OUTLINE:

- Equipment & technique
- Normal ovary
- Abnormalities
- Ovarian cysts
- Benign tumours
- Malignant tumours
- Fallopian tube lesions
- Peritoneal cavity lesions

All descriptions will follow the IOTA simple rules and subjective assessment descriptors

- Examination of the adnexa should be done via the transvaginal route using a transvaginal probe with high frequency 7-12 MHz or more.
- Identification of the normal ovary; an oval structure with hypoechoic fluid spaces (follicles) anterior to iliac vessels.
- In case of difficulty due to previous surgeries, pelvic adhesions, and scarring, abdominal pressure might help and in very laterally situated ovaries, abdominal Ultrasound examination is the last resort.
- Always start by reviewing the normal structure of the ovary, counting of antral follicles and measurement of dominant follicle, together with correlation with day of the cycle (in infertility cases). Mobility of the ovary against the lateral pelvic wall or the uterus should be confirmed by what is known as the "sliding sign" see video 1

Ovarian cysts

The represent normal physiology, i.e. functional ovarian cysts
- They are clear(hypoechoic) unilocular small in size < 5cm (Picture 1).
- Usually Disappear spontaneously in 3 cycles.
- Adding colour Doppler will show minimal vascularity, except Corpus luteum (CL) cysts show prominent high vascularity (observing a CL is ultrasound of evidence of ovulation and should be correlated with day of the cycle (Picture 2)

Hemorrhagic Ovarian cysts

- Unilocular clear cyst with internal echoes denoting clotted blood or fibrin threads (mobile on pressure like jelly).
- Some vascularity could be detected by colour Doppler in hemorrhagic CL cysts (Pictures 3 & 4).
- They disappear spontaneously in 2-3 cycles so a simple follow up is recommended.

Endometriotic Cysts

- According to IOTA simple rules, they are present in premenopausal women, have ground glass echogenicity of the cyst fluid, one to four locules and no solid parts with detectable blood flow
- They could reach large sizes
- The cyst is surrounded by normal ovarian tissue where follicles could be seen and counted, known as the Crescent sign, which denotes the benign nature of the cyst.
- Endometriomas are commonly associated with pelvic adhesions that could result in kissing ovaries stuck to the back of the uterus (Picture 5)
- Using pattern recognition: Gray scale and doppler; has high specificity 98%, good sensitivity; 77%. (Picture 6)

Benign ovarian tumours

Dermoid cysts
- Very common; 20 % of ovarian tumours,
- The ultrasound characteristics of dermoid cysts are highly variable, ranging from predominantly cystic to uniformly dense (described as having mixed echogenicity).
- The most distinctive feature is the presence of a discrete highly echogenic focus, with posterior shadowing (Rokitansky nodule).
- Other characteristics considered pathognomonic are fine, echogenic bands (representing hair) within the cystic area and the presence of a fat–fluid level
- Dermoid cysts are mobile on pressure and show no evident vascularity by colour doppler
- Reported accuracy by ultrasound; accuracy 97%, sensitivity 86%, specificity 99% (Pictures 7 &8)

Ovarian serous cystadenomas

- They are benign ovarian epithelial tumors at the benign end of the spectrum of ovarian serous tumors.

- They are the commonest type of ovarian epithelial neoplasm. The peak incidence is at the 4th to 5th decades of life.

- They can be bilateral in ~15% of cases.

- Serous cystadenomas are usually composed of unilocular (or at times multilocular) cysts filled with clear fluid. The cysts measure 10 cm in average diameter but may be extremely large. The lining of the cyst is flat or may contain small papillary projections.

By Ultrasound
- According to the IOTA instant descriptors a unilocular clear cyst < 10cm is diagnostic of cystadenoma
- Papillary projections are absent
- If there is any wall irregularity, it should be less than 3 mm height
- Some lesions may contain sonographically detectable septations
- No flow is detected on colour doppler
  (Pictures 9,10)

Border line Ovarian Tumours

- They are the most difficult to assess, only 47% were correctly classified
- They show Papillary projections, > 10 locules in a cyst with solid component, low level of echogenicity of cyst fluid, moderate vascularity. (Picture 11, 12)

Malignant Ovarian Tumours

According to the IOTA Simple rules they should have exclusively one or more of the following features;

- Irregular solid tumour (M1)
- Ascites (M2)
- At least four papillary structures (M3)
- Irregular multilocular solid tumour with a largest diameter of at least 100 (M4)
- High colour content on colour Doppler examination (grade 4) (M5). (Picture 13)

According to the IOTA, instant descriptors could be used and would diagnose with great accuracy the type of the lesion

US descriptor	Nature	Pathology	Accuracy of nature
Unilocular cyst with ground glass appearance	Benign	Endometrioma	99.5%
Unilocular cyst with mixed echogenicity and acoustic shadows in premenopausal woman		Teratoma	100%
Unilocular anechoic clear <10cm		Simple cystadenoma	98.8%
Large cyst with ascites and moderate doppler in postmenopausal women	Malignant		95.6%
CA 125 > 100 IU in a postmenopausal woman			93.2%

