ULTRASOUND SOCIETY OF THE PHILIPPINES

SUBSPECIALTY OF THE PHILIPPINE COLLEGE OF RADIOLOGY

ESSENTIALS AND UPDATESINOB-GYNE AND BREAST SONOGRAPHY

part 2

Presented by:

JoLeane R. Salveron, MD, DPBR

TOPICS

1. Common Ovarian Pathologies
2. Interesting Case
3. BIRADS
4. Gynecomastia
5. Interesting Case

COMMON OVARIAN PATHOLOGIES

Ultrasound Technique

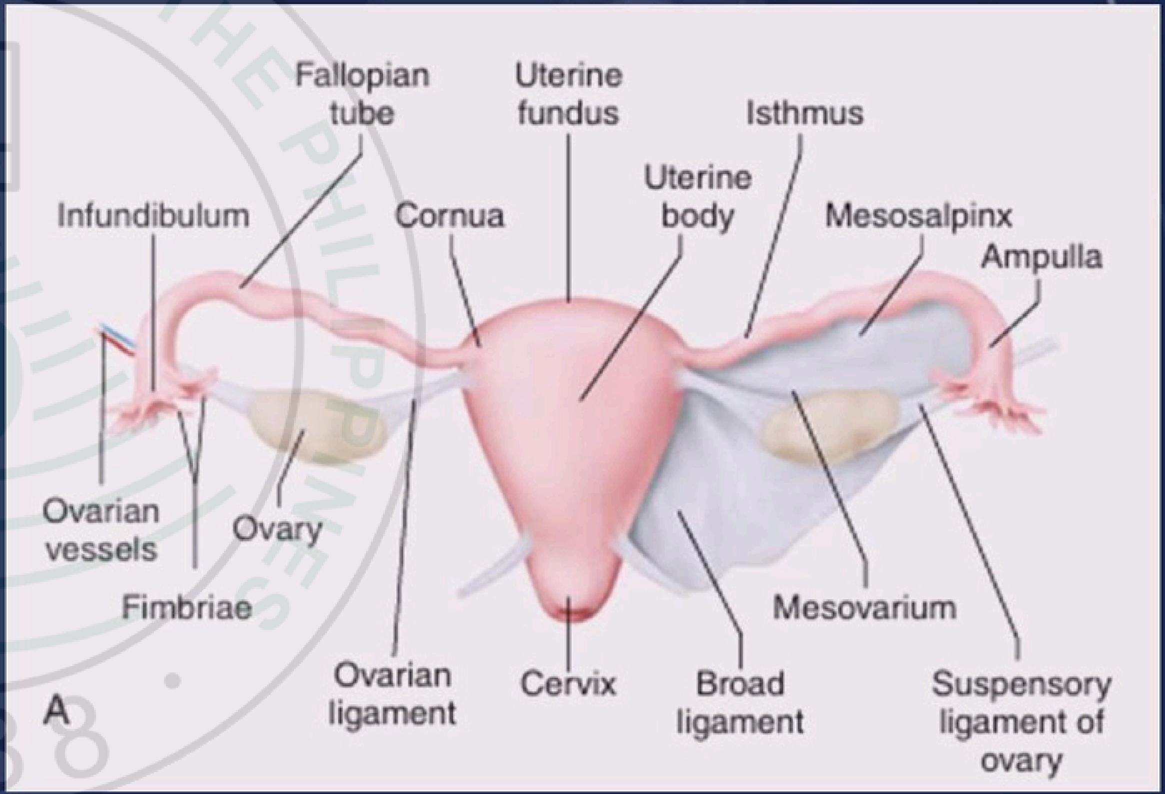
Transvaginal	Transabdominal
Not required	Distended bladder
Closer proximity	Ovaries are high in pelvis
Detailed evaluation	Limited view of pelvic organs

Ovarian Anatomy

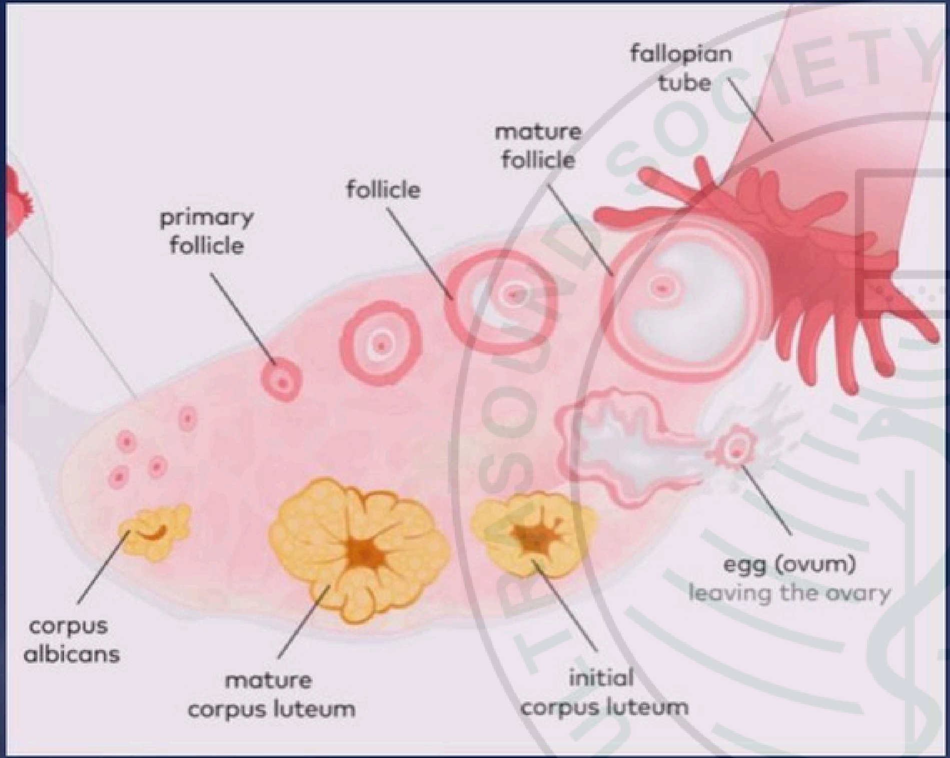
2-3 cm before ovulation

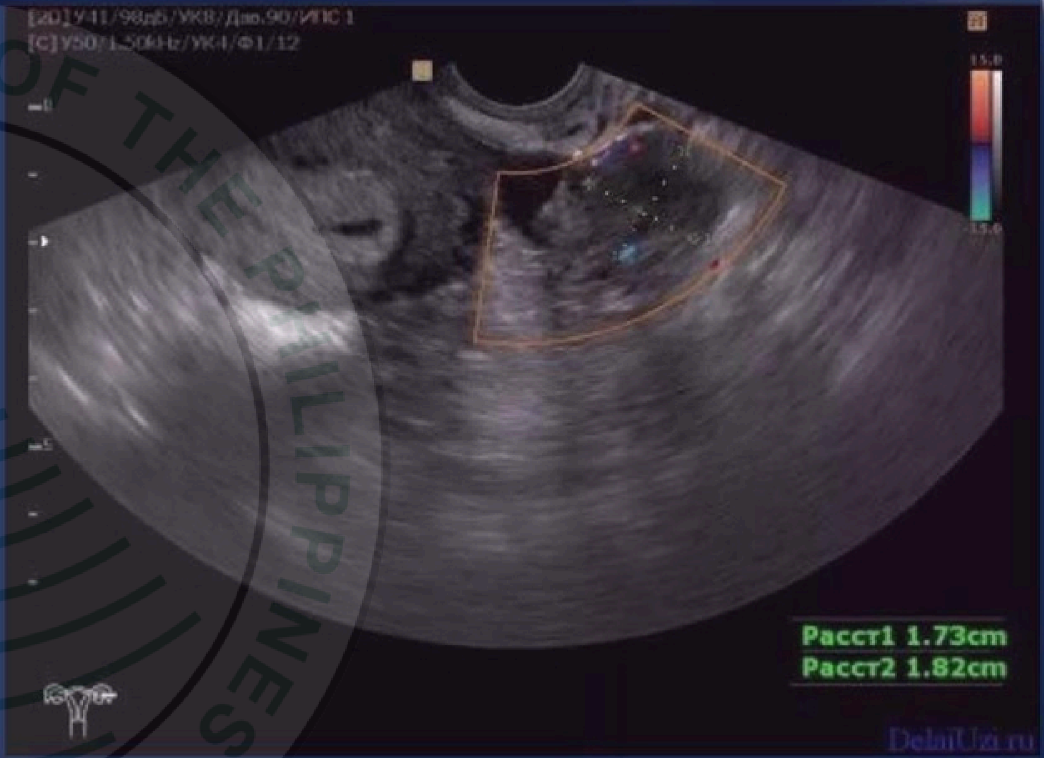
Oval in shape, up to 22 ml

Obliquely oriented



Ovarian Anatomy





Outer cortex: follicles and corpus lutea

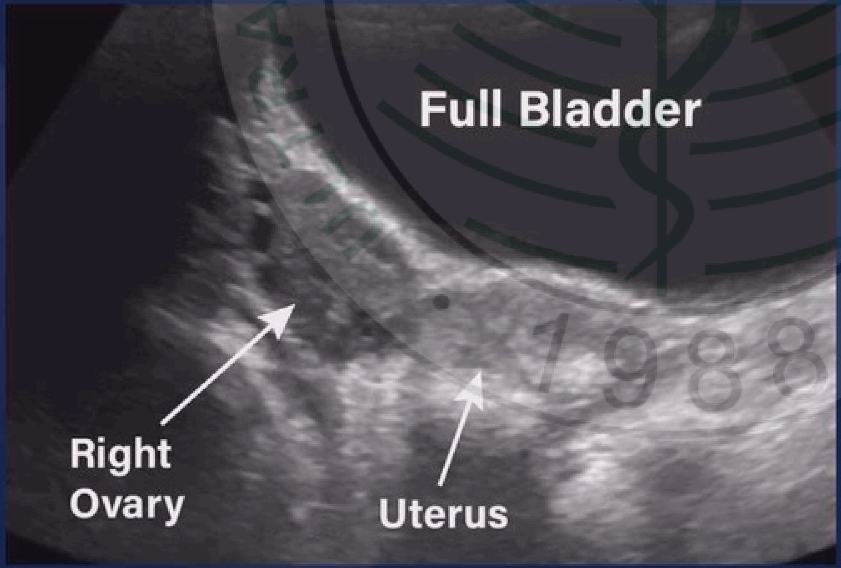
Inner medulla

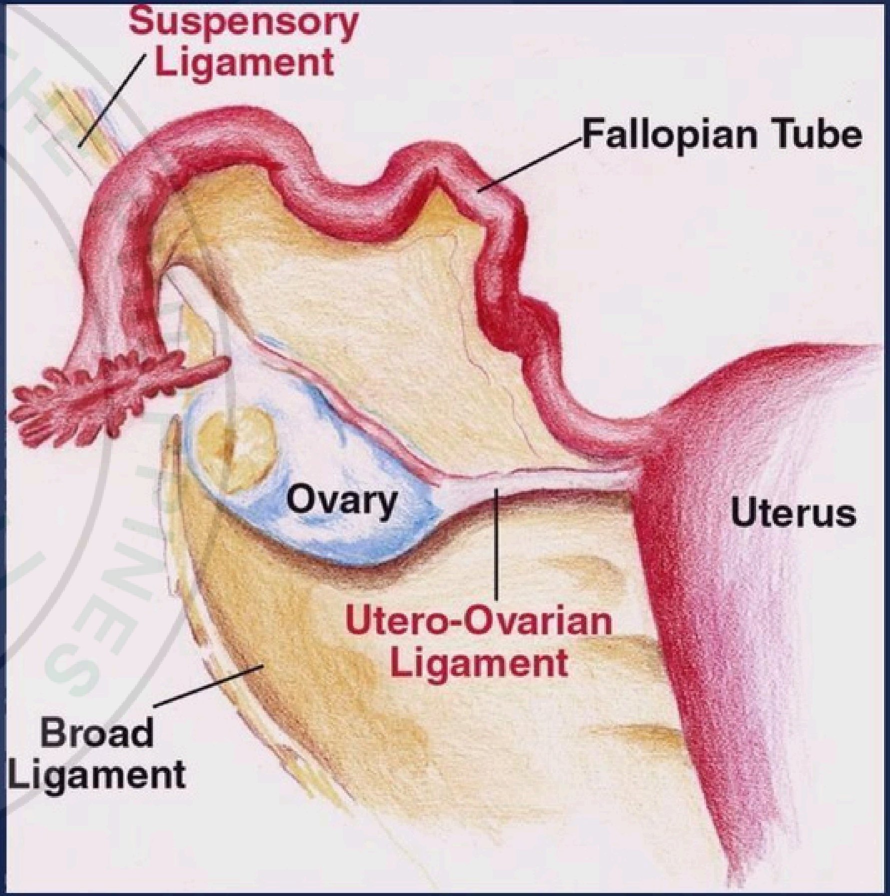
Ovarian Anatomy

Mesovarium

Suspensory ligament

Utero-ovarian ligament





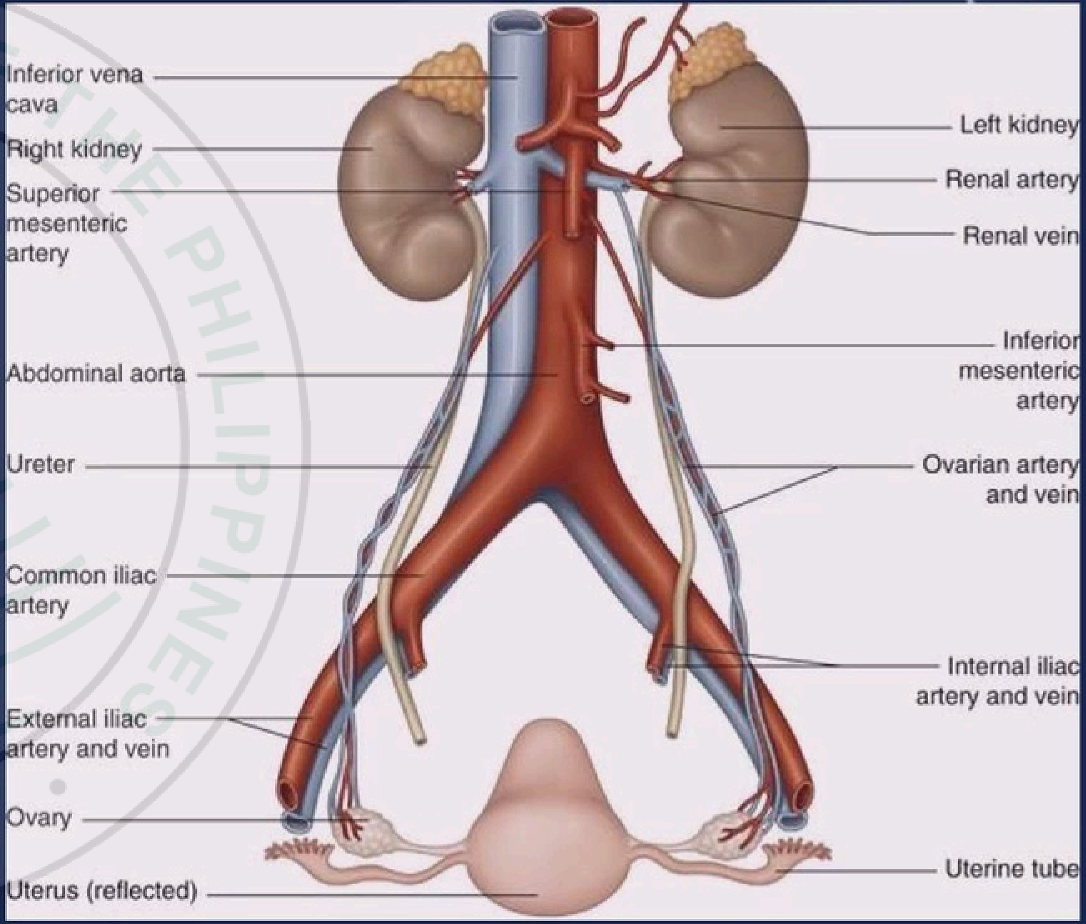
Ovarian Anatomy

<u>Blood Supply</u>

Ovarian artery: primary blood supply
Uterine artery

<u>Venous Drainage</u>

Pampiniform plexus
Right ovarian vein: IVC
Left ovarian vein: left renal vein

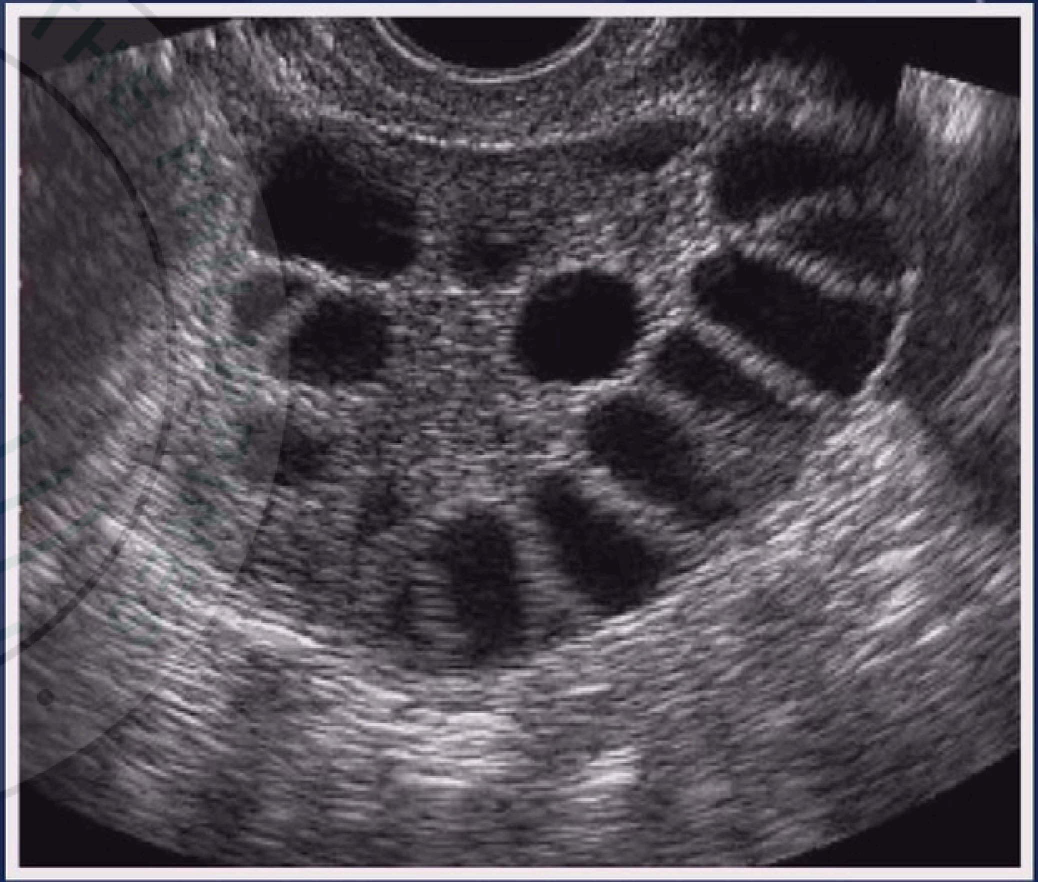


COMMON OVARIAN PATHOLOGIES

Polycystic Ovarian Syndrome

Rotterdam PCOS diagnostic criteria (2/3):

- oligo- or anovulation
- clinical and/ or biochemical hyperandrogenism
- polycystic ovaries



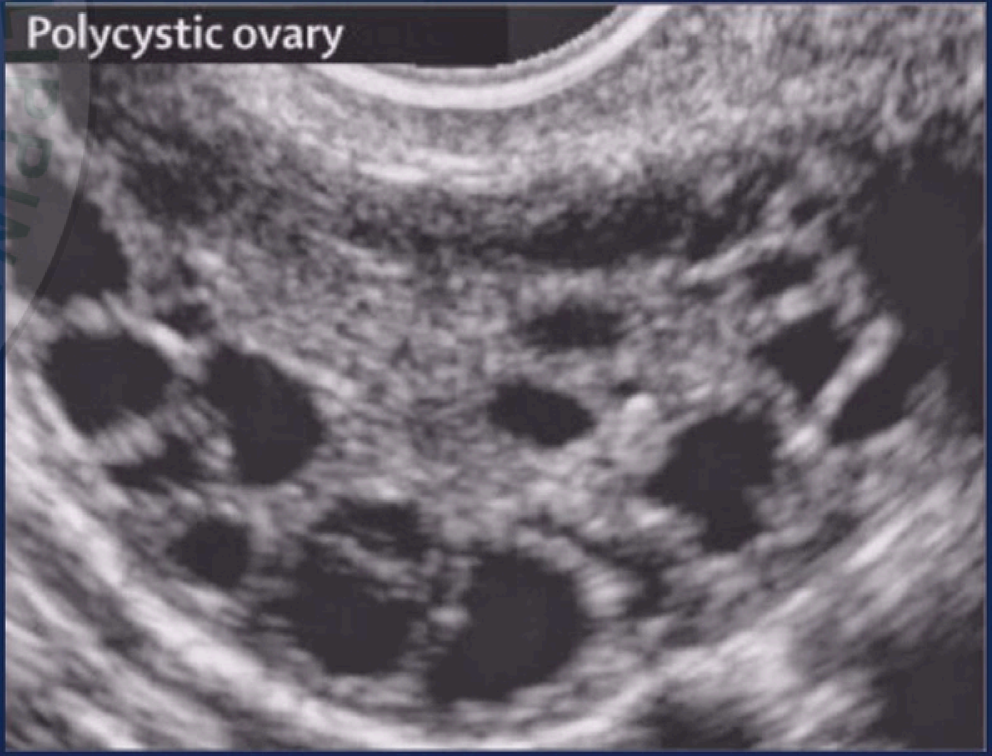
Polycystic Ovarian Syndrome

<u>Sonographic Findings</u>

- Bilaterally enlarged
- Multiple small 2-9 mm peripherally oriented follicles (string of pearls)
- Increased stromal echogenicity

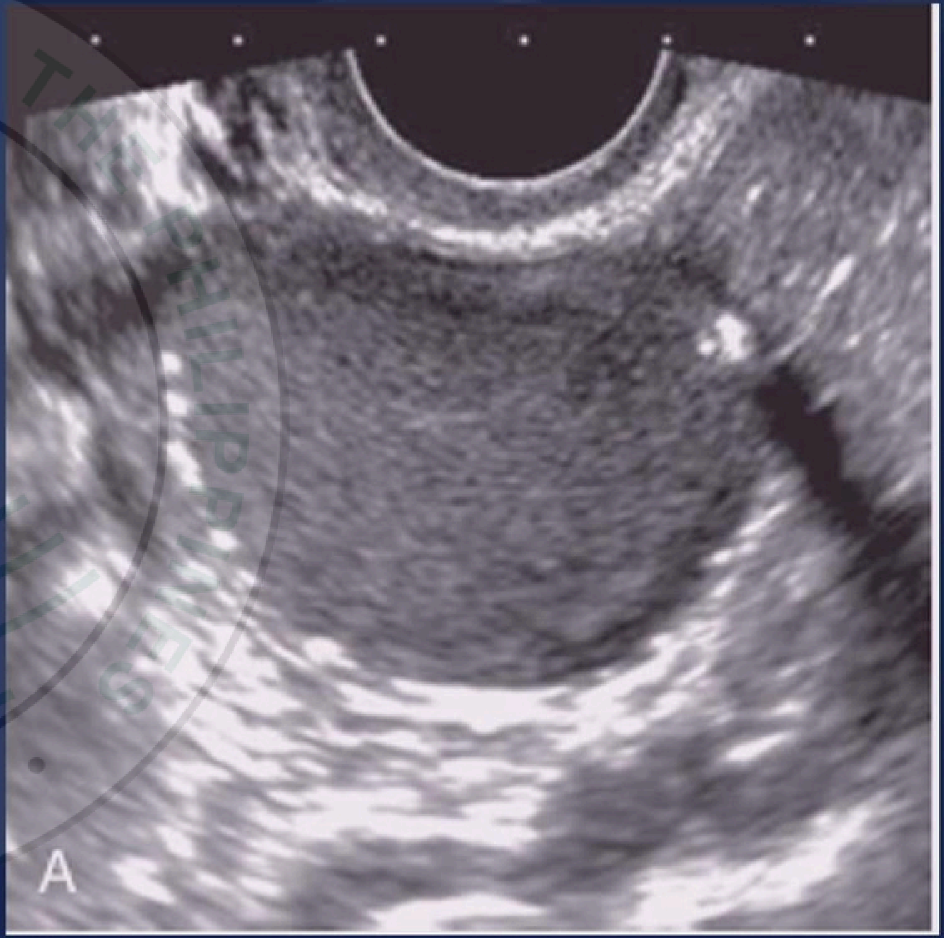
Polycystic Ovarian Morphology:

- One ovary >10 cc volume
- Both ovaries have >20 developing follicles



Endometriosis

- **most common benign gynecologic disorder**
- Ectopic endometrial glands and stroma
- Most commonly involves ovary, fallopian tube, broad ligament and posterior cul-de-sac

