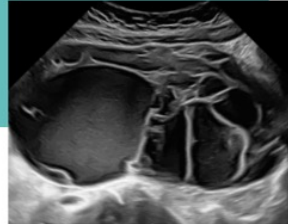


ADNEXAL ULTRASOUND FROM PHYSIOLOGY TO ONCOLOGY

comprehensive three-part online course
in gynecologic ultrasound

PART III Benign and malignant adnexal tumors



Inessa Safonova
MD, PhD, professor
ISUOG ambassador
In Eastern Europe

LESSON 33

STROMAL OVARIAN TUMORS BENIGN

Benign stromal tumors of the sex cord

Ultrasound, clinical,
and surgical characteristics



WHO CLASSIFICATION OF OVARIAN TUMORS 2020

Ovary
General
WHO classification

Authors: Laura Adhikari, M.D., Lewis A. Hassell, M.D.
Editorial Board Member: Gulisa Turashvili, M.D., Ph.D.
Deputy Editor-in-Chief: Jennifer A. Bennett, M.D.

Last author update: 19 July 2021
Last staff update: 24 January 2024

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Epithelial
Mesenchymal
Mixed epithelial /mesenchymal
Sex-cord stromal
Germ cell
Miscellaneous
Mesothelial
Soft tissue tumors
Tumor-like lesions
Lymphoid/myeloid tumors
Secondary tumors

Epithelial tumors

- Serous tumors
 - Serous cystadenoma, adenofibroma and surface papilloma
 - Serous borderline tumor
 - Low grade serous carcinoma
 - High grade serous carcinoma
- Mucinous tumors
 - Mucinous cystadenoma and adenofibroma
 - Mucinous borderline tumor
 - Mucinous carcinoma
- Endometrioid tumors
 - Endometrioid cystadenoma and adenofibroma
 - Endometrioid borderline tumor
 - Endometrioid carcinoma
- Clear cell tumors
 - Clear cell cystadenoma and adenofibroma
 - Clear cell borderline tumor
 - Clear cell carcinoma
- Seromucinous tumors
 - Seromucinous cystadenoma and adenofibroma
 - Seromucinous borderline tumor
- Brenner tumors
 - Brenner tumor
 - Borderline Brenner tumor
 - Malignant Brenner tumor
- Other carcinomas
 - Mesonephric-like adenocarcinoma
 - Undifferentiated and dedifferentiated carcinoma
 - Carcinosarcoma
 - Mixed carcinoma

Mesenchymal tumors

- Endometrioid stromal sarcoma
 - Low grade
 - High grade
- Smooth muscle tumors
 - Leiomyoma
 - Smooth muscle tumor of uncertain malignant potential
 - Leiomyosarcoma
- Ovarian myxoma

Mixed epithelial and mesenchymal tumors

- Adenosarcoma

Sex cord stromal tumors

- Pure stromal tumors
 - Fibroma, NOS
 - Cellular fibroma
 - Thecoma
 - Luteinized thecoma associated with sclerosing peritonitis
 - Sclerosing stromal tumor
 - Microcystic stromal tumor
 - Signet ring stromal tumor
 - Leydig cell tumor
 - Steroid cell tumor, NOS
 - Malignant steroid cell tumor
 - Fibrosarcoma
- Pure sex cord tumors
 - Adult granulosa cell tumor
 - Juvenile granulosa cell tumor
 - Sertoli cell tumor, NOS
 - Sex cord tumor with annular tubules
- Mixed sex cord stromal tumors
 - Sertoli-Leydig cell tumor
 - Well differentiated
 - Moderately differentiated
 - Poorly differentiated
 - Retiform
 - Sex cord stromal tumor, NOS
 - Gynandroblastoma

Germ cell tumors

- Teratoma, benign
- Immature teratoma, NOS
- Dysgerminoma
- Yolk sac tumor
- Embryonal carcinoma
- Choriocarcinoma, NOS
- Mixed germ cell tumor
- Monodermal teratomas and somatic type tumors arising from a dermoid cyst
 - Struma ovarii, NOS
 - Struma ovarii, malignant
 - Strumal carcinoid
 - Teratoma with malignant transformation
 - Cystic teratoma, NOS
- Germ cell sex cord stromal tumors
 - Gonadoblastoma
 - Dissecting gonadoblastoma
 - Undifferentiated gonadal tissue
 - Mixed germ cell - sex cord stromal tumor, unclassified

Miscellaneous tumors

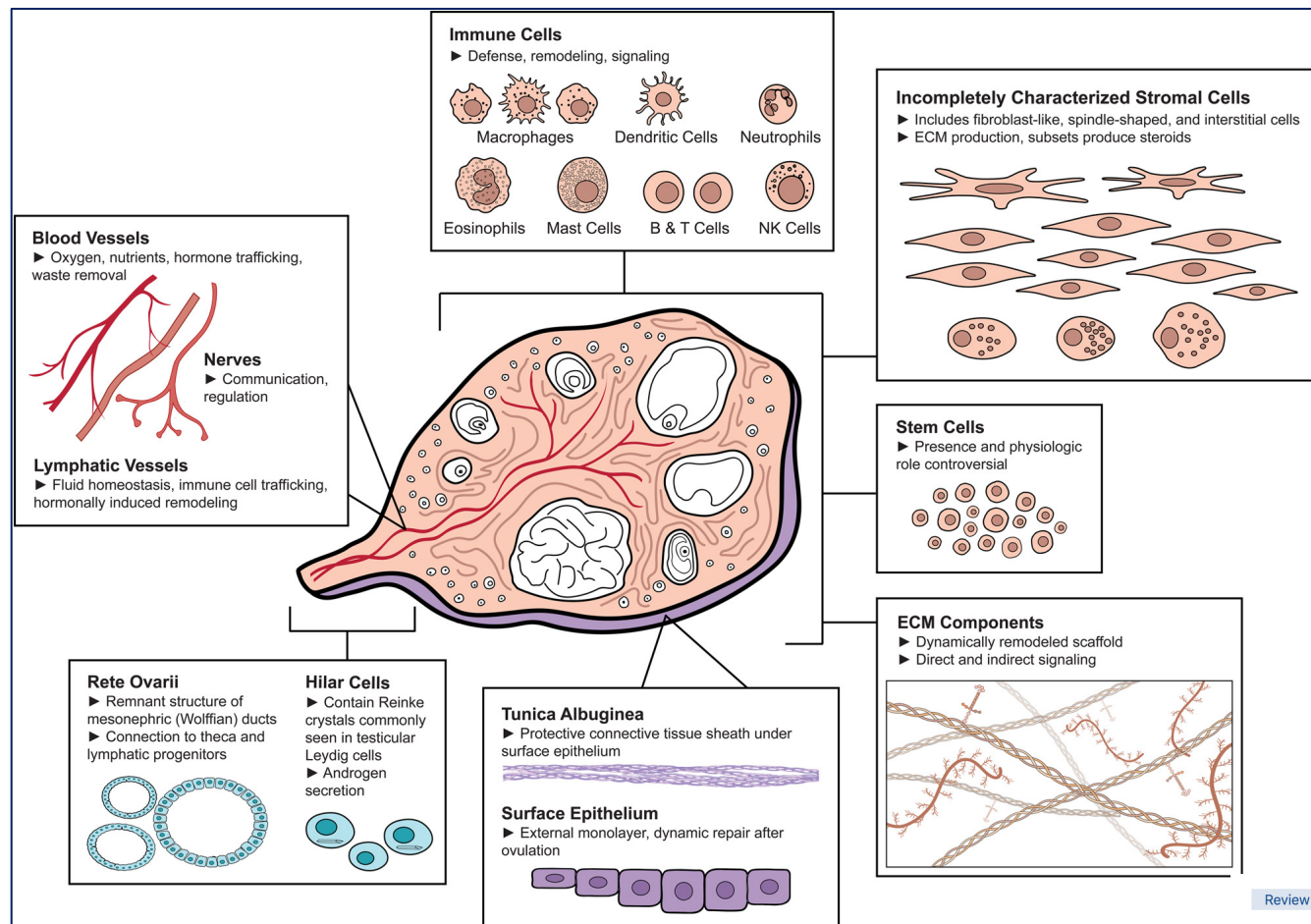
- Rete cystadenoma, adenoma and adenocarcinoma
- Wolffian tumor
- Solid pseudopapillary tumor
- Small cell carcinoma of the ovary, hypercalcemic type
- Wilms tumor

Tumor-like lesions

- Follicle cyst
- Corpus luteum cyst
- Large solitary luteinized follicle cyst
- Hyperreactio luteinalis
- Pregnancy luteoma
- Stromal hyperplasia and hyperthecosis
- Fibromatosis
- Massive edema
- Leydig cell hyperplasia



HISTOLOGY



Review > [Reproduction](#). 2020 Sep;160(3):R25-R39. doi: 10.1530/REP-19-0501.

The ovarian stroma as a new frontier

Hadrian M Kinnear^{1, 2}, Claire E Tomaszewski³, Faith L Chang³, Molly B Moravek^{4, 5, 6}, Min Xu^{4, 5}, Vasantha Padmanabhan^{4, 7}, Ariella Shikanov^{1, 3, 4}

COMPONENTS OF THE OVARIAN STROMA – A HETEROGENEOUS POPULATION OF CELLS

immune cells, blood vessels, nerves and lymphatic vessels, as well as ovary-specific components (surface epithelium, tunica albuginea, intraovarian reticular network, hilus cells, stem cells, poorly characterized stromal cells, ovarian extracellular matrix)



SEX CORD-STROMAL TUMORS

benign

FIBROMA

THECOMA

THECOFIBROMA

FIBROTHERCOMA



Clinical and ultrasound characteristics

FIBROMA / FIBROTHERCOMA

ESGO / ISUOG / IOTA / ESGE 2021

median age 50 years

unilateral

homogeneous structure

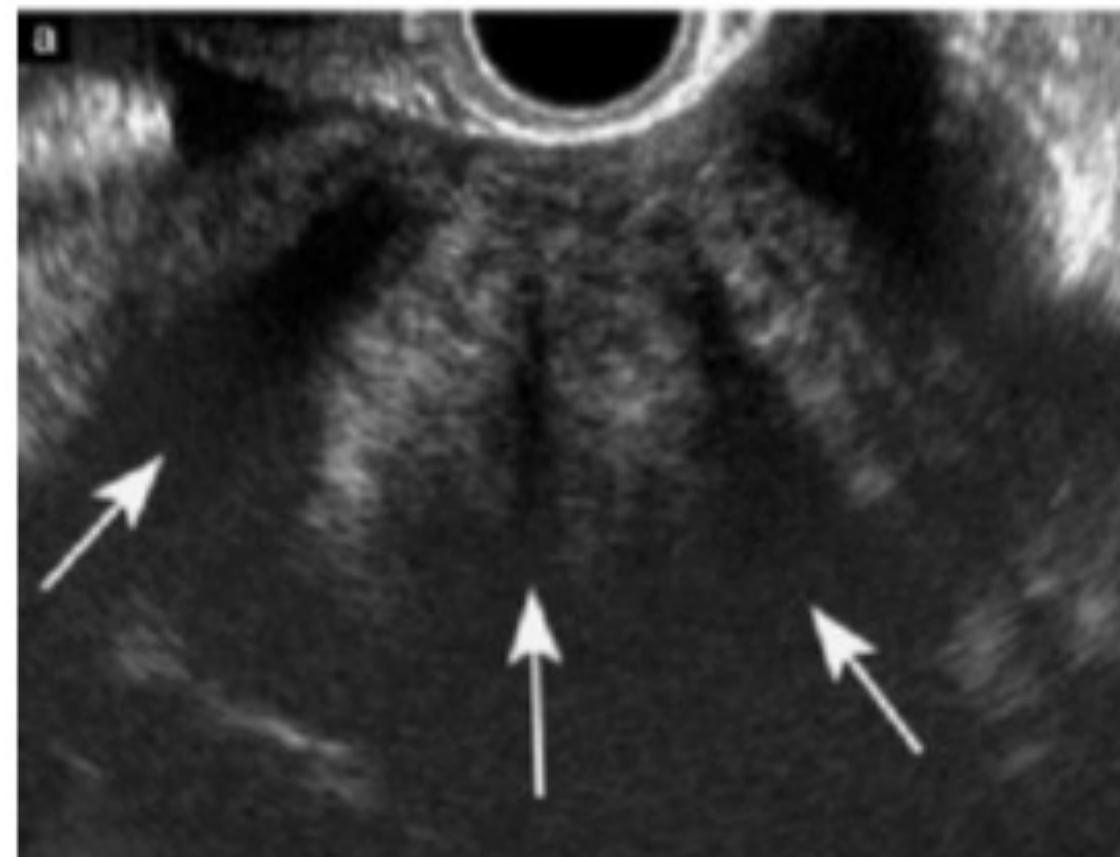
round / oval / slightly lobulated

solid / sometimes multilocular (15–20%)

fan-shaped acoustic shadowing

often raised CA-125 (34%) and/or ascites

CDS (1)/2/3



Fibroma/ fibrothecoma
(65%)