Hydrosalpinx

Very commonly seen in infertile women especially in those who have undergone previous surgery.
It appears as a cystic structure separate from the ovary, although with presence of adhesions could be difficult to outline

- Using pattern recognition has very high Accuracy 98%, Sensitivity 86%, Specificity 98%, no misdiagnosis
- Various forms of hydrosalpinges include; Cogwheel appearance, beads on end, incomplete septations. Communicating hydrosalpinx is the type resulting in continuous watery discharge to the patient and is seen by ultrasound this is the type that needs intervention prior to ART. (Picture 14,15,16)

Peritoneal cysts, peritoneal fluid

An ovary is seen separate or entangled in the pelvic fluid which might or might not have definite outline.
The cysts are clear avascular. They could contain septations varying from thin mobile septations, to thick fixed ones denoting severe adhesions.
Should be carefully distinguished from hydrosalpinges and ovarian cysts. (Picture 17)

Paraovarian cyst:

- **Paraovarian cysts** are remnants of <u>Wolffian duct</u> in the mesosalpinx that do not arise from the <u>ovary</u>. They account for ~10-20% of adnexal masses.

- Paraovarian cysts are also sometimes referred to as **paratubal cysts or hydatid cysts of Morgagni**

    By Ultrasound

- Typically, thin-walled and smoothly outline
- Most often appears as unilocular 'simple' cysts (in ~66%) and rarely as multilocular (~4%)
- There is a sliding movement between ovary and para-ovarian cyst. Clearly separate from the adjacent ovary
- No effect on ovarian function (pictures 18,19,20)
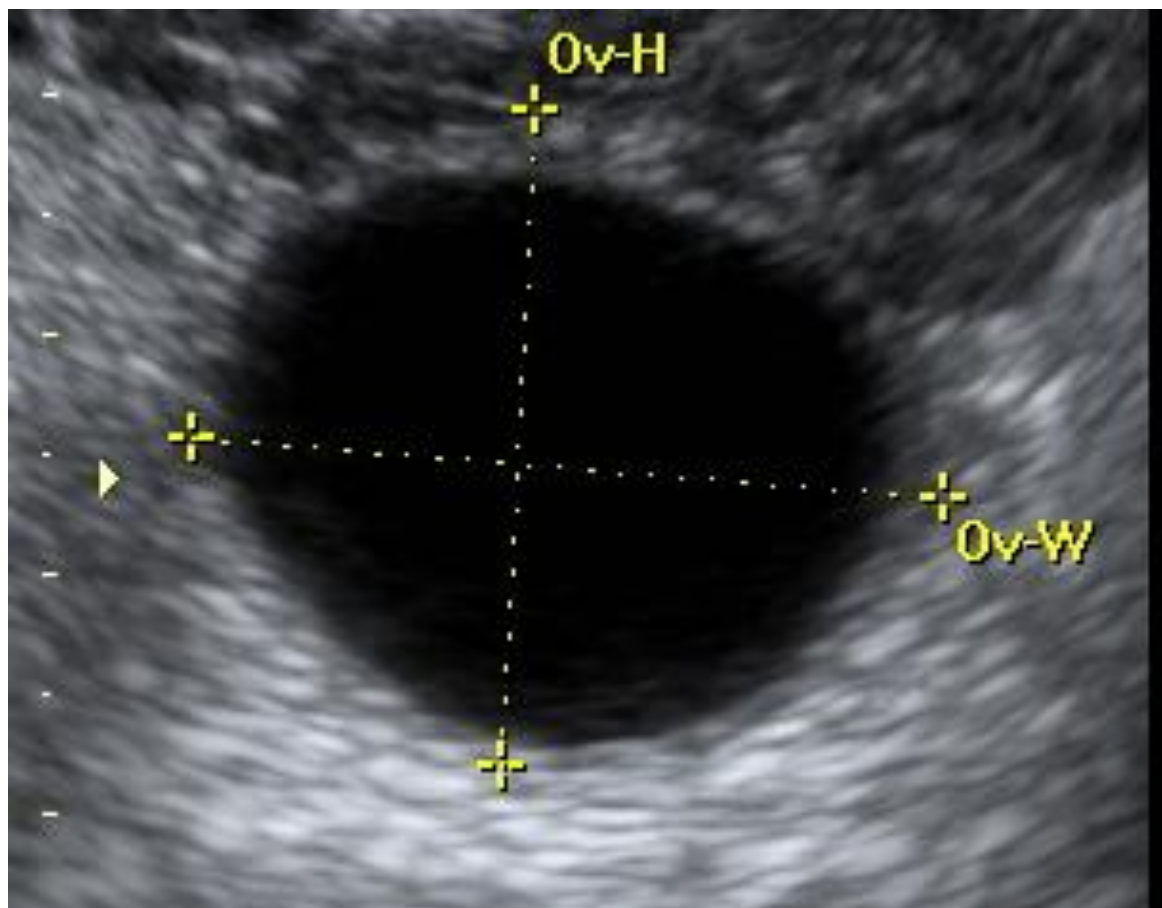
Picture 1 clear cyst
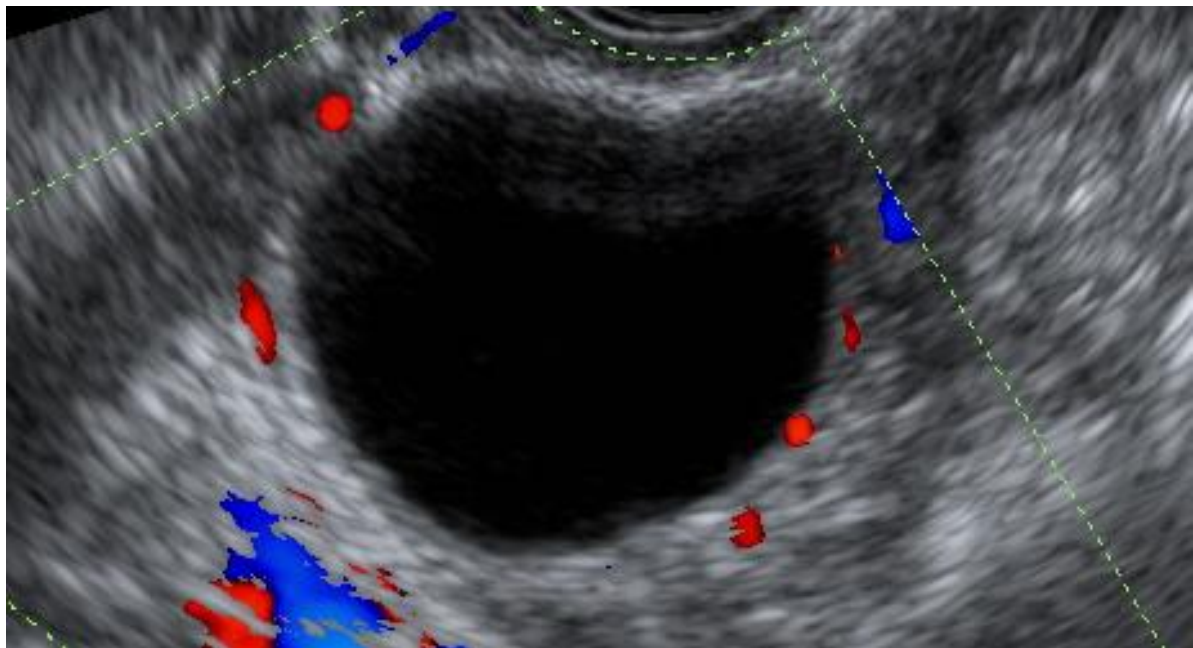
Picture 2 Corpus luteum cyst

