Adenomyosis

Getting the diagnosis right

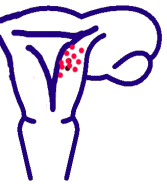
Joel Naftalin, MD, MRCOG

Consultant Gynaecologist

University College Hospital London, United Kingdom

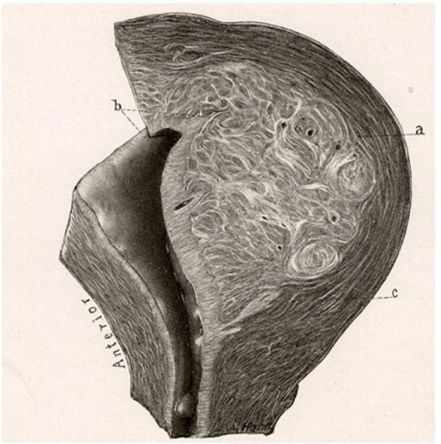
The aim of this talk

- Explain importance of diagnosing adenomyosis
- Explain why we should diagnose it *on ultrasound*
- Show *how* to diagnose adenomyosis?
- Diagnostic pitfalls



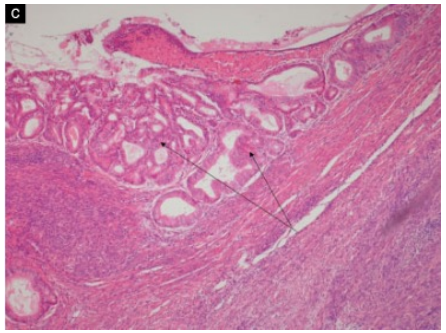
History
Adenomyosis & ultrasound

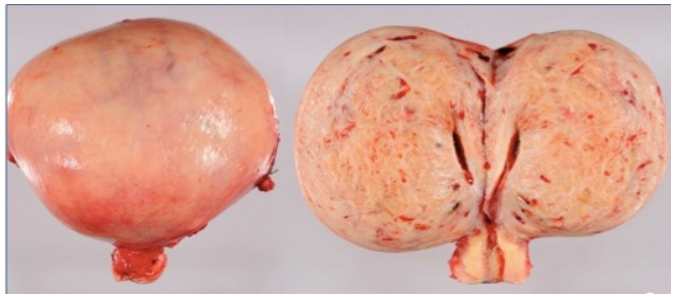
Adenomyosis = enigma

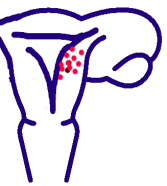


Poorly understood

- How common is it?
- Does it cause menorrhagia?
- Does it cause pain?
- Effect of fertility
- Effect on pregnancy
- Conservative treatments

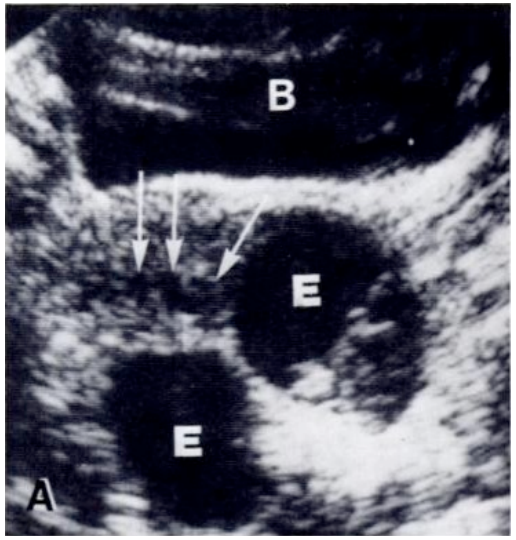


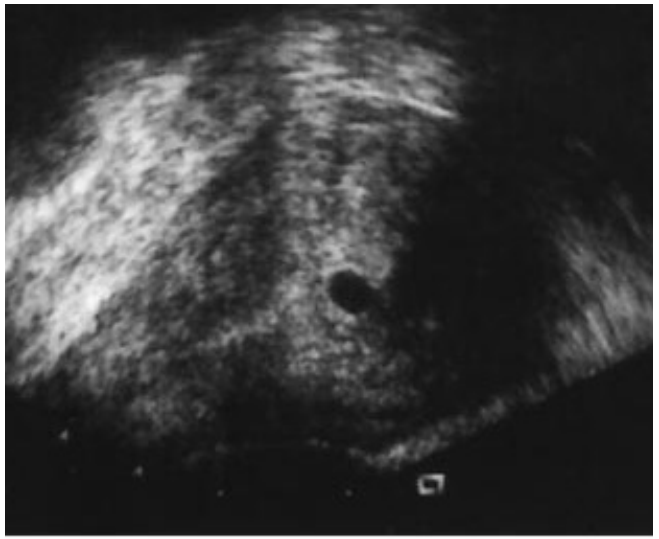


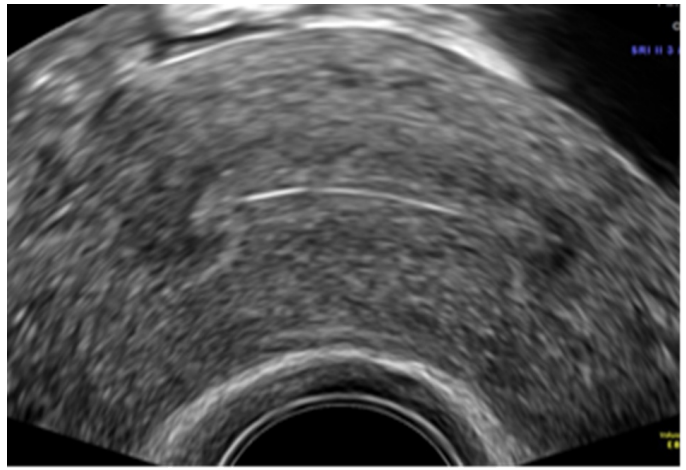


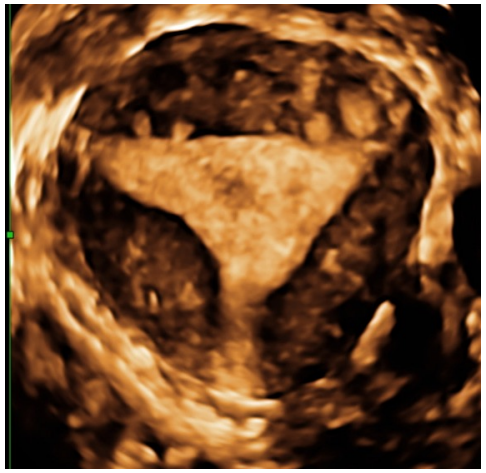
History
Adenomyosis & ultrasound

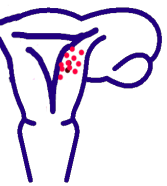
Improvements over time











History
Adenomyosis & ultrasound

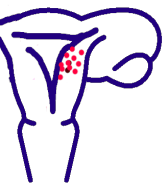
Research advances

Histological diagnosis

- Highly selected population
- Confusion

Ultrasound diagnosis

- More generalisable population
- More valid conclusions



Why diagnose adenomyosis?

- It’s common
- It has a significant symptom burden
    - Menstrual symptoms
    - Fertility
    - Obstetrics
- Diagnosis can be therapeutic
- Misdiagnosis can be dangerous

Adenomyosis
Prevalence

human reproduction ORIGINAL ARTICLE *Gynaecology*

How common is adenomyosis? A prospective study of prevalence using transvaginal ultrasound in a gynaecology clinic

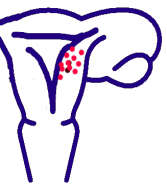
J. Naftalin, W. Hoo, K. Pateman, D. Mavrelos, T. Holland, and D. Jurkovic*

MAIN RESULTS AND THE ROLE OF CHANCE: Adenomyosis was present in 206/985 [20.9% (95% CI: 18.5–23.6%)] women included in the study. Multivariate analysis showed that the prevalence of adenomyosis was significantly associated with women's age, gravidity and pelvic endometriosis ($P < 0.001$). In women who subsequently underwent hysterectomy, there was a good level of agreement between the ultrasound and histological diagnosis of adenomyosis [$\kappa = 0.62$ ($P = 0.001$), 95% CI (0.324, 0.912)].

Table VI Results of multivariate analysis looking at associations between demographic and clinical variables and adenomyosis.

Variable	Category/term	Odds ratio (95% CI)	*P*-value
Age[a]	Linear term	34.3 (9.9, 118)	<0.001
	Squared term	0.70 (0.62, 0.80)	
Gravidity	0	1	
	1	1.83 (1.09, 3.06)	
	2	2.46 (1.44, 4.30)	
	3–5	2.66 (1.62, 4.28)	
	6+	4.90 (2.57, 9.35)	<0.001
Endometriosis	No	1	
	Yes	4.06 (2.25, 7.33)	<0.001

[a]Odds ratios given for a 10-unit increase in explanatory variable.

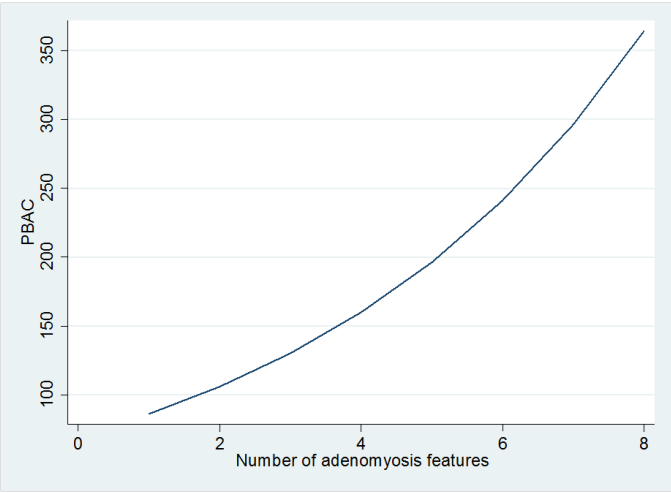


human reproduction ORIGINAL ARTICLE *Gynaecology*

Is adenomyosis associated with menorrhagia?

J. Naftalin, W. Hoo, K. Pateman, D. Mavrelos, X. Foo, and D. Jurkovic*

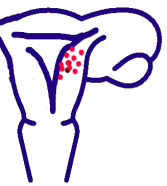
Gynaecology Diagnostic and Outpatient Treatment Unit, University College Hospital, London, UK



Model 2			
BMI[a]	–	1.39 (1.11, 1.73)	0.003
Gravidity	0	1	<0.001
	1	0.31 (0.16, 0.59)	
	2–3	0.91 (0.51, 1.61)	
	4+	2.01 (1.04, 3.92)	
Adenomyosis features (categorical)	None	1	0.002
	1–3	0.73 (0.39, 1.36)	
	4+	3.80 (1.62, 8.91)	
Fibroids (combined)	None	1	<0.001
	Any fibroids	1.49 (0.88, 2.53)	
	Submucous fibroids	6.16 (2.93, 12.9)	
Endometrial polyps	No	1	0.02
	Yes	2.87 (1.16, 7.11)	

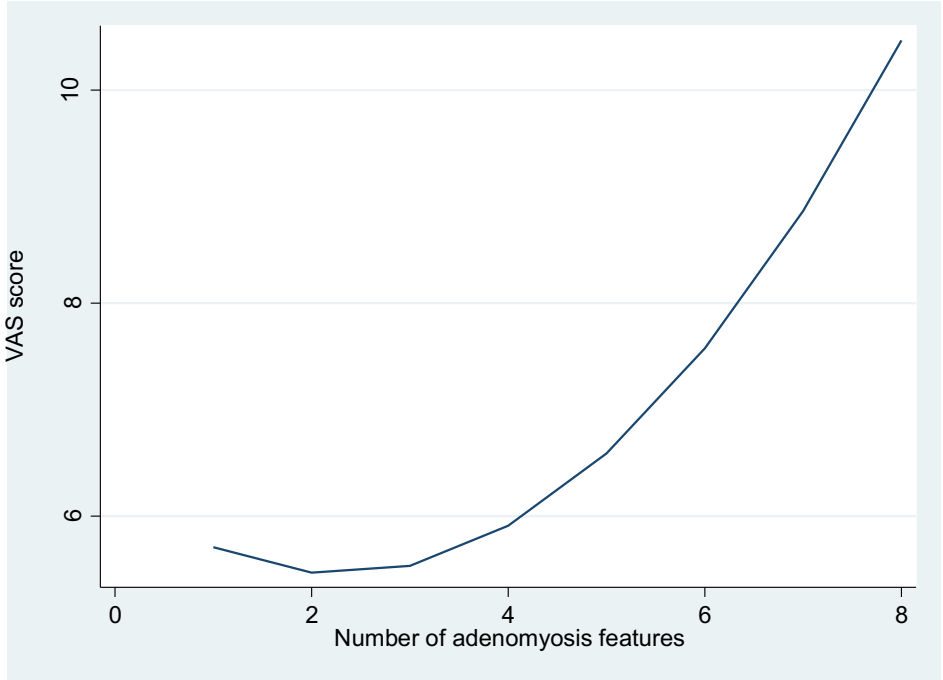
[a]Odds ratios given for 5-unit increase in explanatory variable.