Median, 50; 65%
postmenopausal

Uni

Regular round, oval or
slightly lobulated solid
tumors; sometimes
multilocular-solid (15–20%)

Fan-shaped shadowing; often
raised CA 125 (34%) and/or
ascites

(1)/2/3

ULTRASOUND
in Obstetrics & Gynecology



Consensus Statement | [Open Access](#) | [CC](#) | [BY](#)

**ESGO/ISUOG/IOTA/ESGE Consensus Statement on preoperative
diagnosis of ovarian tumors**

D. Timmerman, F. Planchamp, T. Bourne, C. Landolfo, A. du Bois, L. Chiva, D. Cibula, N. Concin, D. Fischerova, W. Froyman, G. Gallardo, B. Lemley, A. Loft, L. Mereu, P. Morice ... [See all authors](#)

First published: 01 April 2021 | <https://doi.org/10.1002/ug.23635>

This paper is being published simultaneously and jointly, in *International Journal of Gynecological Cancer*, *Ultrasound in Obstetrics & Gynecology* and *Facts, Views and Vision in ObGyn* © 2021, by the European Society of Gynecological Oncology (ESGO), the International Society of Ultrasound in Obstetrics and Gynecology (ISUOG), the International Ovarian Tumour Analysis (IOTA) group and the European Society of Gynaecological Endoscopy (ESGE). All rights reserved.





fan-shaped acoustic shadowing
(a typical feature of fibrous tumors)
CDS 1

DD type 7 leiomyoma nodule

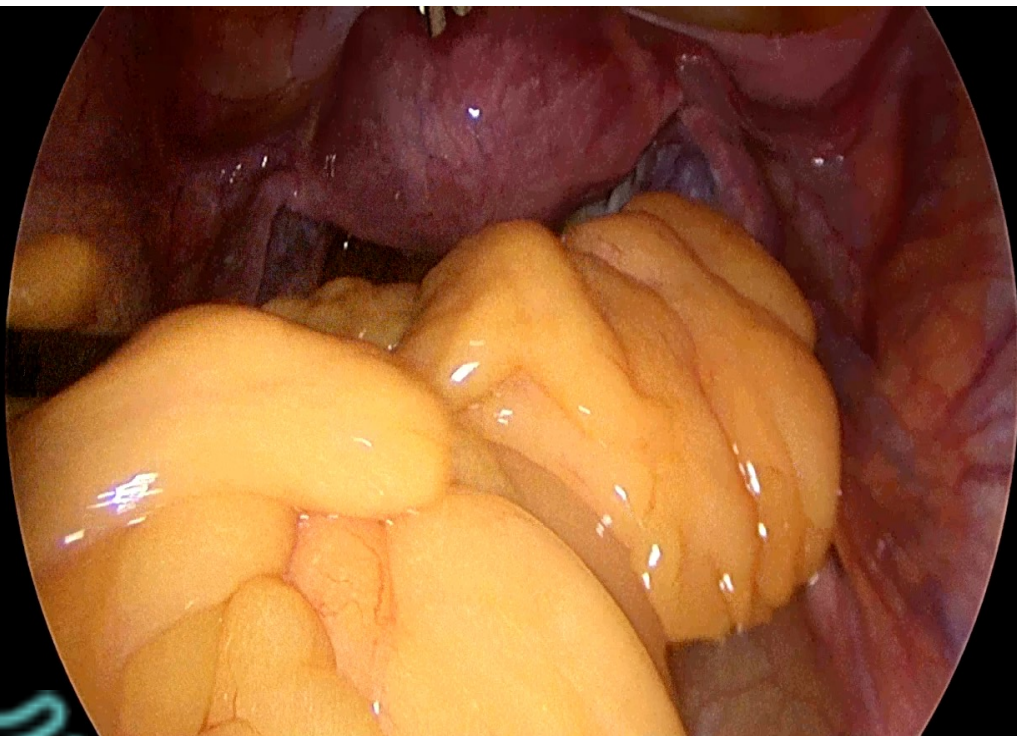
ovarian fibroma



Voluson
Expert 22

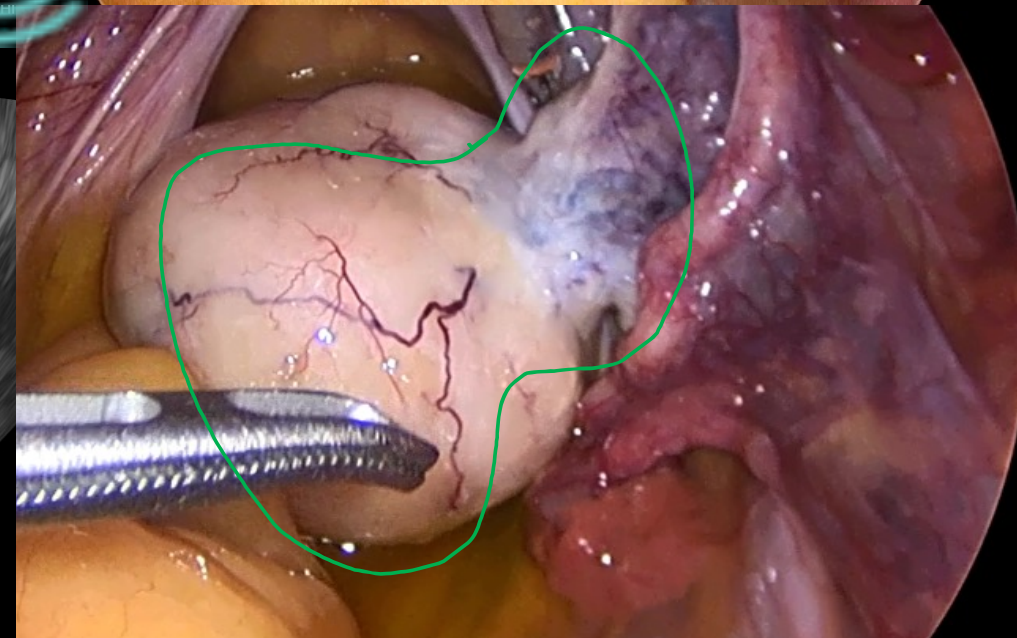
UTERUS

RT-OVARY



Voluson
Expert 22

RT-OVARY

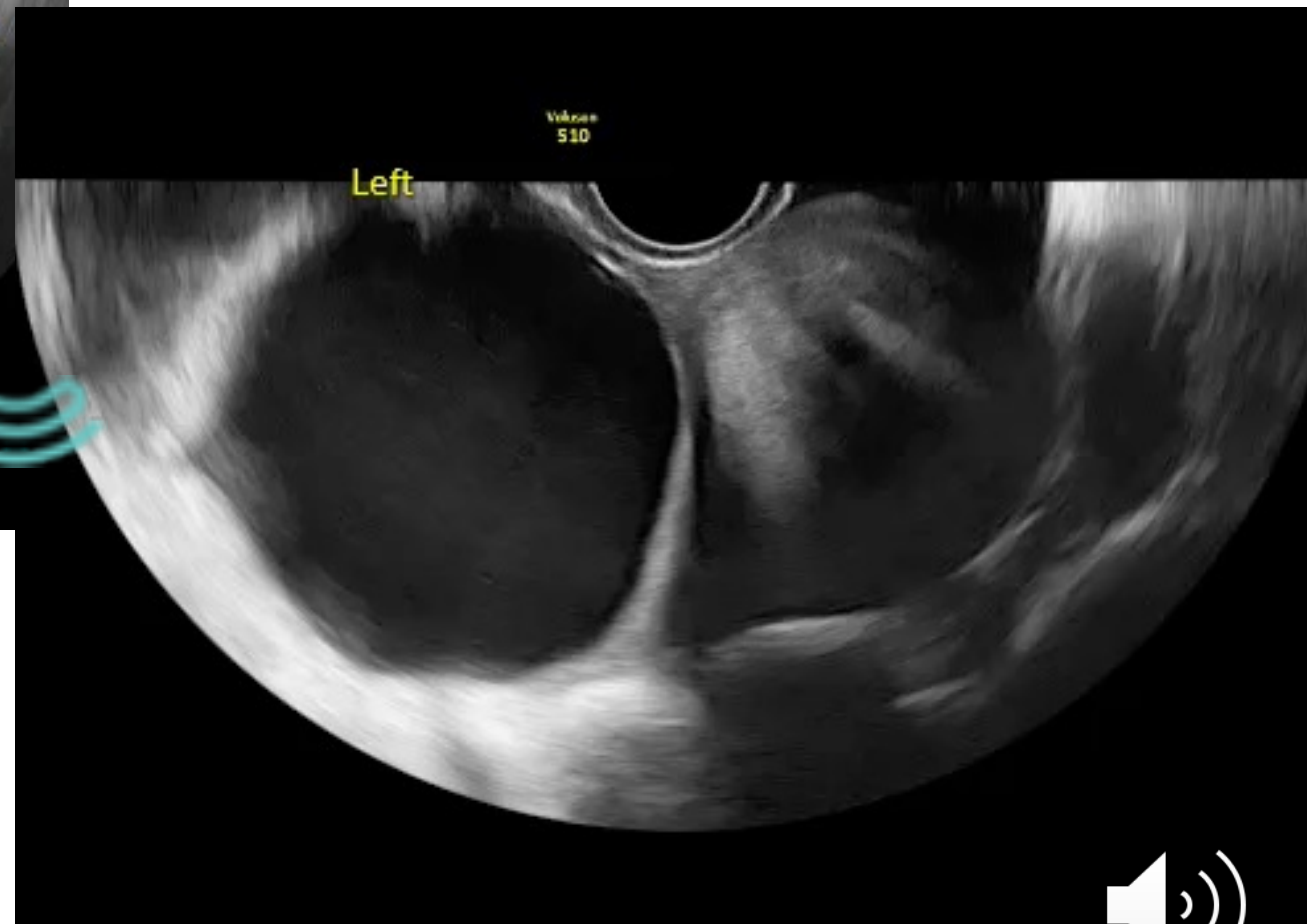
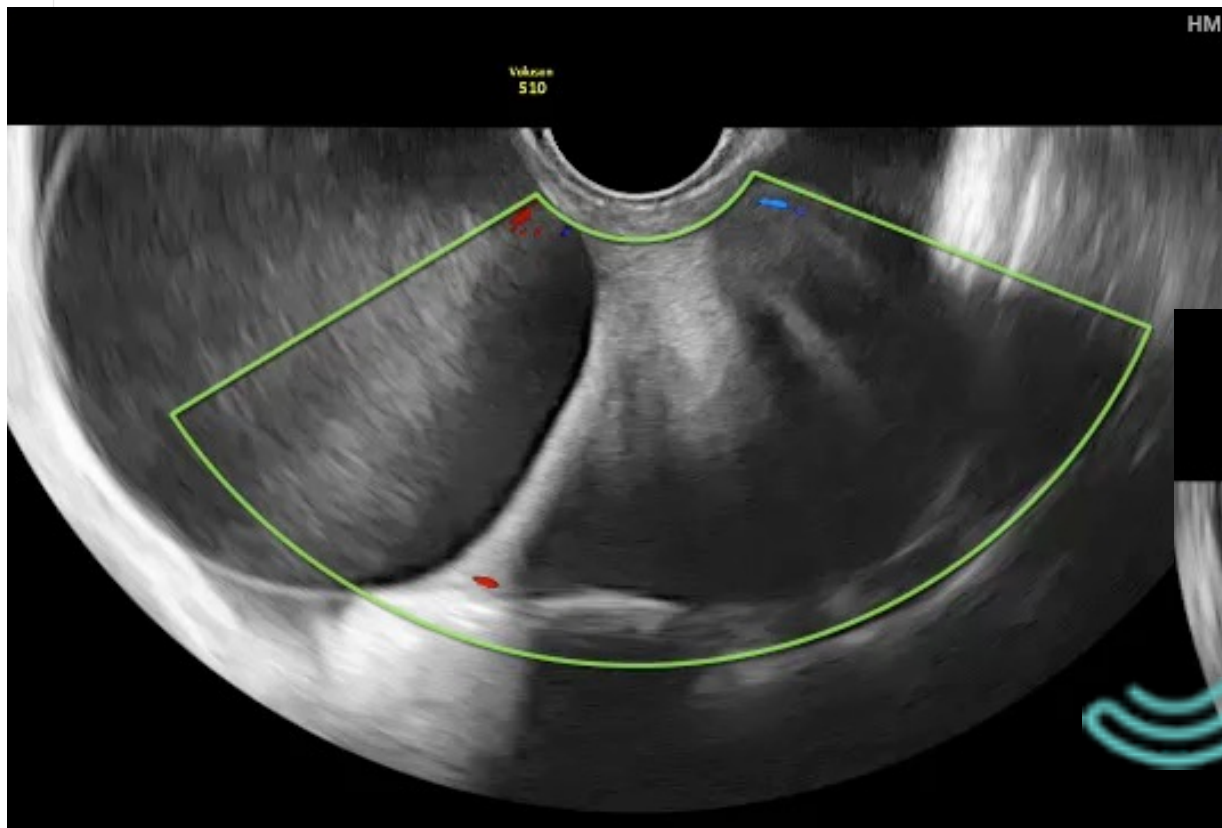


