GENITOURINARY SYSTEM

Dr. Stephen Joshua T. Salazar
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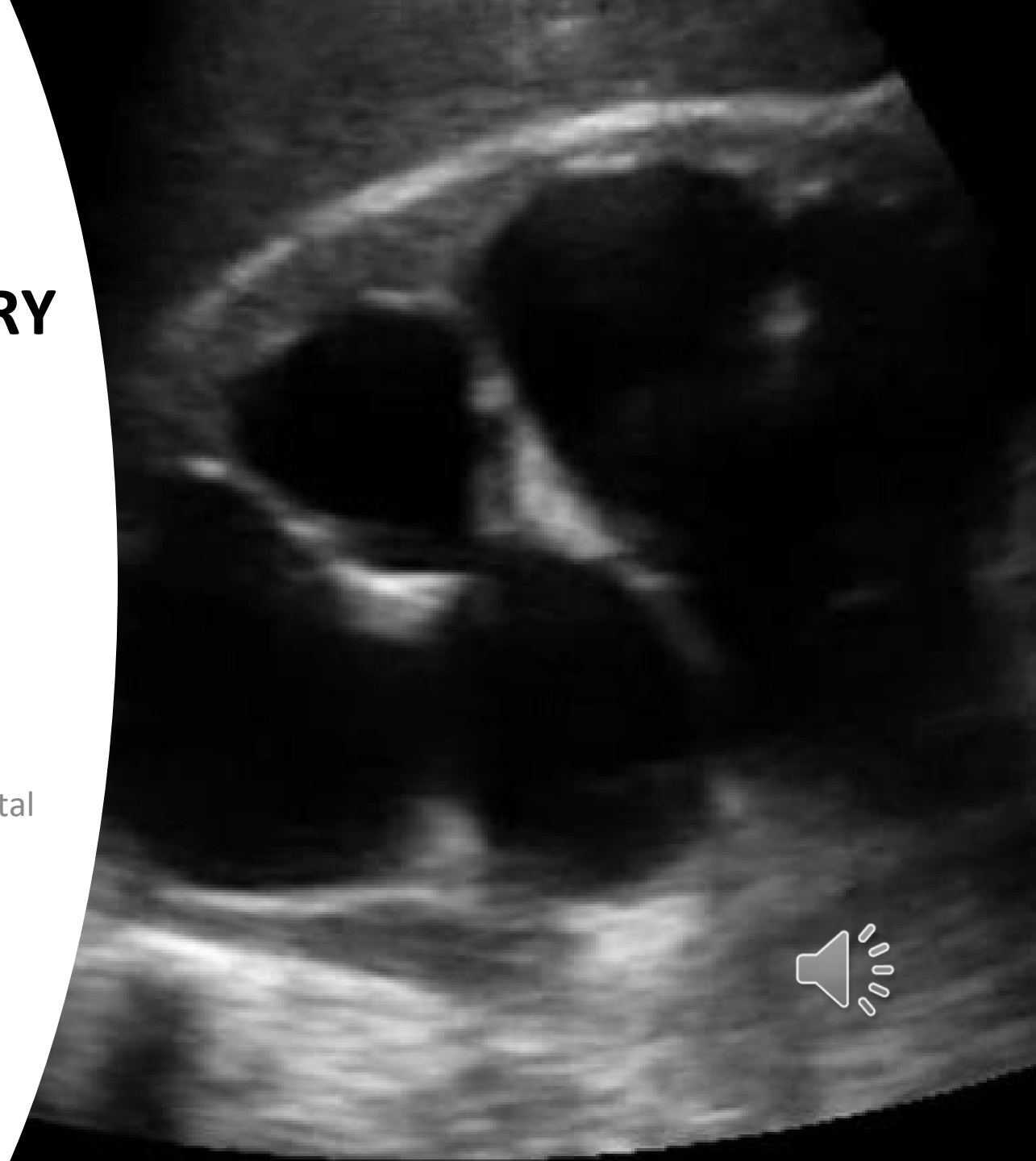
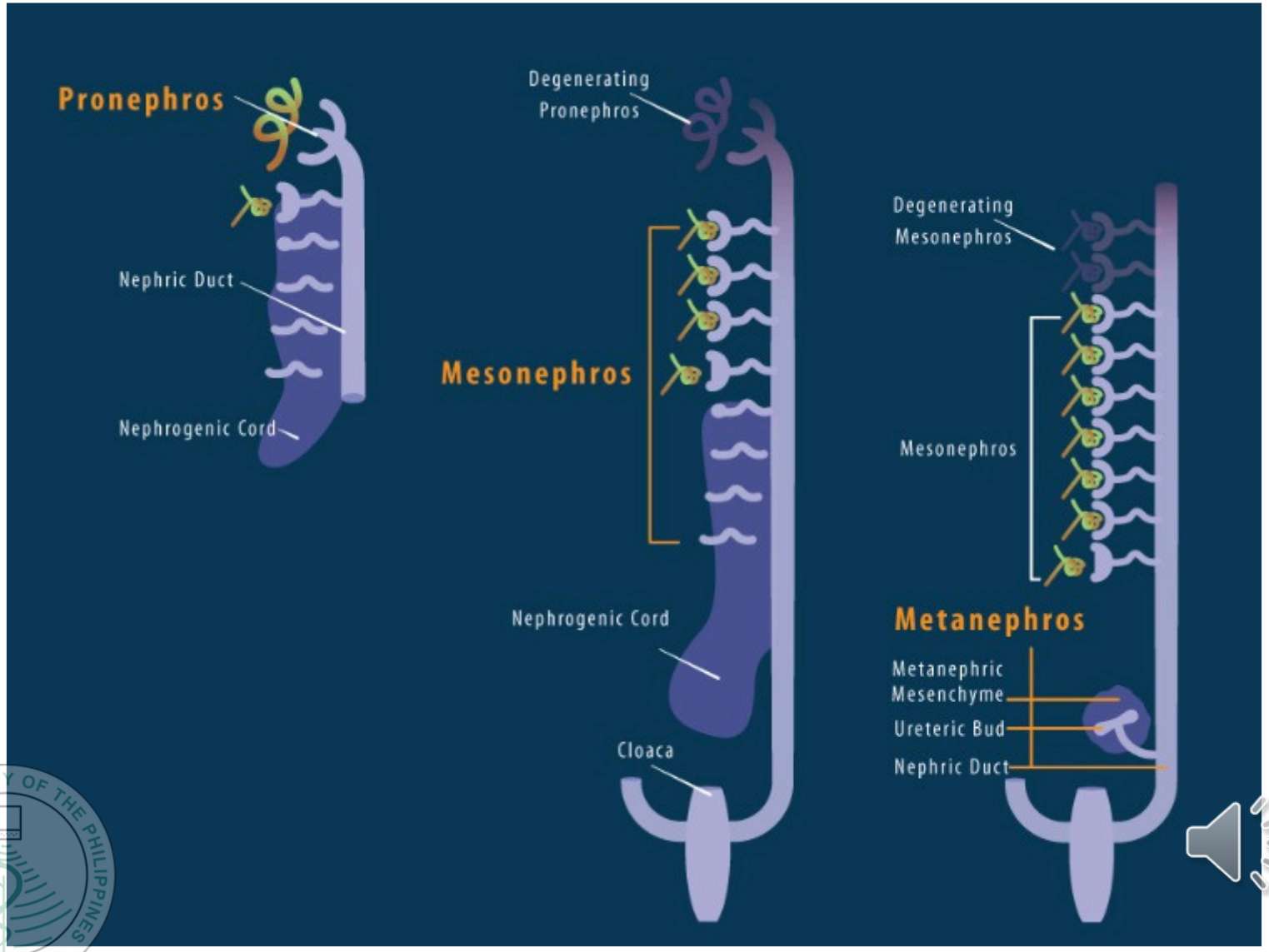


The development of the kidneys is a complex,

staged process that occurs between the **4th and 12th weeks**of gestation.

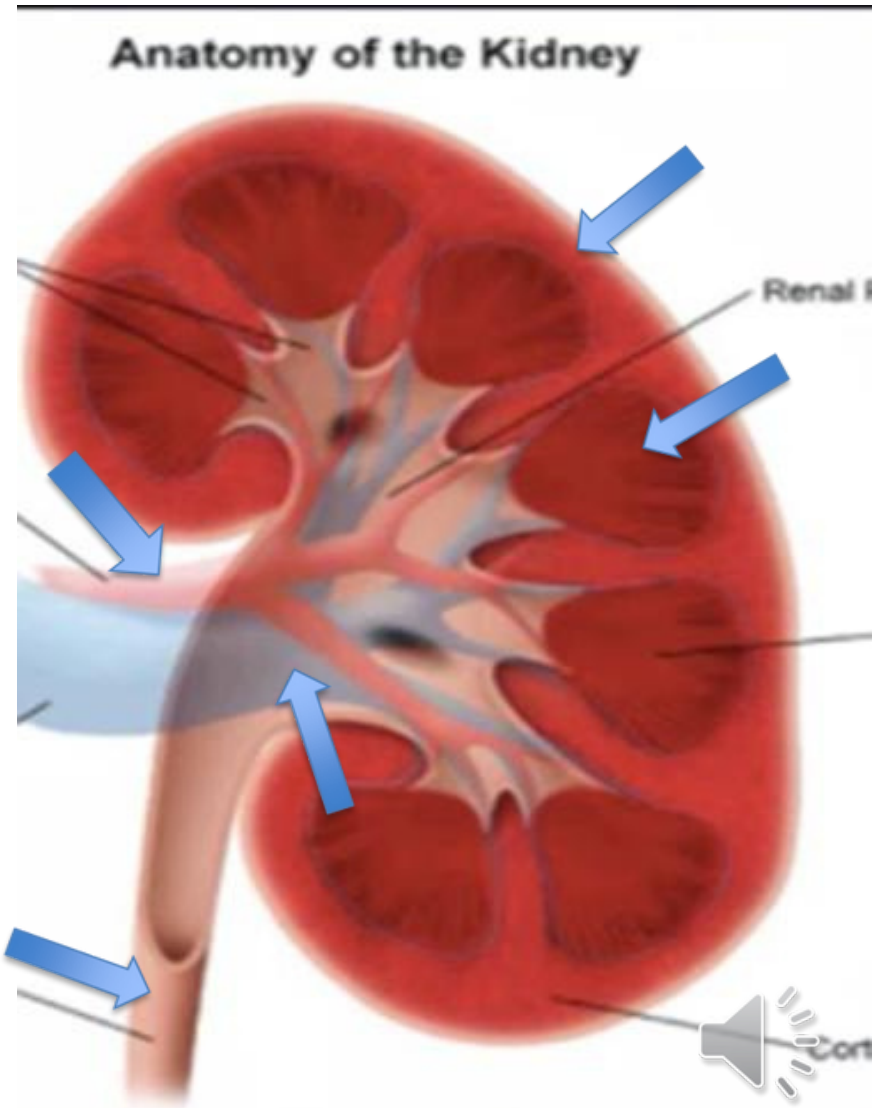
It involves the sequential formation of **three paired structures**from the **intermediate mesoderm**:

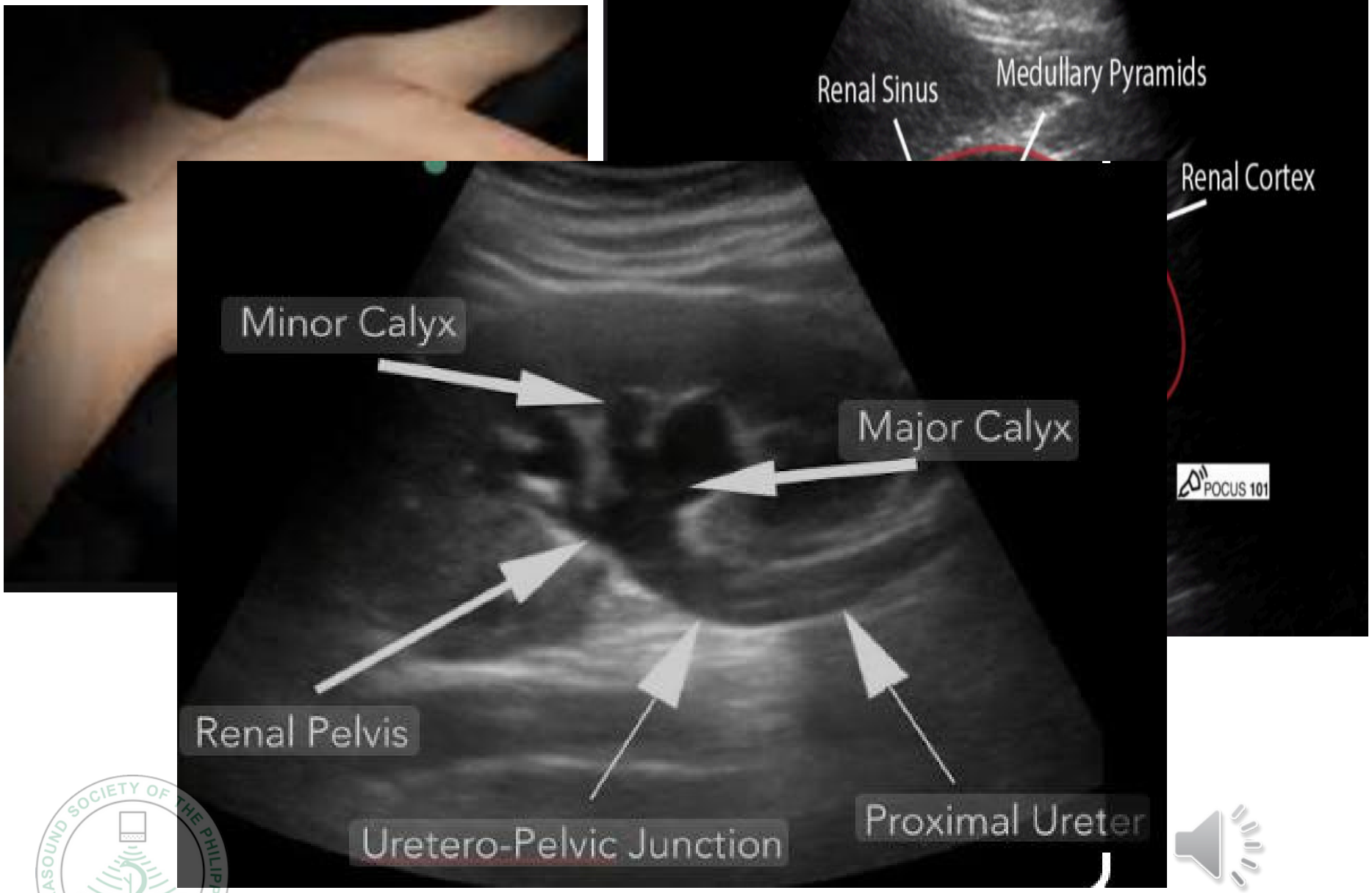


Renal Anatomy

- Kidneys: retroperitoneal organs at T12–L3
- Major structures: Cortex,

  Medulla, Renal pelvis, Ureter
- Blood supply: renal artery from abdominal aorta




Renal Sinus
Medullary Pyramids
Renal Cortex
Minor Calyx
Major Calyx
POCUS 101
Renal Pelvis
Uretero-Pelvic Junction
Proximal Ureter

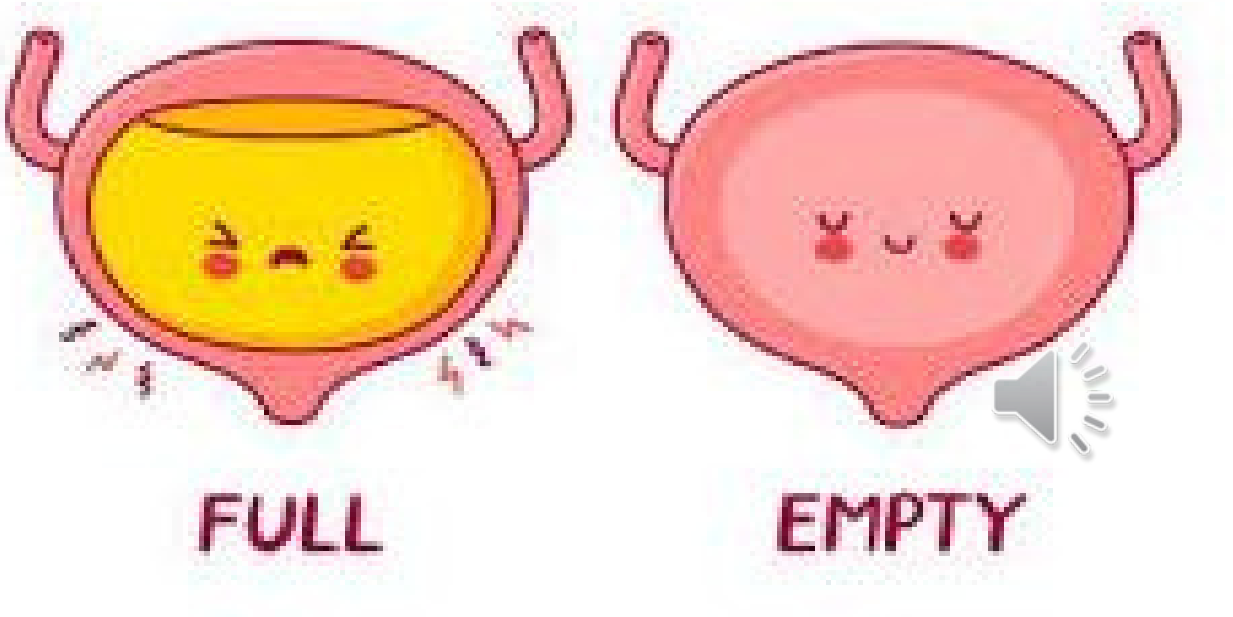
What is Hydronephrosis?

