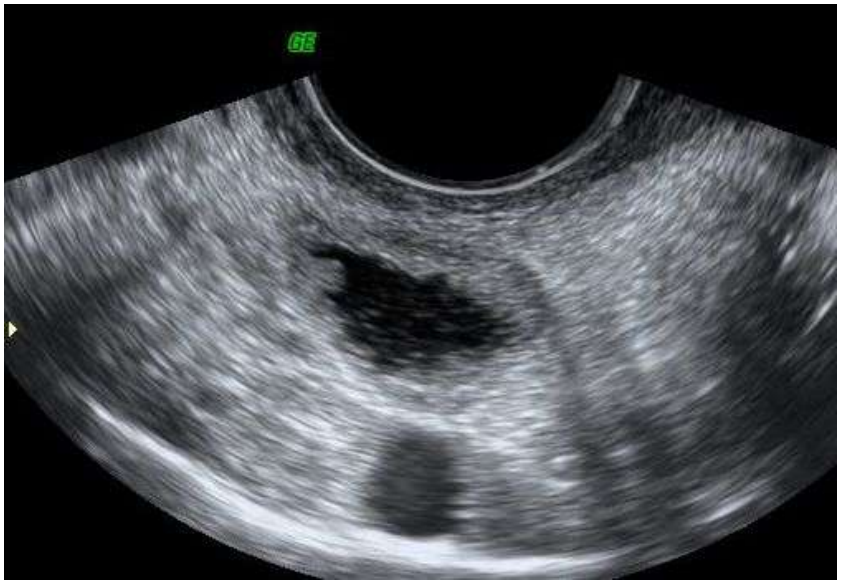
Tubal disease

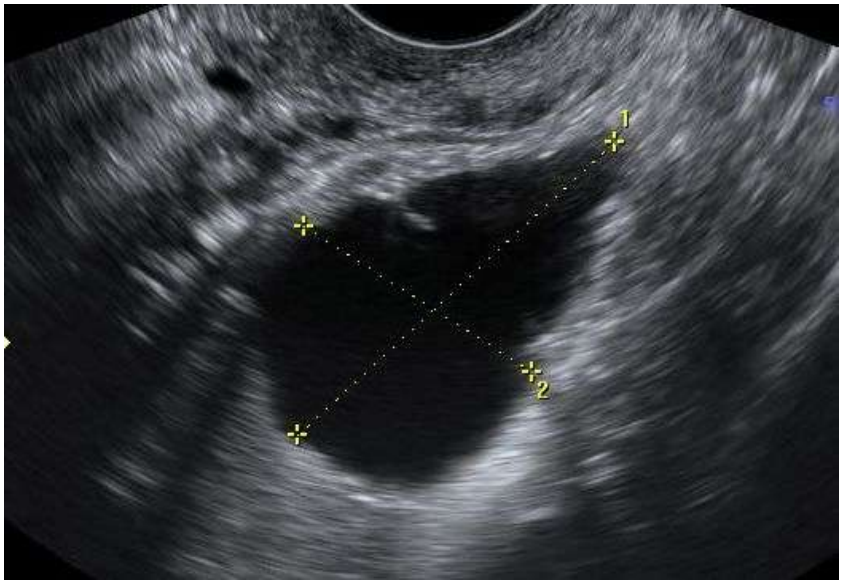
- Tubal disease in conjunction with peritoneal disease
- Adhesions alter normal tubal course or occlude the tube
- Sactosalpinx - “cogwheel” sign- dilated fallopian tube with thick walls and incomplete septa
- Hydrosalpinx – “beads on a string” sign – hyperechoic mural nodules measuring about 2–3mmand seen on cross-section of the fluid filled distended structure
- TOA complex

Timor–Tritsch, 1998

Tubal disease

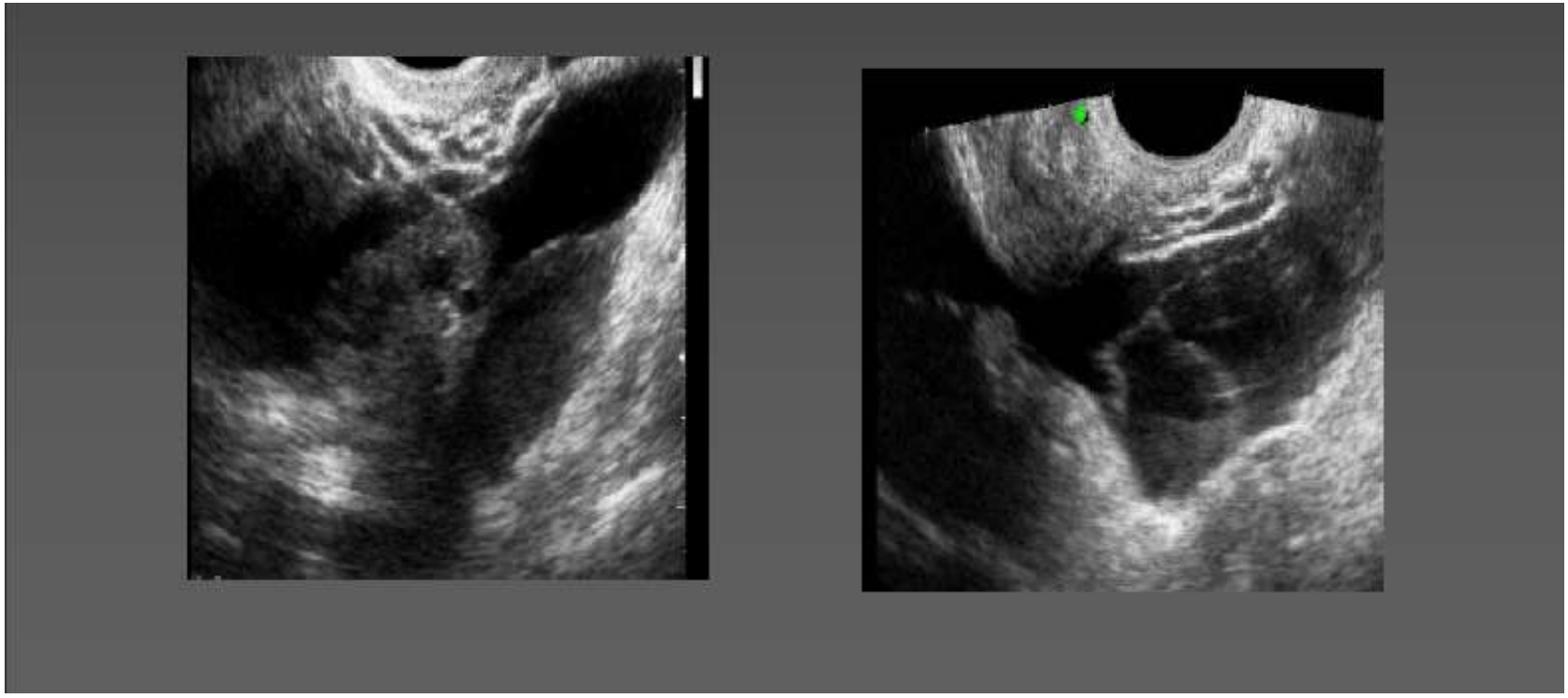






Flapping sail sign

- Investigate the adherence/movement of adjacent structures
- In presence of pelvic fluid one can see fine septa between the organs



Diagnosis of deep endometriosis: DIE

(deep infiltrative endometriosis)

Posterior compartment

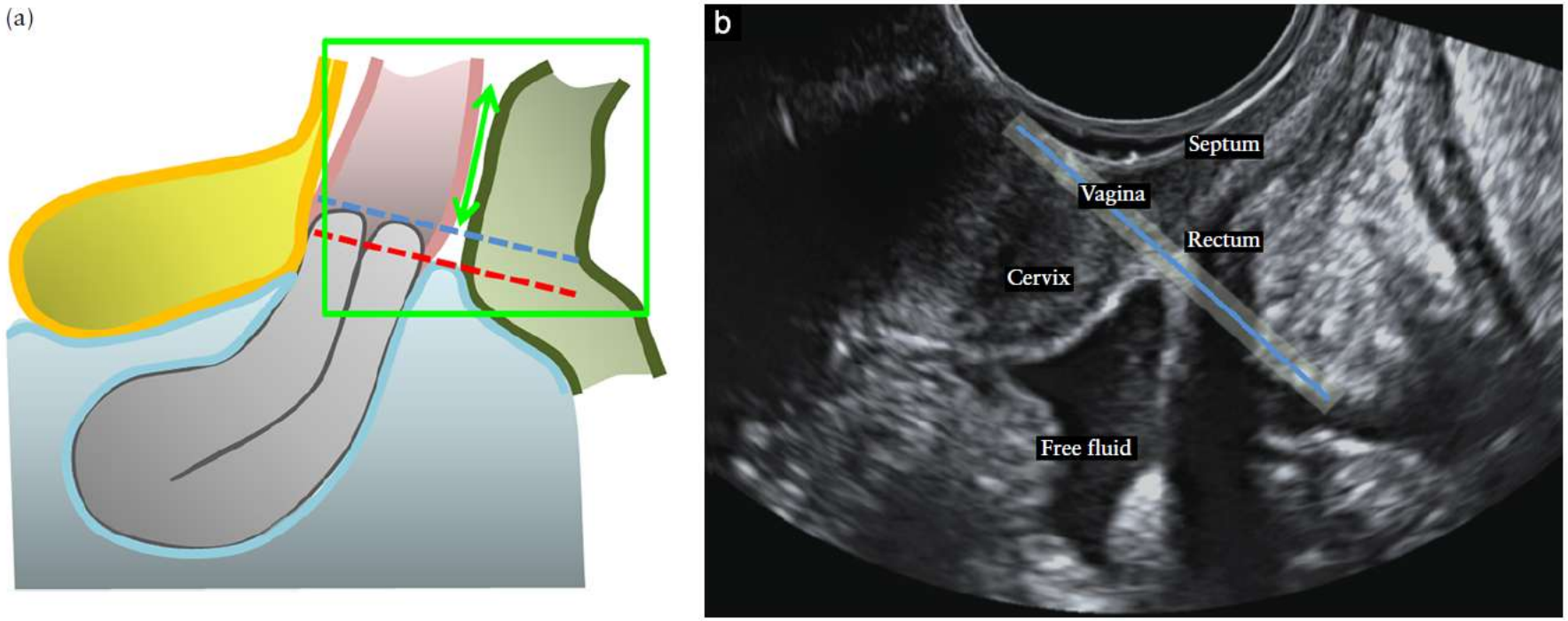


Figure 4 Schematic drawing (a) and ultrasound image (b) demonstrating our proposed ultrasound definition of the rectovaginal septum (RVS). (a) The RVS is denoted by the double-headed green arrow, below (anatomically) the blue line passing along the lower border of the posterior lip of the cervix. The posterior vaginal fornix lies between the blue line and the red line (the latter passing along the caudal end of the peritoneum of the lower margin of the rectouterine peritoneal pouch (cul-de-sac of Douglas)). (b) The upper delimitation of the RVS is where the blue line passes along the lower border of the posterior lip of the cervix.

