



비뇨기영역에서의 초음파의 유용성

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비뇨의학과에서 초음파 이용

- TRUS로 전립선 크기 측정 및 전립선암 감별
- Acute scrotum – DDx torsion or Epididymitis
- Kidney US로 Renal mass, Cyst, 수신증, 신장 결석 진단
- Bladder US로 방광 내 종괴, 결석 확인하거나 방광 잔뇨 측정

US of the Prostate

전립선초음파 적응증

- 전립선 치료 전후로 전반적인 전립선 관찰 및
용적 측정
- 전립선 조직검사 시 초음파 유도
- 전립선염, 전립선농양
- 전립선 및 부속기관 선천성 기형 의심시
- 불임
- 혈정액증

전립선초음파 방법

- 전립선을 다양한 면으로 base부터 apex까지 관찰
- 전립선용적 확인
- 전립선 내 종괴, echogenicity, 대칭성, 경계의 연속성, 방광 내 돌출 정도등을 확인
- 정낭의 모양 및 전립선 내 사정관까지 확인, 불임의 경우에는 사정관 까지 확인 필요

- 정상 전립선

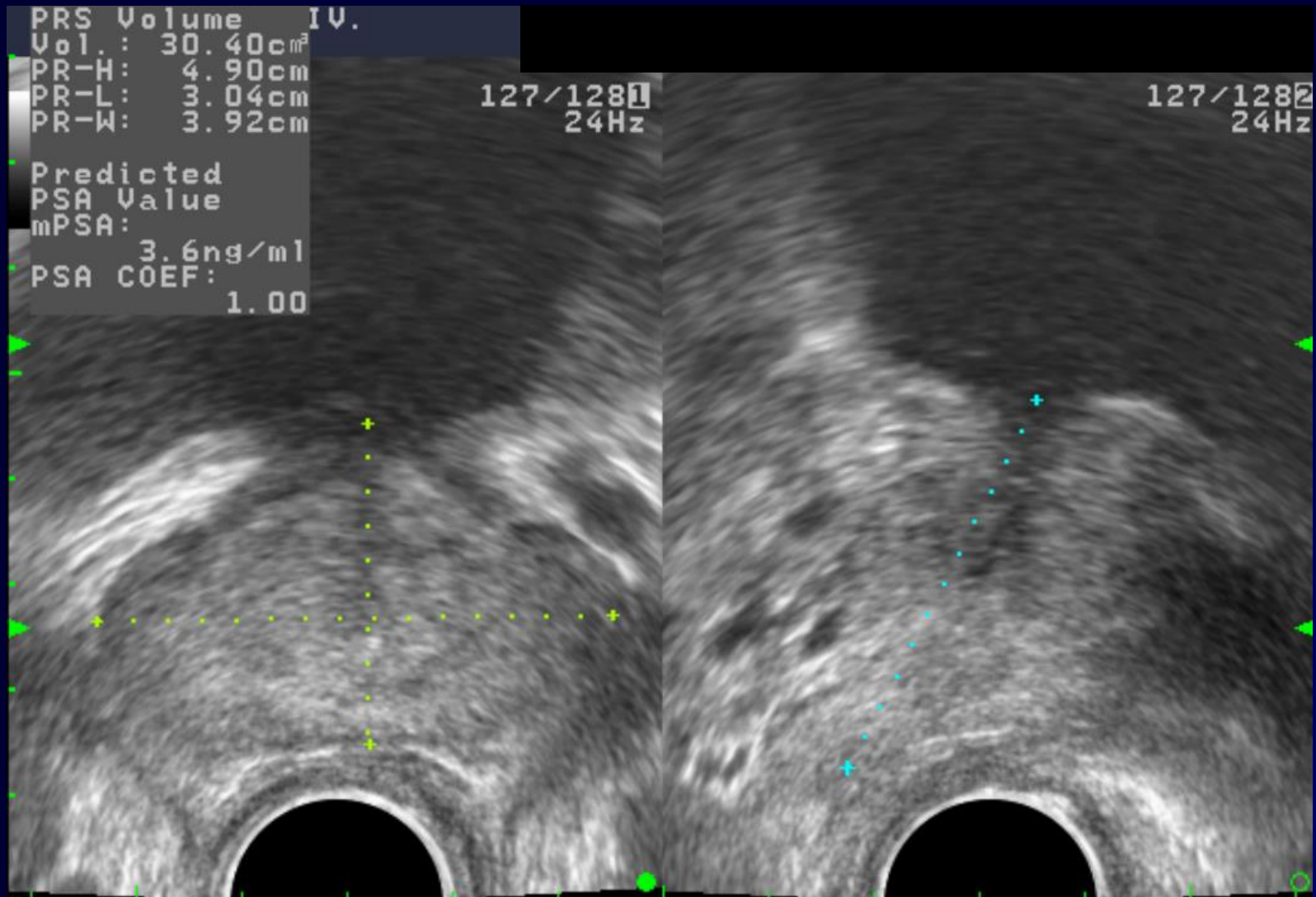


- 전립선비대증

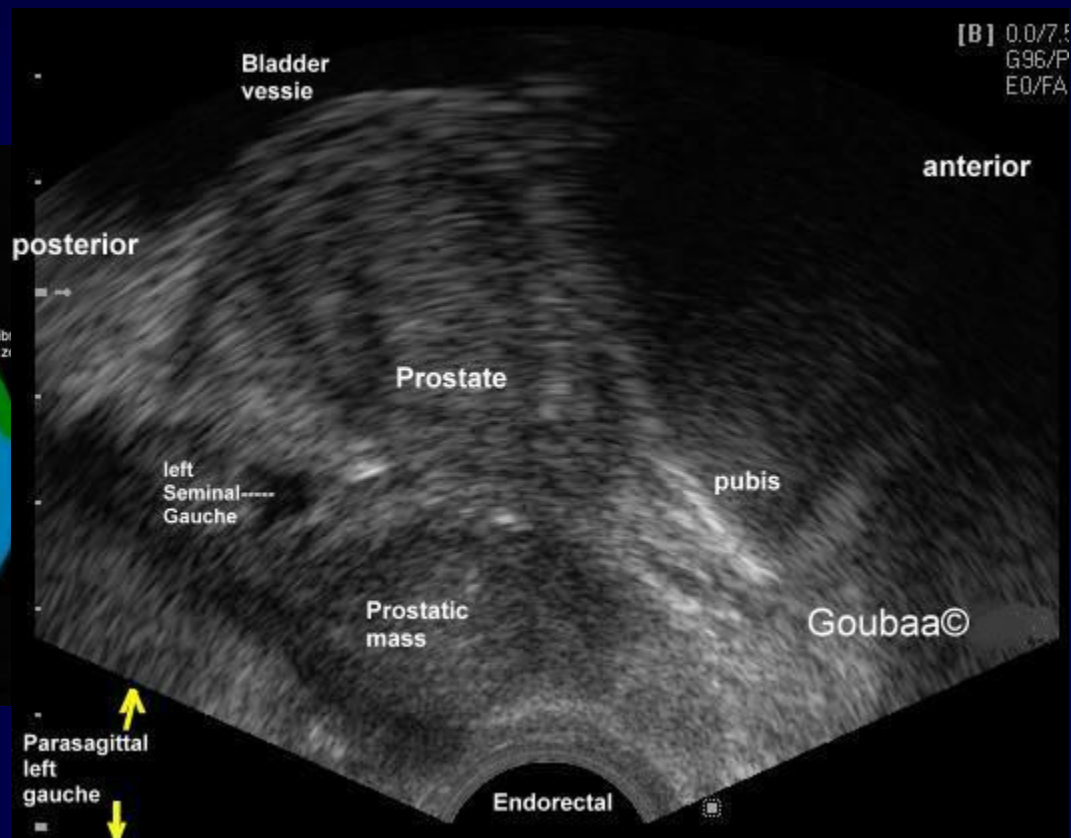
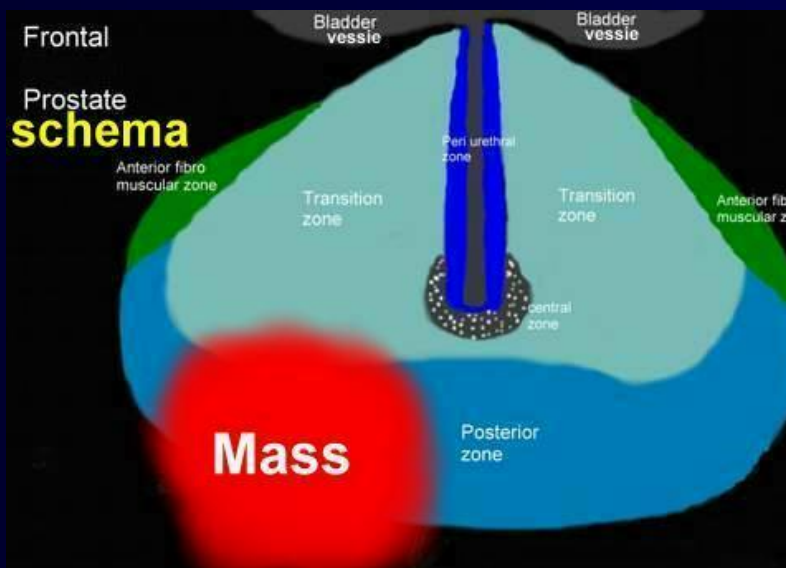