- Dilatation of the collecting system
- May be unilateral or bilateral
- Can be physiologic or pathologic

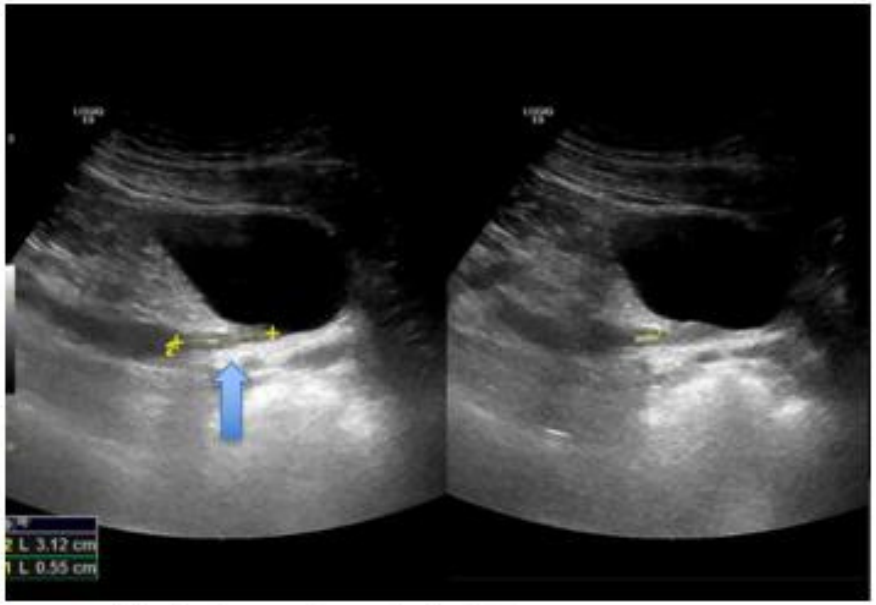
Ultrasound Evaluation

- First-line imaging modality
- Advantages: non-invasive and no radiation
- Assess cortical thickness, ureter, and bladder
- Use longitudinal and transverse views

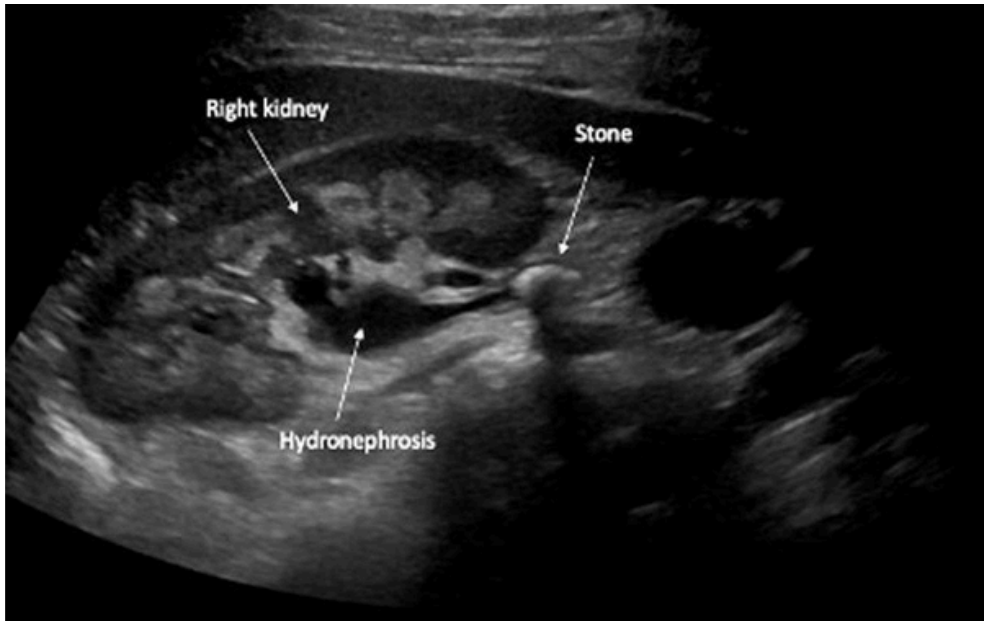
Pre and post void



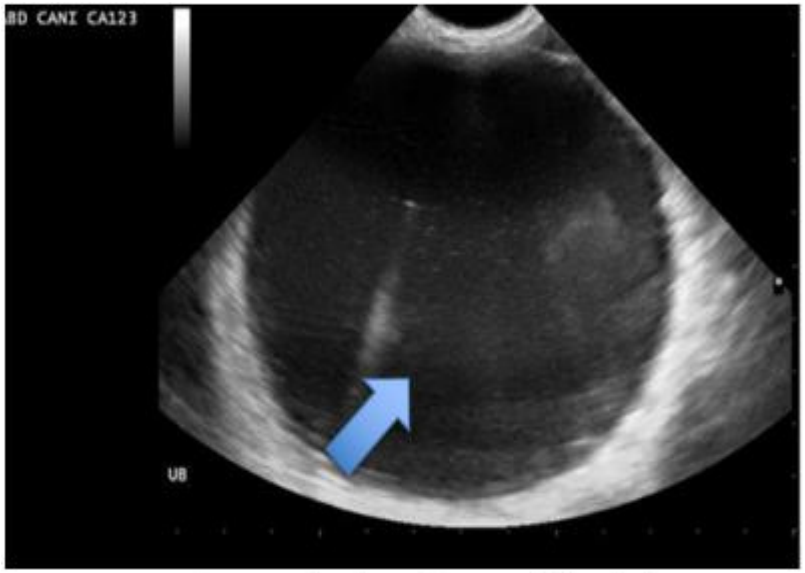
Obstructing Hydronephrosis



Distal ureteral stricture



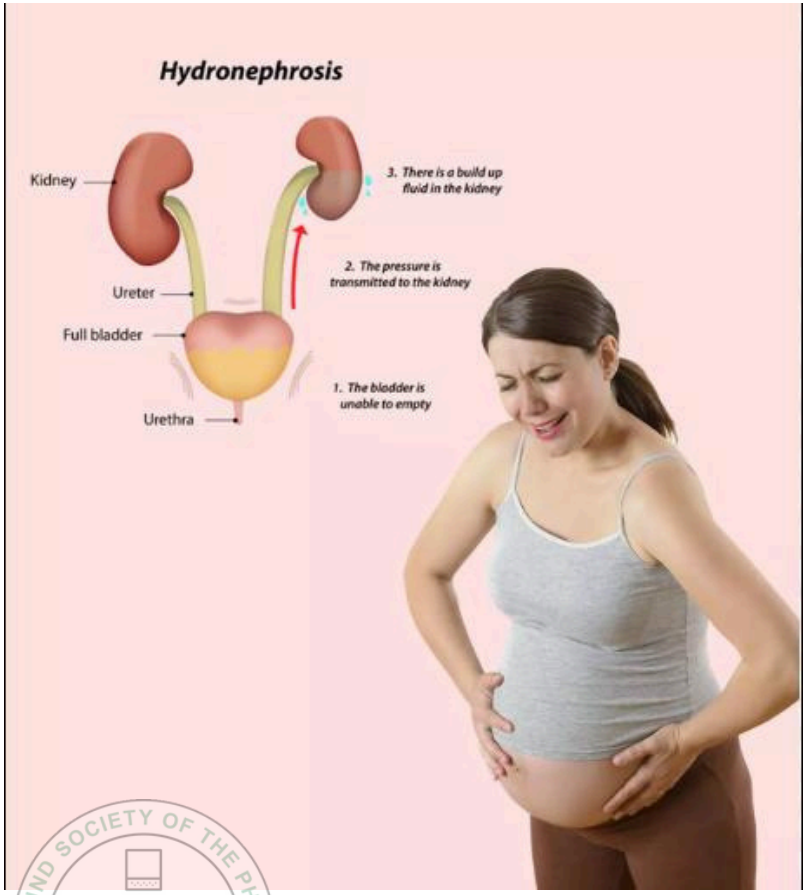
Nonobstructing hydronephrosis



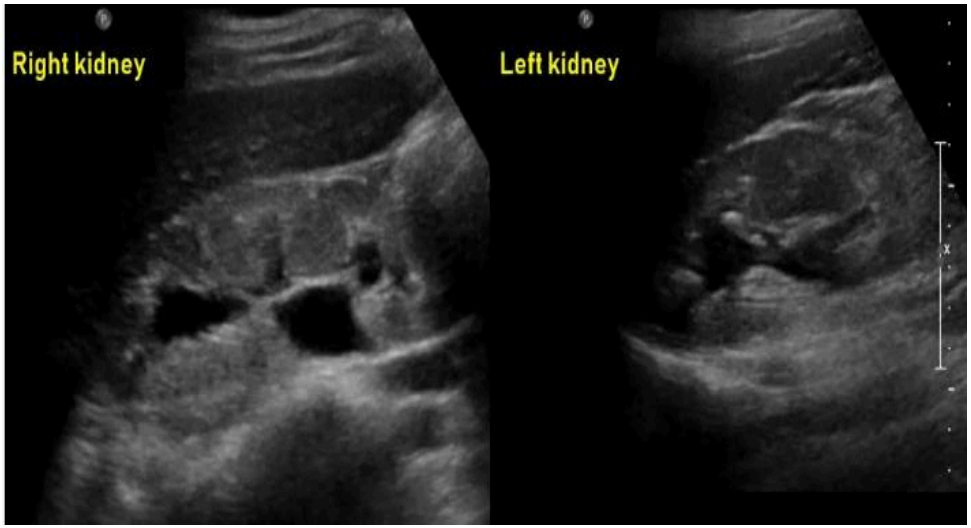
Distended urinary bladder

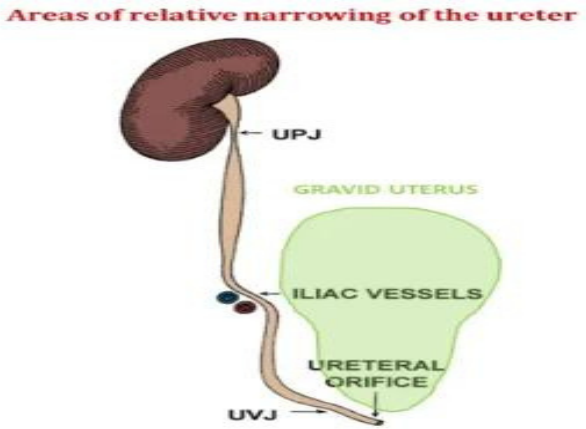
Vesicoureteral reflux

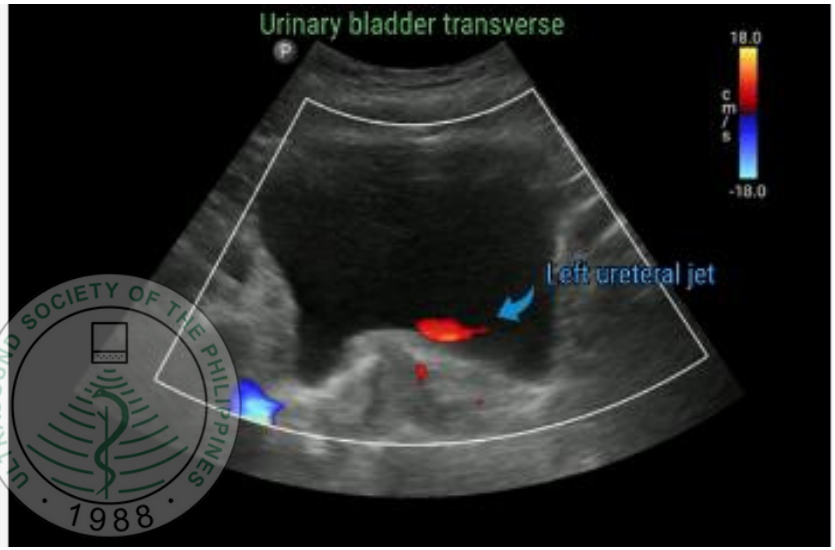
Hydronephrosis in pregnancy



Hydronephrosis in pregnancy



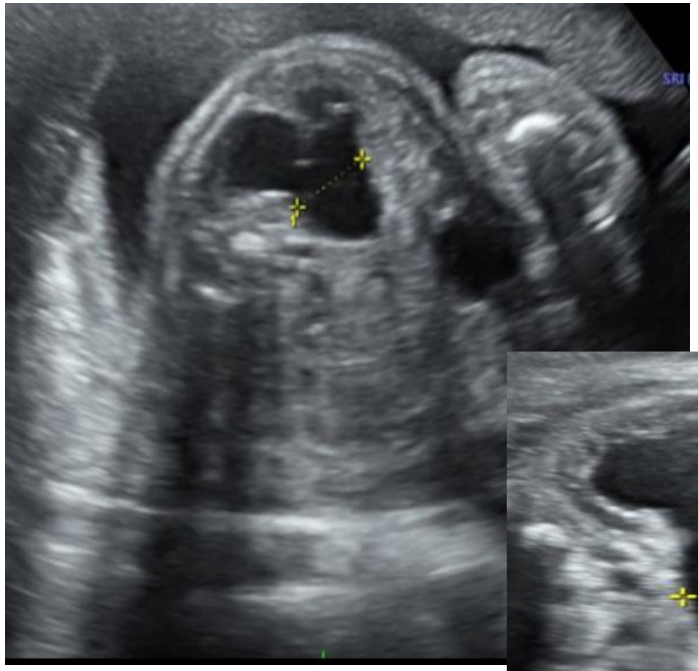




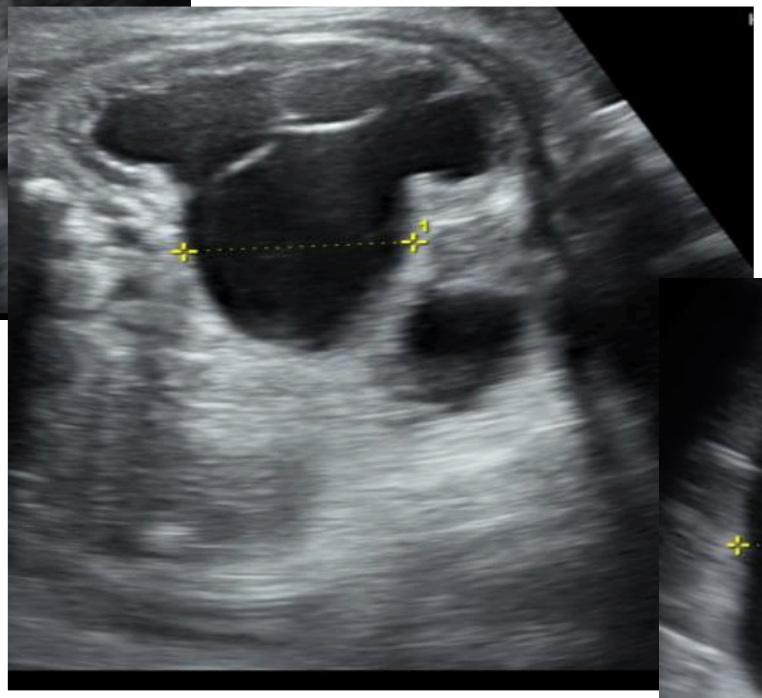
Fetal Hydronephrosis

- Detected via prenatal ultrasound
- Often transient and resolves spontaneously
- Key measurements: AP diameter of renal pelvis
- Postnatal follow-up based on severity