ovarian
thecoma



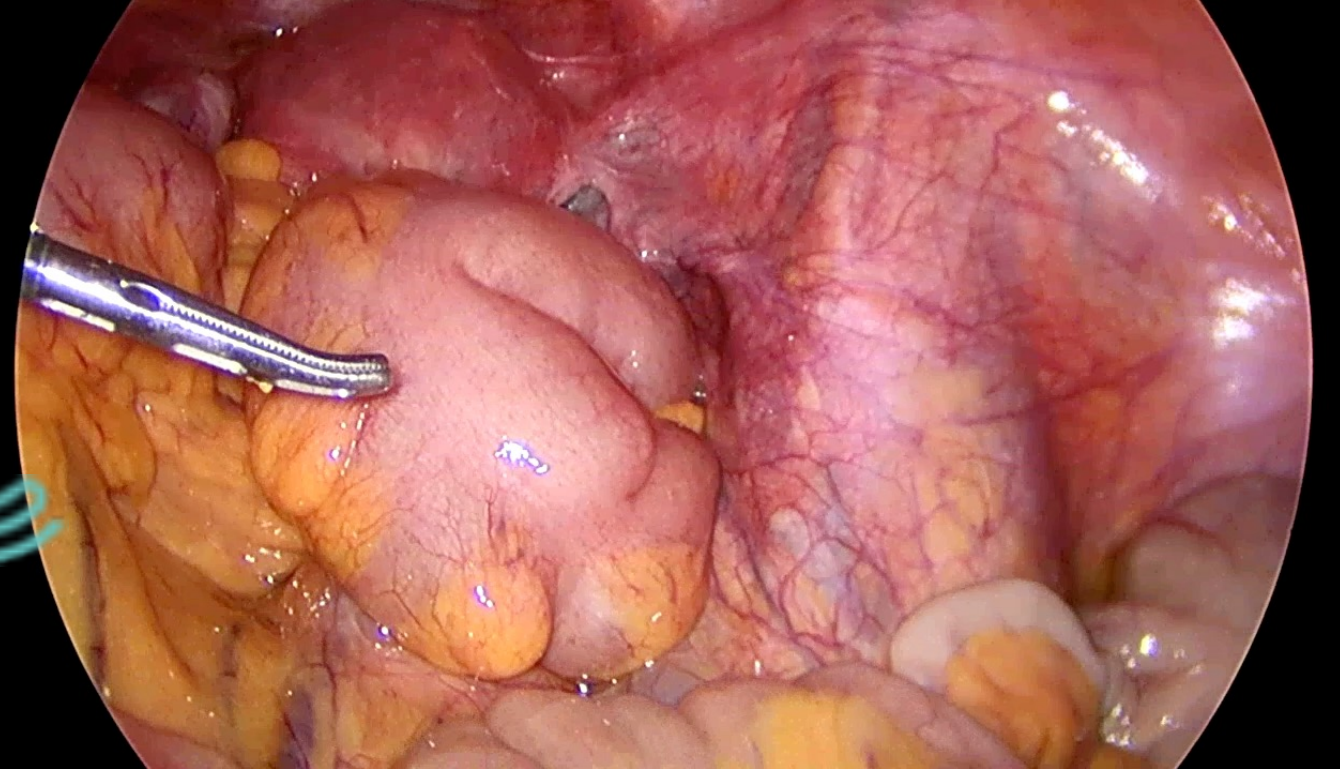
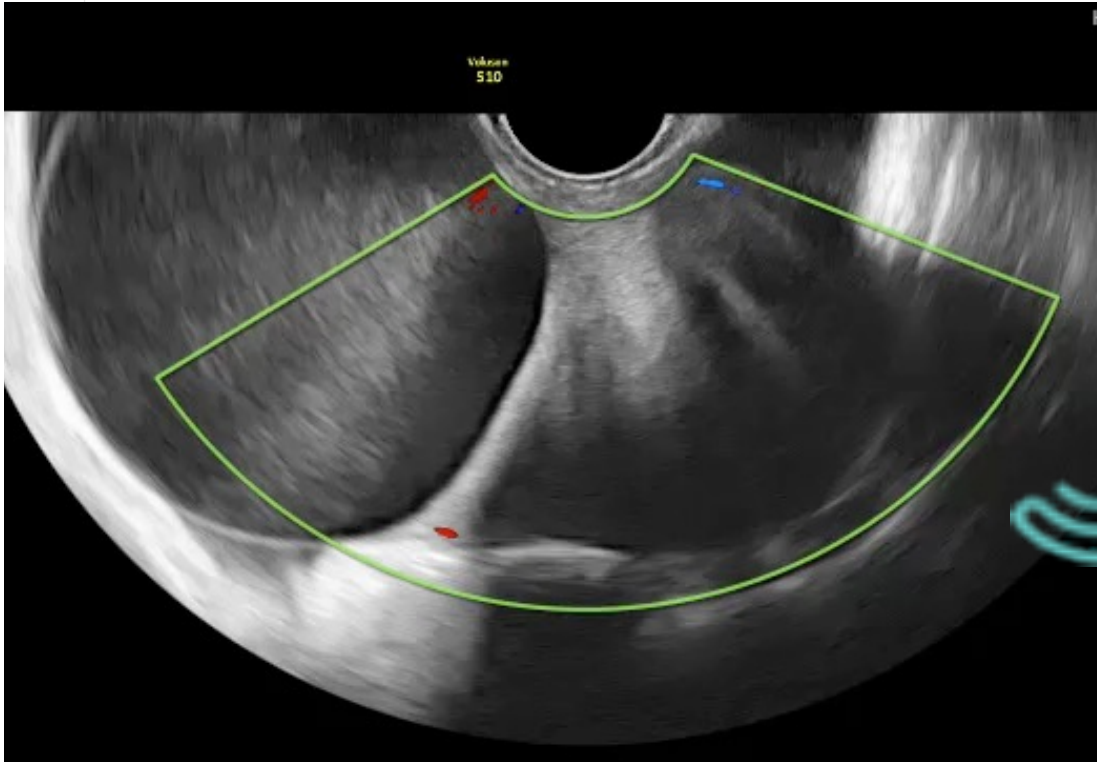
QUIZ TIME





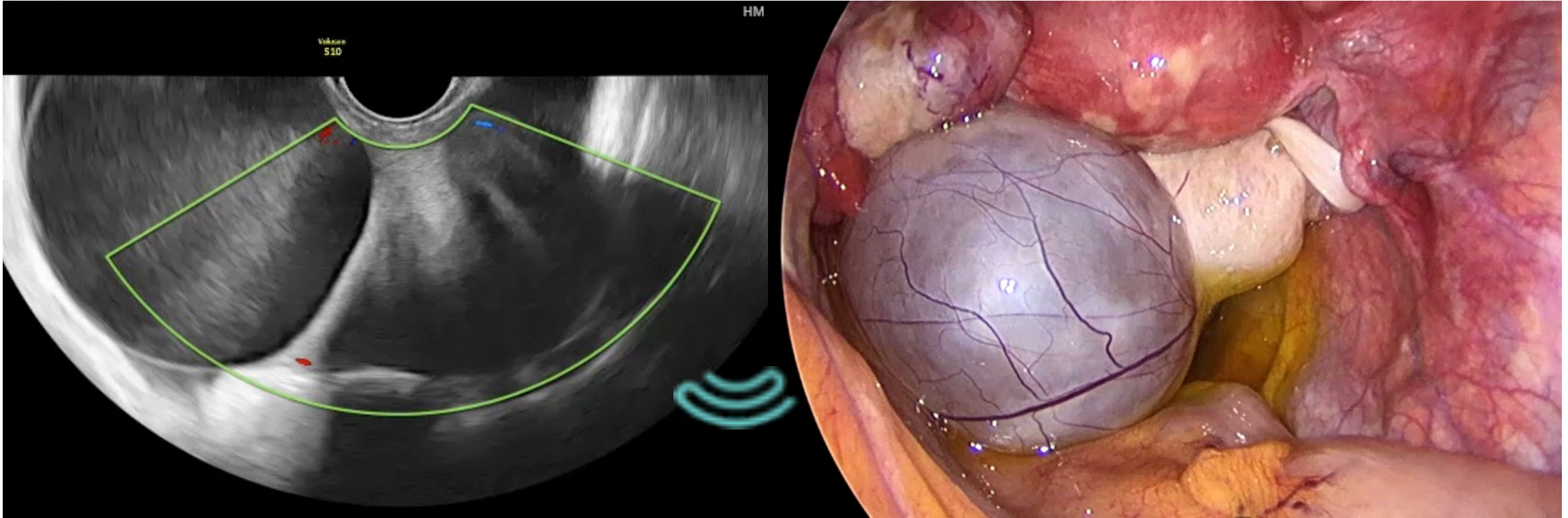
unilocular cyst?
solid component?
Ca-125, AFP, hCG,
LDH, CEA, CA 19-9: within normal range





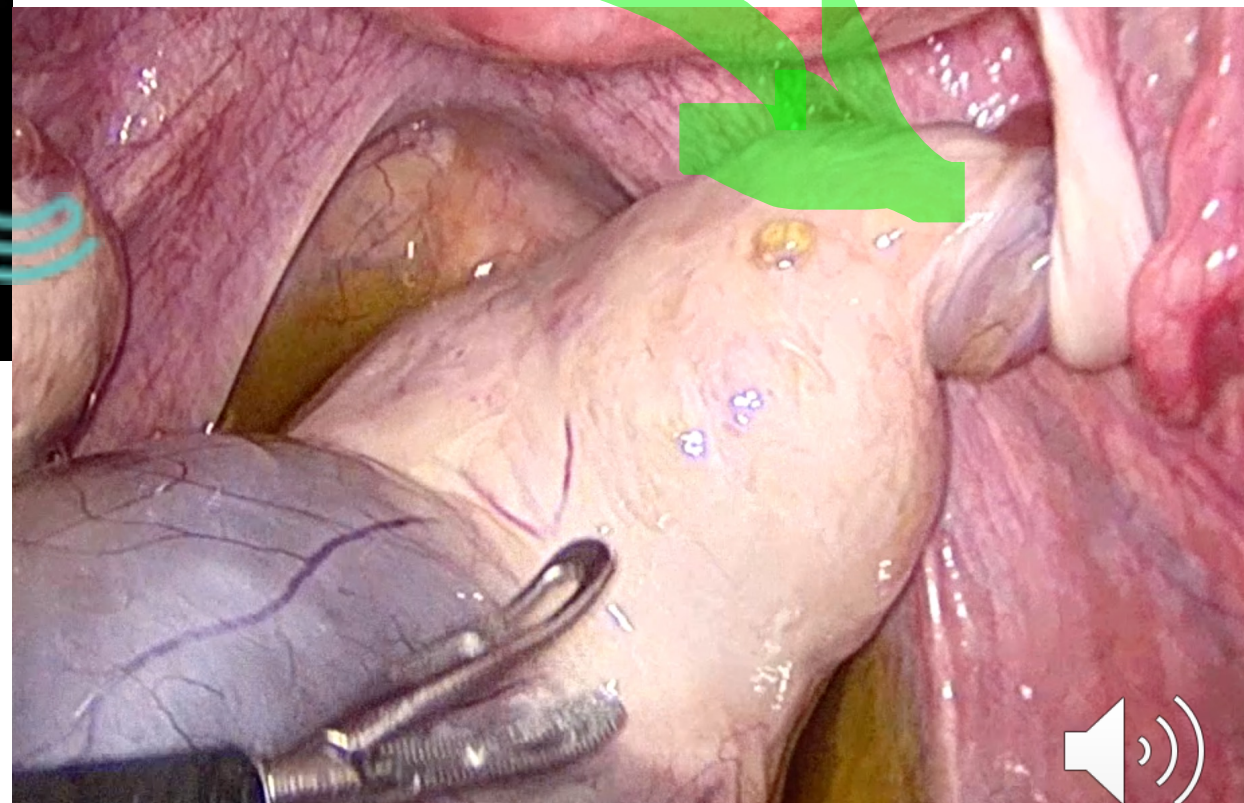
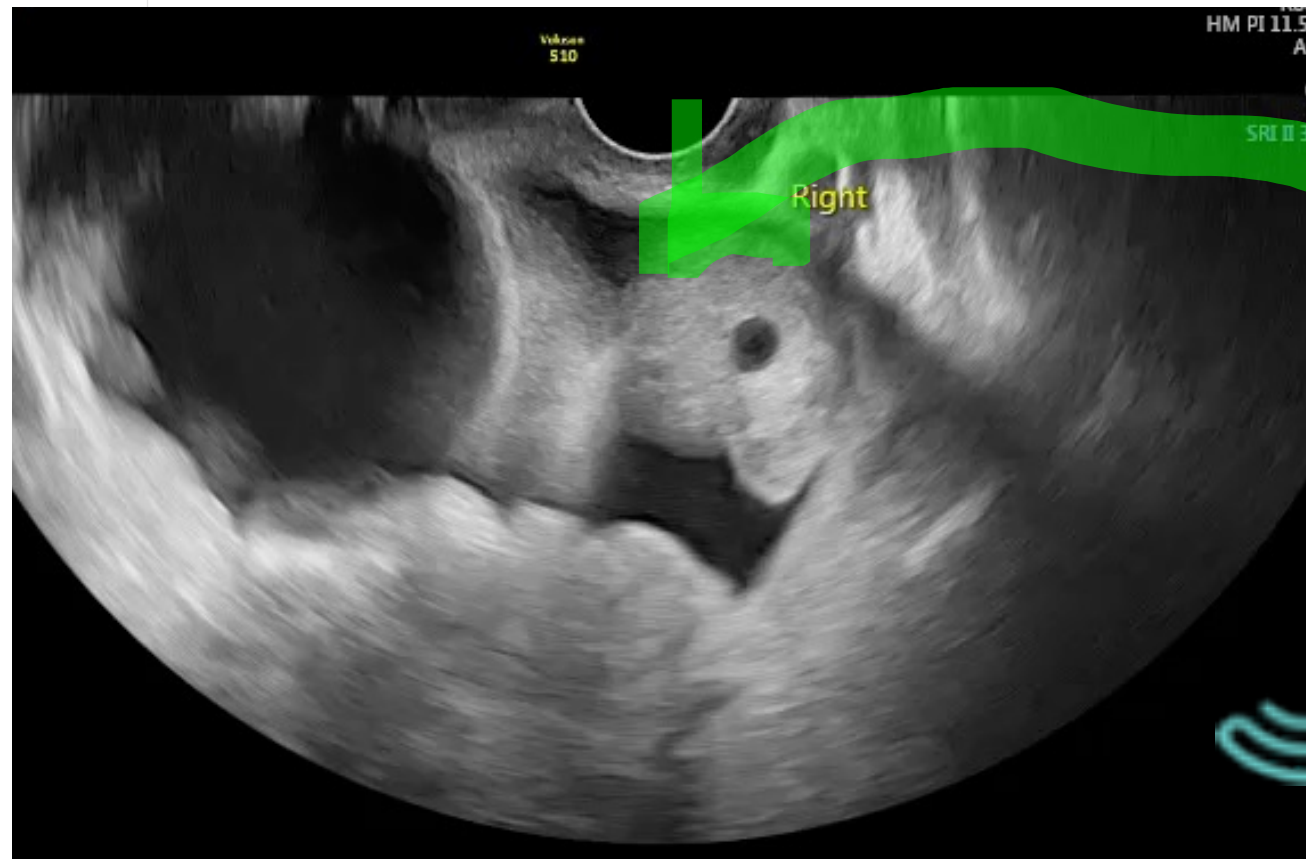
**rare variant of ovarian thecomfibroma
with cystic component, torsion**