전립선크기 측정

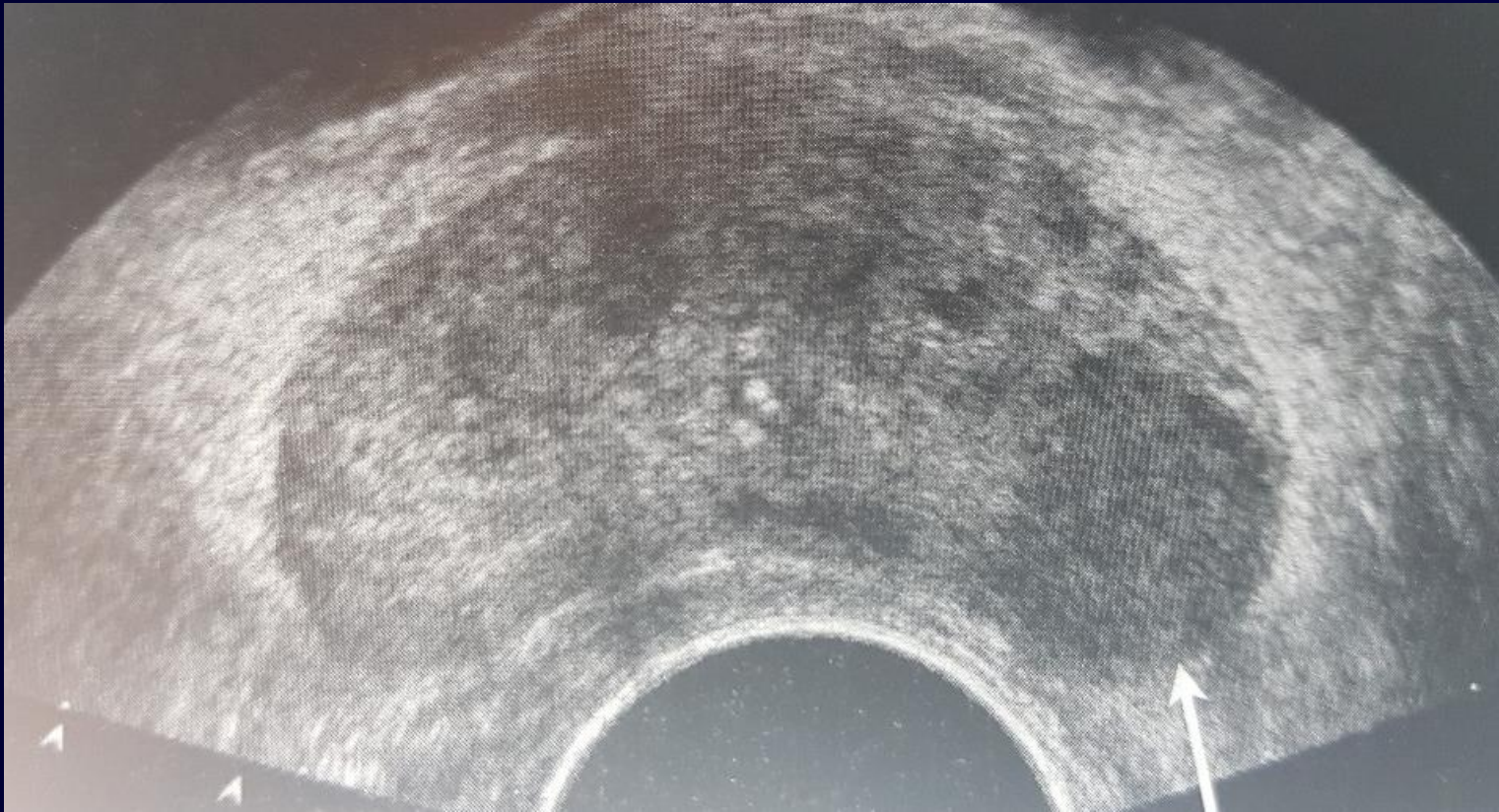
가로 x 세로 x 높이 x 0.52



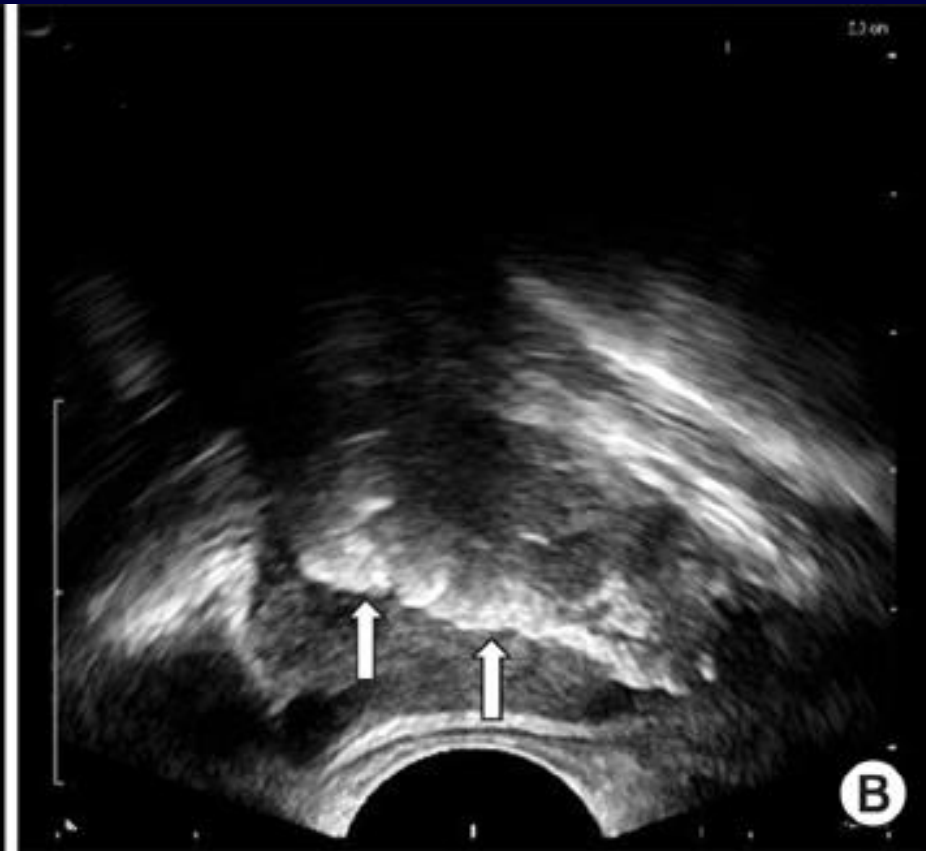
전립선암



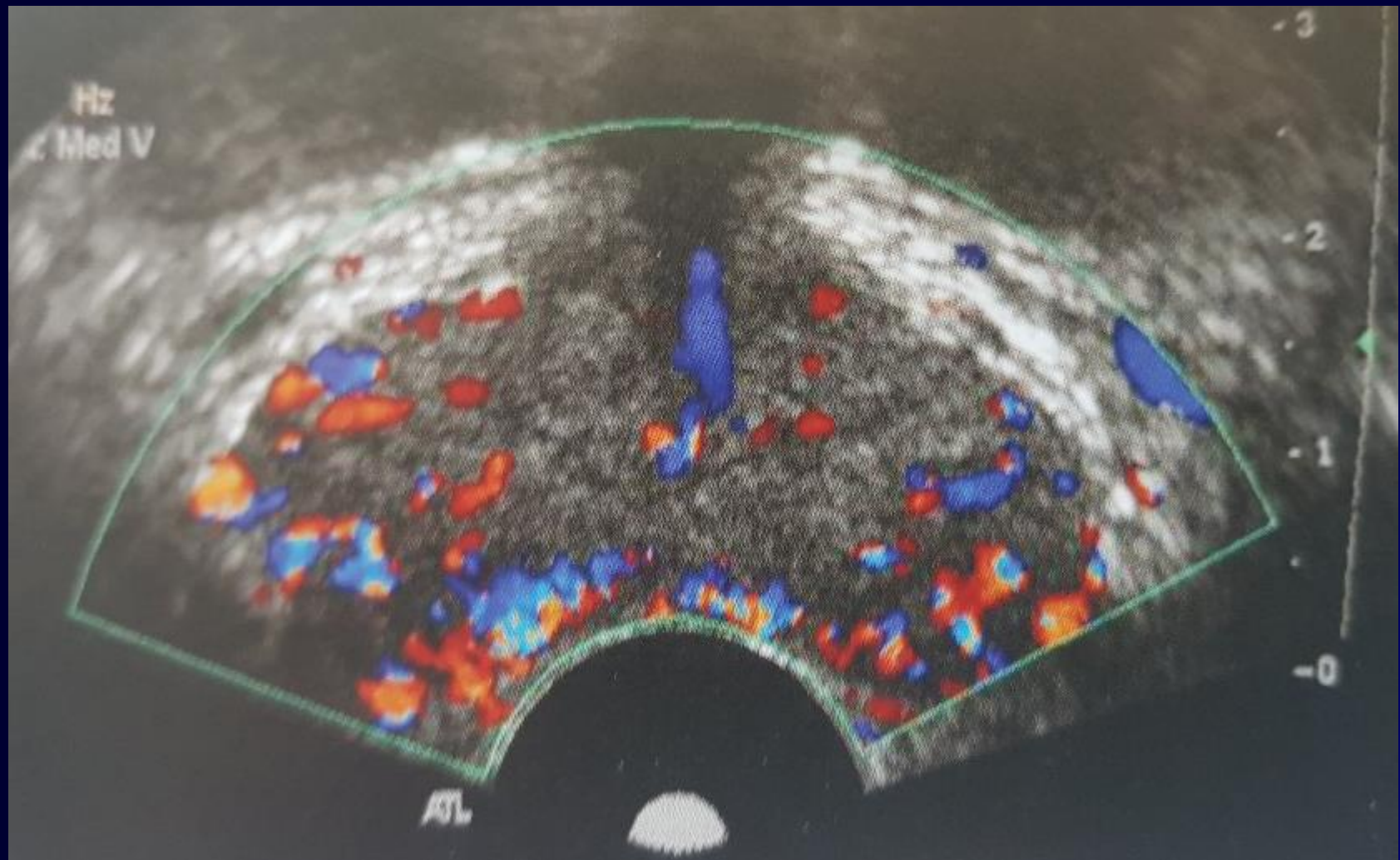
전립선암



전립선 결석



전립선염



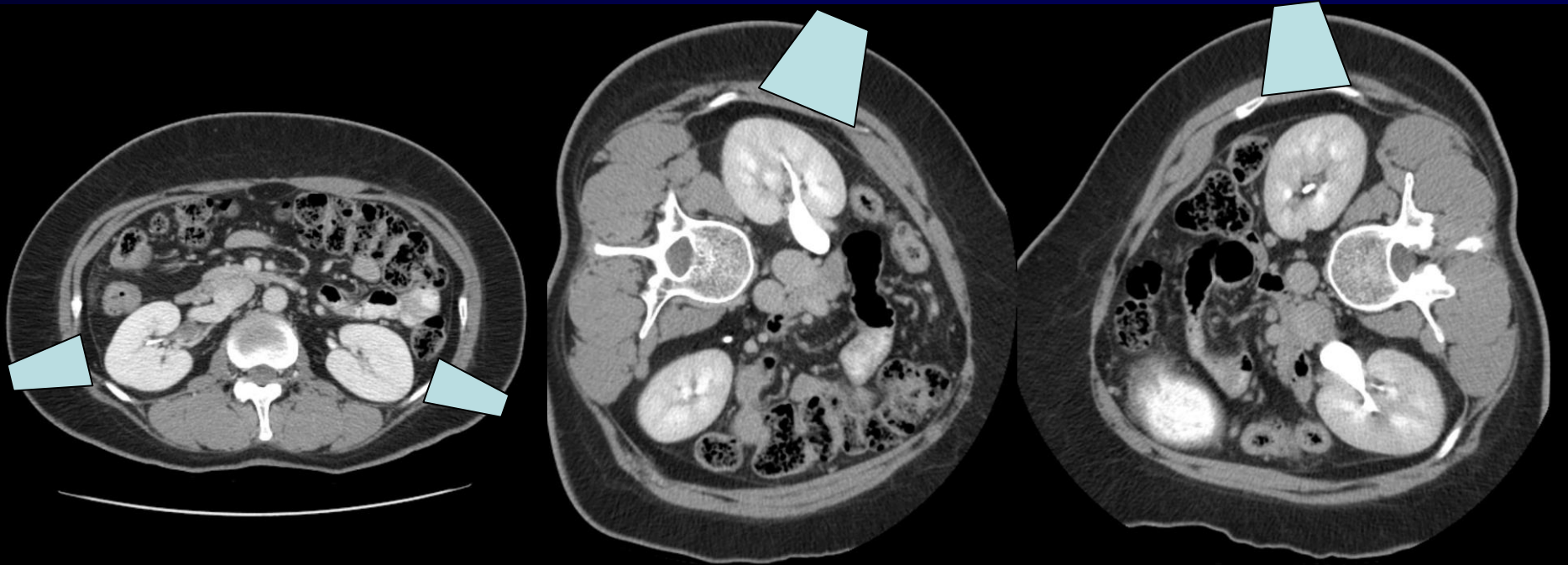
US of the kidney

신장 초음파에서 점검 사항

- 신장 종괴 확인 및 characterization
 - cyst or solid
 - benign or malignant
- 요로폐색 확인
 - Hydronephrosis, stone
- 신장의 vascularity 확인
- 신장 실질 질환 확인
 - size
 - echogenicity

Preparation of renal US

- 2-5 MHz convex probe
- no patient preparation
 - Not NPO
- position of patient
 - supine or decubitus



Technique of renal US

- liver or spleen has a role of sonic window