US feature	p-value
Asymmetrical myometrium	**0.002**
Parallel shadowing	0.18
Linear striation	0.88
Myometrial cysts	0.06
Hyperechoic lesions	0.53
Adenomyoma	0.82
Irregular EMJ	**0.02**

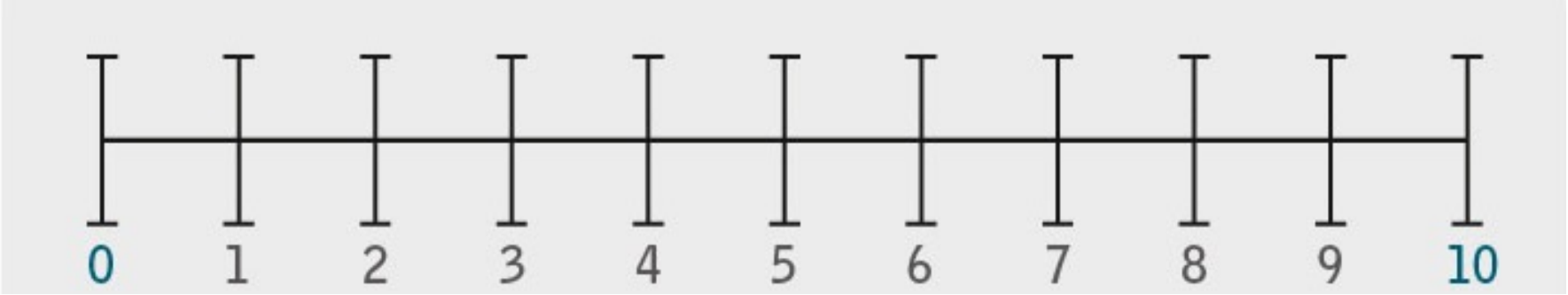


Association between ultrasound features of adenomyosis and severity of menstrual pain

J. NAFTALIN●, W. HOO, N. NUNES, T. HOLLAND, D. MAVRELOS and D. JURKOVIC



Variable	Coefficient	p-value
Adenomyosis	0.94	<0.001
Endometriosis	1.36	0.001



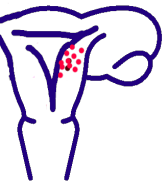
Adenomyosis
Fertility

Effects of adenomyosis on in vitro fertilization treatment outcomes: a meta-analysis

Grace Younes, M.D. and Togas Tulandi, M.D., M.H.C.M.
Department of Obstetrics and Gynecology, McGill University, Montreal, Quebec, Canada

11 studies: Patients with adenomyosis (n=519) vs without adenomyosis (n=1535)

Implantation rate:	**Clinical pregnancy rate:**	**Miscarriage rate:**	**Live birth rate:**
Odds Ratio 0.66	Odds ratio 0.75	Odds Ratio: 2.2	Odds ratio 0.59
34% reduced	**25% lower**	**More than double**	**41% reduced**



Adenomyosis

«complications»
In pregnancy and labor

Miscarriage

RR 2.12, 95% CI 1.20–3.75

Placenta previa

(OR 1.65, 95%CI 1.18–2.32)

Preeclampsia

OR 1.21 95%CI 1.05-1.39

Stillbirth

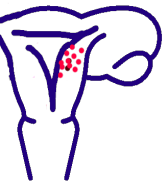
(OR 2.29, 95% CI 1.24–5.22)

Prematurity

(aOR: 3.09, 95% CI; 1.88-5.09)

Intrauterine growth restriction

(aOR: 3.23, 95% CI; 1.71-6.09)

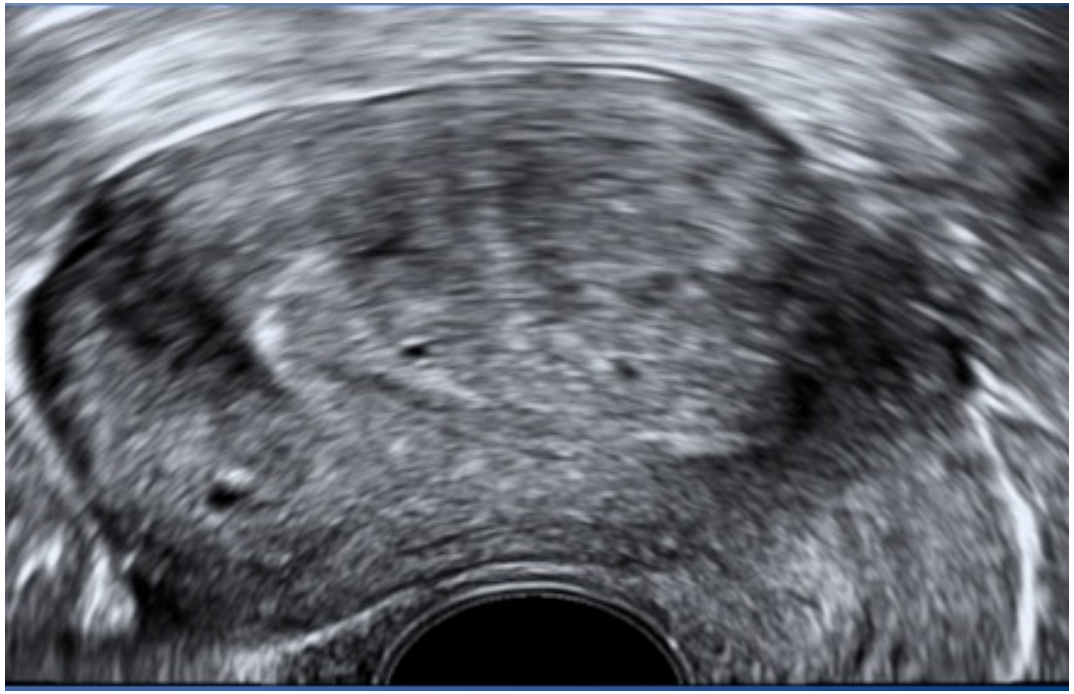


Vigano 2012, Vercellini 2012, Stephansson 2009, Hjordt Hansen, Ek 2015, Koninckx 2018, Hashimoto 2018, Bruun 2018, Tamura 2017, Zullo 2017, Lalani 2017, Aris 2014, Healy 2010, Vercellini 2012, Lalani 2017

Case 1

39 year old, Infertility

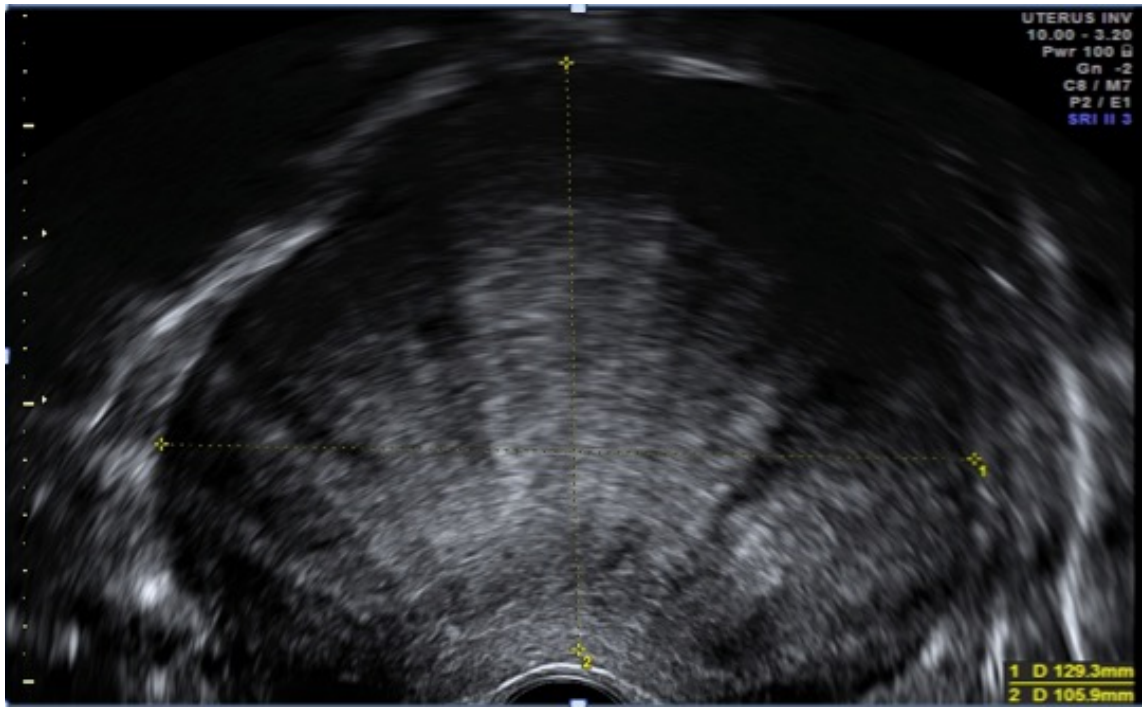
- 39 year old planning to undergo IVF
- Booked for fibroid resection after SIS showed sub-mucous fibroid
- Hysteroscopy – normal cavity

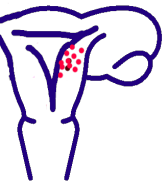


Case 2

38 year-old, Infertility

Case report





Unexpected outcome (positive or negative) including adverse drug reactions

CASE REPORT

An unexpected diagnosis of adenomyosis in the subfertile woman

Tia Hunjan,[1] Andrew Davidson[2]

SUMMARY

A 38-year-old nulliparous female presented to an assisted conception clinic with subfertility and a long-standing history of dysmenorrhoea. Transvaginal ultrasound revealed two lesions in the body of the uterus, which were presumed to be fibroids. A decision was made to remove these lesions prior to attempting in vitro fertilisation (IVF). However, on laparotomy, deeply penetrating adenomyosis was discovered, resulting in an unexpected hysterectomy and significant blood loss. Based on our experience, we highlight the importance of suspecting a diagnosis of adenomyosis preoperatively and the methods by which this diagnosis can be made, in order to avoid potential unforeseen outcomes as described in this case. We discuss conservative management options for this condition, particularly in women wishing to preserve fertility.

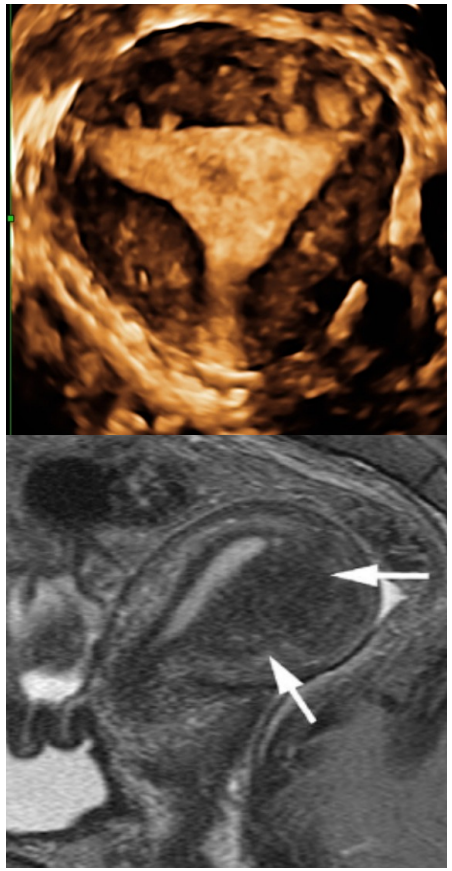
CASE PRESENTATION

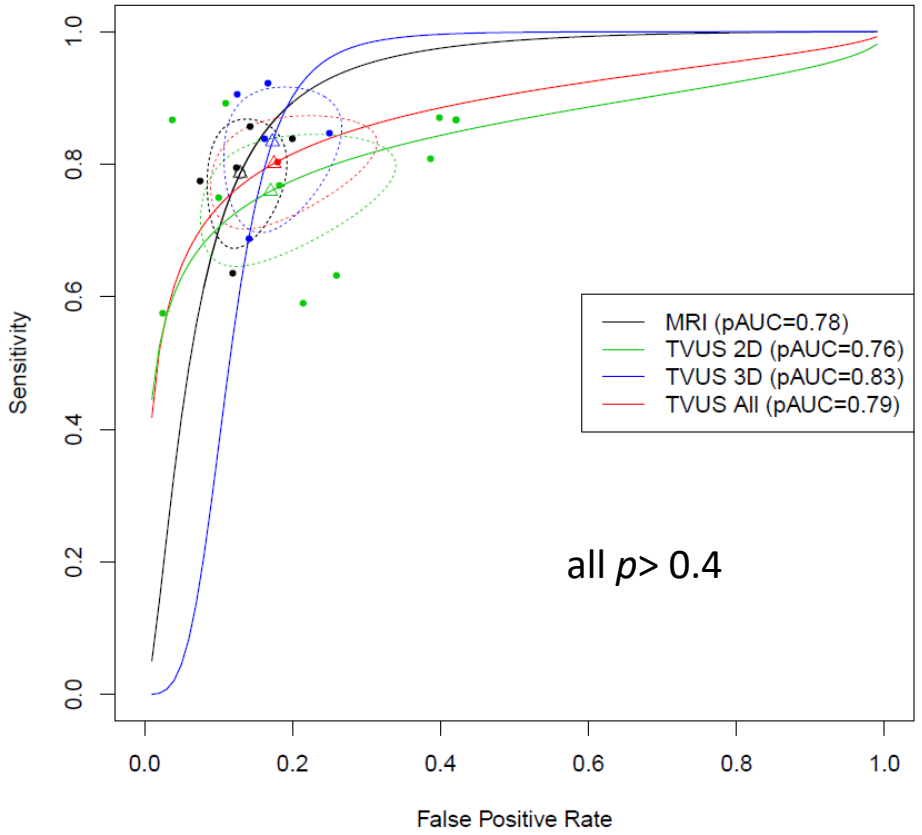
A 38-year-old nulliparous female presented to an assisted conception clinic with subfertility. Her husband had two children from a previous marriage and had a vasectomy 8 years previously. An attempt at Testicular Sperm Aspiration and Percutaneous Epididymal Sperm Aspiration (TESA-PESA) with a view to performing intracytoplasmic sperm injection had been successful. Thus she was hoping to conceive via in vitro fertilisation (IVF). She had a history of subfertility with severe dysmenorrhoea and regular cycles. She denied any menorrhagia. Her medical history was otherwise unremarkable and she did not take any regular medications. She had no significant smoking or alcohol history. Pelvic examination revealed a bulky uterus.

INVESTIGATIONS

Adenomyosis Imaging

MRI and transvaginal ultrasound perform equally well!





Pooled sensitivity

MRI 78% (95%CI 70%–84%)

2D TVUS 74% (95%CI 68%–79%)

3D TVUS 84% (95%CI 77%–89%)

Pooled specificity

MRI 88% (95%CI 83%–92%)

2D TVUS 76% (95%CI 71%–79%)

3D TVUS 84% (95%CI 77%–89%)

Dueholm 2006, Tellum et al 2019

Conclusion

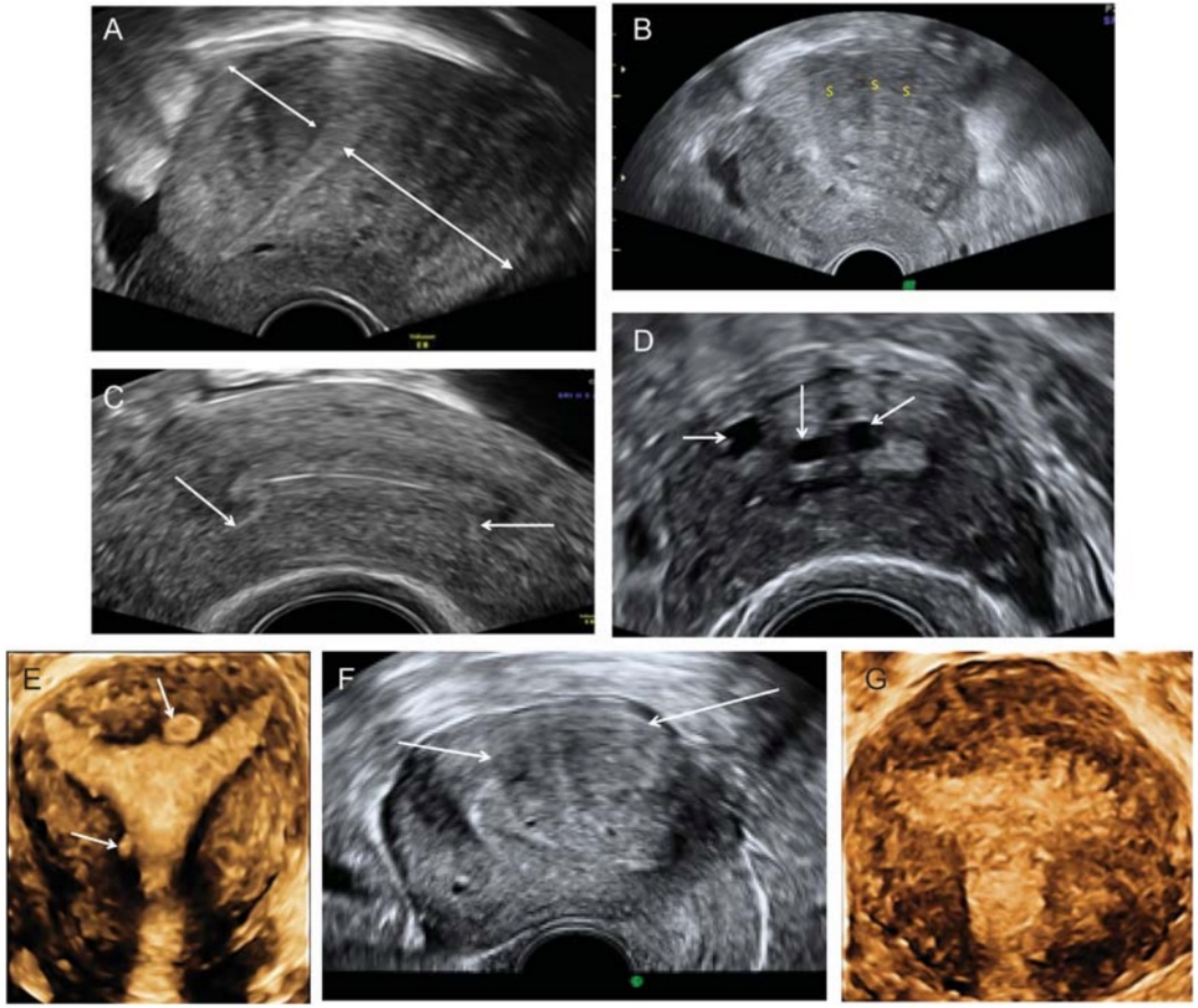
- The diagnostic accuracy of TVS is in line with MRI and should be the primary diagnostic tool in women with suspected adenomyosis