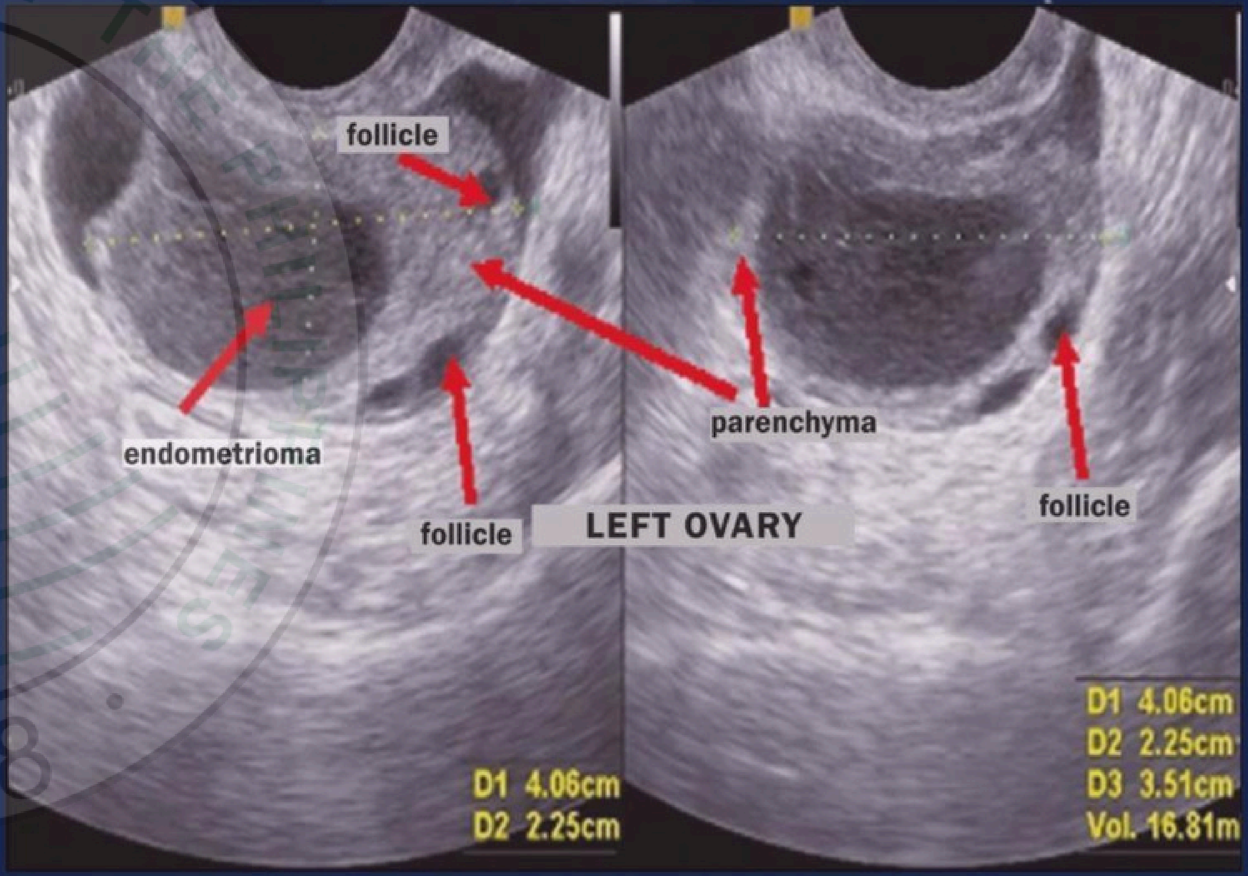


Endometriosis

<u>Sonographic Findings</u>

- Predominantly cystic mass
- Diffuse, homogeneous, low-level internal echoes (ground-glass)
- Little vascularity, if any

Uterine sliding sign: kissing ovaries



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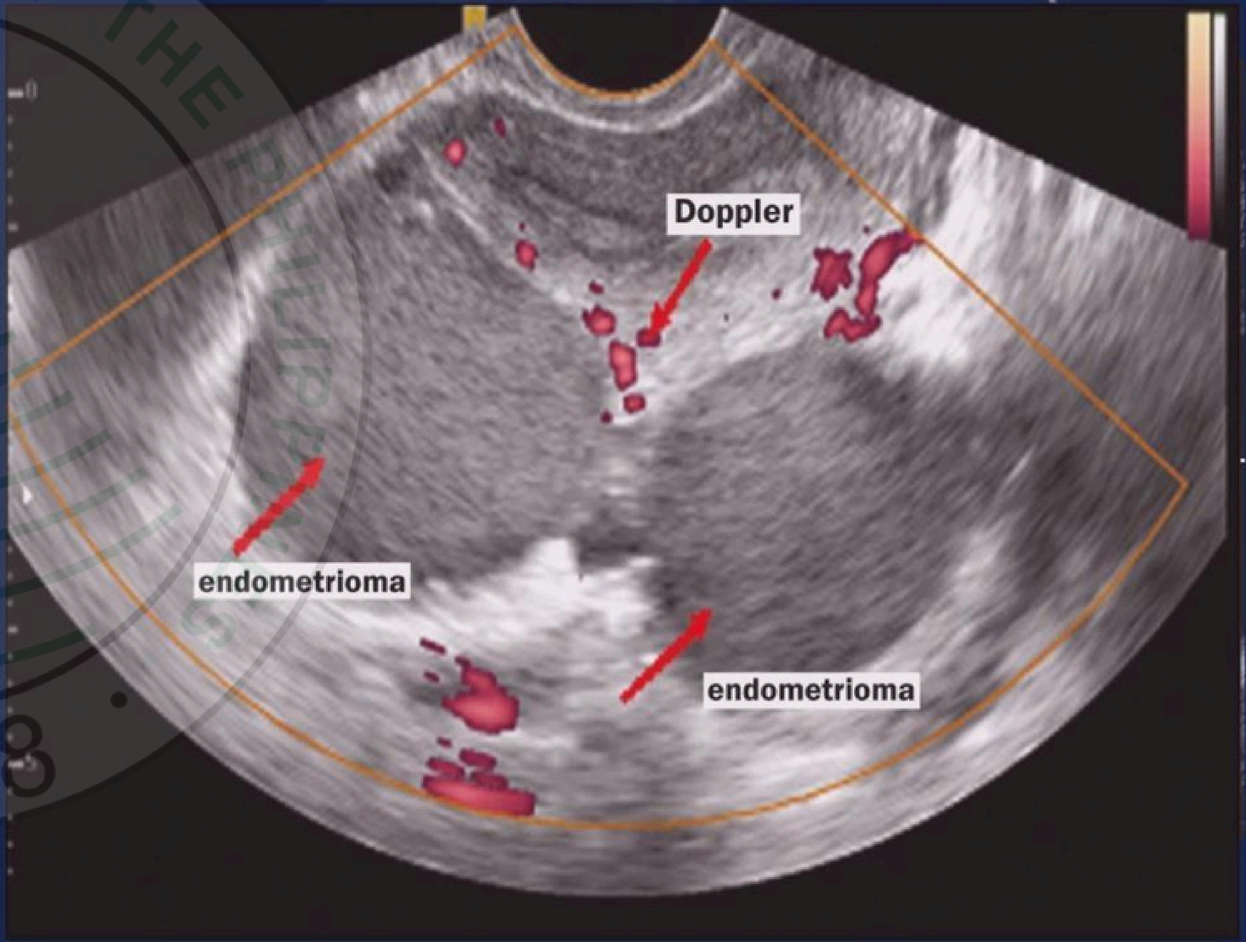

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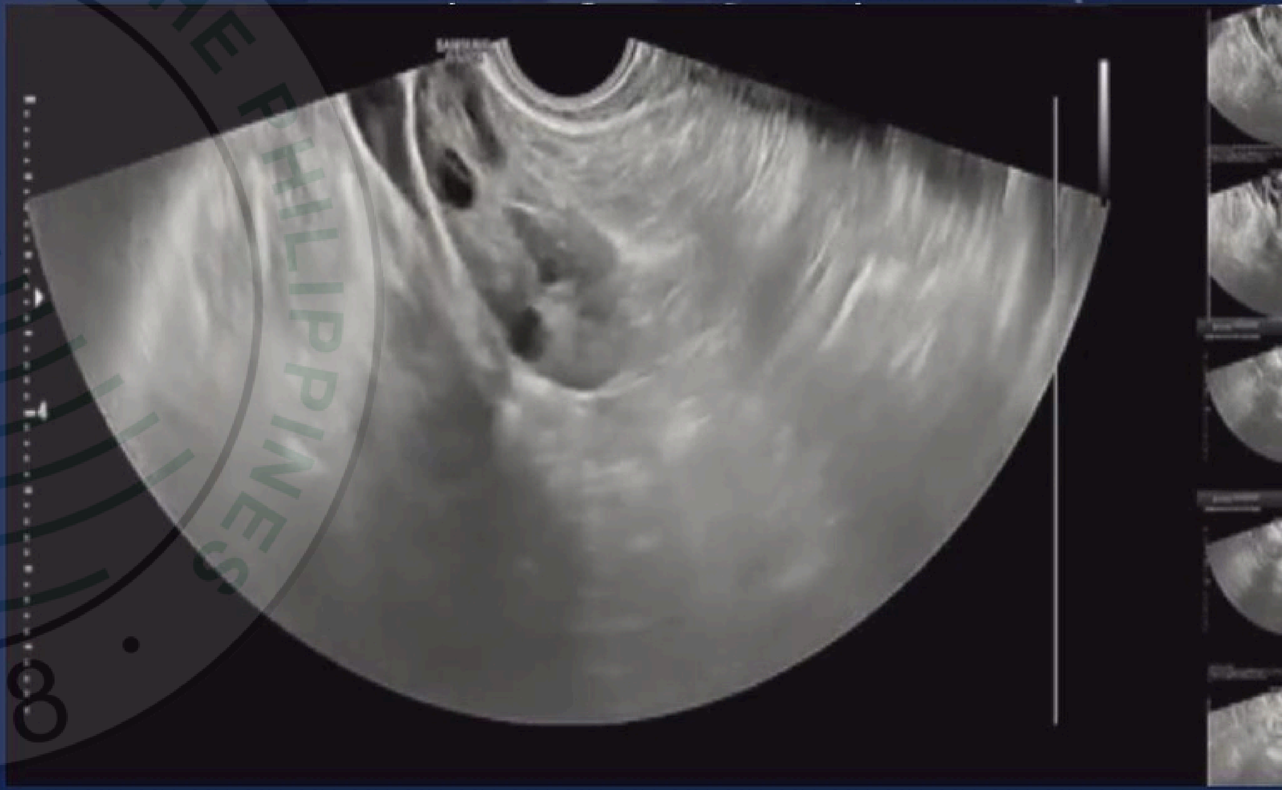

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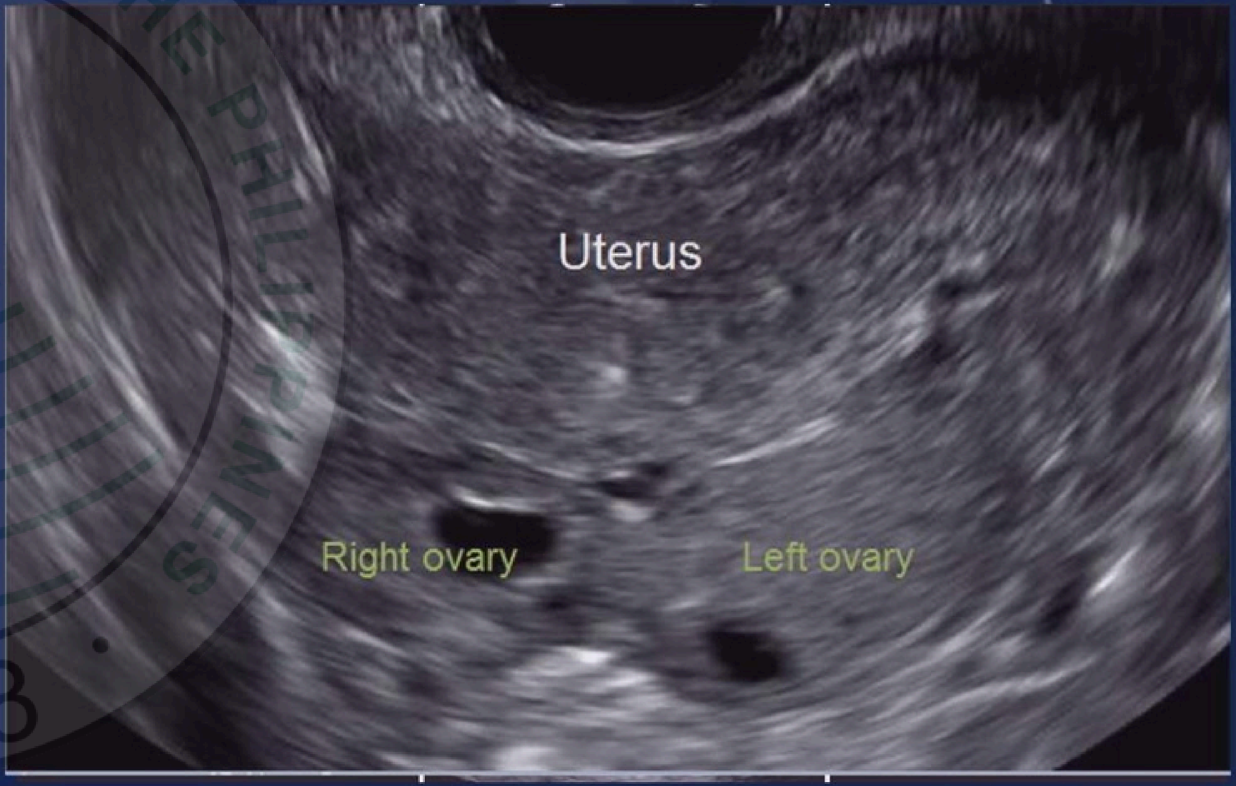
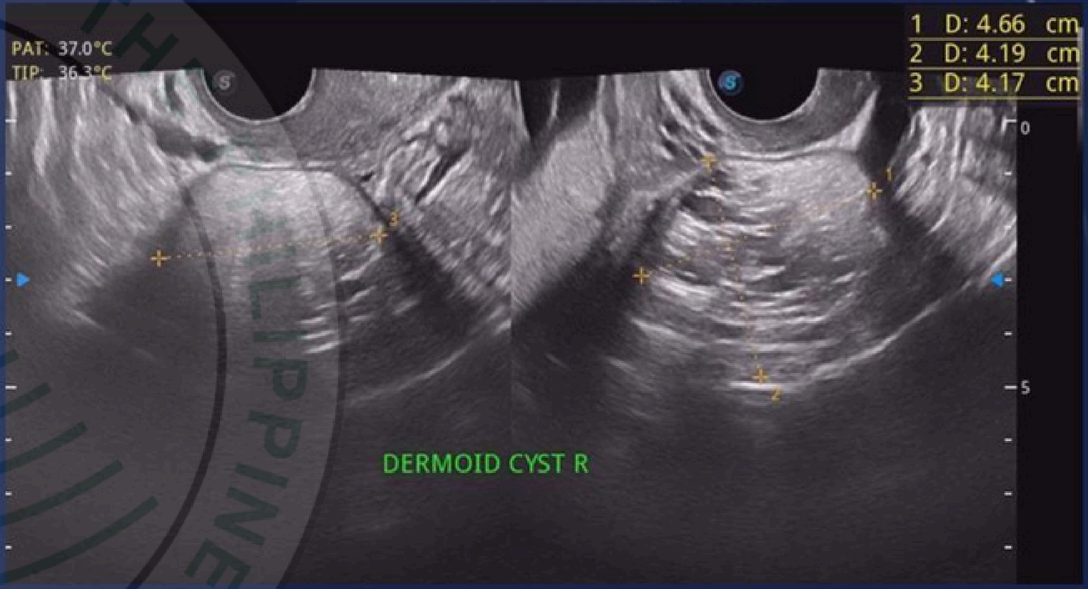
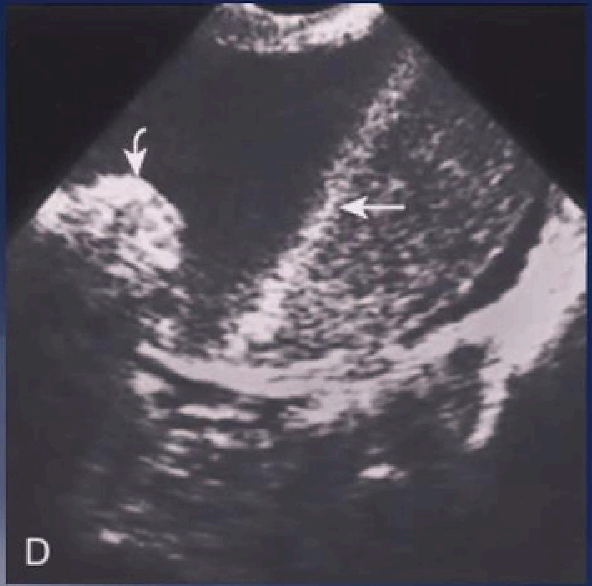


Mature Cystic Teratoma

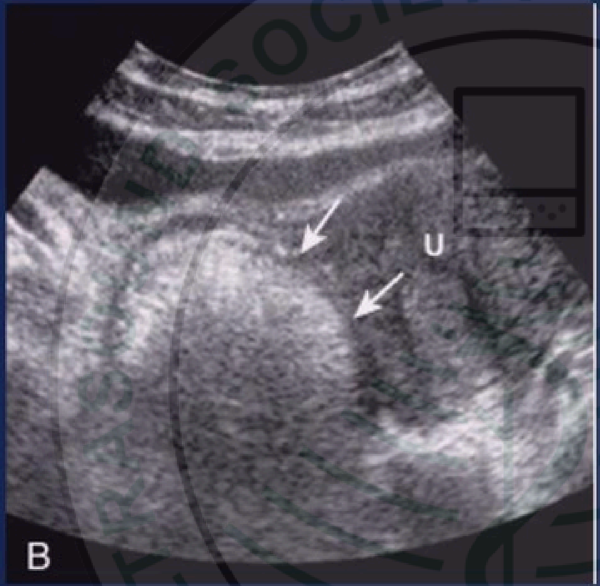
- **Most common ovarian neoplasm in patients younger than 20 years**
- Dermoid cyst: ectodermal
- Mature cystic ovarian teratoma: three germ cell layers



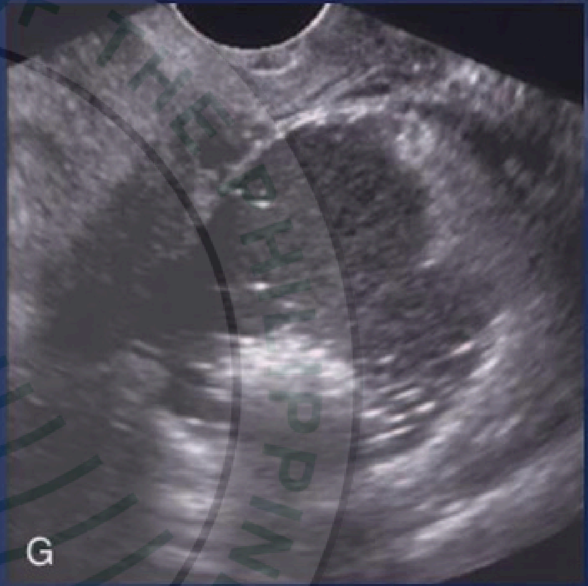
Mature Cystic Teratoma



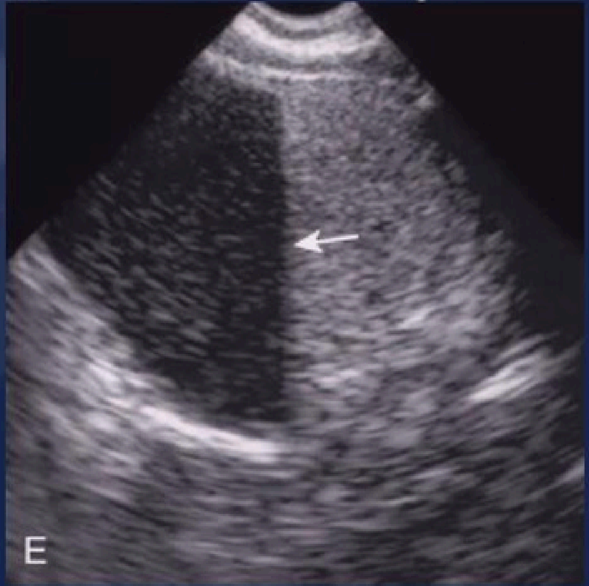
Dermoid plug



Tip of the iceberg



Dermoid mesh

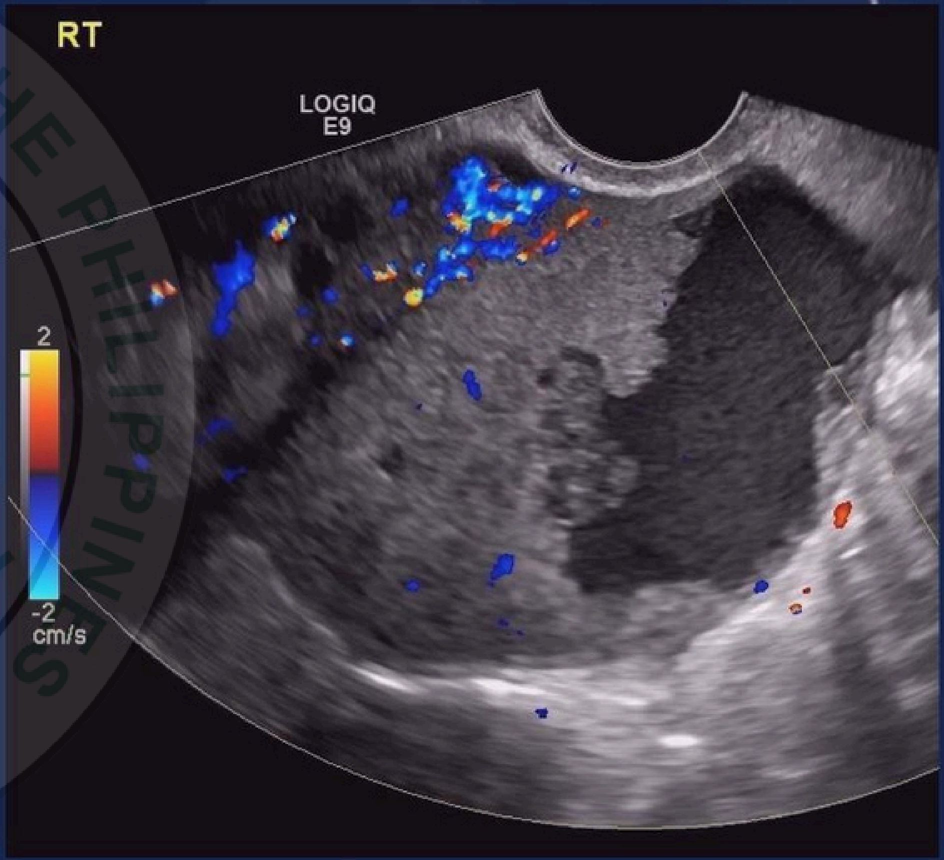


Fat-fluid level

The presence of a shadowing echogenicity is the most accurate feature for diagnosis

Ovarian Cysts with Typical Malignant Features

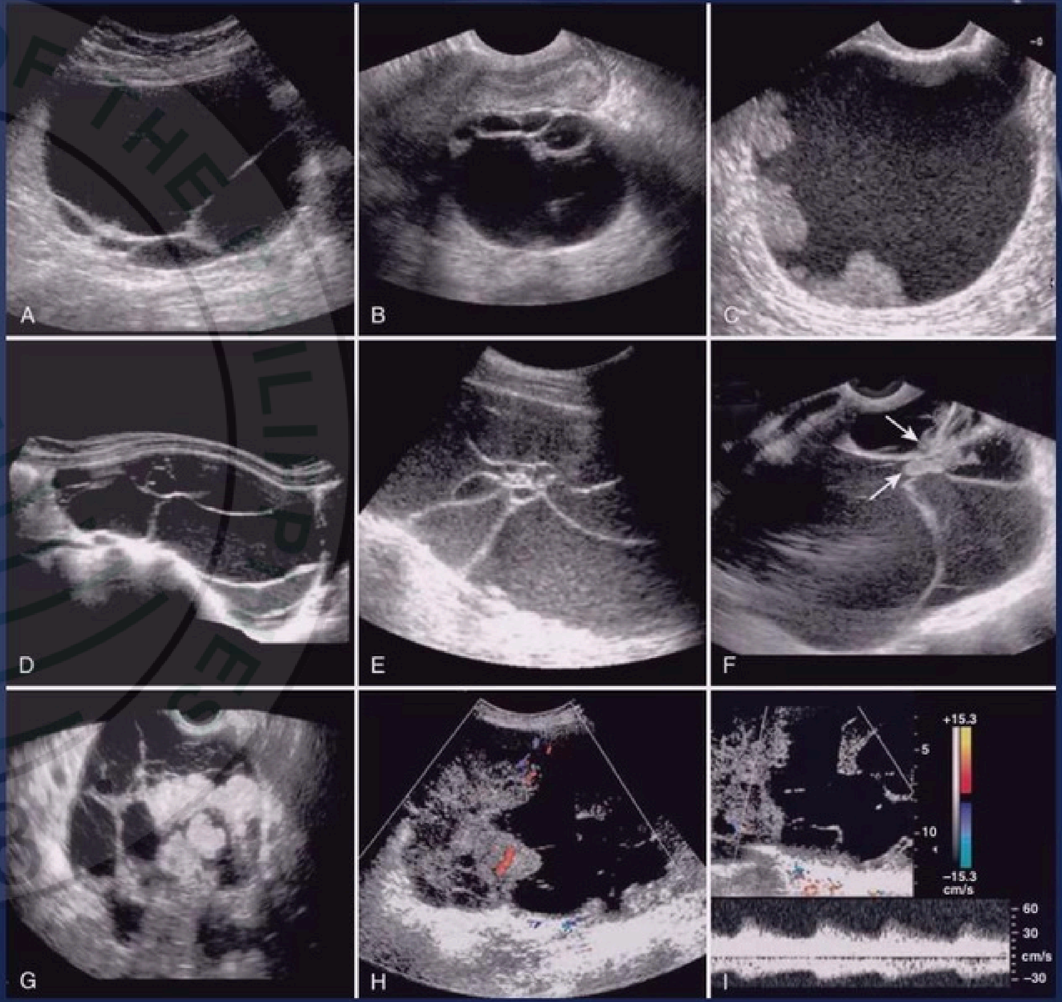
- Epithelial ovarian carcinomas:
  - Type I - present early, indolent
  - Type II - advanced stage, highly aggressive
- Sex cord-stromal neoplasm
  MC: fibromas
- Germ cell neoplasm
  MC: dysgerminoma
- Metastatic neoplasm



