

# Ultrasound Diagnosis of Endometriosis & Adenomyosis

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*Ultrasound is good at assessing the ovaries for endometriomas*

*Will my scan show if I have endometriosis?*

*Endometriosis elsewhere is best visualised by laparoscopy or MRI*

# Overview

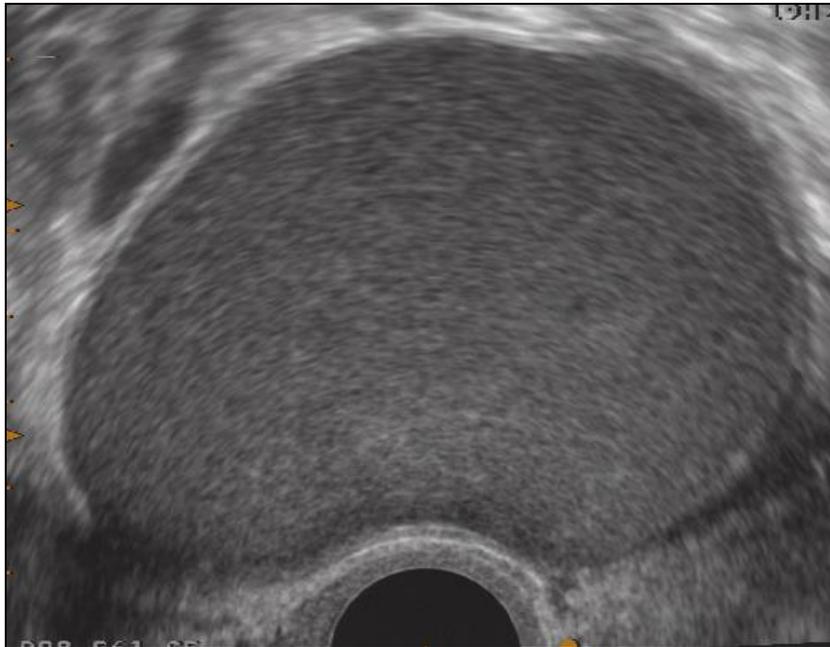
- Endometriosis typically manifests as follows:  
endometriomas, adhesions and endometriotic nodules (deep or superficial) +/- adenomyosis
- Consider the ultrasound features
- What to look for during an 'endometriosis' scan
- How to assess for pelvic mobility

# Ovarian Endometrioma

- Endometriomas are common, result from cyclic haemorrhage
- Walls are thick and fibrotic
- Contents = thick, dark degenerate blood product 'chocolate cyst'
- If unilateral more likely to occur within the left ovary
- Are bilateral in approximately 50% of cases
- Overlap with appearances of haemorrhagic cyst
- Usually regress substantially after menopause

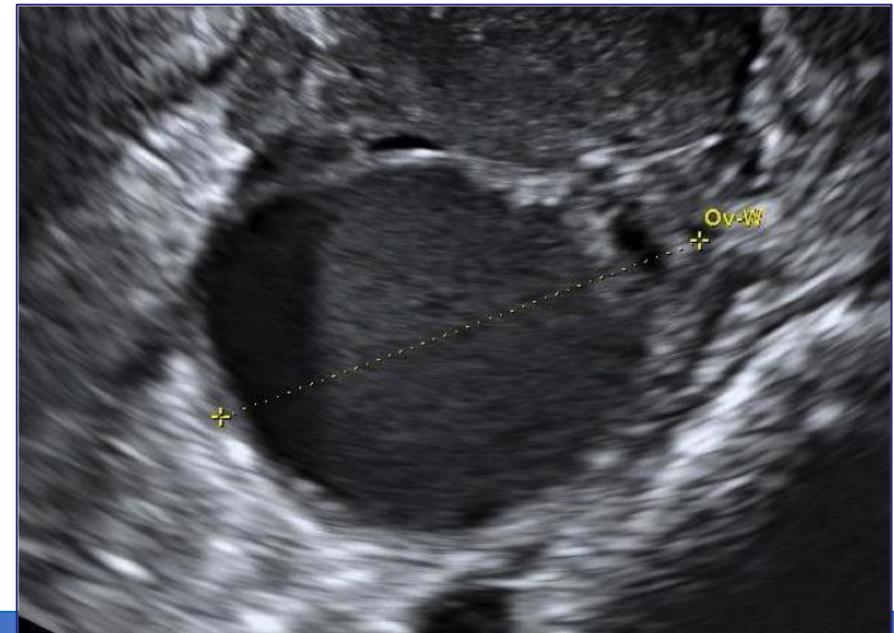
# Ovarian endometriomas – typical appearances

- Unilocular cyst contains homogeneous low-level internal echoes ‘ground glass’ (measure ‘inner to inner’ in three dimensions)
- Can be multilocular (more likely to be an endometrioma)



# Ovarian endometrioma – typical appearances

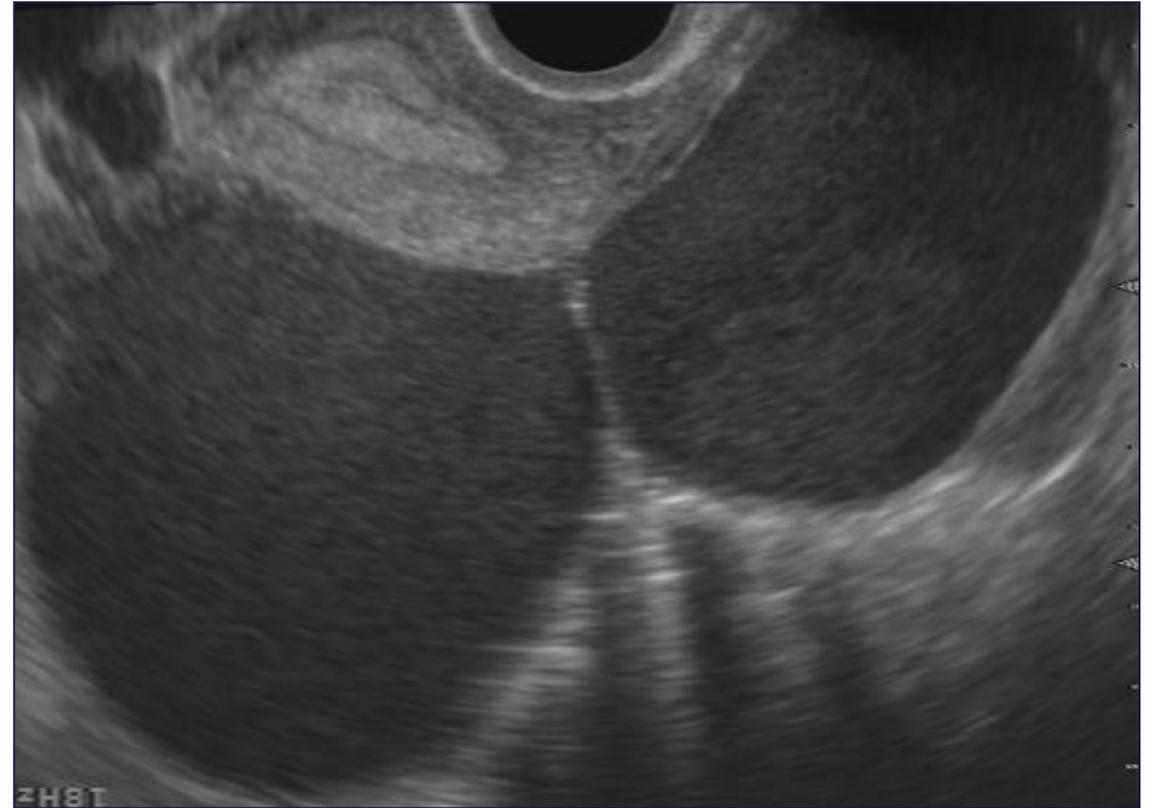
- Hyperechoic wall foci – specific for endometriomas
- Cholesterol deposits
- Fluid level, the hyperechoic layer will be the dependent portion of the cyst
- Typically avascular or low flow (Doppler does not improve sensitivity)



# Kissing ovaries

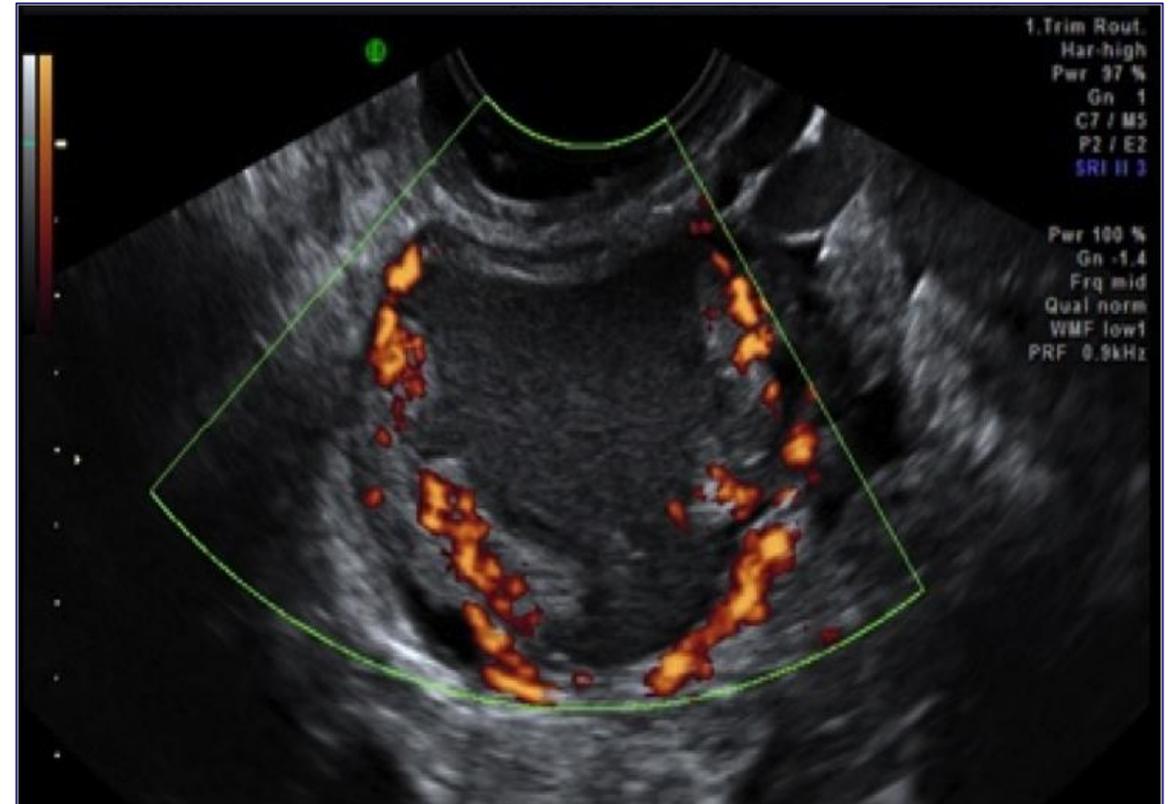
- Both ovaries are joined behind the uterus in the pouch of Douglas
- Negative sliding sign (no movement) on applying gentle pressure with the trans-vaginal ultrasound probe
- Strongly associated with the presence of endometriosis and indicates a severe form of the disease (stage IV)