Adenomyosis

Ultrasound features

Ultrasound features

- Asymmetrical myometrial thickening
- Parallel shadowing
- Linear striations
- Myometrial cysts
- Echogenic buds or islands
- Adenomyoma
- Irregular EMJ



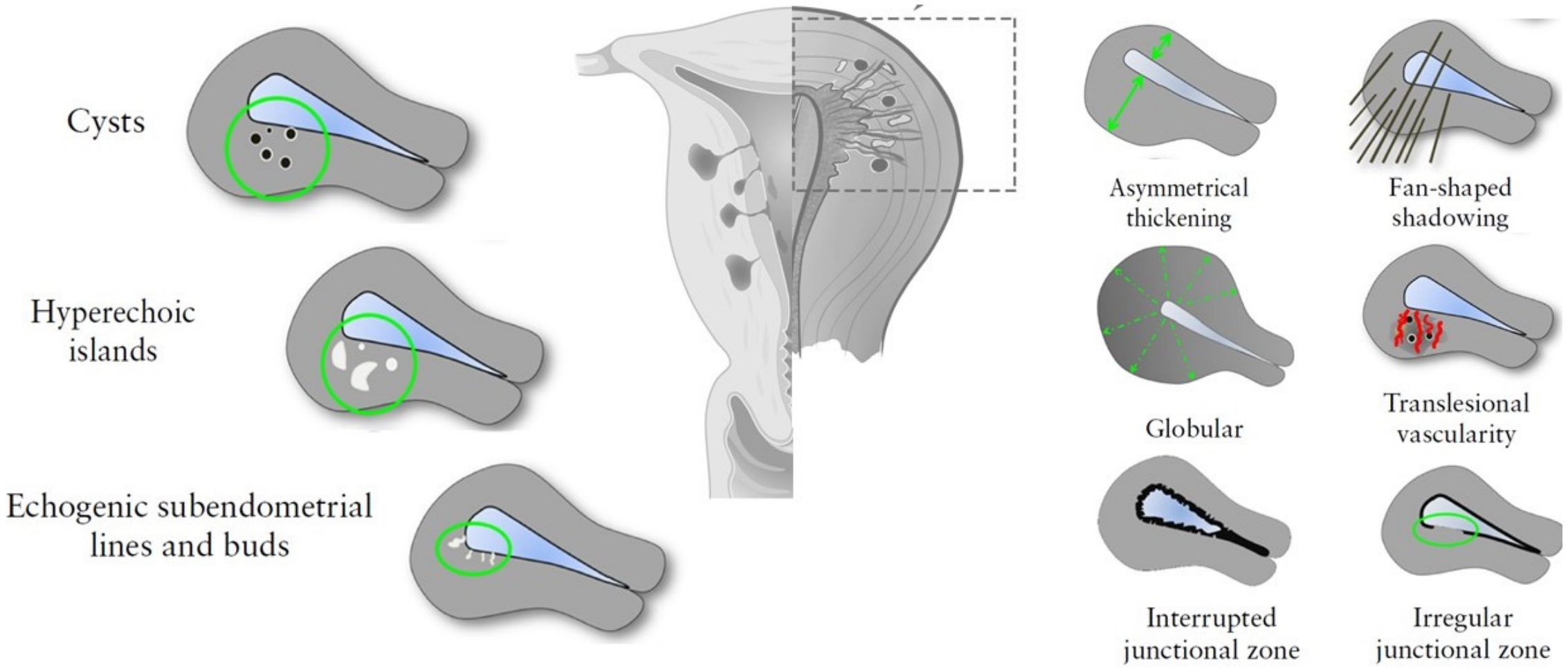
Adenomyosis
Imaging

Direct signs

Indirect signs

Direct features: pathognomonic

Indirect features: indicators

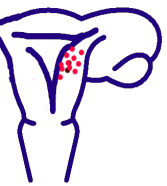


Definition refinements of Morphological Uterus Sonographic Assessment (MUSA) features, MUSA 2021; submitted to UOG