Distinction

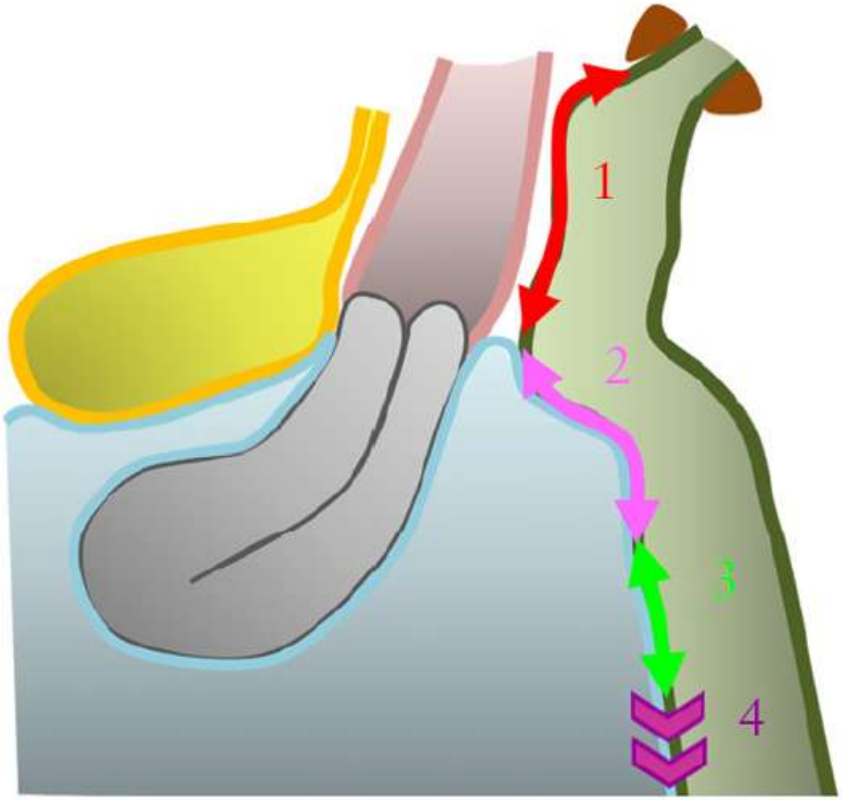
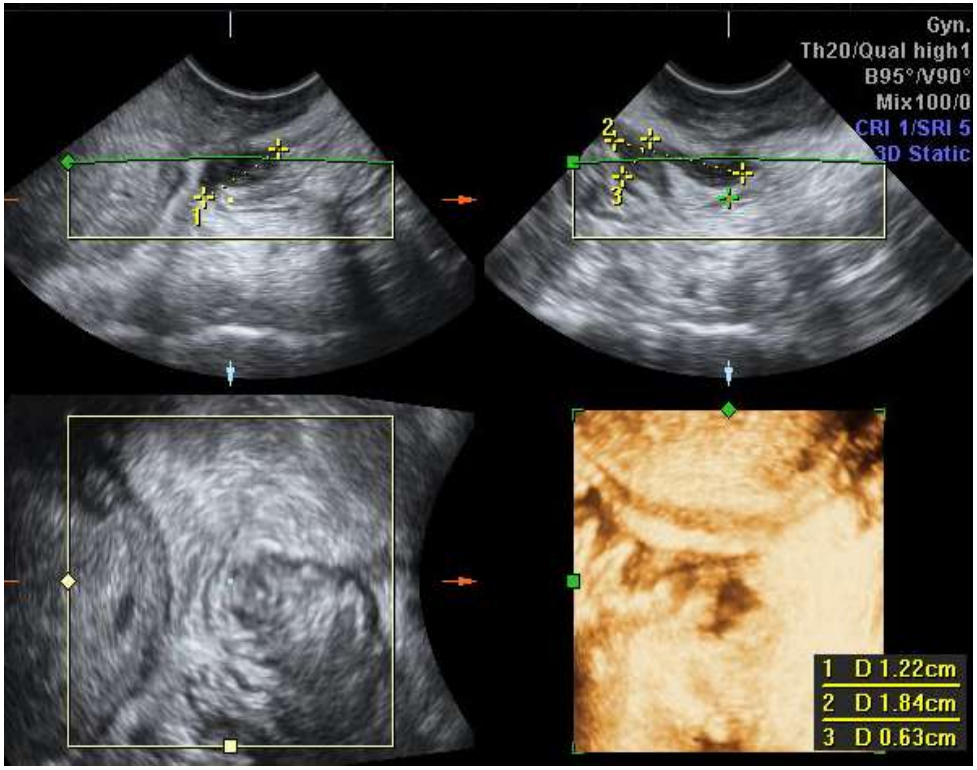


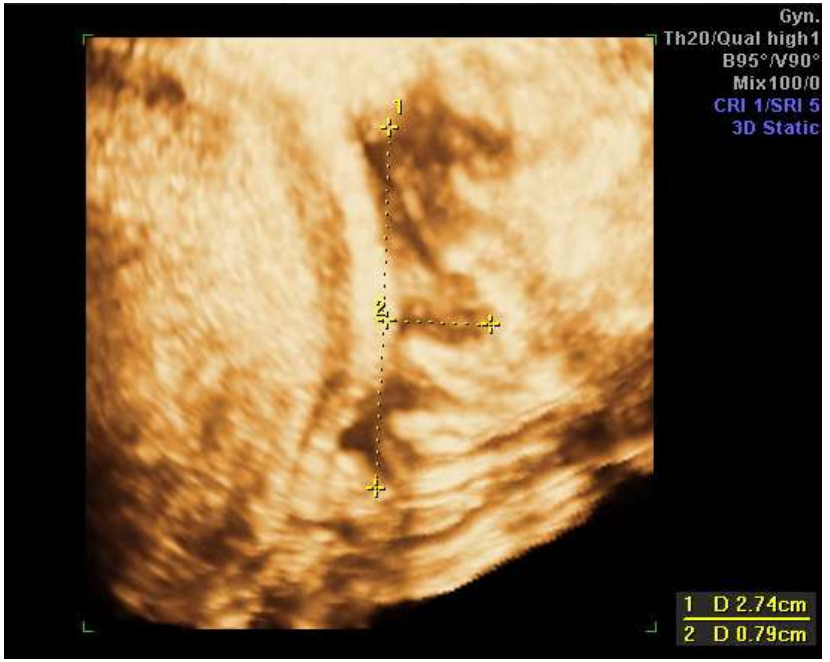
Figure 10 Schematic drawing demonstrating distinction at ultrasound between segments of the rectum and sigmoid colon for specifying location of deep infiltrating endometriotic lesions: lower (or retroperitoneal) anterior rectum (1); upper (visible at laparoscopy) anterior rectum (2); rectosigmoid junction (3); and anterior sigmoid (4).

Bowel involvement

- Antimesenteric portion of the rectosigmoid junction and the rectum
- Hypoechoic fixed nodule behind the cervix, attached to the bowel wall
- External margins of the nodule are hyperechoic (presence of congested adipose tissue, submucosa and mucosa)
- Some nodules manifest internal hyperechoic spots (calcified portions)
- Power Doppler - few blood vessels within and around the nodule
- 93% - second deep location