# Kissing Ovaries



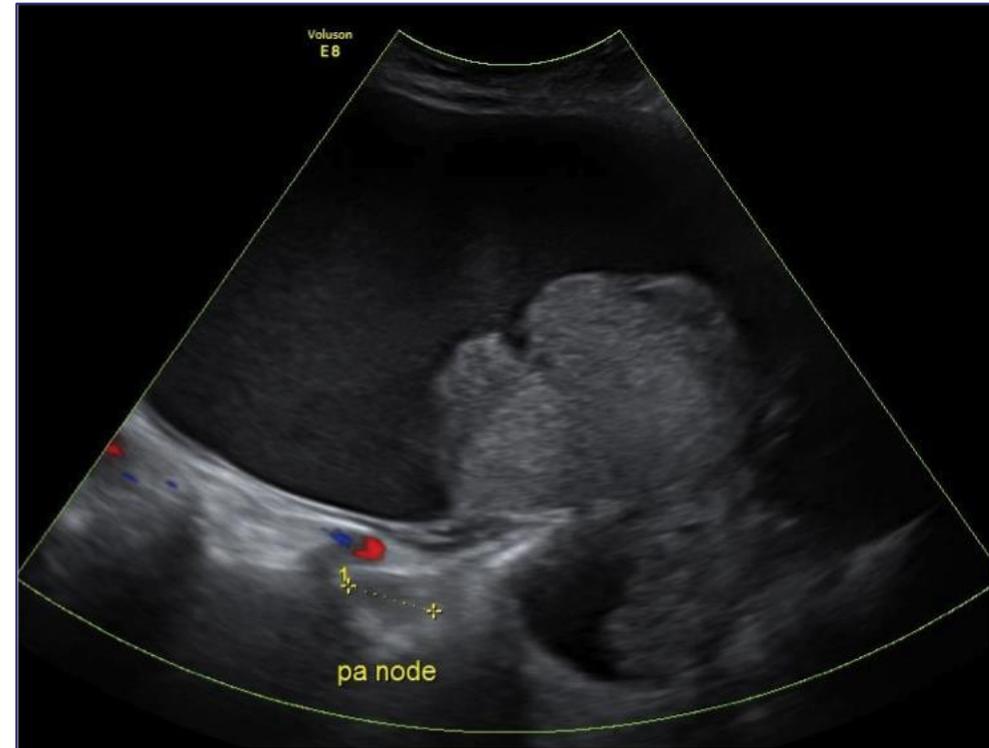
# Ovarian endometrioma- decidualisation during pregnancy

- Hypertrophy of endometrial stromal cells & development of decidua as a response to progesterone
- Characteristically highly vascular
- Can be mistaken for an ovarian malignancy
- 4-5% of ovarian cysts in early pregnancy are endometriomas



# Malignant transformation of an endometrioma

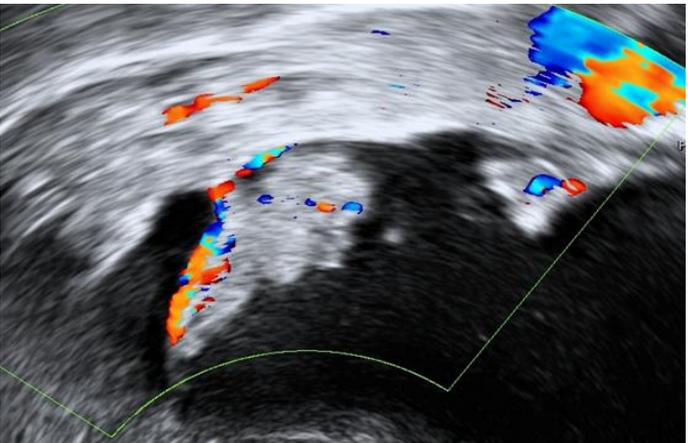
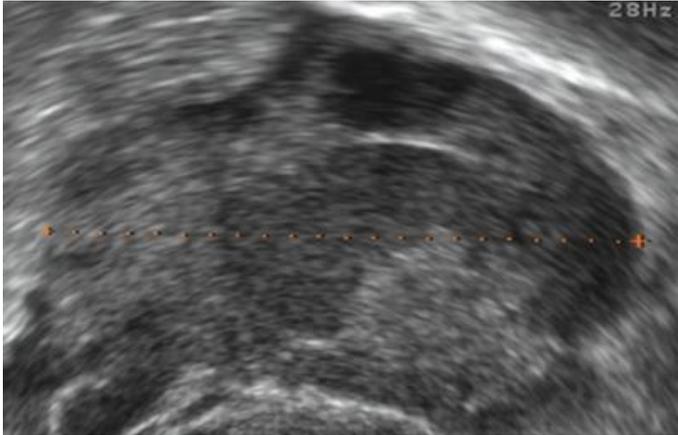
- Malignant transformation of endometriomas is rare, but reported to occur in 0.3-0.8% of women
- Typically in women 50-60 years



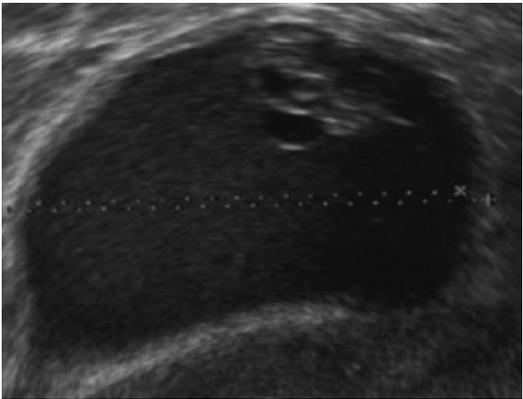
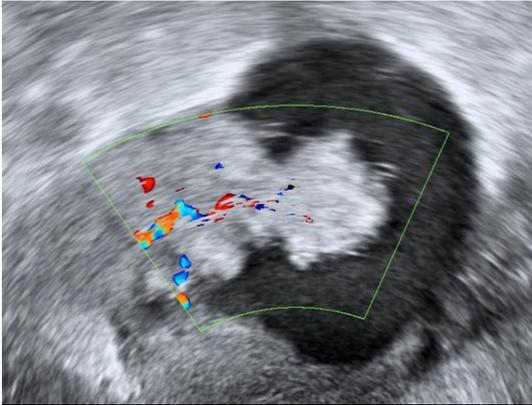
*Ovarian endometrioid carcinoma stage 2*

# Cancers arising from endometriosis

Endometrioid

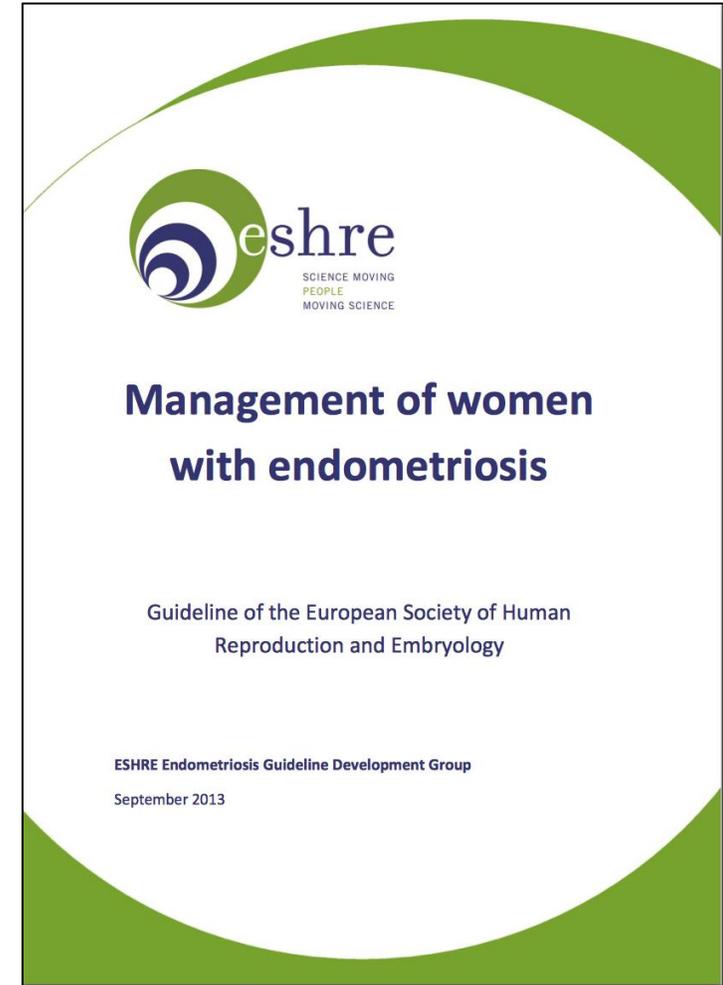


Clear cell



# Ovarian endometrioma only are rarely the sole findings

Women with ovarian endometriomas have more pelvic and intestinal areas invaded by endometriosis, compared to women without ovarian endometriomas (*Redwine, 1999*)



# IDEA group

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

- Evaluation of uterus and adnexae – assessing uterine mobility, sonographic signs of adenomyosis and the presence of endometrioma
- Soft markers site-specific tenderness and fixed ovaries
- Evaluation of the pouch of Douglas using ‘sliding organs sign’
- Assessment for DIE nodules

# Definition of Adenomyosis

- Migration of ectopic endometrial glands from the basal layer of the endometrium to within the myometrium
- Usually present in older reproductive age group
- Symptoms include uterine tenderness, dysmenorrhoea and menorrhagia
- Often incorrectly diagnosed as fibroids
- 27% of women with pelvic endometriosis had adenomyosis on pre-op MRI

•Bazot et al: *Deep pelvic endometriosis: MR imaging for diagnosis and prediction of extension of disease.*  
*Radiology 232:379, 2004*

## Ultrasound features of adenomyosis

*Asymmetrical myometrial thickening (not caused by the presence of fibroids)*

*Parallel shadowing*

*Linear striations*

*Myometrial cysts*

*Hyperechoic islands*

*Adenomyoma: ill-defined nodular heterogenous myometrial mass*

*Irregular endometrial-myometrial layer*

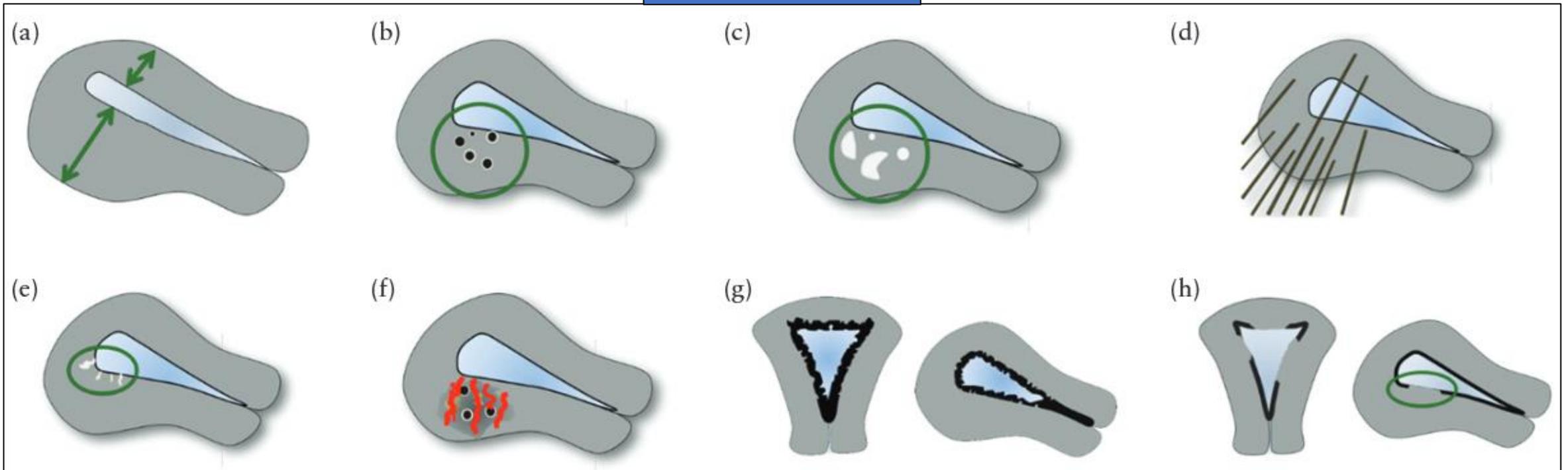
*Increased junctional zone thickness on 3D  $\geq 8$  mm*

*Uterus globular in shape*



# Terms, definitions and measurements to describe sonographic features of myometrium and uterine masses: a consensus opinion from the Morphological Uterus Sonographic Assessment (MUSA) group