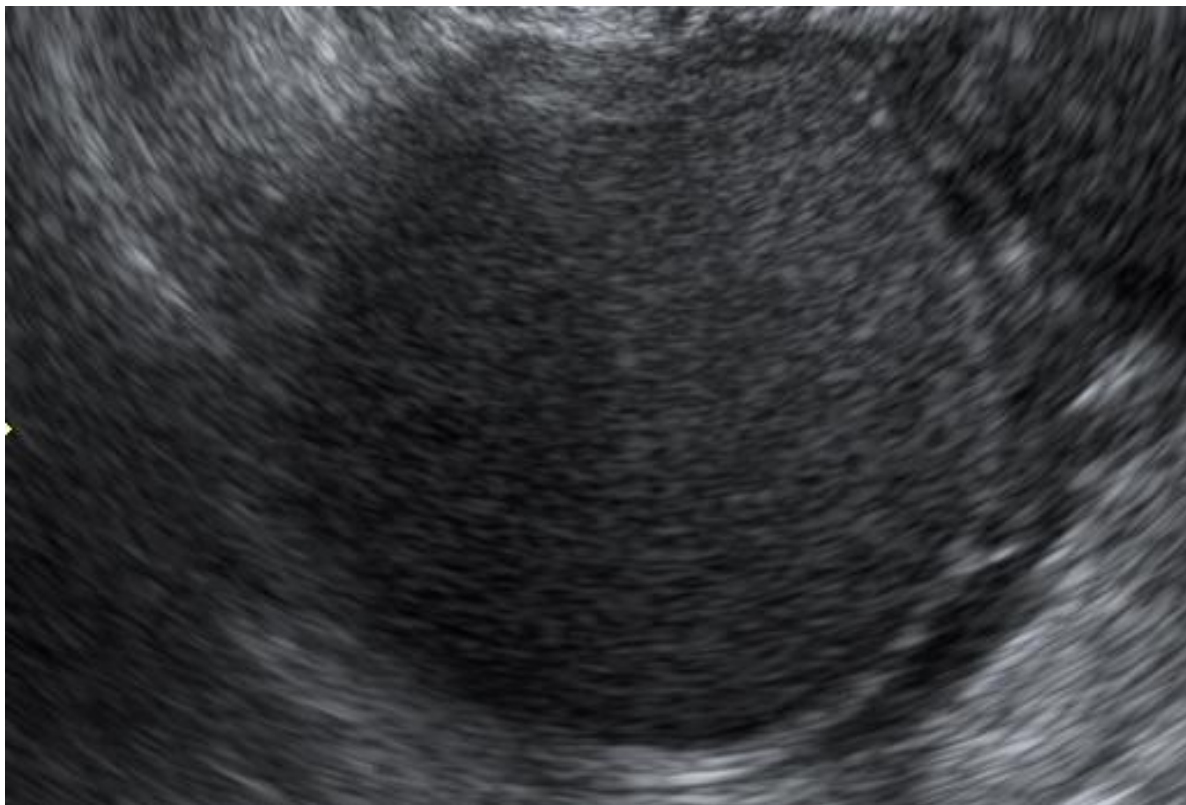Picture 3 Blood clot in hemorrhagic cyst

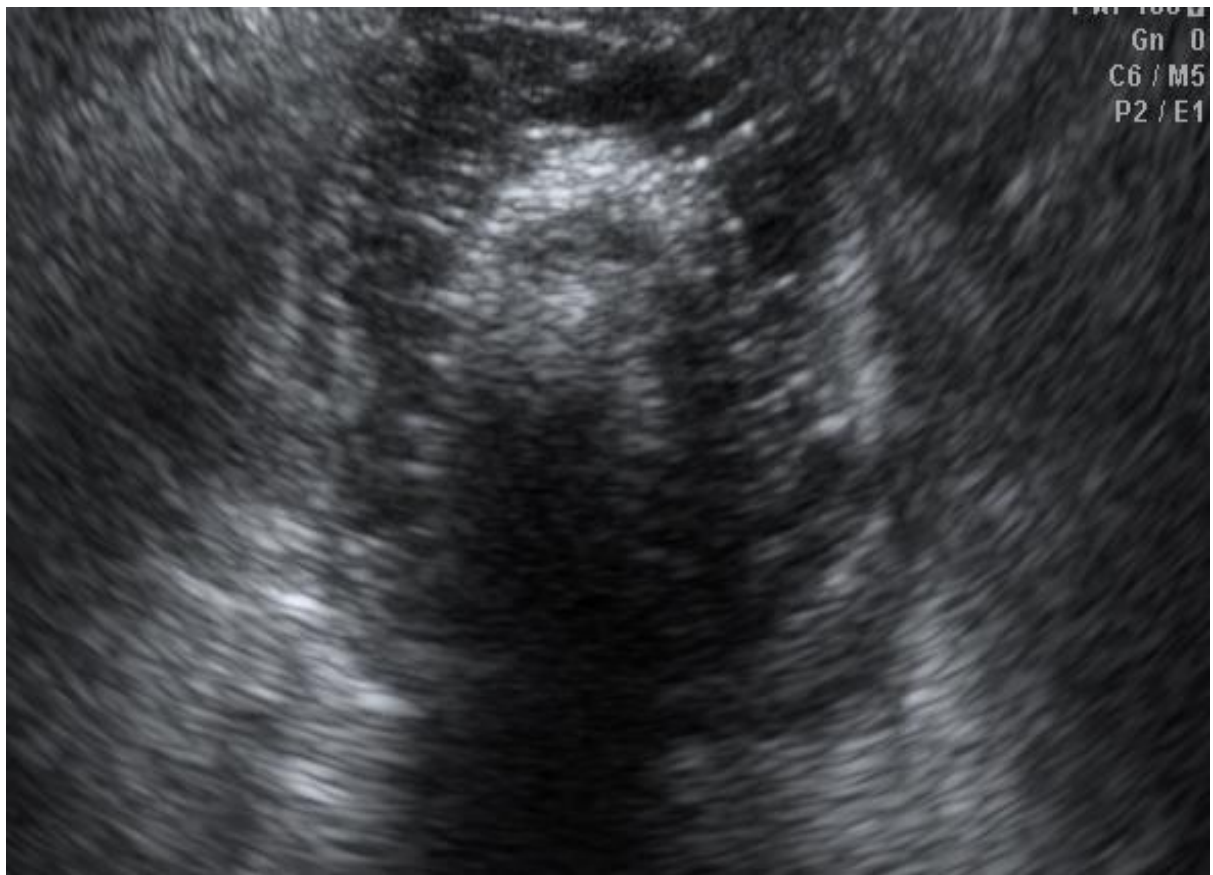Picture 4 Fibrin threads in a hemorrhagic cyst