Adenomyosis

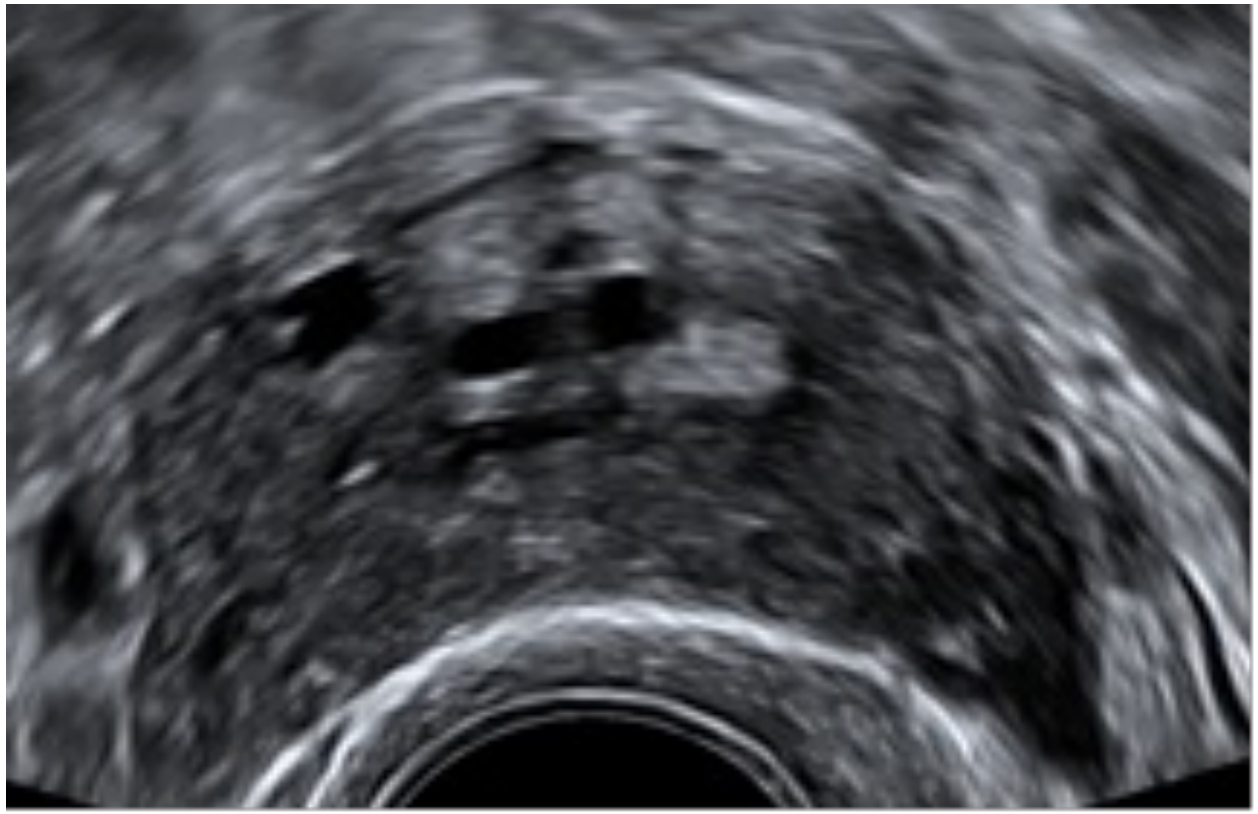
Direct signs

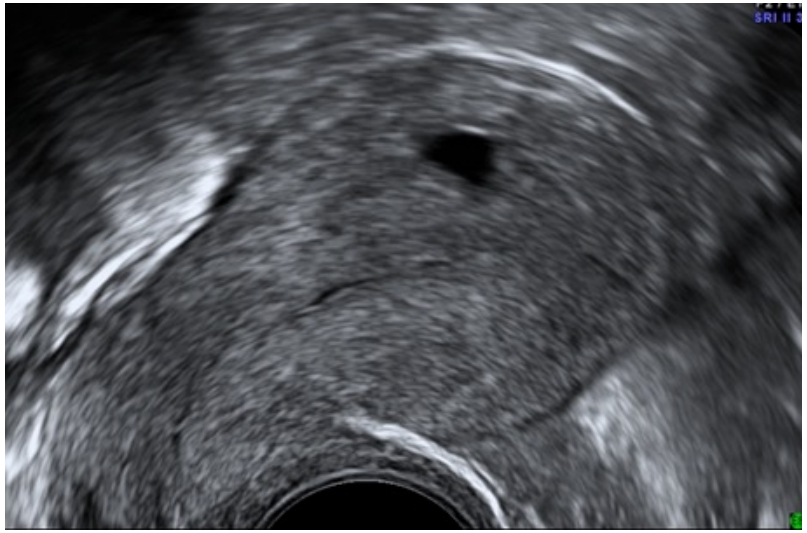
in ultrasound

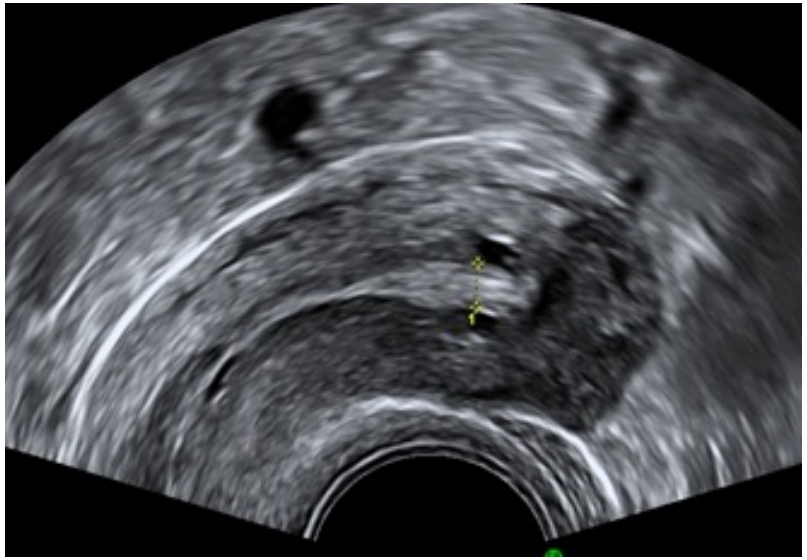


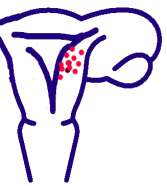
Adenomyosis
Direct signs
in ultrasound

Myometrial cysts



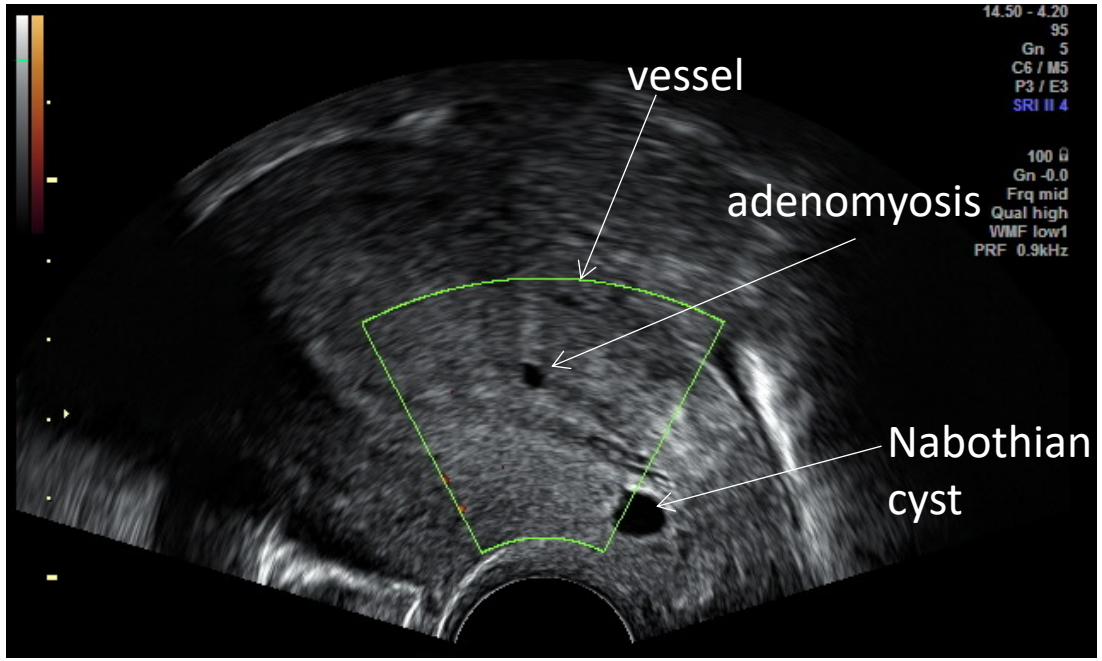


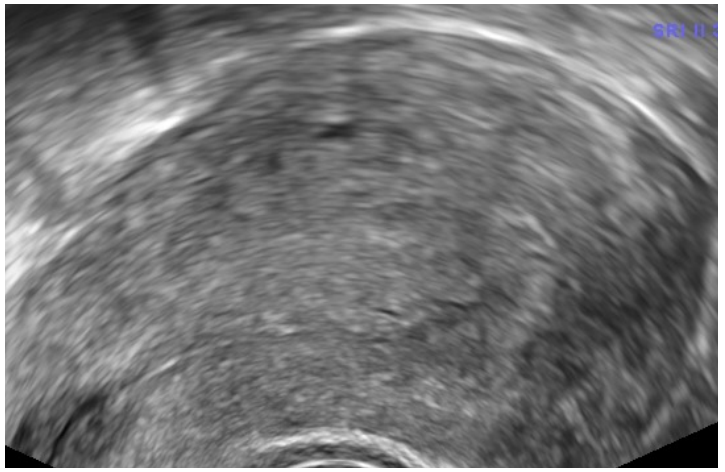


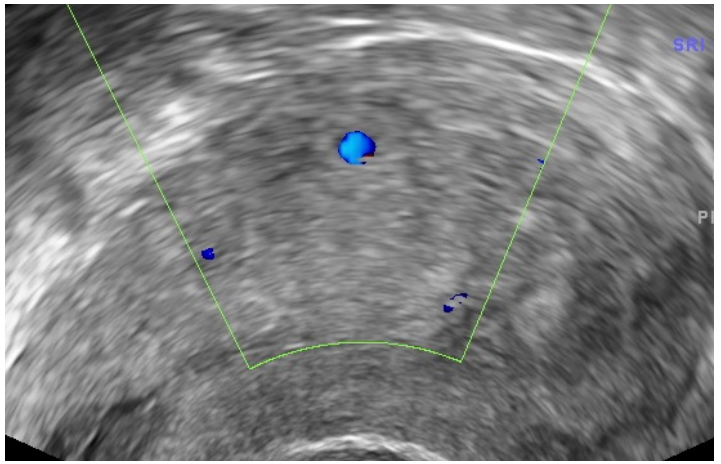


Adenomyosis
Direct signs
in ultrasound

Hypoechoic, myometrial cysts

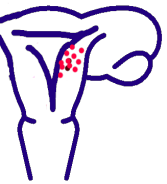




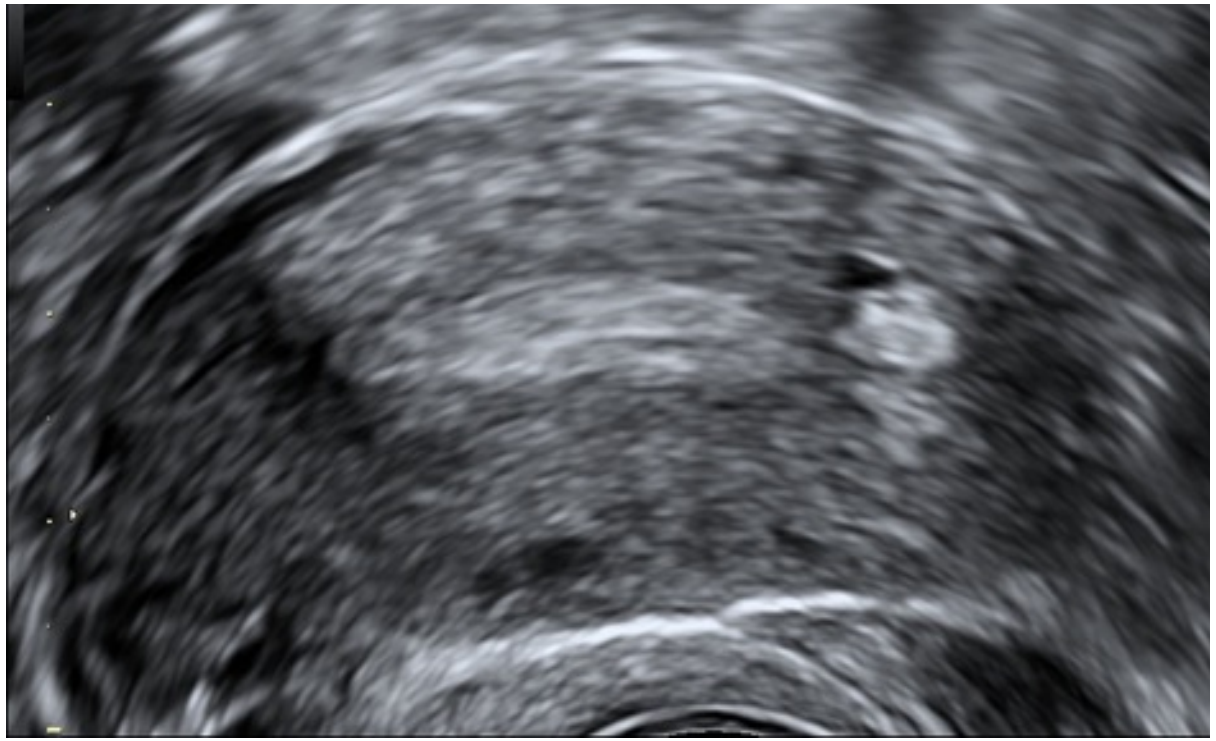


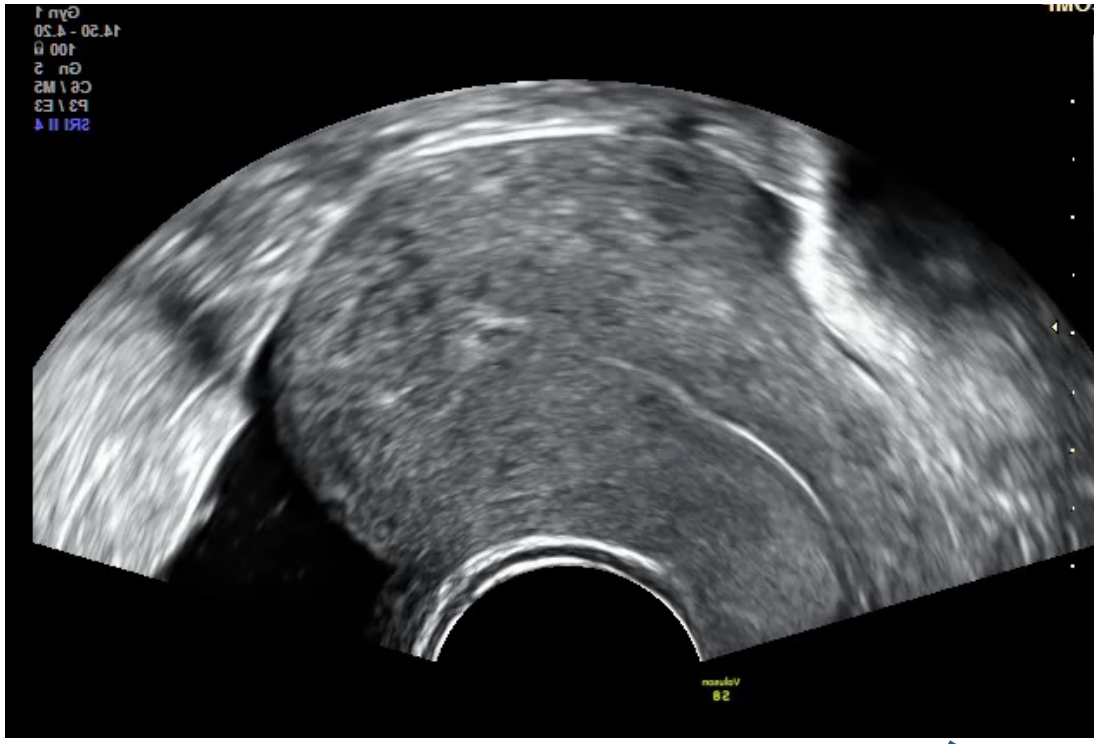
Diagnostic pitfalls:

- Bld vessels
- Nabothian cysts



Hyperechoic islands

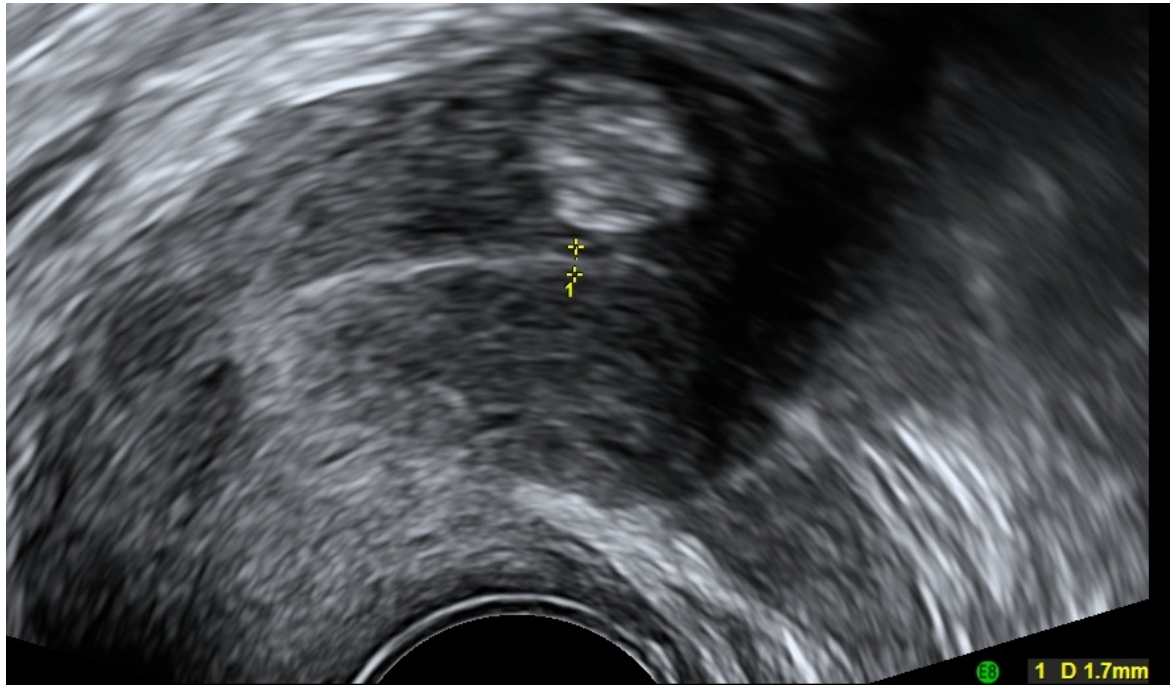


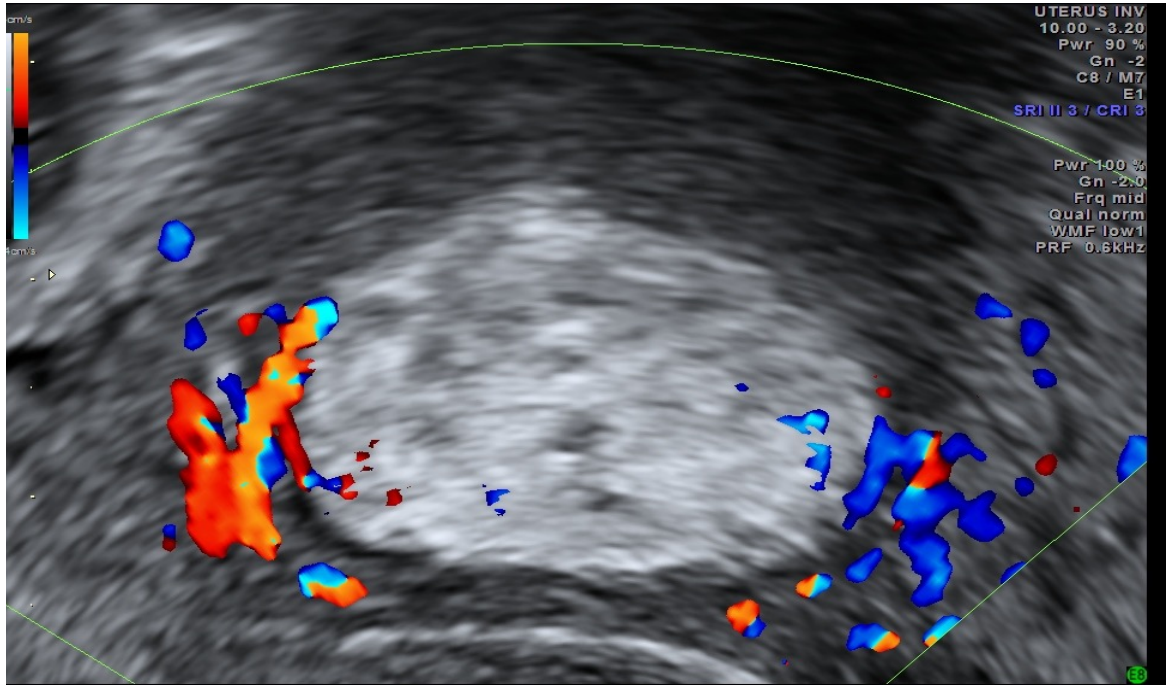


Hyperechoic islands

Diagnostic pitfalls:

- Lipofibromas

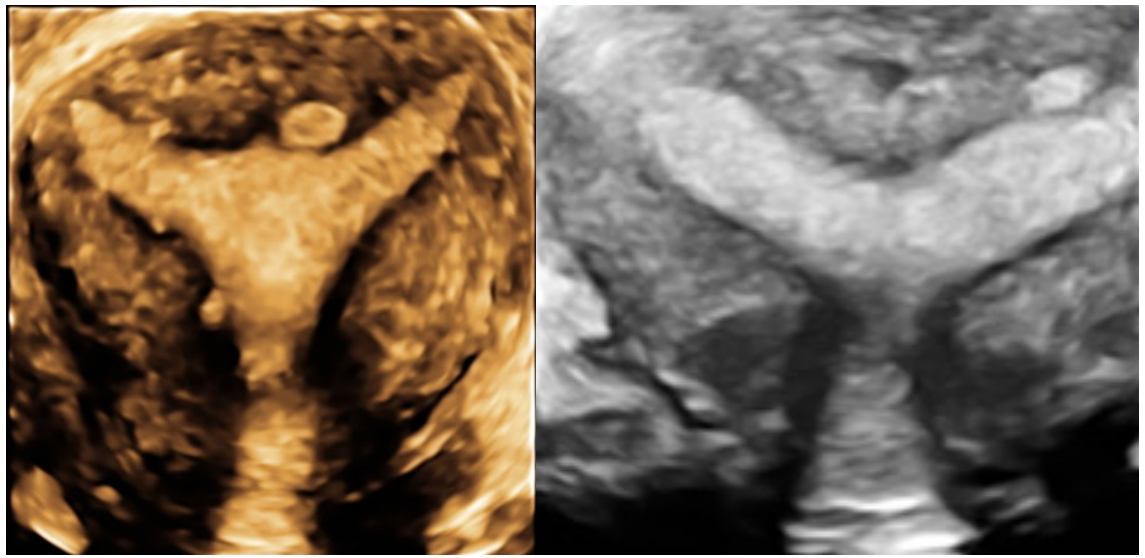




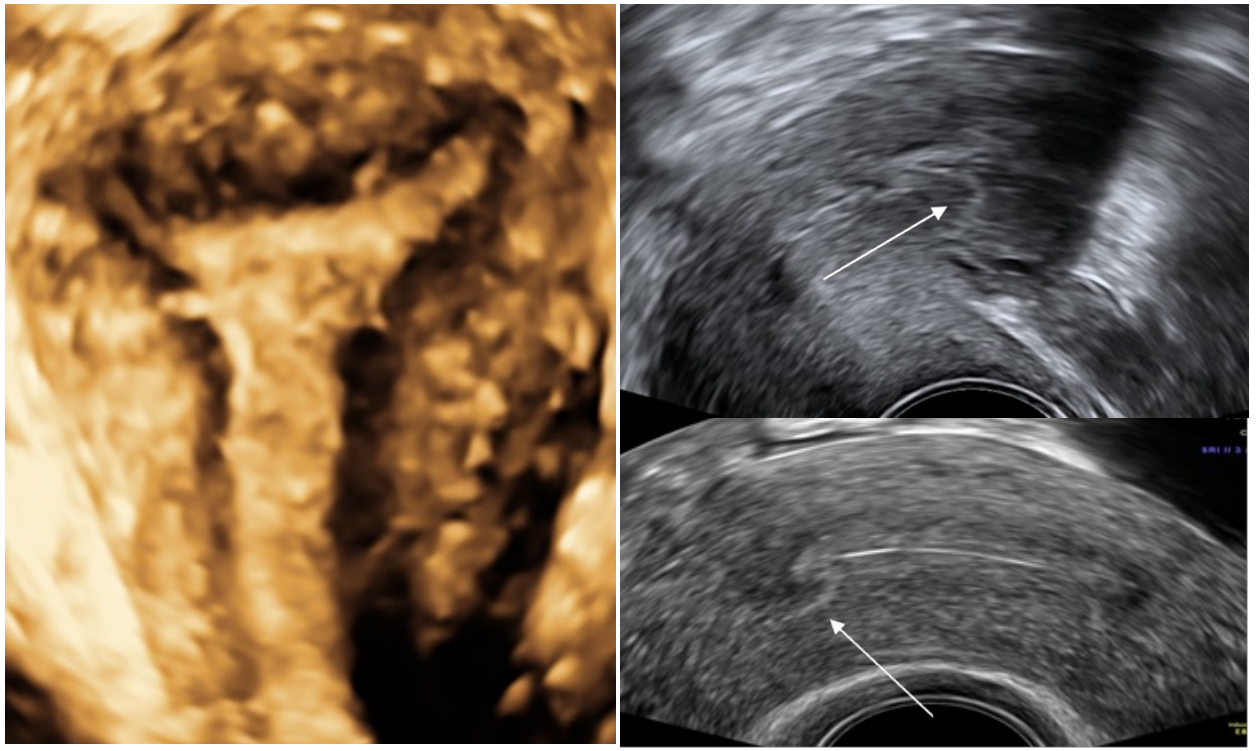
Adenomyosis
Direct signs
in ultrasound

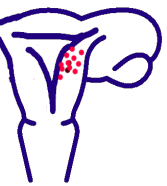
Echogenic subendometrial buds/lines

Buds



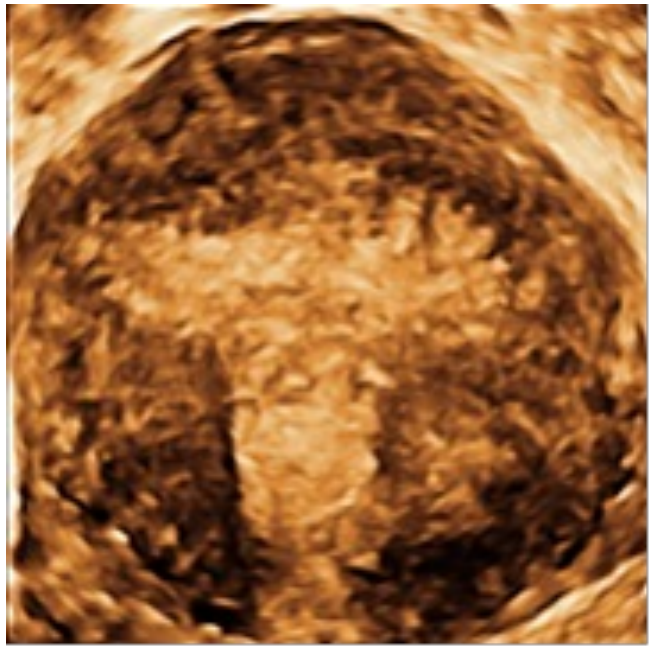
Lines

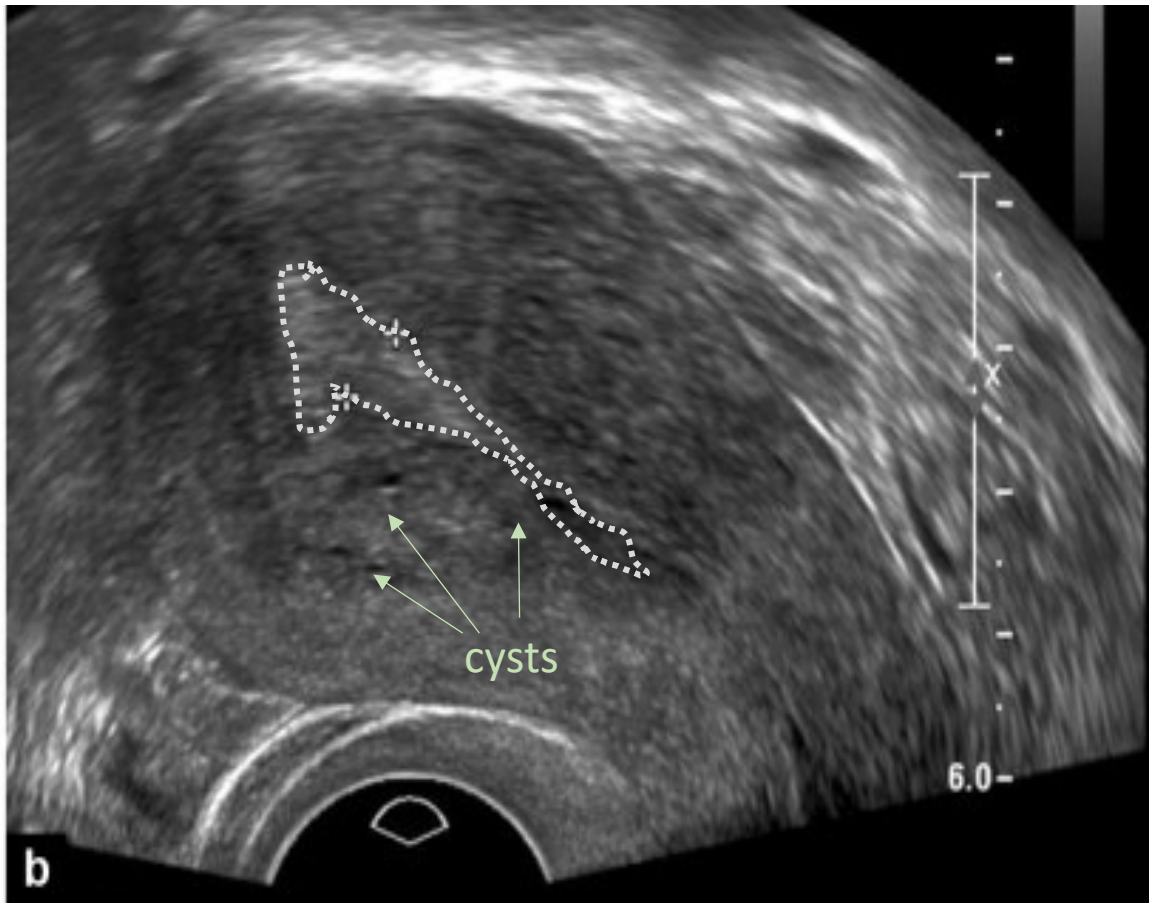


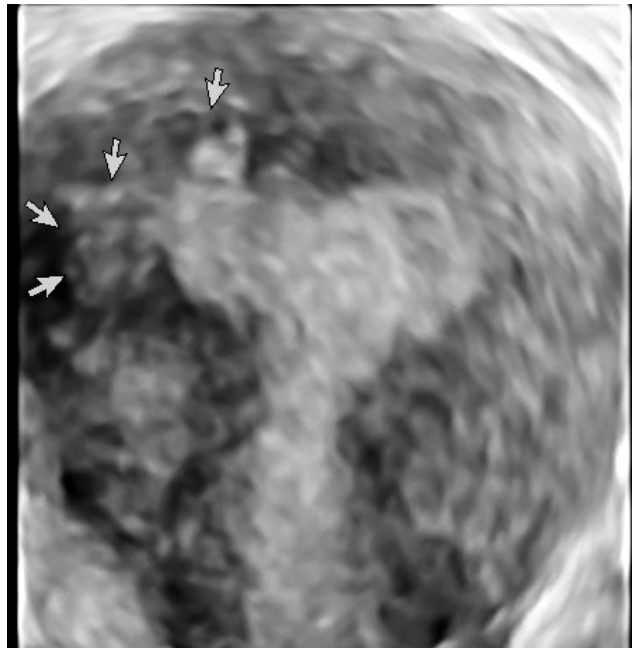


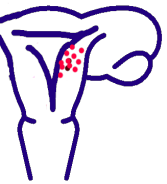
Adenomyosis
Indirect signs
in ultrasound