## Adenomyosis

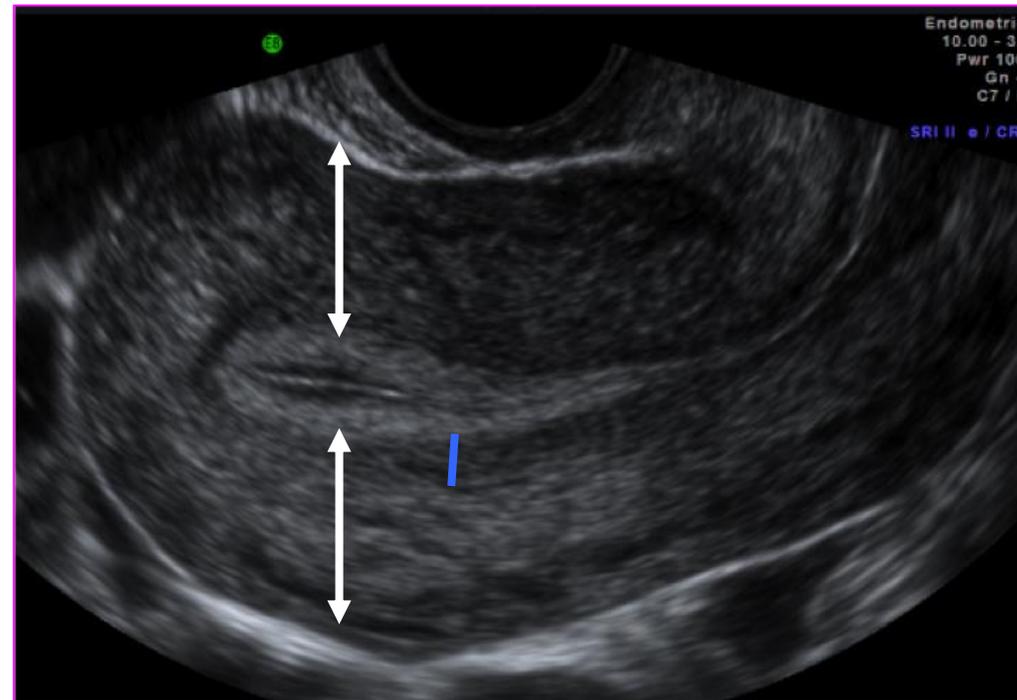


# Normal myometrial appearances

Junctional zone/ Inner myometrium/ Sub-endometrial myometrium |

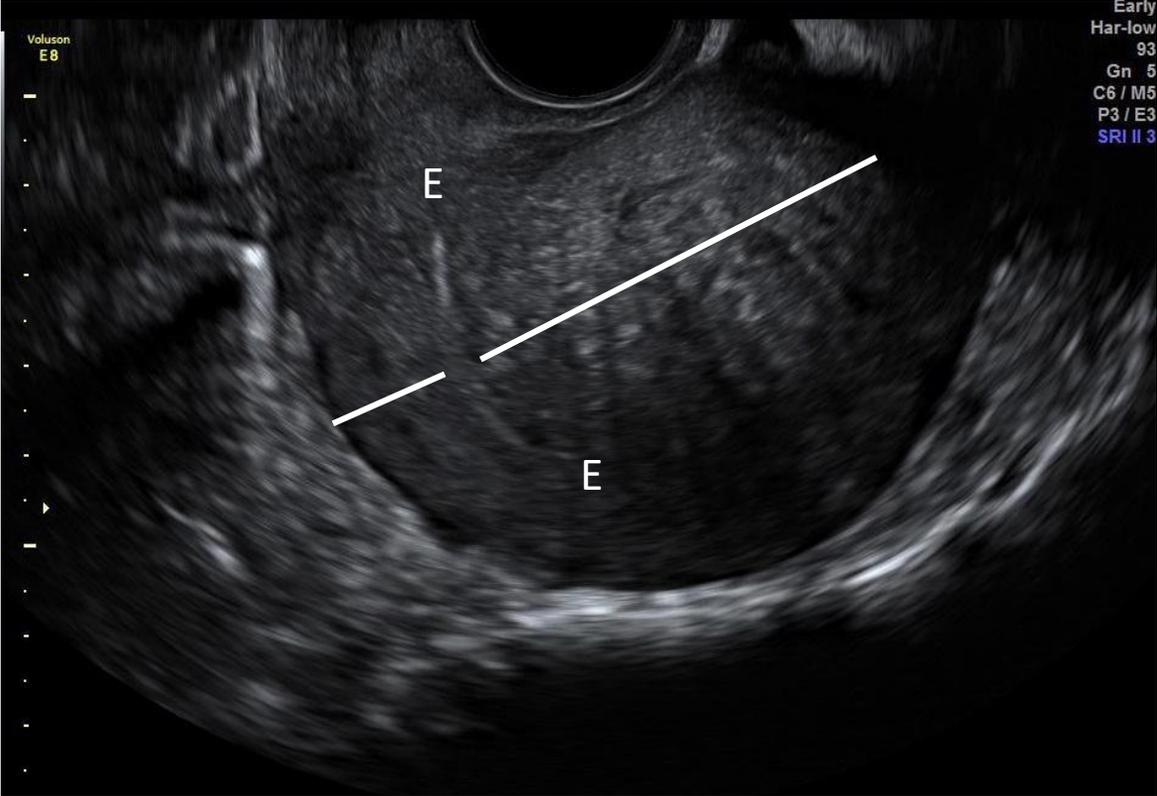
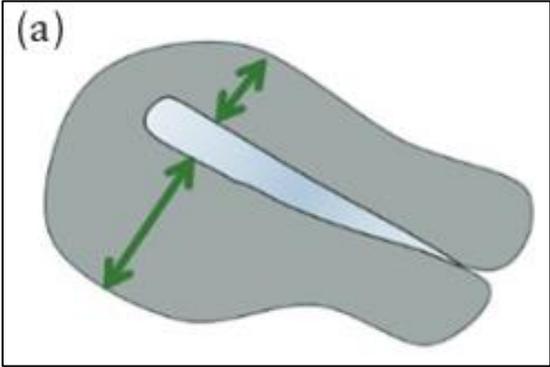


*TV scan – 3D coronal view*

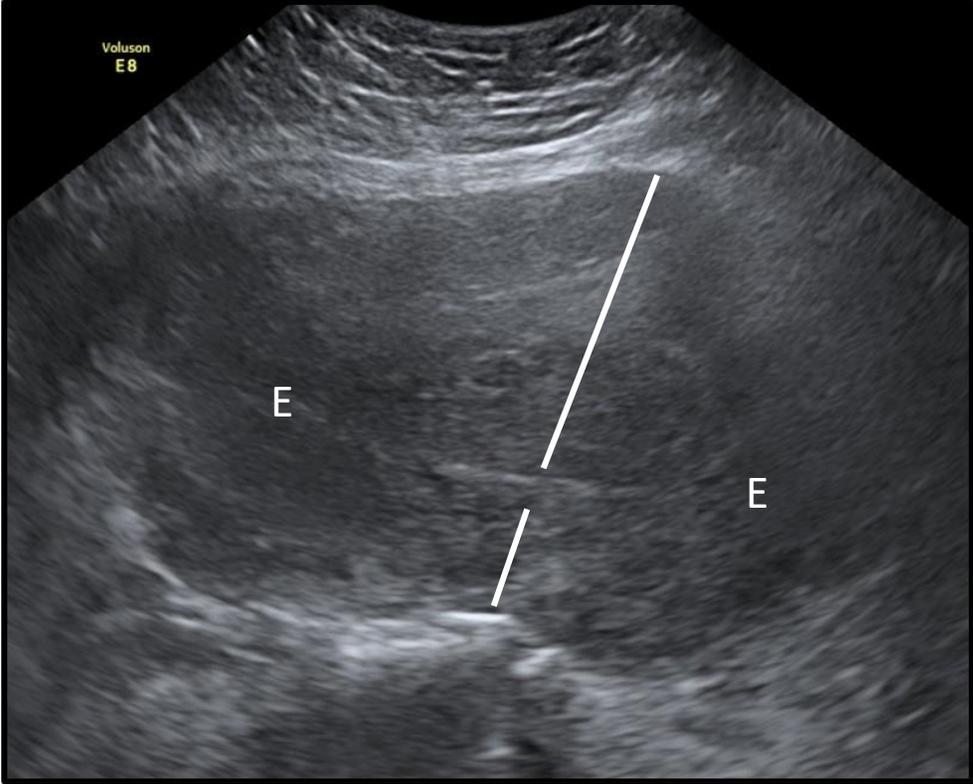


*TV scan - LS Anteverted Uterus*

# Asymmetrical myometrial thickening

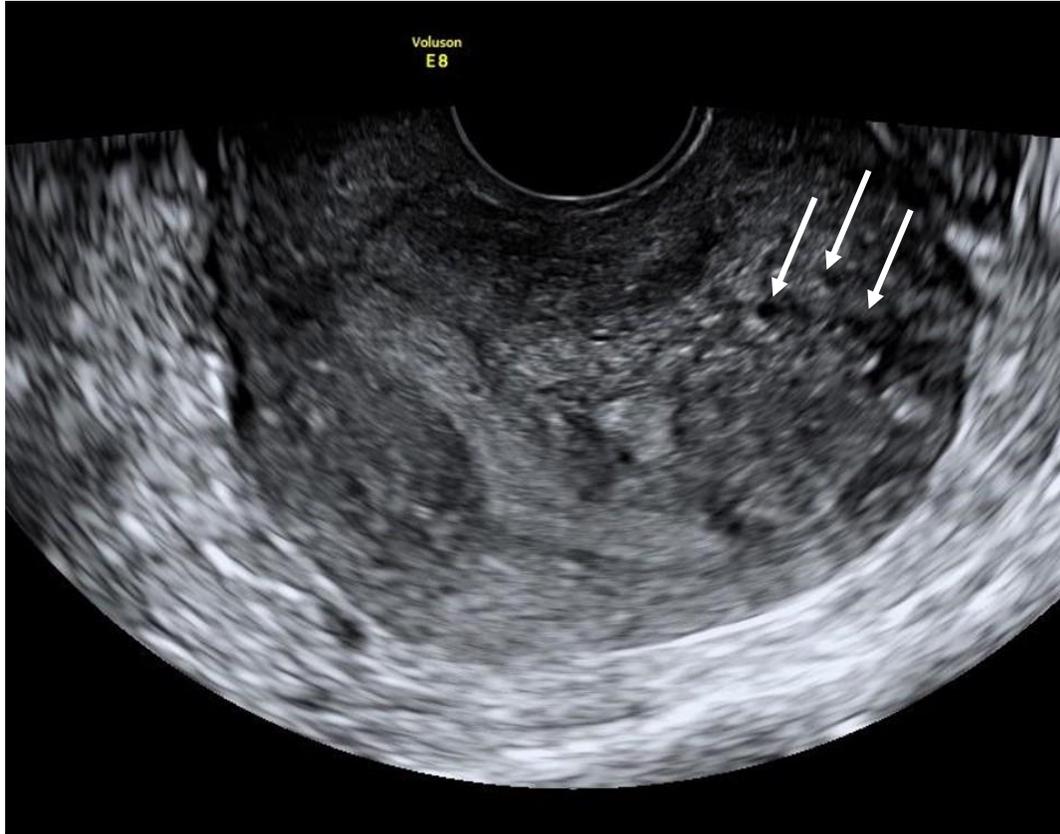
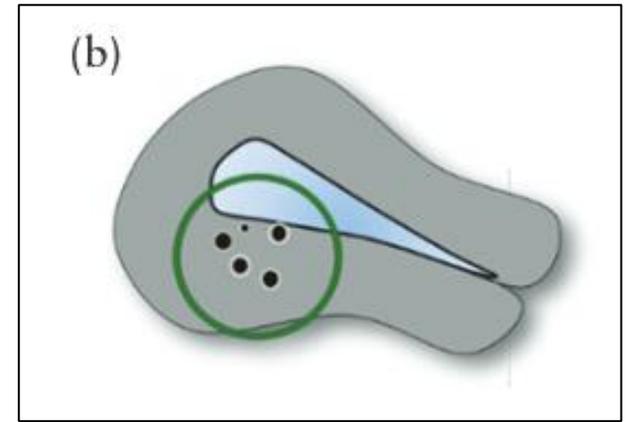