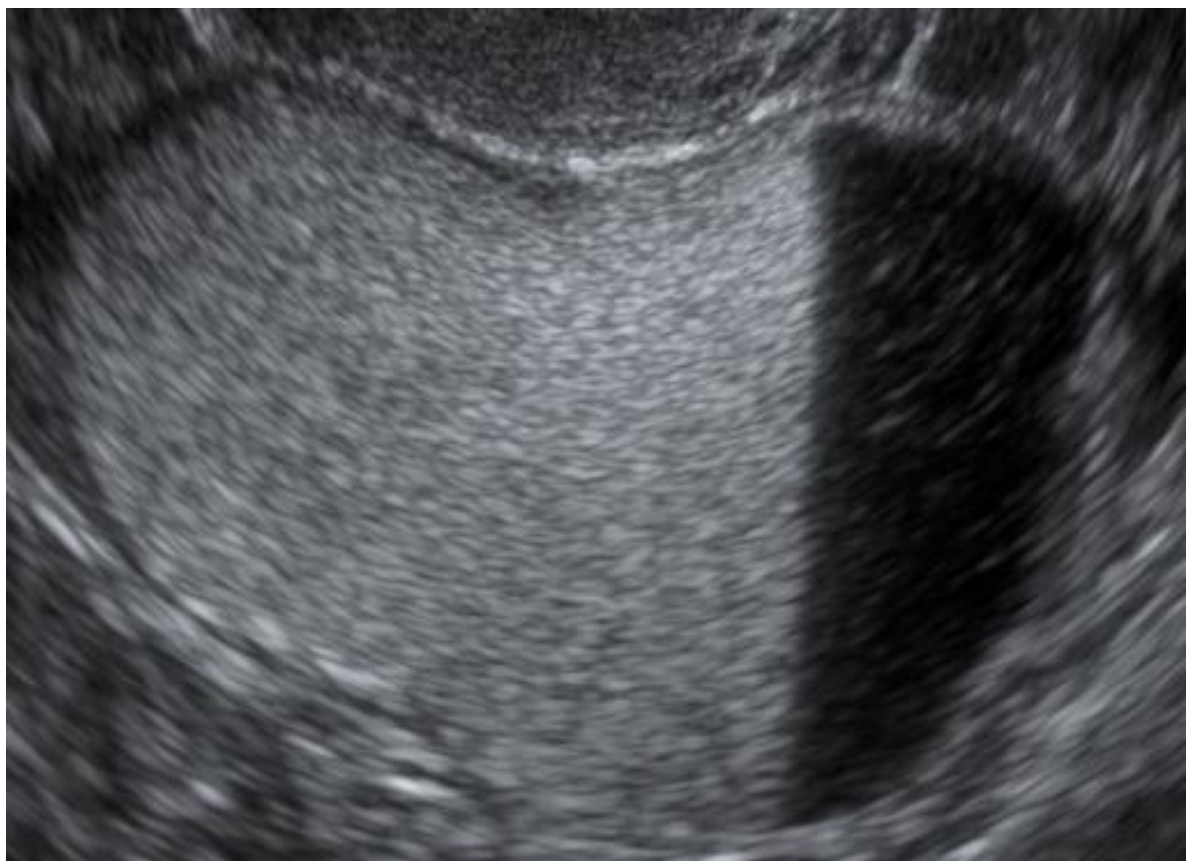Picture 5 Crescent sign in kissing ovaries with bilateral endometriomas