- subcostal or intercostal scan
- quite respiration and breath hold on inspiration of patients
- avoid reverberation artifact of colonic air



Technique of renal US

- sagittal and axial scan
 - midsagittal view
 - : size measurement
 - medial/lateral sagittal view
 - axial view with renal sinus
 - : upper pole/mid/lower pole



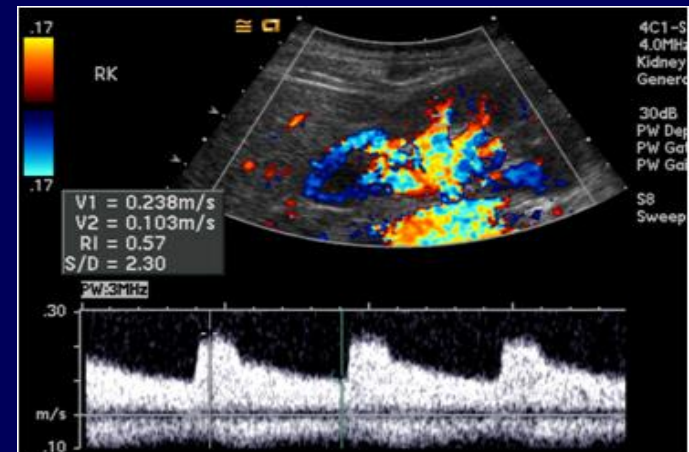
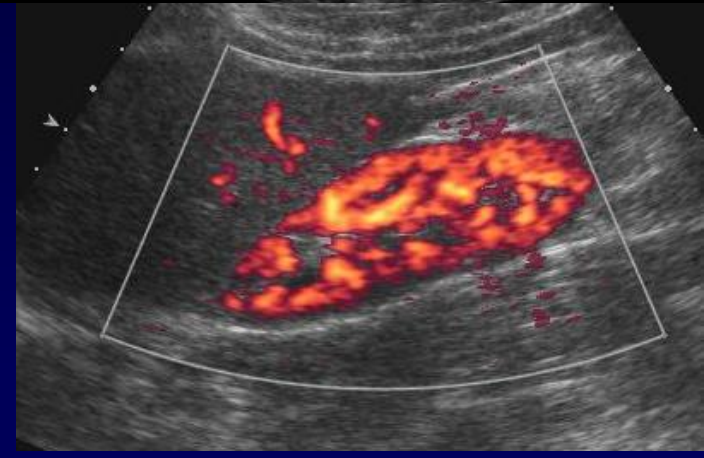
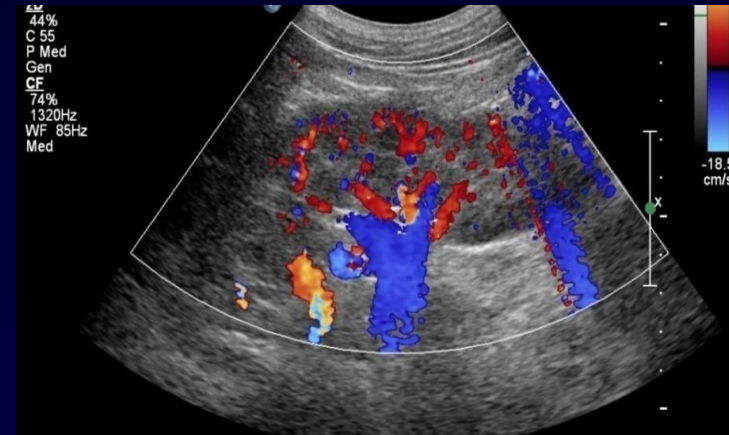
Gray scale renal US

- renal parenchymal echotexture
 - liver, spleen $\geq$ cortex $>$ medulla
- bright echo in renal sinus fat
- echogenic foci around medulla
 - interlobular or arcuate vessels