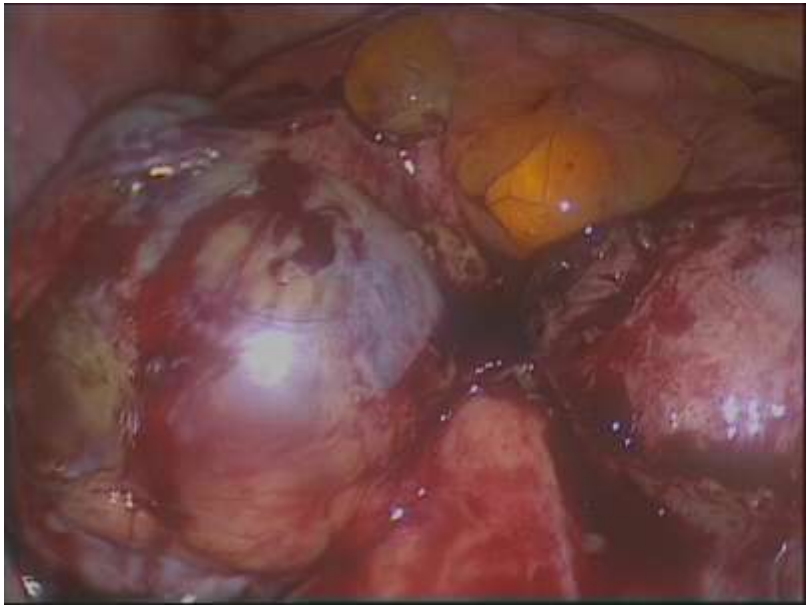
Rectosigmoid nodules

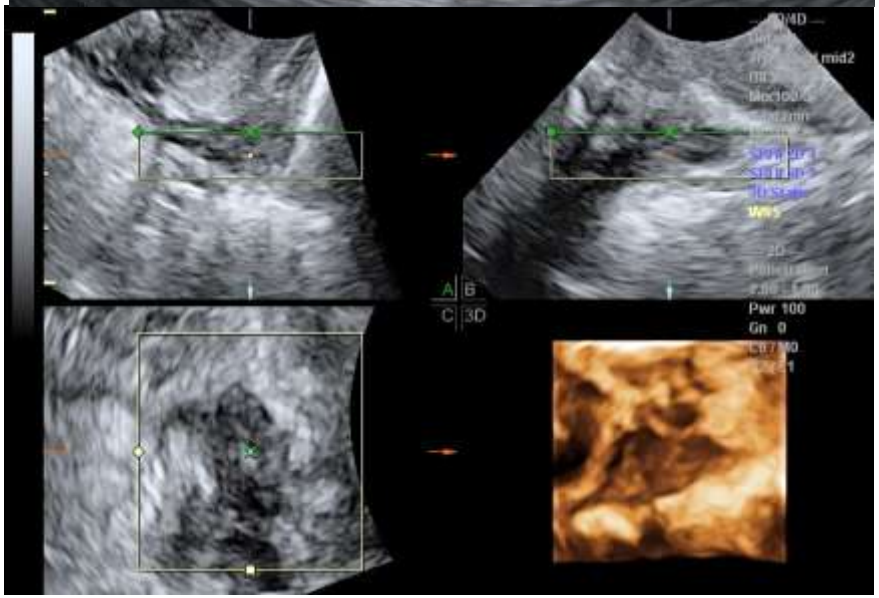


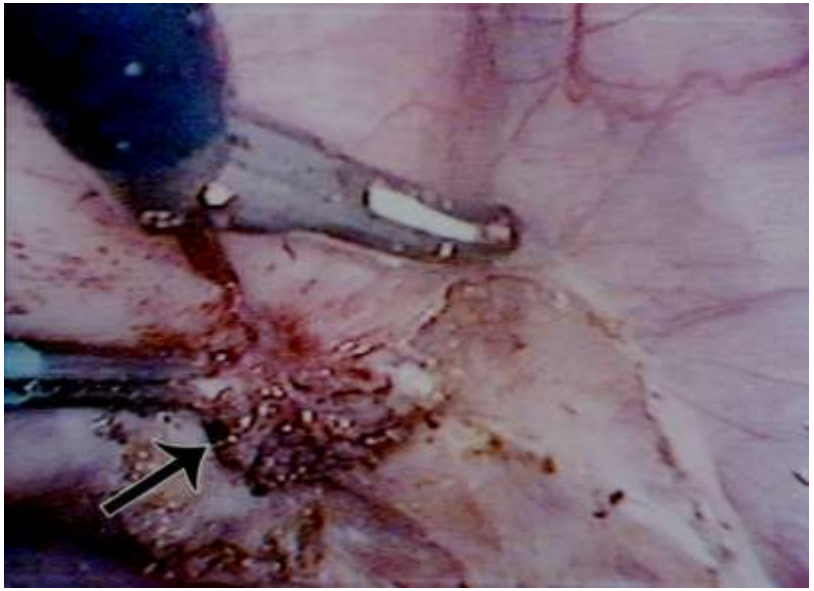


Indian headdress sign

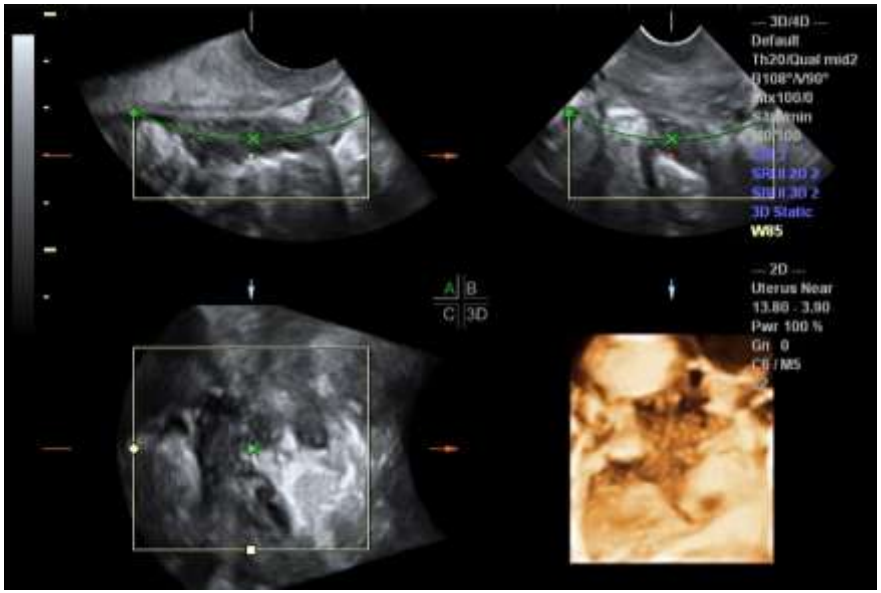
Rectosigmoid nodules

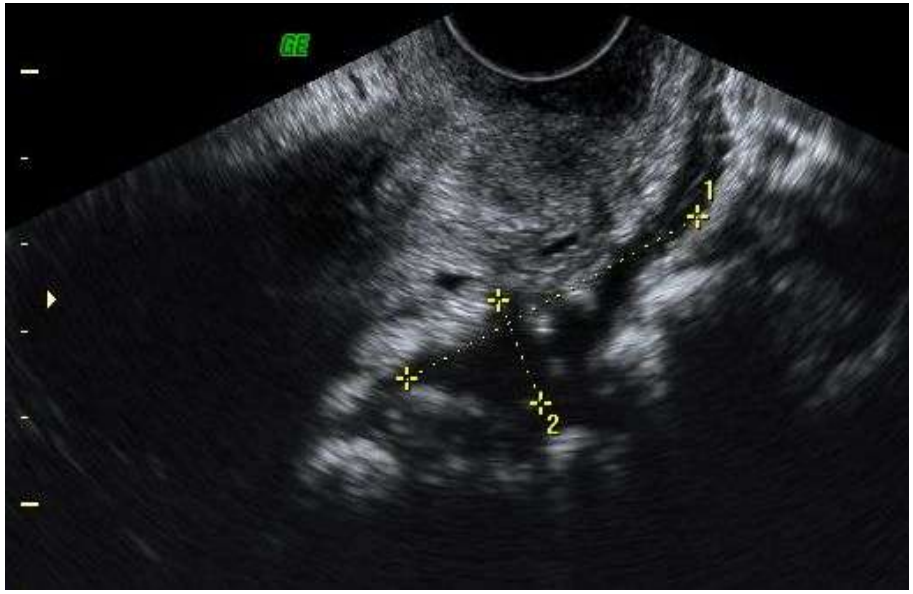


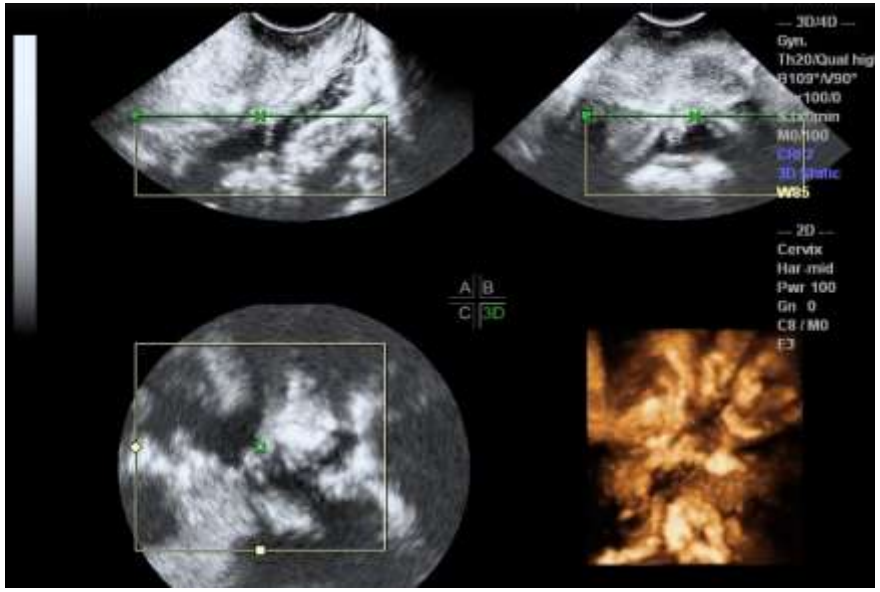




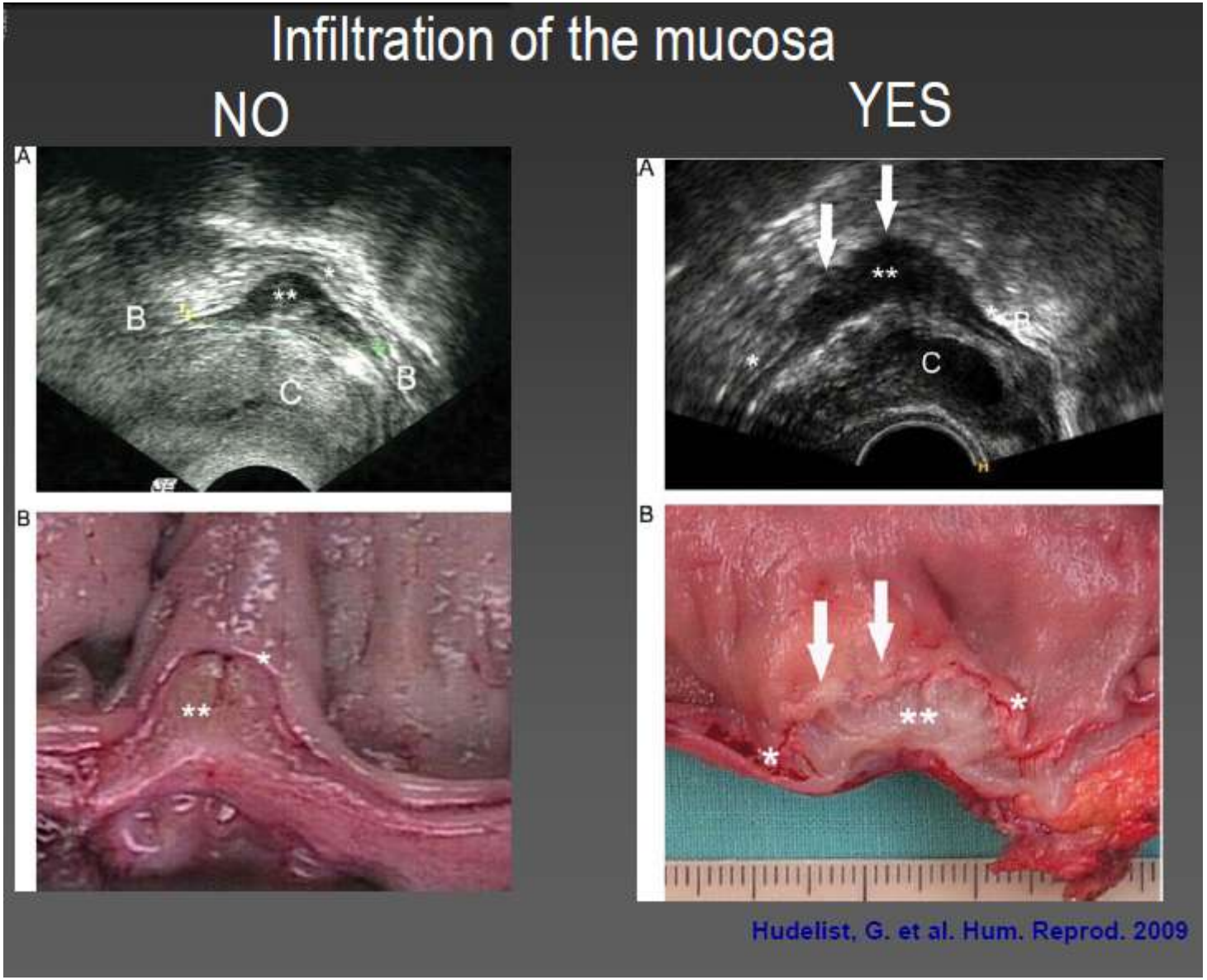
Rectosigmoid nodules



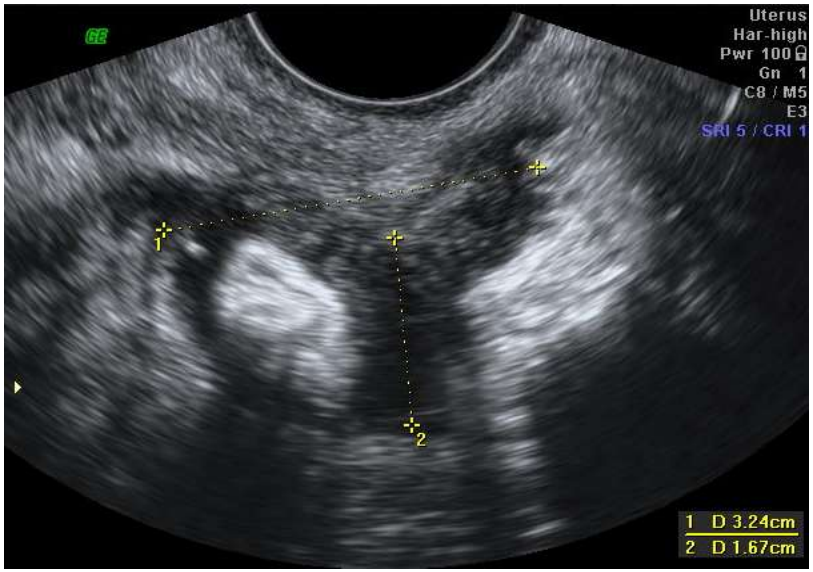


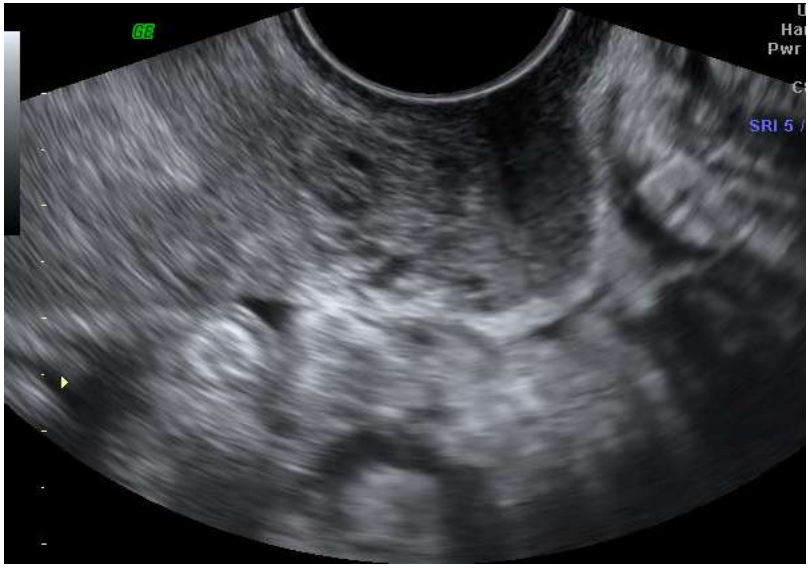


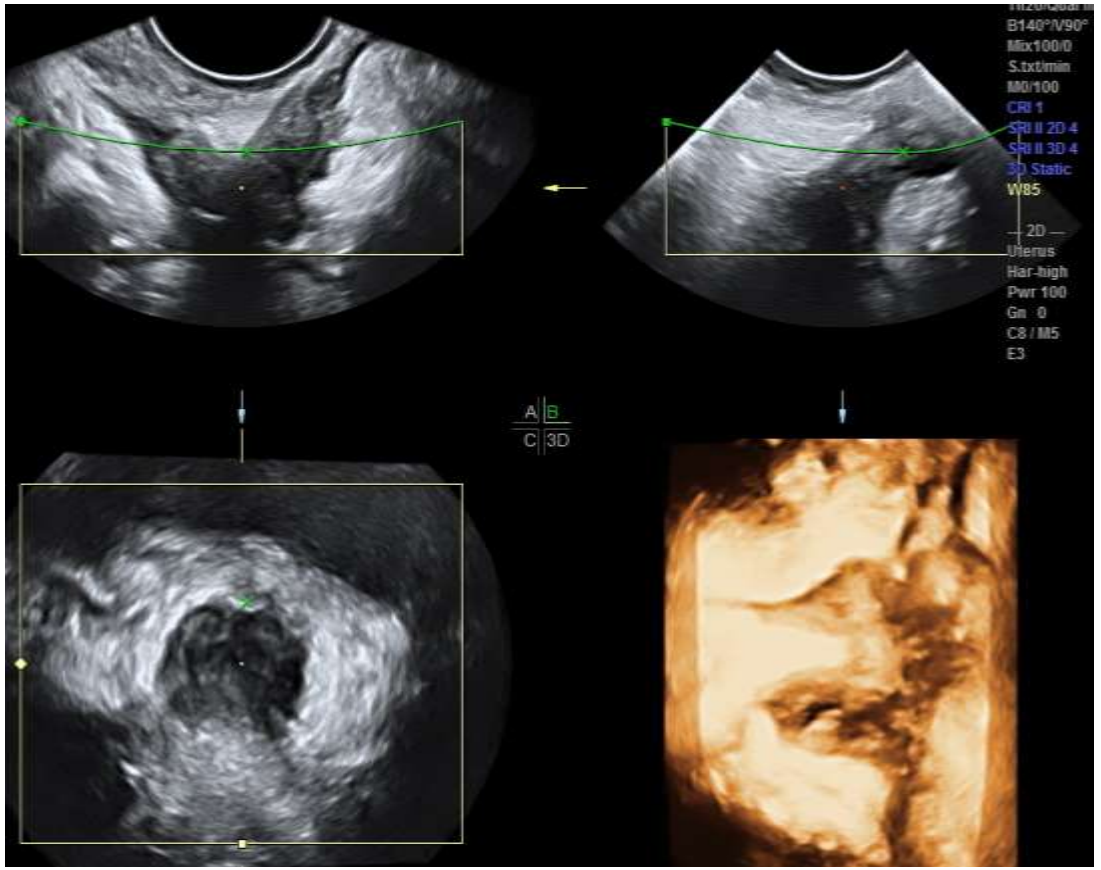
Mucosal infiltration



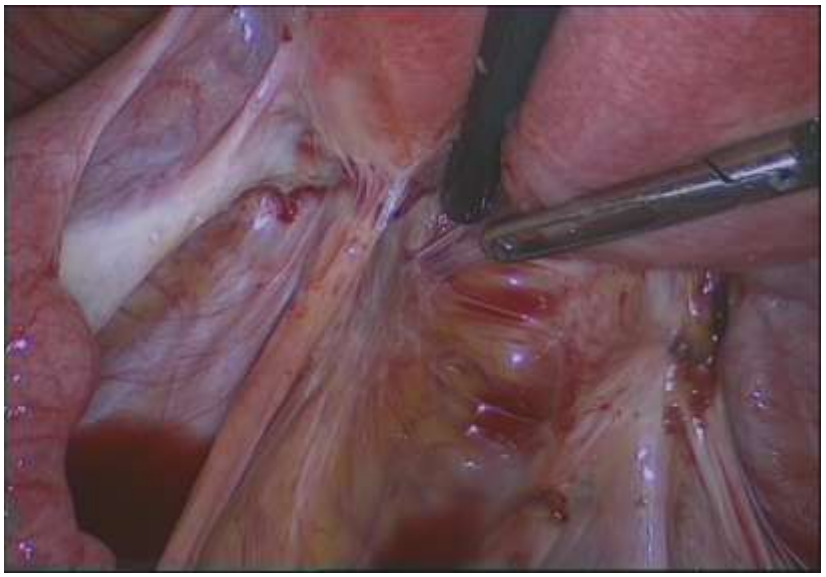
Bowel endometriosis

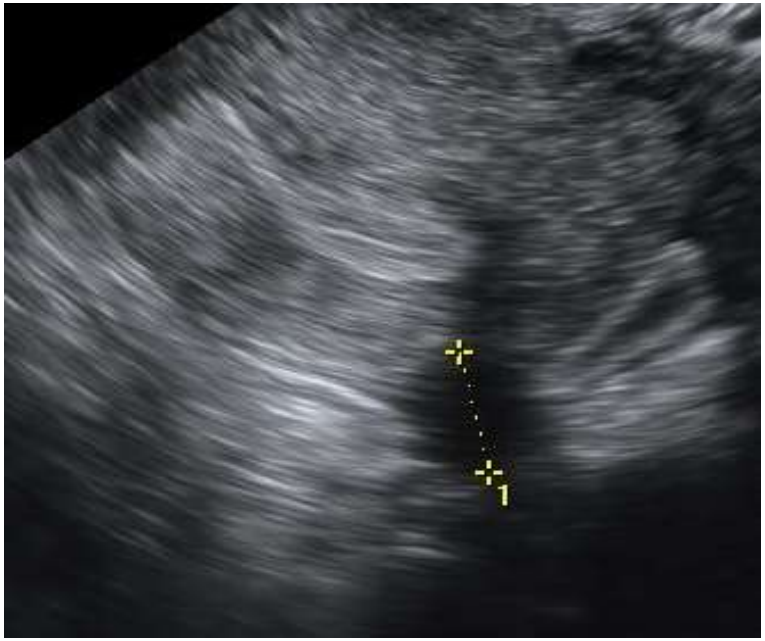






Uterosacral ligament involvement

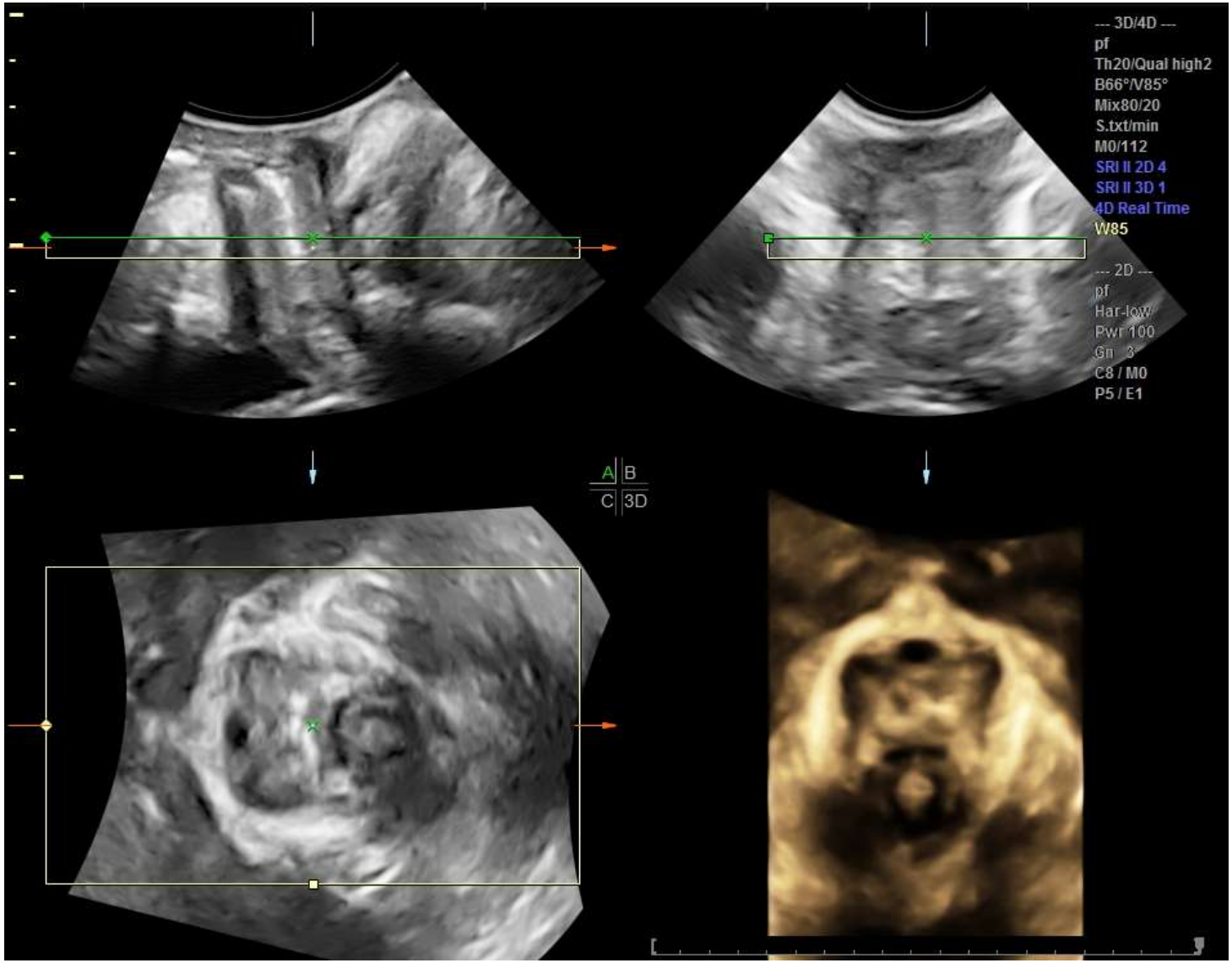




Vagina and rectovaginal septum

- Sensitivity if isolated – 29%