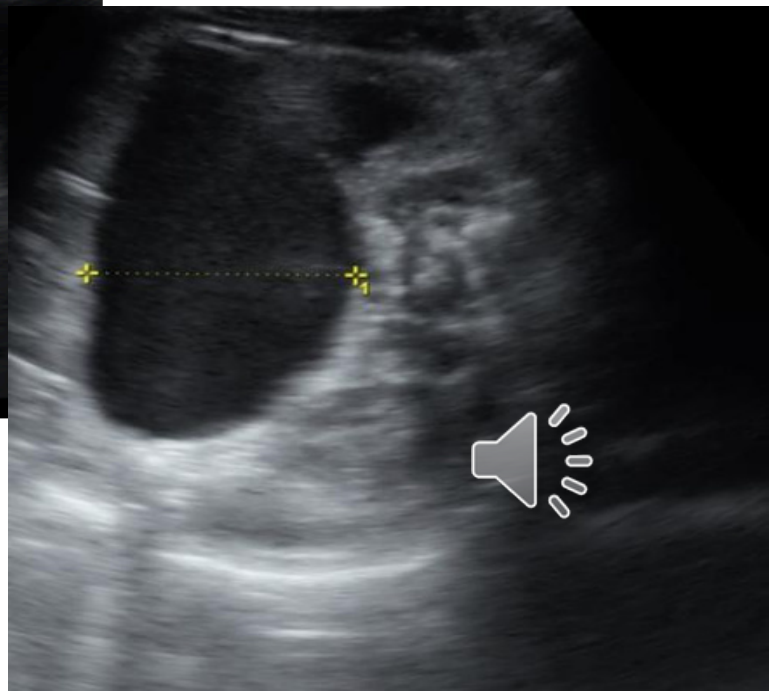
27 week of gestation

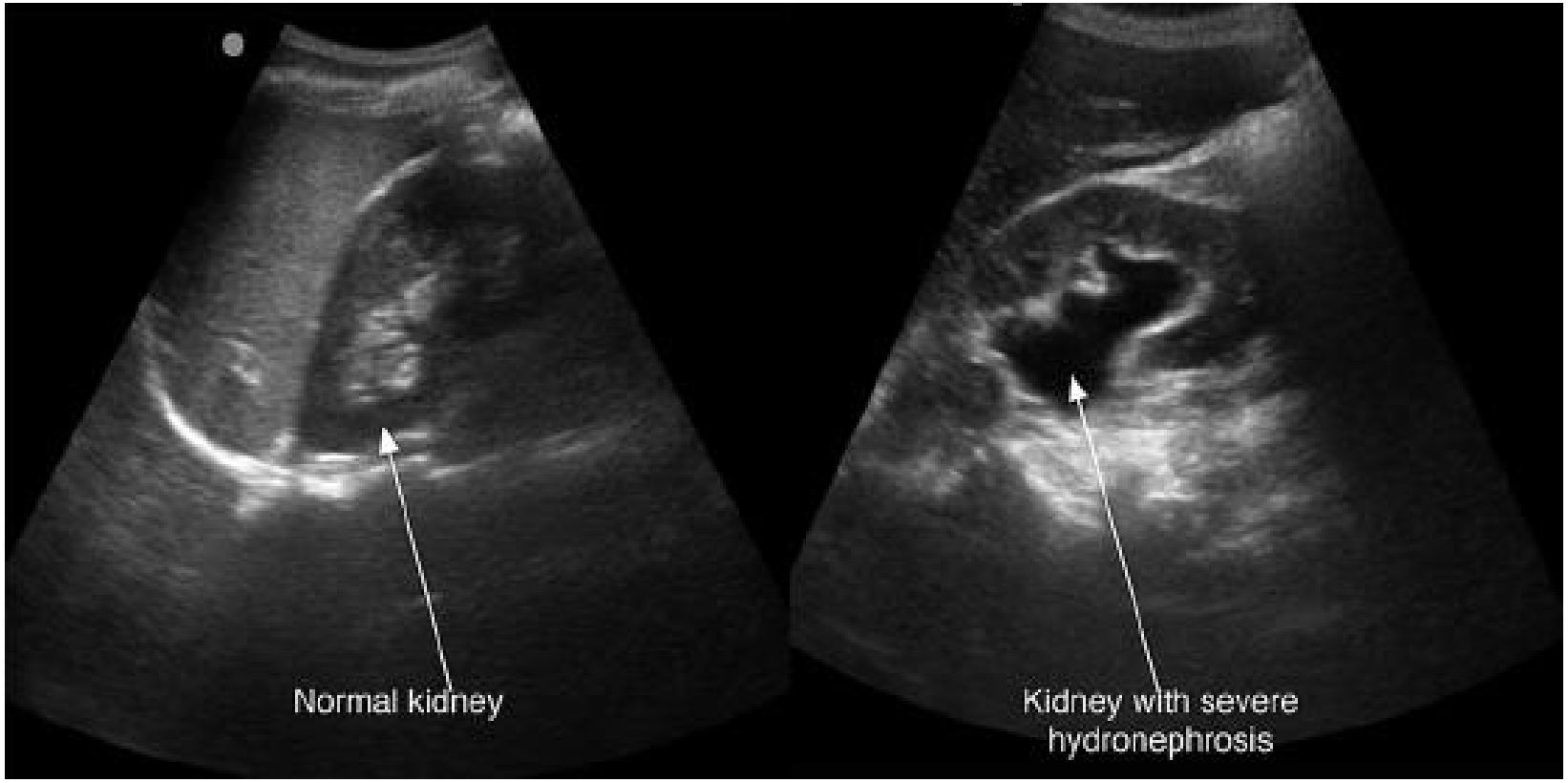


32 week of gestation



Postnatal

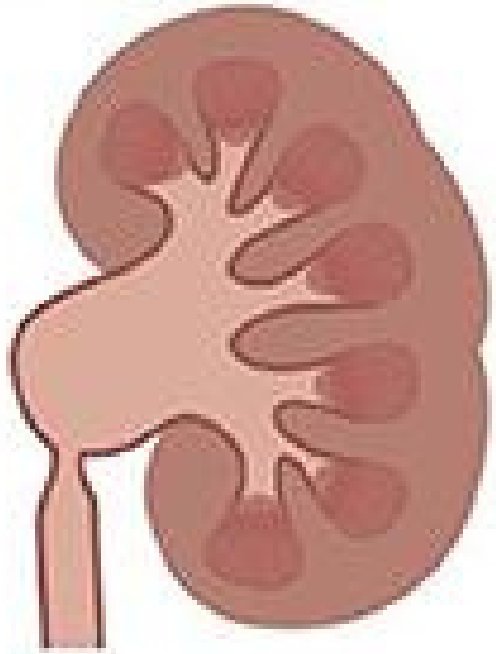




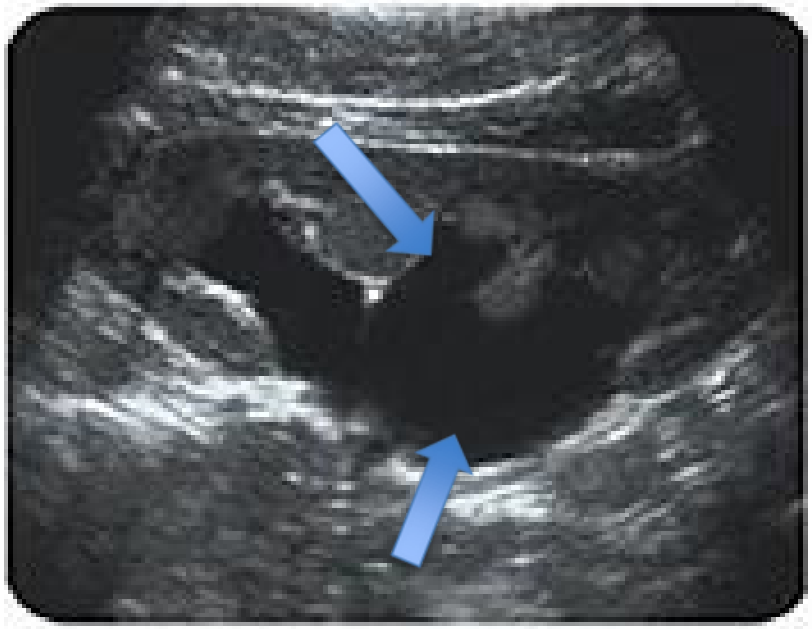
Grading of Hydronephrosis (SFU)

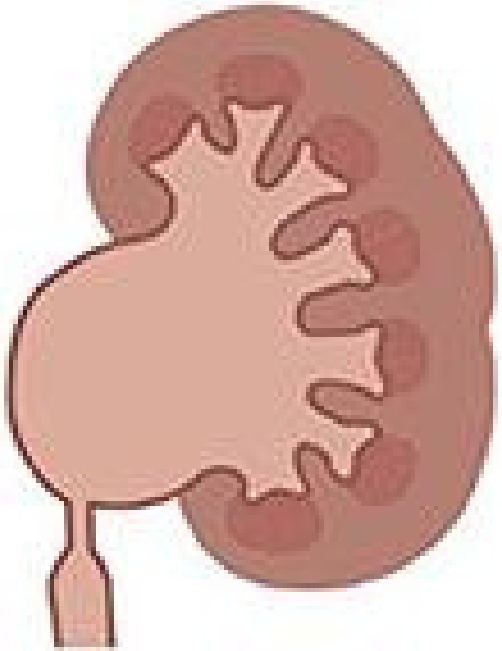
- Grade 0: Normal
- Grade 1: Slight renal pelvis dilation
- Grade 2: Mild calyceal dilation
- Grade 3: Moderate calyceal dilation, thinning of parenchyma
- Grade 4: Severe dilation and parenchymal thinning

Grade 1: Slight renal pelvis dilation

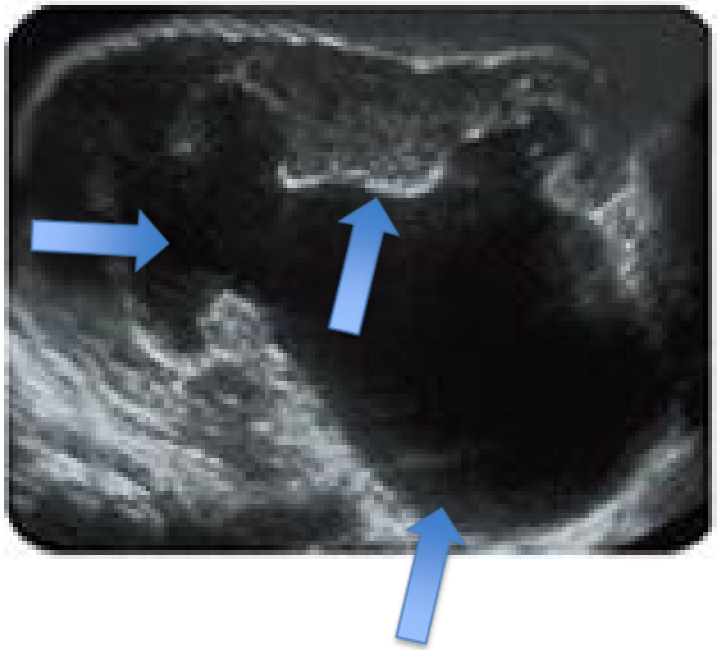


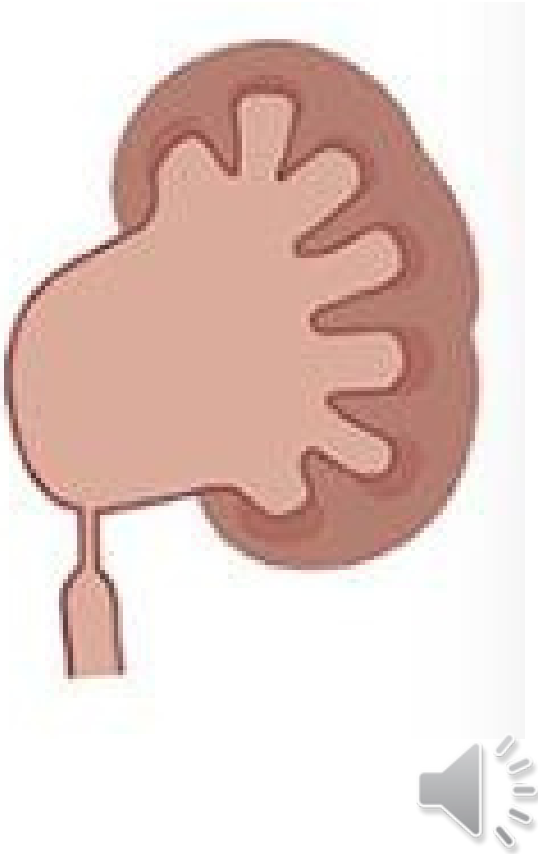
Grade 2: Mild calyceal dilation



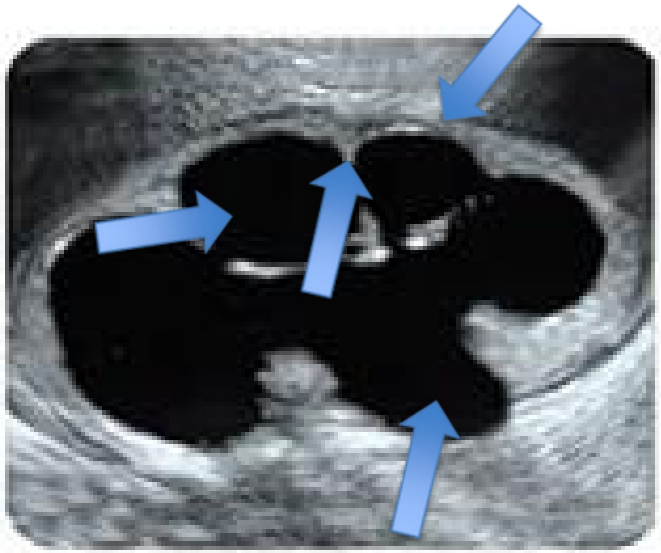


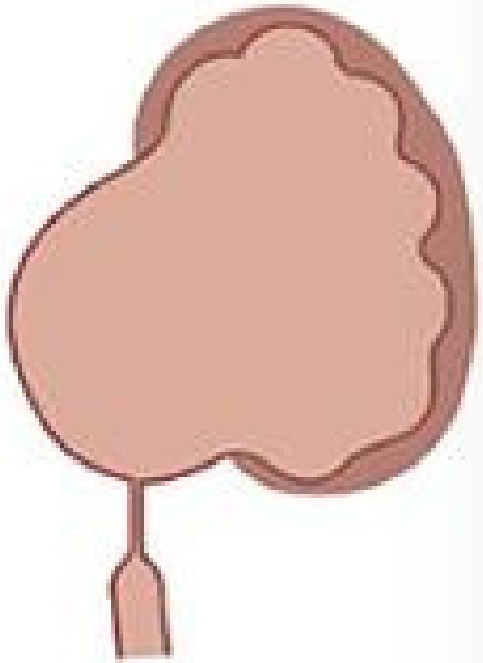
Grade 3: Moderate calyceal dilation, thinning of parenchyma



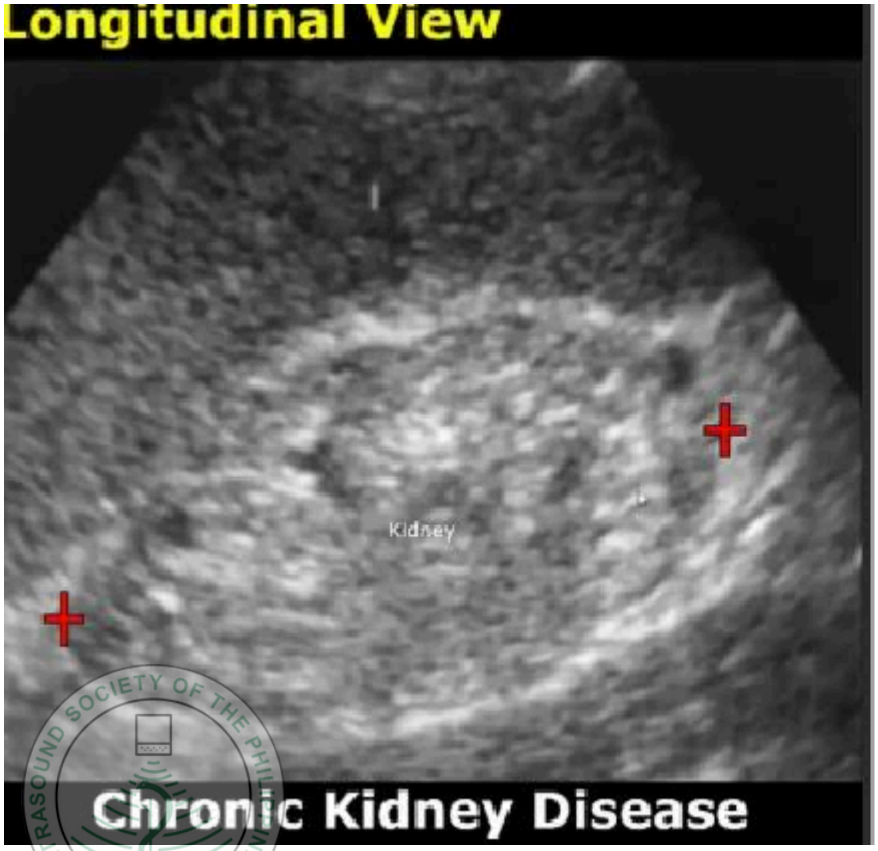


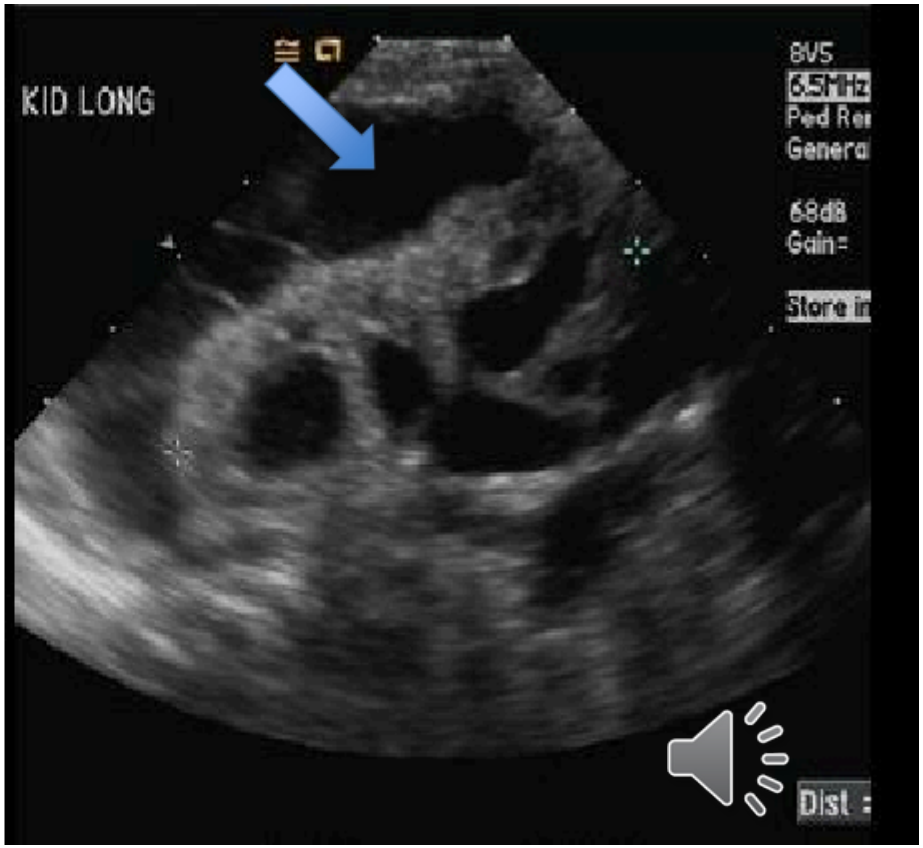
Grade 4: Severe dilation and parenchymal thinning