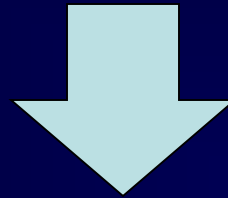
Doppler renal US

- color Doppler US
 - direction of flow
- power Doppler US
 - smaller vessels
 - detection of weak flow
 - no directional information
- spectral Doppler US
 - quantitative measurement of flow



Systemic approach of renal US

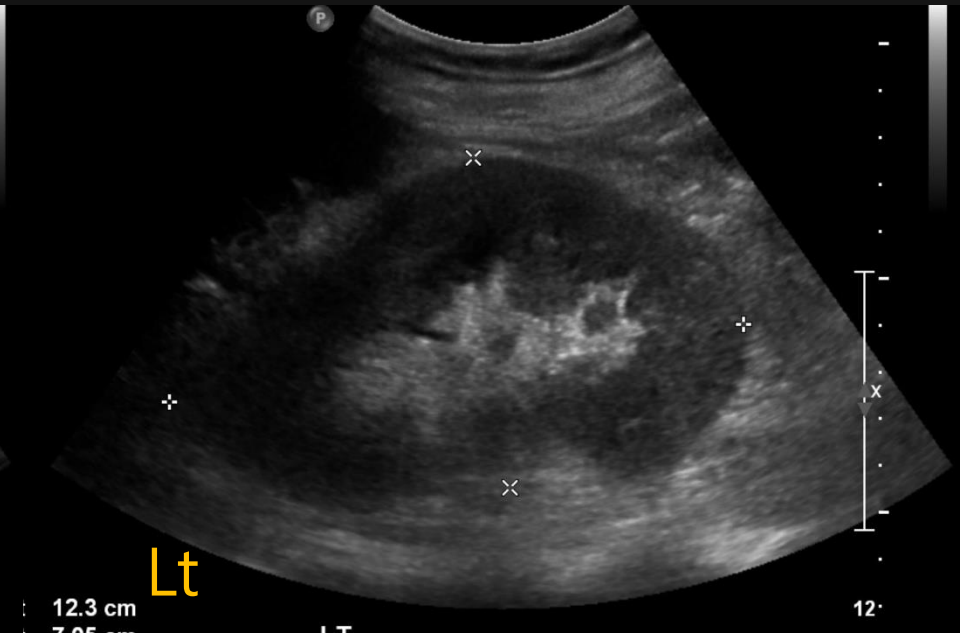
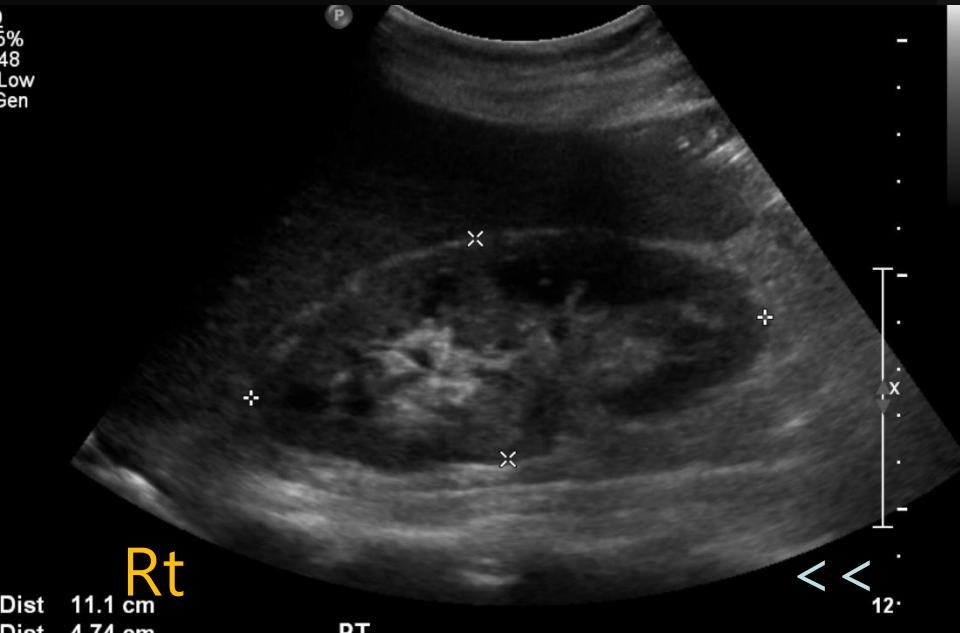
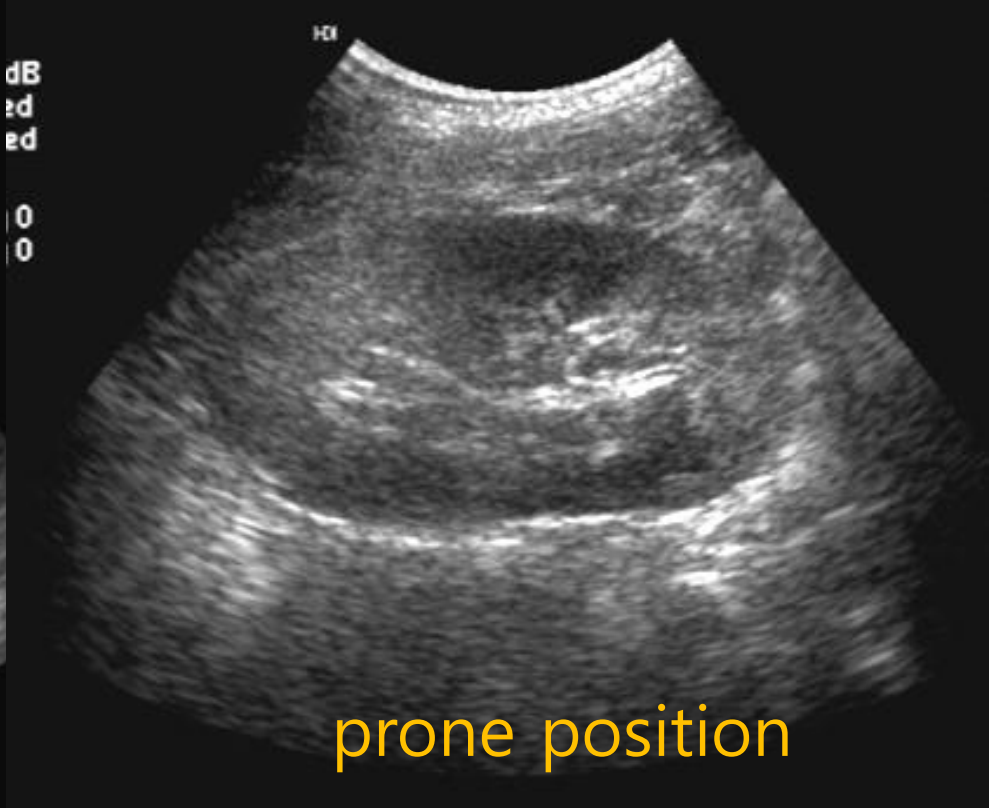
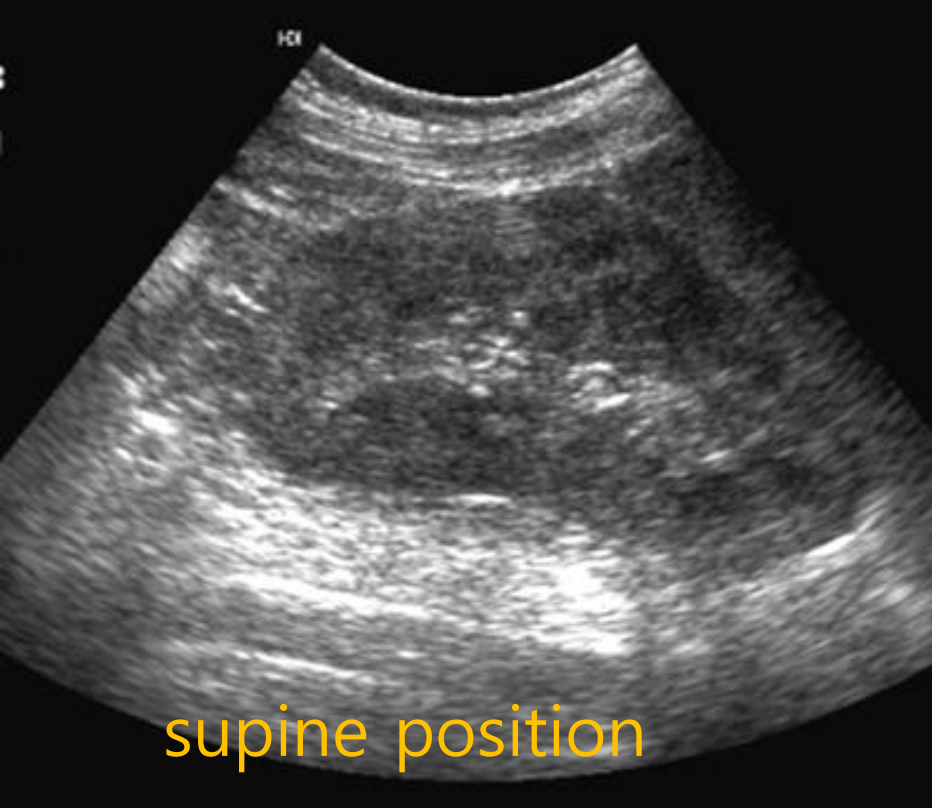
- Gray scale US
 - renal size / contour
 - echogenicity
- Doppler US
 - resistive index (RI)