Ovarian Cysts with Typical Malignant Features

Sonographic Findings

- Adnexal mass
  - Irregular walls
  - Thick irregular septations (>3mm)
  - Mural nodules
  - Solid elements with flow



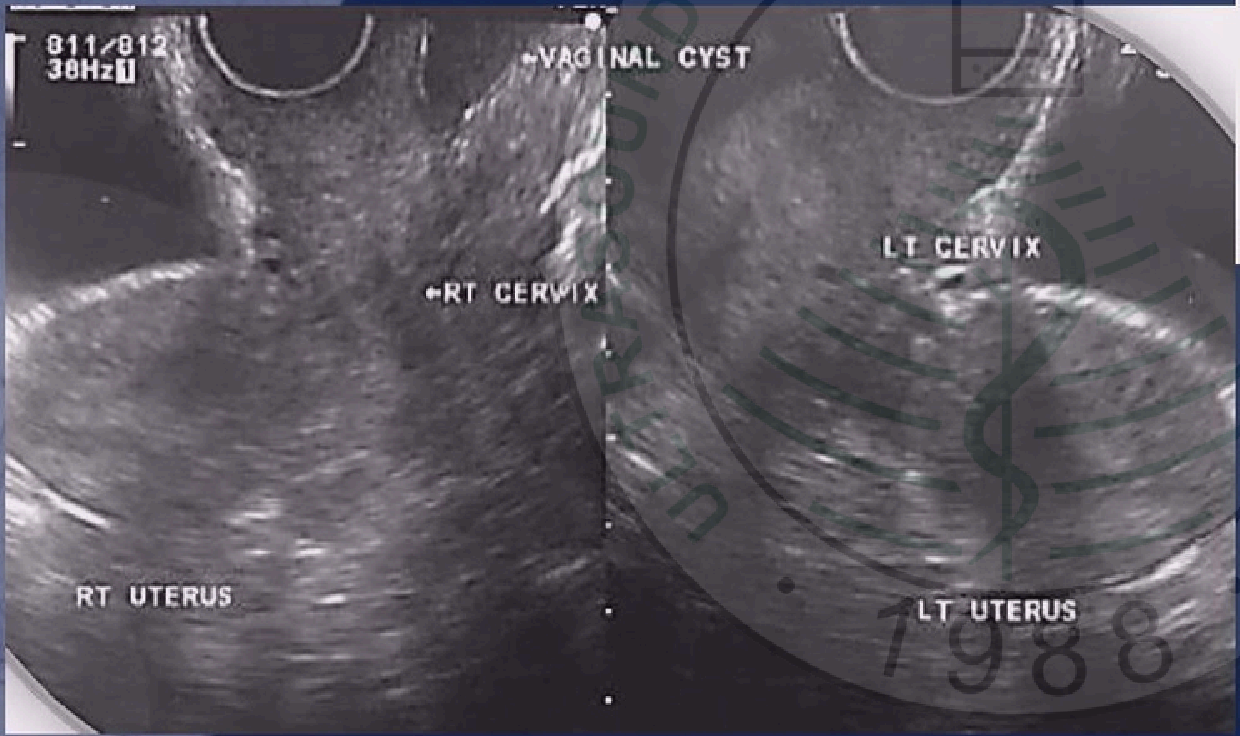
INTERESTING CASE

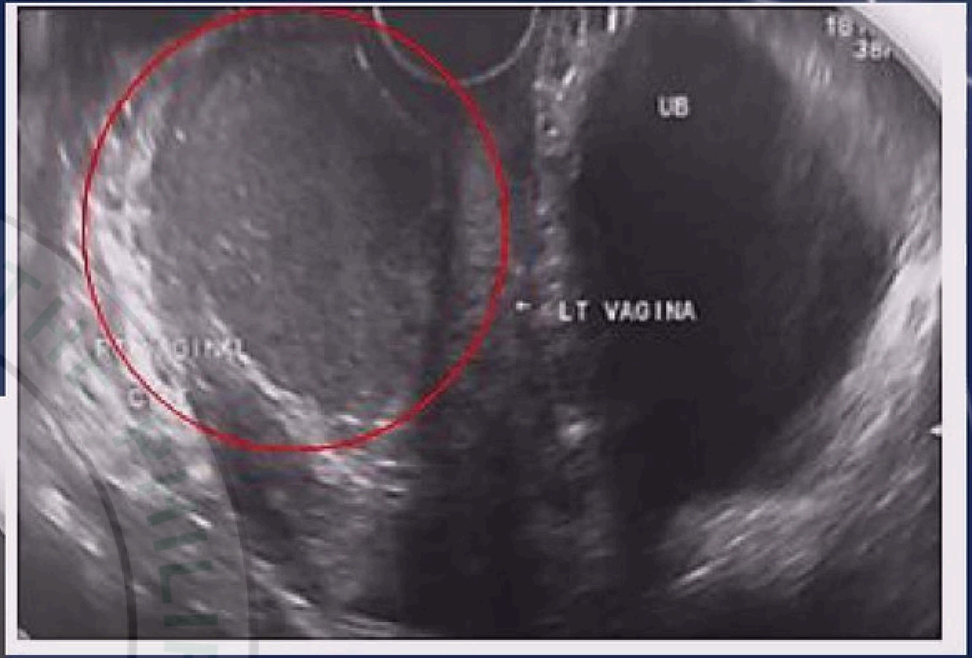
General Data	31F, Single, from Davao City
Presenting Complaint	• Undocumented fever during menses • Dysmenorrhea • Dizziness • Foul-smelling menstrual blood
Gynecologic History	• Menarch = 12 y.o • Regular 28 to 30 day cycle for 5-7 days • G0

Physical Exam	Palpable RLQ mass approximately 8 cm diameter
Speculum	cystic mass in the right anterolateral vaginal wall
Bimanual exam	Leftward cervical deviation
	Fluctuant non tender vaginal mass extending to the RLQ

Transvaginal ultrasound

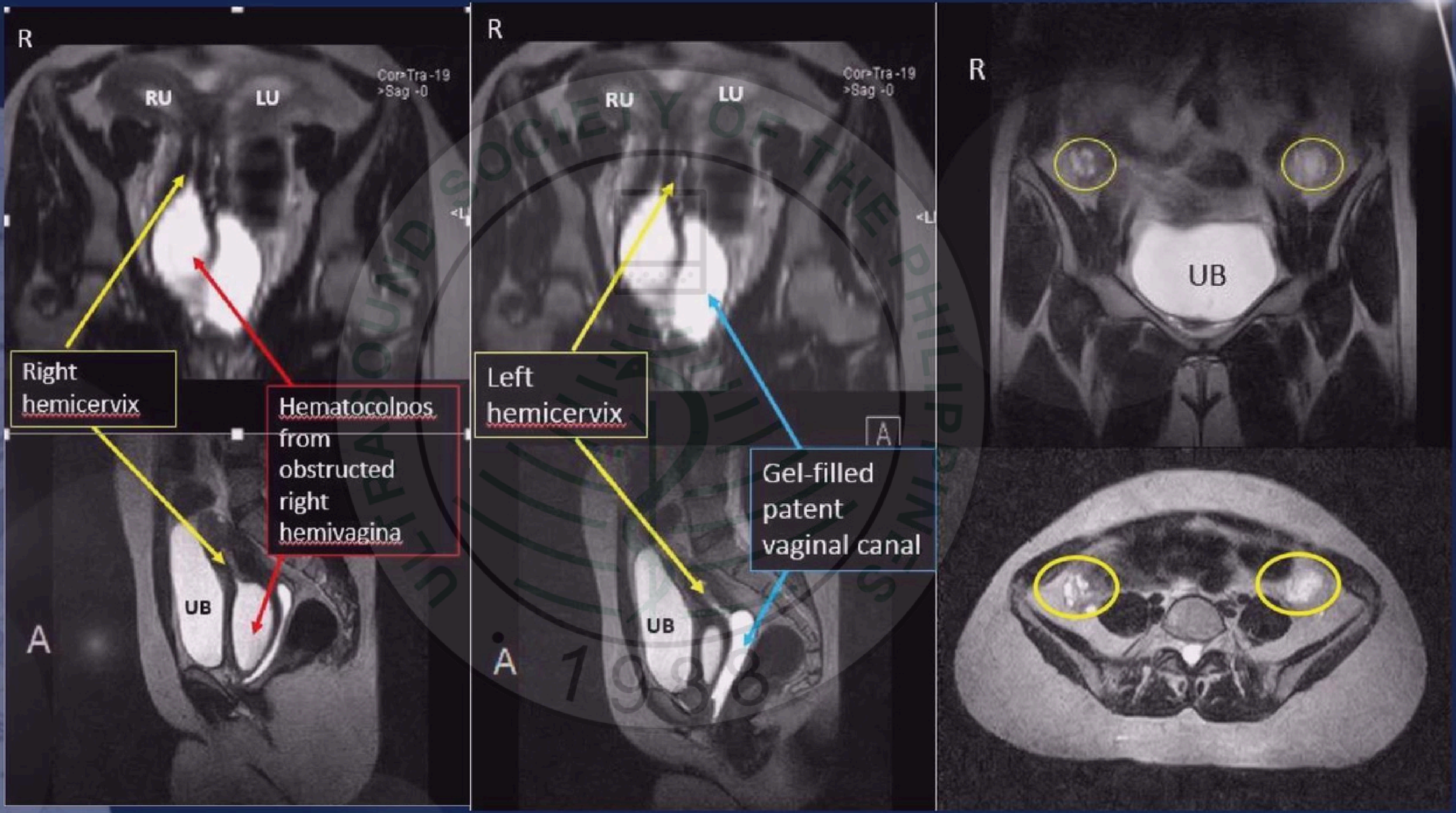
Two uterine bodies, each with a cervix



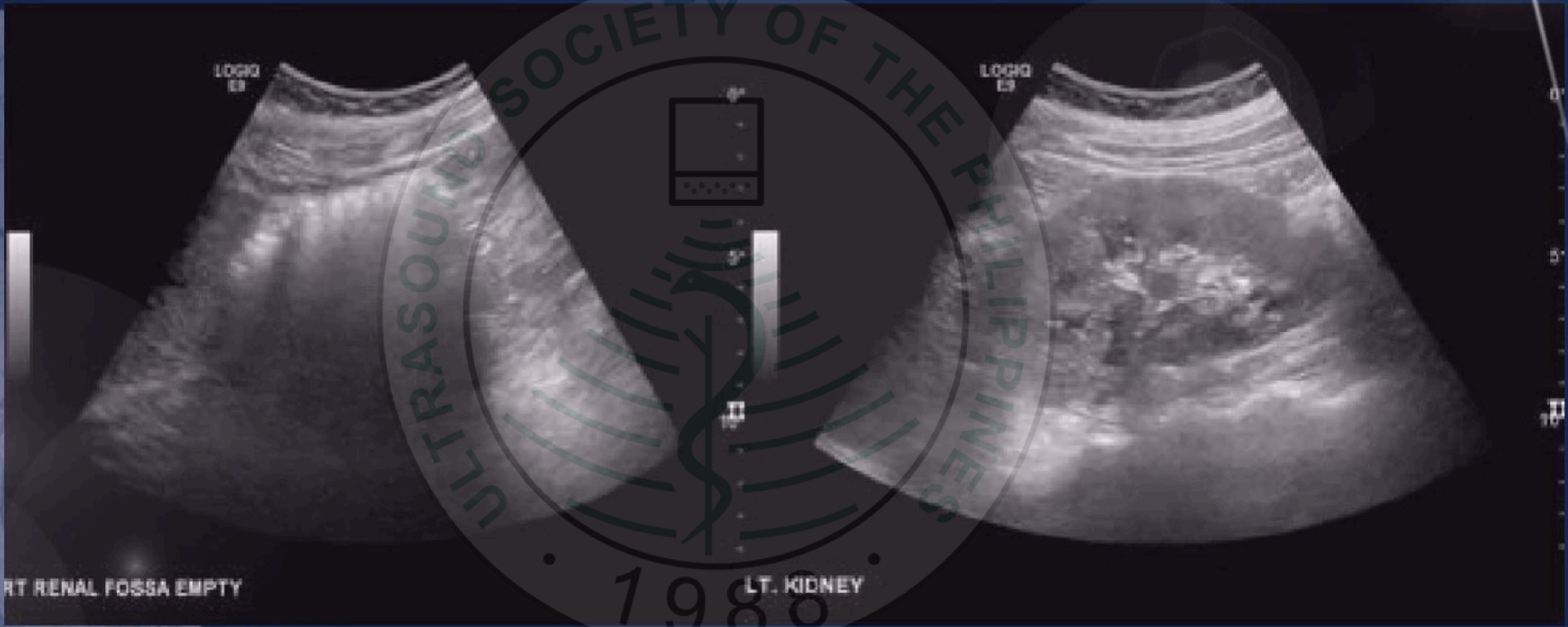


5.5 x 5.5 x 4.0 cm cystic vaginal mass with ground glass appearance inferior to the right cervix

MRI of Pelvis



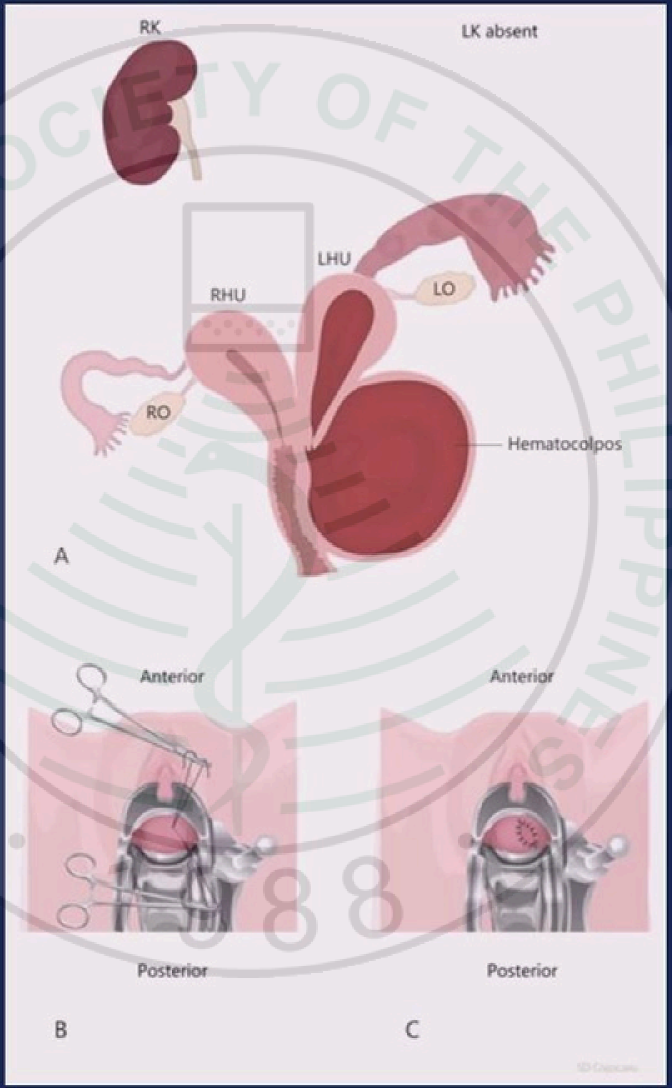
KUB Ultrasound



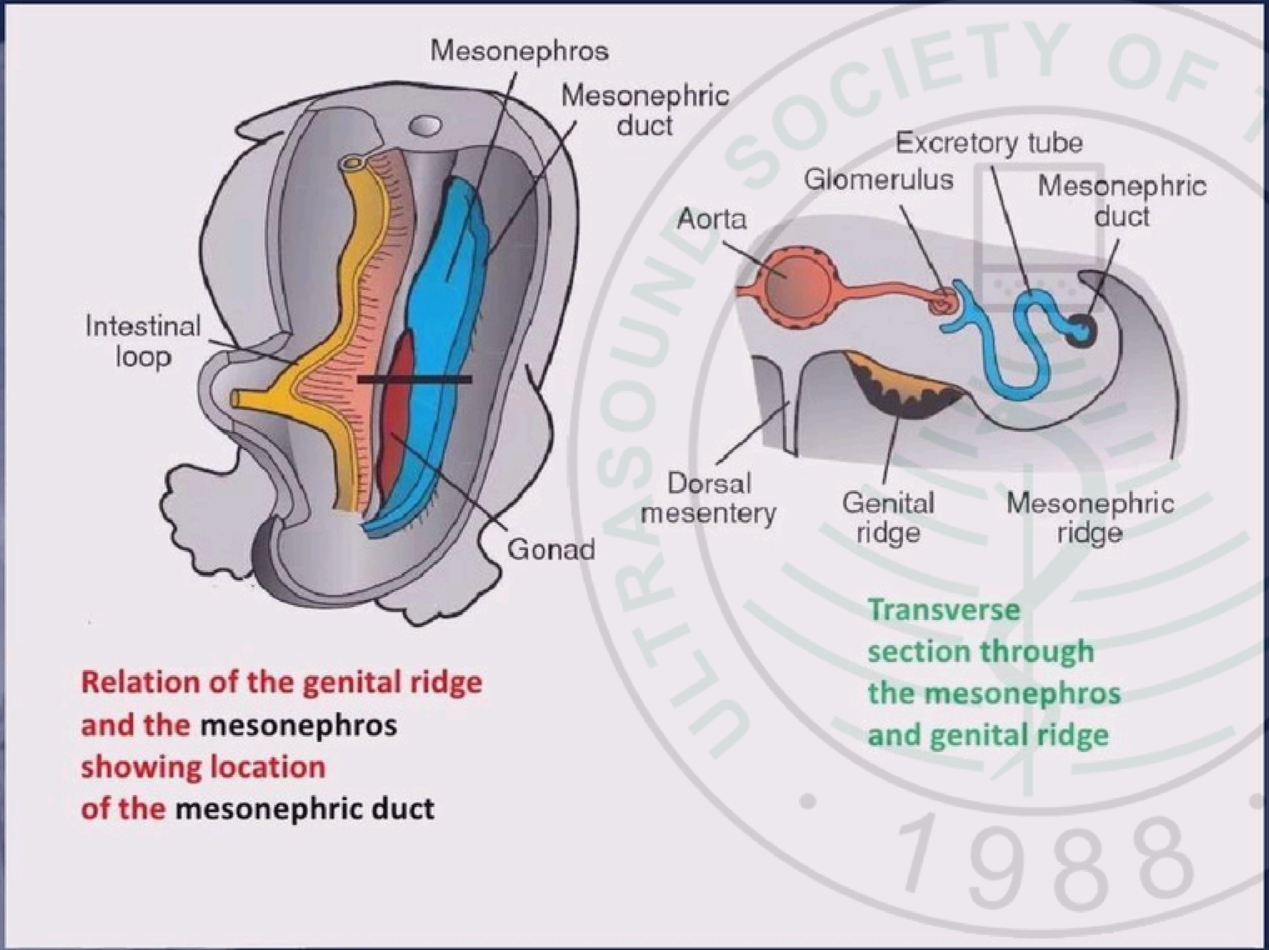
Other Procedures

Cysturethroscopy	• Left ureteral orifice with efflux of urine • Absent right ureter
Diagnostic Hysteroscopy with Diaphanoscopy	• Slit-like opening in both uterine horn probably the cervix

Herlyn-Werner-Wunderlich Syndrome



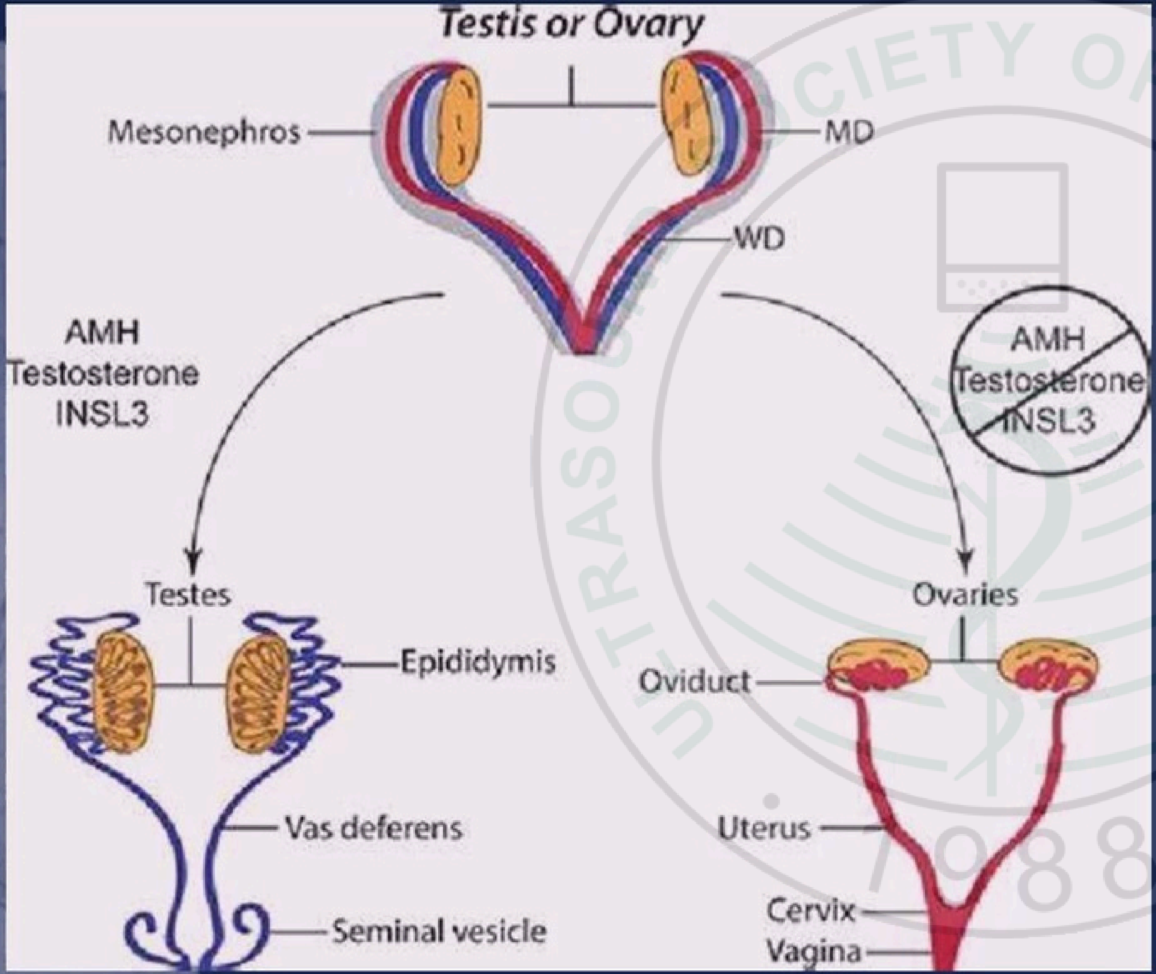
Herlyn-Werner-Wunderlich Syndrome



Embryology

- Urinary and genital system arise from common ridge of mesoderm.
- **Renal agenesis** – most common anomaly associated with Mullerian duct anomalies