*TV scan - LS retroverted uterus*

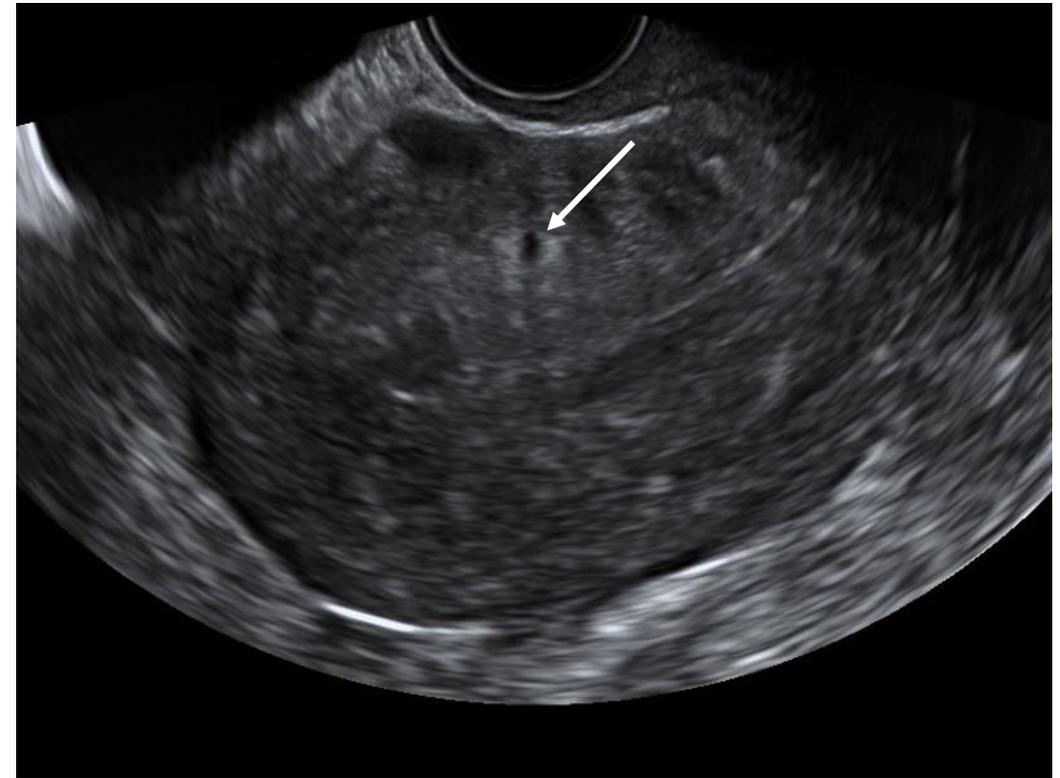


*TA scan - LS axial uterus*

# Myometrial cysts

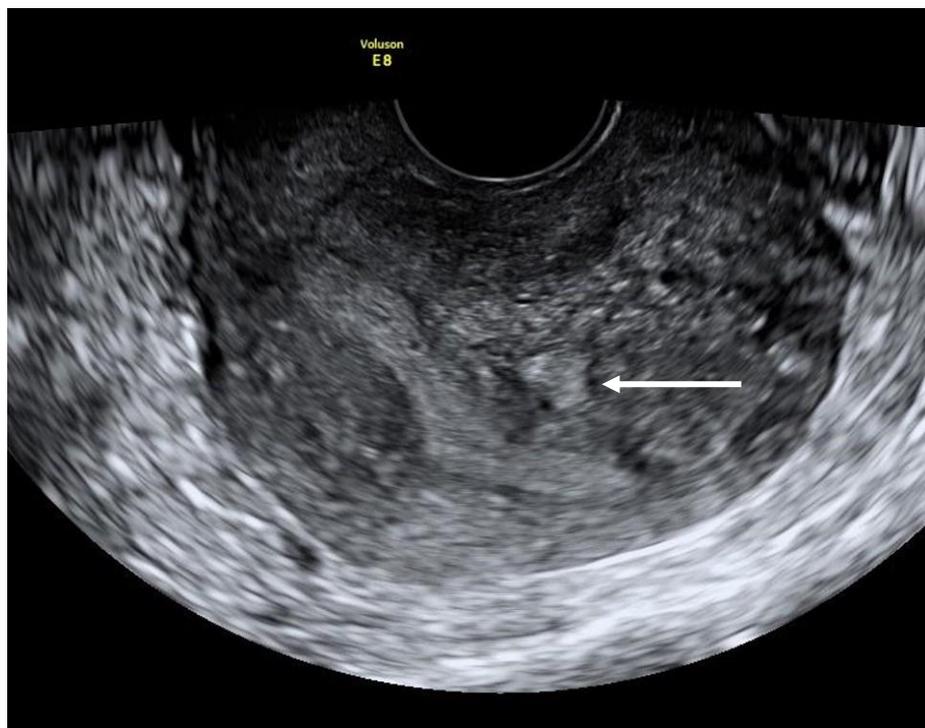
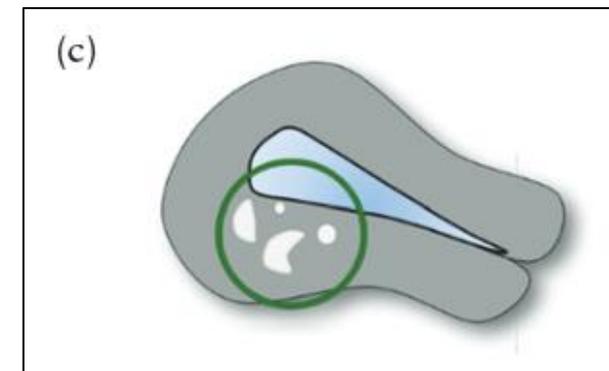


*TV scan - LS retroverted uterus*

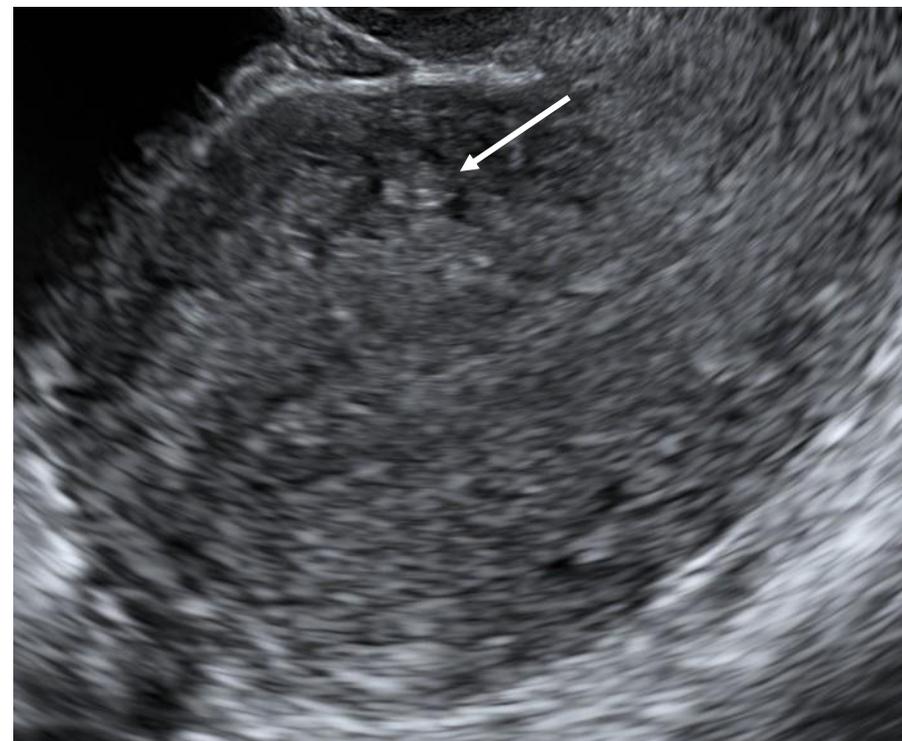


*TV scan - LS anteverted uterus*

# Hyperechoic islands

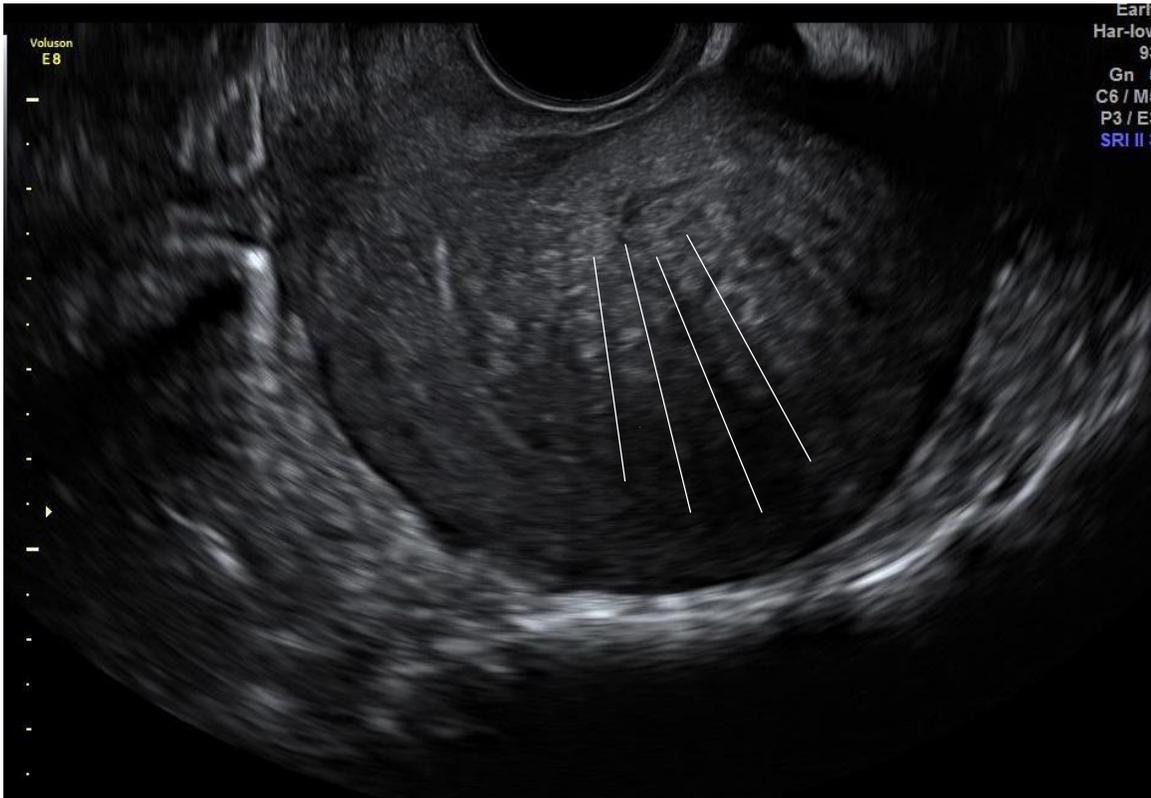
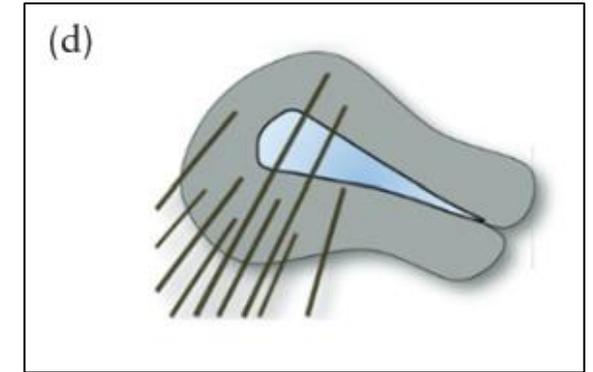