**rare variant of ovarian thecofibroma
with cystic component, torsion**

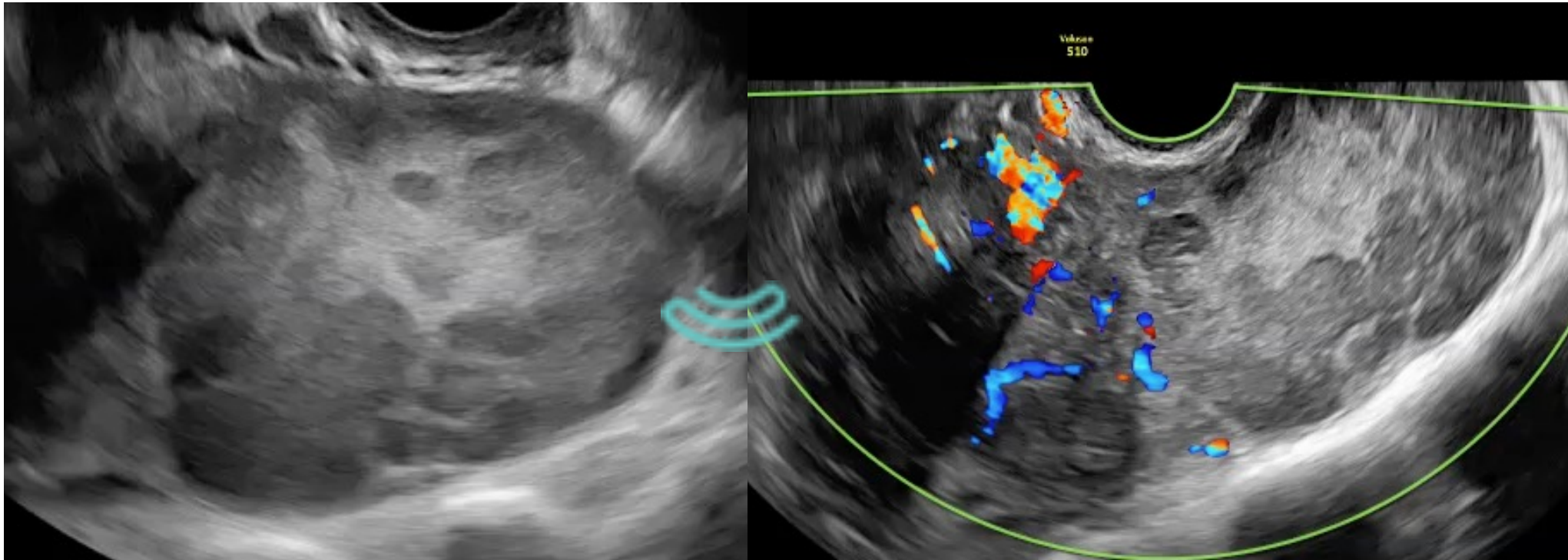




**ovarian thecofibroma
with cystic component,
torsion**

ONE MORE QUIZ





39 y.o.

solid tumor

large: 11 × 7 cm

unilateral, lobulated

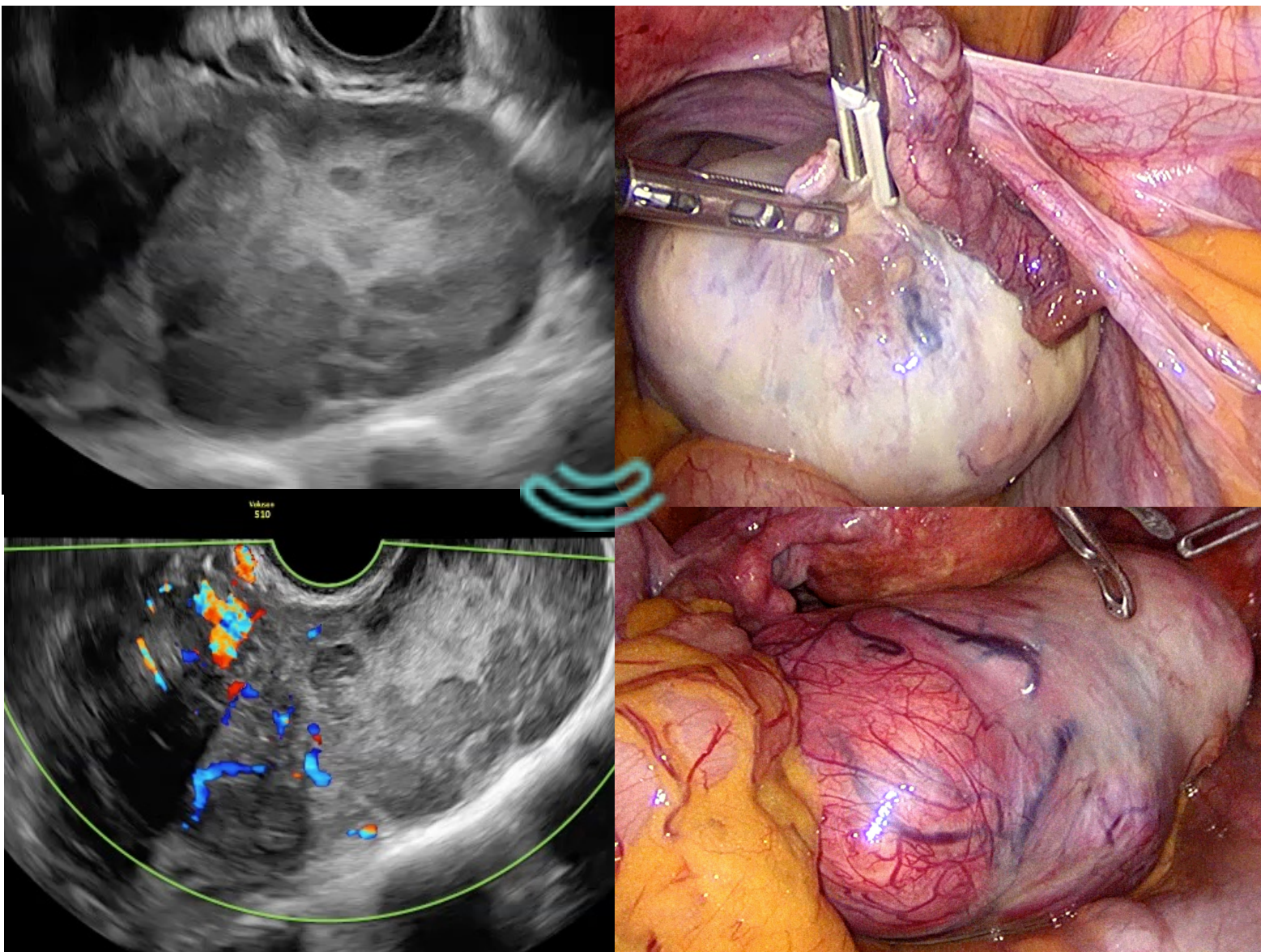
smooth / irregular surface?