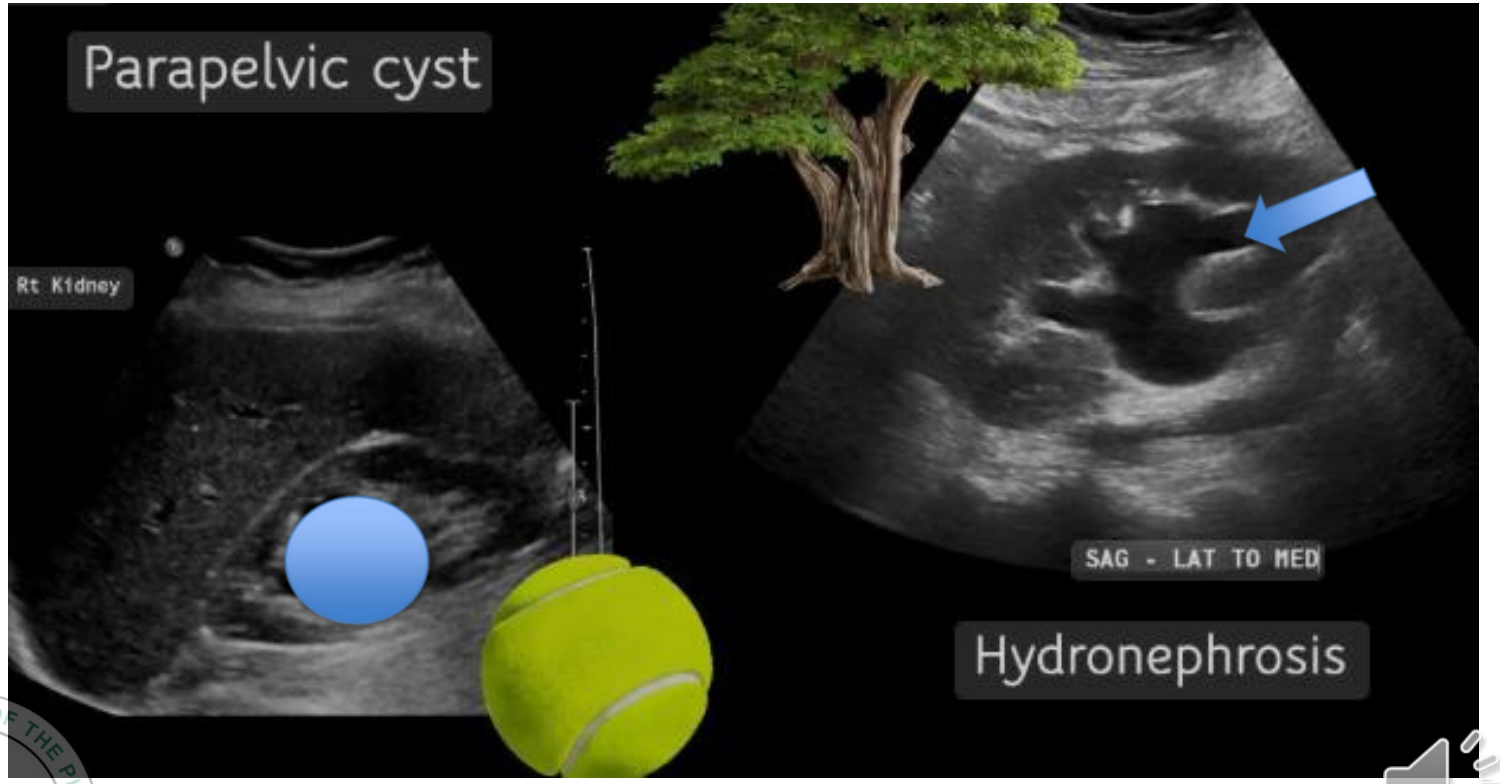


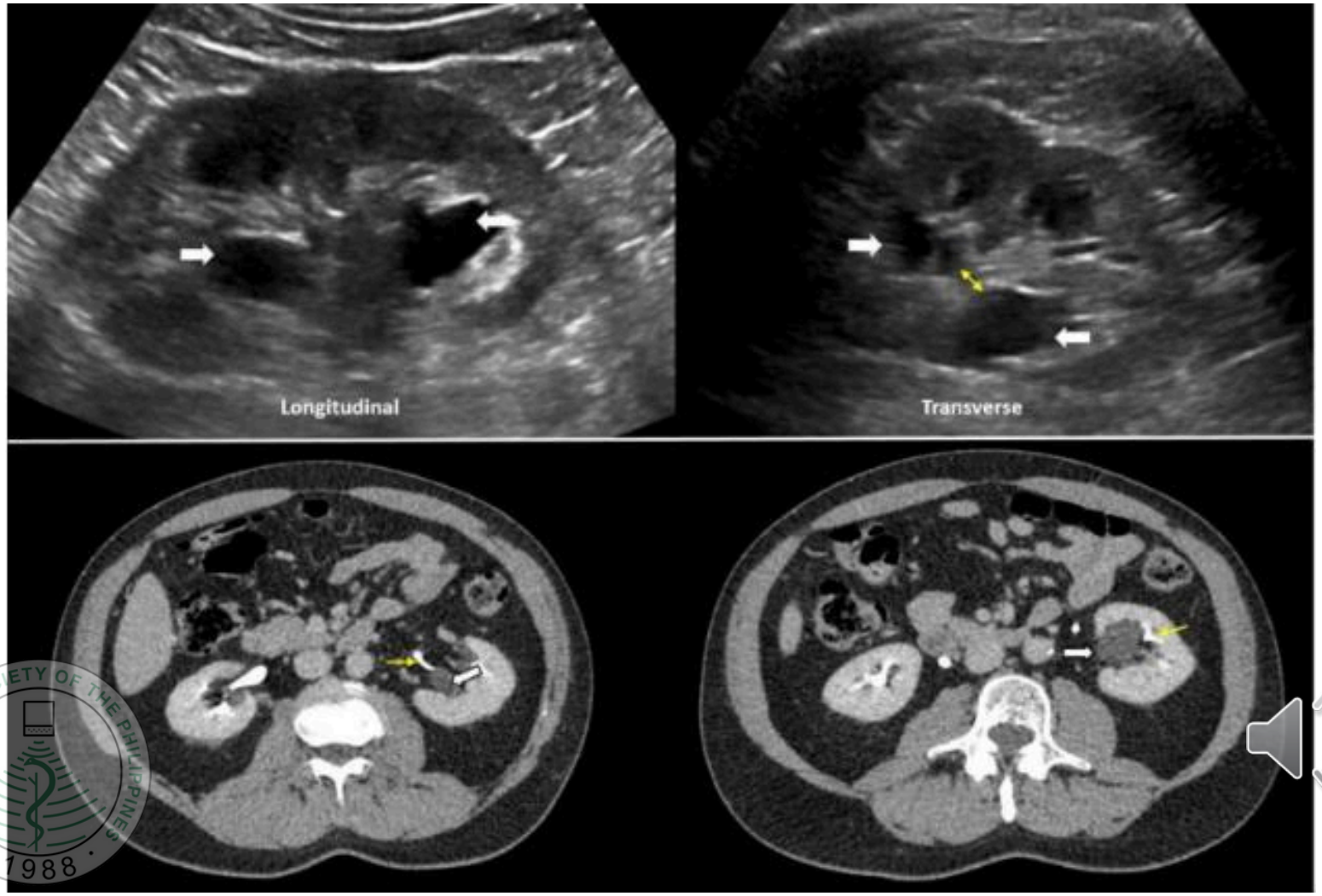
PITFALLS IN ASSESSMENT OF OBSTRUCTION



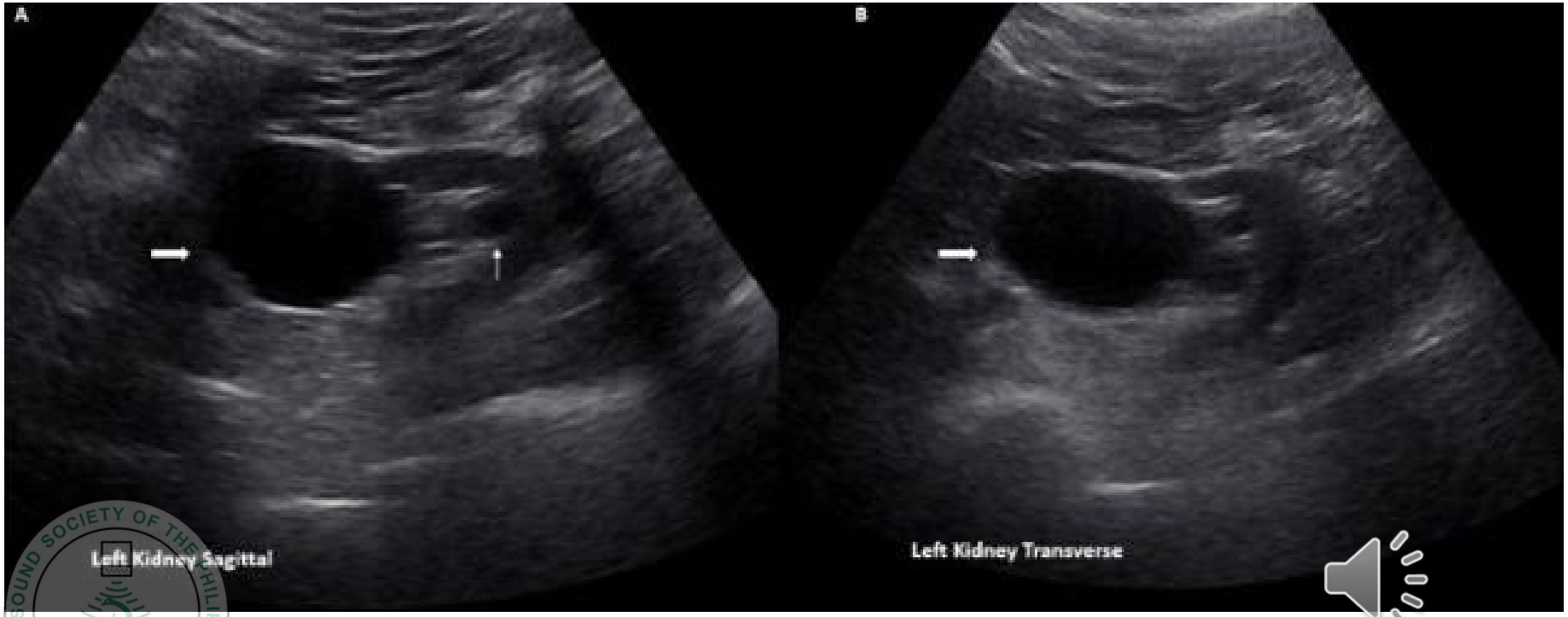


Differential Diagnosis

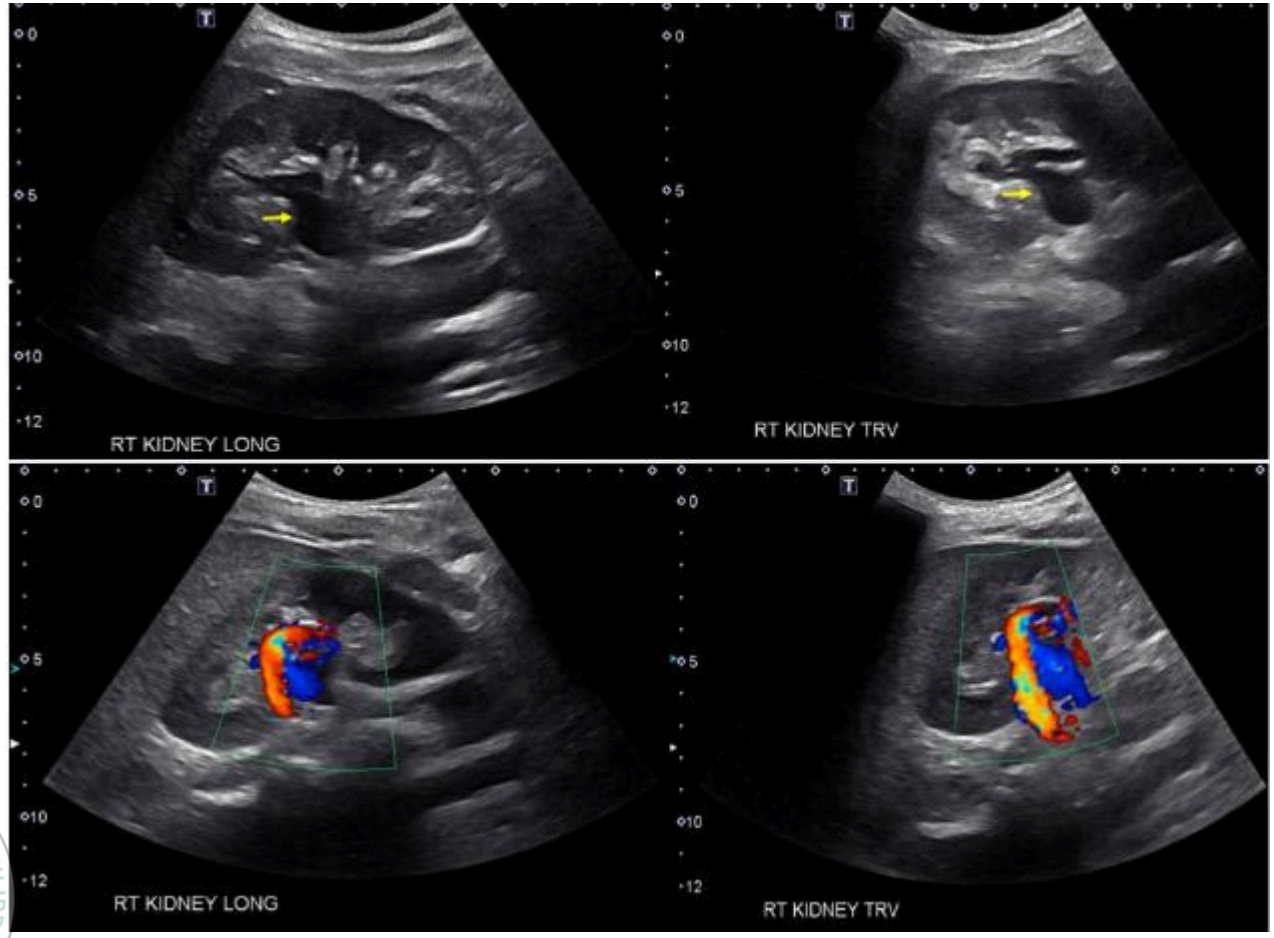


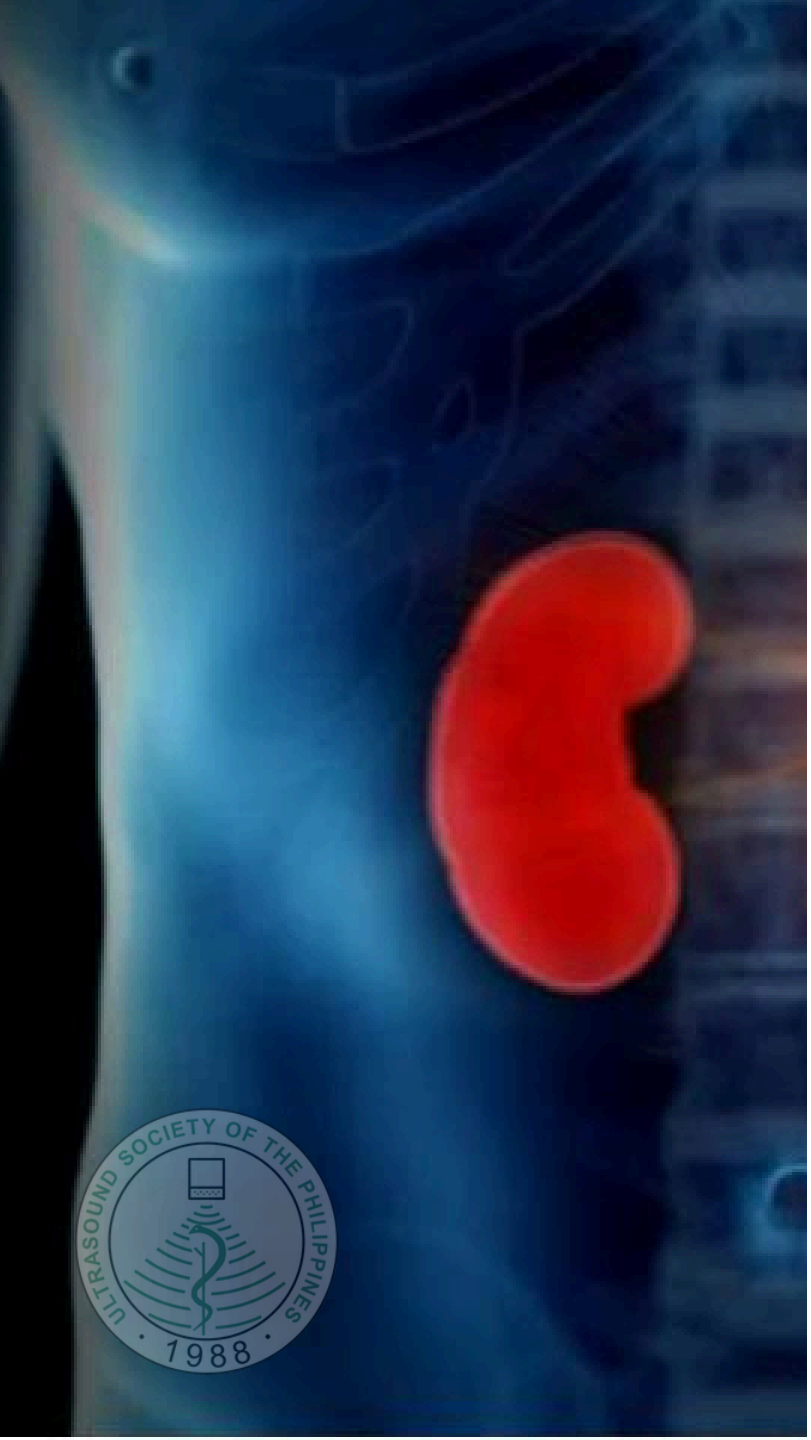

Longitudinal
Transverse

Extrarenal pelvis



Prominentrenalvasculatureand vascular malformations





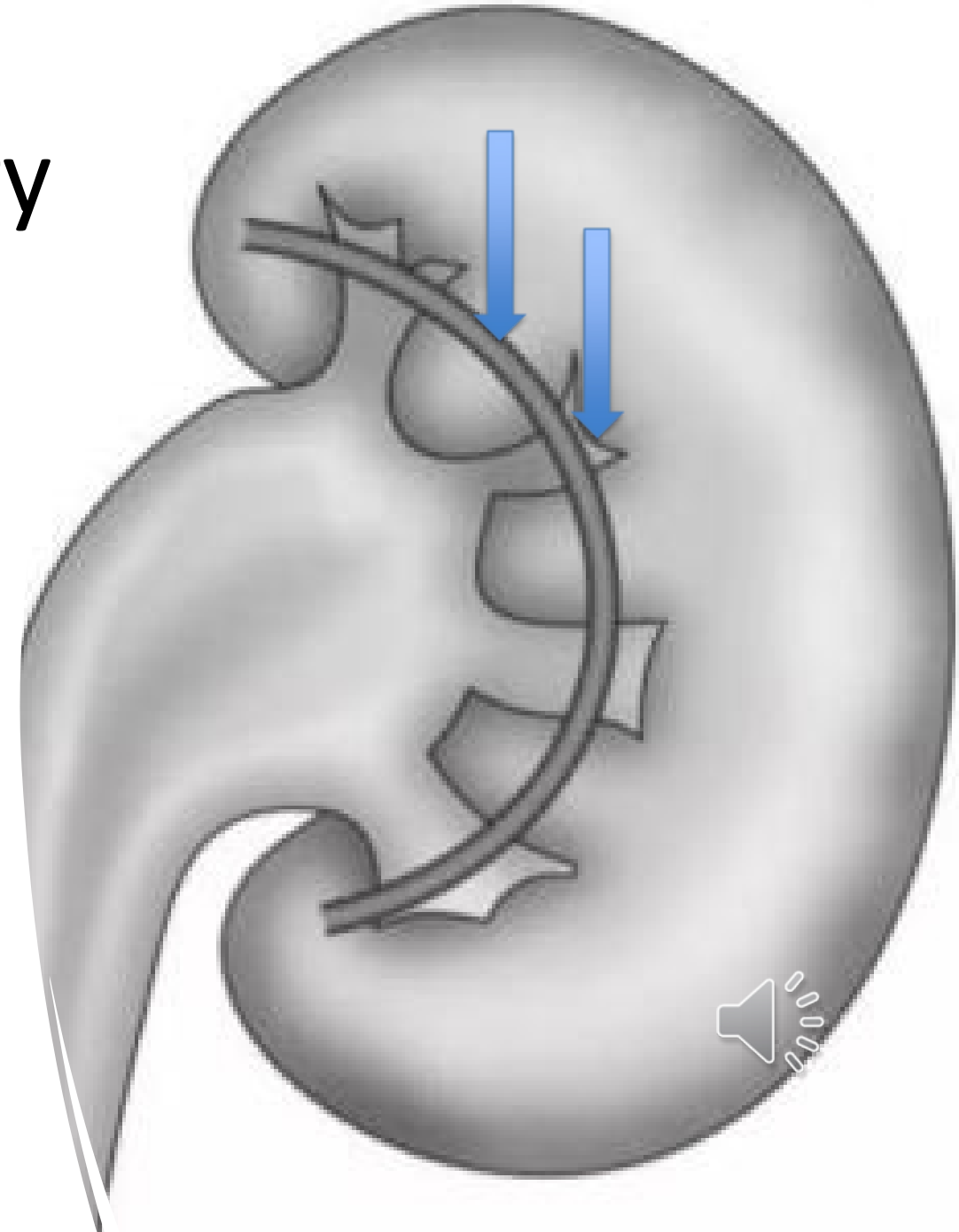
RENAL PARENCHYMAL DISEASE

Interpapillary line

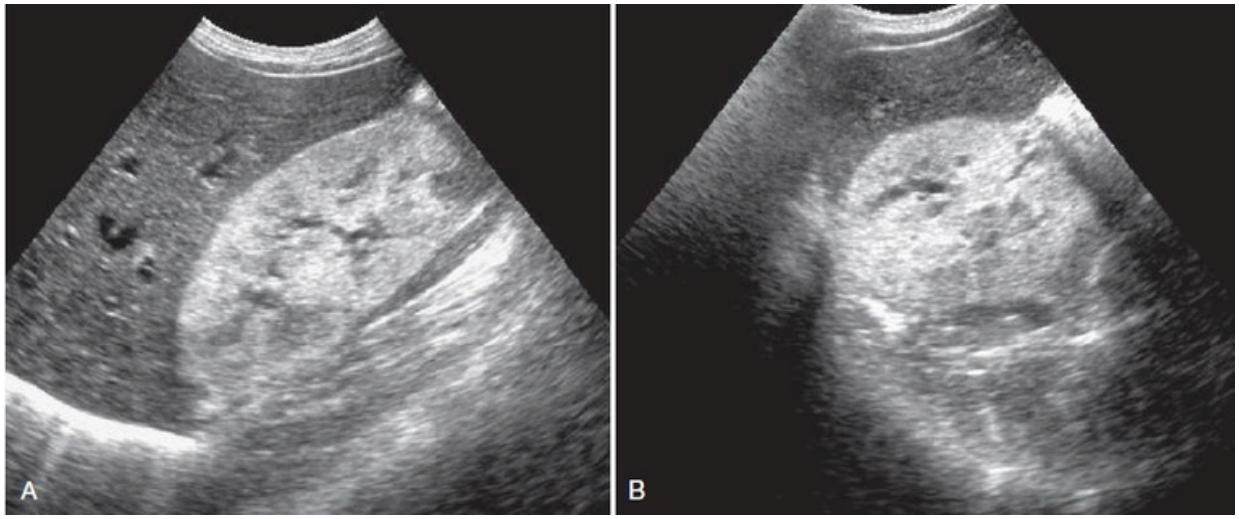
Renal parenchymal thickness: 2.5-3cm

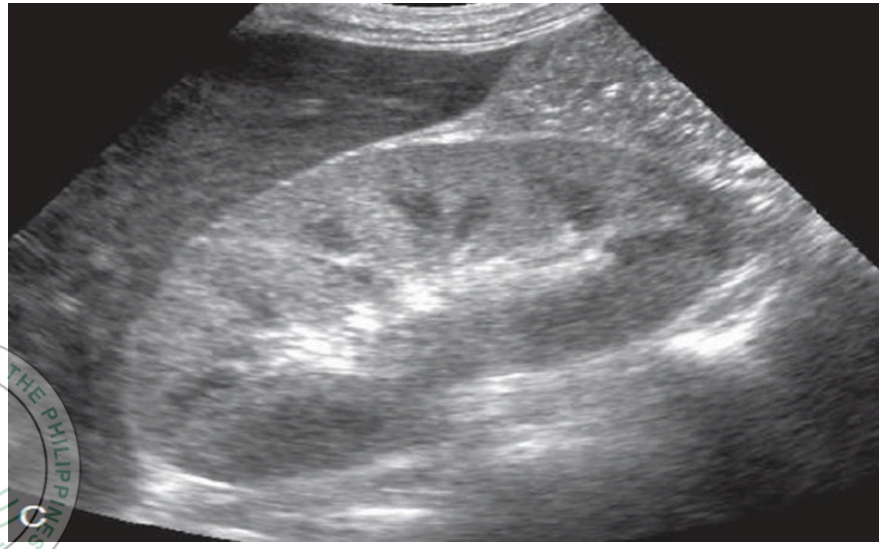
Less than 2 cm: parenchymal loss

Greater than 3.5 cm: indicate mass lesion or infiltration



Acute disease





- Acute tubular necrosis