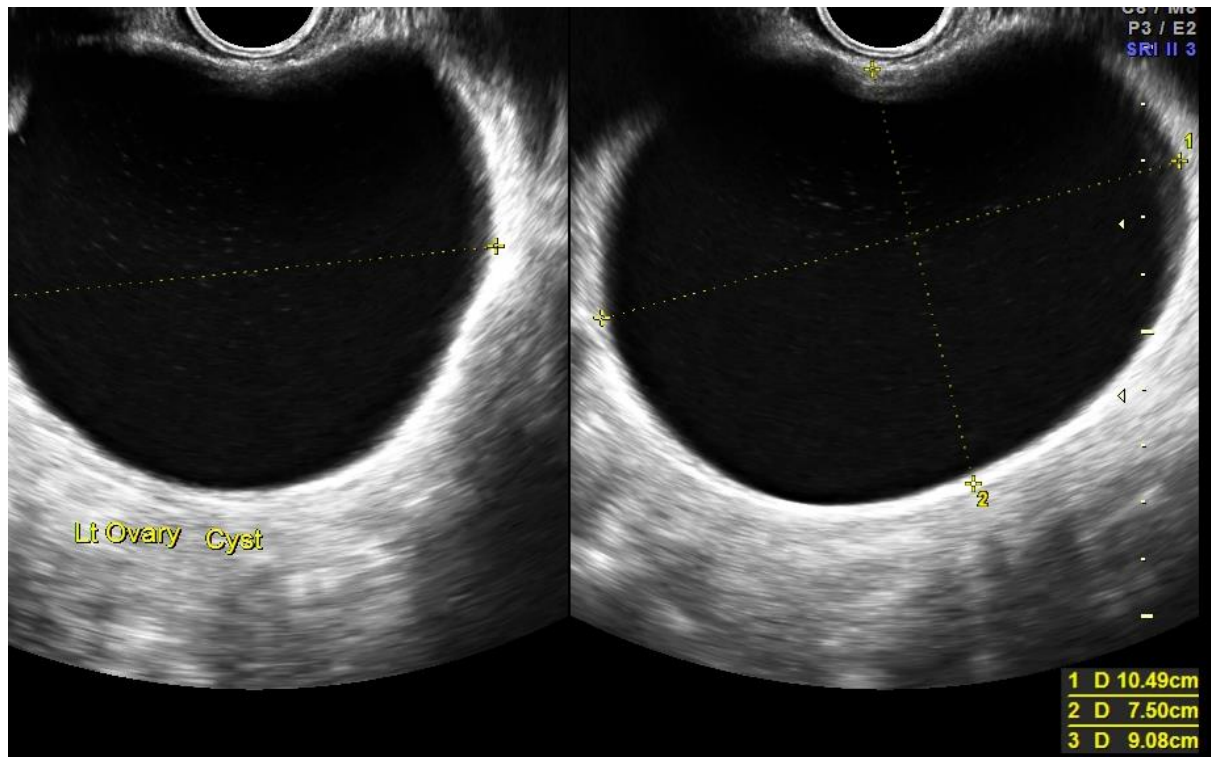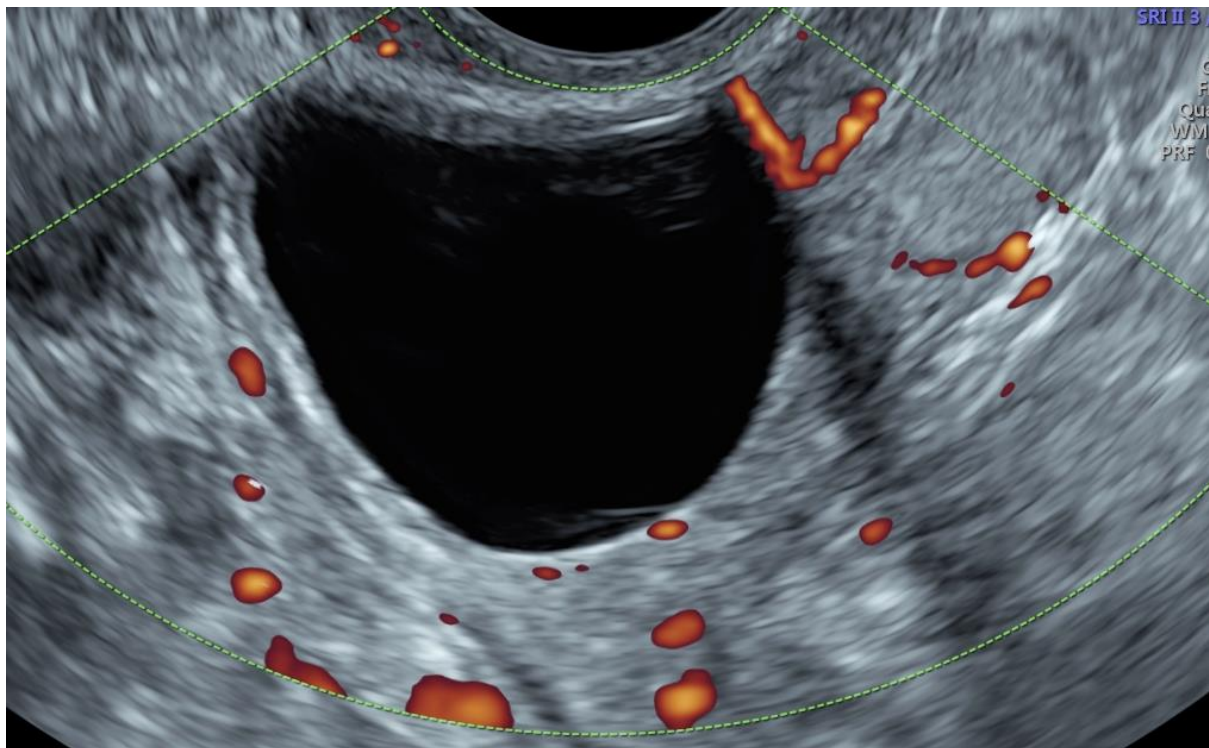Picture 6 endometrioma