ORADS 4 / 5

CDS 4

CA-125, AFP, hCG, LDH, CEA, CA 19-9 – within normal range





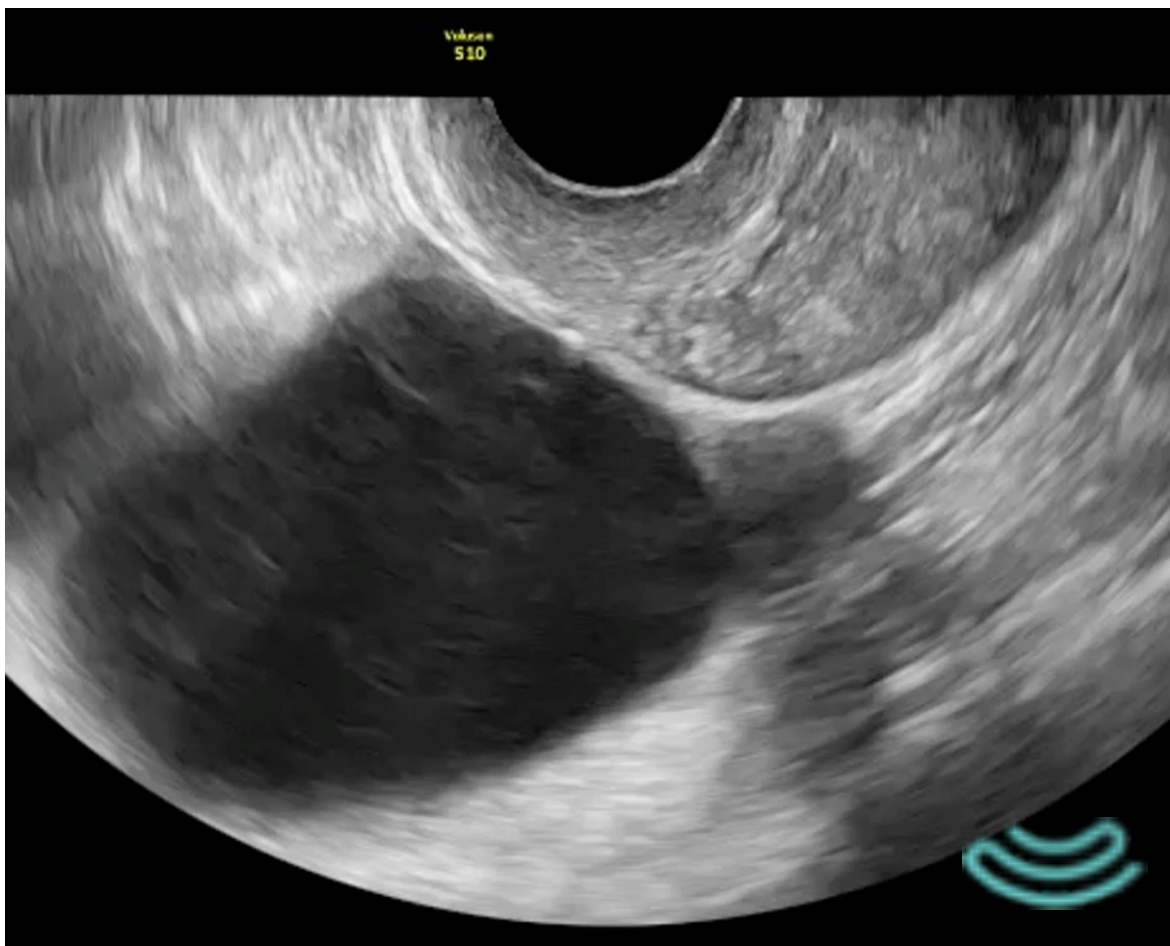
fibrothecoma

rare benign
stromal tumor



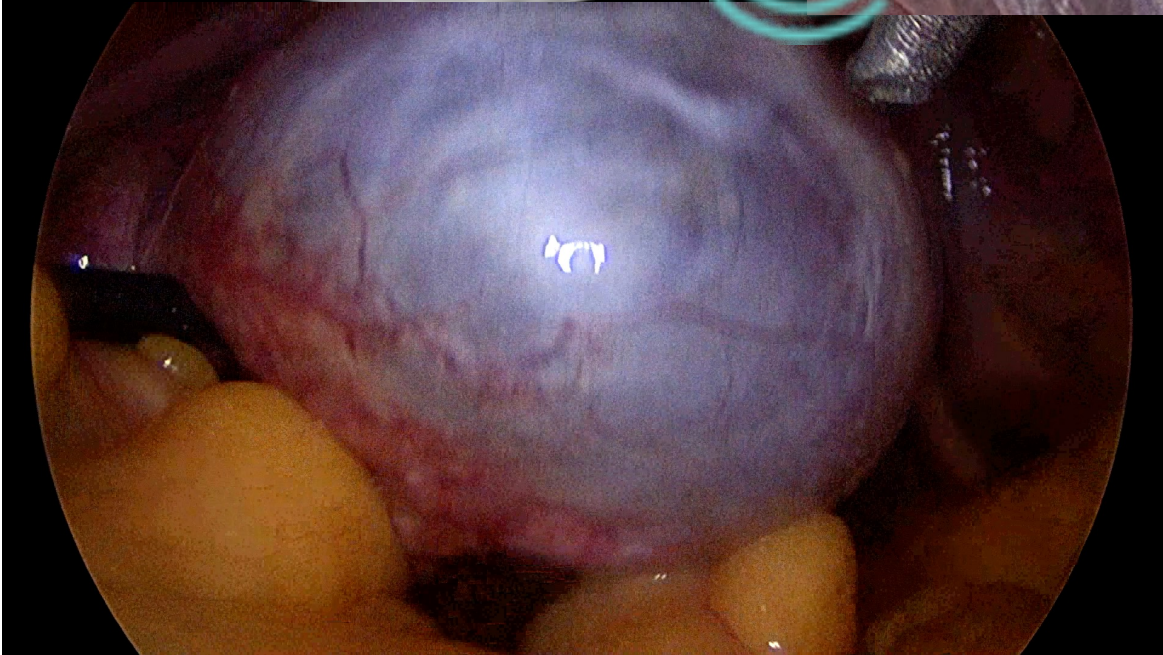
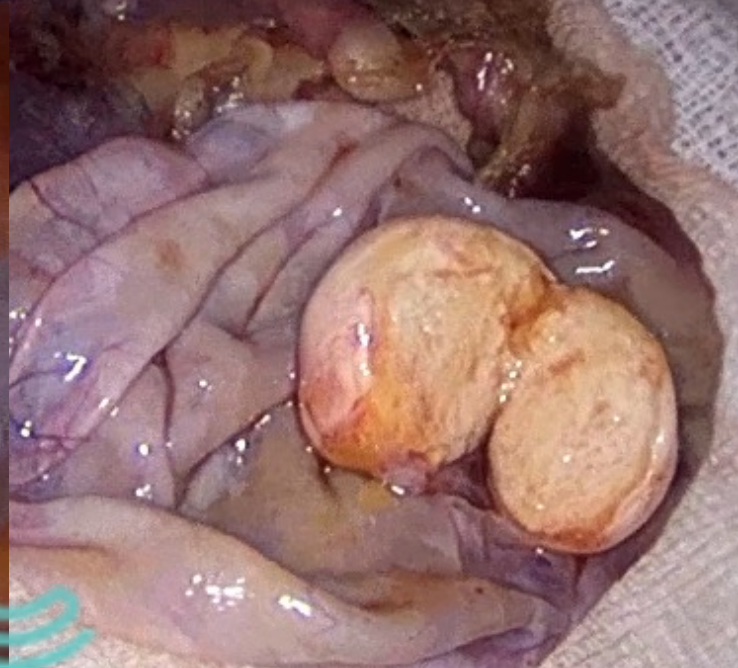
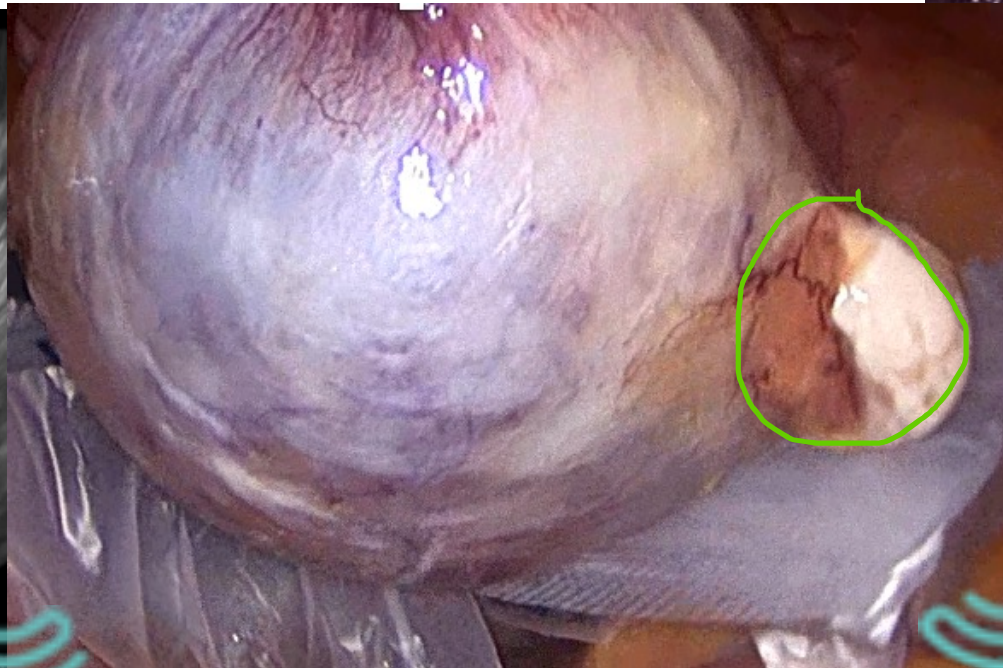
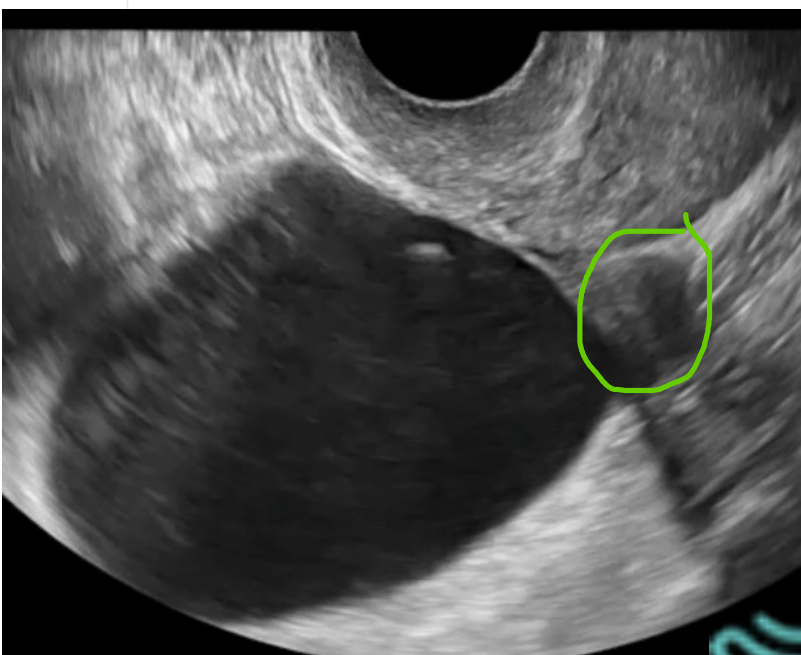
...AND ONE MORE TIME





56 y.o.
simple cyst?
+solid component with radial shadowing?
CA-125: 60
CDS 1
ORADS???



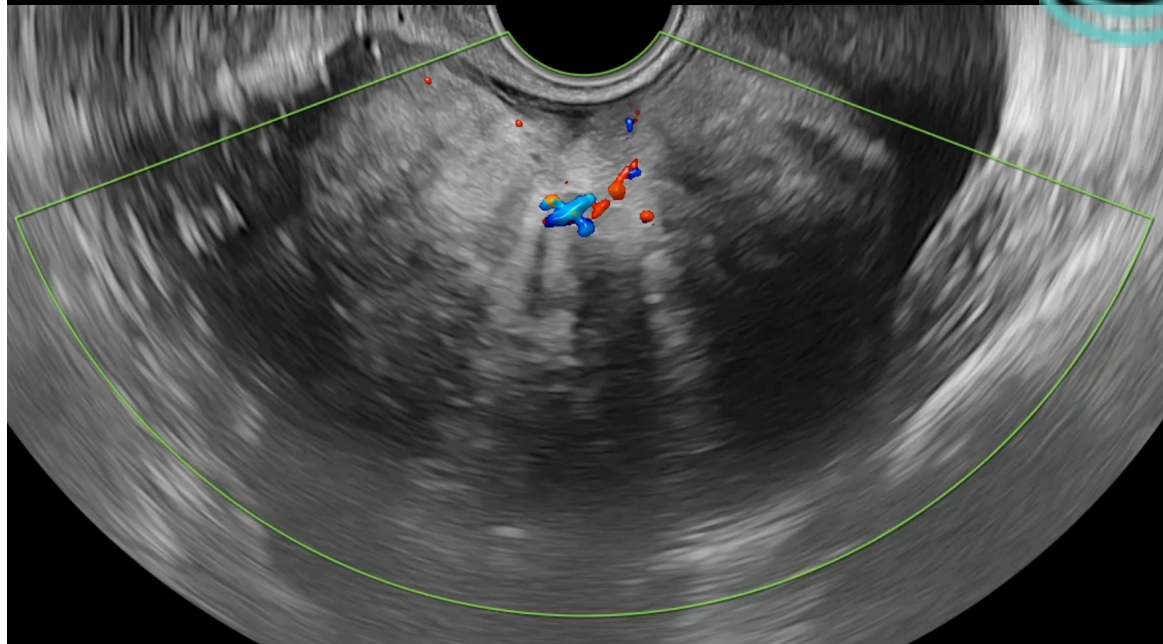
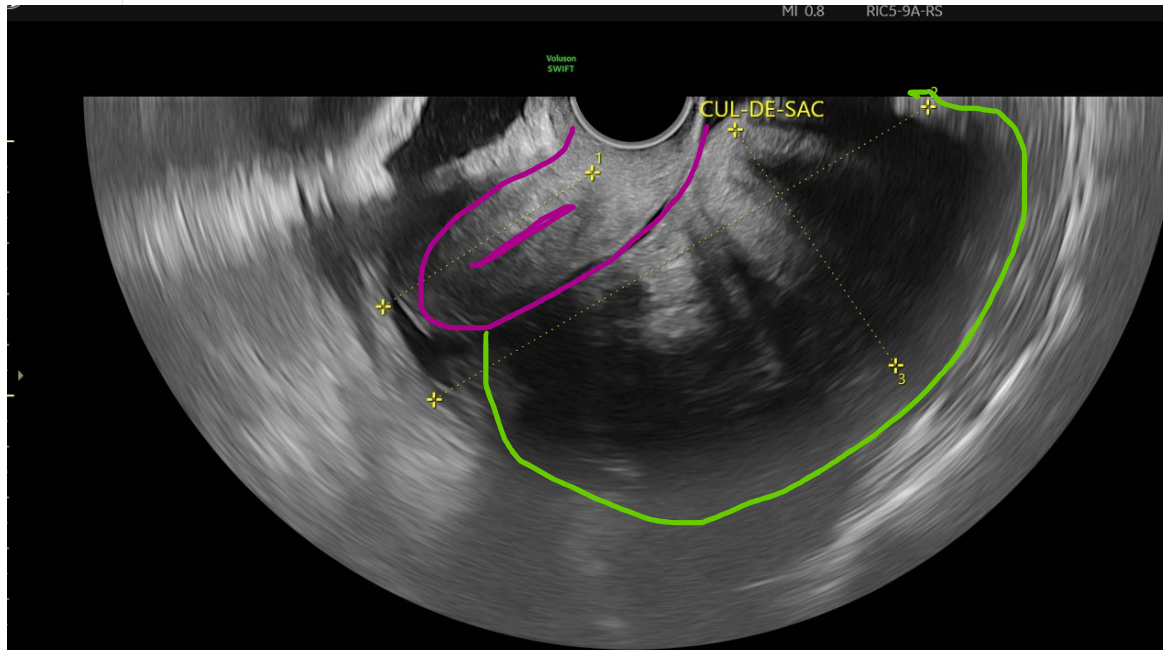


ovarian fibroma
with cystic degeneration
and a small solid component

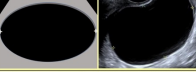
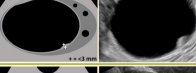
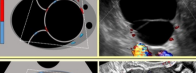
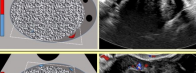
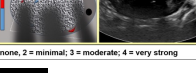