- glomerulonephritis

Causes of bilateral large smooth kidneys

Proliferative/necrotizing disorders
- Acute glomerulonephritis
- Polyarteritis nodosa (microscopic form)
- Systemic lupus erythematosus
- Wegener's granulomatosis
- Diabetic glomerulosclerosis

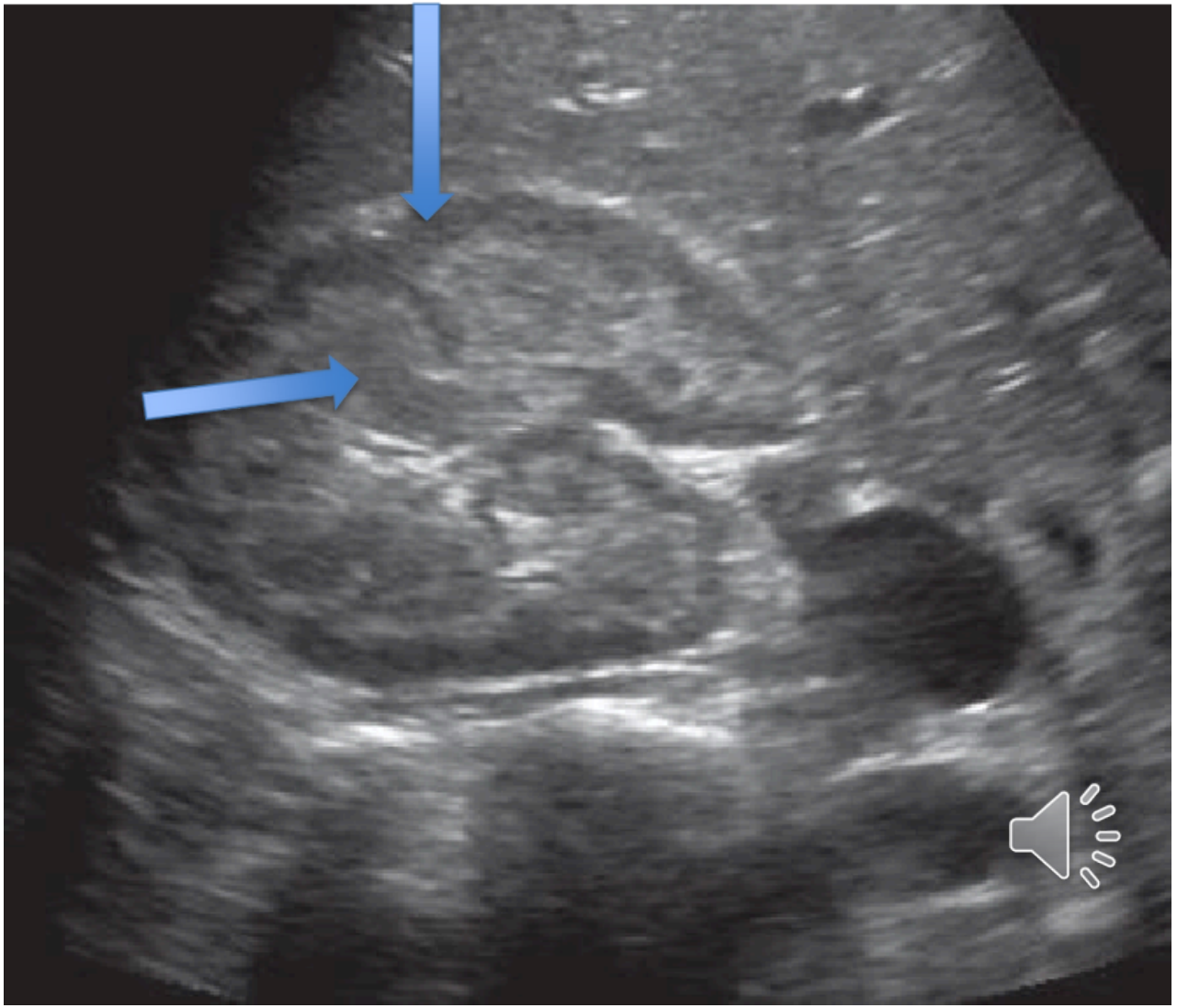
Plasma cell dyscrasias
- Multiple myeloma
- Waldenstrom's macroglobulinemia
- Amyloidosis

Abnormal fluid accumulation
- Acute tubular necrosis
- Acute cortical necrosis

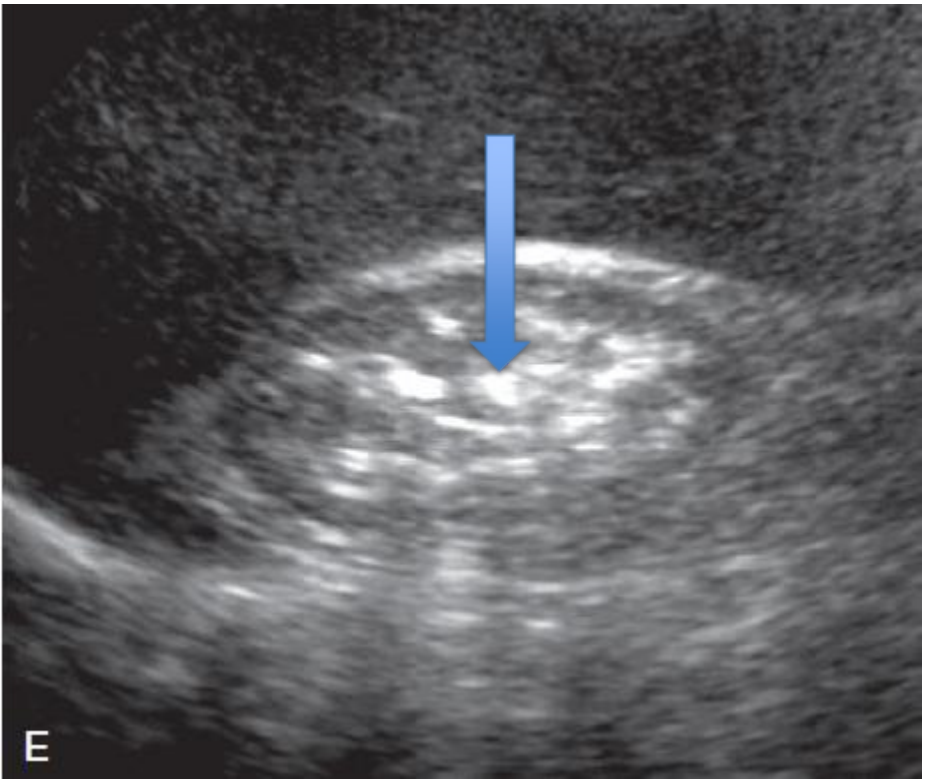
Acute blockage of tubules
- Acute urate nephropathy
- Tamm–Horsfall protein
- Acute myeloma nephropathy

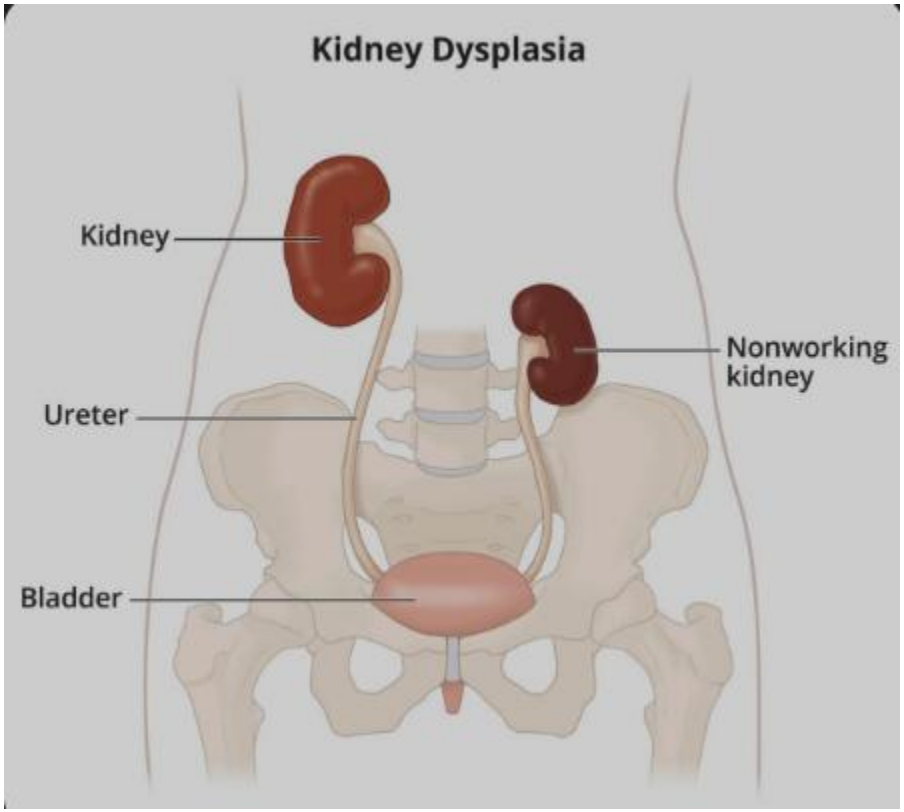
Others
- Autosomal recessive polycystic kidney disease
- Leukemia
- Fabry's disease