Herlyn-Werner-Wunderlich Syndrome



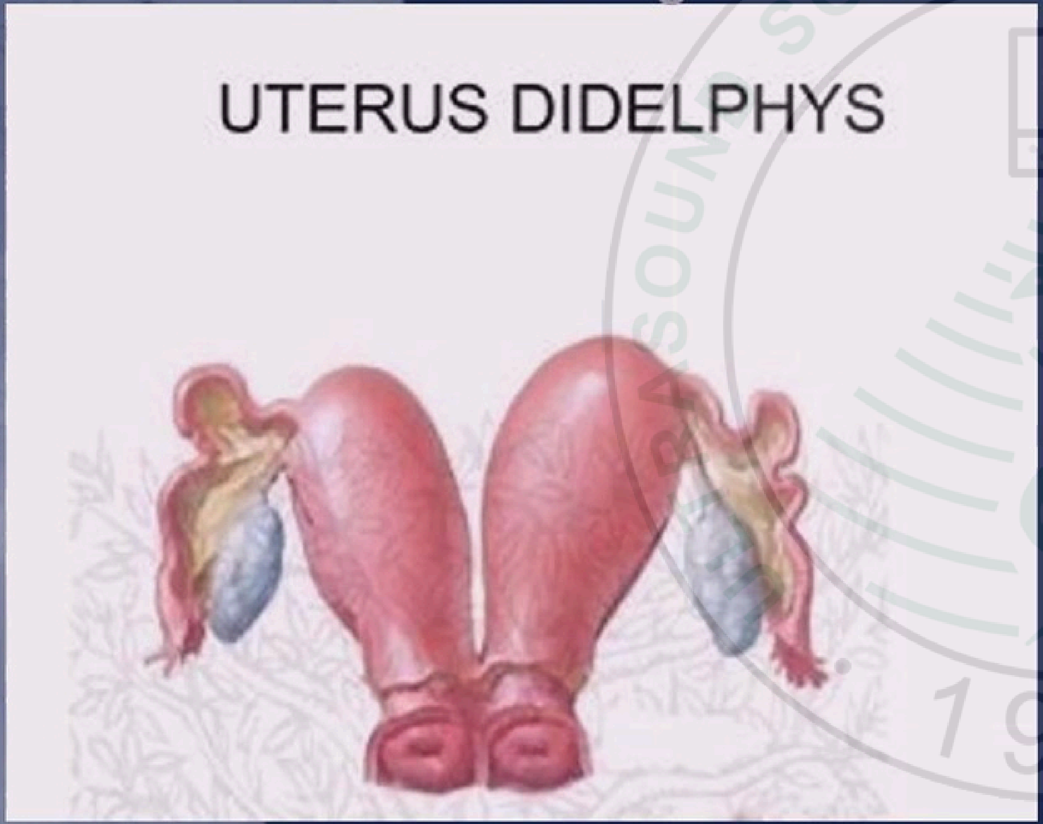
Embryology

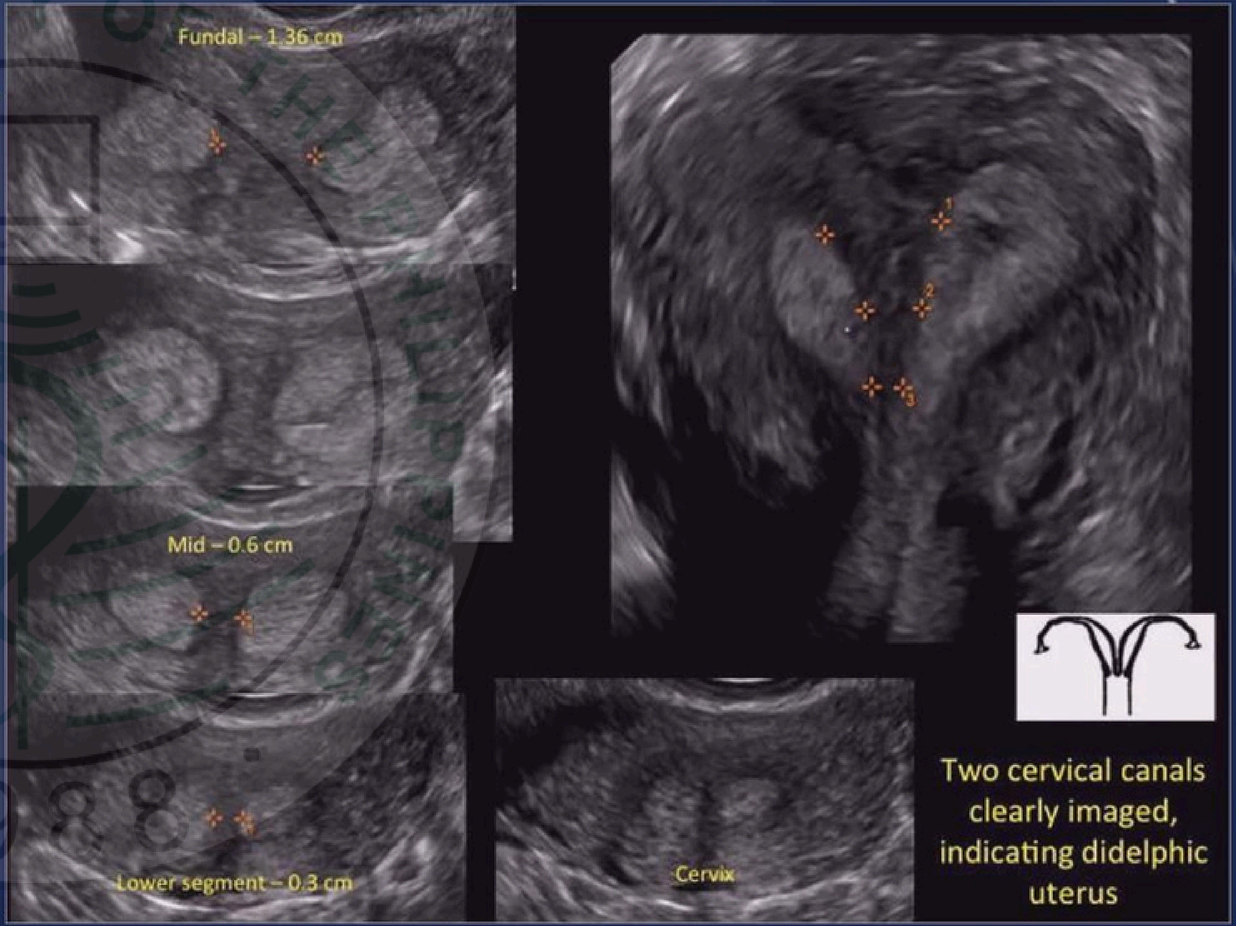
- Wolffian ducts (male)
- Mullerian/paramesonephric ducts (female)

Herlyn-Werner-Wunderlich Syndrome

Pathology

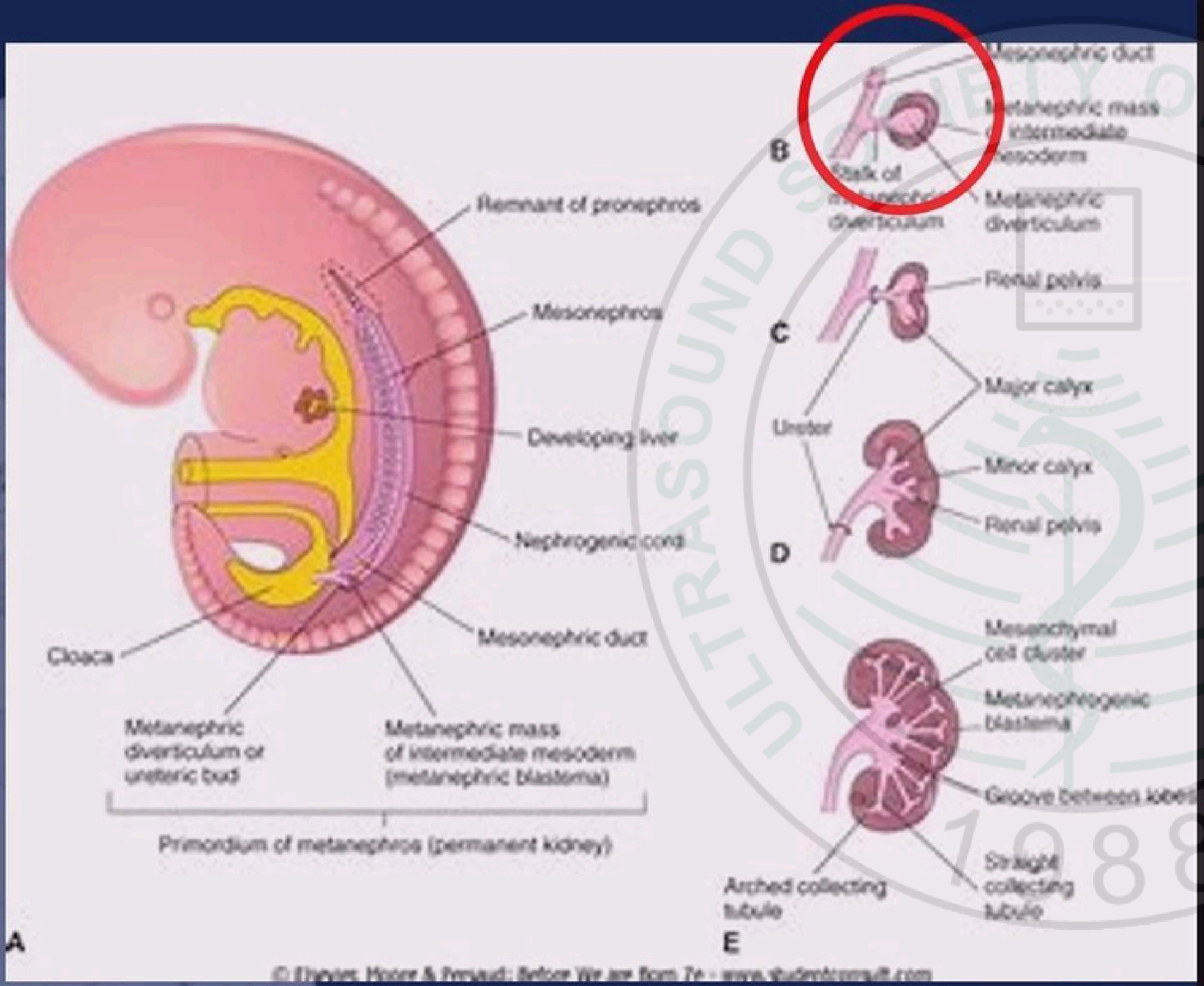
8th or 9th week of gestation

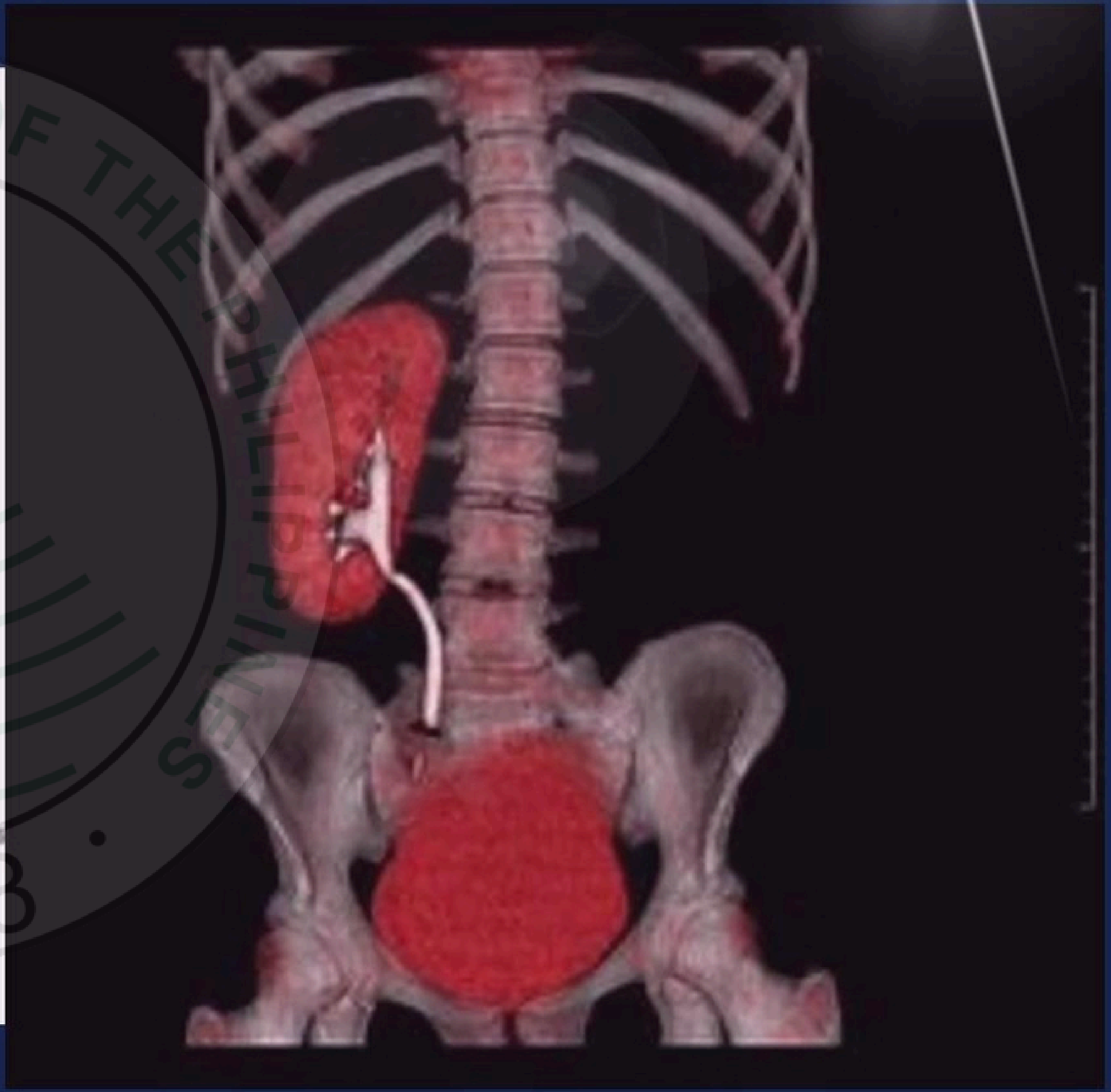




Herlyn-Werner-Wunderlich Syndrome

Pathology

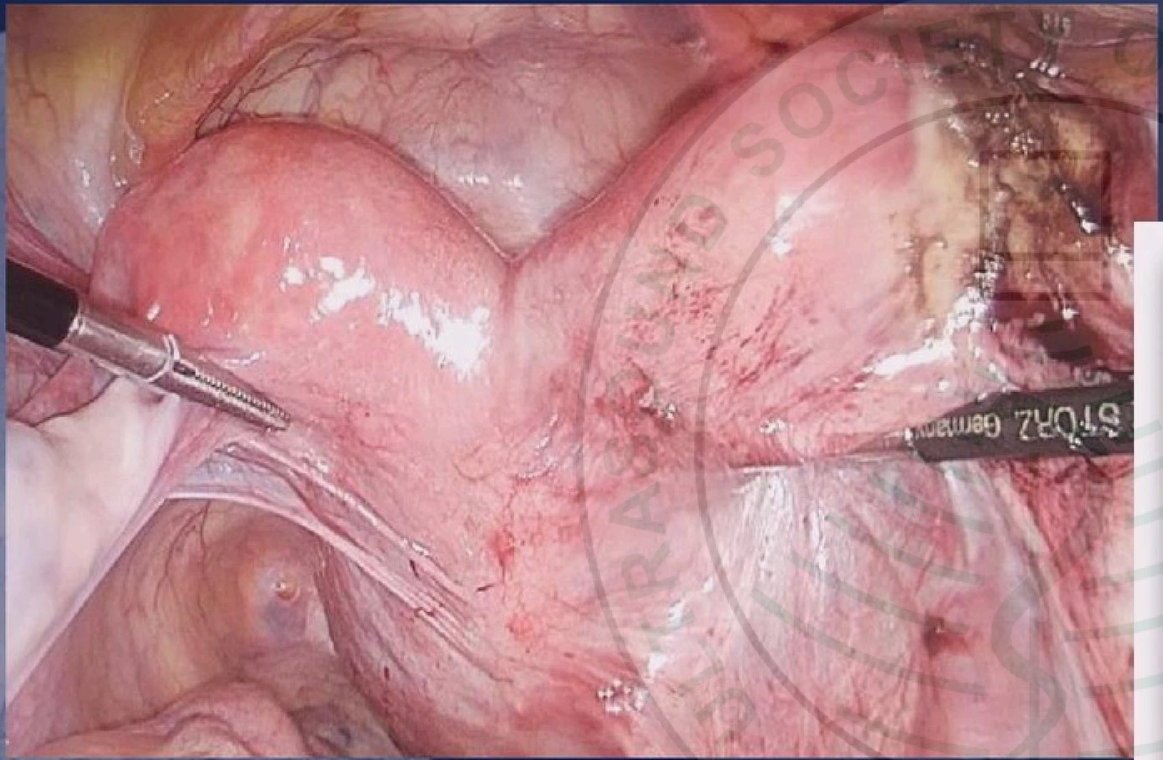




Herlyn-Werner-Wunderlich Syndrome

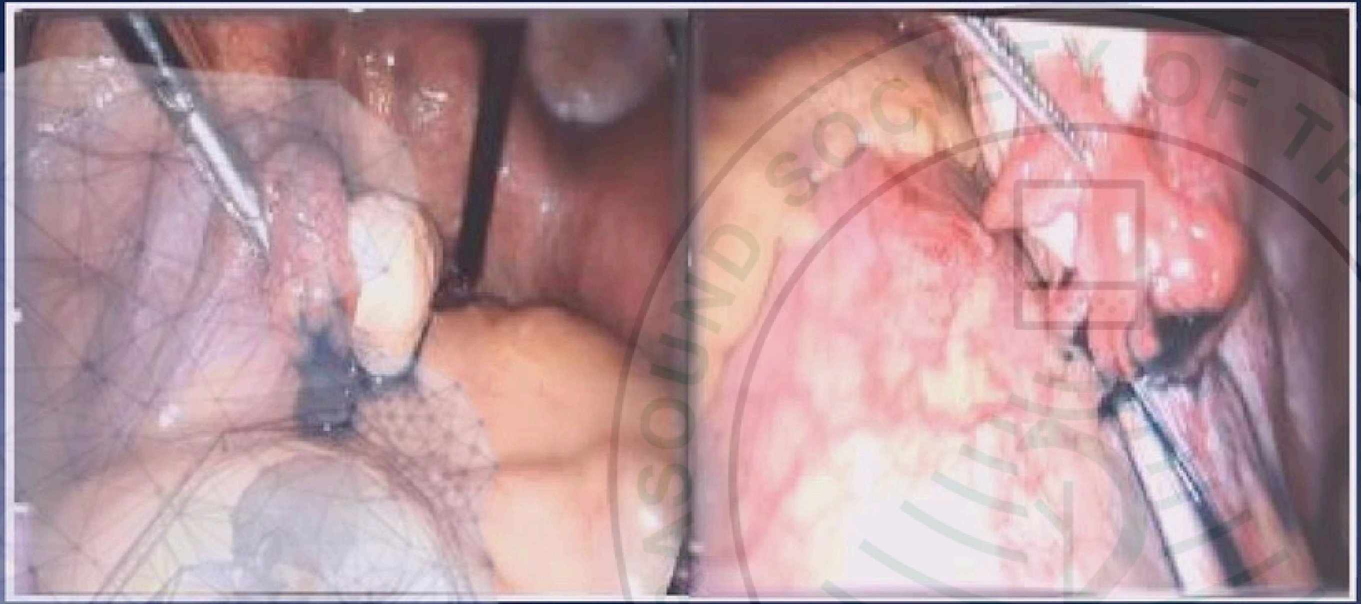
Epidemiology	• Rare congenital anomaly: 0.16% - 10% of all mullerian duct abnormality
Clinical Presentation	• typically after menarche with pelvic pain due to the obstructed hemivagina • may be a palpable pelvic mass
Differential Diagnoses	• Cystadenoma • Endometrioma