- Implants located on the posterior vaginal fornix close to the uterine cervix can be visualized
- Those located in the posterior vaginal wall and the rectovaginal septum may be missed
- Increasing the amount of ultrasound gel inside the probe cover may aid diagnosis

Rectovaginal nodule



Urinary tract involvement

- 1-2% of endometriosis patients
- 90% of these – bladder
- Non-specific symptoms:
  - mimicking recurrent cystitis with dysuria, urgency, frequency, suprapubic pain, vesical tenesmus, incontinence and hematuria
- Tilt transducer upward, painful
- Hypoechoic, isoechoic, bubble like areas
- Location:
  - Bladder base, dome
- Nodular, comma shaped
- Small internal echoes – 30%

Anterior compartment

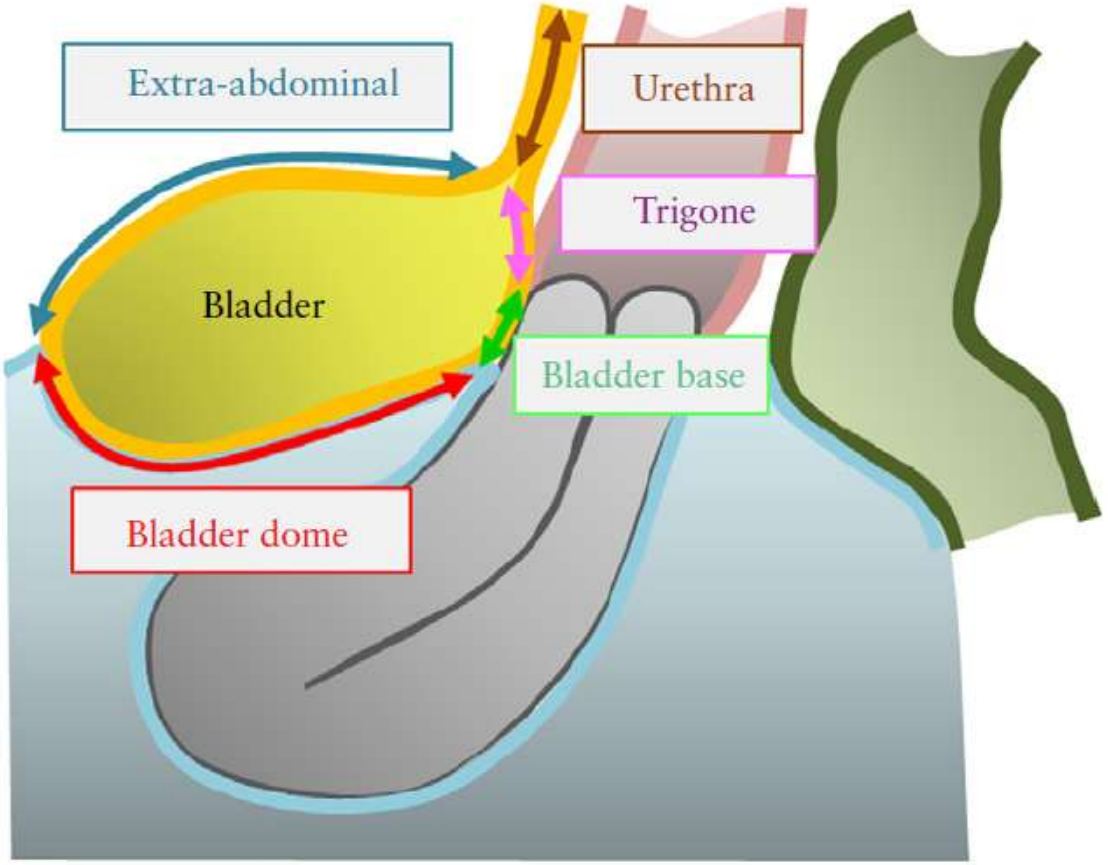
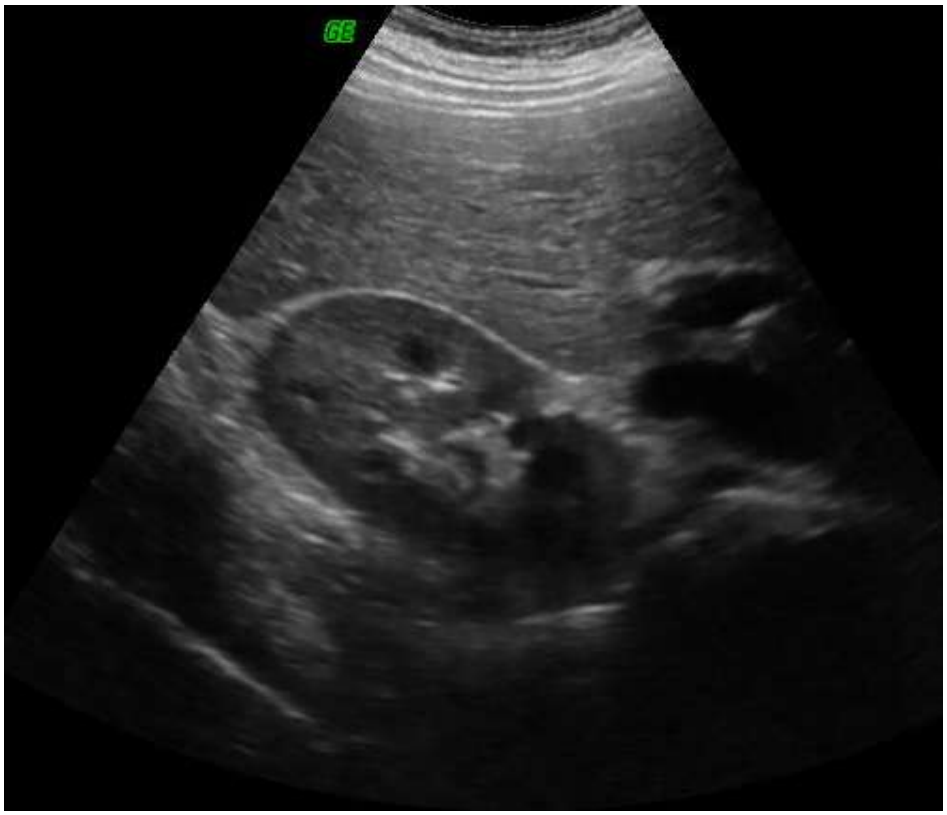
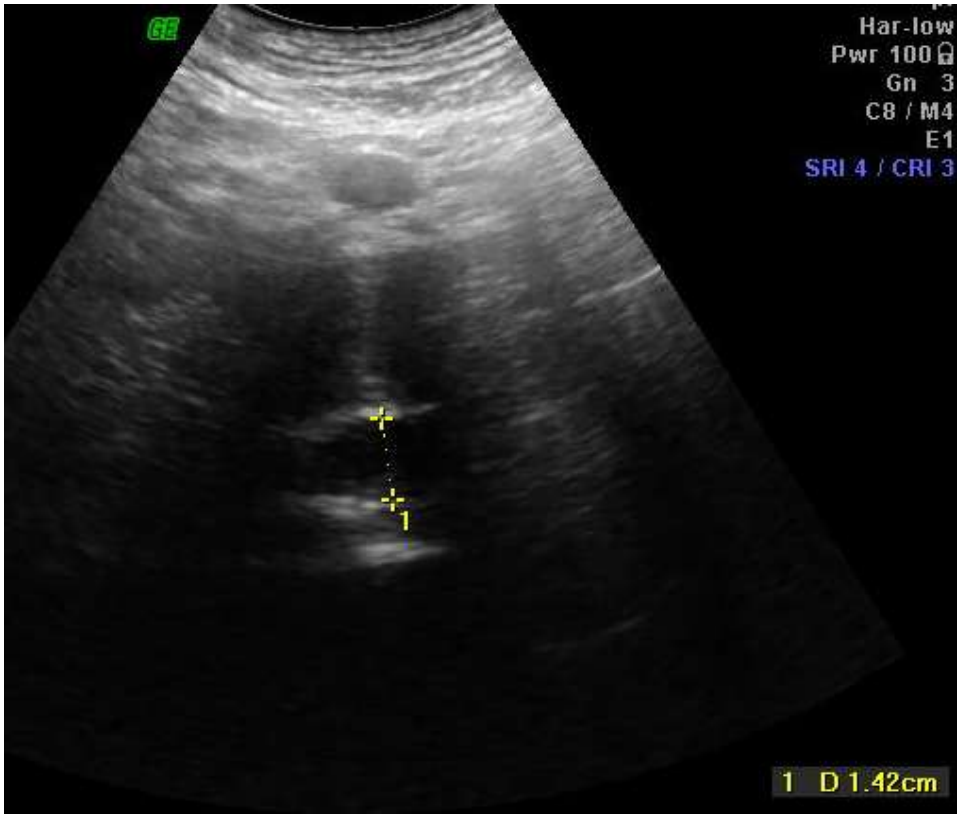