- differentiation of true and pseudolesion in the kidney
- evaluation of renal parenchymal disease
- evaluation of obstructive uropathy
- characterization of renal mass

Renal length in US

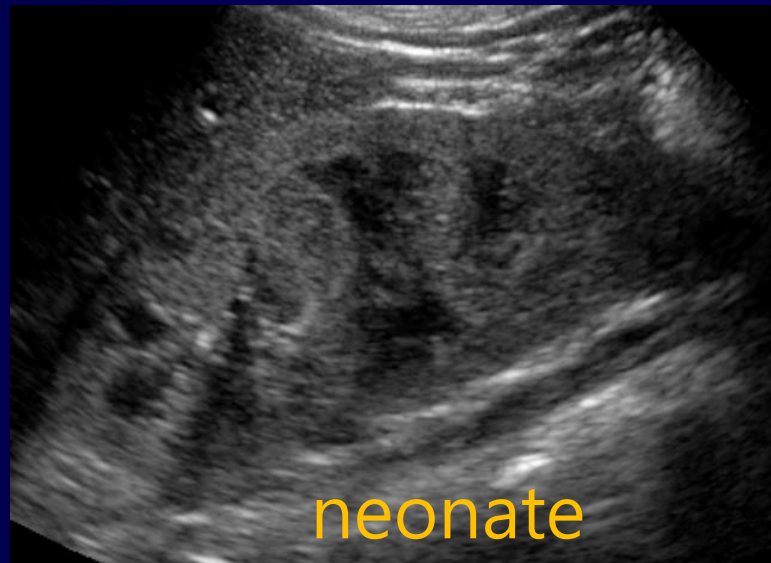
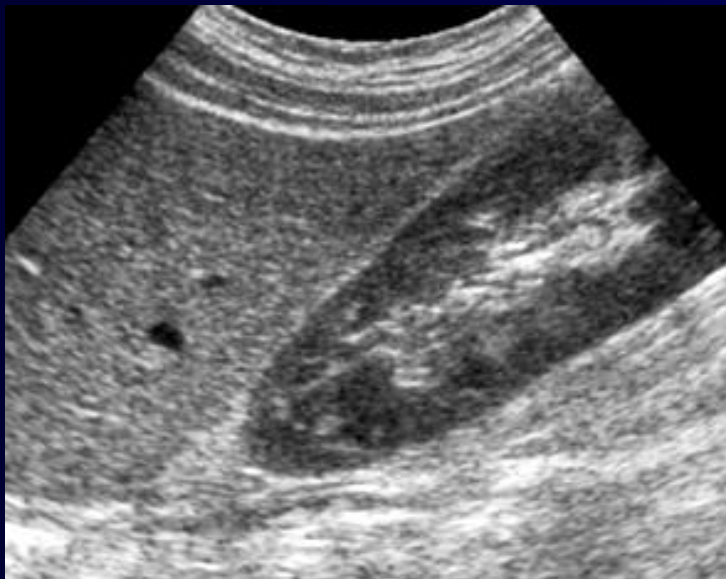
- male : female = 10-14 cm : 9-13 cm
 - > 10 cm: normal
 - < 9 cm: abnormal
 - < 8 cm: chronic disease
- Lt > Rt
- variations
 - operator's technique
 - caliper placement
 - scanning directions
 - : supine or decubitus position > prone position