Treatment

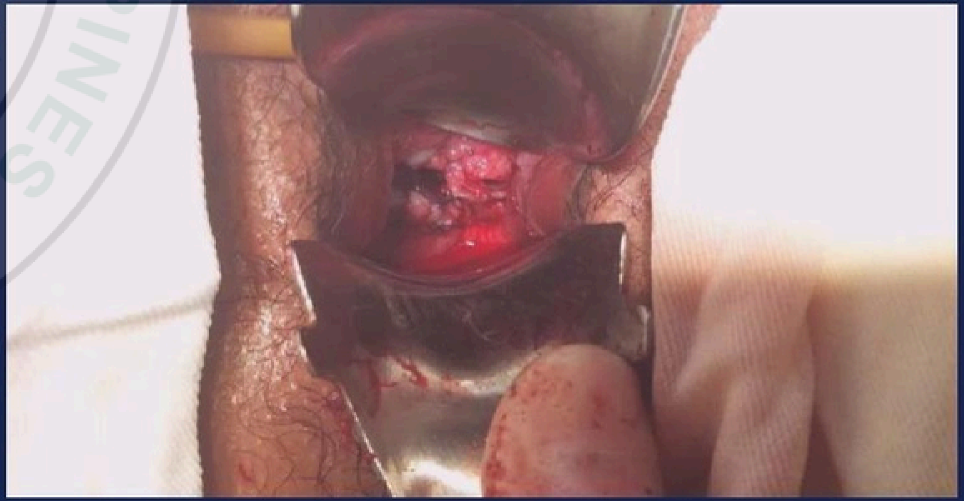


Laparoscopy

Treatment

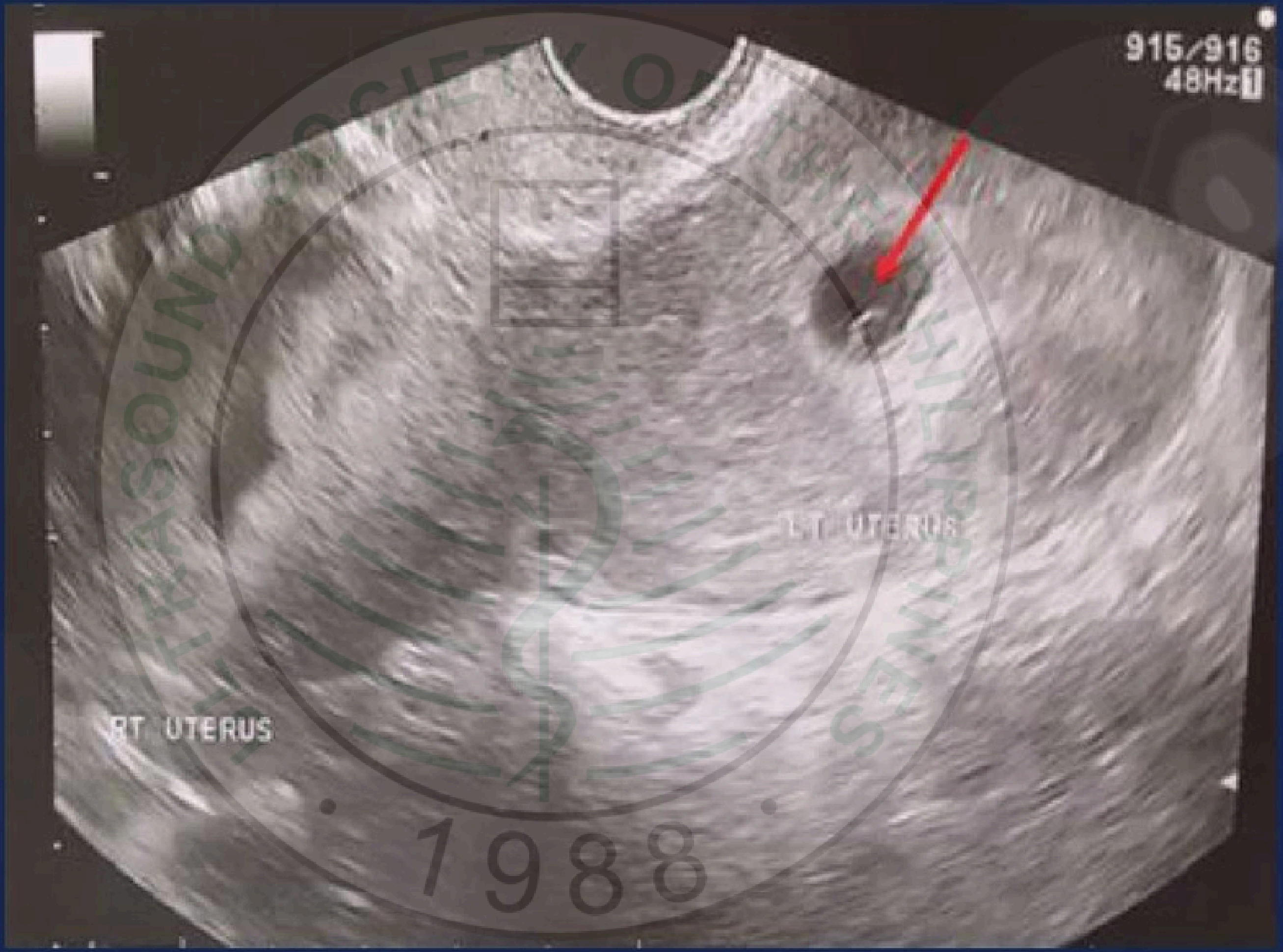


Chromotubation using methylene blue



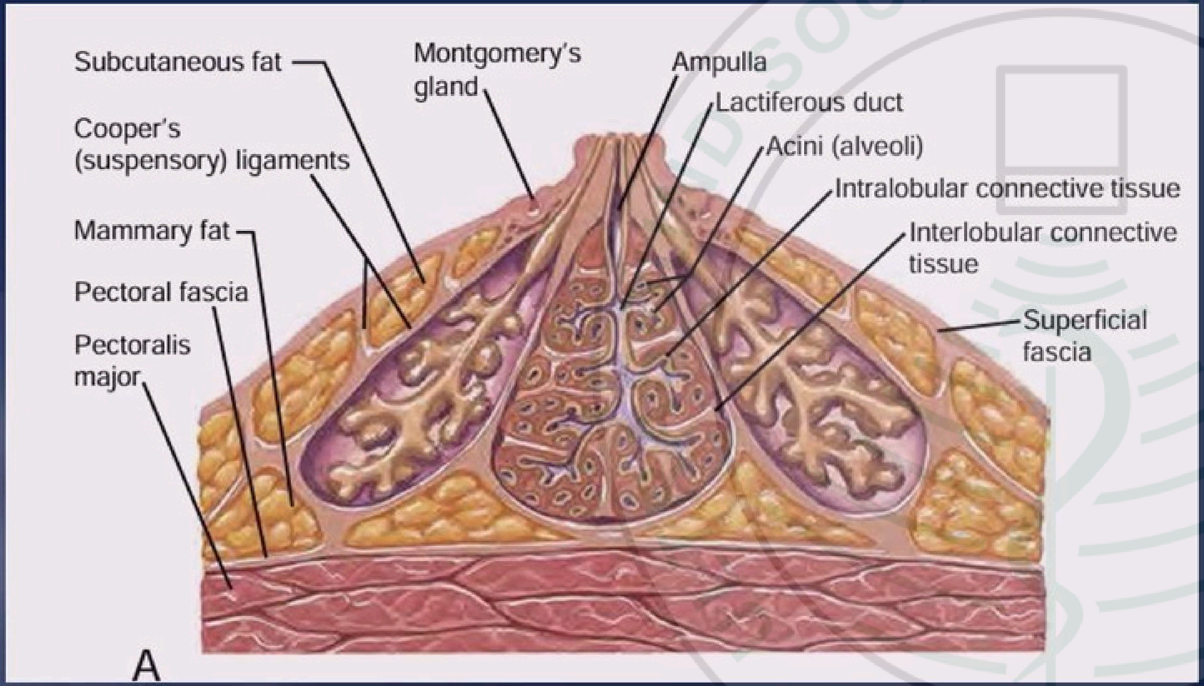
Excised vaginal septum

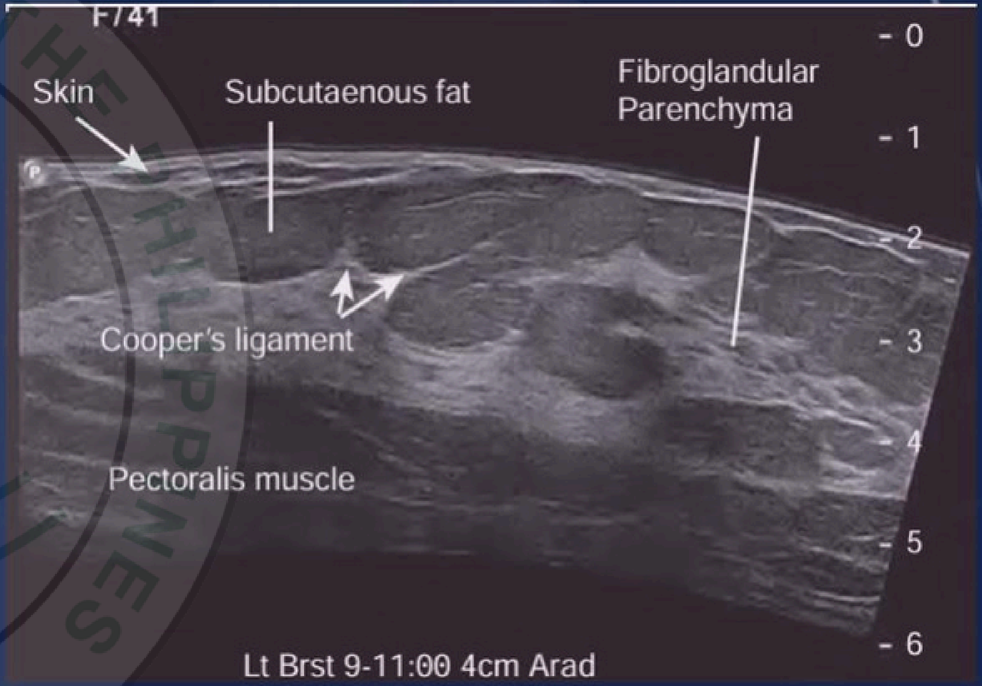
Follow-up



BREAST IMAGING REPORTING AND DATA SYSTEMS

Breast Anatomy





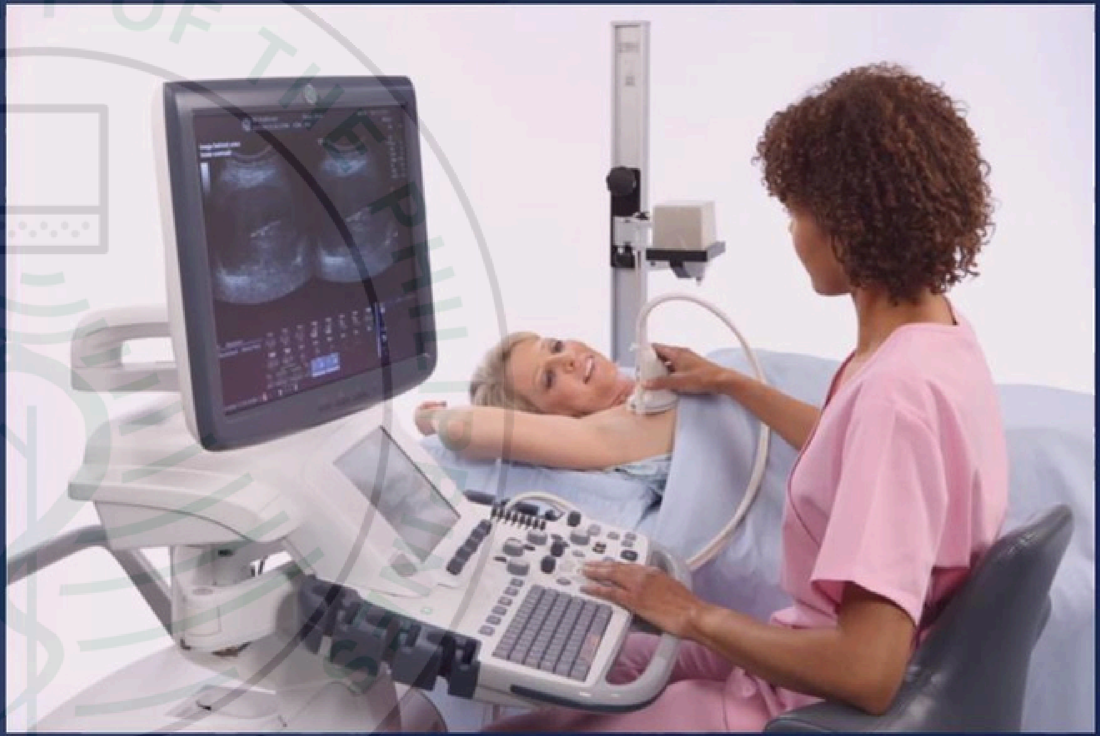
Scanning Techniques

A. Patient positioning

B. Probe selection

C. Image acquisition

D. Color Doppler imaging



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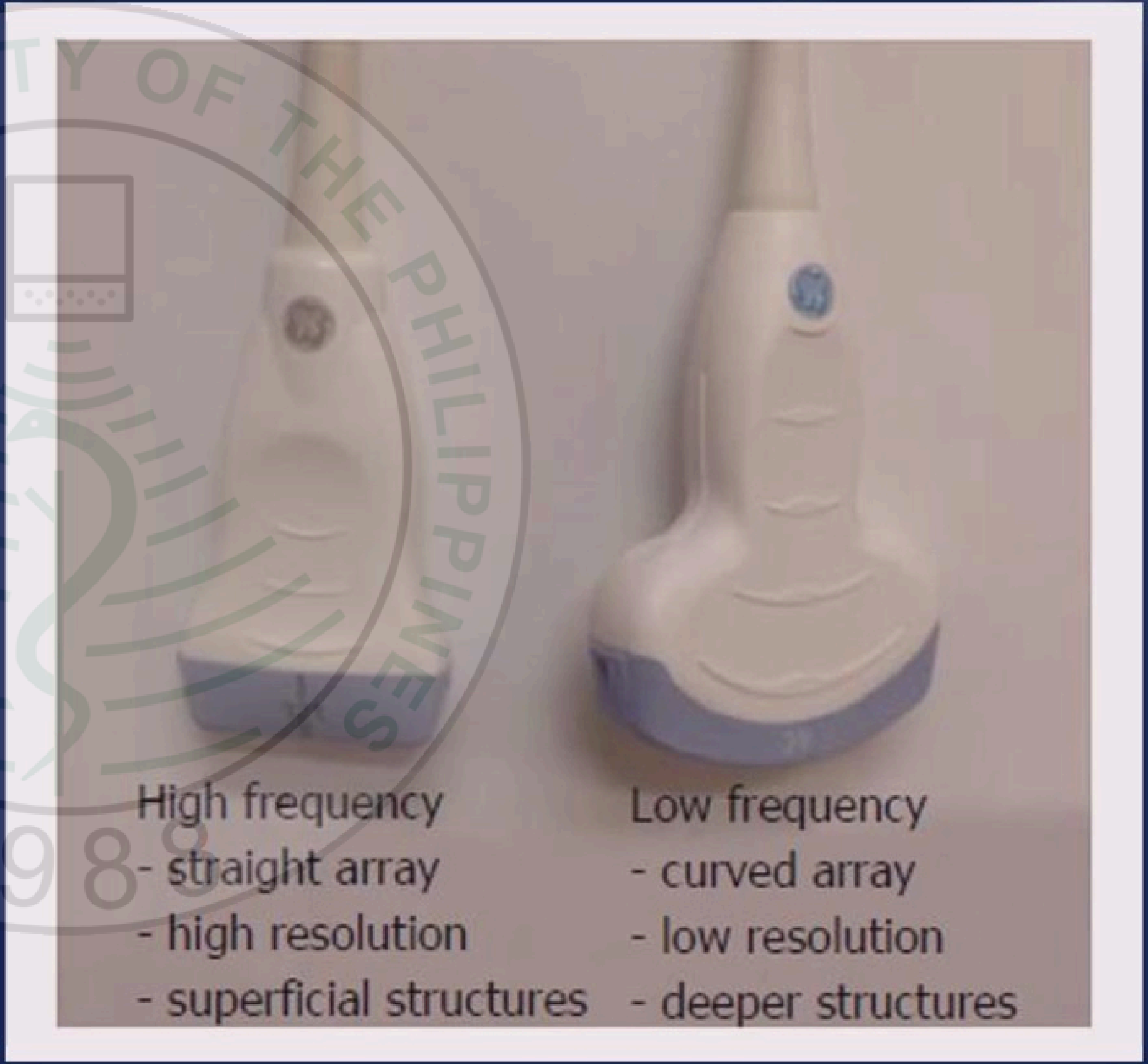

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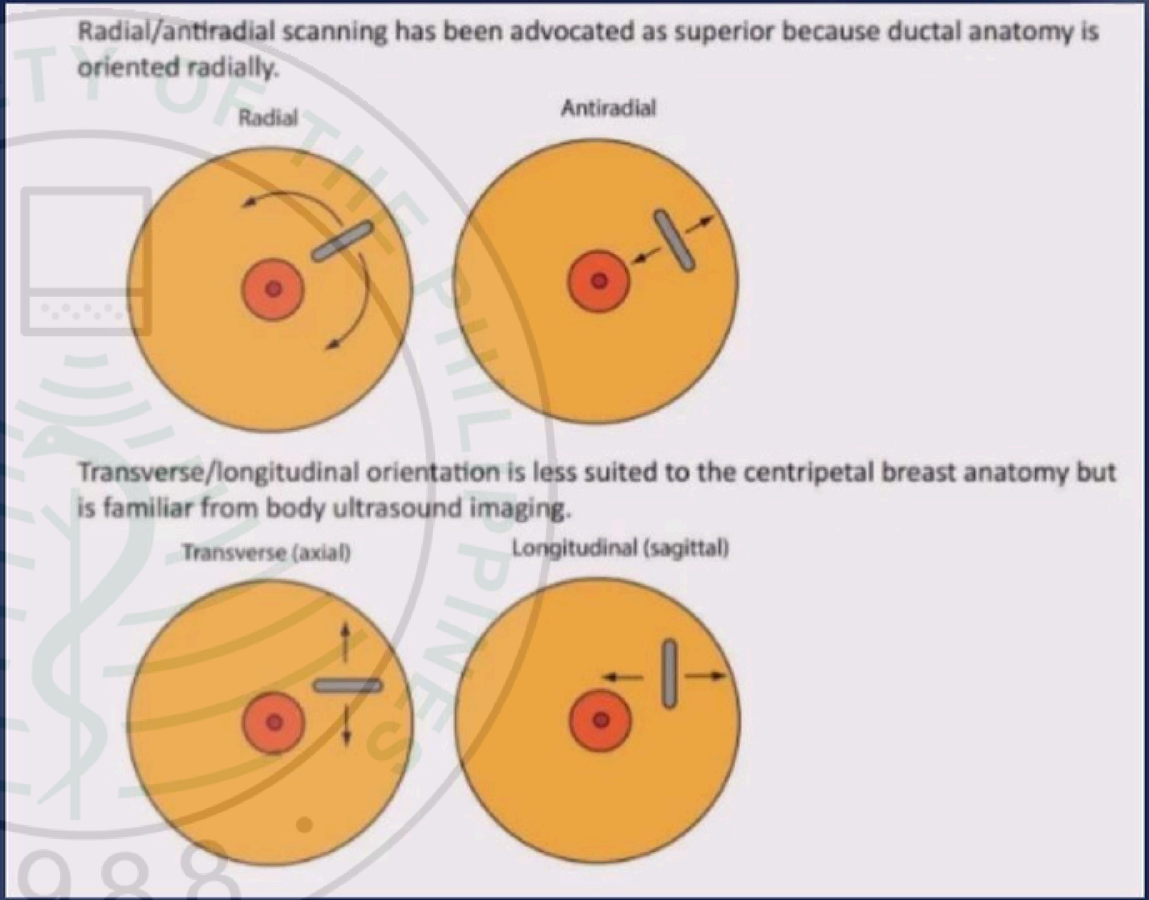

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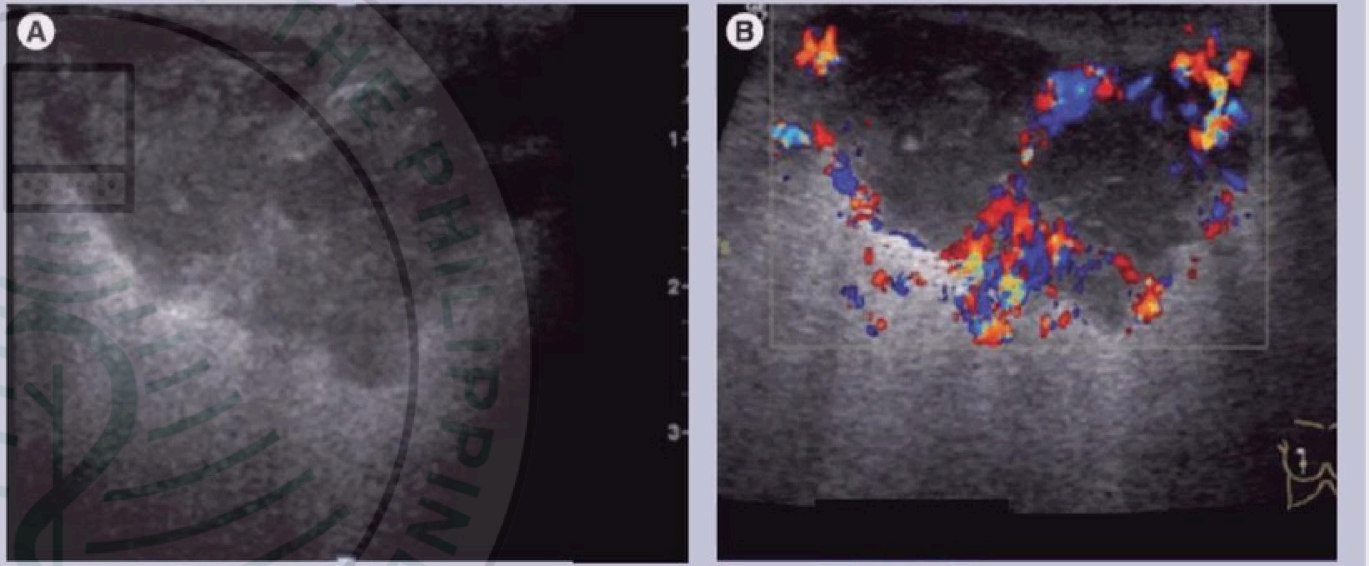


Figure 2. (A) Grayscale image of a palpable breast mass that could be cystic or solid, and (B) color Doppler images demonstrate internal vessels, thus, this is a solid lesion.

SCREENING

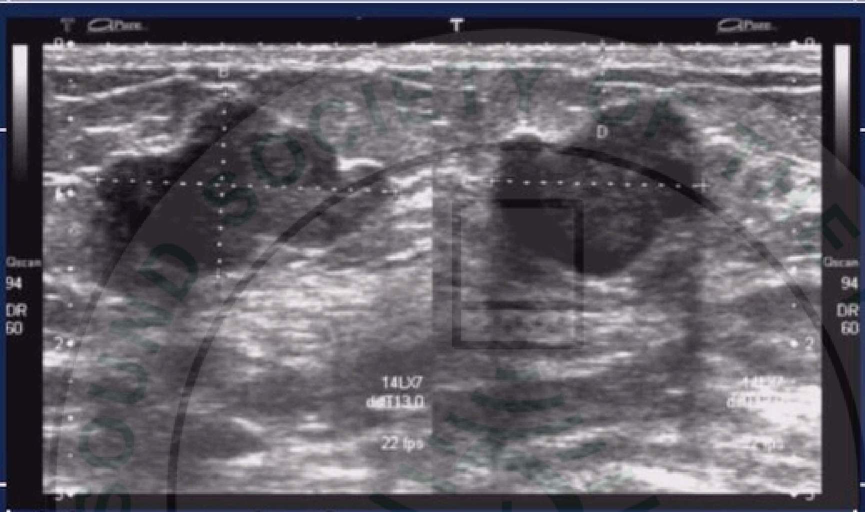
- For asymptomatic women

DIAGNOSTIC

- is used for symptomatic women or for women with findings detected on screening mammography

US LEXICON	5TH EDITION	6TH EDITION
MASS		
Shape	Oval Round Irregular	Oval Round **+Lobulated** Irregular
Echogenicity	Hypoechoic Isoechoic Hyperechoic Complex cystic and solid	Hypoechoic Isoechoic Hyperechoic ~~Complex cystic and solid~~ □□ **MIXED SOLID AND CYSTIC**

Updates

US LEXICON	5^{TH} EDITION	6^{TH} EDITION
MASS		
Shape		Oval Round **+Lobulated** Irregular
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Updates

US LEXICON	5TH EDITION	6TH EDITION
NON MASS LESION		**ADDED**
ASSOCIATED FEATURES	Architectural distortion Duct changes Skin changes Skin thickening Skin retractions Edema Vascularity Elasticity Assessment	+ Echogenic rind Architectural distortion Duct changes Skin changes Skin thickening Skin retractions Edema Vascularity Elasticity Assessment

Class	Definition	Major Features	Associated Features
Masses	3D 2 planes	Shape Margin Orientation Echo pattern Posterior features	Calcifications, architectural distortion, duct changes, skin changes, edema, vascularity, and elasticity
Nonmass	distinct from normal tissue 1 plane	Distribution Echo pattern	Calcifications, architectural distortion, duct changes, posterior features, vascularity, and elasticity

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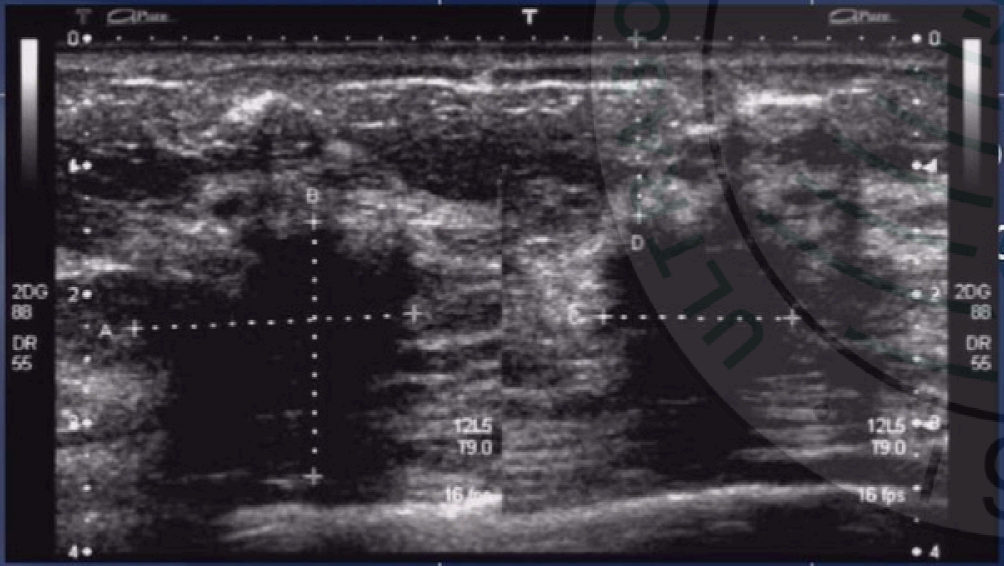

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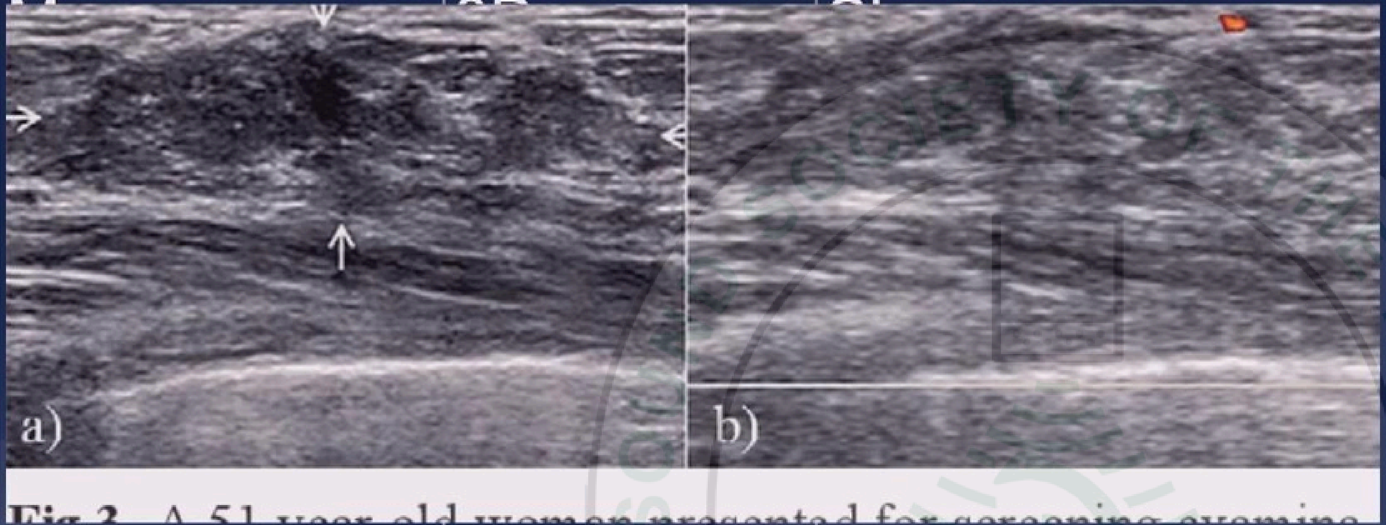			Calcifications, architectural distortion, duct changes, skin changes, edema, vascularity, and elasticity
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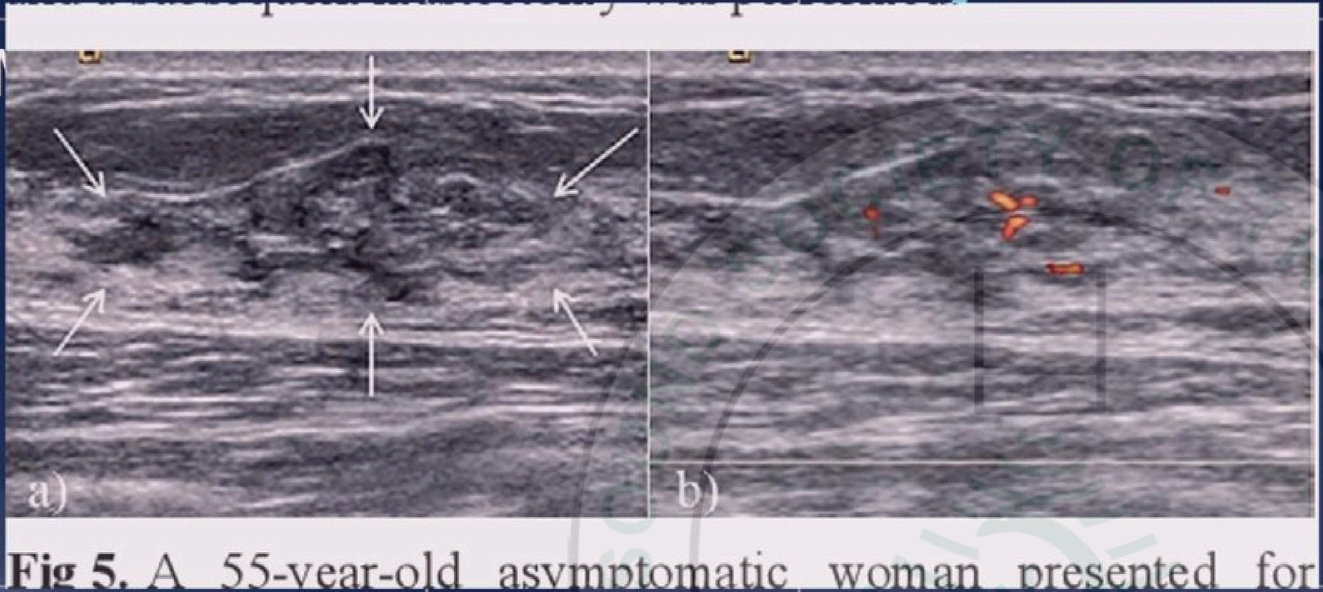			Calcifications, architectural distortion, duct changes, skin changes, edema, vascularity, and elasticity
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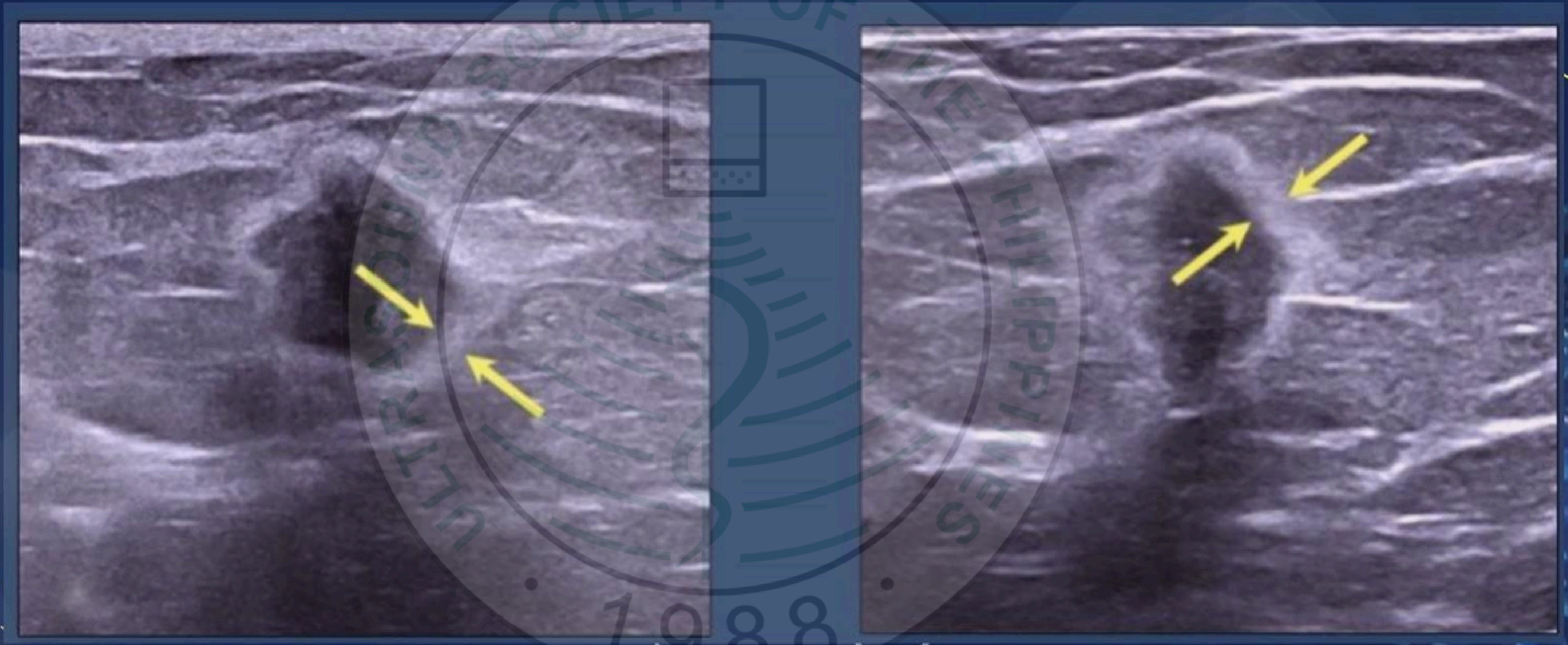
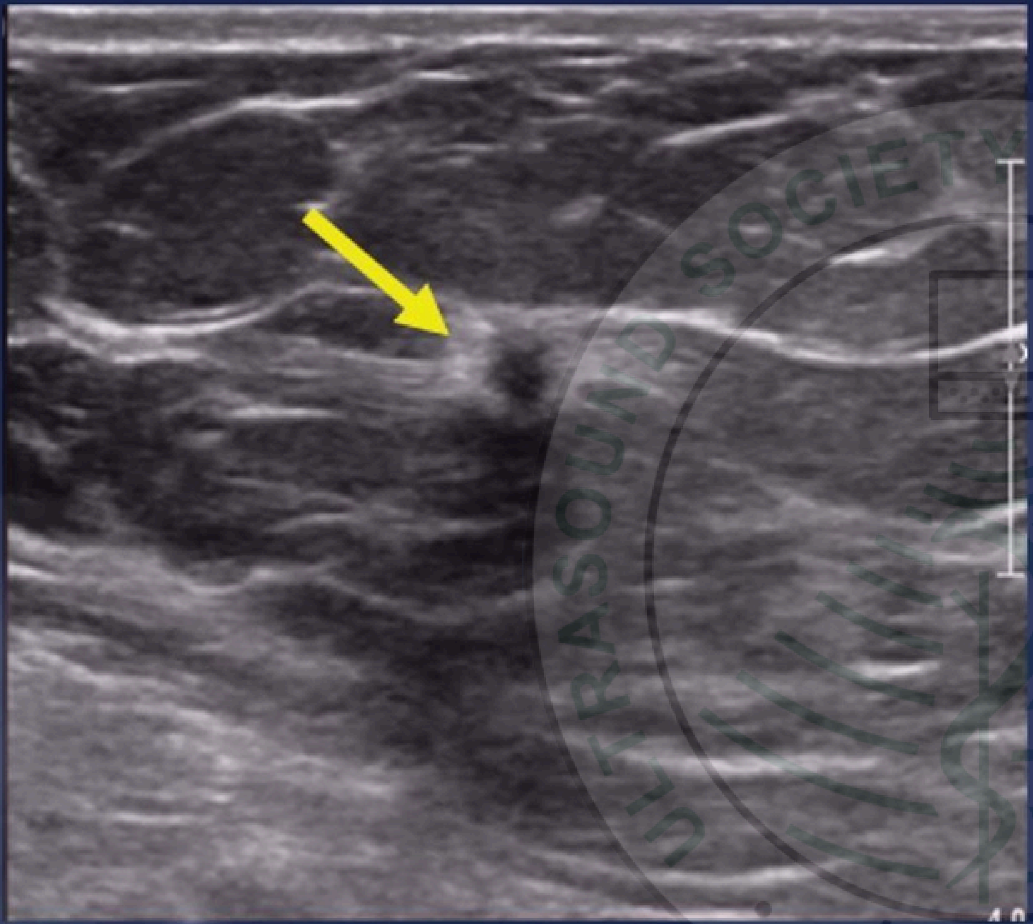
Echogenic Rind