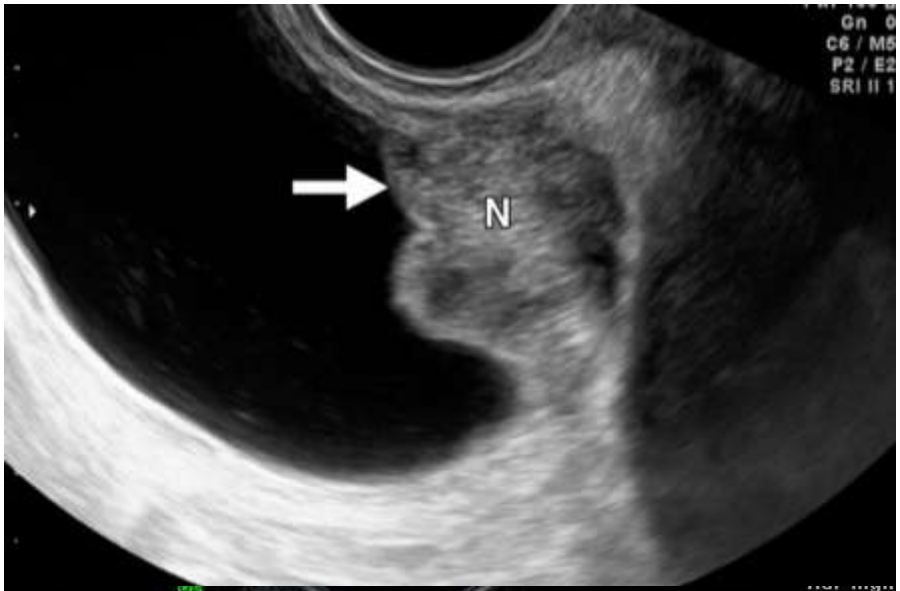
Figure 3 Schematic drawing illustrating the four bladder zones: trigone, bladder base, bladder dome and extra-abdominal bladder. The demarcation point between the base and the dome of the bladder is the uterovesical pouch.