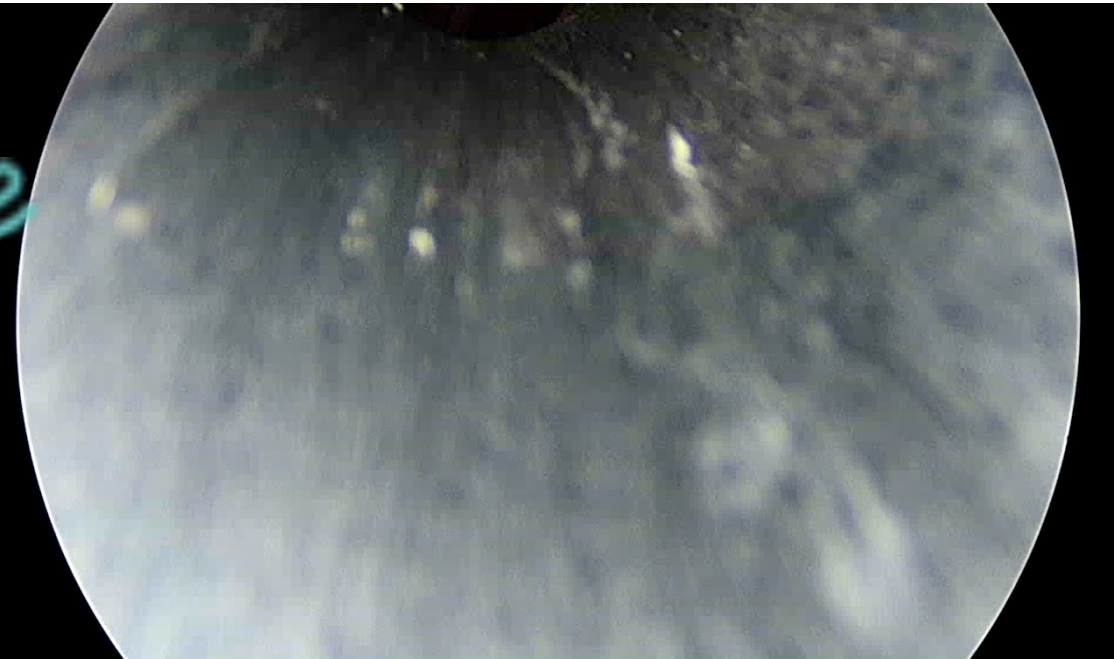
Again?.. Yes. QUIZ!





59 y.o, 10 years postmenopausal
mild pain
solid mass 10 cm behind the uterus
smooth contour and shadowing
CDS 2–3
Ca 125: 40
ORADS 3
250 ml of fluid in the pouch of Douglas

O-RADS US v2022 Assessment Category 3 – Low Risk (1 - <10% risk of malignancy)	
Typical benign ovarian lesion, ≥ 10 cm	See "Classic Benign Lesions" table
Unilocular or bilocular* cyst, ≥ 10 cm * 2 locules (1 complete septation) - May be simple (anechoic) or non-simple (internal echoes or incomplete septa)	
Unilocular cyst, irregular* inner walls, any size * Focal thickening < 3 mm in height (into cyst lumen)	
Multilocular* cyst, smooth inner walls and septations, < 10 cm, color score ≤ 4 * ≥ 3 locules (2 septations)	
Solid lesion, ± shadowing*, smooth outer contour, any size, color score 1 80% solid * Must be diffuse or broad (not refractive artifact)	
Solid lesion, shadowing*, smooth outer contour, any size, color score 2-3 80% solid * Must be diffuse or broad (not refractive artifact)	
Color score (degree of internal vascularity): 1 = none, 2 = minimal; 3 = moderate; 4 = very strong	

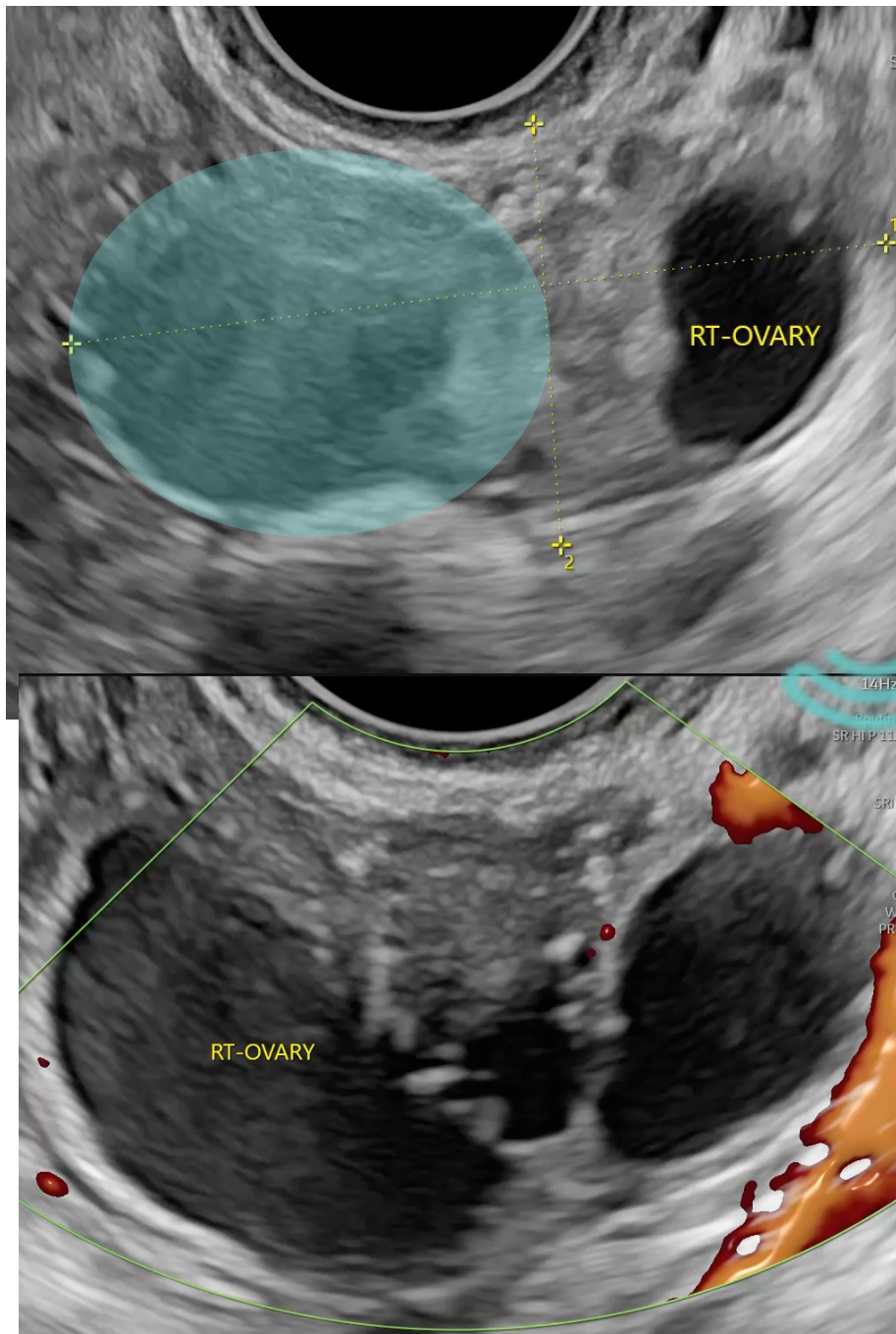


ovarian fibroma
hydroperitoneum
Meigs syndrome



**LAST ONE.
I PROMISE.
QUIZ!**





40 y.o.
multilocular solid mass
solid component with fan-shaped shadows
cystic component with calcification