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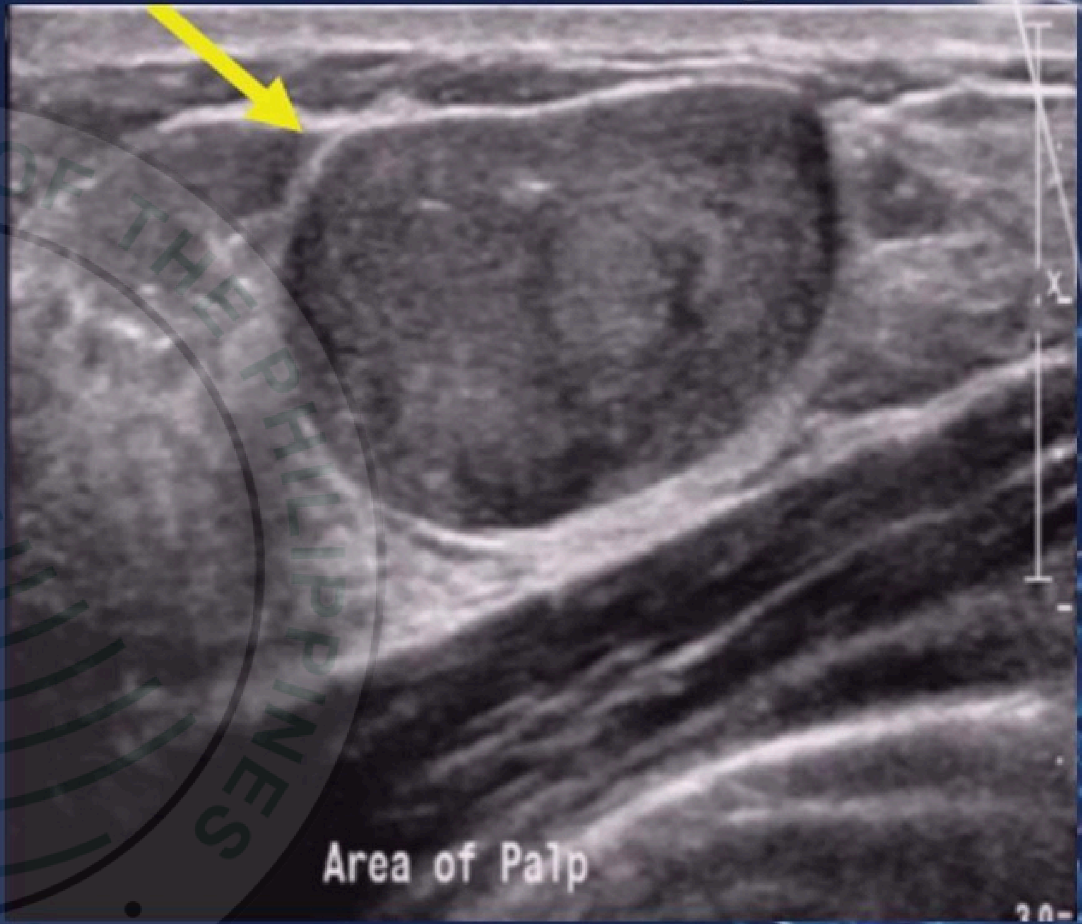
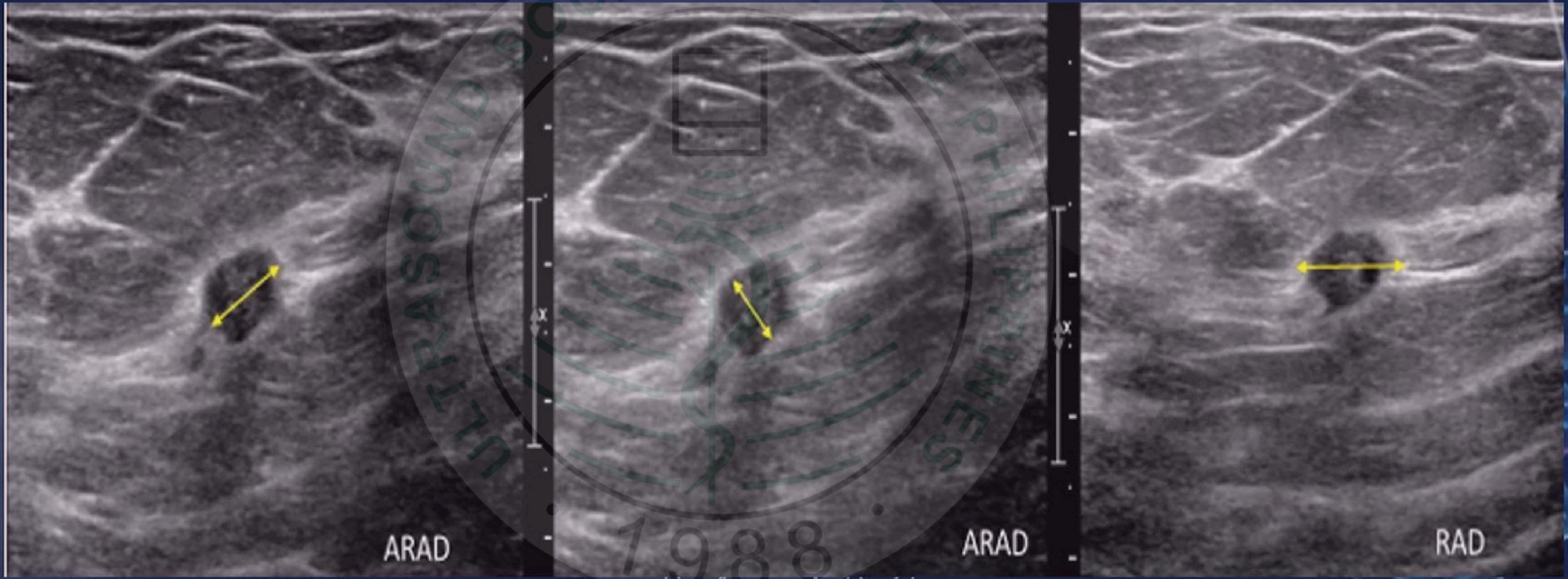


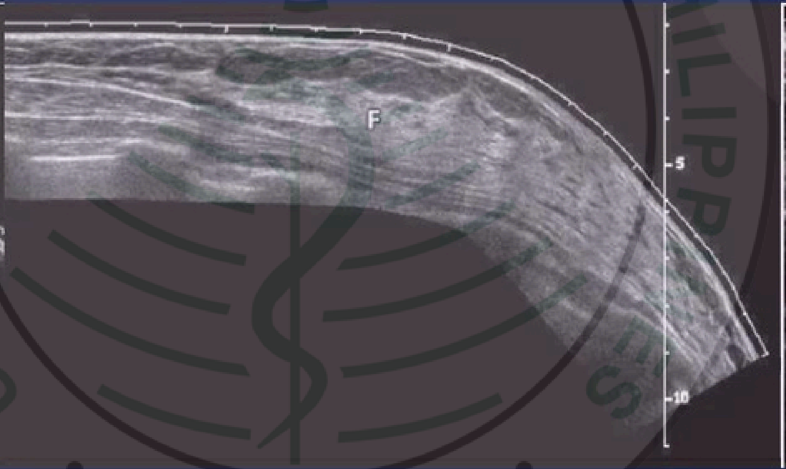
Pseudocapsule

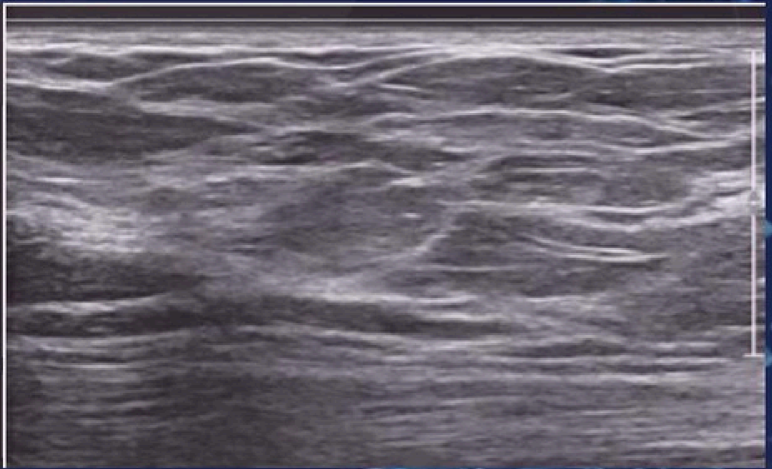
Echogenic Rind



Breast Composition

Homogeneous (Fat)	Homogeneous (fibroglandular)	Heterogeneous





Breast composition	a. homogeneous - fat b. homogeneous - fibroglandular c. heterogeneous

Ultrasound Lexicon

Mass	shape	oval - round - irregular
	margin	Circumscribed *or* Not-circumscribed: indistinct, angular, microlobulated, spiculated
	orienta-tion	parallel - not parallel
	echo pattern	anechoic - hyperechoic - complex cystic/solid hypoechoic - isoechoic - heterogeneous
	posterior features	no features - enhancement - shadowing - combined pattern

Malignant tumors may appear as round/oval masses

Ultrasound Lexicon

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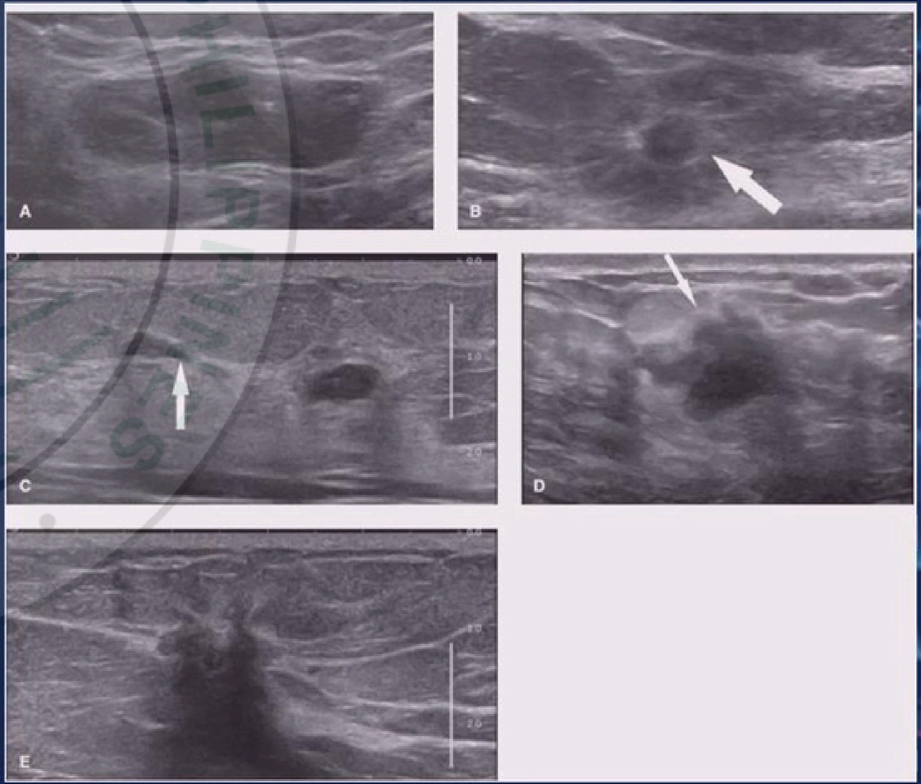
Most suspicious margin: Not-circumscribed



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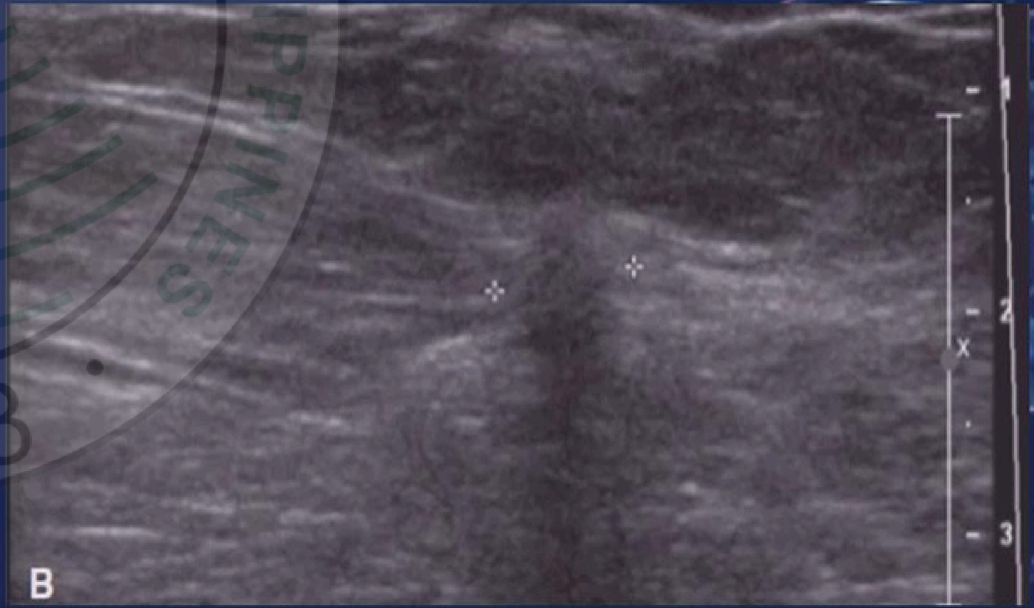
	margin	Circumscribed *or* Not-circumscribed: indistinct, angular, microlobulated, spiculated
	orienta-tion	parallel - not parallel
	echo pattern	anechoic - hyperechoic - complex cystic/solid hypoechoic - isoechoic - heterogeneous
	posterior features	no features - enhancement - shadowing - combined pattern

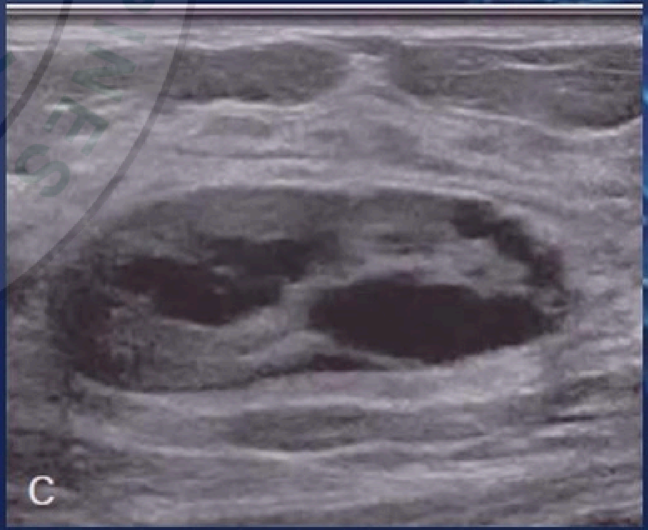
Not parallel or taller-than-wide orientation:
Mass growing through normal tissue planes



Ultrasound Lexicon

Mass	shape	oval - round - irregular
	margin	Circumscribed or Not-circumscribed: indistinct, angular, microlobulated, spiculated
	orienta-tion	parallel - not parallel
	echo pattern	anechoic - hyperechoic - complex cystic/solid hypoechoic - isoechoic - heterogeneous
	posterior features	no features - enhancement - shadowing - combined pattern

Relative to subcutaneous fat



Ultrasound Lexicon

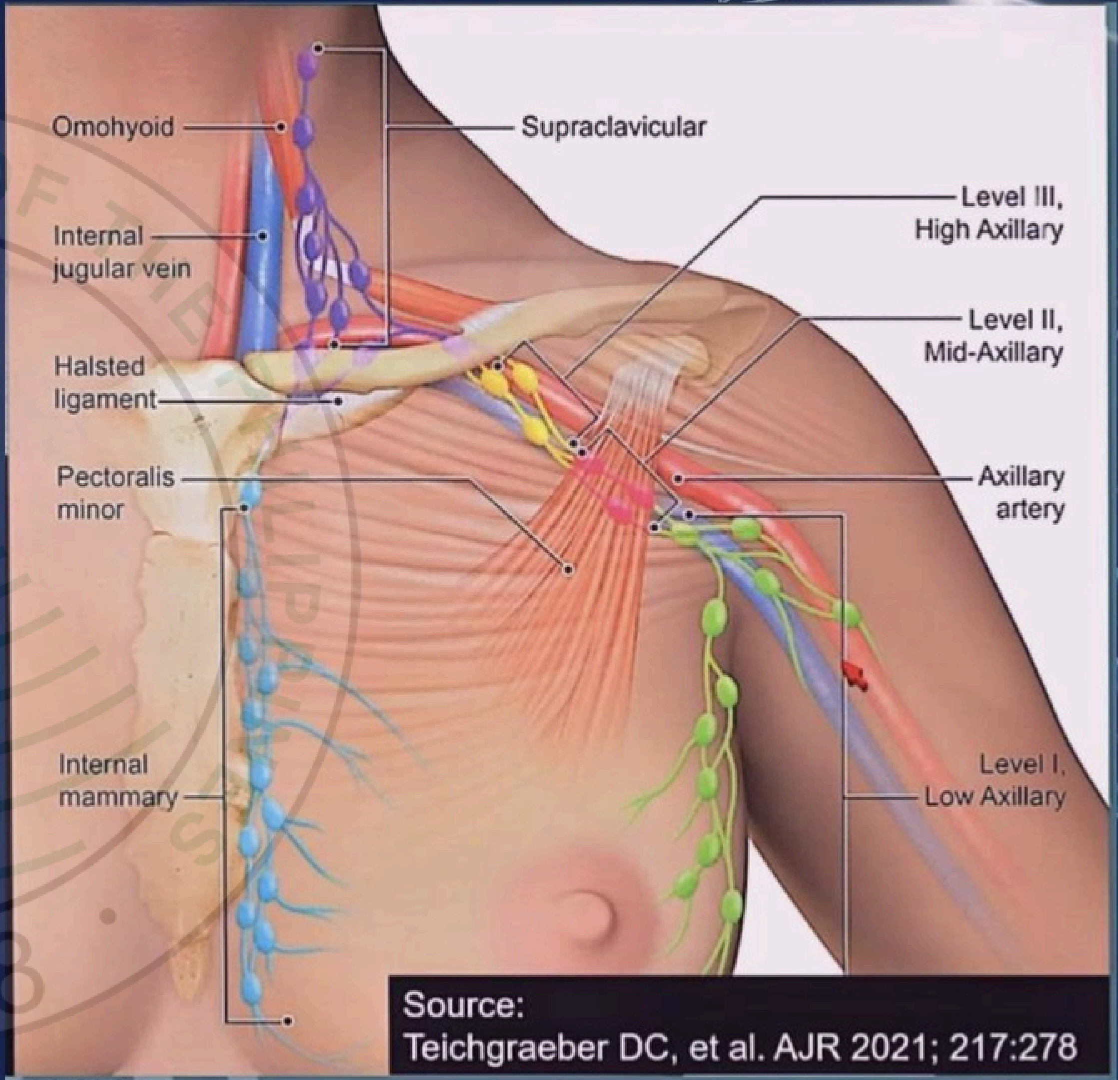
Calcifications	in mass - outside mass - intraductal
Associated features	architectural distortion - duct changes - skin thickening - skin retraction - edema - vascularity (absent, internal, rim) - elasticity
Special cases *(cases with a unique diagnosis)*	simple cyst - clustered microcysts - complicated cyst - mass in or on skin - foreign body (including implants) - intramammary lymph node - AVM - Mondor disease - postsurgical fluid collection - fat necrosis