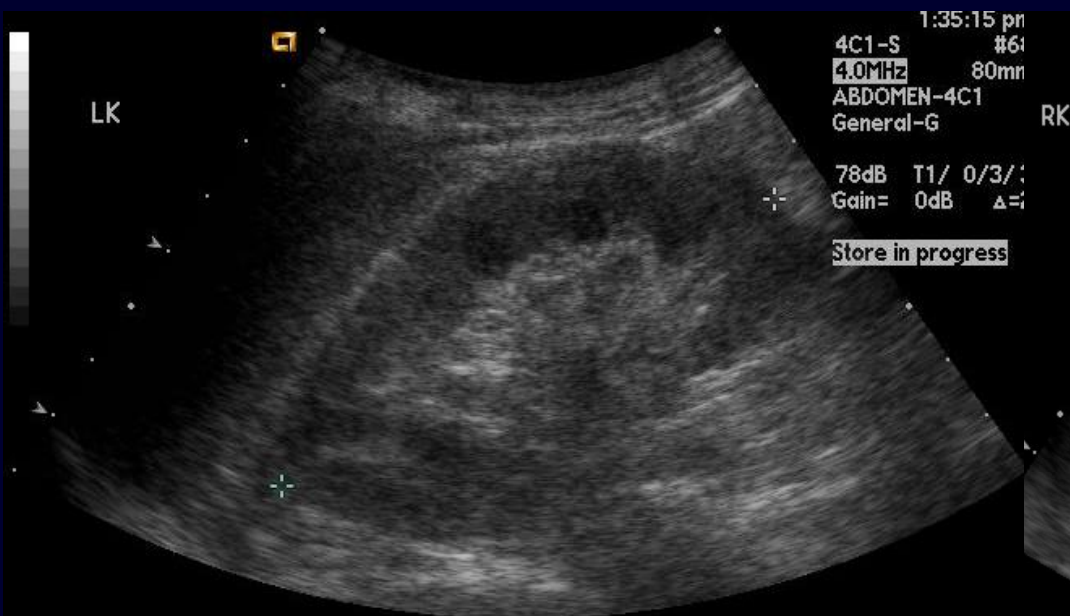


Parenchymal echo in Renal US

- kidney < liver/spleen (normal adult)
- kidney = liver/spleen (normal neonate)
- kidney > liver/spleen (parenchymal disease)