**fibroma + cystadenofibroma
2 in 1**



THECOMA / FIBROMA OF THE OVARY

UZ comments

May show a cystic part due to edema or torsion

Macroscopically appear white or yellow

Stromal tumors are hard to describe with IOTA terms

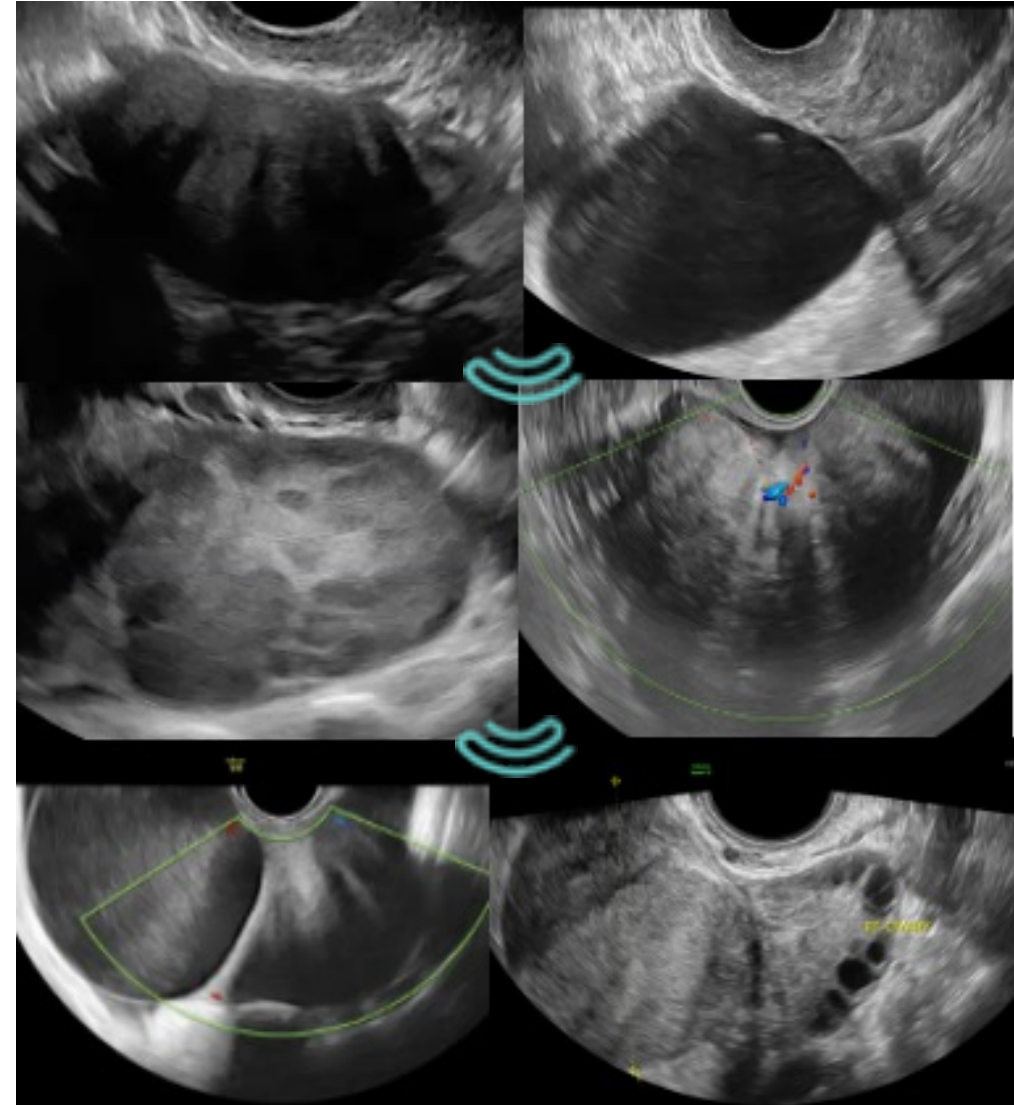
Risk estimation in ADNEX is unreliable

Fibrous lesions often give fan-shaped shadowing

Can be mistaken for a type 7 uterine fibroid

Sometimes combined with an epithelial tumor

May present with ascites and elevated Ca 125



SERTOLI CELL TUMORS

benign



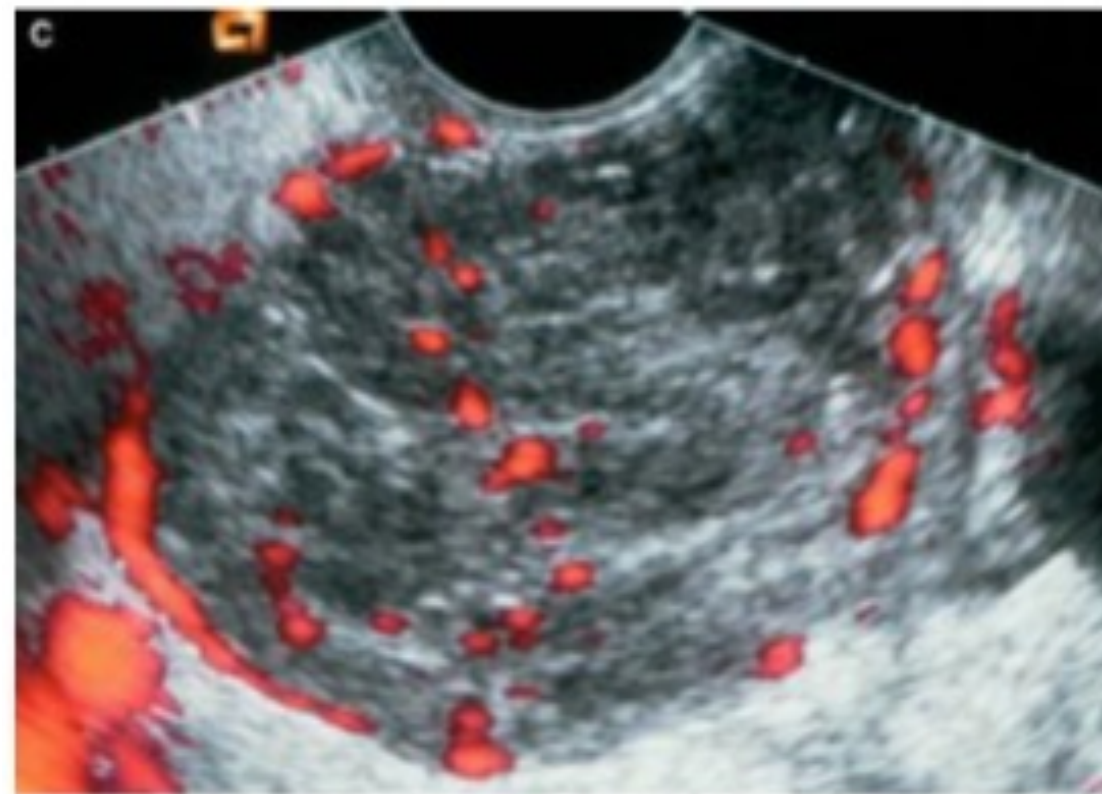
CLINICAL AND ULTRASOUND CHARACTERISTICS

SERTOLI CELL TUMORS

predominantly benign

ESGO / ISUOG / IOTA / ESGE 2021

< 30 years (75%)
 unilateral
 solid mass
 average diameter: 90 mm
 hormonally inactive / estrogen-producing (AUB)
 CDS 3/4



Sertoli cell tumor (most benign)	≤30 (75%)	Uni	Solid; median diameter 90 mm	Hormonally inactive or estrogen-producing (abnormal bleeding)	3/4
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ULTRASOUND in Obstetrics & Gynecology



Consensus Statement | Open Access | © 2021

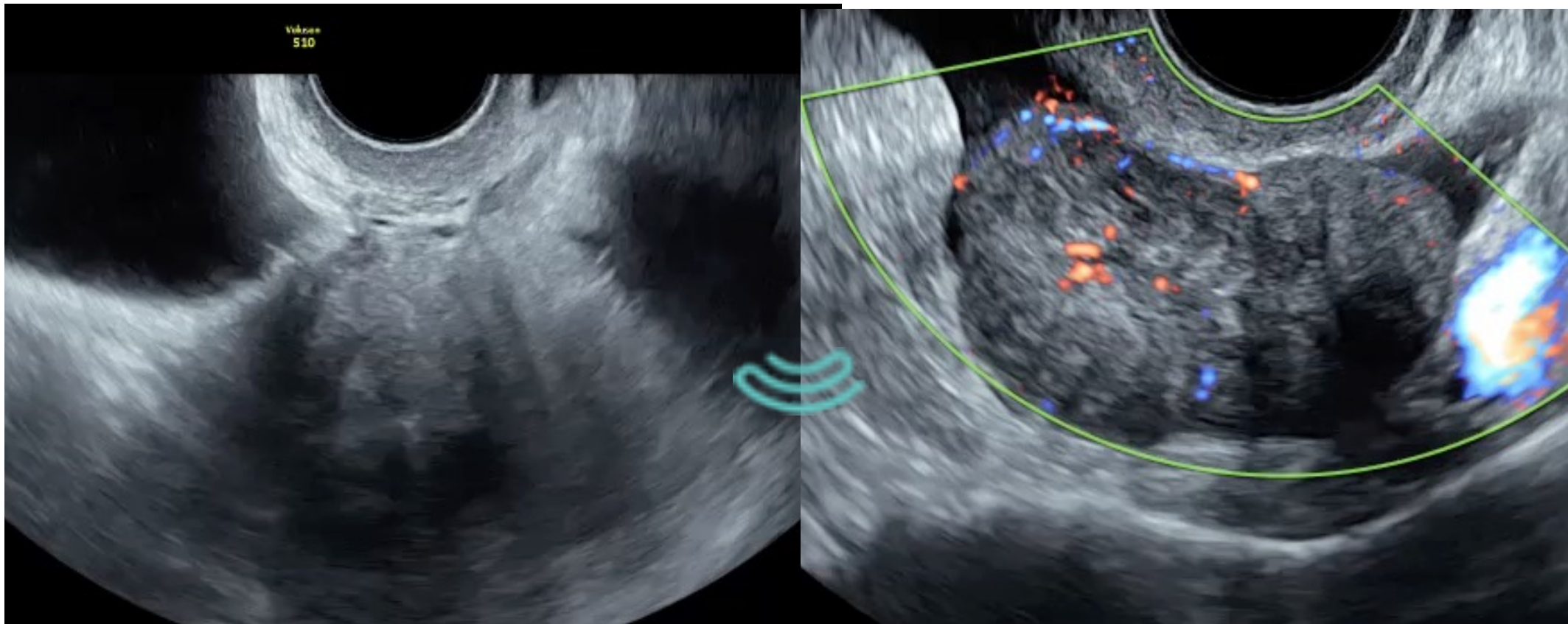
ESGO/ISUOG/IOTA/ESGE Consensus Statement on preoperative diagnosis of ovarian tumors

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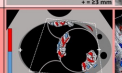
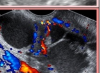
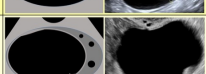
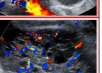
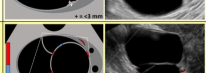
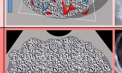
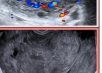
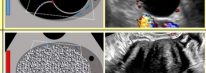
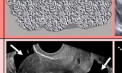
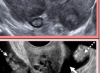
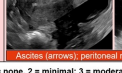
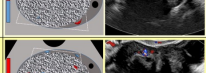
First published: 01 April 2021 | <https://doi.org/10.1002/uo.23635>

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52 y.o.
unilateral solid tumor
7 cm
CDS 3–4
smooth?
irregular surface?
ORADS 3? 5?

O-RADS US v2022 Assessment Category 3 – Low Risk (1 - <10% risk of malignancy)		O-RADS US v2022 Assessment Category 5 – High Risk (≥50% risk of malignancy)	
Typical benign ovarian lesion, ≥10 cm	See "Classic Benign Lesions" table	Unilocular cyst, ≥4 papillary projections, any size, any color score	
Unilocular or bilocular* cyst, ≥10 cm		• Papillary projection (pp) = solid component protruding ≥3 mm into cyst lumen and surrounded by fluid on 3 sides	
• *2 locules (1 complete septation)		• Any type of solid component; may emanate from a wall or septation	
• May be simple (anechoic) or non-simple (internal echoes or incomplete septa)			
Unilocular cyst, irregular* inner walls, any size		Solid lesion, ± shadowing, smooth outer contour, any size, color score 4	
• *Focal thickening ≥3 mm in height (into cyst lumen)		• ≥80% solid	
Multilocular* cyst, smooth inner walls and septations, <10 cm, color score ≤4		Solid lesion, ± shadowing, irregular* outer contour, any size, any color score	
• *≥3 locules (≥2 septations)		• ≥80% solid	
Solid lesion, ± shadowing*, smooth outer contour, any size, color score 1		• "Not smooth; includes lobular"	
• ≥80% solid		Ascites and/or peritoneal nodules	
• "Must be diffuse or broad (not refractive artifact)"		• May be anechoic fluid or contain echoes	
Solid lesion, shadowing*, smooth outer contour, any size, color score 2-3			
• ≥80% solid			
• "Must be diffuse or broad (not refractive artifact)"			

Color score (degree of internal vascularity): 1 = none, 2 = minimal; 3 = moderate; 4 = very strong

Color score (degree of internal vascularity): 1 = none, 2 = minimal; 3 = moderate; 4 = very strong

Sertoli

CLINICAL AND ULTRASOUND CHARACTERISTICS SERTOLI CELL TUMORS predominantly benign ESGO / ISUOG / IOTA / ESGE 2021

< 30 years (75%)
unilateral
solid mass
average diameter: 90 mm
hormonally inactive / estrogen-producing (AUB)
CDS 3/4



Sertoli cell tumor (most <30 (75%) benign)

UFI

Solid median diameter 90 mm

Hormonally inactive or estrogen-producing (abnormal bleeding) 3/4

ULTRASOUND

ESGO / ISUOG / IOTA / ESGE 2021



LEYDIG CELL TUMORS

benign



Clinical and ultrasound characteristics

LEYDIG CELL TUMORS

predominantly benign

ESGO / ISUOG / IOTA / ESGE 2021

median age 58 years

unilateral

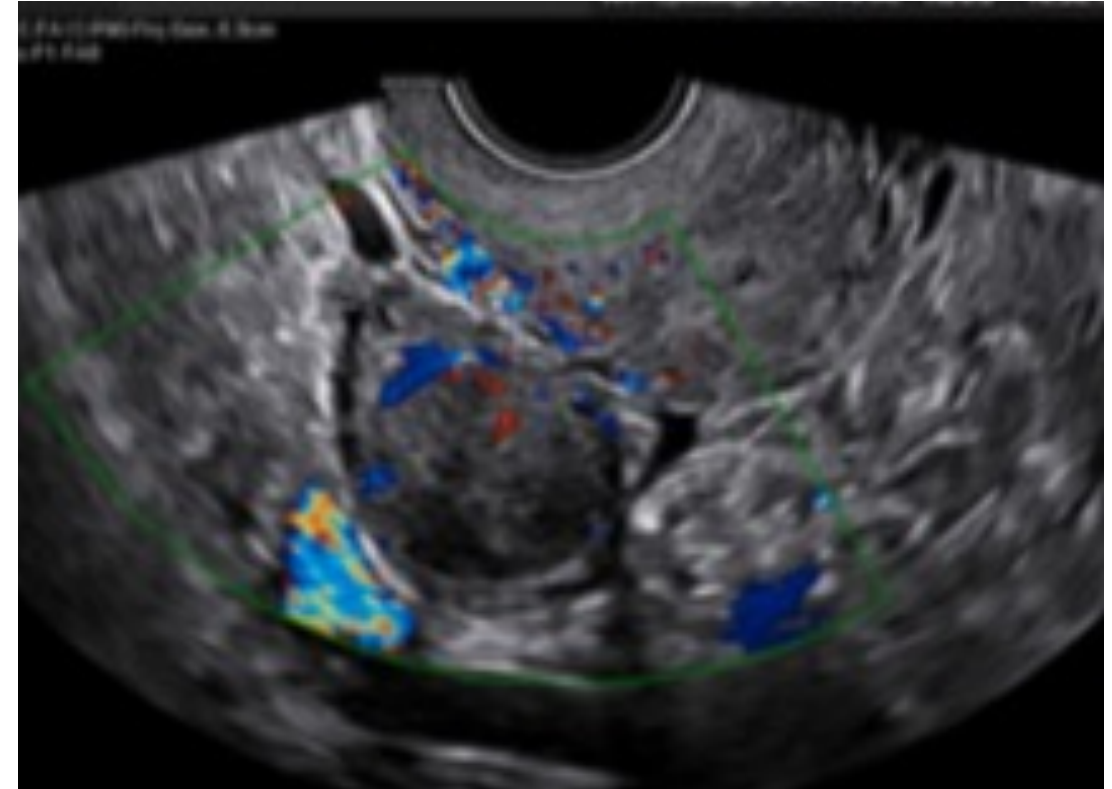
solid, small

average diameter 24 mm

endocrine symptoms (75% virilization)

testosterone / androstenedione

CDS 3/4



Leydig cell tumor (almost all benign)	Median, 58	Uni	Solid; median diameter 24 mm	Endocrine symptoms (75% virilization); testosterone/ androstenedione	3/4
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ULTRASOUND in Obstetrics & Gynecology