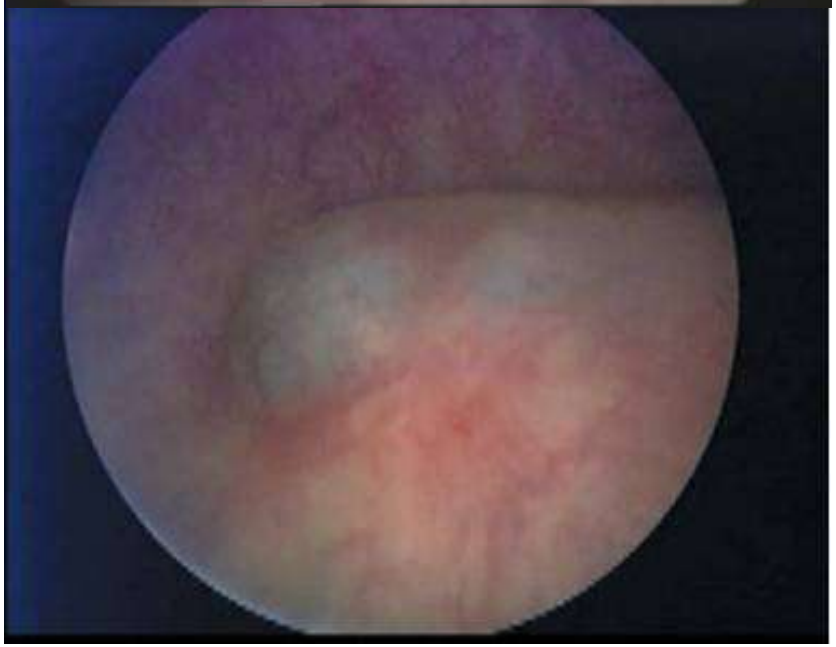
Hydronephrosis



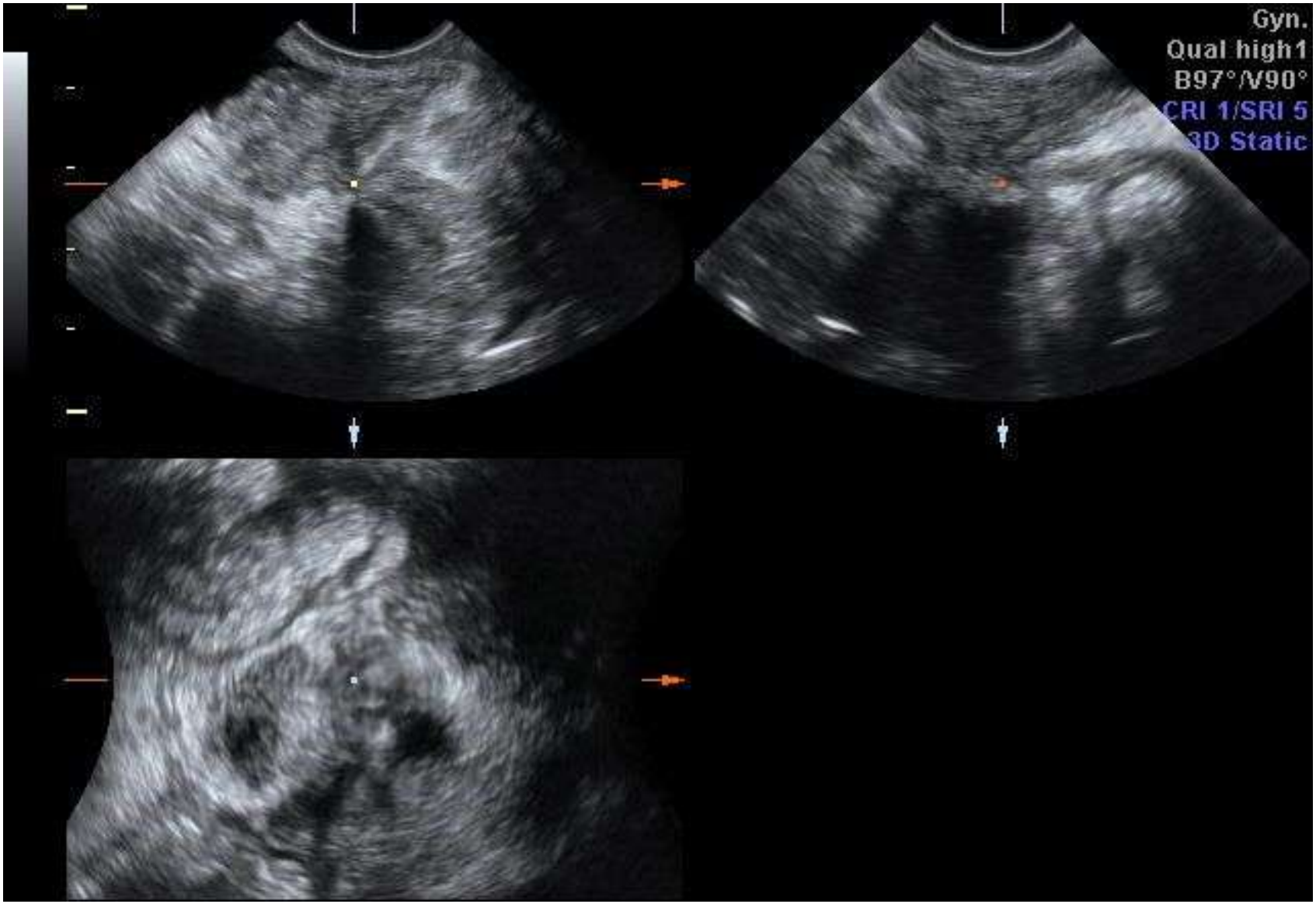


Anterior compartment involvement

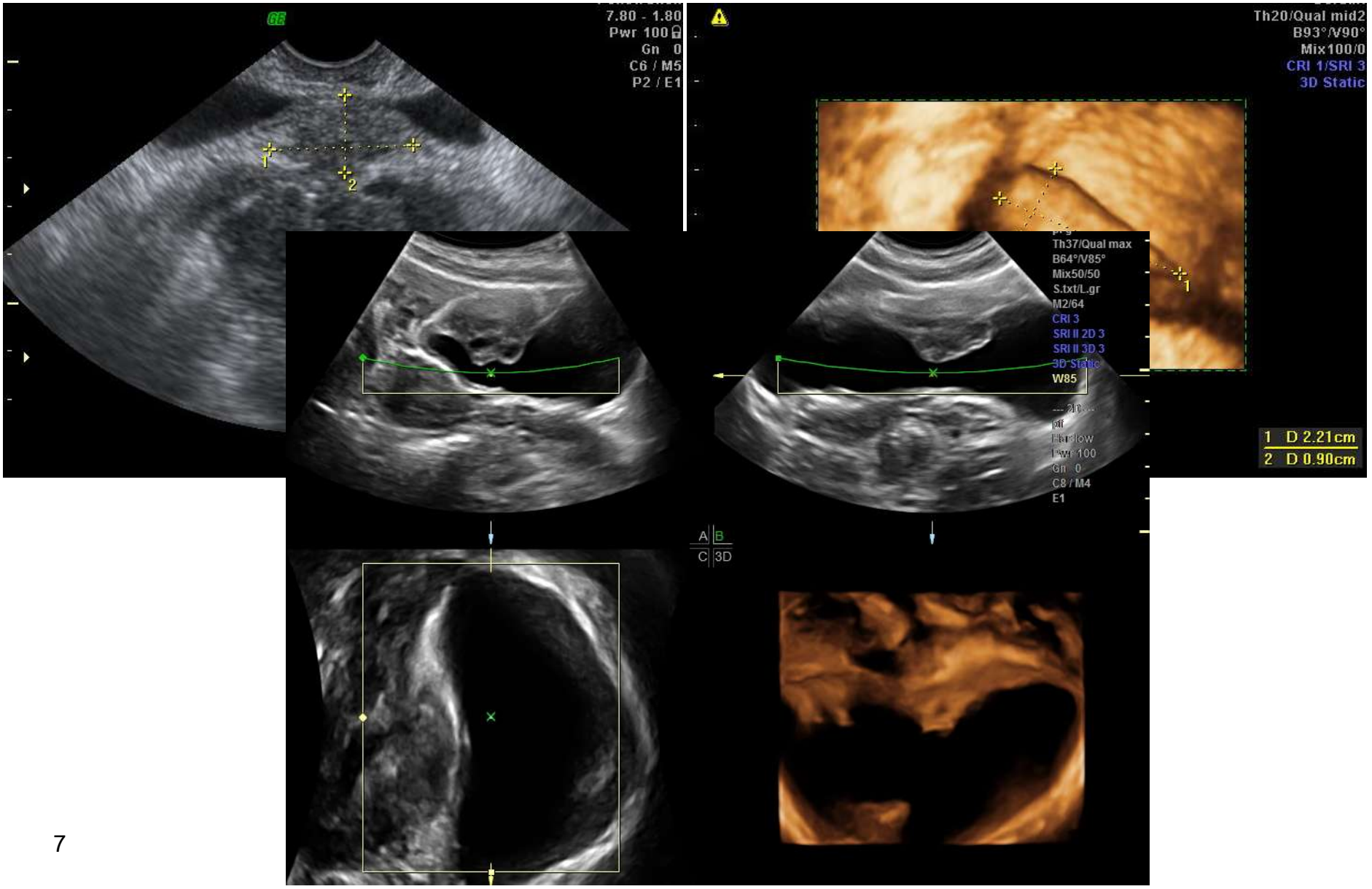




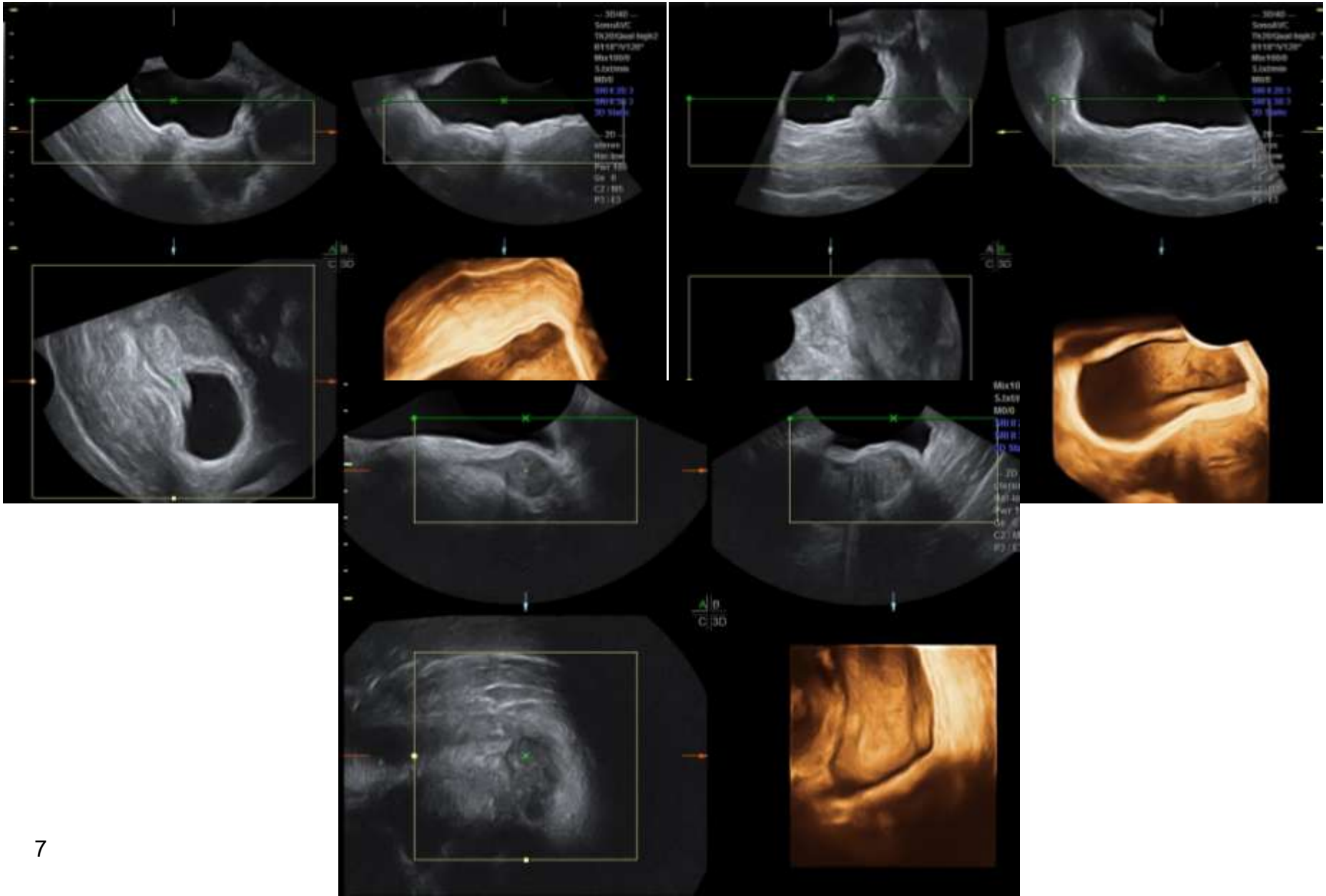
Bladder detrusor endometriosis penetrating from anterior uterine wall - hourglass appearance



Anterior compartment involvement



Virtual cystoscopy



Ureters


Voluson
E6
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RIC5-9-D/GYN
MI 1.0
Tel HaShomer, 117
4.2cm/1.2/25Hz
TIs 0.1
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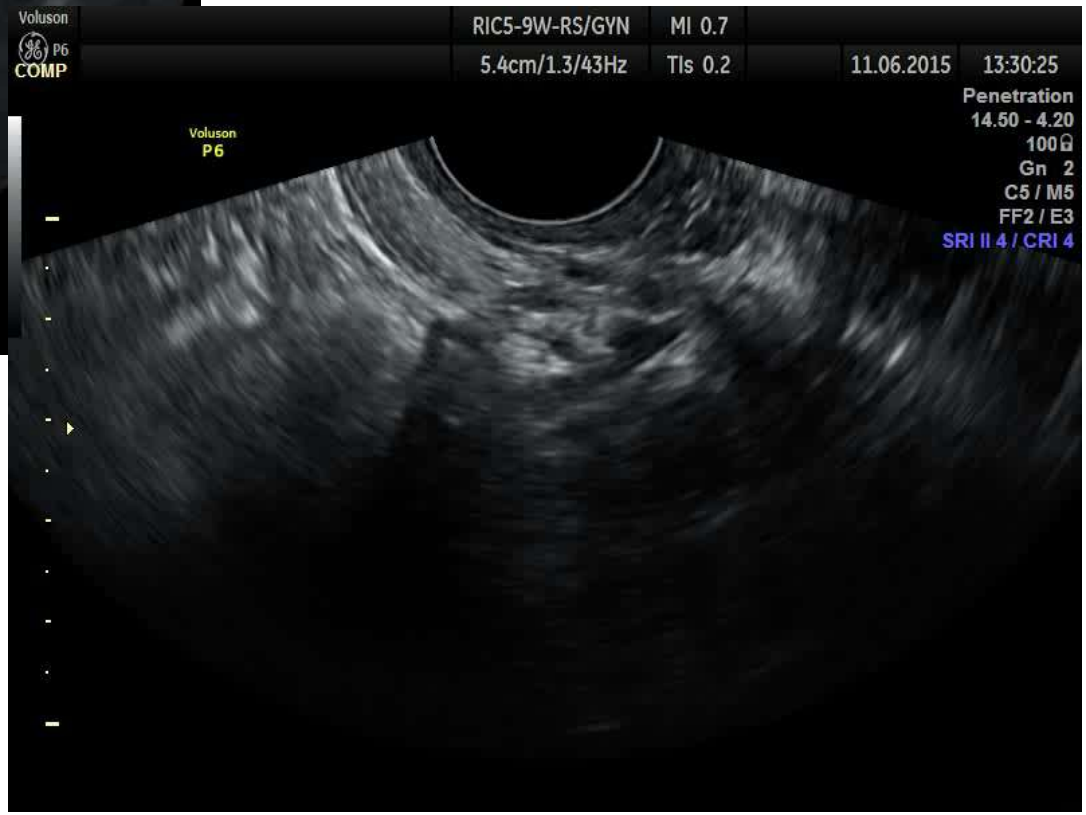
uterus
Har-low
100
Gn -2
C2 / M5
P3 / E3
5RI II 3
Voluson
E6


Voluson
P6
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TIs 0.2
11.06.2015
13:30:25
Penetration
14.50 - 4.20
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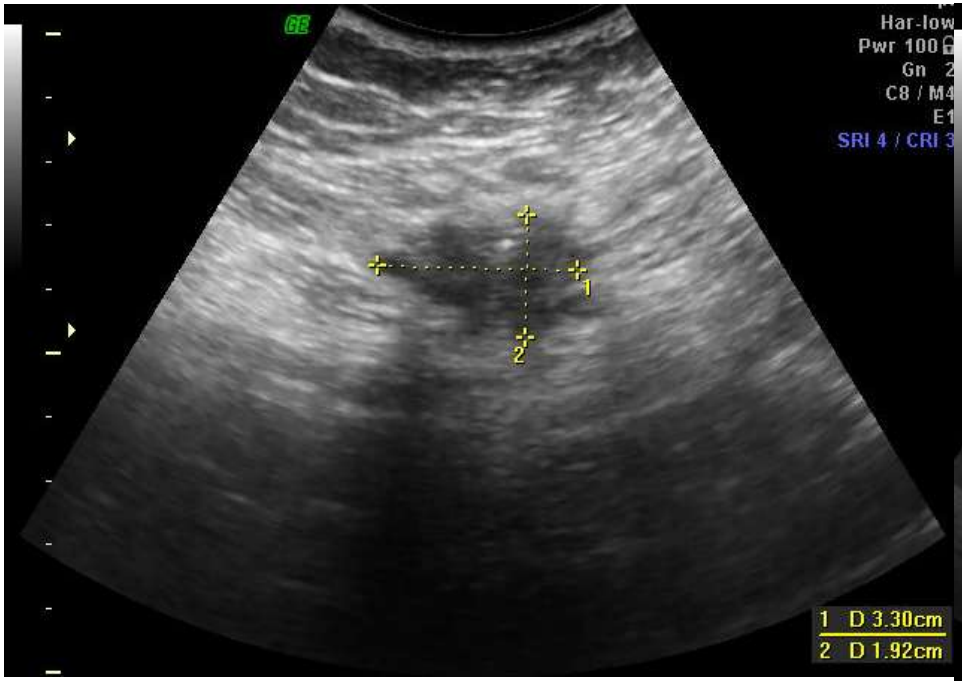
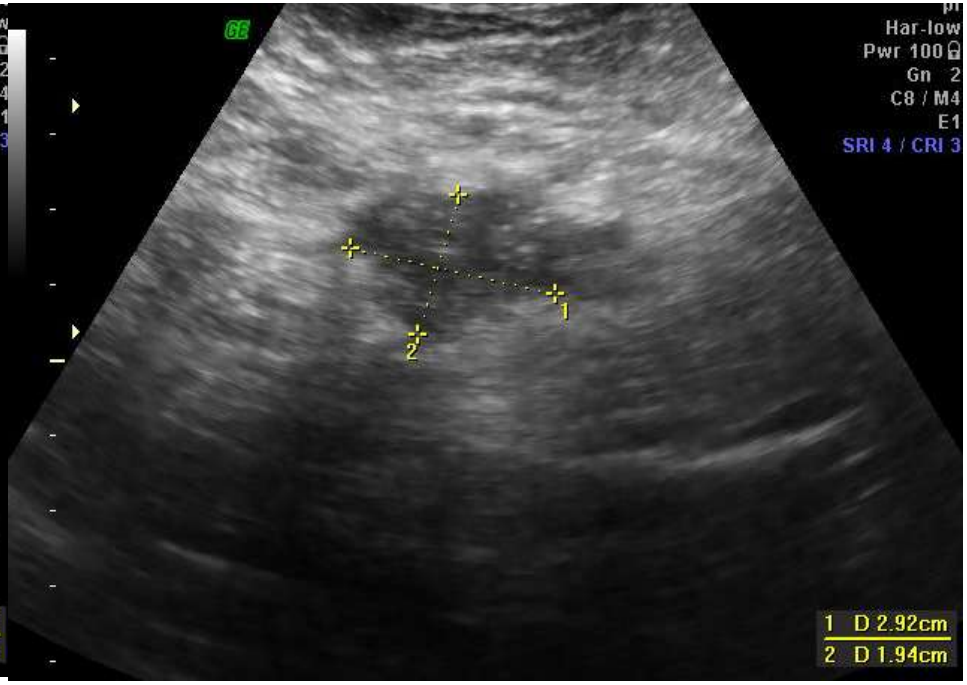
Gn 2
C5 / M5
FF2 / E3
SRI II 4 / CRI 4
Voluson
P6