*TV scan - LS retroverted uterus*

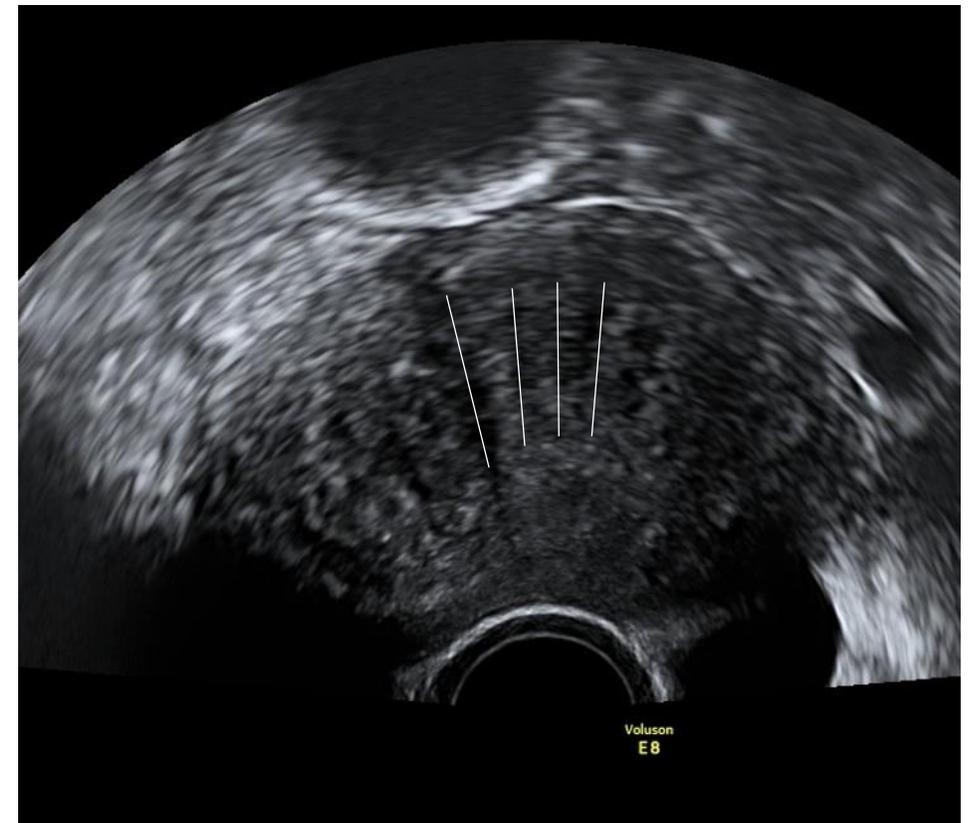


*TV scan - LS anteverted uterus*

# Parallel shadowing (fan-shaped/ rain forest)

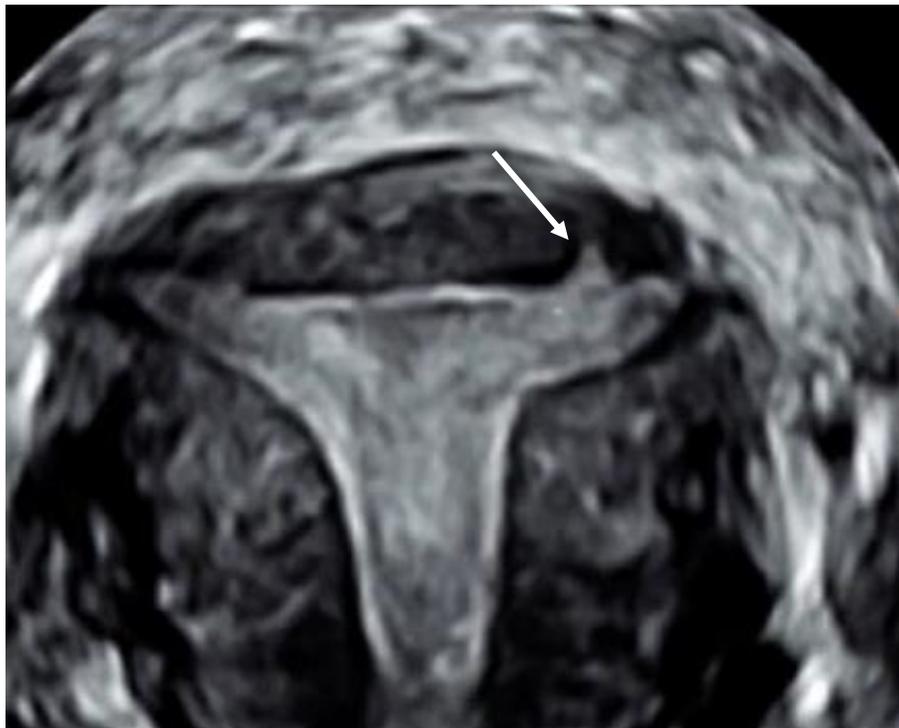
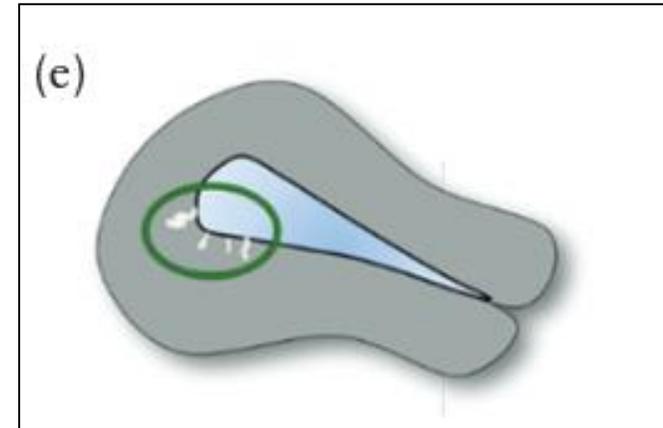