Acute Cortical Necrosis

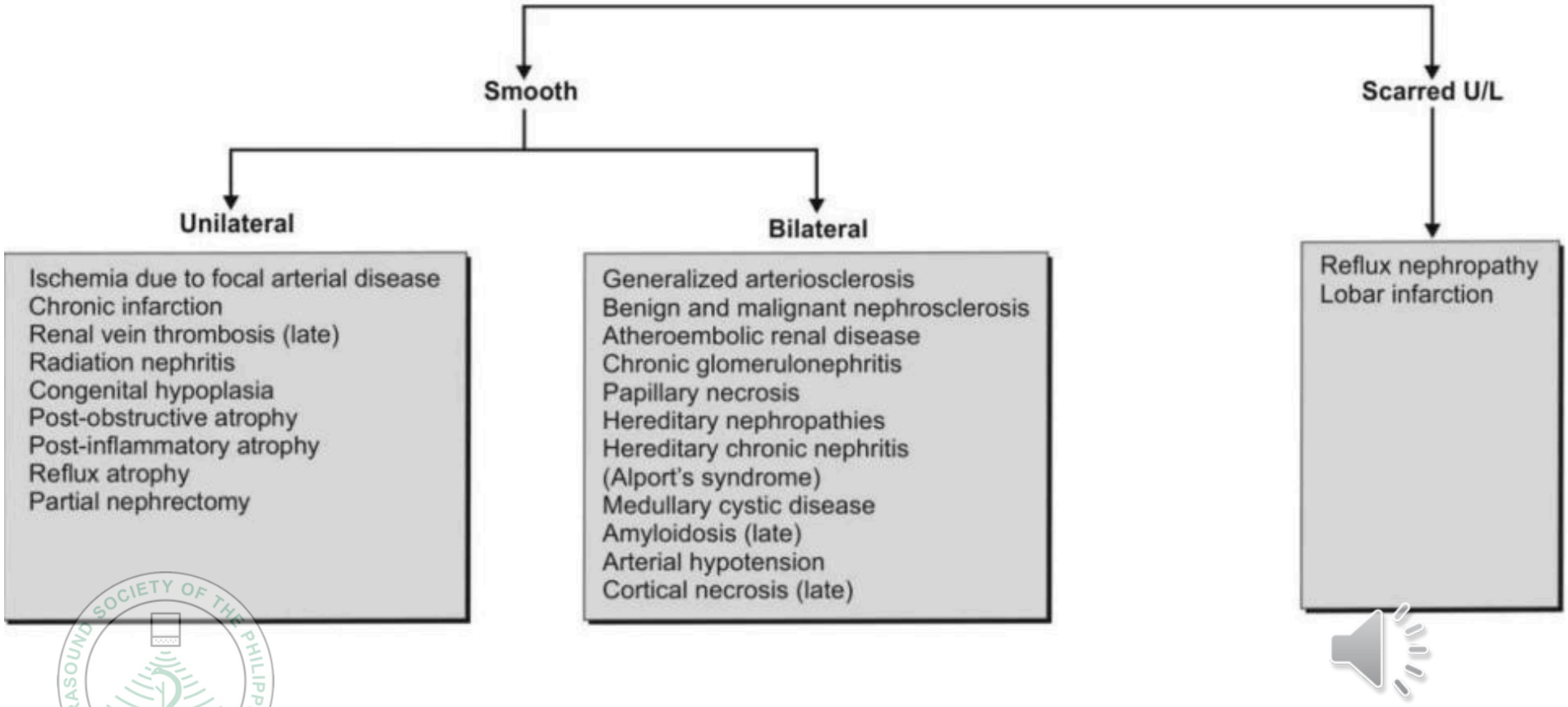


Chronic renal parenchymal disease

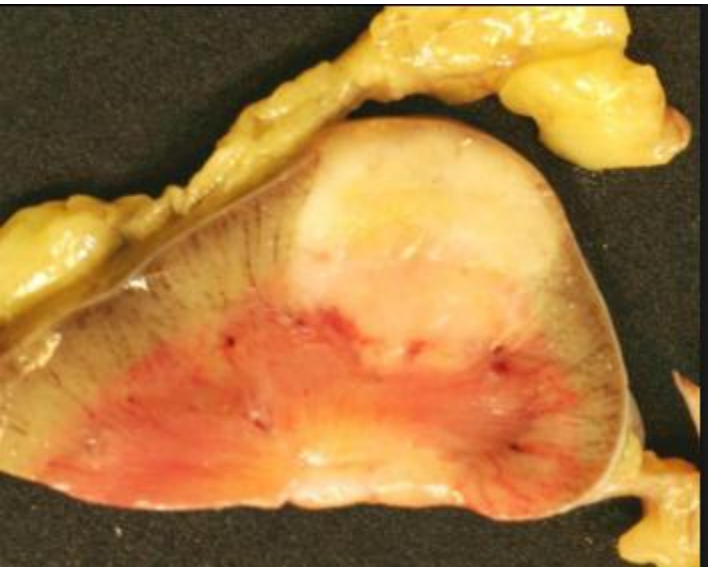


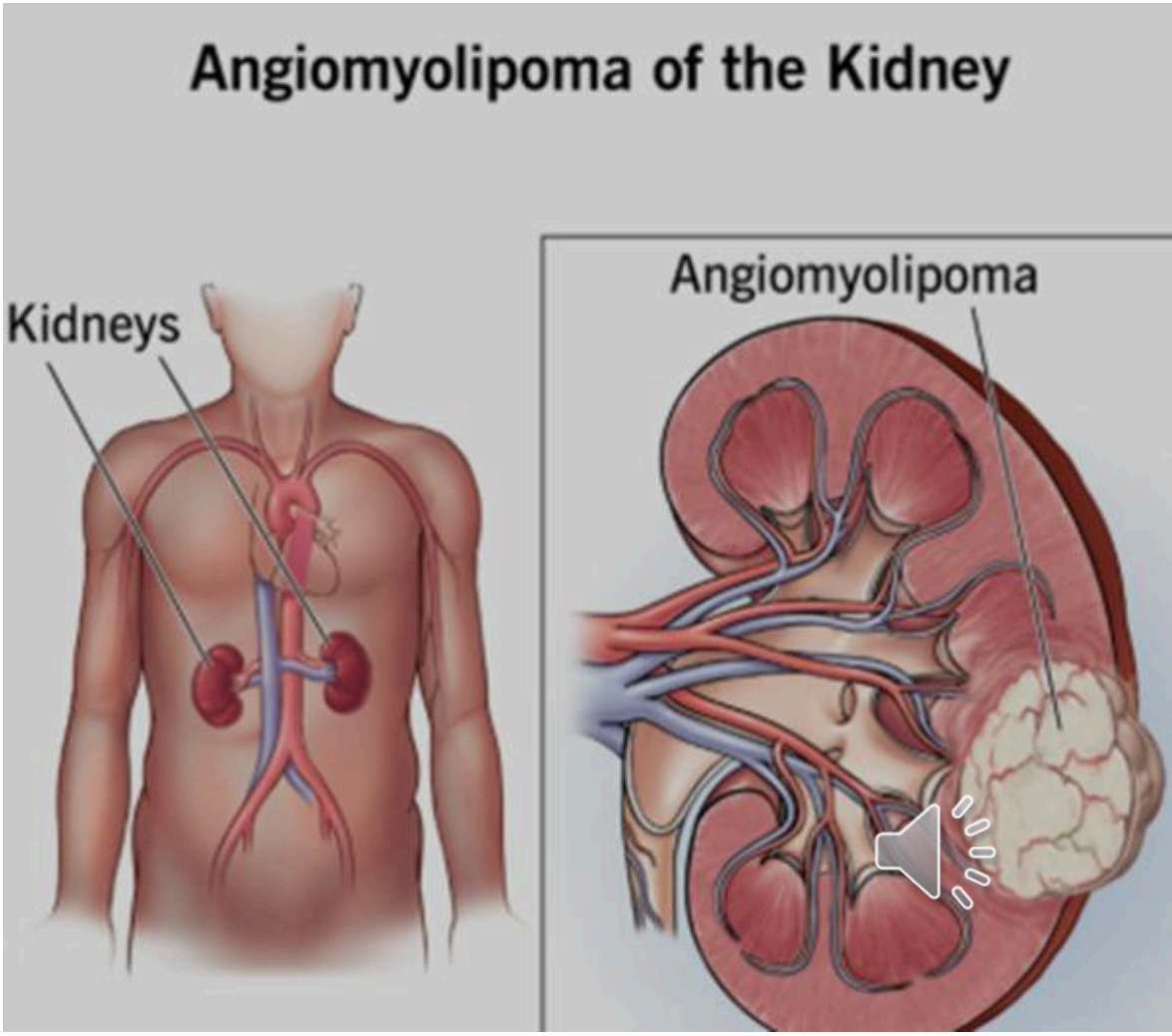


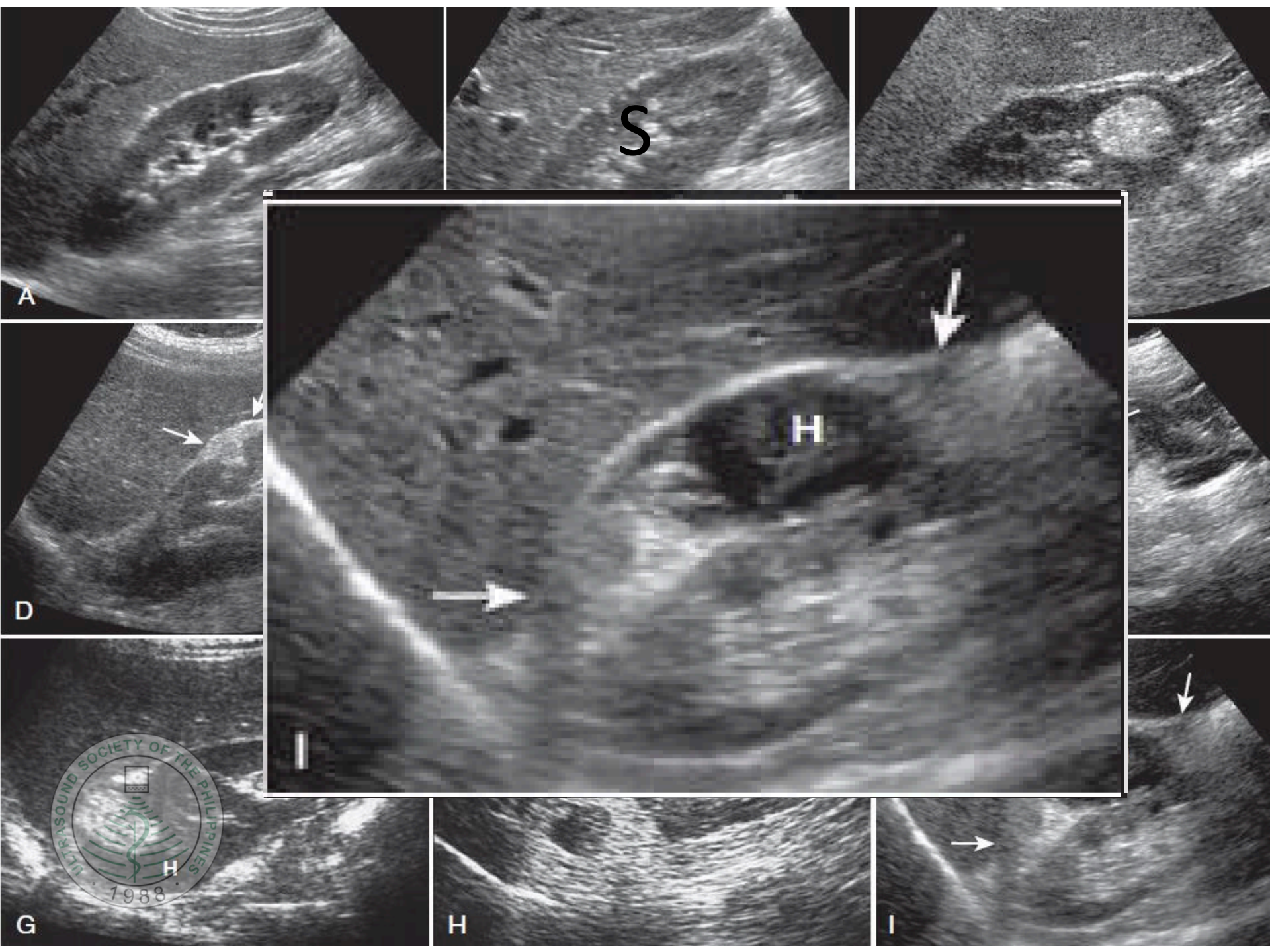
Causes of small kidney



Renal angiomyolipoma



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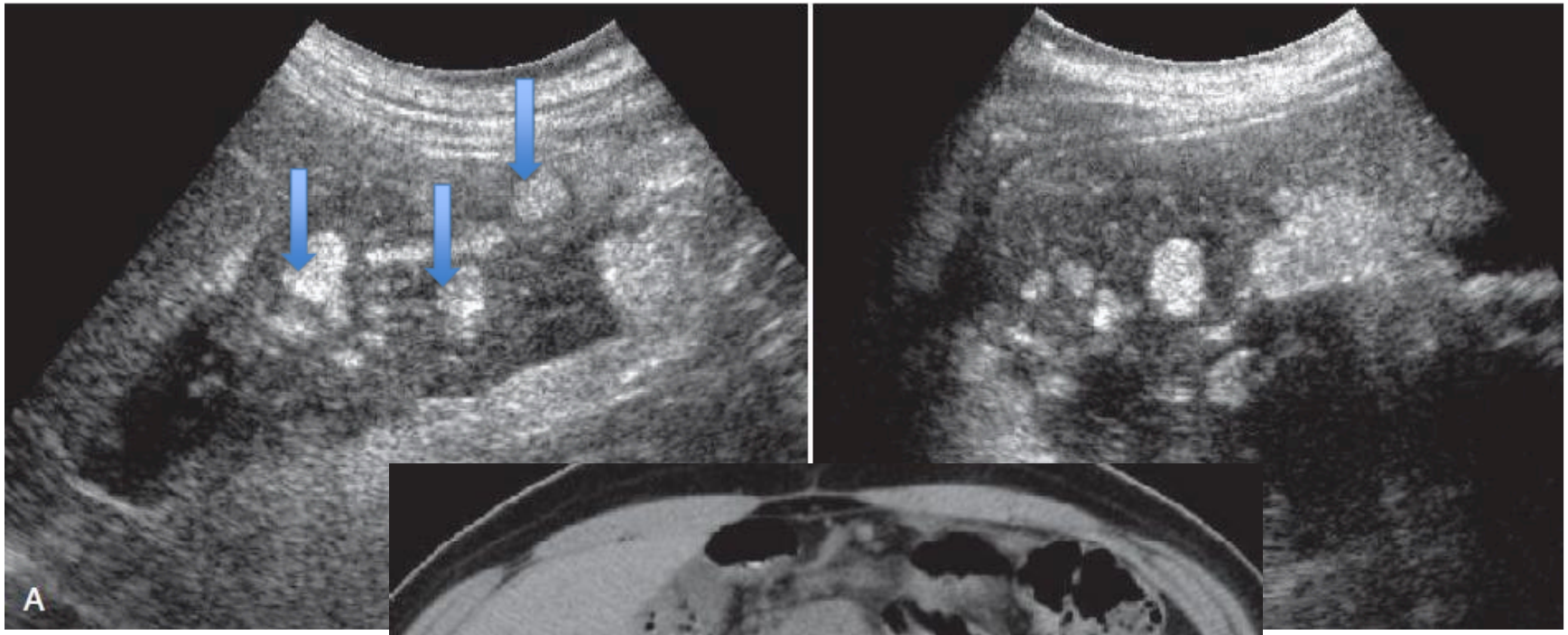
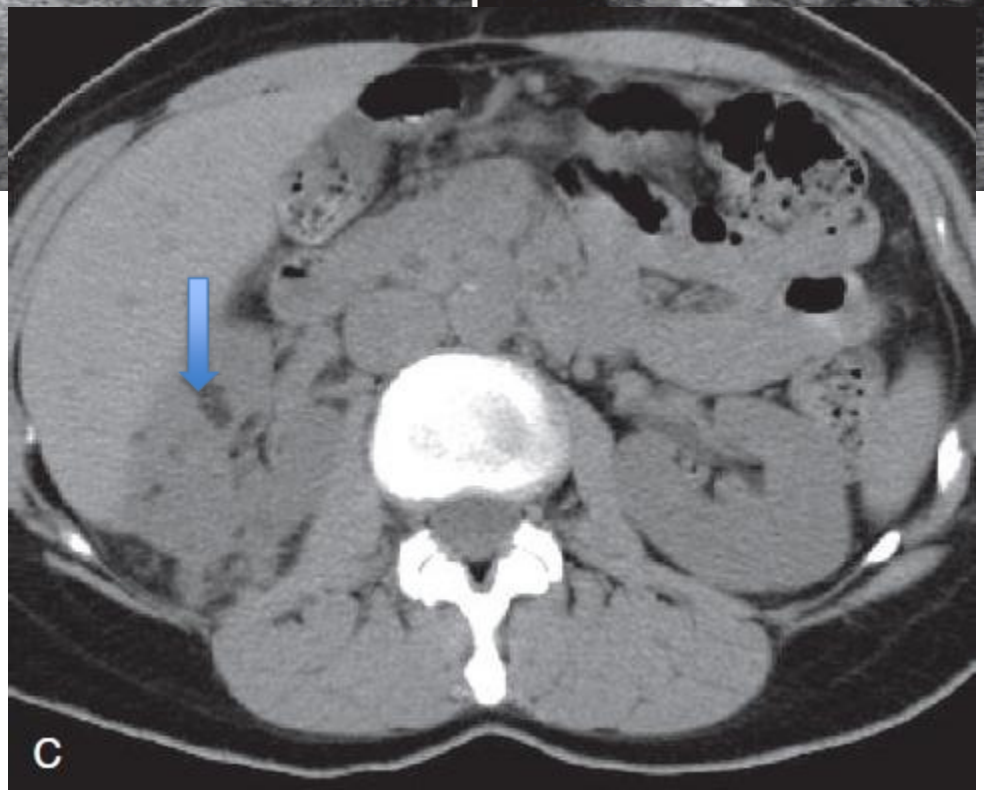
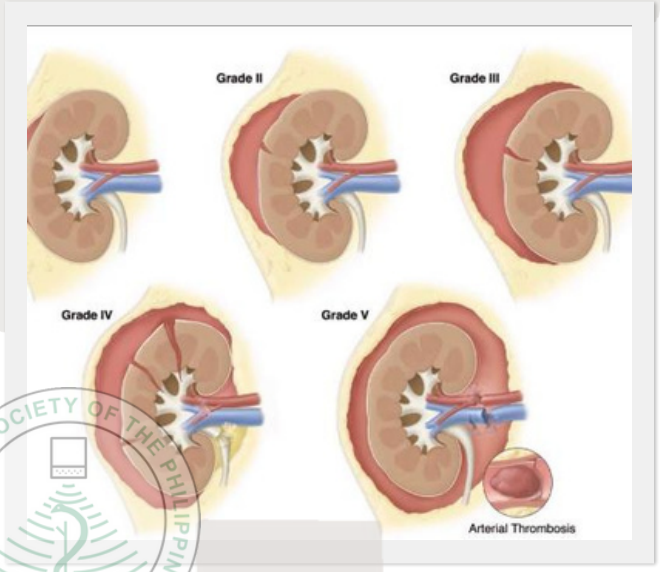
TUBEROUS SCLEROSIS