Platt JF, et al. AJR 1988



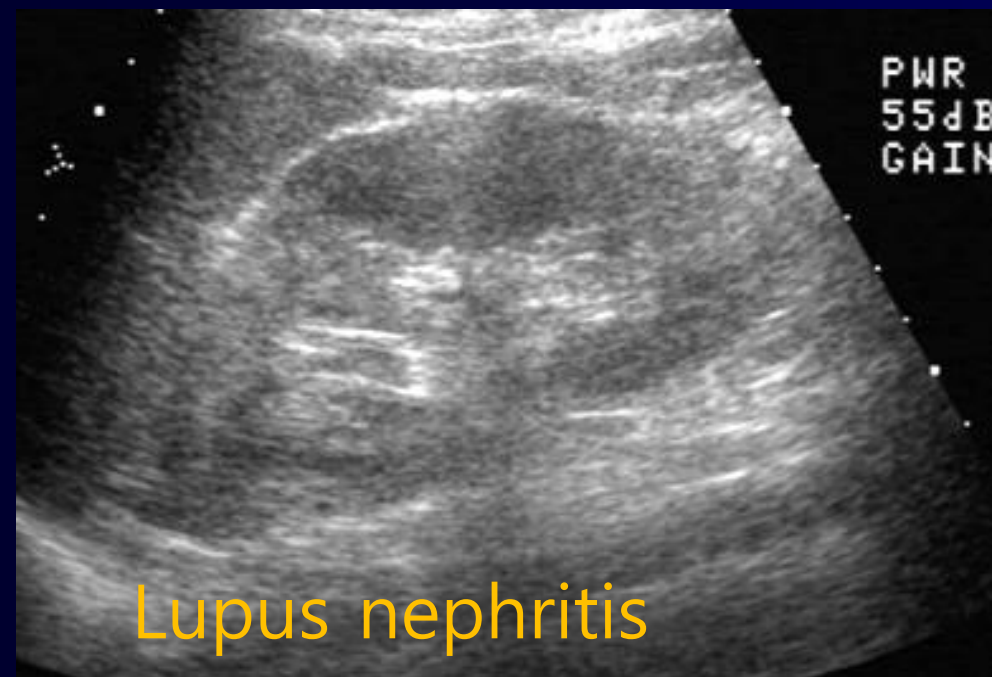


normal

Dist = 8.52cm



glomerulonephritis



Lupus nephritis



DM nephropathy

Map 6
30dB/C 5
Persist Med
Fr Rate Med
D Opt:Gen
BW 0 Pg 0
Col 0 Pg 0

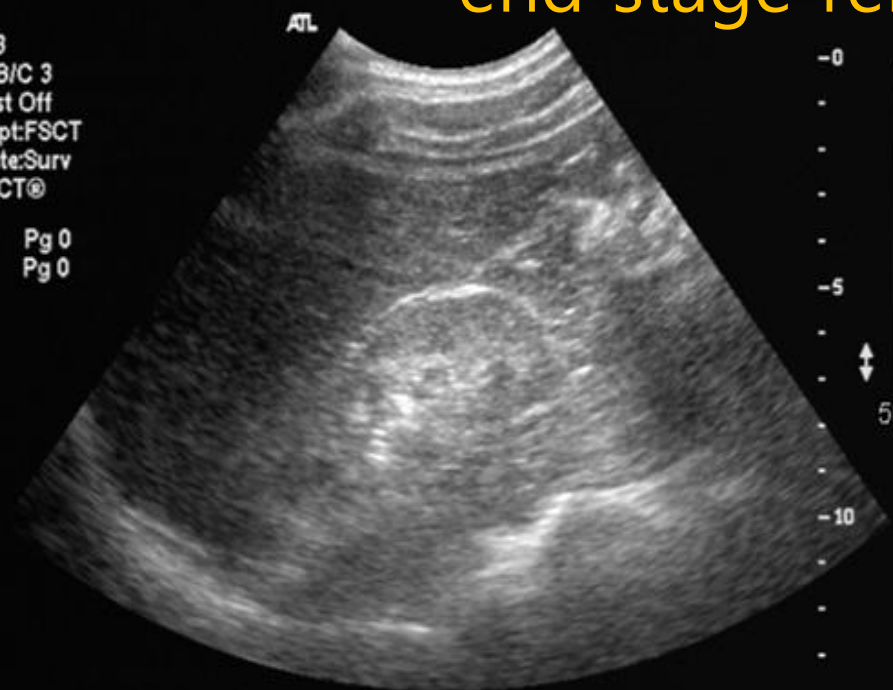


g 55dB
st Med
te Med
Pg 0
Pg 0



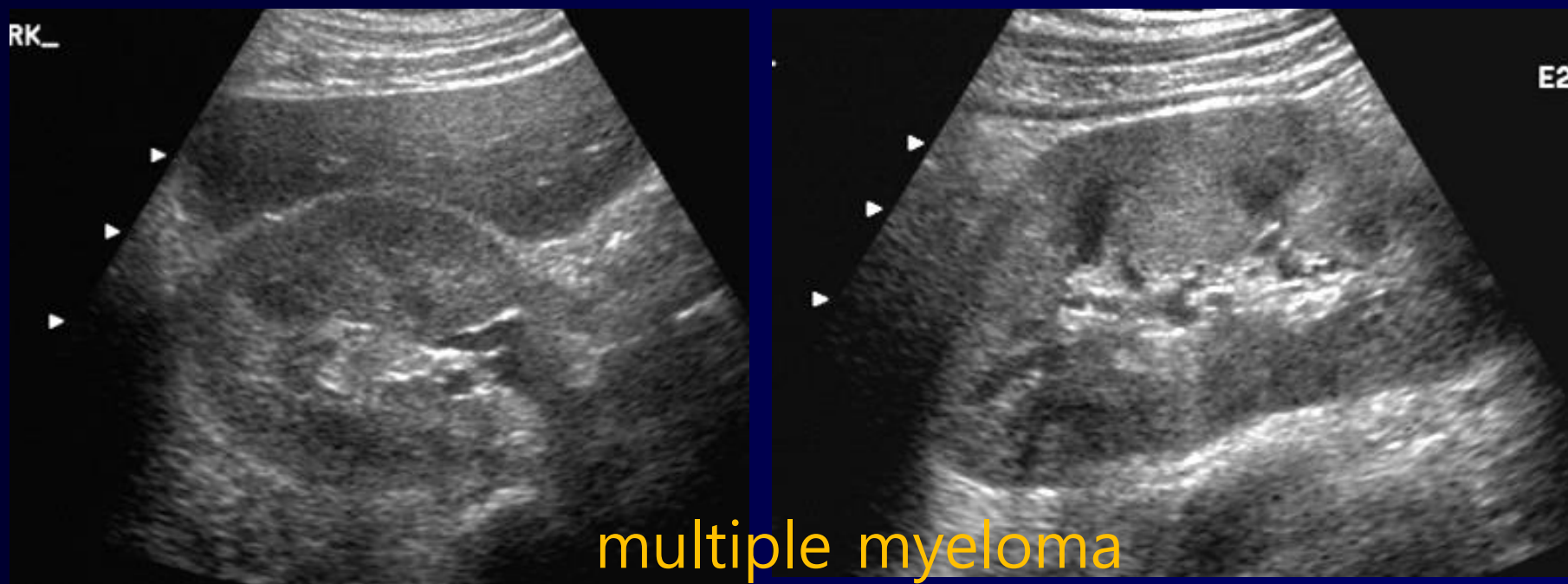