*TV scan LS retroverted uterus*

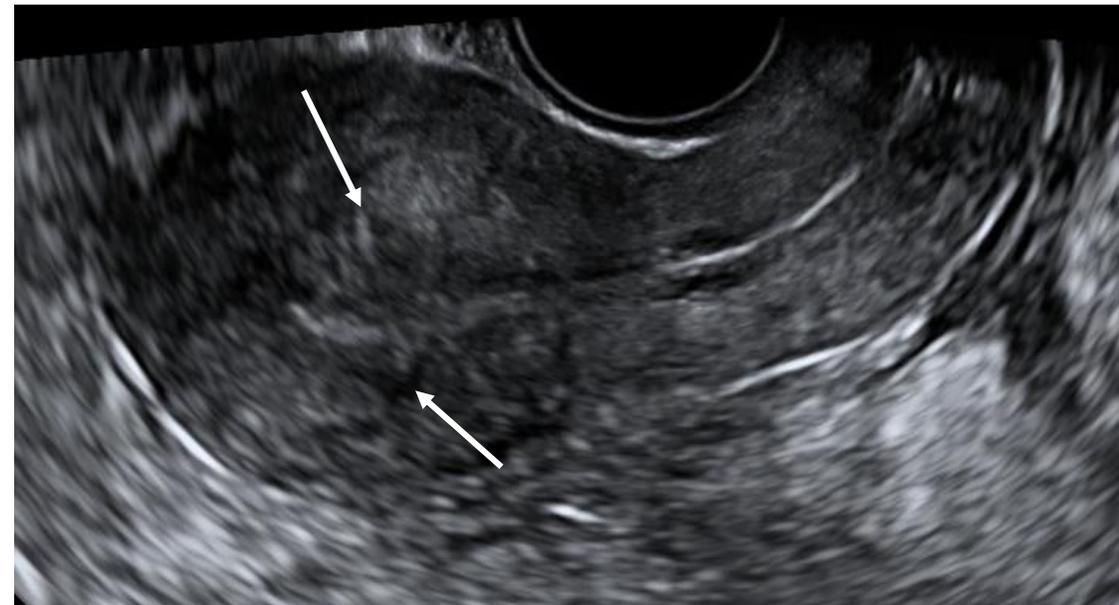


*TV scan TS uterus*

# Linear Striations (sub-endometrial lines/ buds)

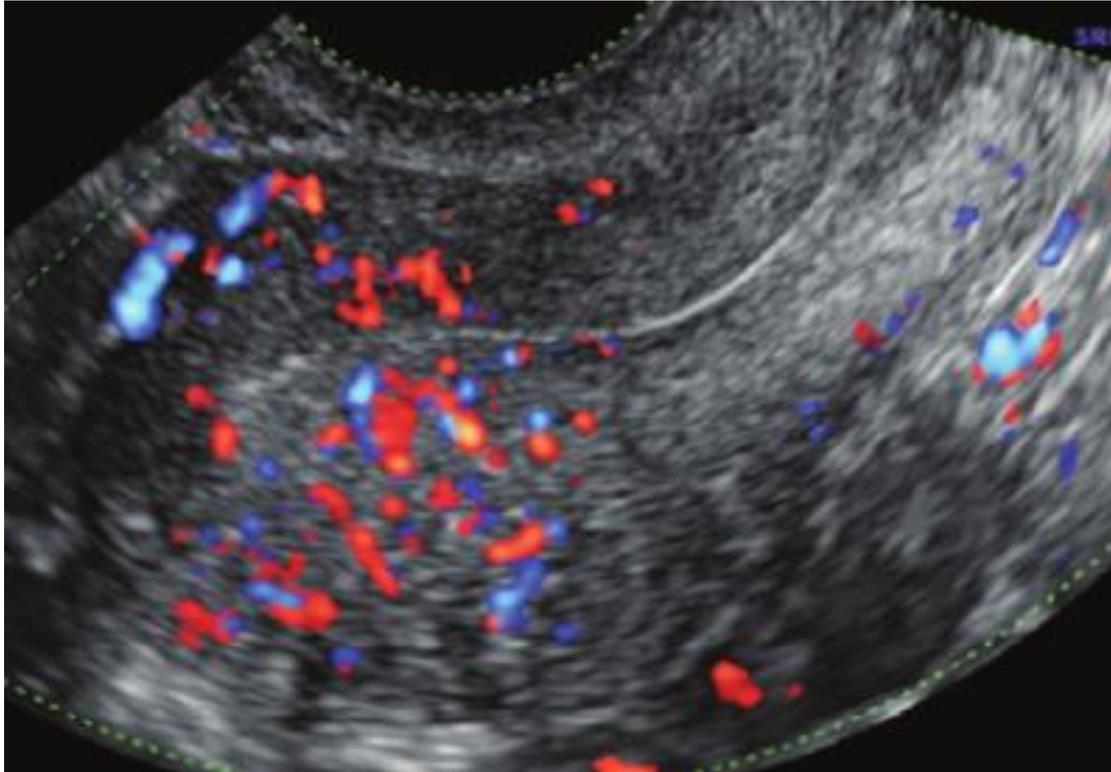


*TV scan – 3D coronal view*

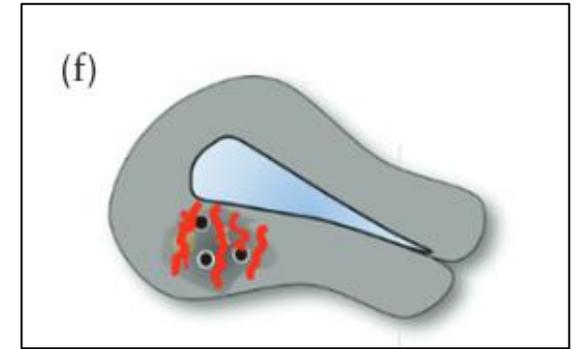


*TV scan - LS anteverting uterus*

# Trans-lesional vascularity



*TV scan - LS anteverted uterus*

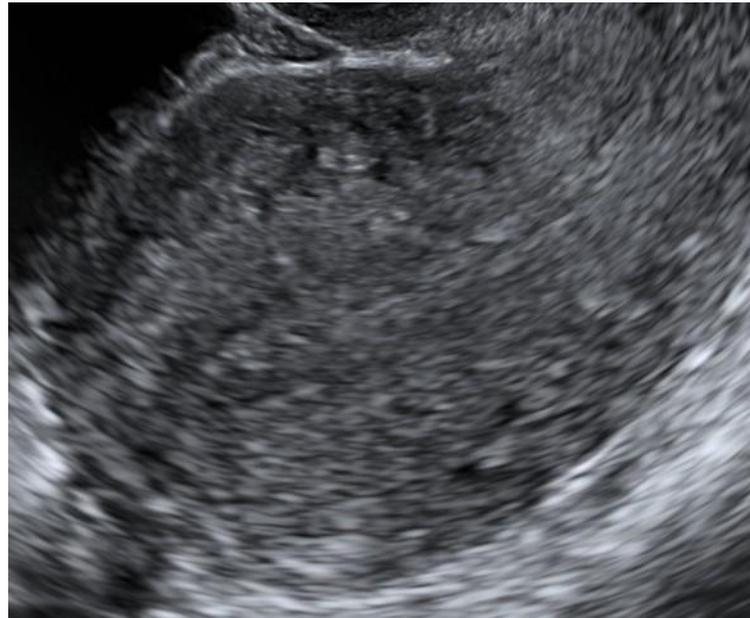
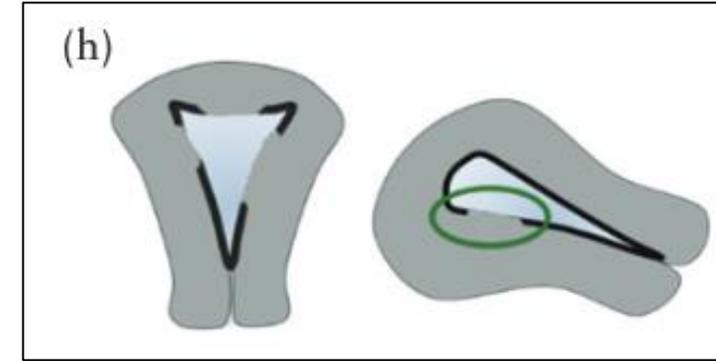
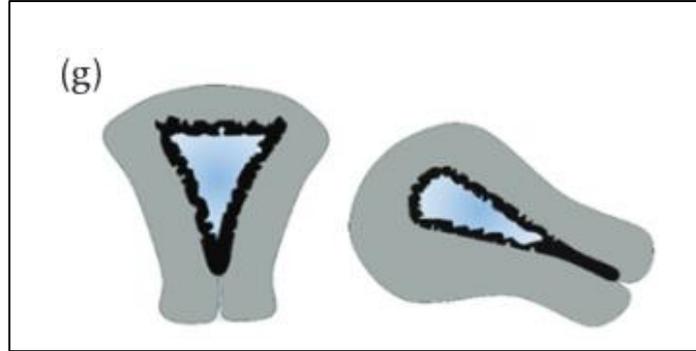


- Vessels perpendicular to endometrium, crossing the lesion (rather than circumferential)
- Power Doppler more sensitive to small vessels with low blood flow velocities

# Ill defined endometrial – myometrial interface



*TV scan - LS anteverted uterus*

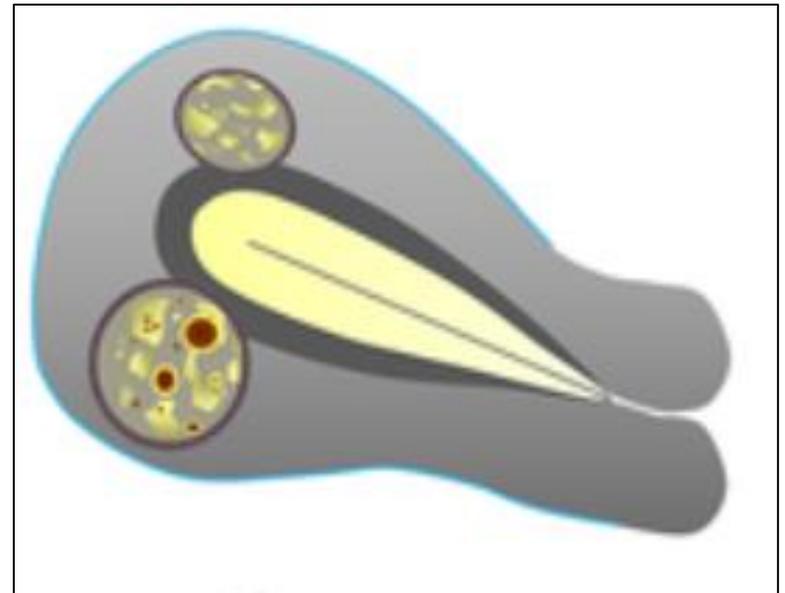


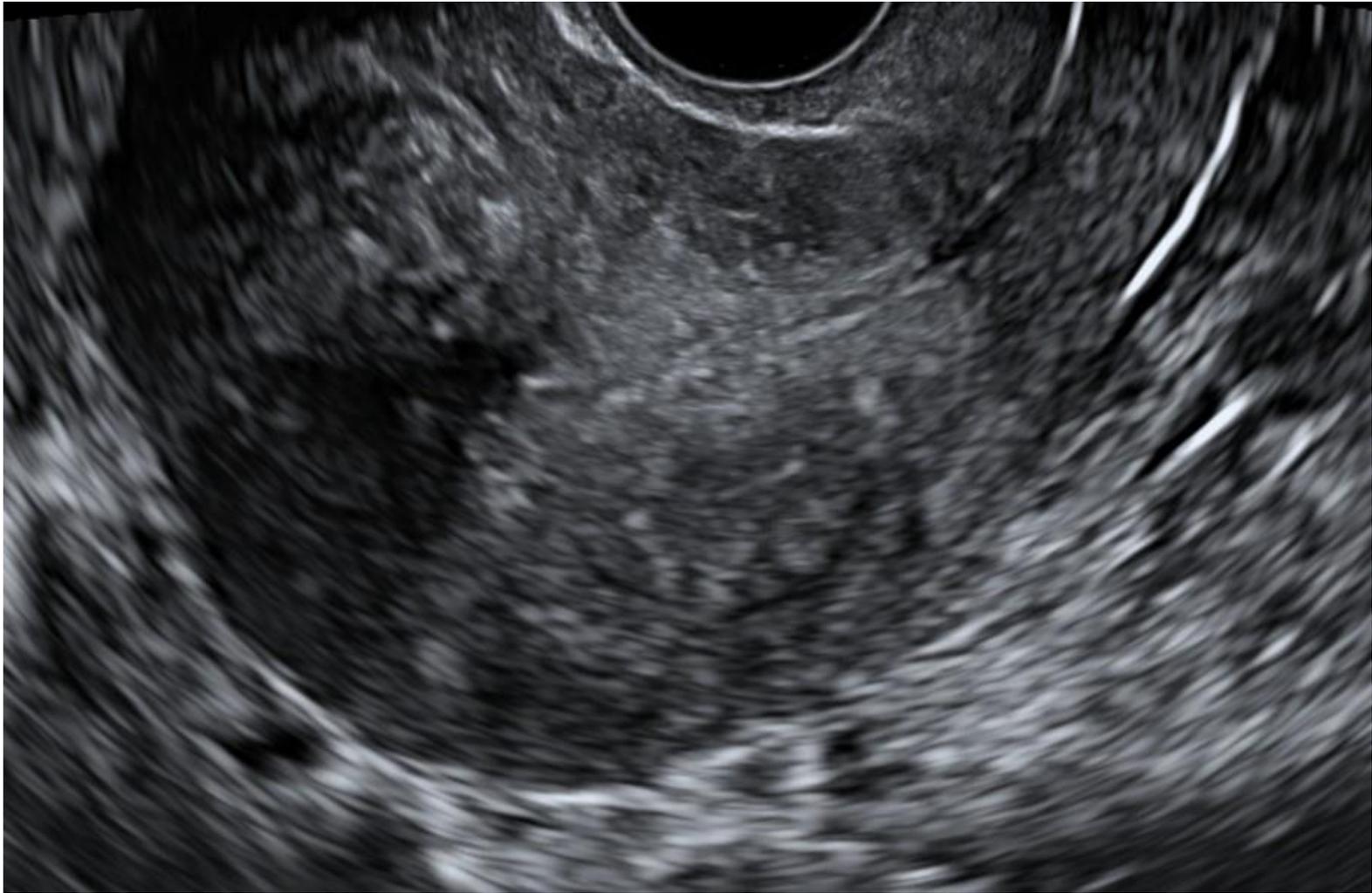
*TV scan - LS anteverted uterus*

- Regular/ irregular
- Interrupted
- Not visible
- Or combination of above

# Adenomyoma

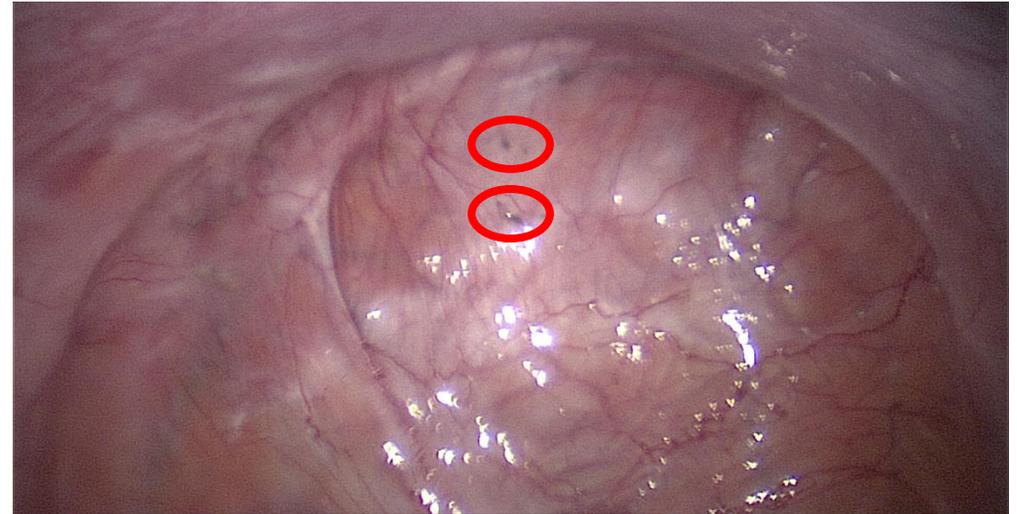
- Focal adenomyosis well demarcated surrounded by hypertrophic myometrium
- Colour Doppler - trans-lesional vascularity rather than circumferential





# Nodules or implants

- Nodules vary in size from a few mm to a few cm and are superficial or deep
- Nodules may change appearance during the menstrual cycle – becoming more swollen and congested during menses and develop internal haemorrhage
- Only laparoscopy can detect superficial peritoneal implants