Lymph Nodes

Level 1: below lower edge of pectoralis minor

Level 2: at the level of pectoralis minor

Level 3: above the pectoralis minor



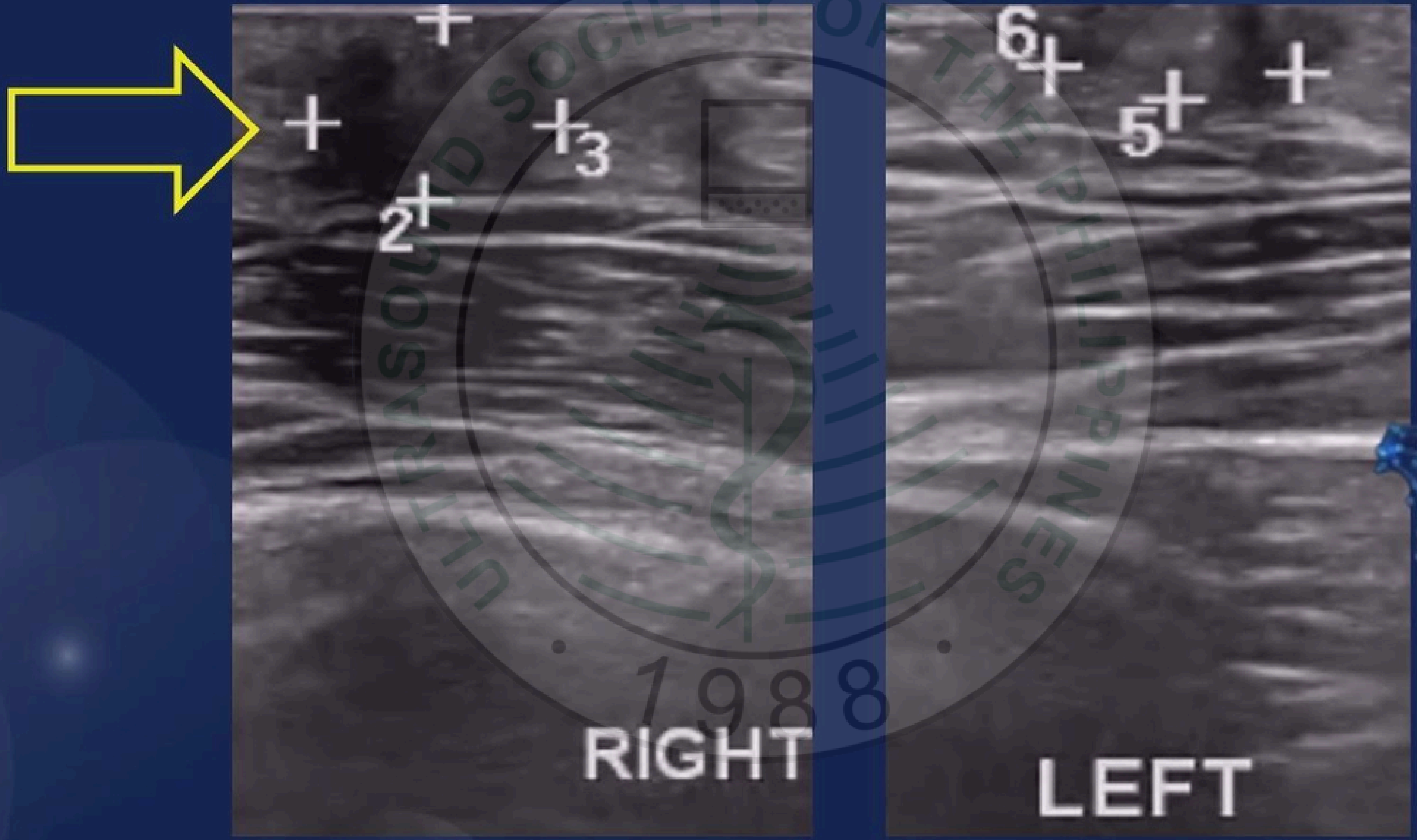
BI-RADS CATEGORIES
BI-RADS 0 (incomplete): Recommend additional imaging -- mammogram or targeted ultrasound
BI-RADS 1 (negative): Routine breast MR screening if cumulative lifetime risk ≥ 20%
BI-RADS 2 (benign): Routine breast MR screening if cumulative lifetime risk ≥ 20%
BI-RADS 3 (probably benign): Short-interval (6-month) follow-up
BI-RADS 4 (suspicious): Tissue diagnosis
BI-RADS 5 (highly suggestive of malignancy): Tissue diagnosis
BI-RADS 6 (known biopsy-proven malignancy): Surgical excision when clinically appropriate

GYNECOMASTIA

Gynecomastia

General Data	31M
Presenting Complaint	Painful enlargement of the right breast

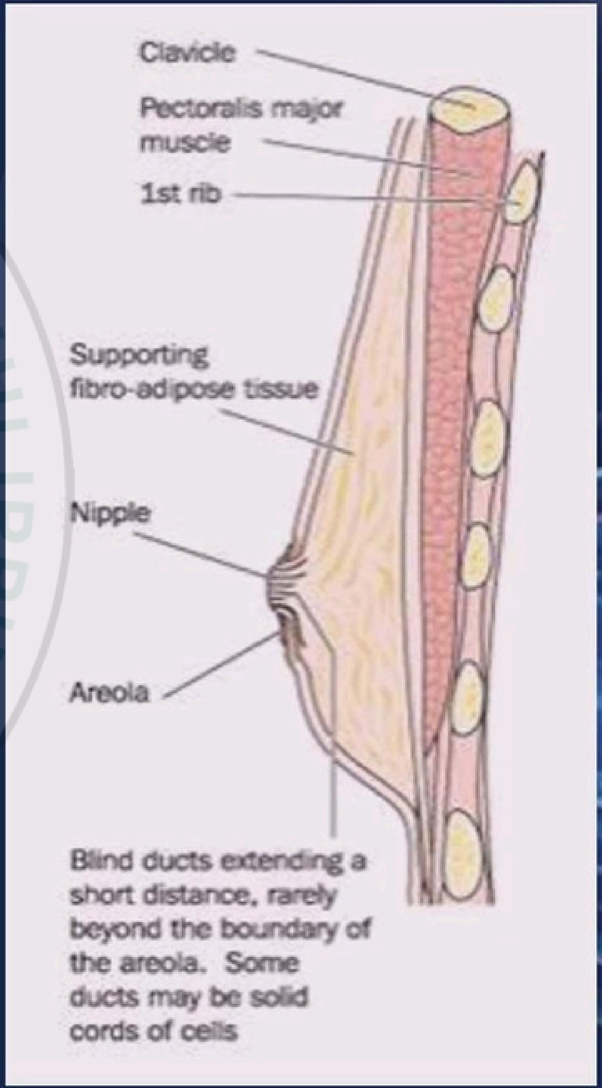
Gynecomastia



The Male Breast

Composition

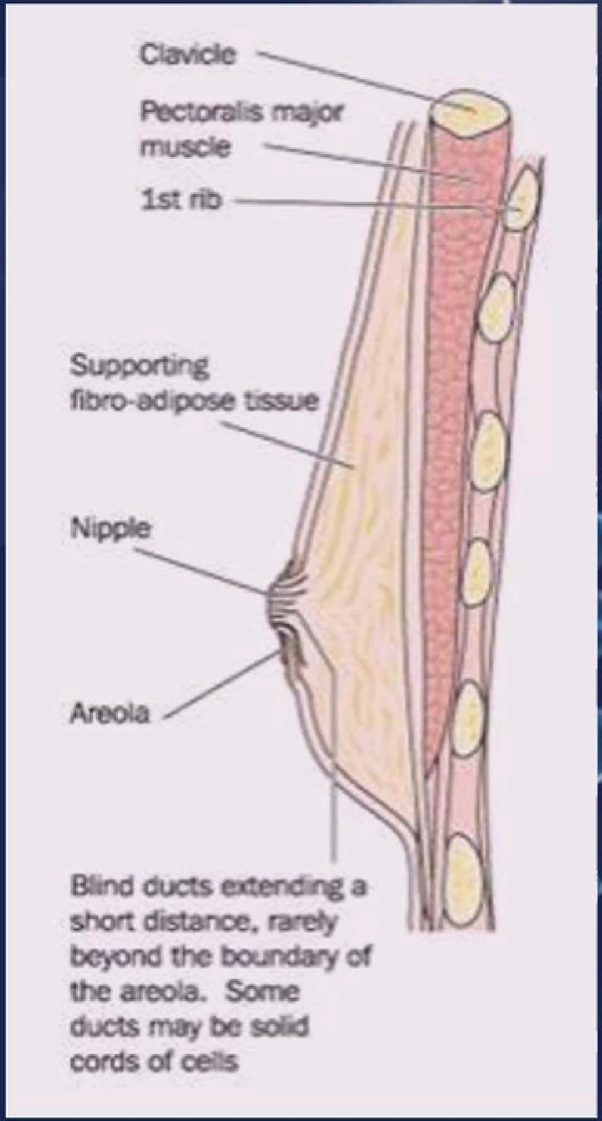
- Largely adipose tissue
- Small glandular tissue
- Absent lobular formations and Cooper ligaments



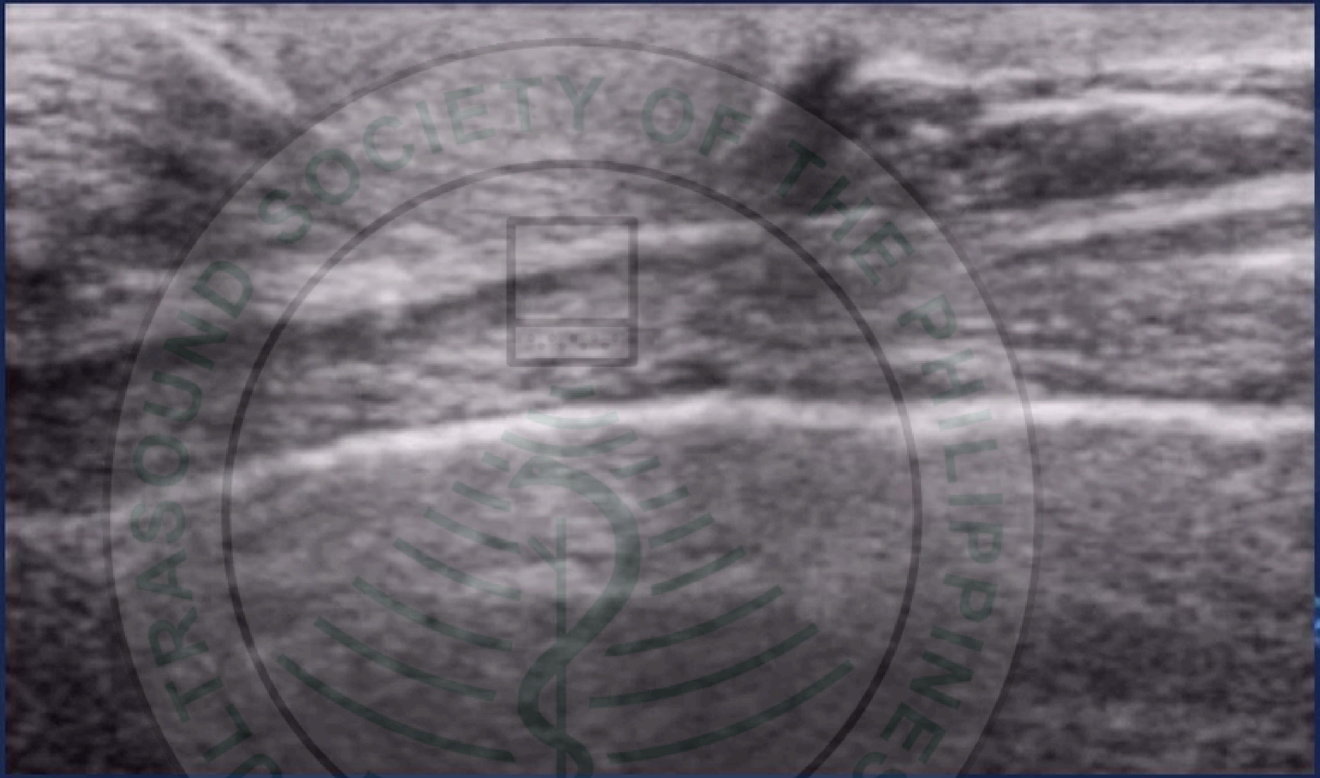
The Male Breast

Development

- Breasts in men and women have the same origin and development until puberty
- Rising testosterone concentrations at puberty arrests further development of breast



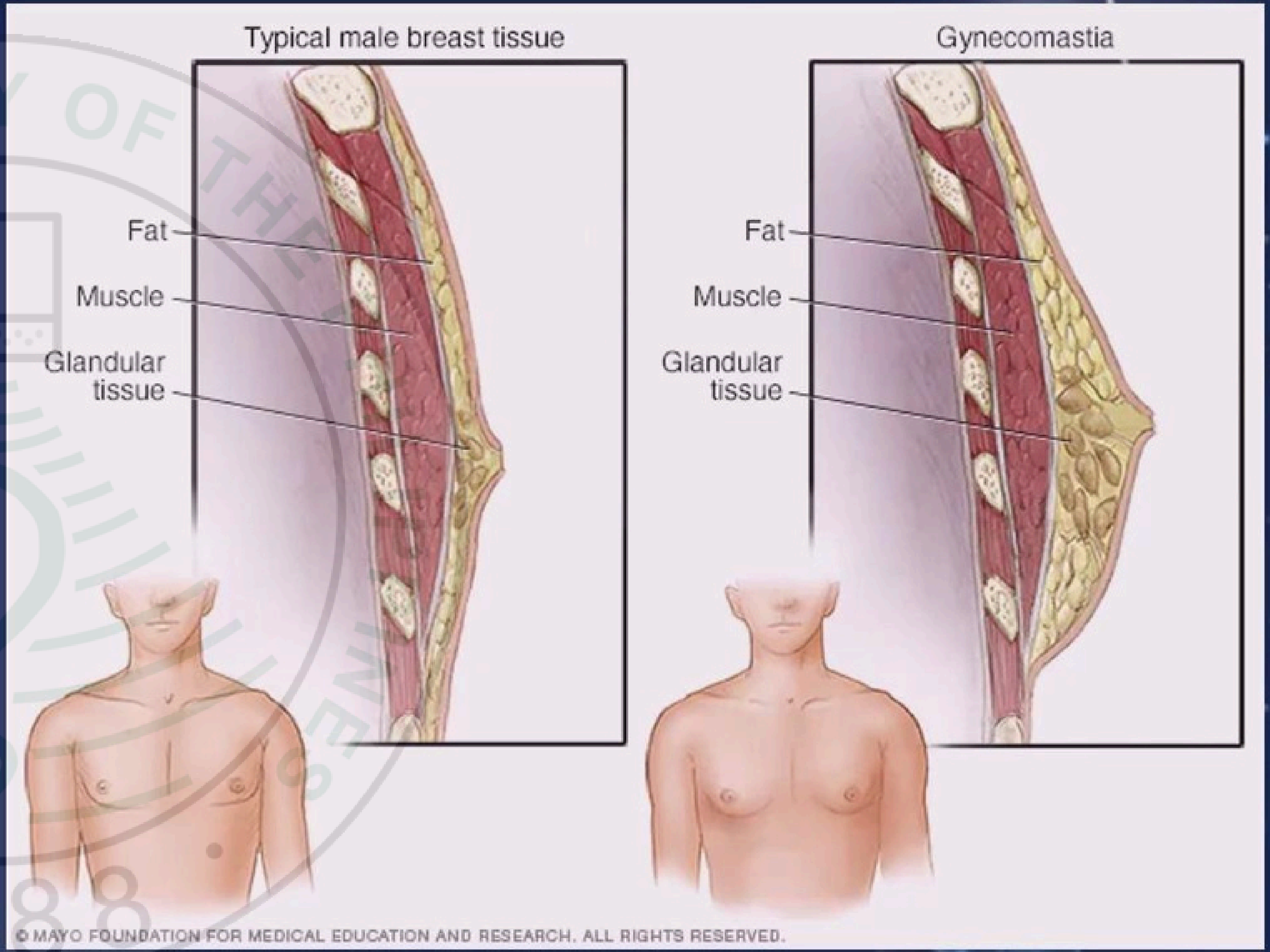
The Male Breast



Nipple: small hyperechoic nodule with mild posterior attenuation
Glandular tissue: hypoechoic

Gynecomastia

- Benign ductal and stromal proliferation
- NOT a risk factor per se for developing male breast cancer
- Reversible - early correction



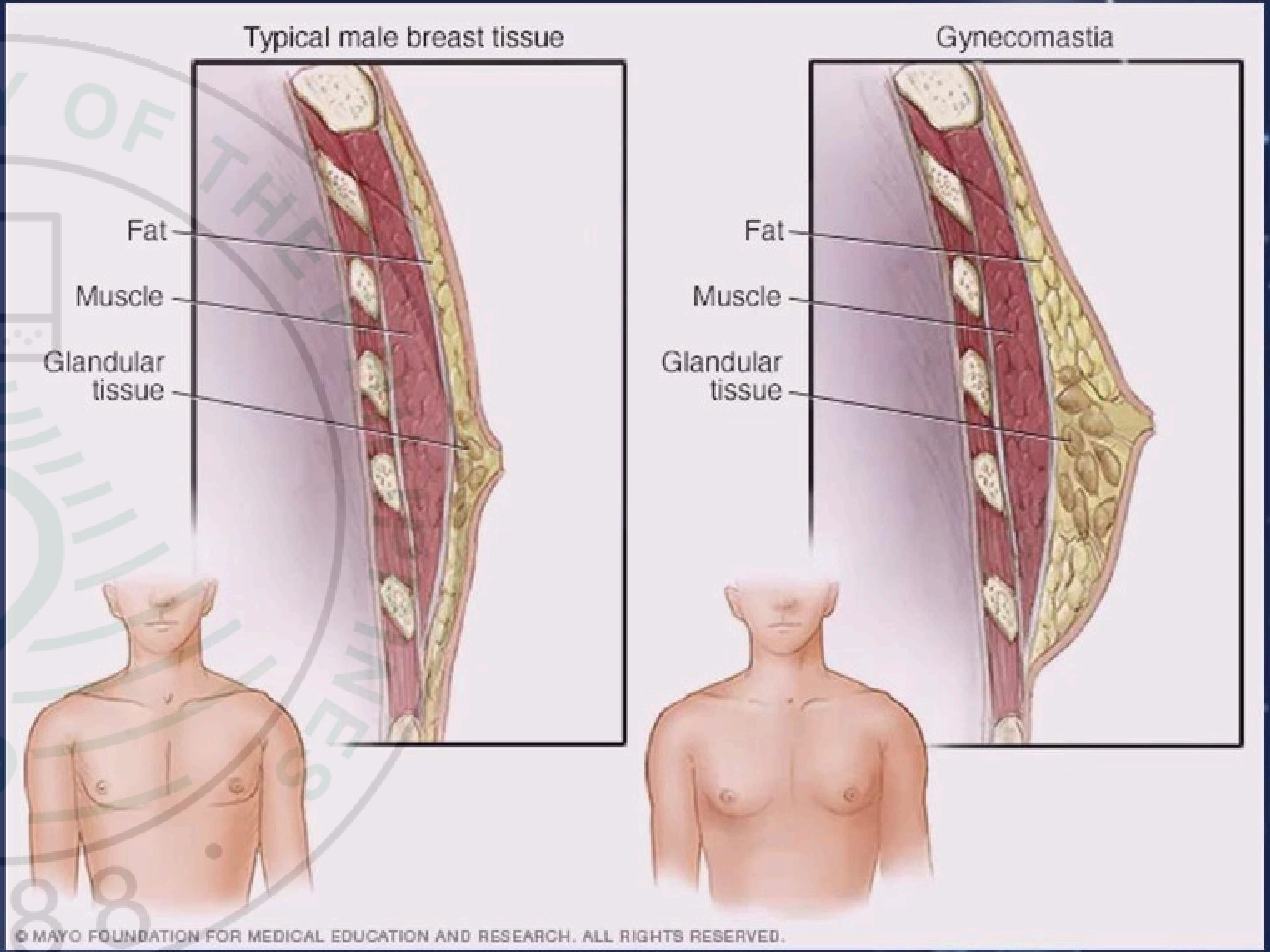
Gynecomastia

Perinatal period	Transplacental exposure to maternal estrogens
Puberty	Hormonal instability
Adults	Diminished androgen secretion

Gynecomastia

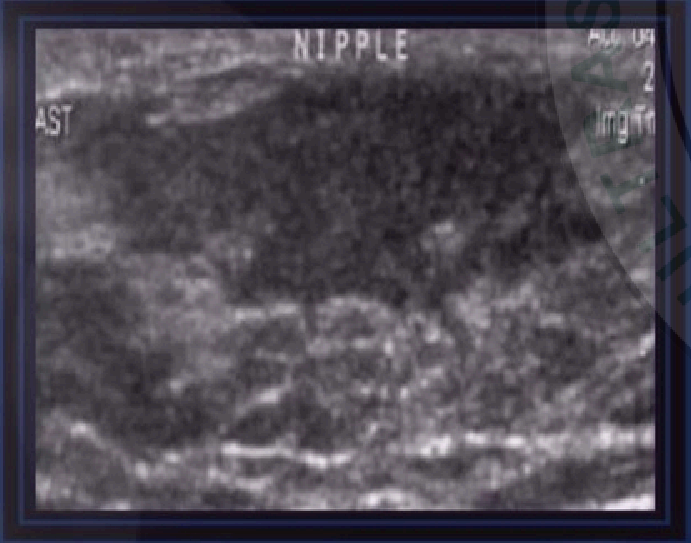
Other causes

- Hormonal
  - Klinefelter syndrome
- Drugs
- Systemic disorders
  - Advanced alcohol cirrhosis
- Estrogenic tumors
- Idiopathic



Gynecomastia

1. Early nodular gynecomastia	subareolar fan or disc-shaped
2. Diffuse glandular gynecomastia	both nodular and dendritic features
3. Chronic dendritic gynecomastia	fingerlike projections or "spider legs"



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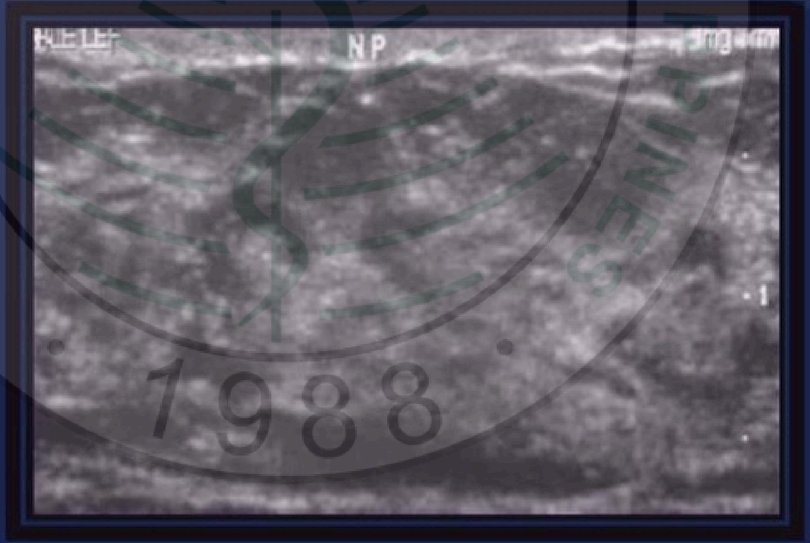
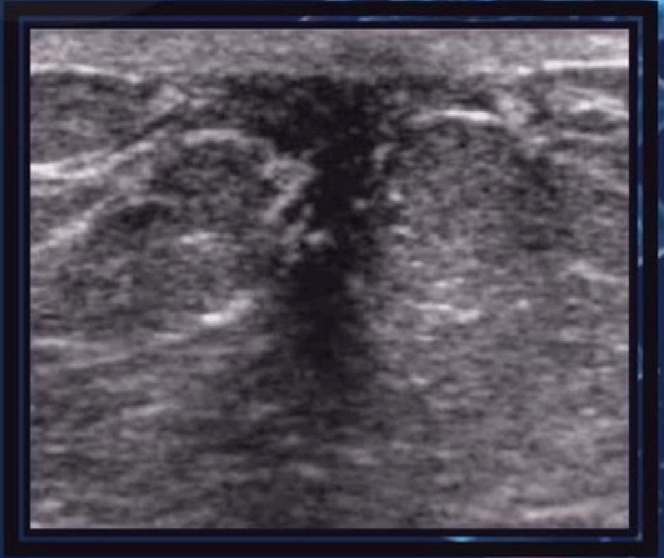
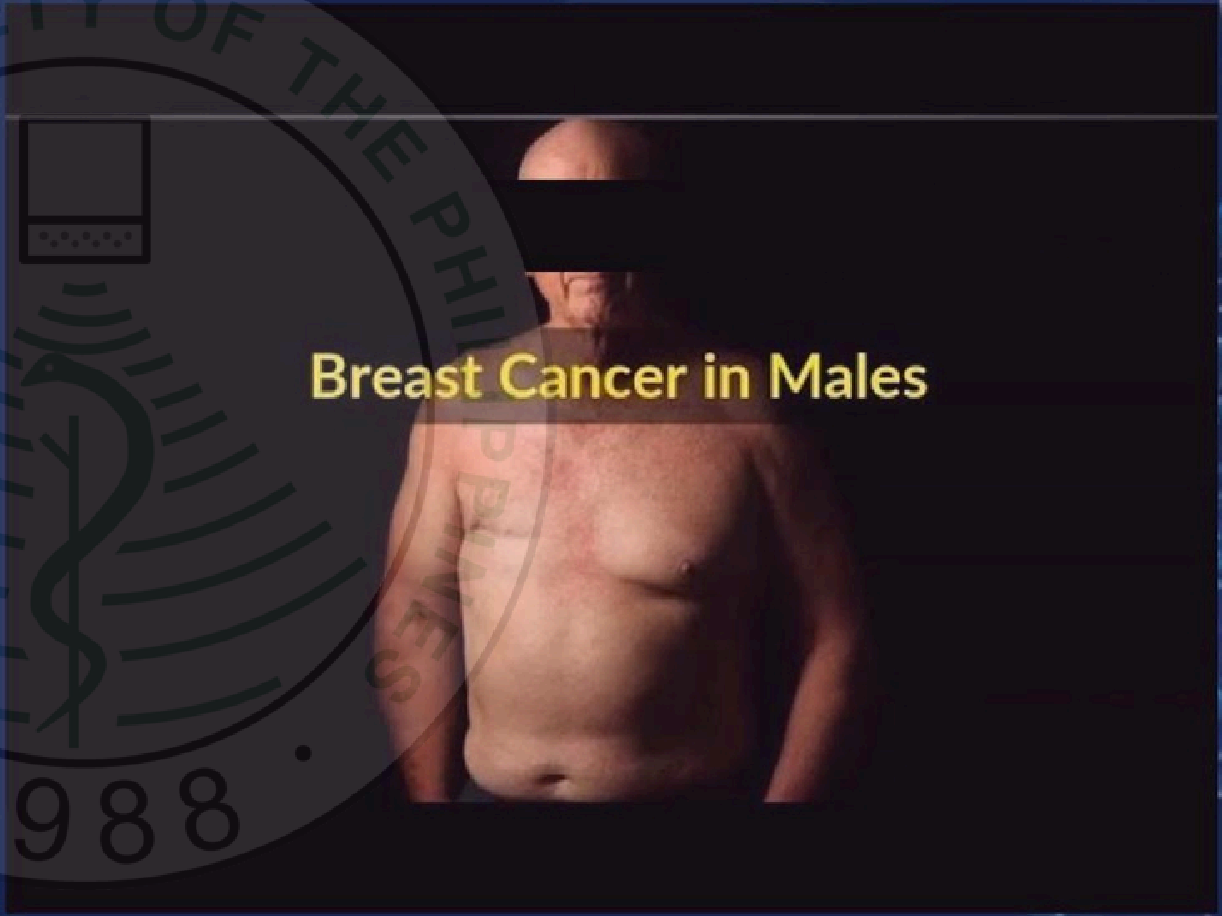




2

Differential Diagnoses

Pseudogynecomastia



Male Breast Cancer

INTERESTING CASES

General Data	36F, single, from Santiago, Isabela
Presenting Complaint	• Multiple palpable right breast RLO masses
Relevant History	Multiparous, non-lactating

2013 — **Diagnosed with SLE**

(+) prednisone, hydroxychloroquinolone and methotrexate

7 months PTC — **Palpable right breast masses**

(+) Redness and swelling
(-) trauma, breast infections

4 months PTC — **Consult**

(+) Breast ultrasound done

3 months PTC — **Biopsy**

2013 — **Diagnosed with SLE**

(+) prednisone, hydroxychloroquinolone and methotrexate

7 months PTC — **Palpable right breast masses**

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7 months PTC — **Palpable right breast masses**

(+) Redness and swelling
(-) trauma, breast infections

4 months PTC — **Consult**

(+) Breast ultrasound done

RIGHT BREAST ULTRASOUND:

The right breast shows normal parenchyma.