Picture 7 Dermoid with Rokitansky Nodule

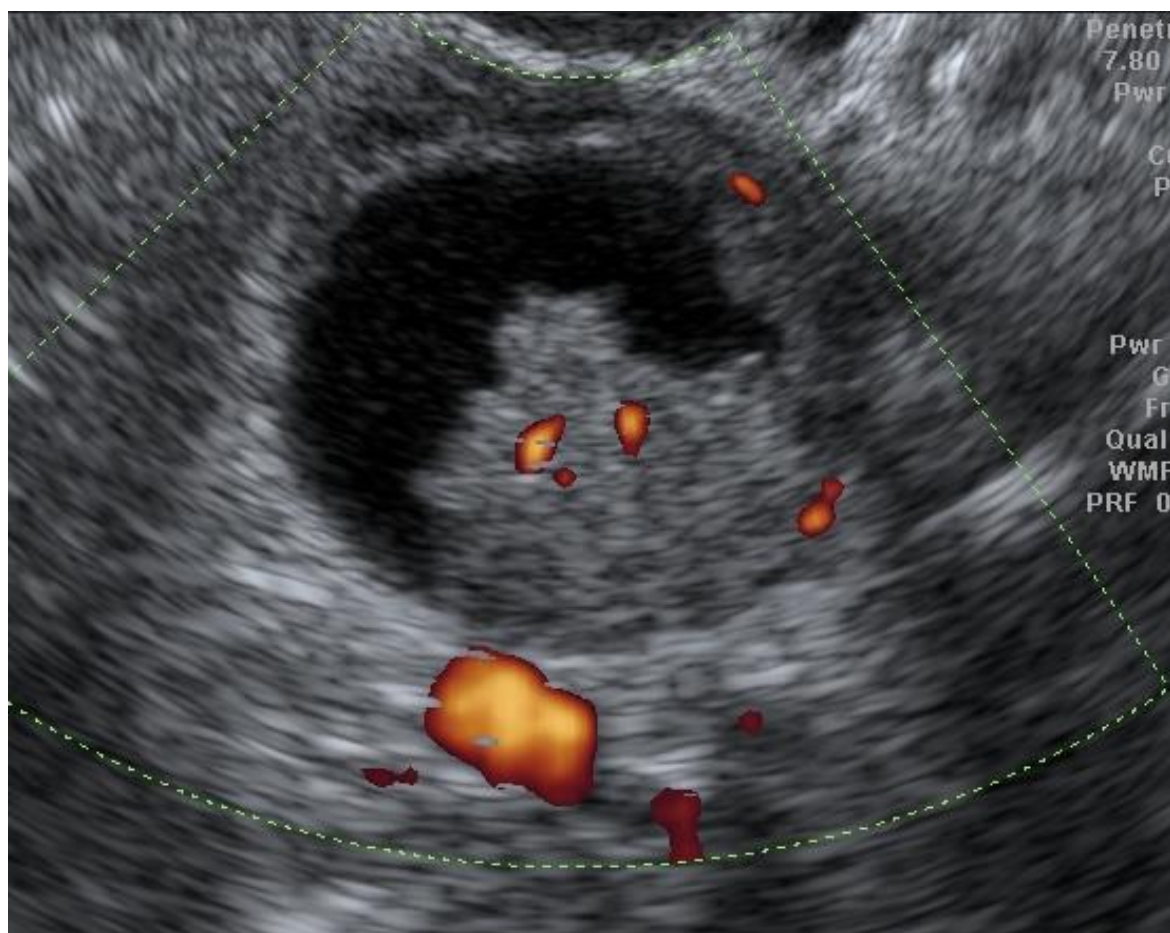

Picture 8 Dermoid with fat fluid level

Picture 9 serous cystadenoma

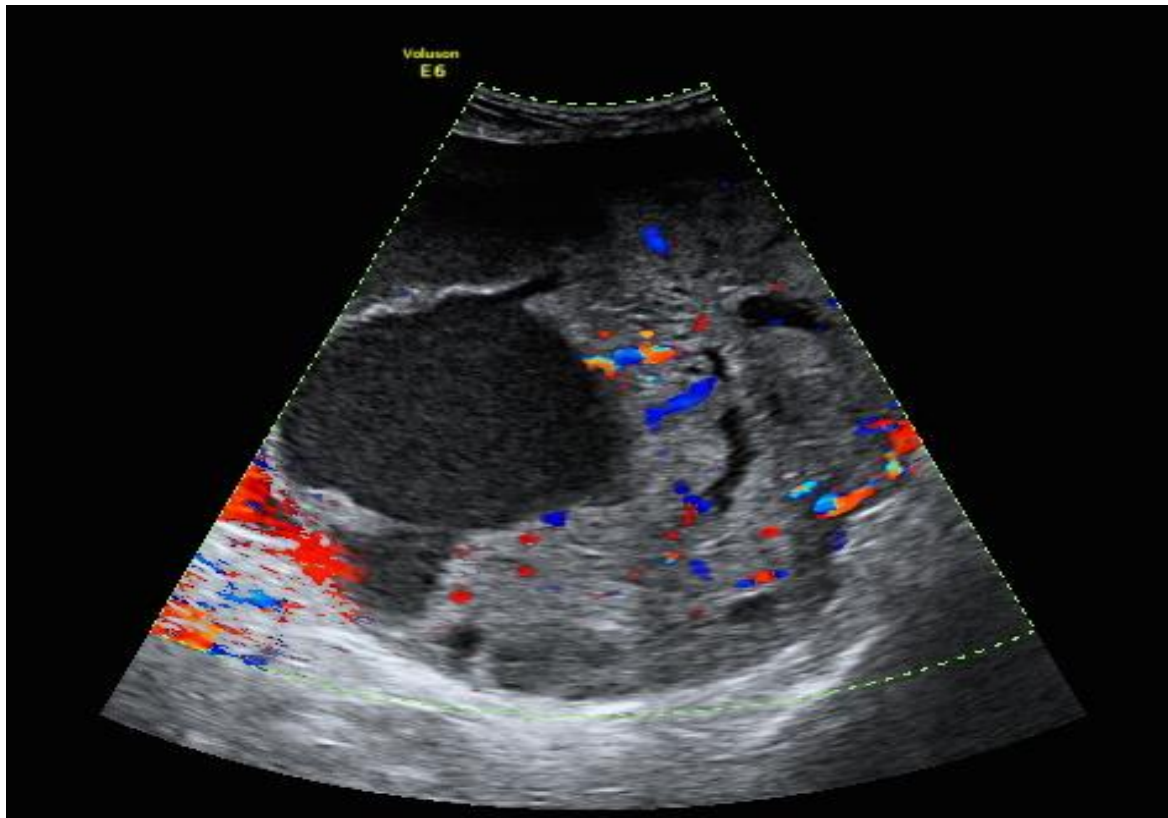Picture 10 Serous cystadenoma no vascularity by colour doppler