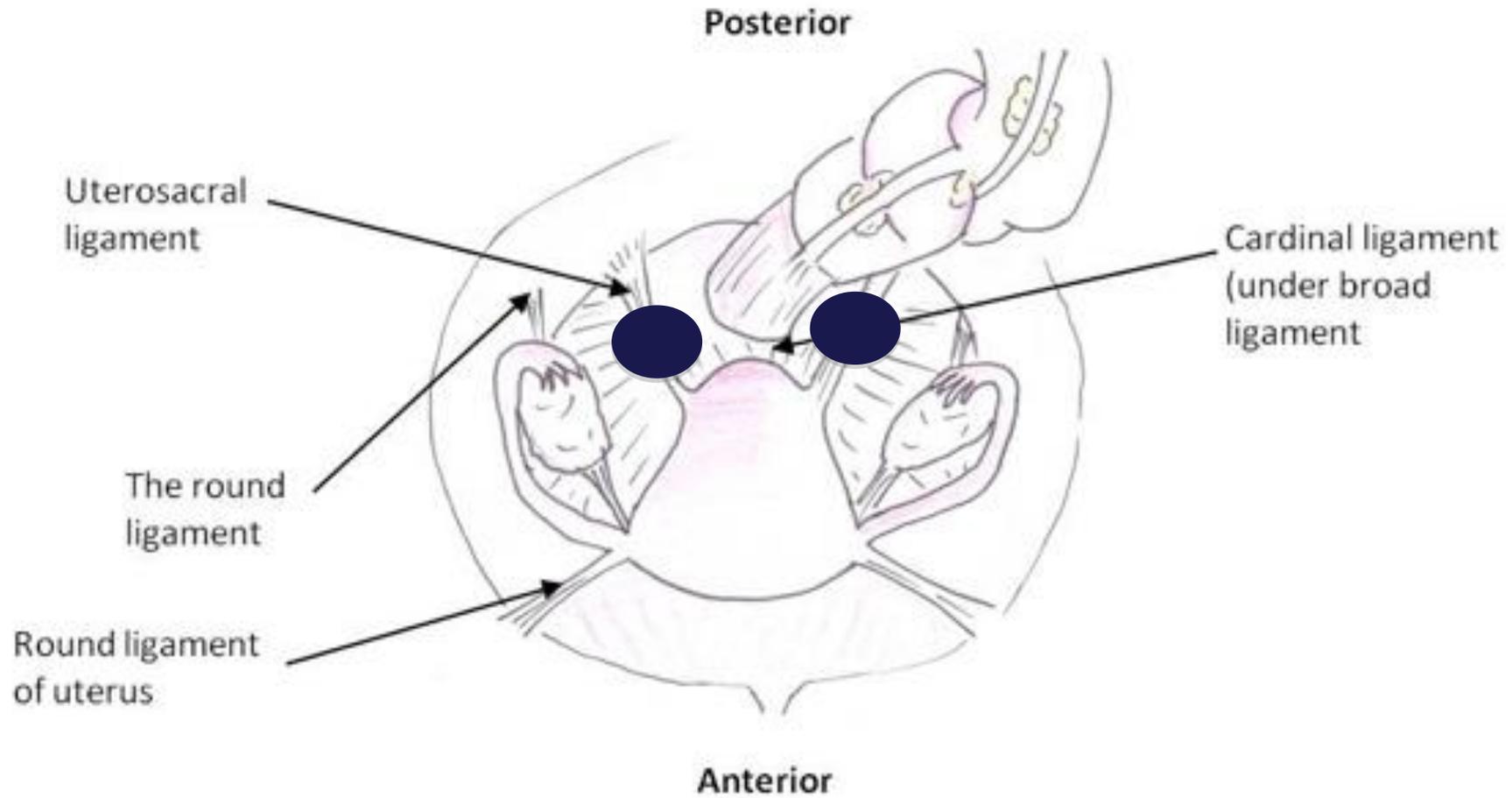
# Deep infiltrating endometriosis (DIE)

- Definition is the infiltration of endometriotic nodules  $\geq 5\text{mm}$
- Locations includes
  - rectosigmoid
  - utero-sacral ligaments
  - recto-vaginal septum
  - vagina
  - bladder

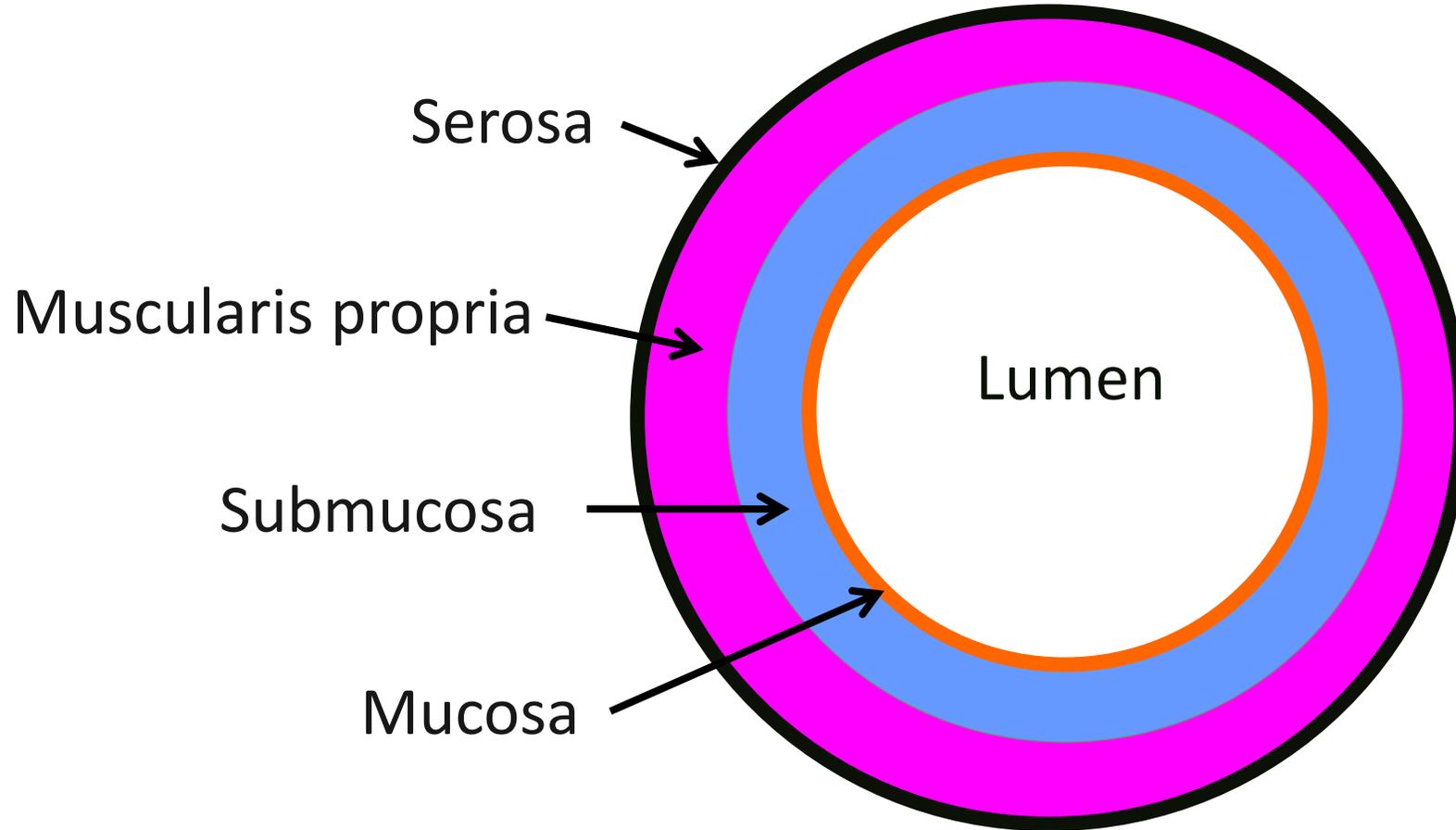
# DIE



# DIE



# Bowel wall layers



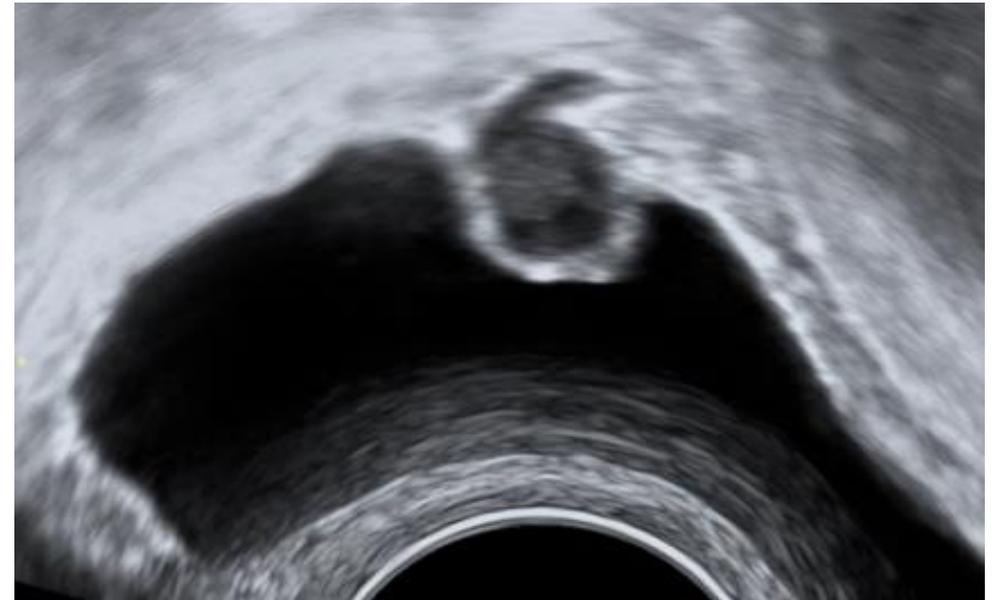
# Bowel nodules

- Histologically defn - presence of endometrial glands & stroma in the bowel reaching at least the muscularis propria
- Involves anterior rectum, rectosigmoid junction and/ or sigmoid colon
- Typically hypoechoic or isoechoic solid masses with irregular outer margins
- Tender on palpation



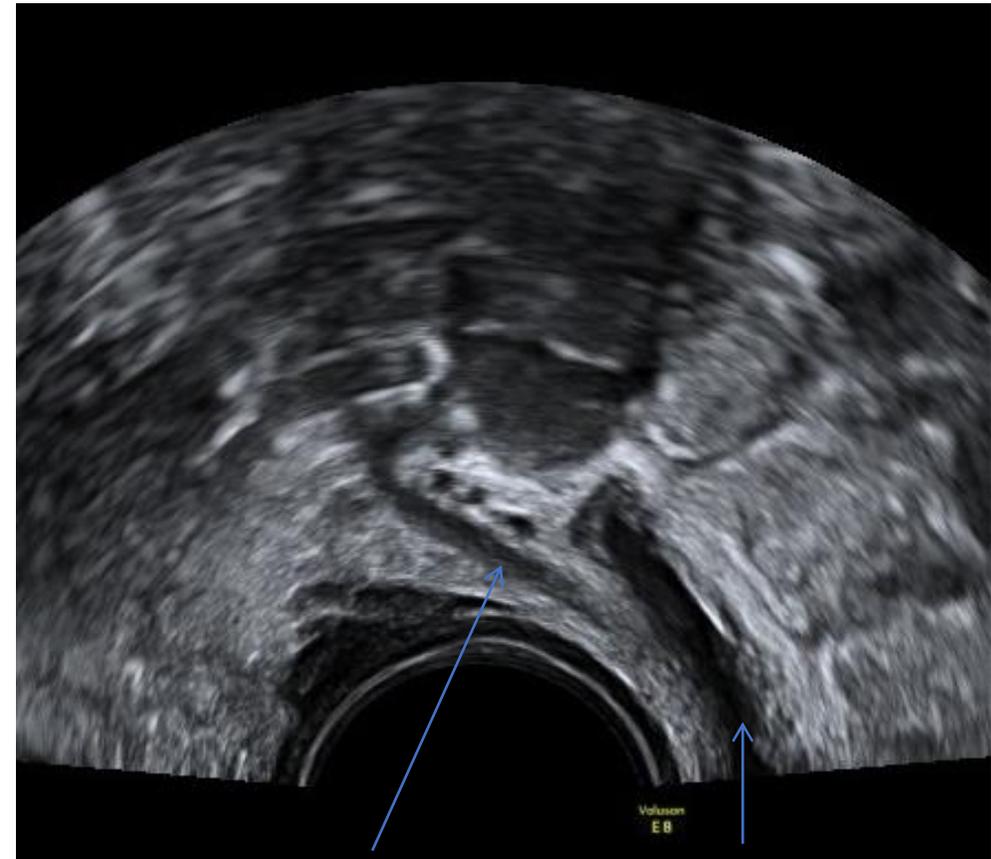
# Bladder lesions

- Hypo- or isoechogenic nodule within the bladder base (close to the ureteral ostia) or in the bladder dome
- 'Nodular' or a 'comma' shape
- Small internal anechoic cystic areas are seen in approximately 30% of the nodules