RENAL TRAUMA

Categories of renal injury



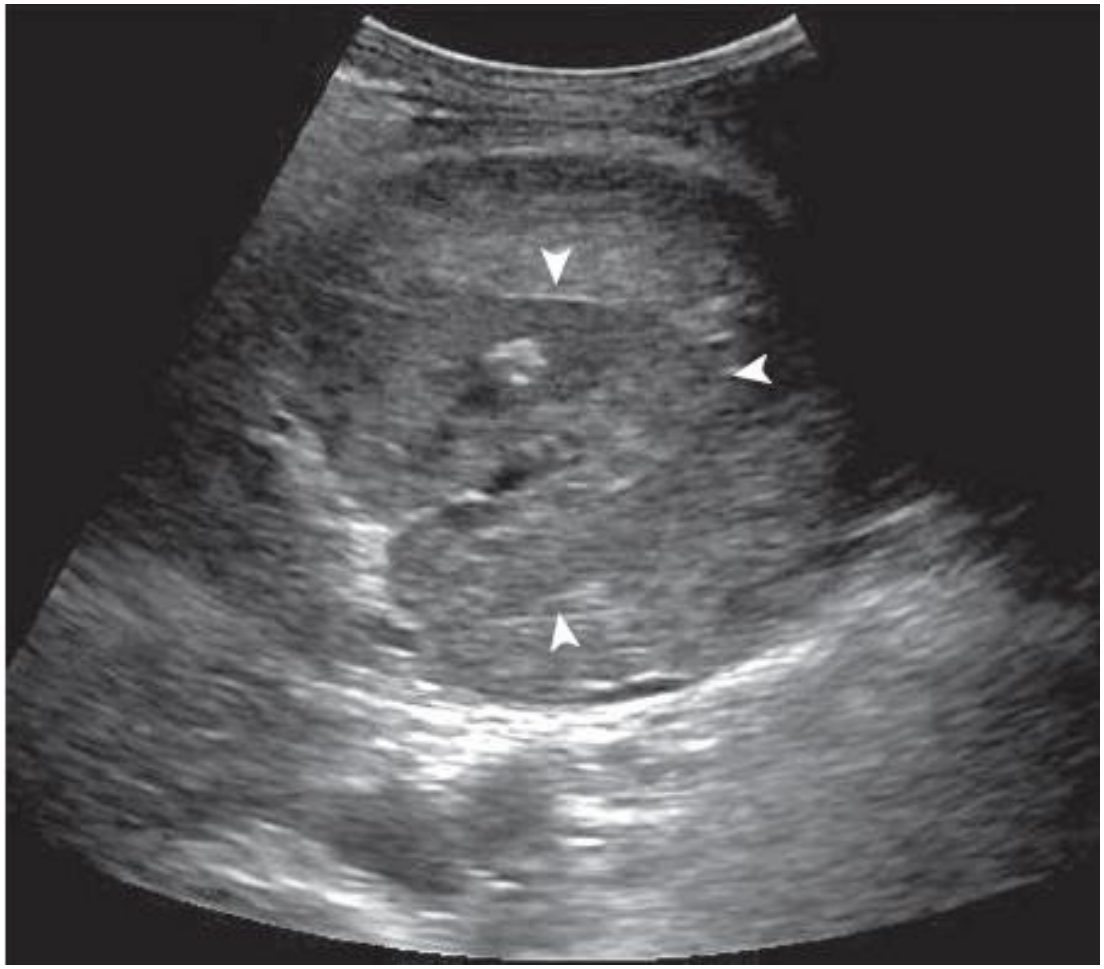
- **I: Minor injury** (75%-85%): contusions, subcapsular hematoma,
- small cortical infarct and lacerations that do not extend into
- the collecting system

- **II: Major injury** (10%): renal lacerations that extend into the
- collecting system and segmental renal infarct

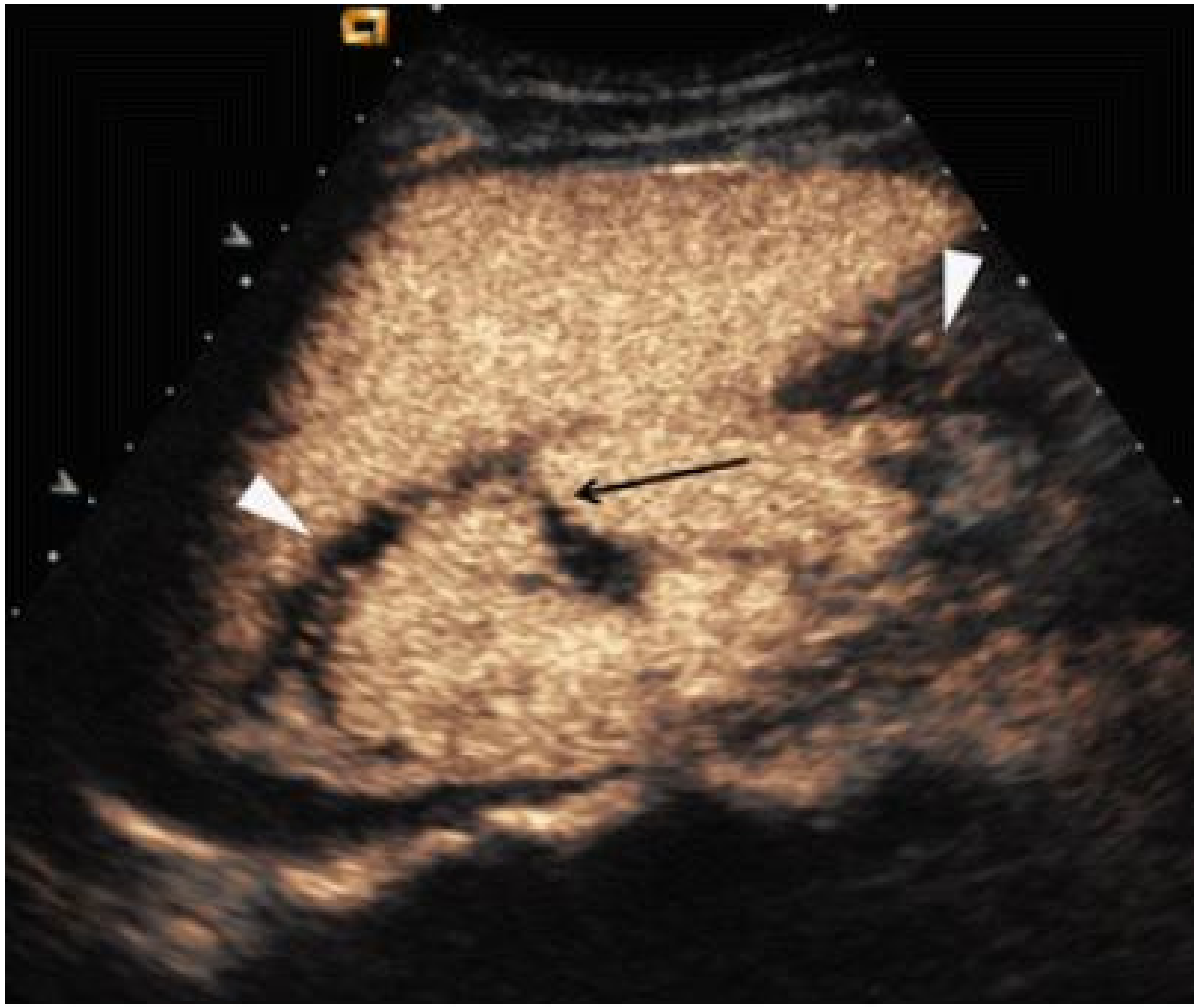
- **III: Catastrophic injury** (5%): vascular pedicle injury and shattered Kidney

- **IV: Uteropelvic junction avulsion**

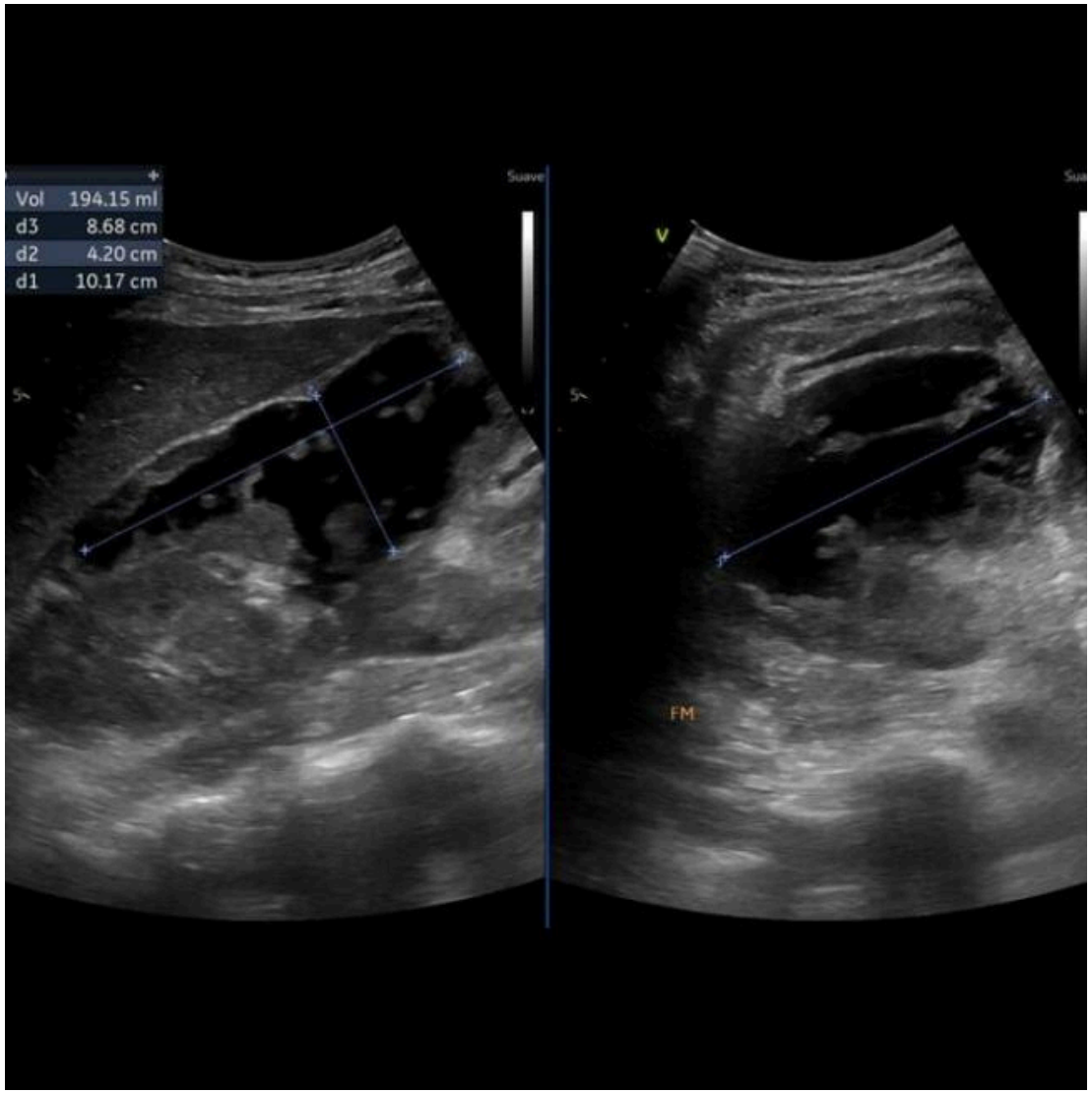
Minor injury



Major injury



Catastrophic injury



Benign urinary bladder tumors

- Mesenchymal bladder tumors
  - 1% of all bladder tumors

Leiomyomas

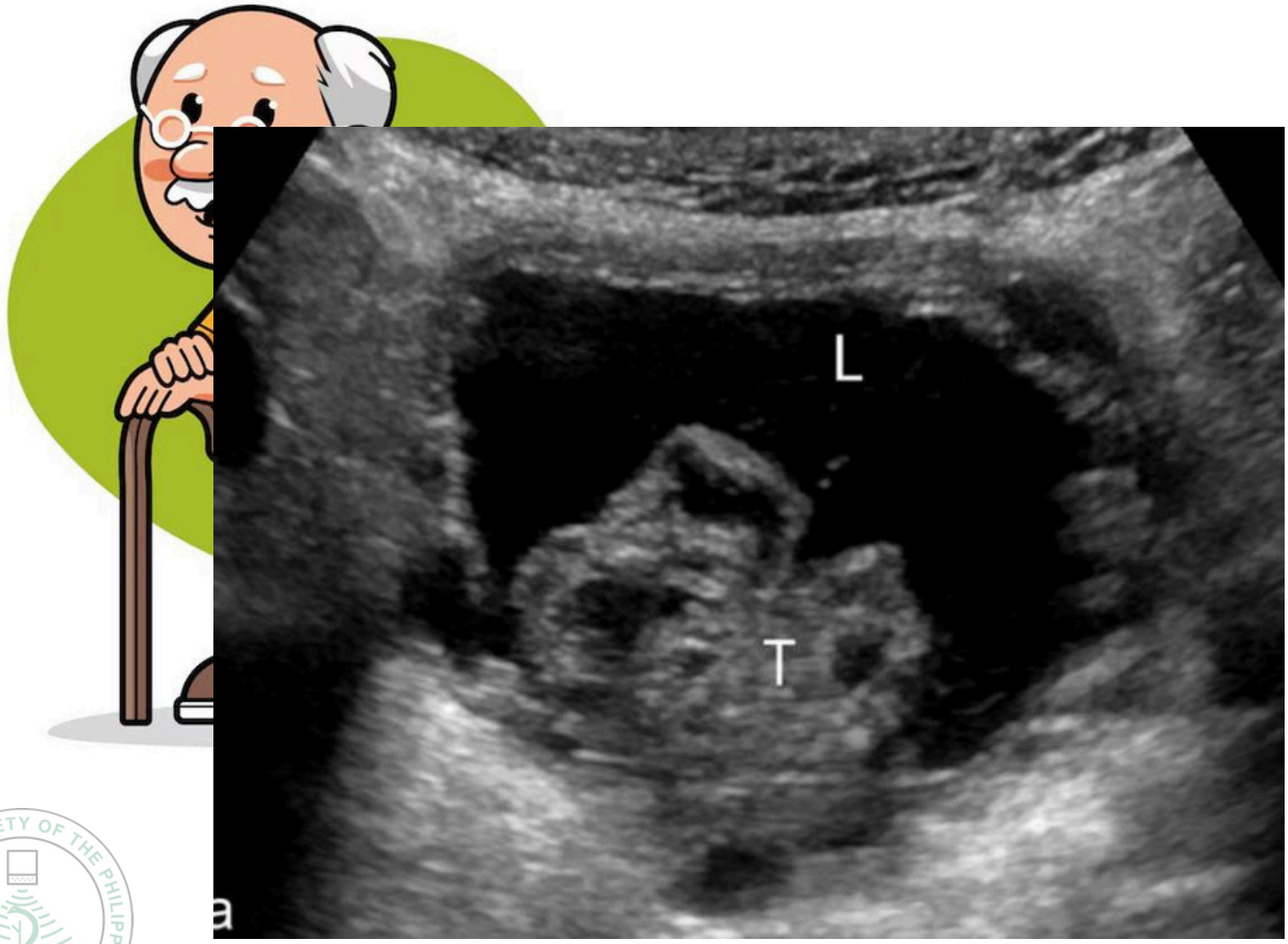
-Most common benign bladder tumors

- Malignant Mesenchymal bladder tumors
  - Most common leiomyosarcoma and rhabdomyosarcoma

Malignant Urinary bladder tumors

Urothelial carcinoma in the urinary bladder is 50x more common than renal pelvic UC