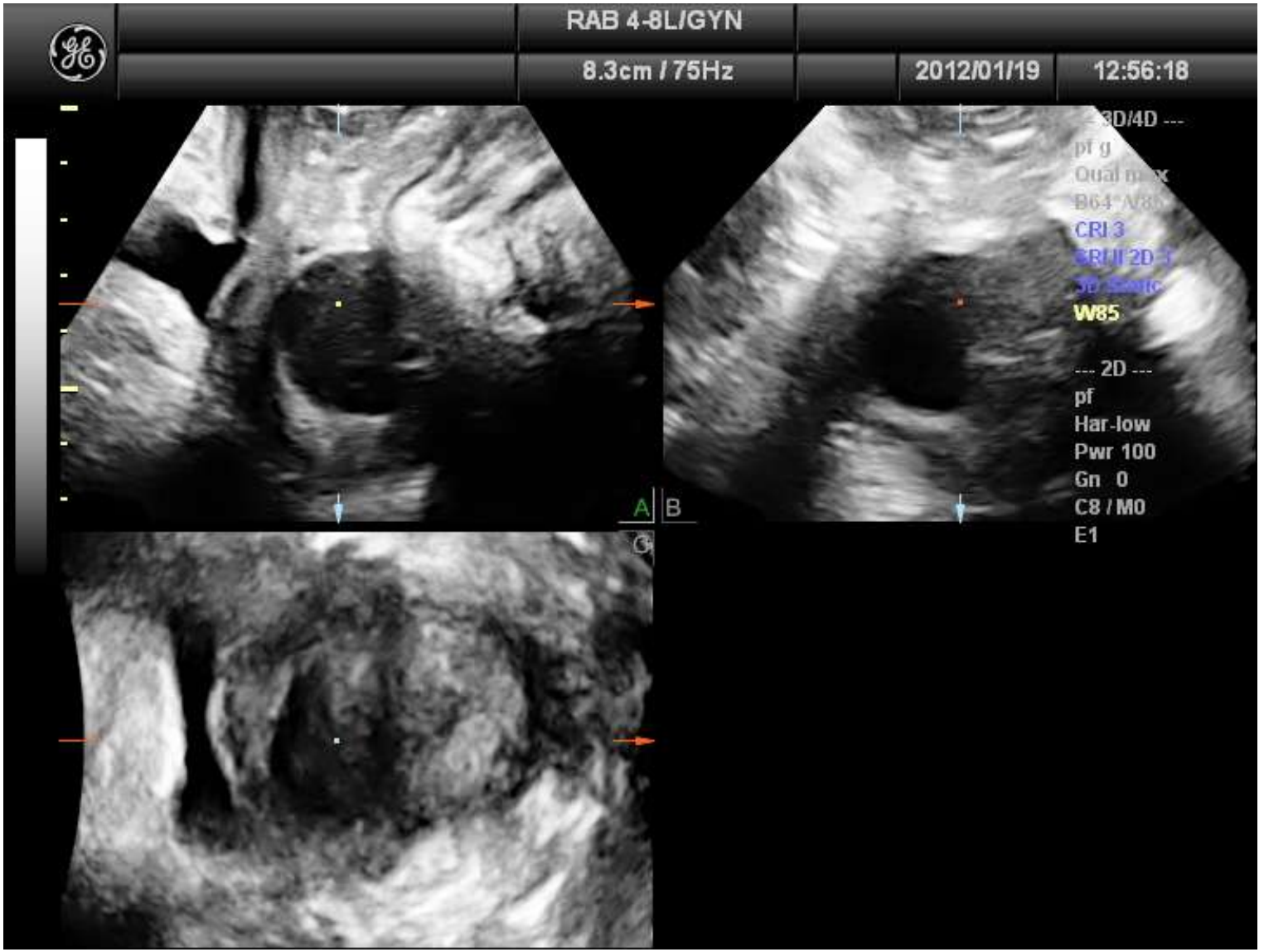
Ureter with lesion

Abdominal wall endometriosis

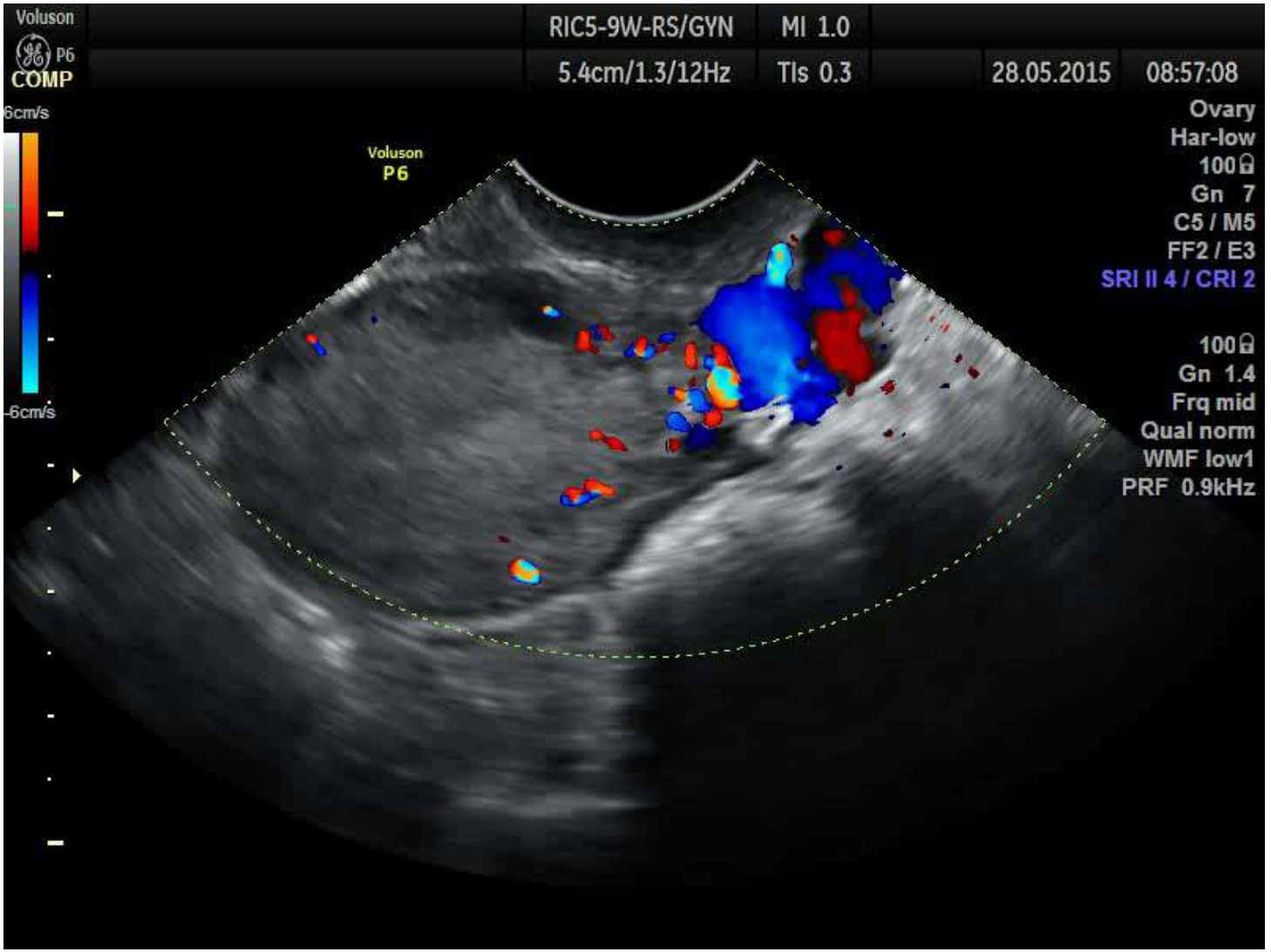




Cervical endometrioma



Pelvic congestion syndrome



Other modalities

Human Reproduction Vol.22, No.12 pp. 3092–3097, 2007
doi:10.1093/humrep/dem187
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Comparison between clinical examination, transvaginal sonography and magnetic resonance imaging for the diagnosis of deep endometriosis

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US better than MRI

?

MRI better than US

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Diagnostic accuracy of physical examination, transvaginal sonography, rectal endoscopic sonography, and magnetic resonance imaging to diagnose deep infiltrating endometriosis

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MRI

Learning curve in the detection of ovarian and deep endometriosis by using Magnetic Resonance
Comparison with surgical results

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Presence of a learning curve!

Also the radiologist have to know and learn the findings associated with presence of the deep endometriosis

→ Creation of dedicated team

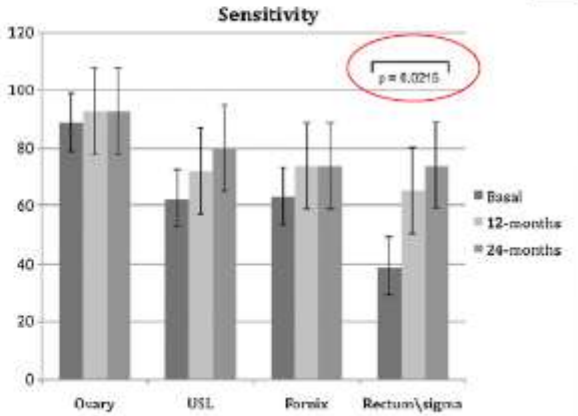


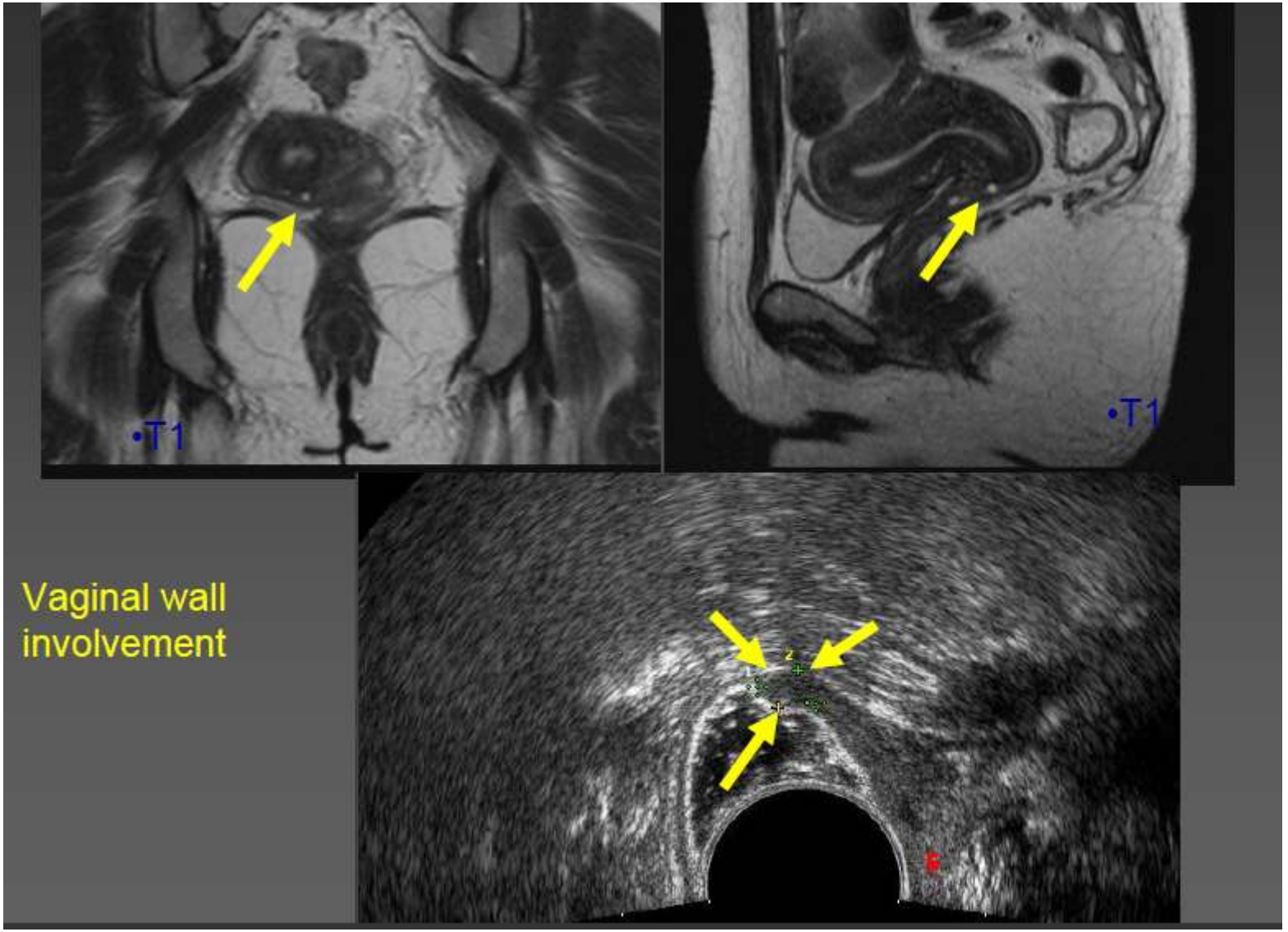
Fig. 5. Graph about sensitivity of ovary, USL, fornix and rectum\sigma localization according to basal, 12 and 24 months. Bar represent Deviation Standard.

Table 1. MRI and tg-TVUS in Recto-sigmoid Endometriosis Detection

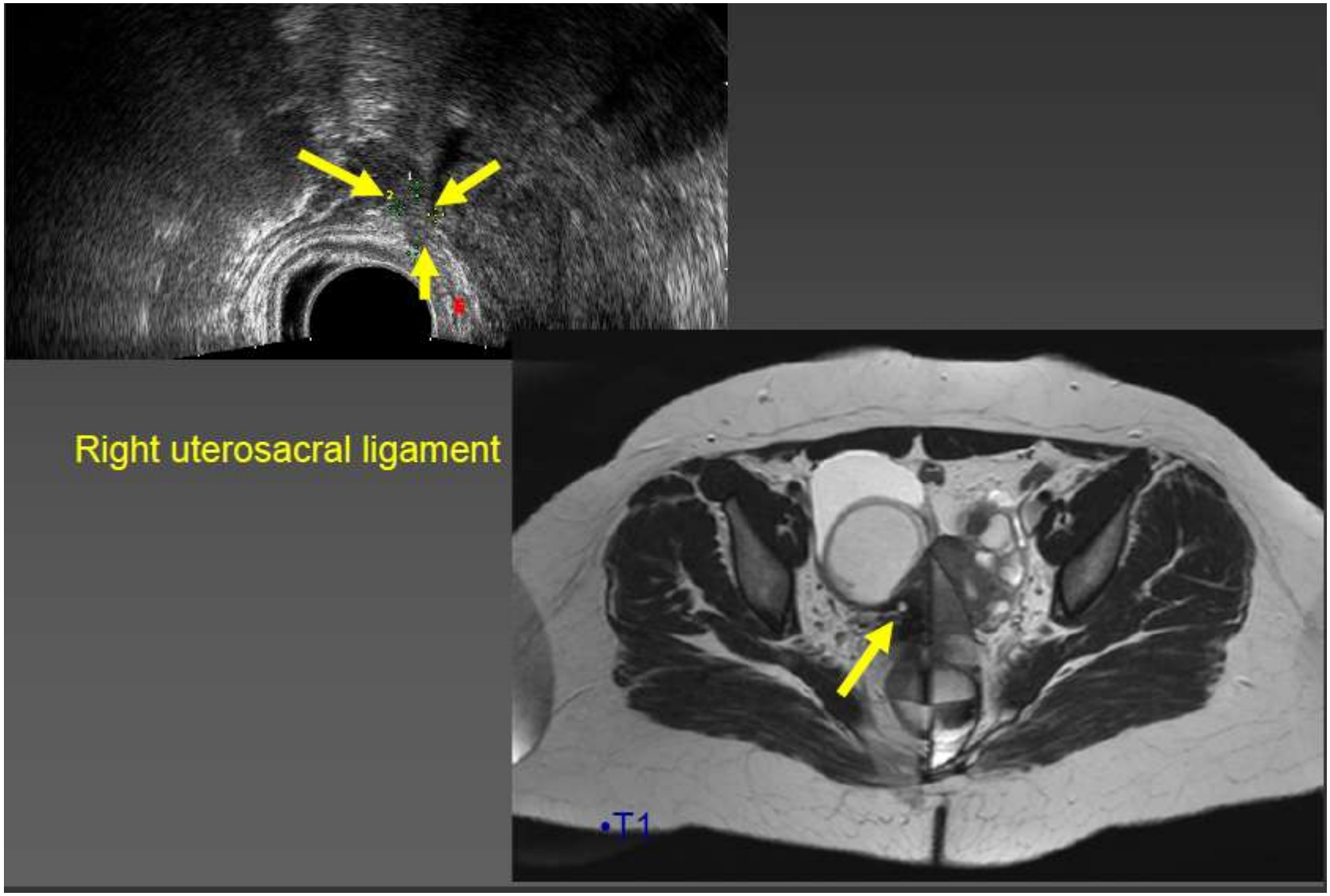
	MRI	tg-TVUS
Specificity	90% (76%-97%) [26/29]	86% (72%-95%) [25/29]
Sensitivity	73% (60%-80%) [22/30]	73% (60%-82%) [22/30]
LR +	7,089	5,317
LR −	0,297	0,309