# Examining the Ureters

- Find urethra in the sagittal plane
- Move the probe laterally to find the intra-vesical portion of the ureter
- Follow the ureter and rotate the probe to get a view of the distal ureter
- Follow until it reaches the internal iliac vessels



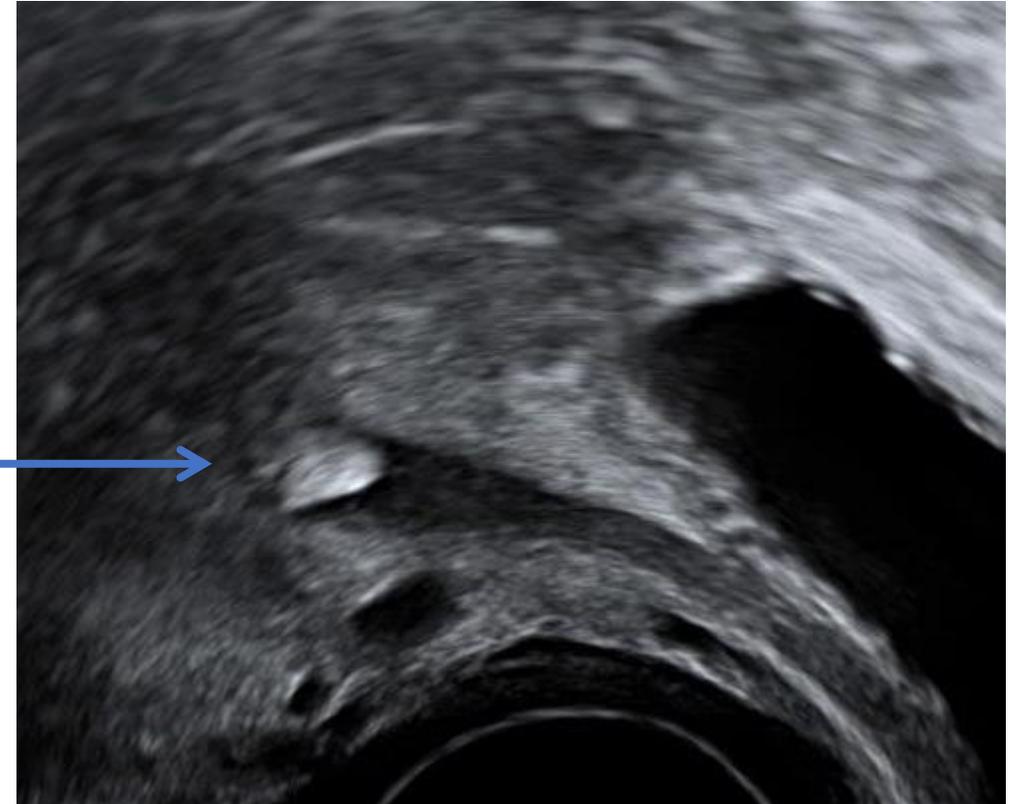
Ureter

Bladder

# Why is it important to diagnose bladder endometriosis?

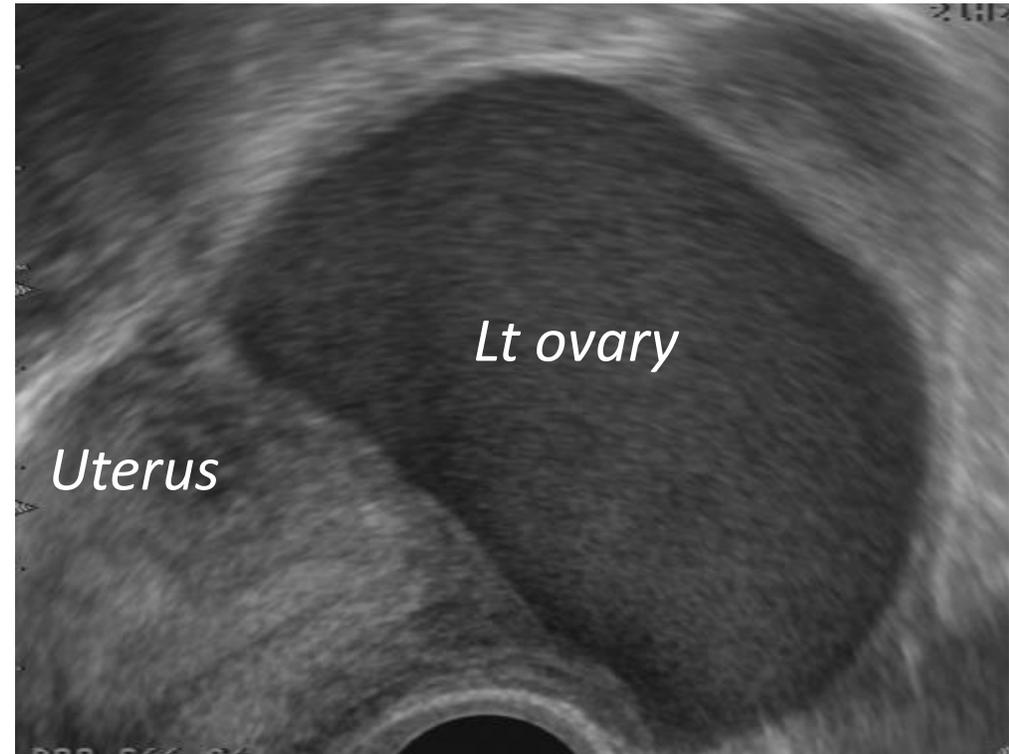
- Bladder endometriosis mimics recurrent cystitis with dysuria, urgency, frequency, suprapubic pain and incontinence
- Macroscopic haematuria relatively rare
- Occurs in 1 – 4% of women with laparoscopic diagnosis of endometriosis
- Diagnosis is often delayed or not considered at all

*Ureteric stone*



# Ovarian mobility

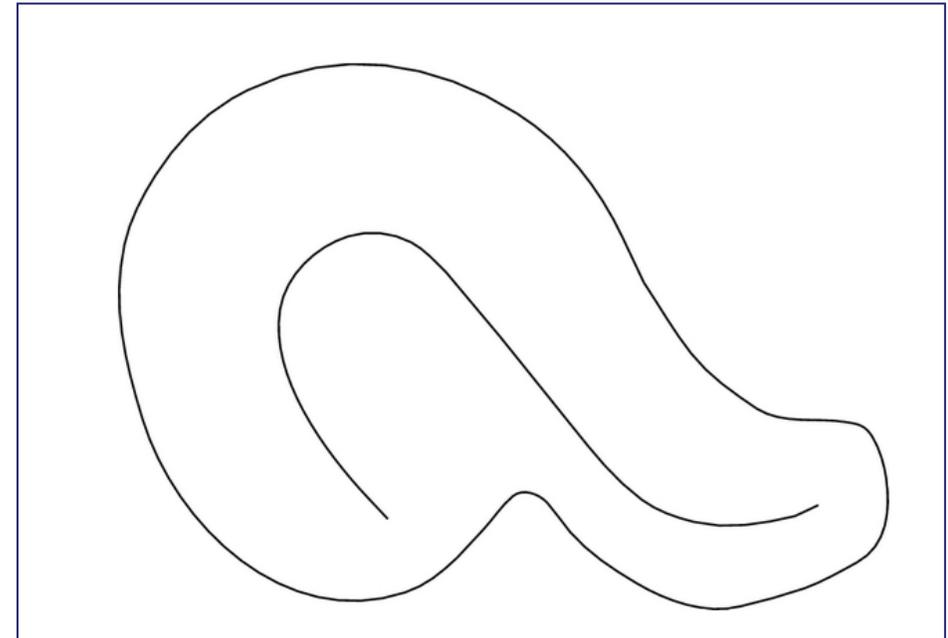
- Apply pressure with transvaginal probe to assess whether ovary is fixed to the uterus medially or the pelvic side wall laterally
- Note any indication of site specific pain



# Question mark sign ? (association with endometriosis)



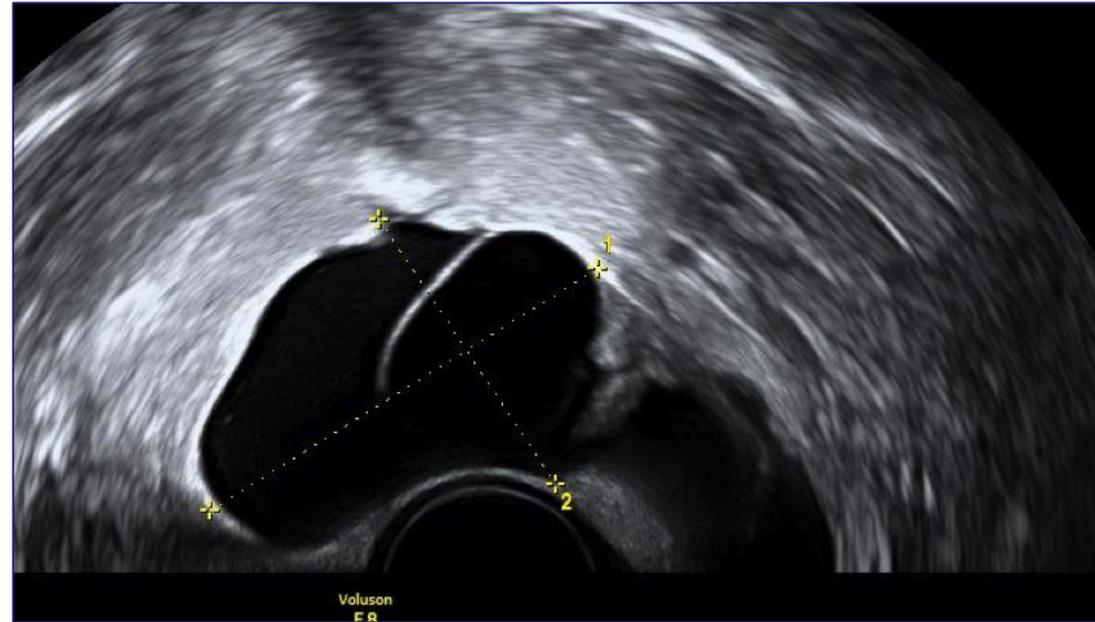
- Uterine corpus/ body flexed backwards
- Uterine fundus faces the posterior pelvic compartment
- Cervix directed anteriorly towards the urinary bladder



*Di Donato et al, Ultrasound Obstet Gynecol 2015*

# Adhesions

- Filmy adhesions have fluid entrapped within them
- Known as the 'flapping sail sign'



# How to assess the pelvis



# Ovarian mobility



# Staging - American Society for Reproductive Medicine (ASRM)

## *Stage I (Minimal)*

Findings restricted to only superficial lesions and possibly a few filmy adhesions

## *Stage II (Mild)*

In addition, some deep lesions are present in the cul-de-sac

## *Stage III (Moderate)*

As above, plus presence of endometriomas on the ovary and more adhesions.

## *Stage IV (Severe)*

As above, plus large endometriomas, extensive adhesions

# Take home messages



- TV U/S accurate at assessing endometriomas
- Severity of symptoms does not correlate with extent of disease
- Identifying an endometrioma – likely further sites of pelvic endometriosis
- ‘Kissing ovaries’ associated with extensive pelvic adhesions
- Adenomyosis is usually under reported
- Assessment of pelvic mobility can indicate adhesions



Thank you