Picture 11 Border line tumour
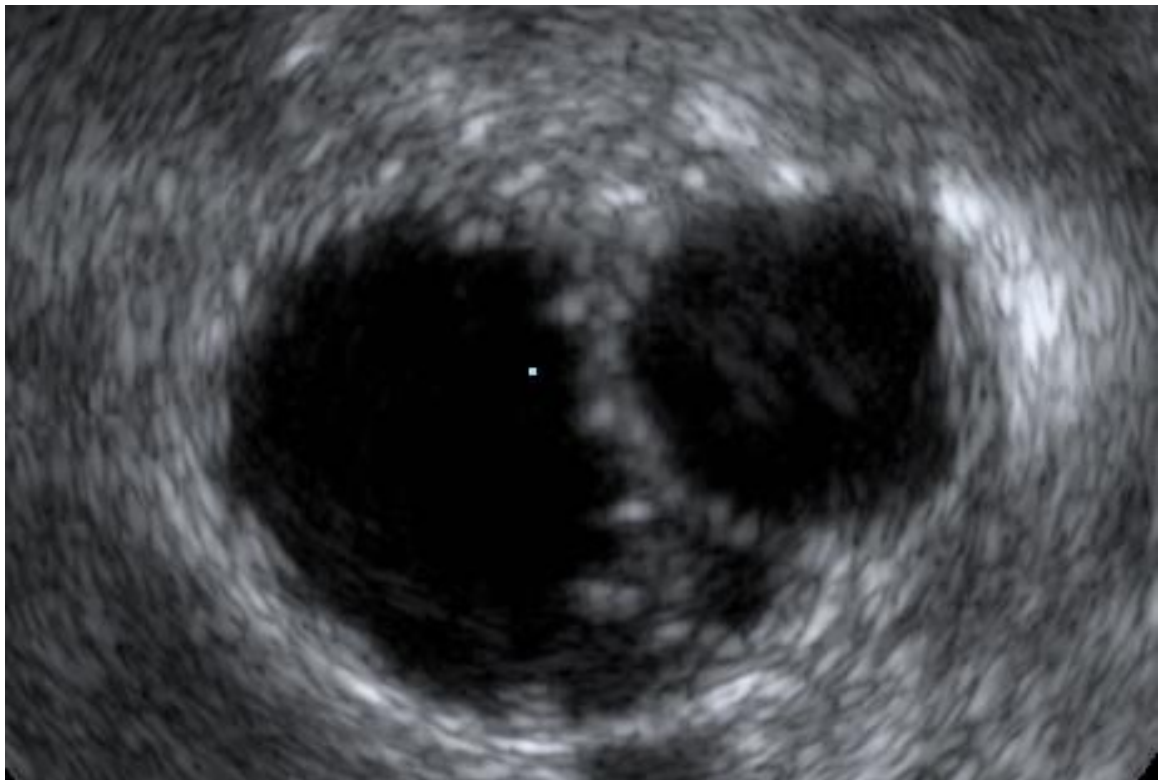

Picture 12 Border line tumour

Picture 13 Malignant ovarian tumour large Solid parts and high vascularity by colour doppler

Picture 14 Hydrosalpinx
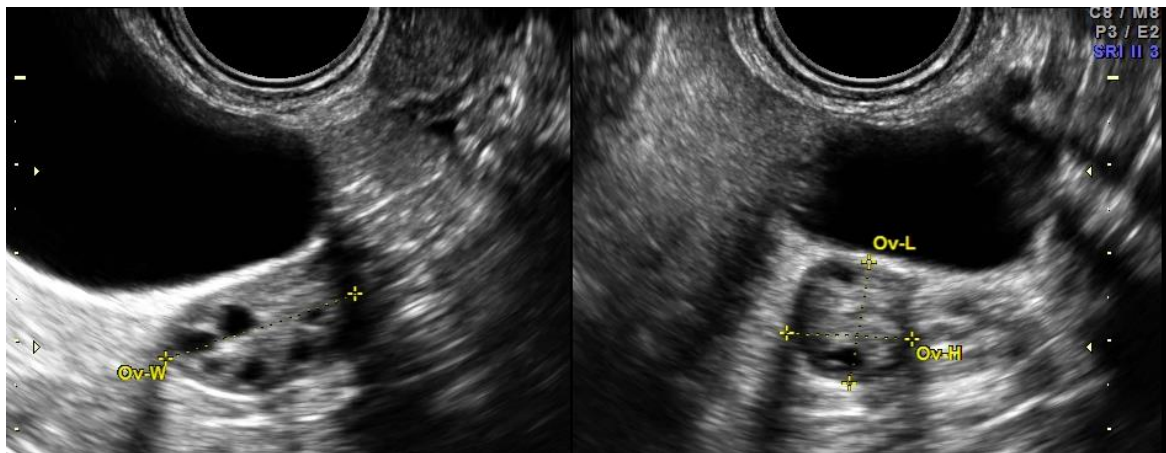
Picture 15 Hydrosalpinx

Picture 16 Hydrosalpinx

Picture 17 Peritoneal cyst

Picture 18 left Paraovarian cyst , normal ovary seen adjacent to the cyst

Picture 19 Large Paraovarian cyst adjacent to normal ovary and separate from it

Picture 20 Large Paraovarian cyst clear unilocular, normal ovary adjacent to it

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