Multiple focal dilatation of the intrmammary ducts are seen in the right upper breast, with internal low and medium level echoes and wall thickening. The largest is seen in the 12:00 position, periareolar region, measuring 0.9 x 1.2 x 0.8cm.

The rest of the intramammary ducts are not dilated.

The retroareolar region is unremarkable.

No enlarged axillary lymph nodes seen.

Impression:

Right breast foci as described, consider an inflammatory process such as tuberculous mastitis.

Suggest follow-up.

3 months PTC — **Biopsy**

2013 — **Diagnosed with SLE**

(+) prednisone, hydroxychloroquinolone and methotrexate

7 months PTC — **Palpable right breast masses**

(+) Redness and swelling
(-) trauma, breast infections

4 months PTC — **Consult**

(+) Breast ultrasound done

3 months PTC — **Biopsy**

FINAL HISTOPATHOLOGIC DIAGNOSIS:

BREAST MASS, EXCISION BIOPSY:

- CHRONIC GRANULOMATOUS INFLAMMATION WITH LANGHANS-TYPE GIANT CELLS AND CASEATION NECROSIS CONSISTENT WITH TUBERCULOUS MASTITIS.

7 months PTC — **Palpable right breast masses**

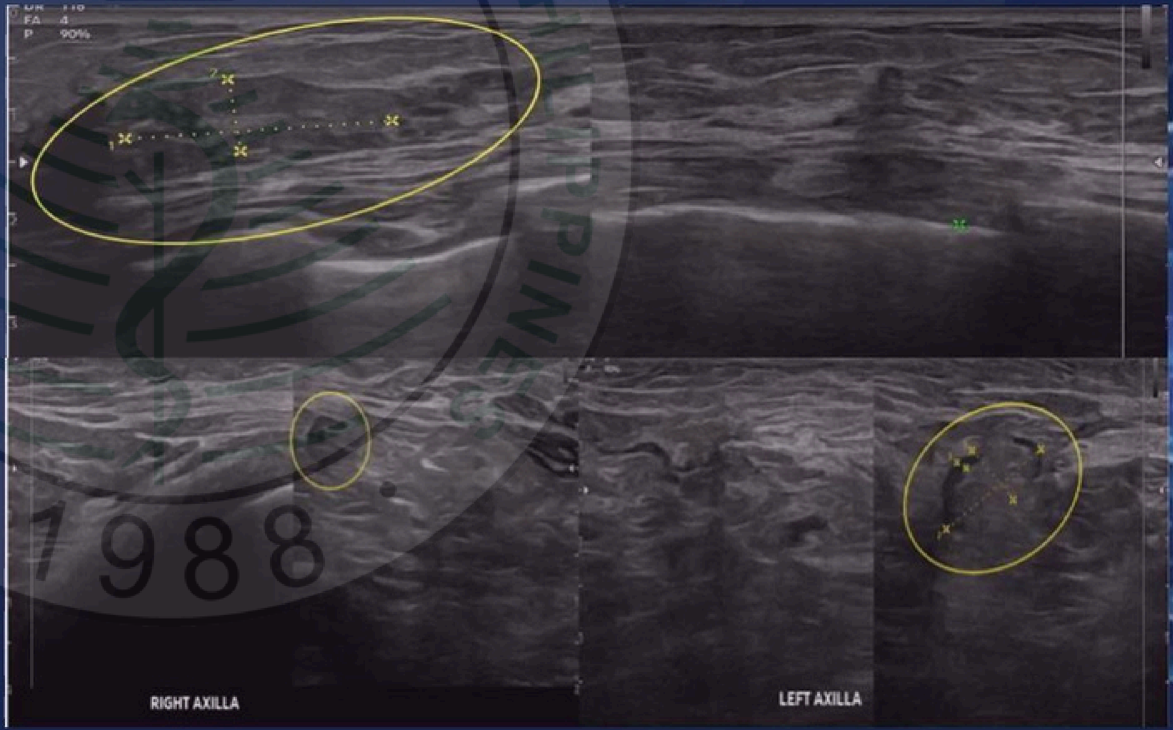
(+) Redness and swelling
(-) trauma, breast infections

4 months PTC — **Consult**

(+) Breast ultrasound done

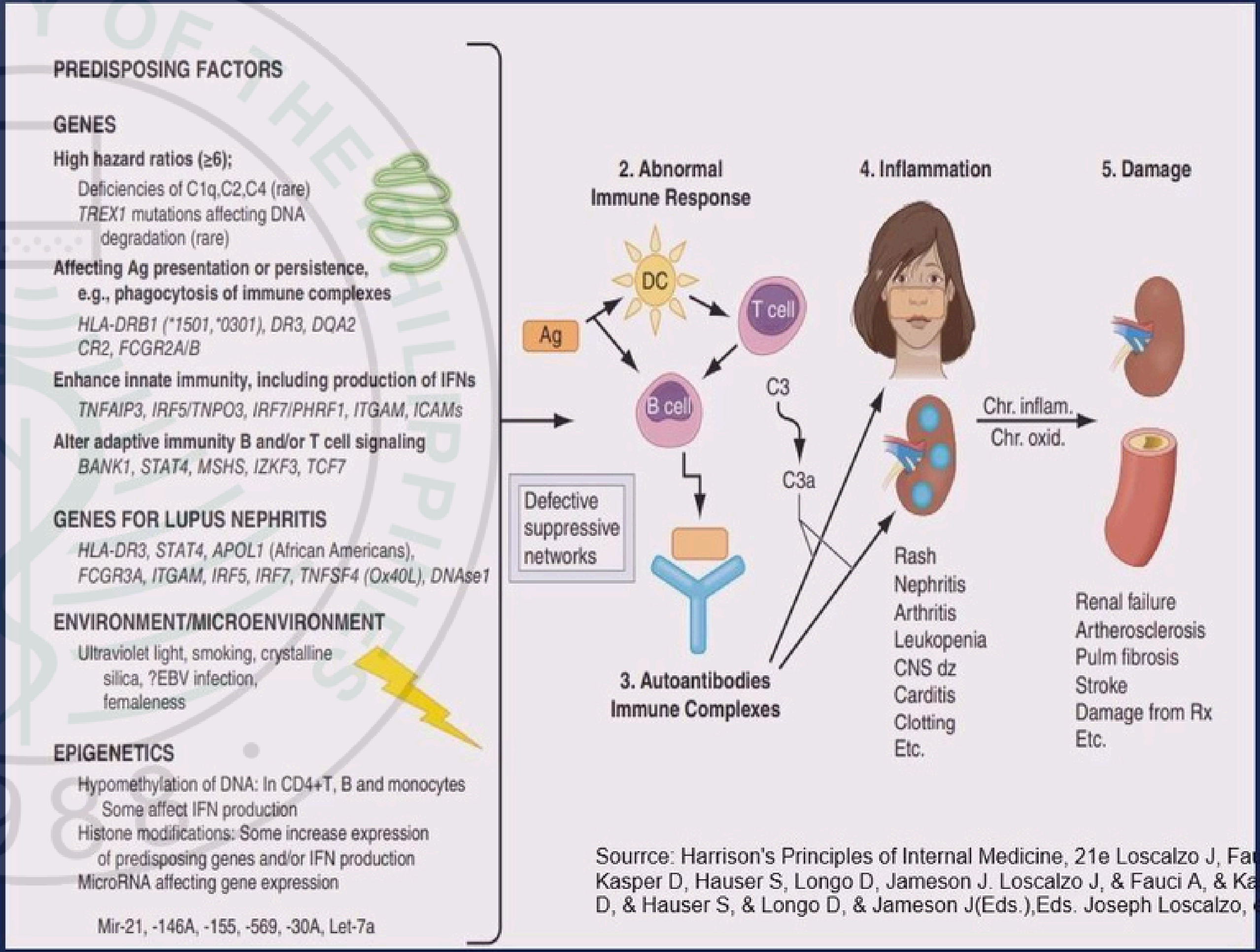
3 months PTC — **Biopsy**

Admission — **Follow-up ultrasound**



Systemic Lupus Erythematosus

- A **non-specific, autoimmune disorder**
- Mainstay of treatment is **<u>corticosteroid</u> therapy**
- **<u>Tuberculosis</u> is a** most common **<u>opportunistic</u>** infection



Sourrce: Harrison's Principles of Internal Medicine, 21e Loscalzo J, Fauci A, Kasper D, Hauser S, Longo D, Jameson J. Loscalzo J, & Fauci A, & Kasper D, & Hauser S, & Longo D, & Jameson J(Eds.),Eds. Joseph Loscalzo, et al

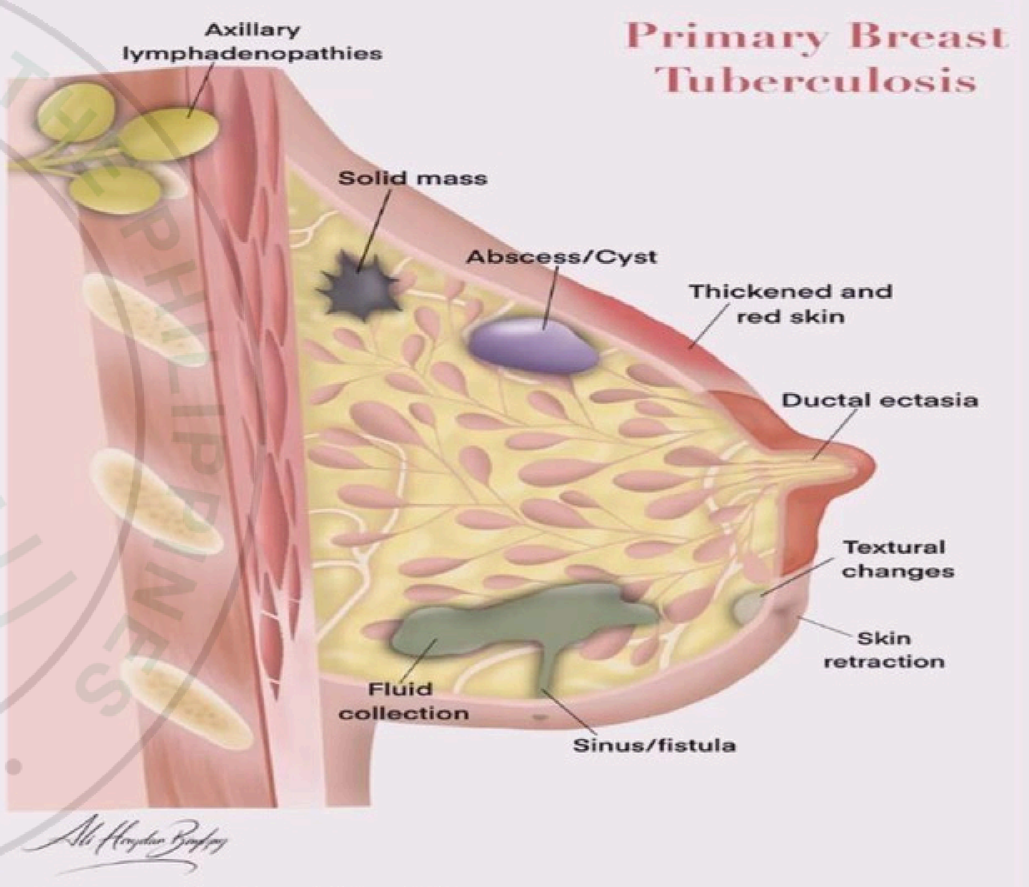
Tuberculous Mastitis

- Rare form of extrapulmonary tuberculosis.

- Clinical manifestations:
  - Unilateral and solitary mass
  - Associated findings: nipple and skin retractions, swellings, inflammatory changes, sinus formations, and axillary lymphadenopathies

- Primary and secondary forms.

Fig. 1



Breast anatomy and the effects of tuberculosis

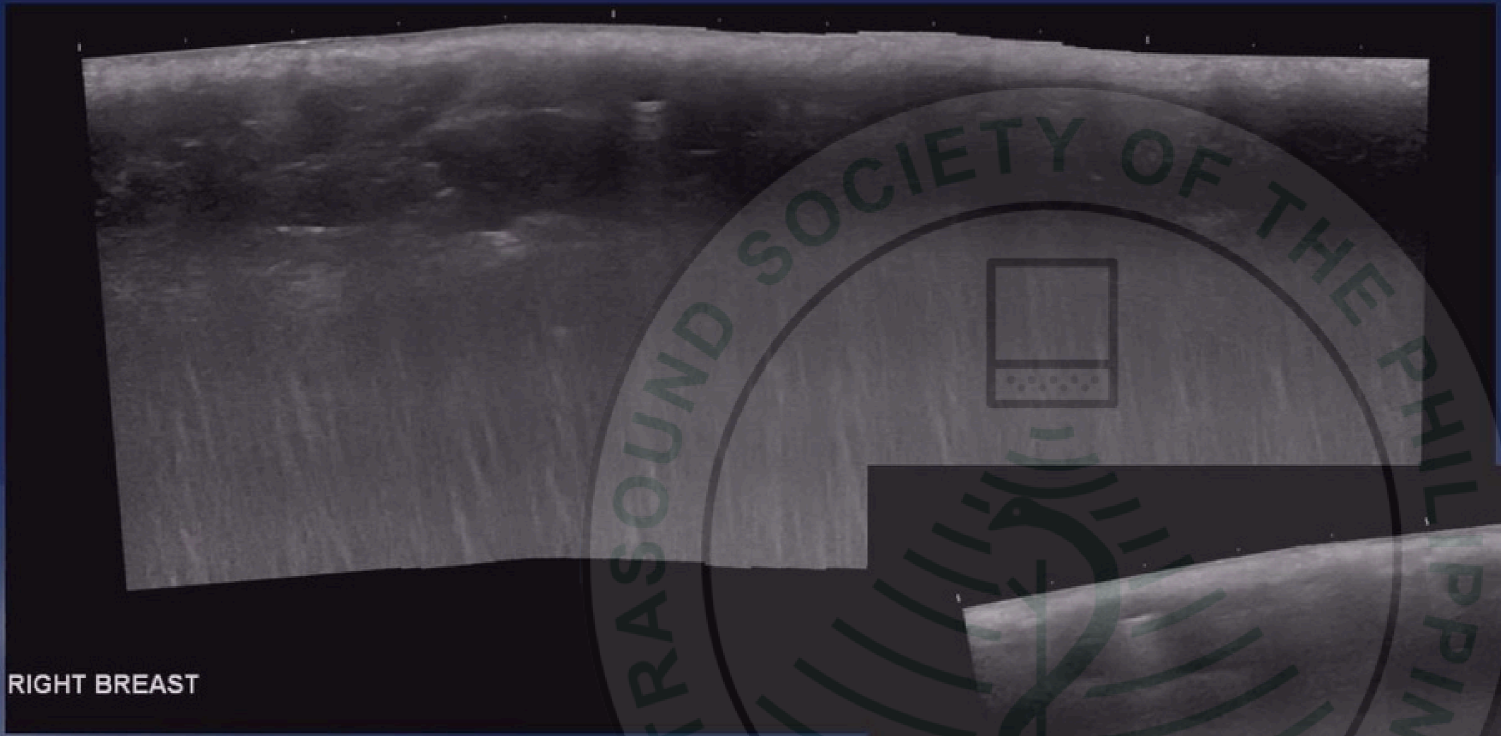
Image source: Baykan, A.H., Sayiner, H.S., Inan, I. et al. Primary breast tuberculosis: imaging findings of a rare disease. Insights Imaging 12, 19 (2021). https://doi.org/10.1186/s13244-021-00961-3

Tuberculous Mastitis

Classification	Ultrasound Findings
1. Nodular form	Indistinct bordered, hypoechoic, heterogeneous mass
2. Diffuse form	Ill-defined hypoechoic masses
3. Sclerosing form	Increase in the echogenicity of the breast parenchyma without a mass formation
Other findings: • Ductal ectasia • Axillary lymphadenopathy • Abscess formation with fistulous tracts	

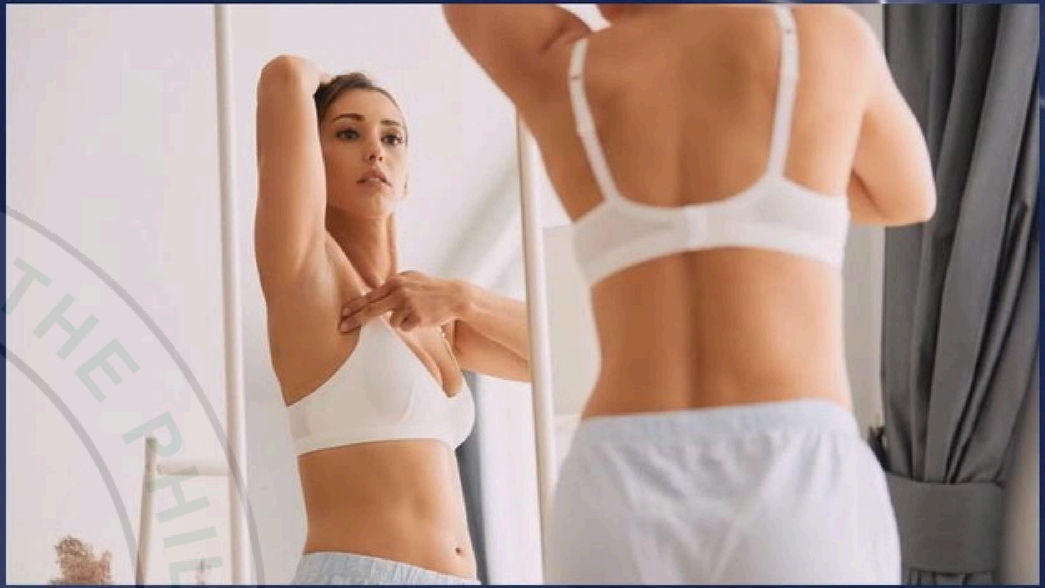
General Data	43F, married
Presenting Complaint	• Palpable masses in both breasts
Relevant History	• Previous direct silicone injections in both breasts

Breast ultrasound



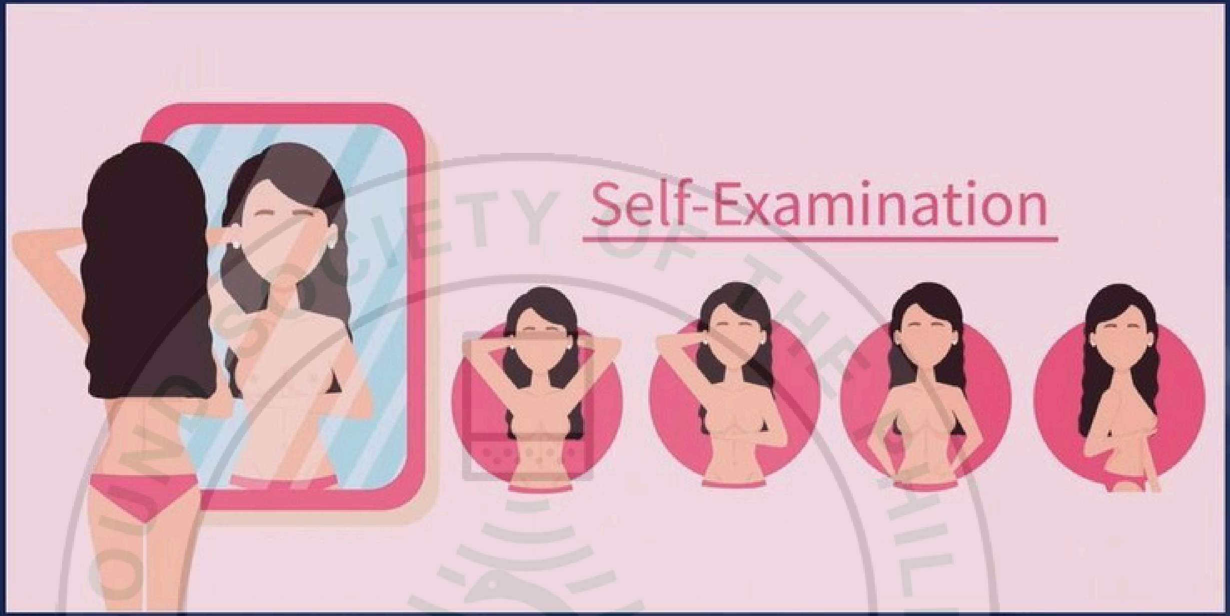
Free Silicone Breast Injections

- Silicone mastopathy
- Alternative to breast implants
- Serious adverse effects
- Banned in many countries



Common Complications

- Silicone granulomas
- Fibrosis
- Lymphadenopathy

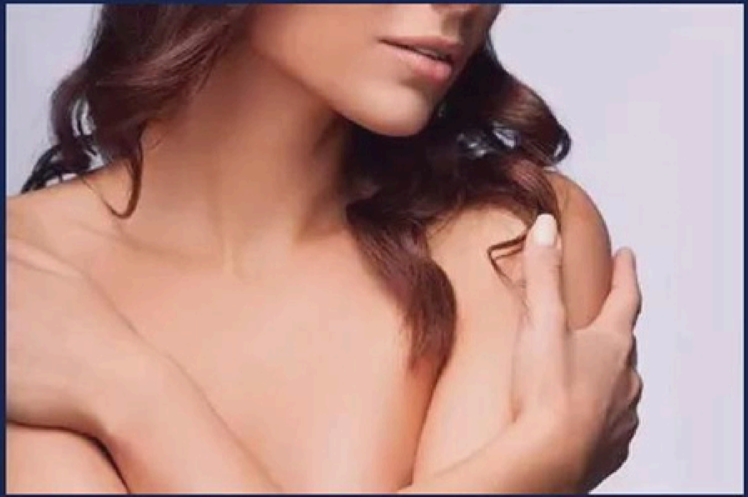


Clinical Features

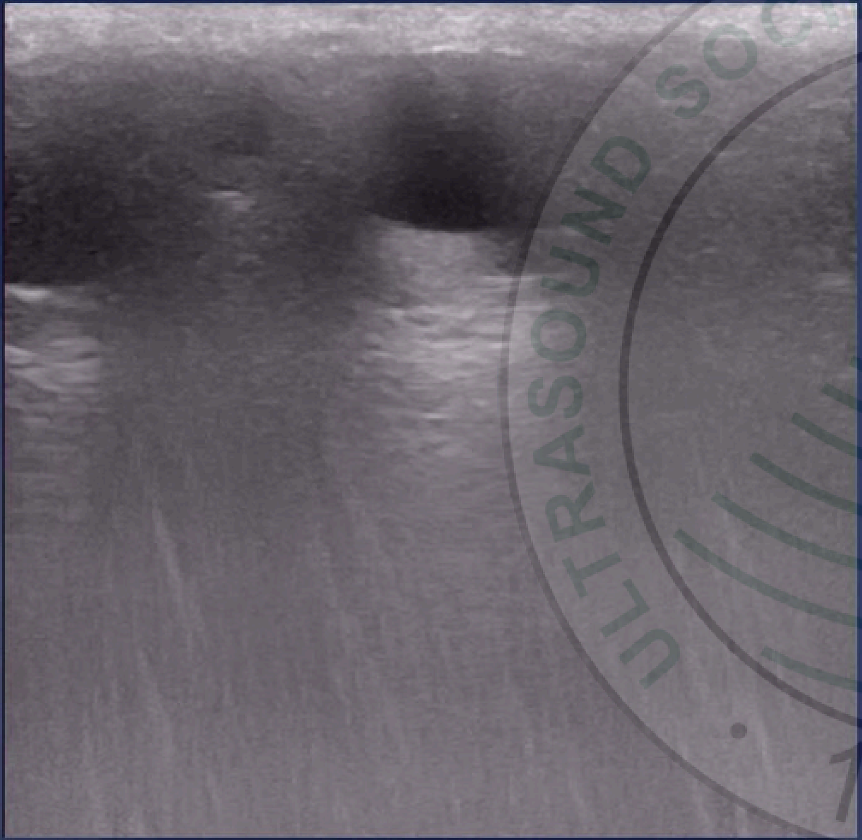
- Palpable nodule and hard lumps on breast examination
- Pain
- Lymphadenopathy

Silicone Granuloma

- Siliconoma: small area of inflammation from silicone
- Silicone oil, gels and rubber are bioactive agents.
- Immune response is mediated by giant cells and lymphocyte.



Snowstorm Pattern



End.

THANK YOU!