- Superficial = 70%
- Invasive =30%



Urothelial carcinoma

PAPILLARY

- Exophytic,polypoidlesions with stalks

- Typically, low-grade

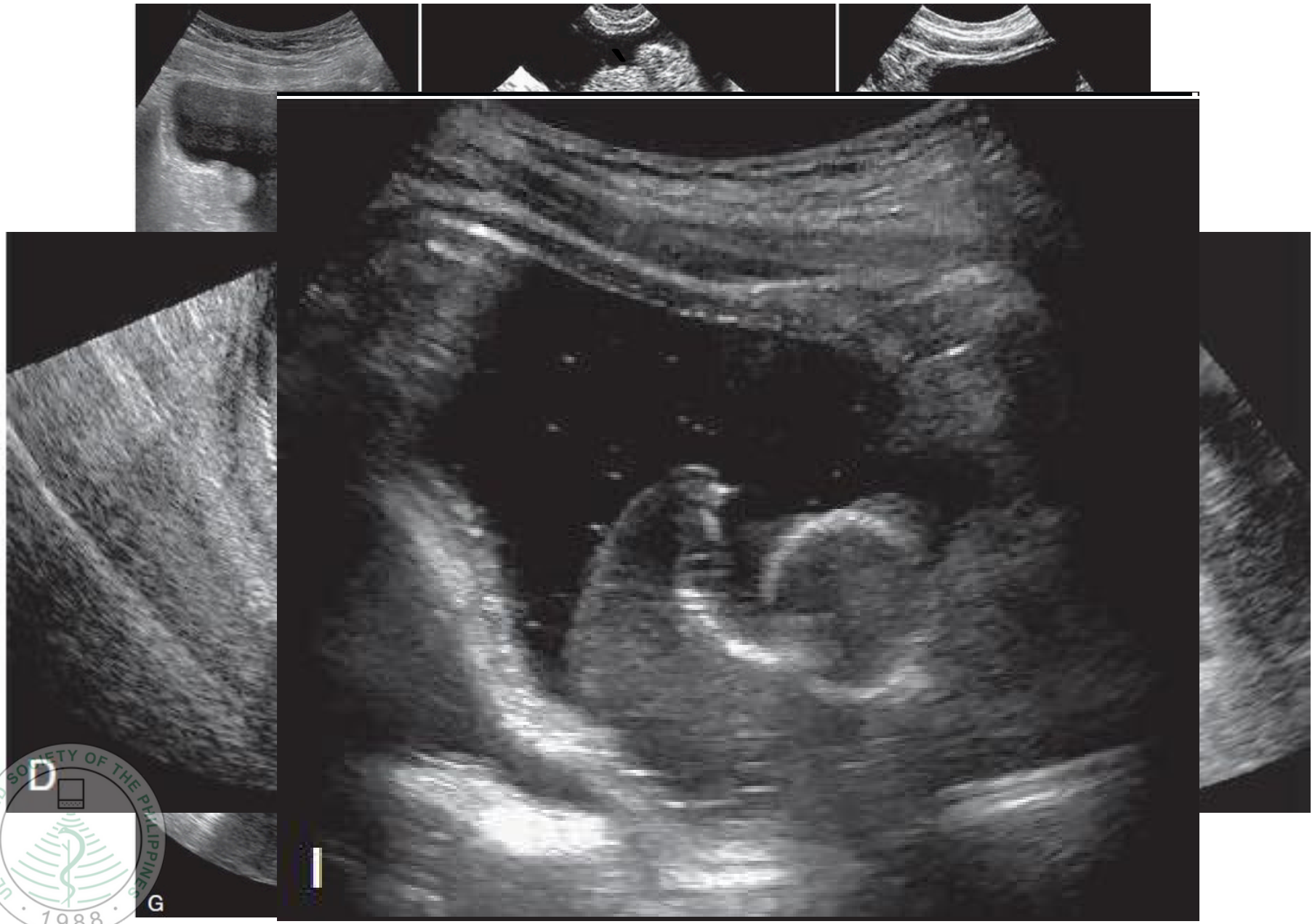
-Slowinfiltration and late metastasis

NONPAPILLARY (SESSILE)

- Nodular or flattumors

-Mucosal thickening (hard to detect on CT)

-Usuallyhigh-grade and infiltrative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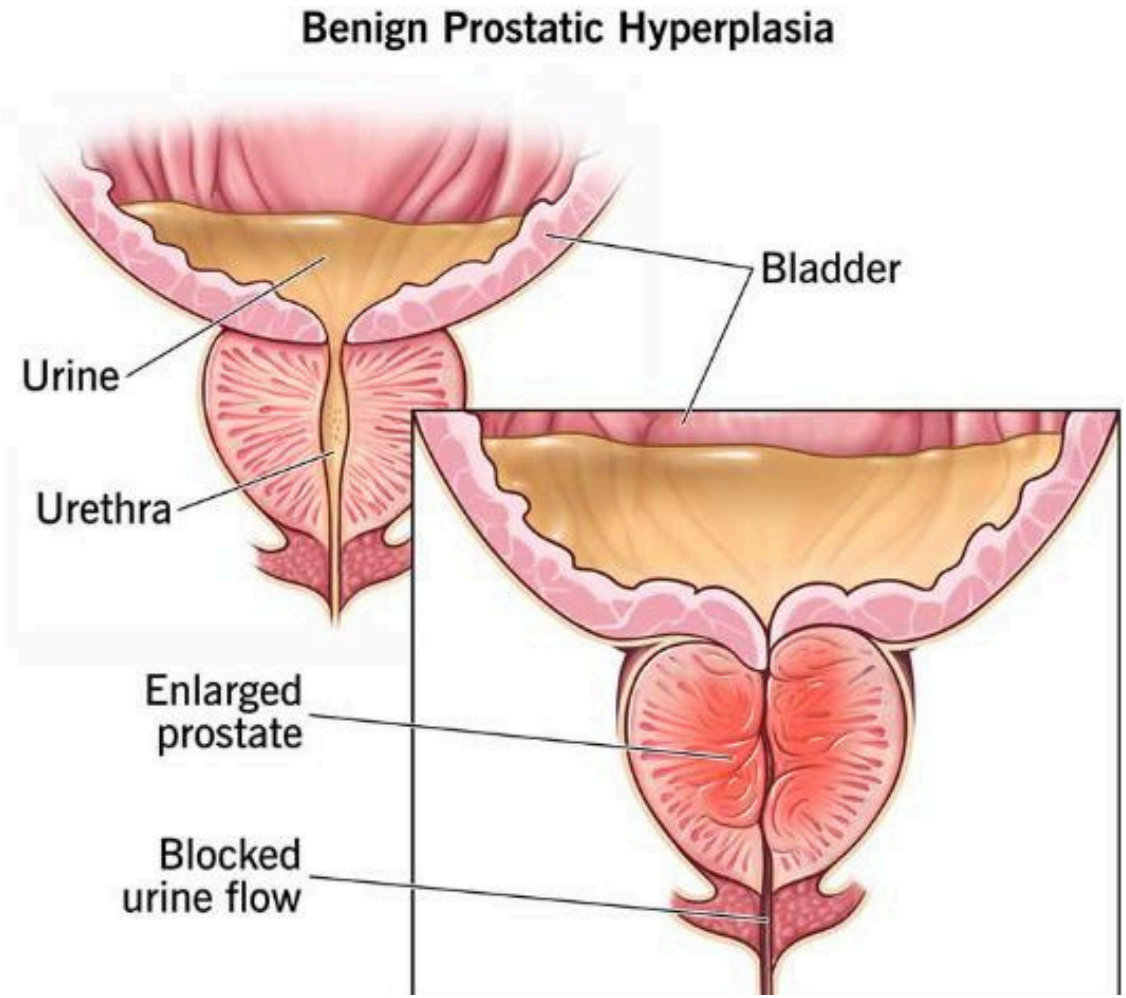
BENIGN PROSTATE HYPERPLASIA



What is Benign Prostatic Hyperplasia (BPH)?

- BPH is a non-cancerous enlargement of the prostate gland.
- Common in aging men, typically >50 years old.
- May lead to lower urinary tract symptoms (LUTS).
- Diagnosedclinicallyandconfirmed with imaging such as ultrasound.

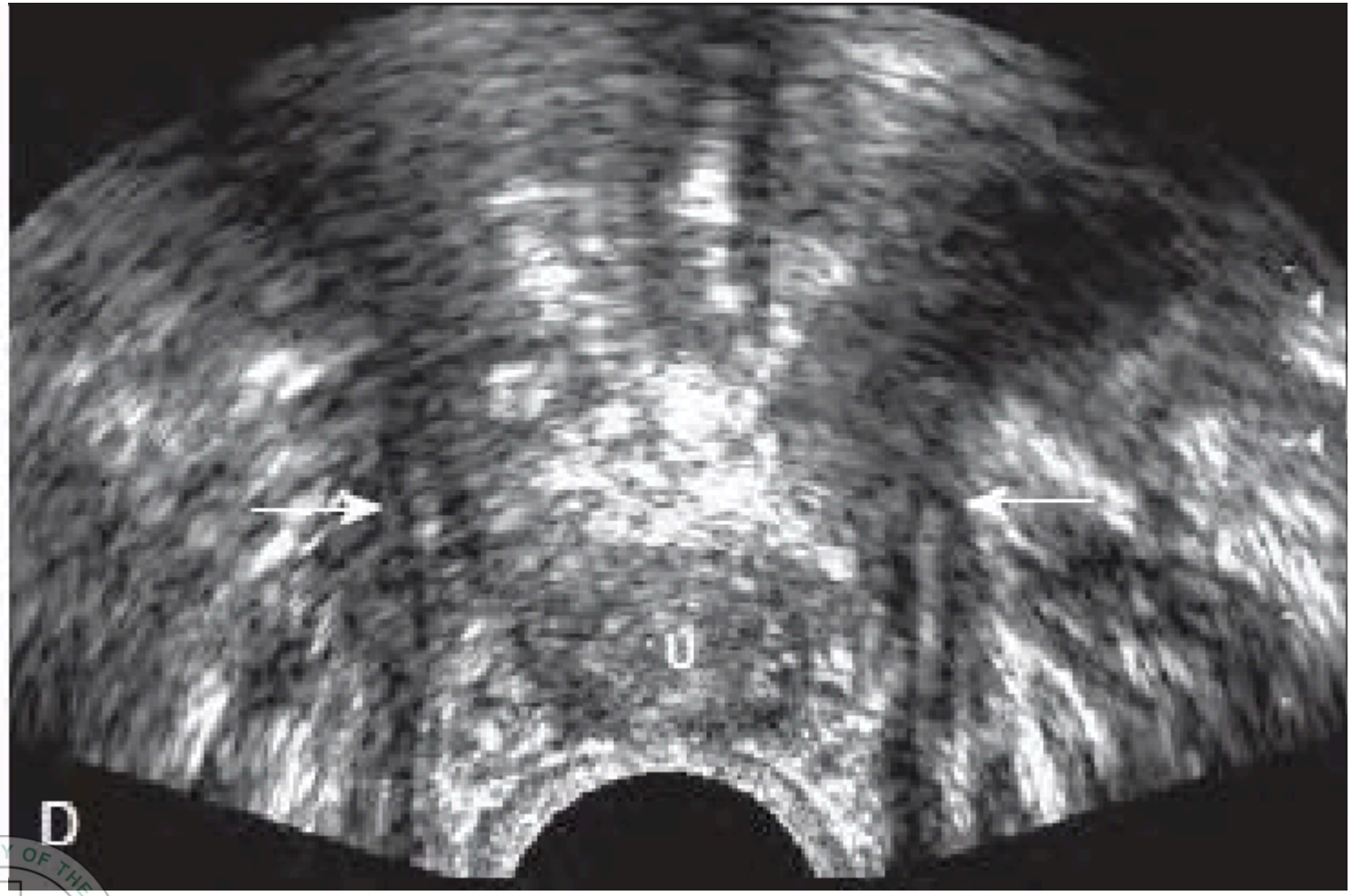
Normal Prostate Anatomy vs BPH

Normal Prostate

- Small
- symmetrical
- Homogeneous echotexture

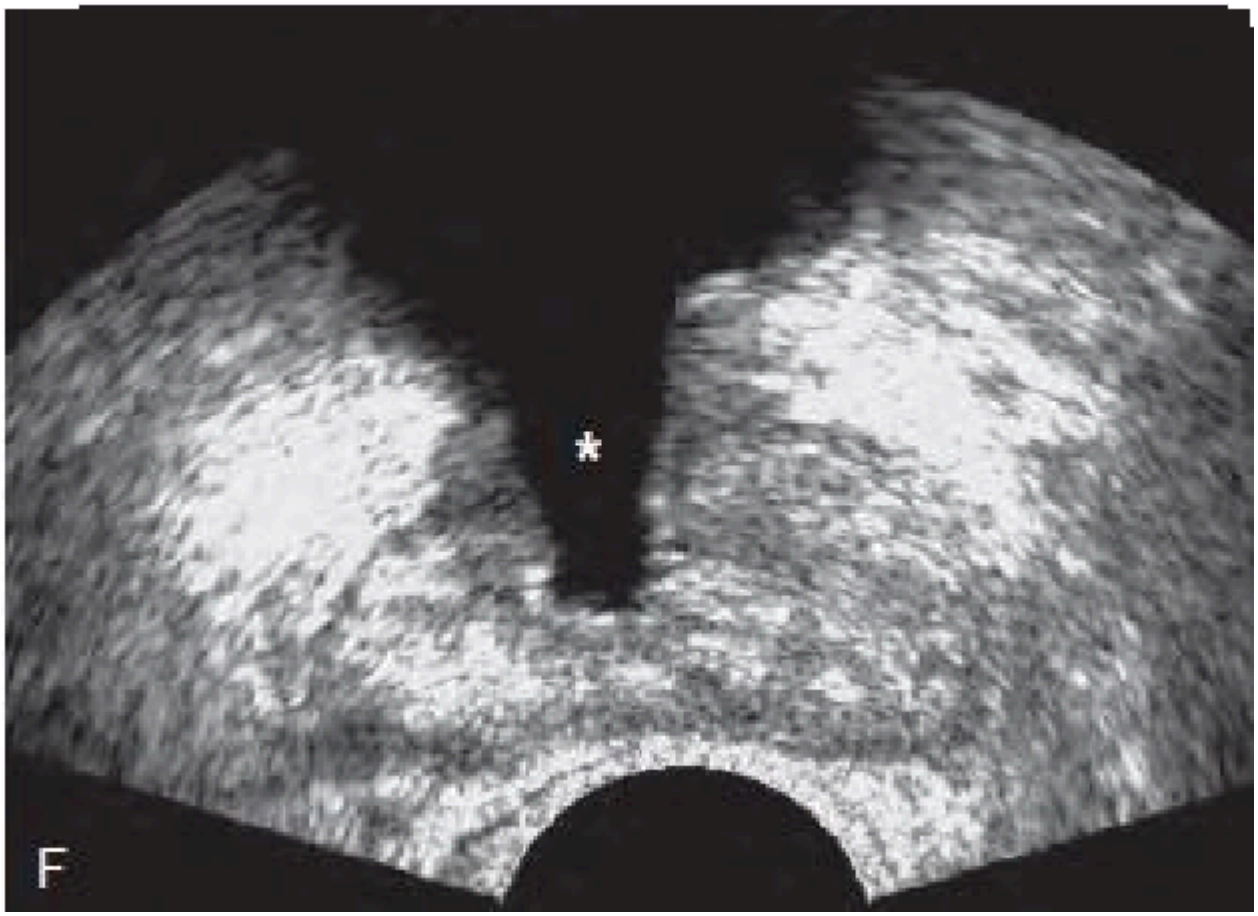
BPH Prostate:

- Enlarged size
- Heterogeneous echotexture
- May have nodules



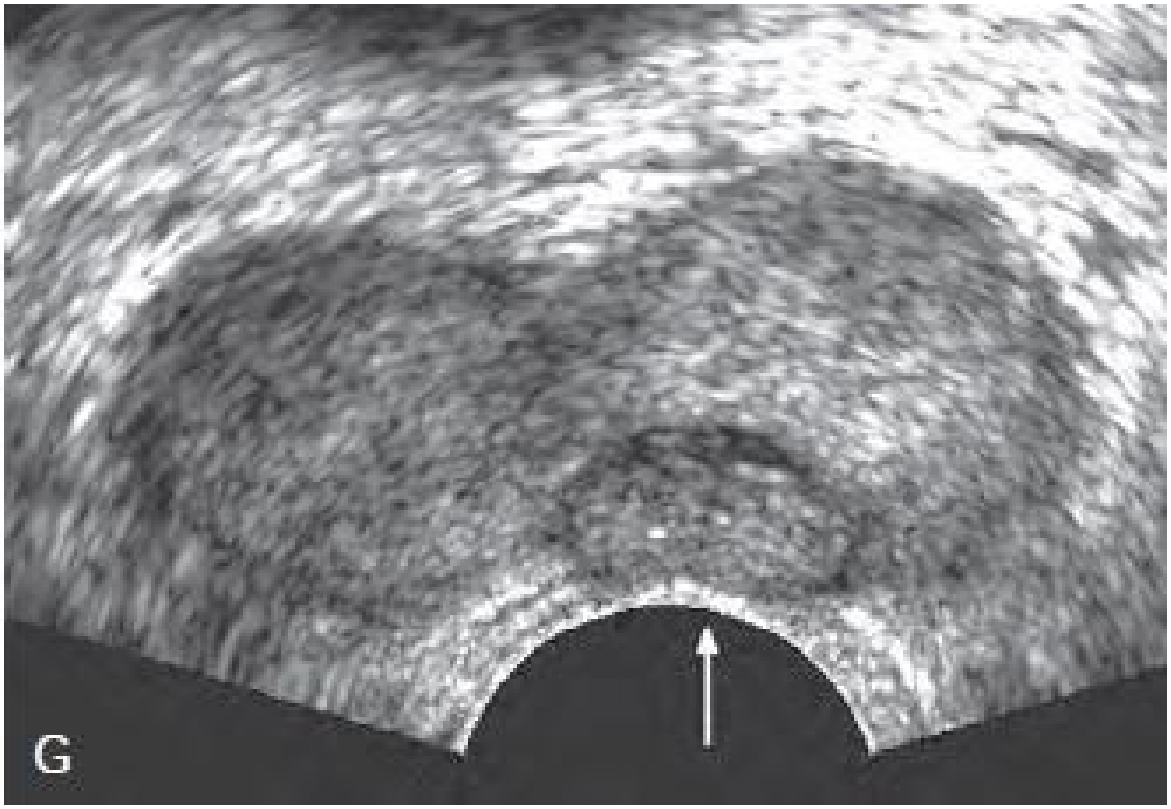
Ultrasound Features of BPH

- Enlarged prostate (>30 cc volume)
- Hypoechoic or heterogeneousappearance
- Median lobe enlargement
- Presence of calcifications
- Post-void residual volume may be elevated



Prostate Volume Measurement on Ultrasound

- • Transabdominal or transrectal approach
- ••Prolate ellipsoidformula:(Length×Width × Height) ×0.52
- •• Volume >30 cc suggestive of BPH
- •• Check post-void residual urine volume



Thank you