Saba Saba, JMRI 2011

MRI



MRI



Comparison between modalities

Location	Test	PE (%)	TVUS (%)	RES (%)	MRI (%)
Overall	Sensitivity	83	86	73	95
Uterosacral	Sensitivity	73	78	48	84
	Accuracy	74	77	47	85
Rectosigmoid	Sensitivity	46	94	89	87
	Accuracy	54	96	89	87
Vaginal	Sensitivity	50	47	7	80
	Accuracy	75	79	70	84
Rectovaginal	Sensitivity	18	9	18	55
	Accuracy	87	88	86	94

Diagnosis of deep endometriosis

Diagnosis of deep endometriosis

Authors	Methods	Prevalence	Location	Sensitivity	Specificity
Bazot et al. *Radiology 2004* *N= 195*	MRI	84%	ALL	90%	91%
Kataoka et al. *Radiology 2005* *N= 57*	MRI	53%	cul de sac	68%	76%
Fedele et al. *Obstet Gynecol 1998* *N= 140*	TR	24%	recto-vaginal	97%	96%
Bazot et al. *Hum Reprod 2003* *N= 30*	Rectal endoscopic sonography	93%	ALL	96%	83%
Bazot et al. *Hum Reprod 2003* *N= 30*	TVS	93%	ALL	89%	50%
Dessole et al. *Fertil Steril 2003* *N= 46*	TVS	69%	recto-vaginal	44%	50%
Dessole et al. *Fertil Steril 2003* *N= 46*	TVS sonovaginography	69%	recto-vaginal	91%	86%
Bazot et al. *UOG 2004* *N= 142*	TVS	56%	ALL	78%	95%
Guerriero et al. *Fertil Steril 2007* *N= 50*	TVS tenderness-guided	62%	ALL	90%	95%

Barium enema

- barium enema examination of a 32-year-old woman with chronic pelvic pain demonstrates an abnormal mass defect in the rectosigmoid area

TVS first line imaging

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Advanced Access publication on December 17, 2008 doi:10.1093/humrep/den405

human reproduction

ORIGINAL ARTICLE *Gynaecology*

Preoperative work-up for patients with deeply infiltrating endometriosis: transvaginal ultrasonography must definitely be the first-line imaging examination

Mathilde Piketty[1], Nicolas Chopin[1], Bertrand Dousset[2], Anne-Elodie Millischer-Bellaische[3], Gilles Roseau[1], Mahaut Leconte[2], Bruno Borghese[1,4,5], and Charles Chapron[1,4,5,6]

How can we improve?

- Develop a reporting system
- Operator training
- **Bring the sonographer into the OR**
  - Literally
  - Videos and audit
- Feedback
- Shorten the learning curve
- Dedicated multidisciplinary team

Learning curve

Disease location	Cases (n=94)	Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)	Accuracy (%)
Right endometrioma	42 (55.3%)	100	100	100	100	100
Left endometrioma	42 (55.3%)	100	100	100	100	100
Uterosacral ligaments	49 (52.1%)	95.9	93.3	94	95.5	94.7
Posterior compartment	50 (53.2%)	96.2	95.1	96.2	95.1	95.7
Bladder	11 (11.7%)	90.9	100	100	98.8	98.9

Principles

- “Hard markers” – endometrioma, hydrosalpinx
- “Soft markers” – adhesions (mobility), pain
- Deeply infiltrating endometriosis (DIE)
- Specific signs:
  - ‘ear sign’, ‘flapping sail sign’, ‘acoustic streaming’, ‘kissing ovaries’, ‘sliding sign’
- Additional techniques:
  - Color Doppler
  - 3D

Summary

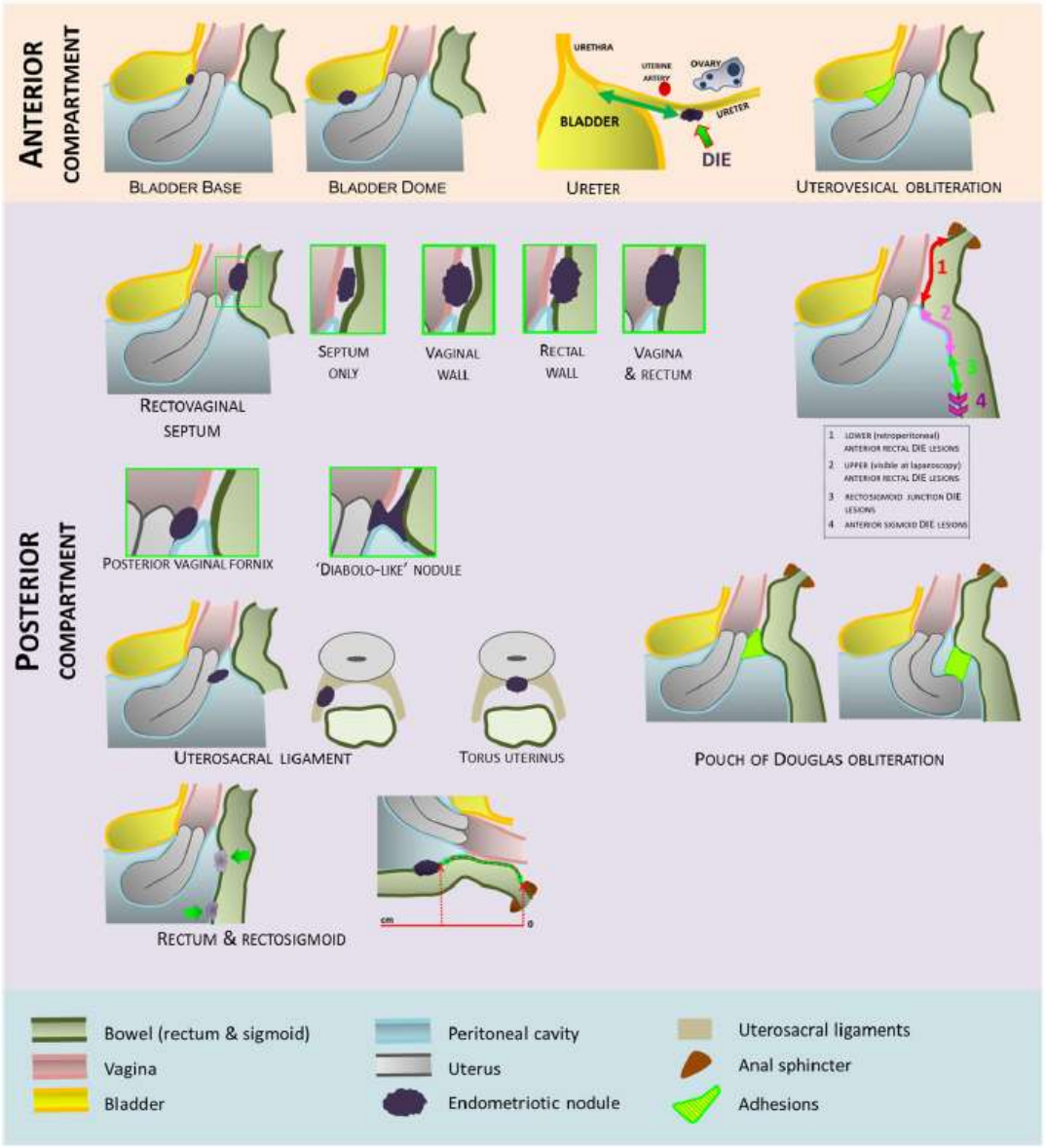
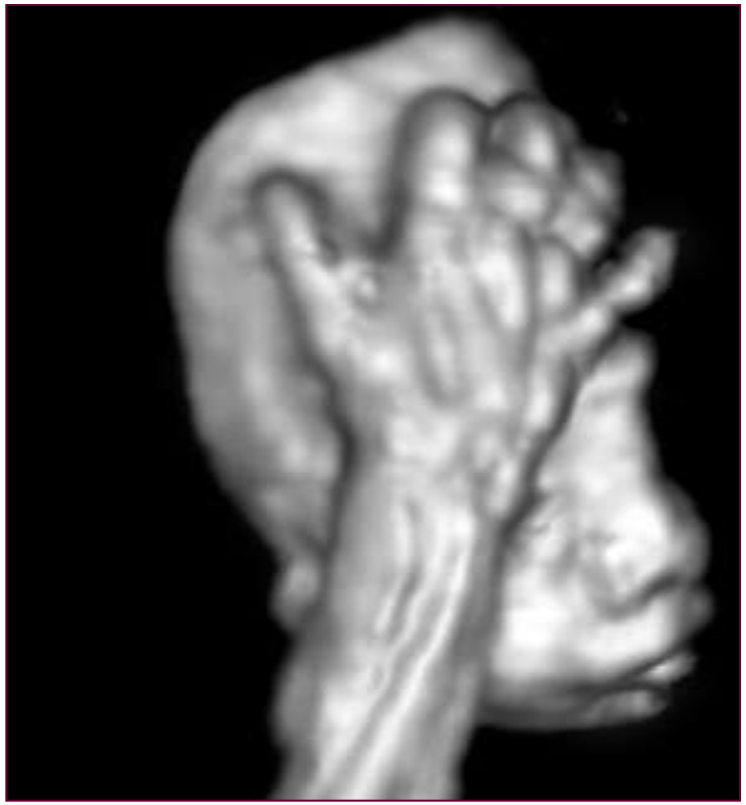


Figure 13 Schematic drawings giving overview of anterior and posterior compartmental locations of deep infiltrating endometriosis.

Conclusion

- TVS should be the first-line imaging technique to select patients for surgery and to predict the presence (and localization) of severe endometriosis
- Allows planning of multidisciplinary surgery
- Superficial endometriosis is not clearly visible at ultrasound, but ‘soft markers’ are important to increase diagnostic sensitivity
- In doubtful or difficult cases other preoperative investigations may be used
- A “normal” ultrasound does not rule out mild peritoneal endometriosis
- Heavily operator dependent

Thank you



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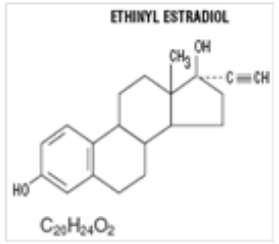
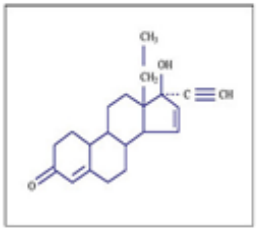
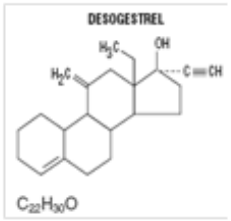
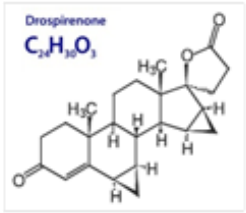
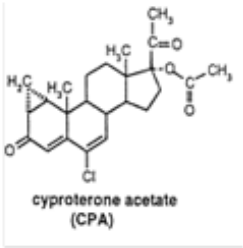
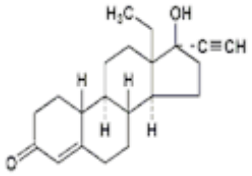
סיכום גלולות

מרכיב אסטרוגני (מ"ג) ethinylestradiol	מרכיב פרוגסטרוני				
	Gestodene 0.06-0.075 מ"ג	Desogestrel 0.15 מ"ג	Drospirenone 3 מ"ג	Cyproterone acetate 2 מ"ג	Levonorgestrel 1.5 מ"ג
					
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	הרמונט	פמינט			
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				אסטל	