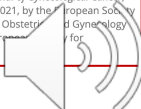
Consensus Statement | [Open Access](#) | [DOI](#) | [Cite](#)

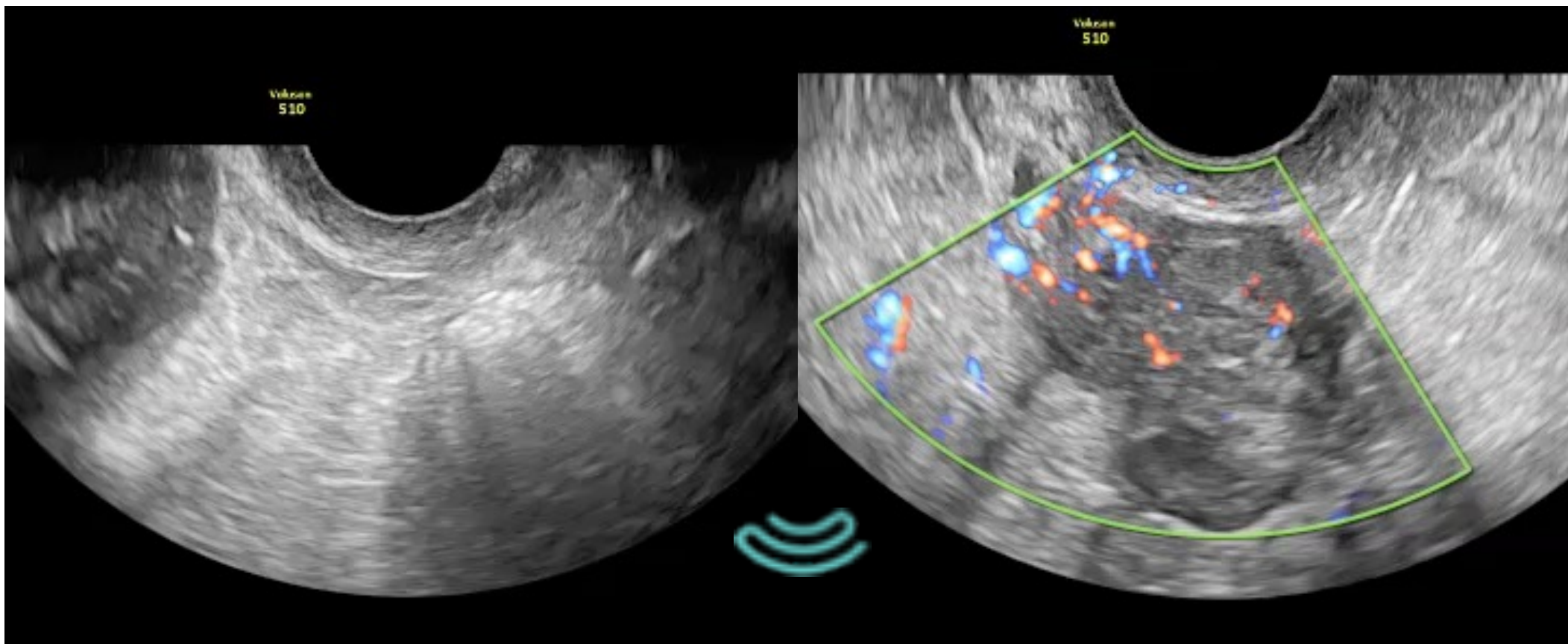
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First published: 01 April 2021 | <https://doi.org/10.1002/uog.23635>

This paper is being published simultaneously and jointly, in *International Journal of Gynecological Cancer*, *Ultrasound in Obstetrics & Gynecology* and *Views and Vision in Obstetrics & Gynecology* © 2021, by the European Society of Gynecological Oncology (ESGO), the International Society of Ultrasound in Obstetrics & Gynecology (ISUOG), the International Ovarian Tumour Analysis (IOTA) group and the European Society for Gynaecological Endoscopy (ESGE). All rights reserved.

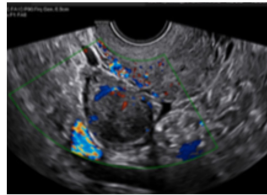




47 y.o.
2 years postmenopausal
symptoms of virilization
small solid tumor 3 cm
CDS 3–4

Clinical and ultrasound characteristics
LEYDIG CELL TUMORS
predominantly benign
ESGO / ISUOG / IOTA / ESGE 2021

median age 58 years
unilateral
solid, small
average diameter 24 mm
endocrine symptoms (75% virilization)
testosterone / androstenedione
CDS 3/4



Leydig cell tumor (almost all benign)	Median, 58	Unilateral	Solid, median diameter 24 mm	Endocrine symptoms (75% virilization) testosterone/ androstenedione	3/4
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ULTRASOUND
Leydig cell tumor: 4-6 mm
Heterogeneous echotexture, sometimes with internal vascularity
Hyperechoic areas may be present
CDS 3/4

Leydig cell tumor



Malignancy risk of sonographically benign appearing purely solid adnexal masses in asymptomatic postmenopausal women

Alcazar, Juan Luis MD, PhD¹; Pascual, Maria Angela MD, PhD²; Marquez, Reyes MS¹; Ajossa, Silvia MD³; Juez, Leire MD¹; Graupera, Betlem MD, PhD²; Piras, Alba MD³; Hereter, Lourdes MD²; Guerriero, Stefano MD, PhD³

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Menopause: June 2017 - Volume 24 - Issue 6 - p 613-616
doi: 10.1097/GME.0000000000000814

Alcazar et al 2017

99 postmenopausal women
solid ovarian masses
asymptomatic
CDS 1–2
no ascites, no carcinomatosis

mean lesion size: 2.9 cm (1.0–7.8 cm)
mean CA-125: 10 (range 3–400)

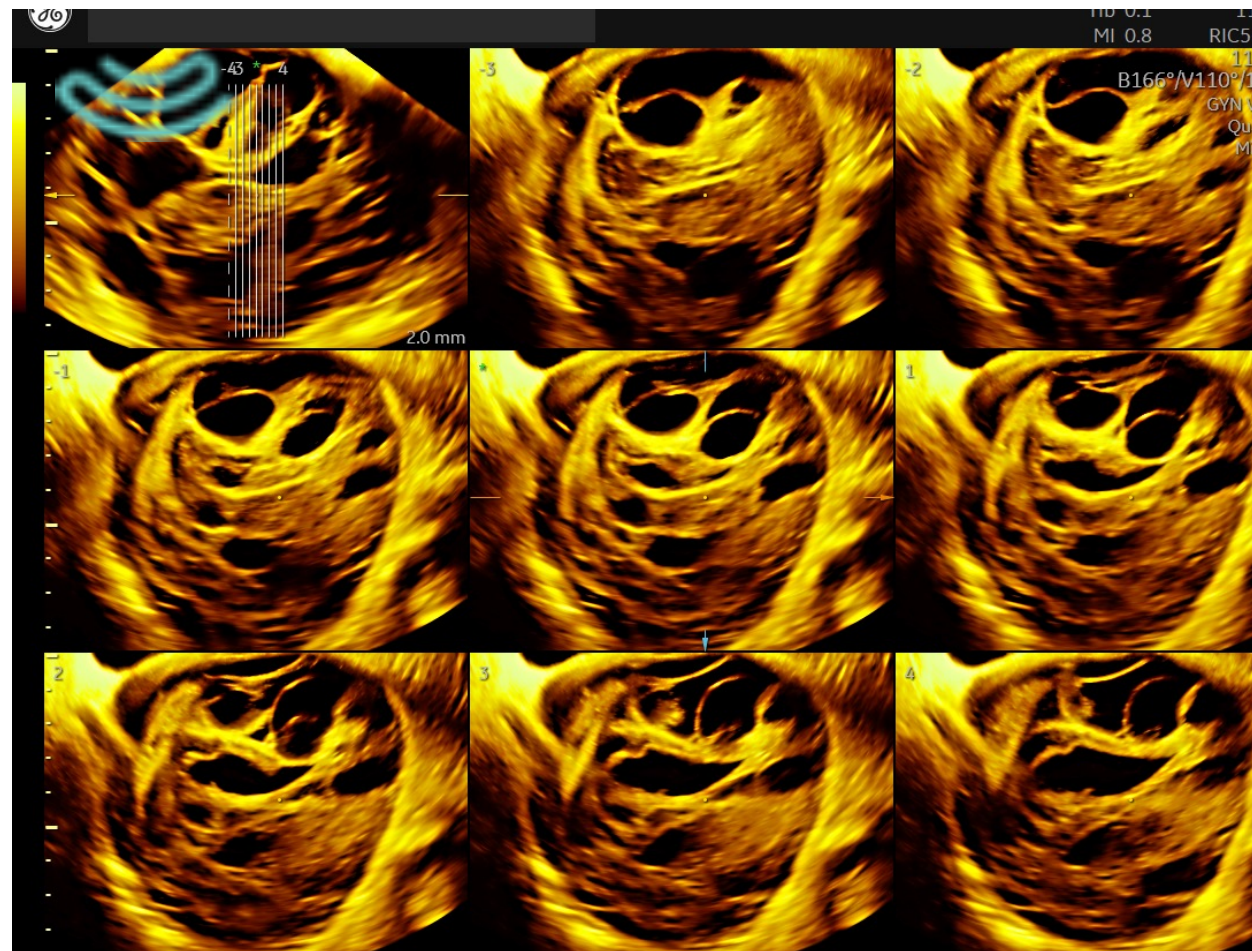
fibroma – 26
fibrothecoma – 5
dermoid – 3
Brenner – 3
endometrioma – 2
thecoma – 1
primary invasive carcinoma – 2

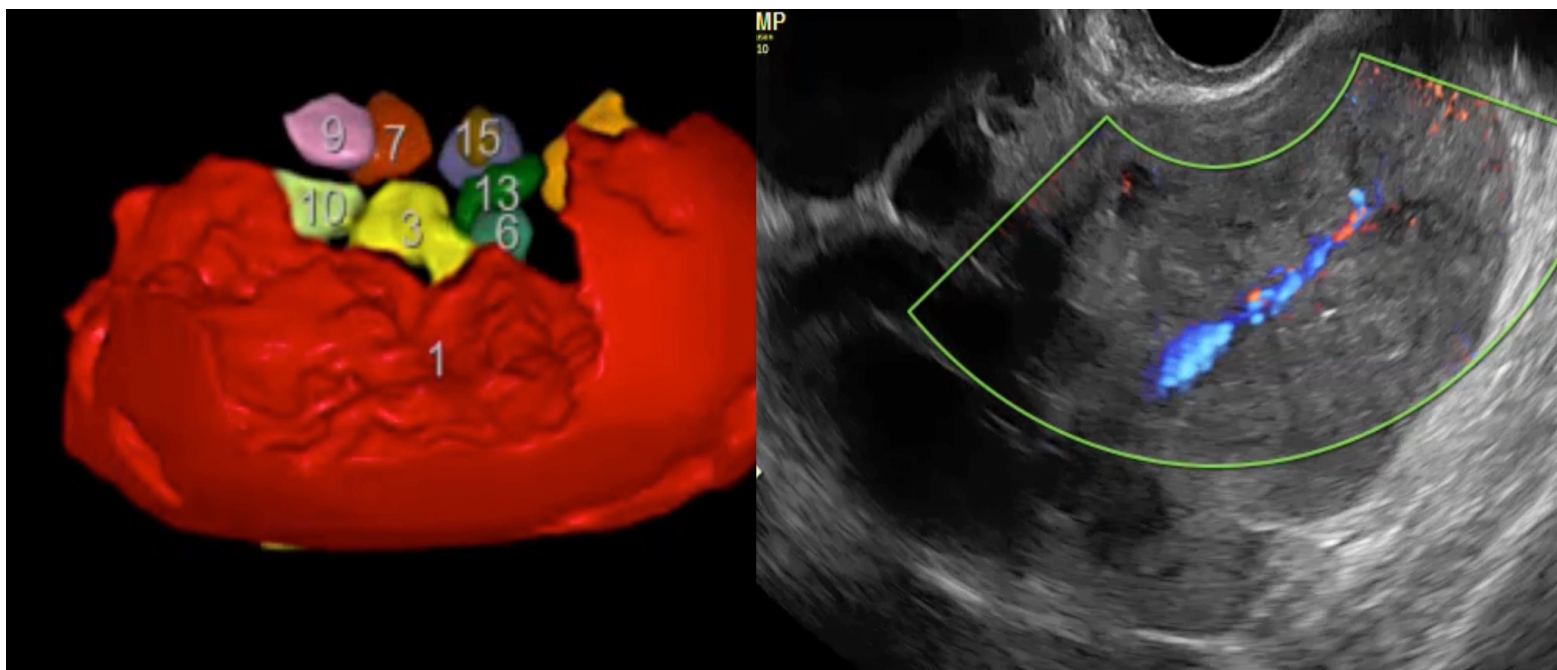


**STAY TUNED
IN THE NEXT EPISODES**



SEX CORD-STROMAL TUMORS malignant





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training center