Irregular endometrial-myometrial junction







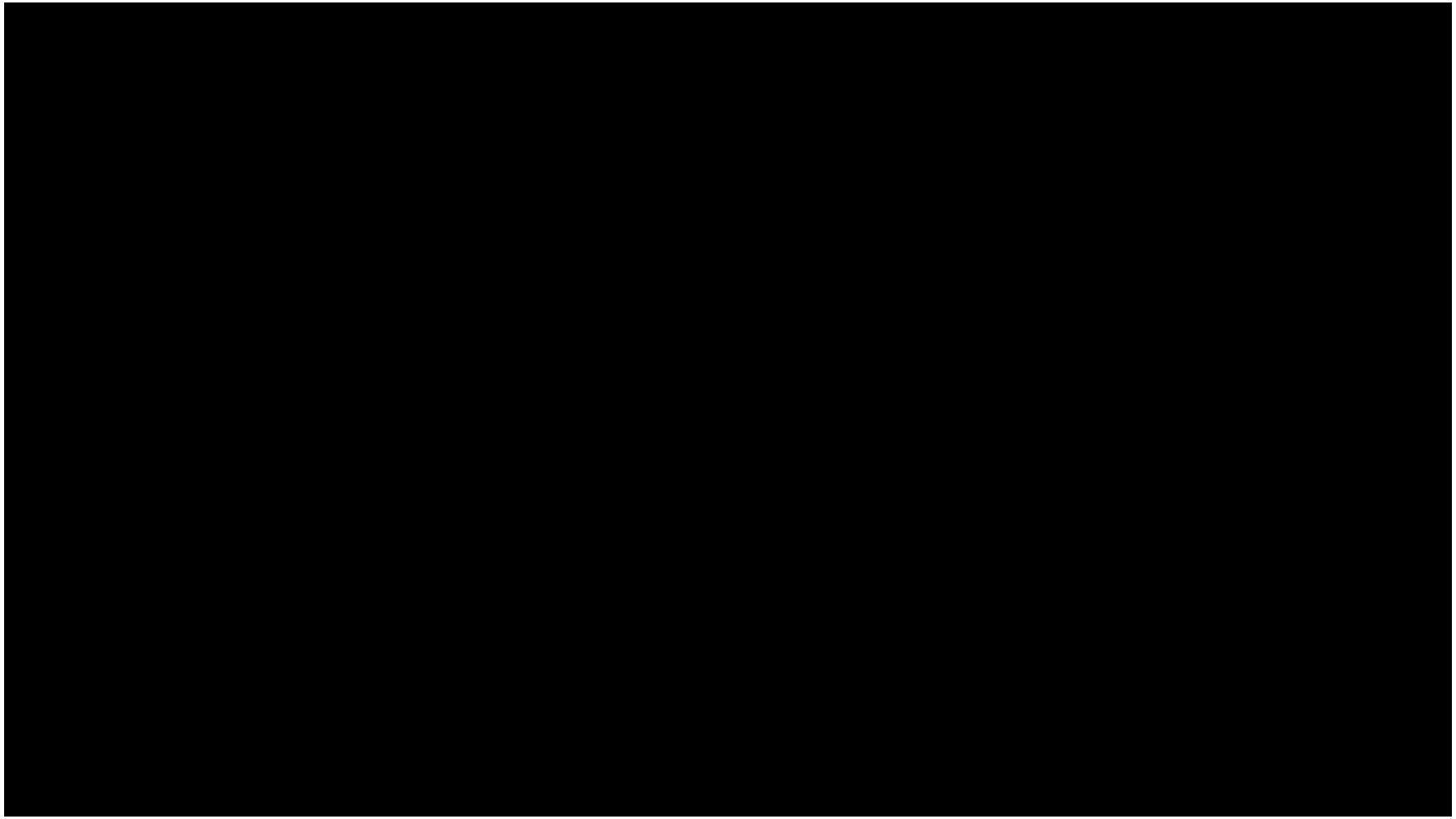


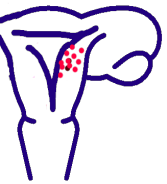
Case 3

68 year-old

Endometrial thickness with Irregular EMJ

Postmenopausal bleeding

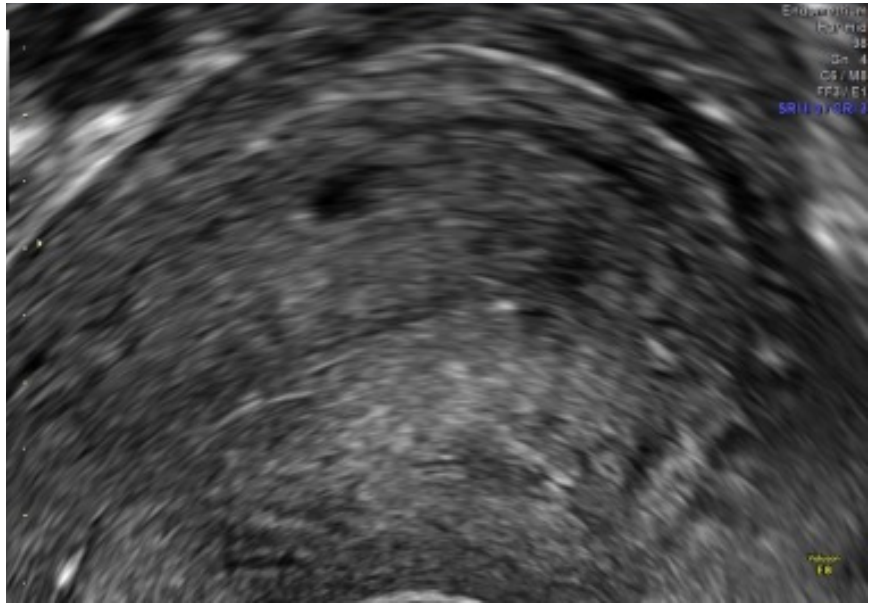


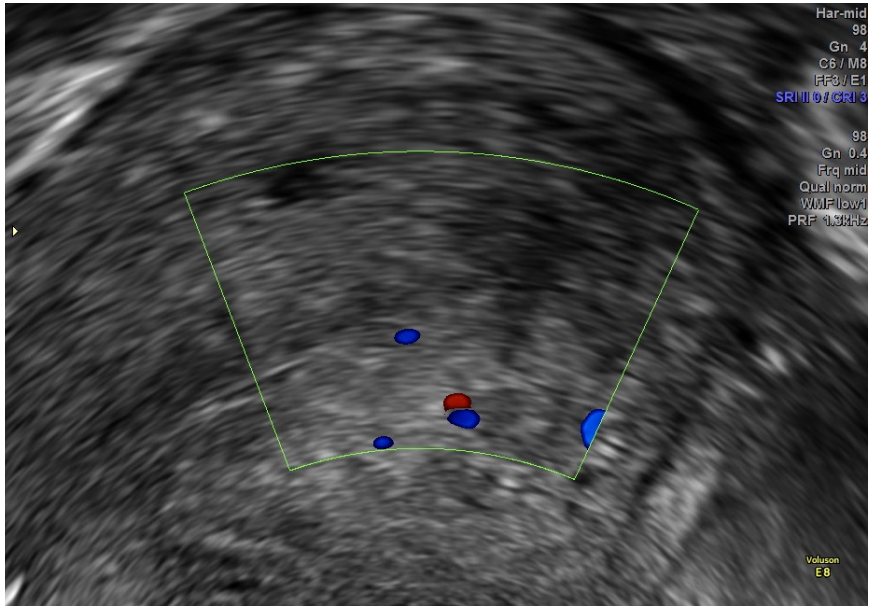


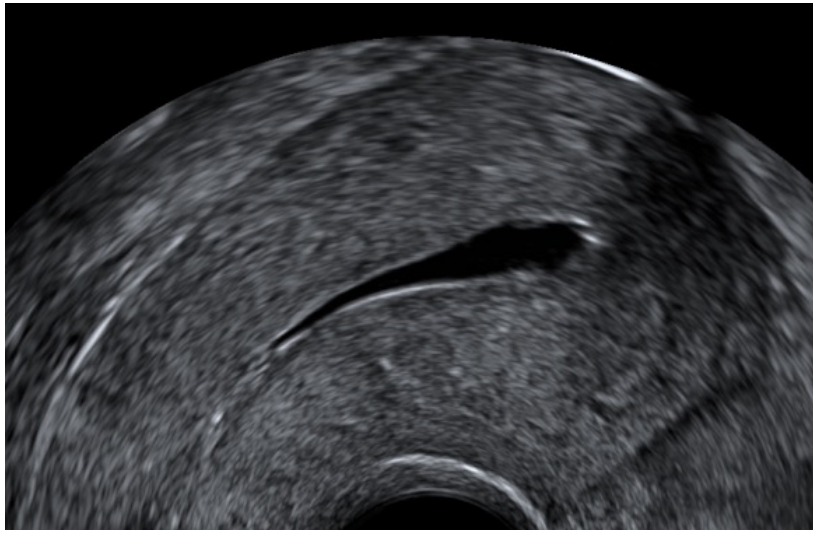
Adenomyosis

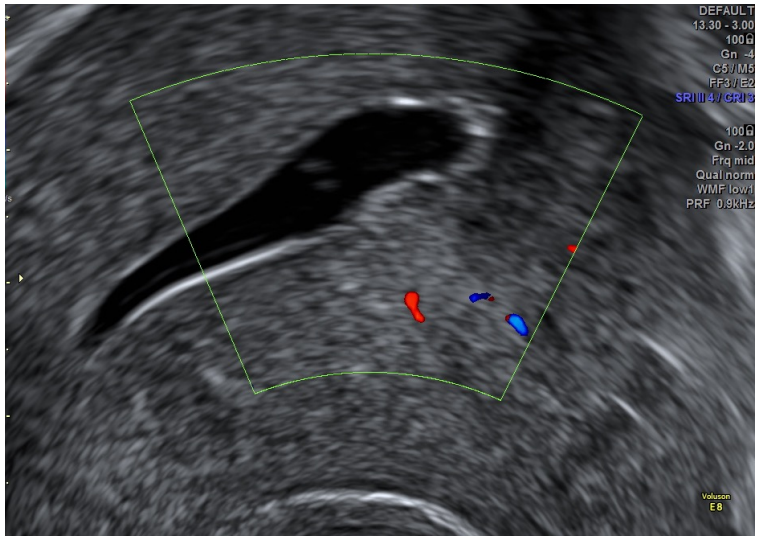
In menopause &

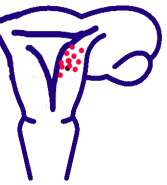
postmenopausal bleeding









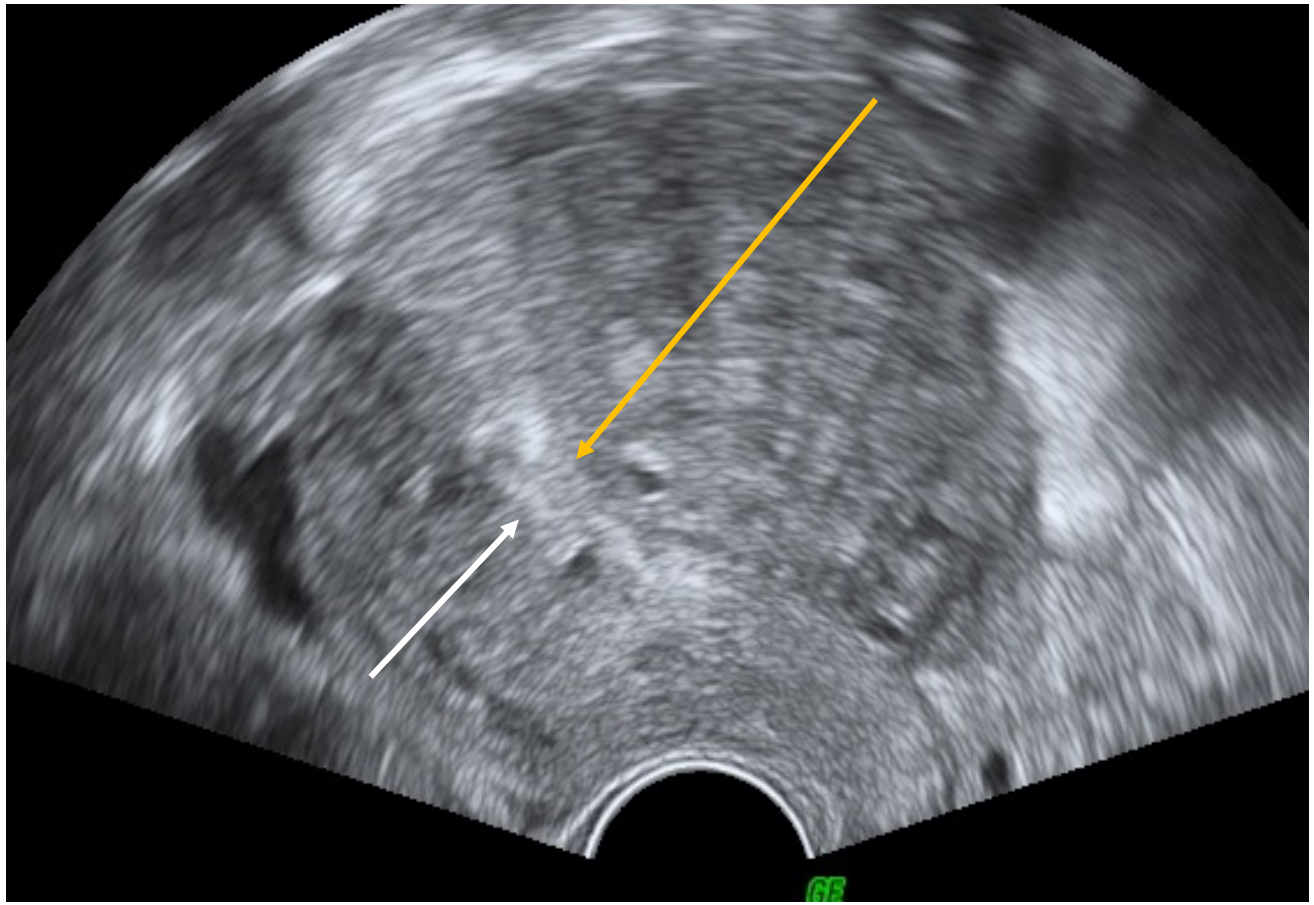


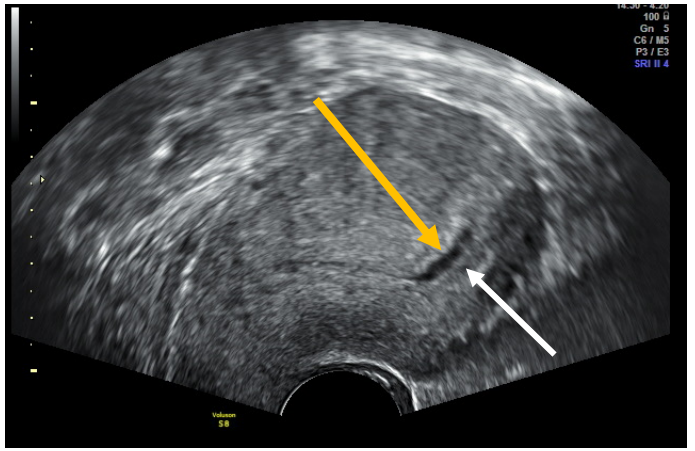
Solution – Saline infusion sonography

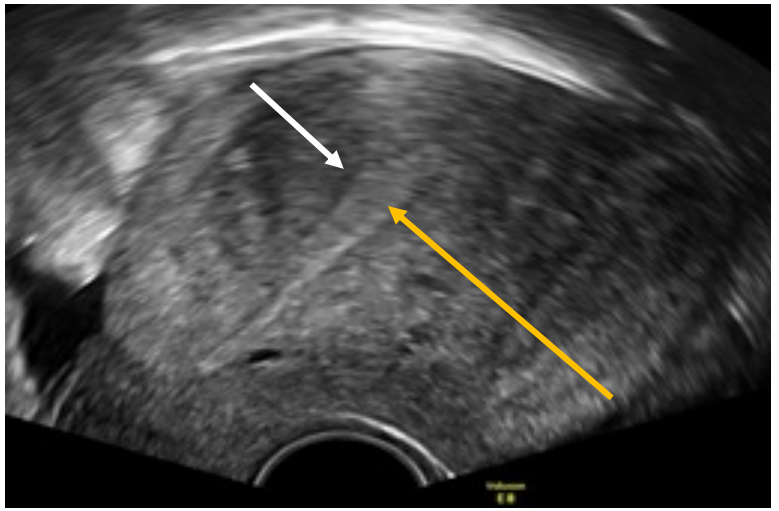
Adenomyosis

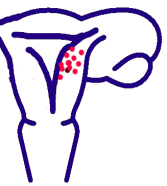
Indirect signs
in imaging

Asymmetrical myometrial thickening

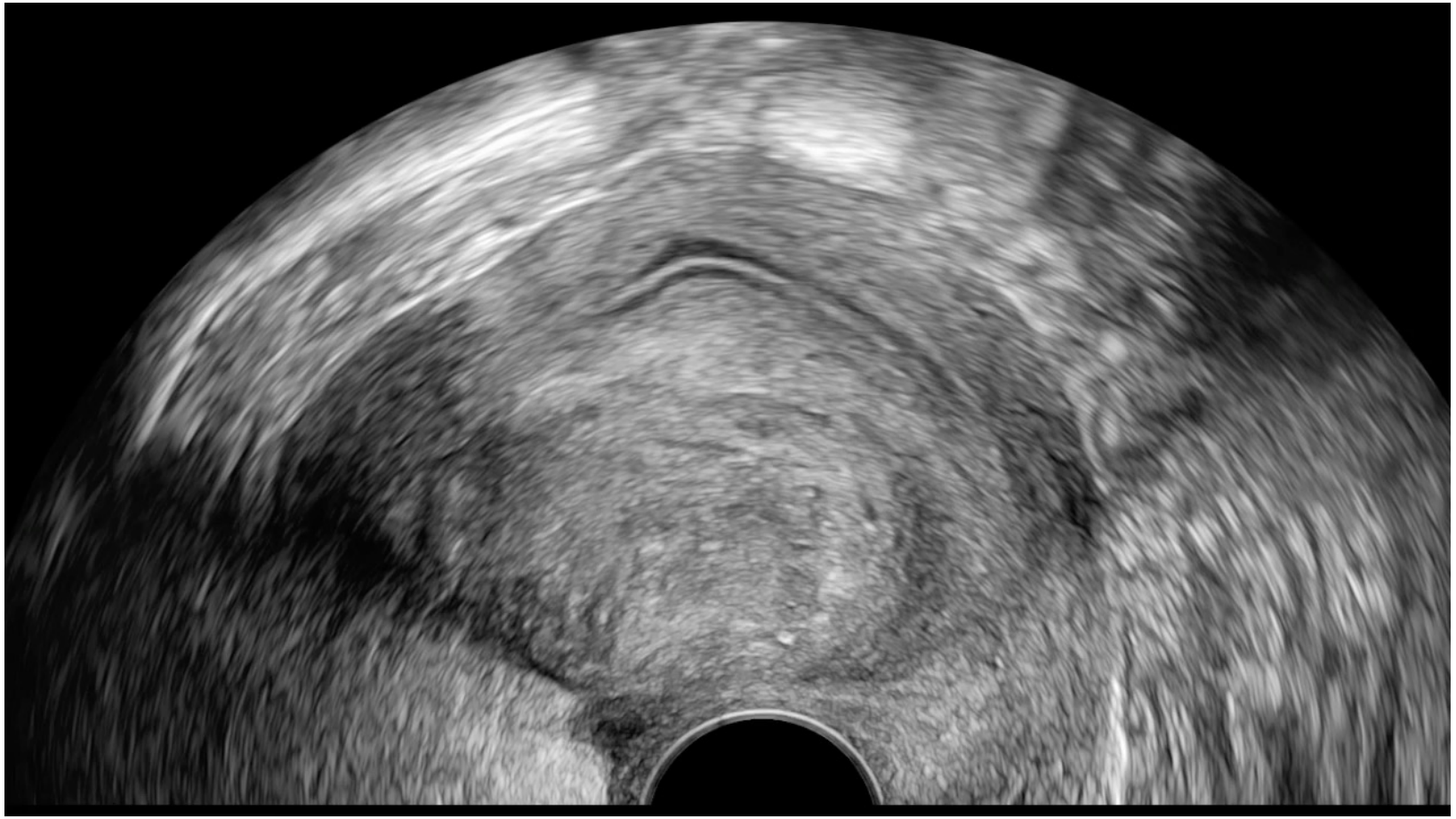






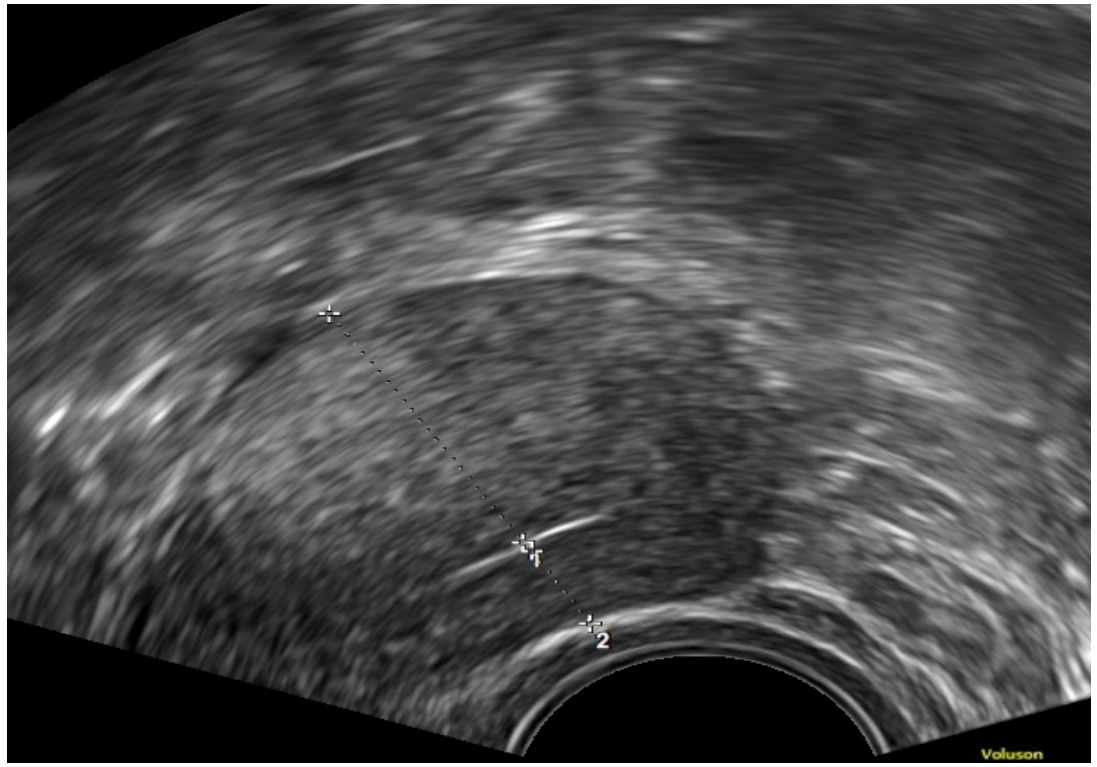


Uterine contractions and peristalsis

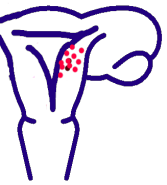


Adenomyosis
Indirect signs
in imaging

Asymmetrical myometrial thickening



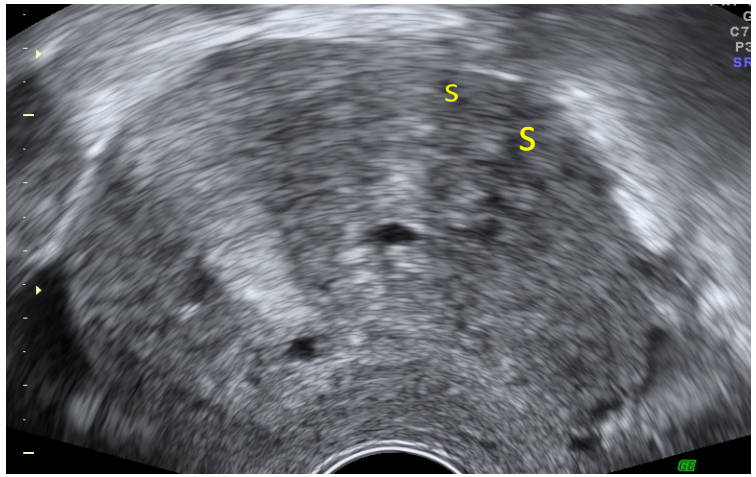
Sagittal 2D ultrasound images of the same patient, 5 minutes apart

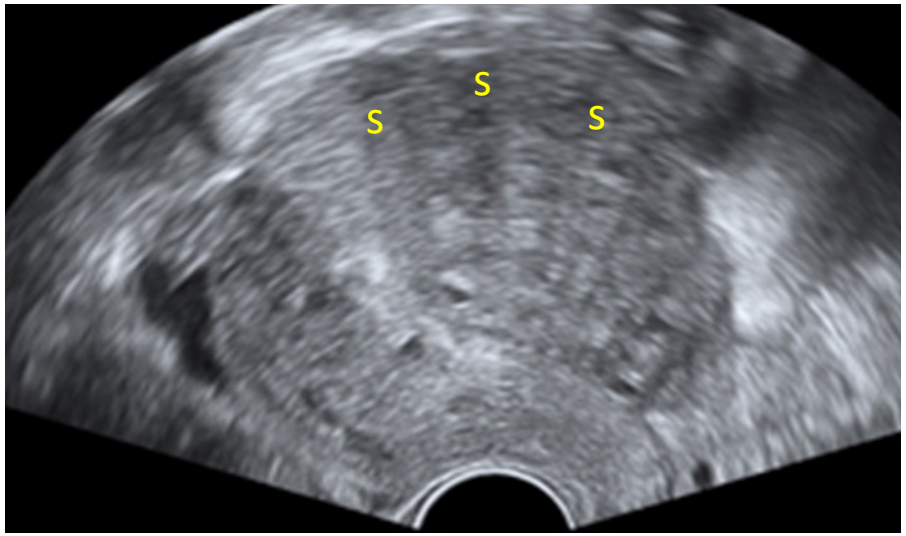


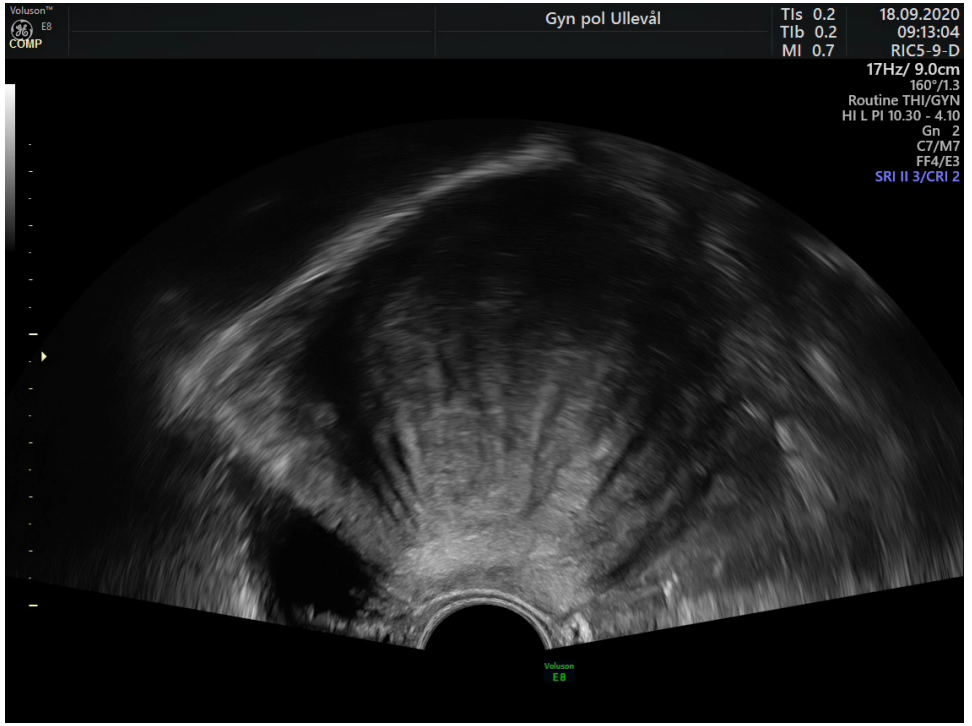
Diagnostic pitfall:
contractions

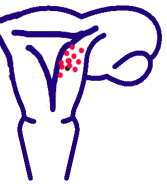
Adenomyosis
Indirect signs
in imaging

Fan-shaped shadowing







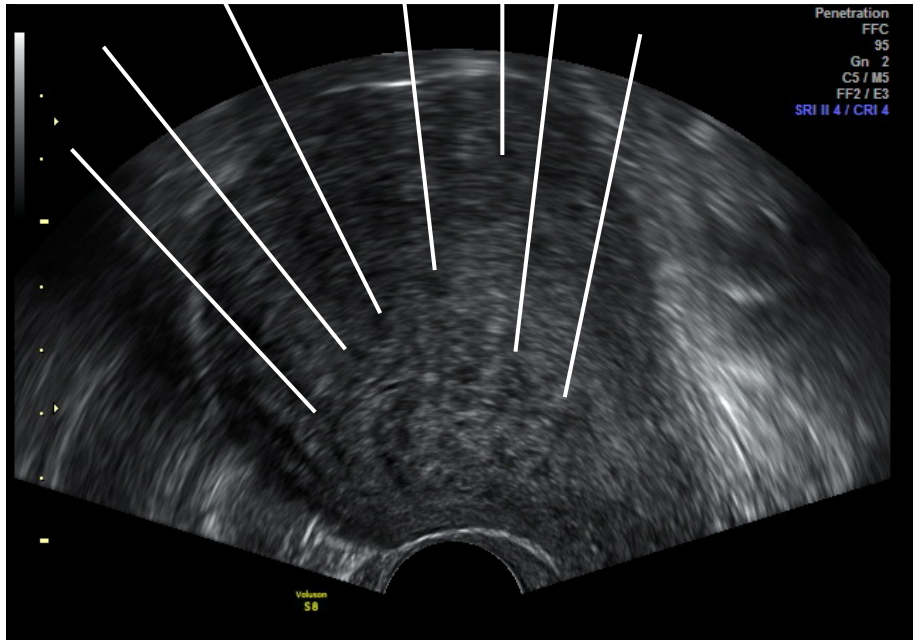


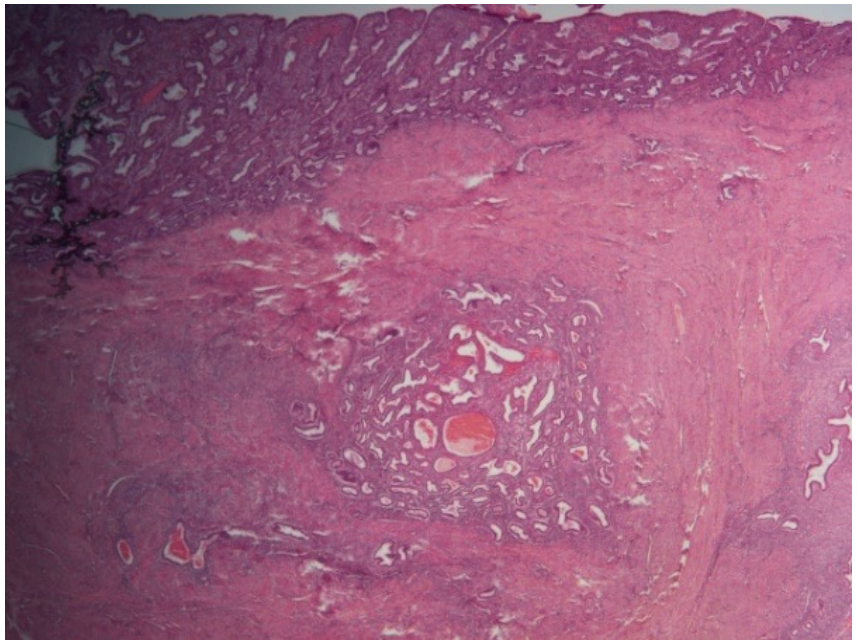
Adenomyosis
Indirect signs
in imaging

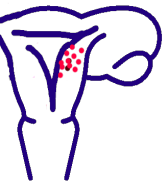
Indirect visualisation = muscular hypertrophy

Fan-shaped shadowing

Histology: Circular layers of hypertrophic muscle fibers surrounding adenomyosis foci







Adenomyosis
Indirect signs
in imaging

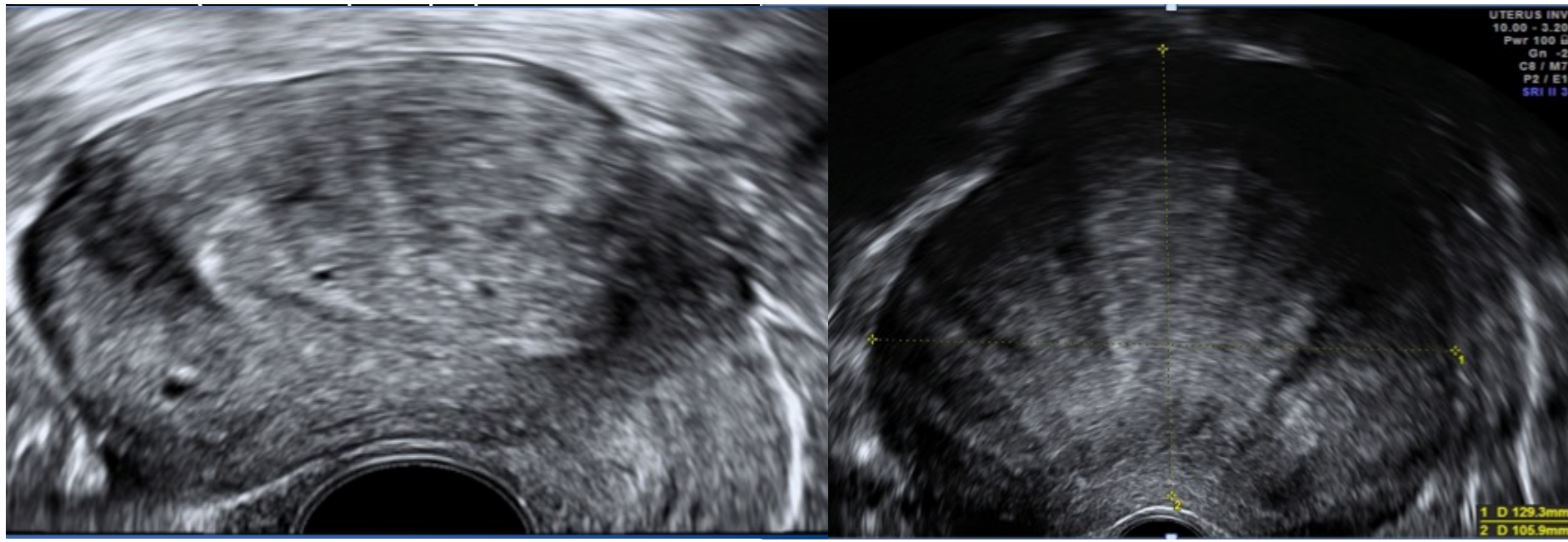
Indirect visualisation = muscular hypertrophy

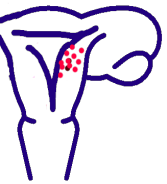
Fan-shaped shadowing

Diagnostic pitfalls:

Fibroids

Histology: Circular layers of hypertrophic muscle fibers surrounding adenomyosis foci



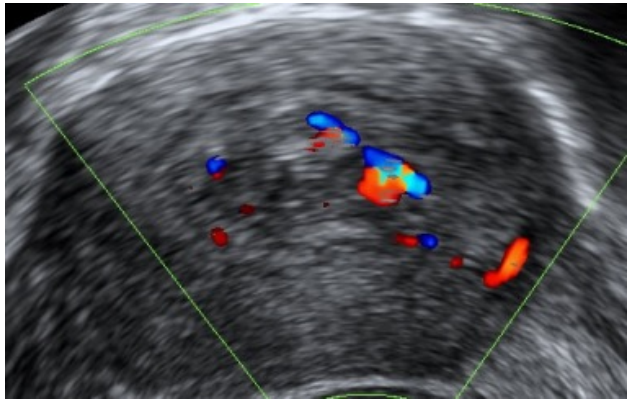


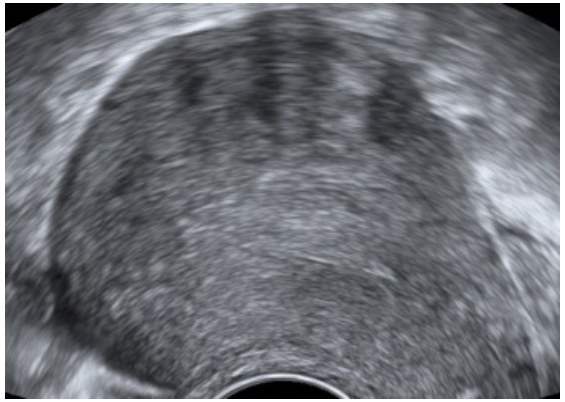
Adenomyosis

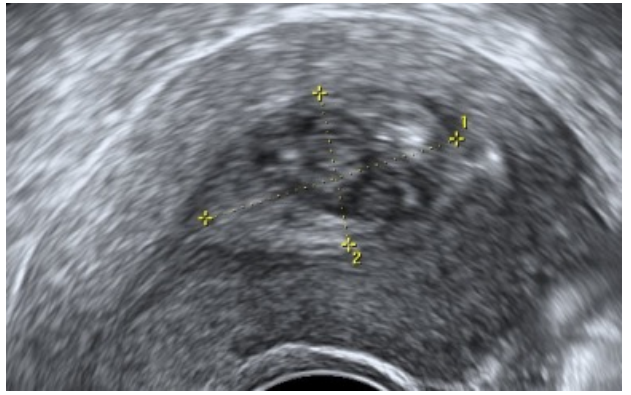
Adenomyoma vs. Fibroid

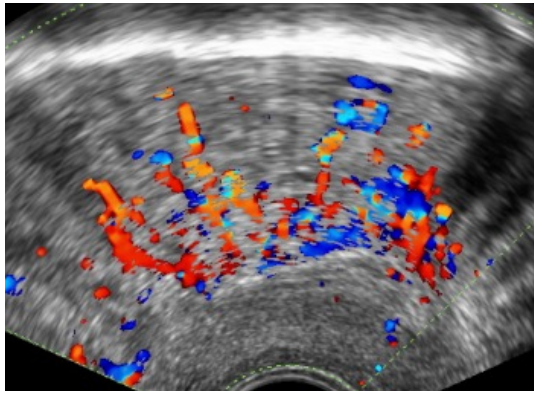
Tips – Myoma v Adenomyoma

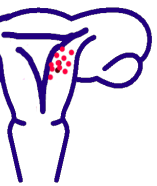
	Fibroid	Adenomyosis
Definition	Clear	Poor
Shape	Spherical	Elliptical
Uterine vascular architecture	Disrupted	Intact



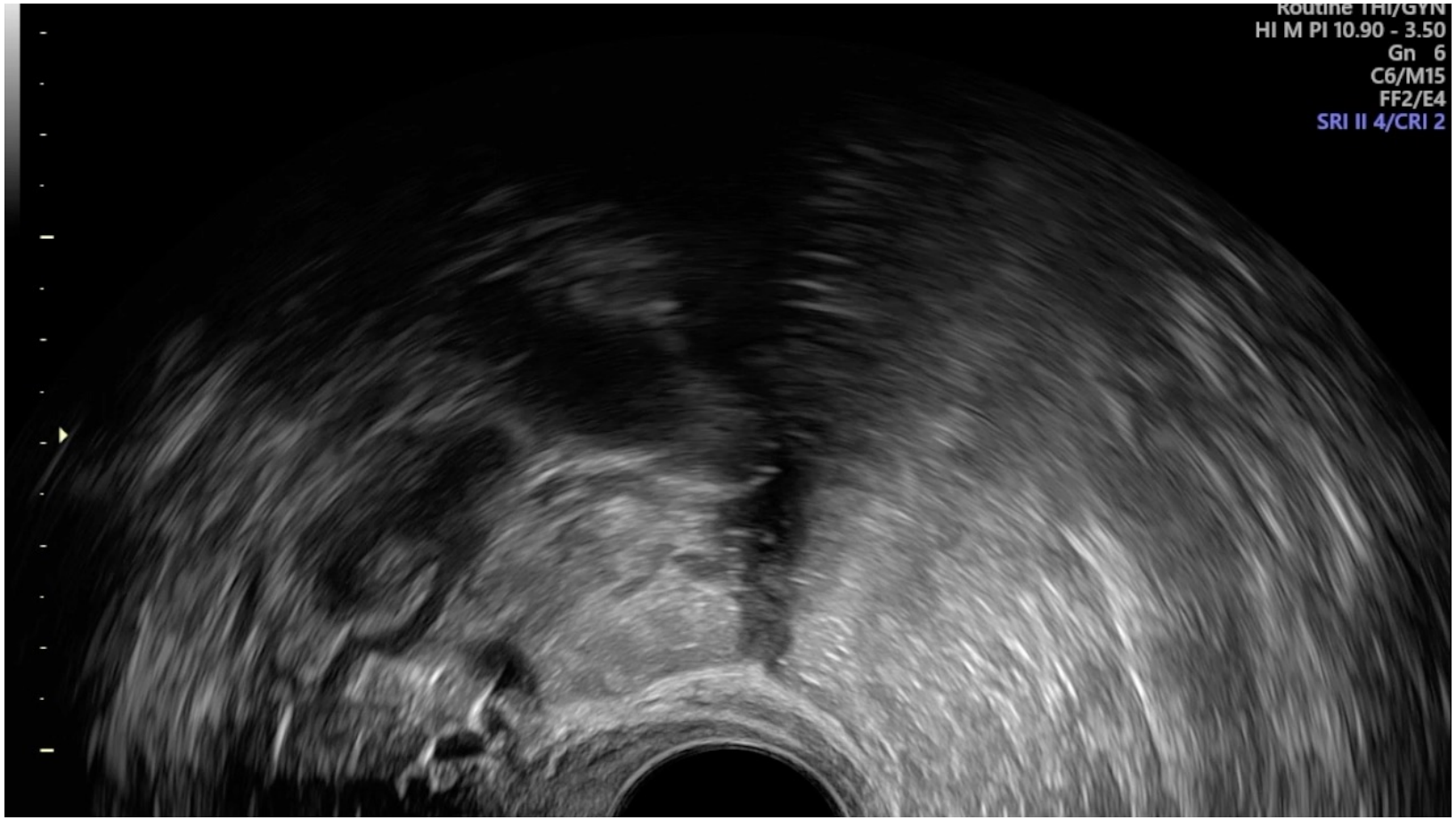


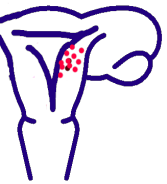






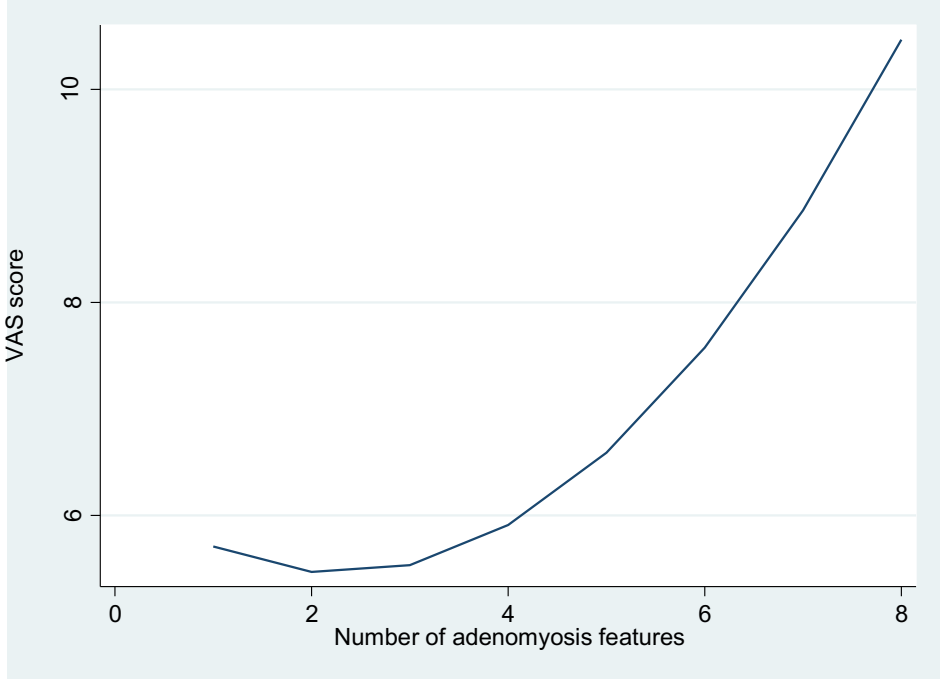
Myoma v adenomyoma



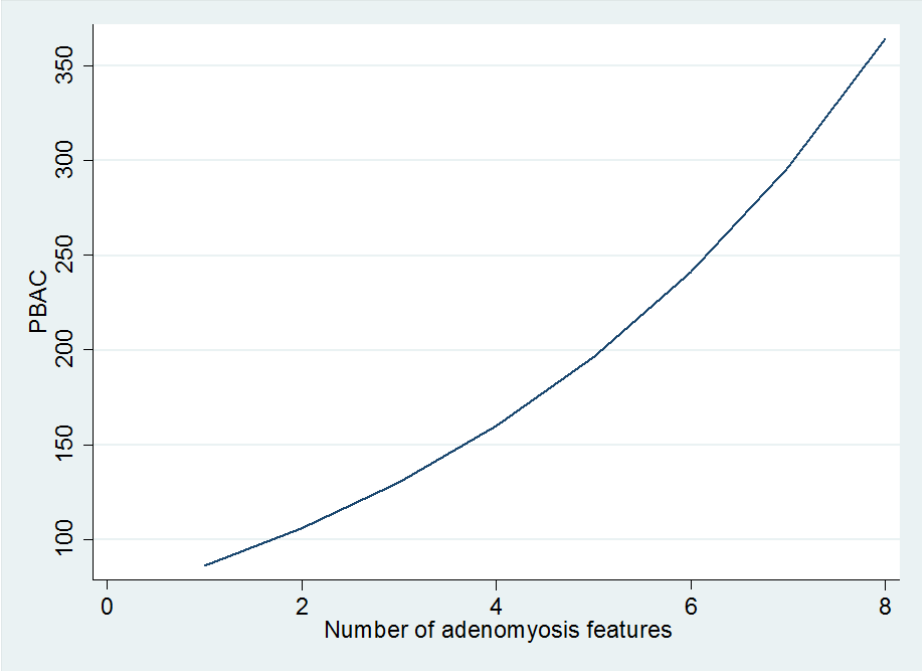


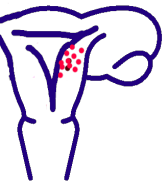
How should we report adenomyosis?

Dysmenorrhoea



Menorrhagia





Naftalin 2014 Human Reproduction, Naftalin 2016 Ultrasound in Obstetrics and Gynecology

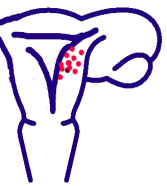
Summary: Why should we look for adenomyosis?

Early diagnosis of adenomyosis:

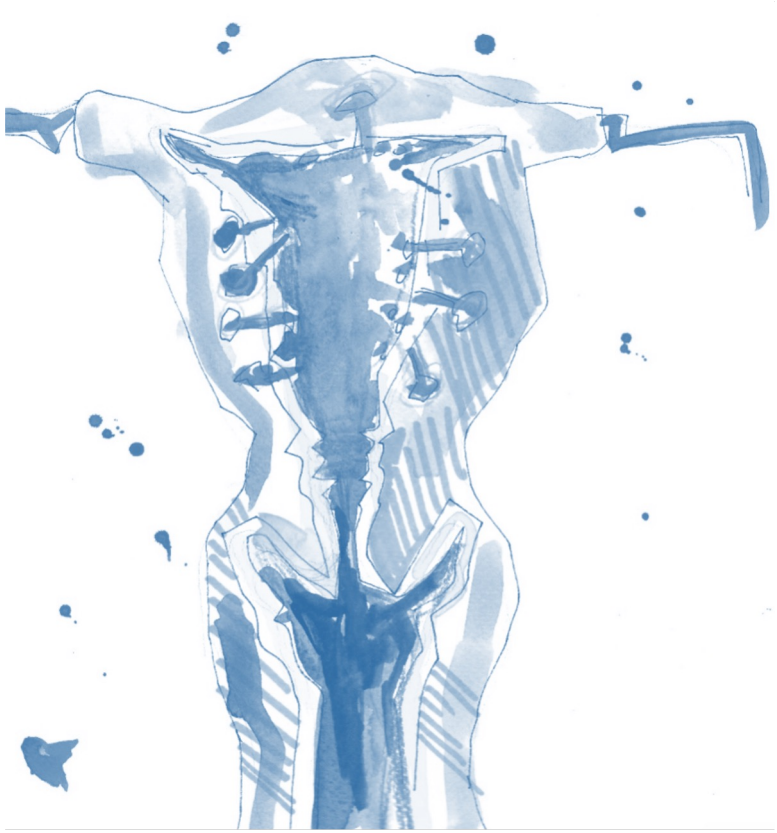
- Treat symptoms
- Explanation for patients' symptoms

Correct diagnosis of adenomyosis avoids:

- Unnecessary surgery
- Intraoperative complications (adenomyoma vs myoma)
- Less optimal IVF protocol?



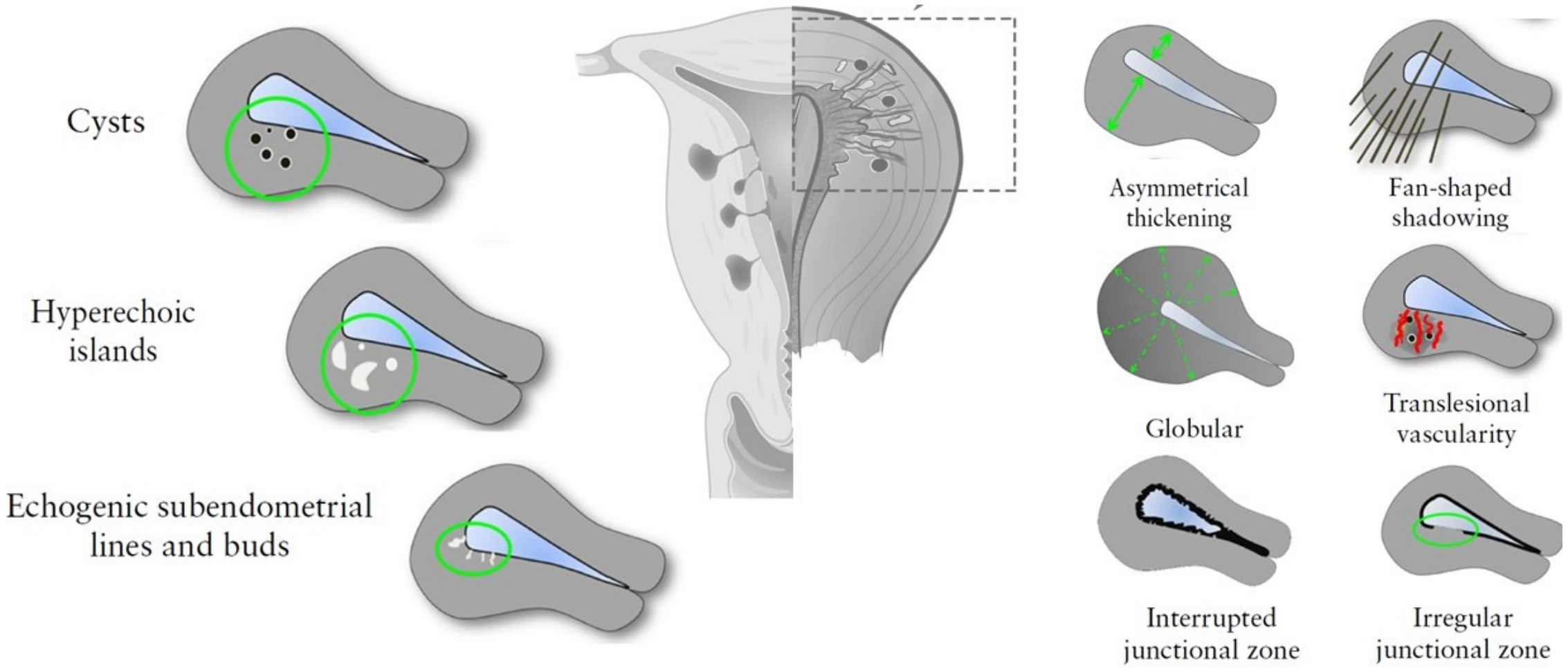
Direct signs



Indirect signs

Direct features: pathognomonic

Indirect features: indicators



Definition refinements of Morphological Uterus Sonographic Assessment (MUSA) features, MUSA 2021; submitted to UOG

Thank you for listening

Any questions?