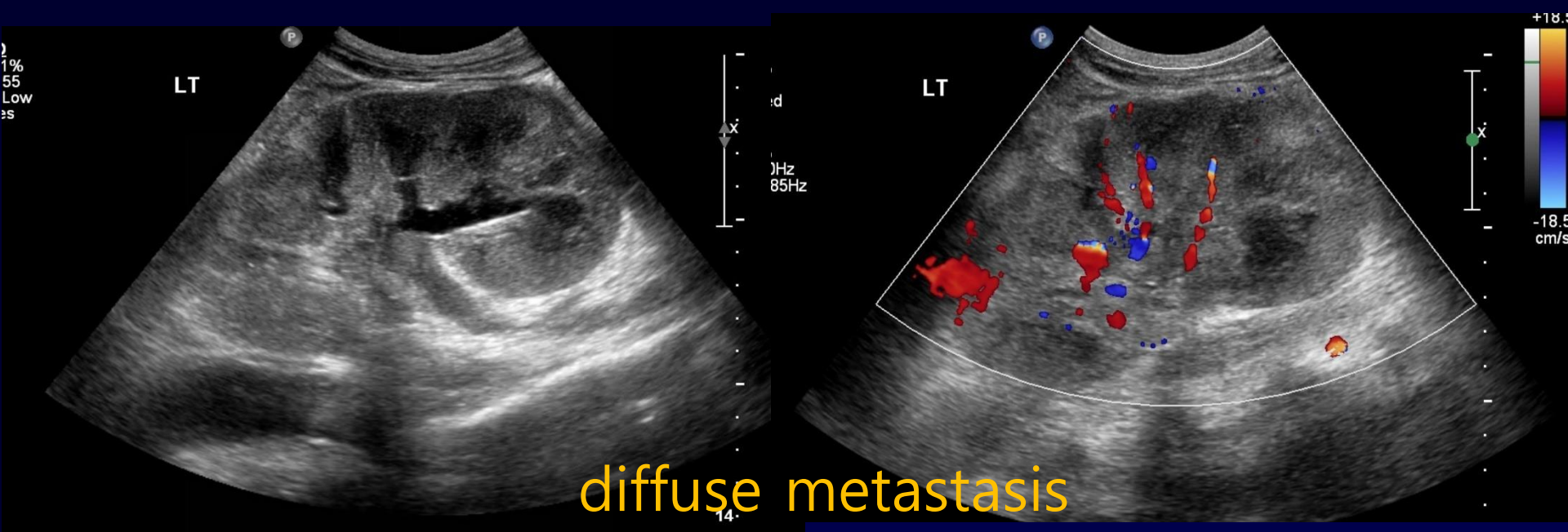
end stage renal disease

Map 3
170dB/C 3
Persist Off
2D Opt:FSCT
Fr Rate:Surv
SonoCT®
BW 0 Pg 0
Col 0 Pg 0



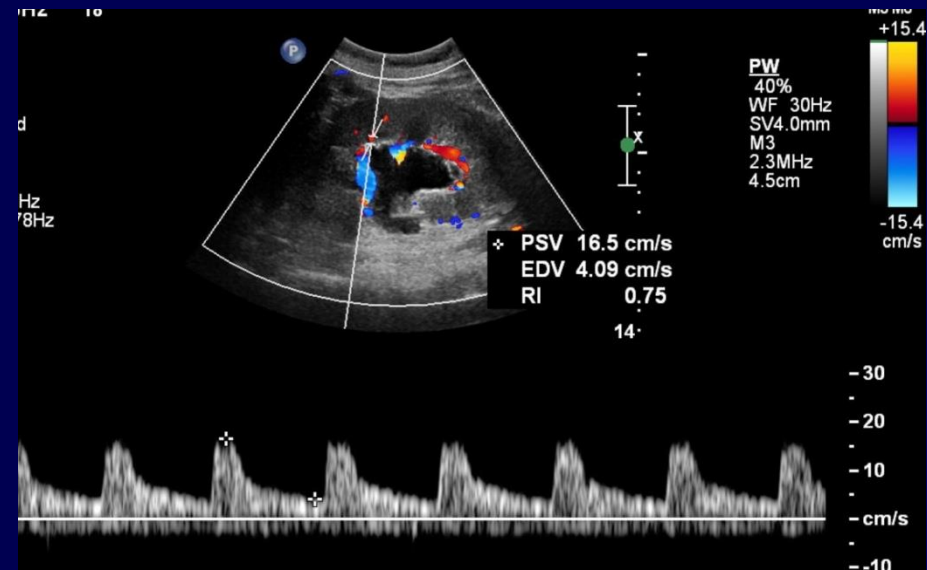
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170dB/C 3
Persist Off
2D Opt:FSCT
Fr Rate:Surv
SonoCT®
BW 0 Pg 0
Col 0 Pg 0





Hydronephrosis

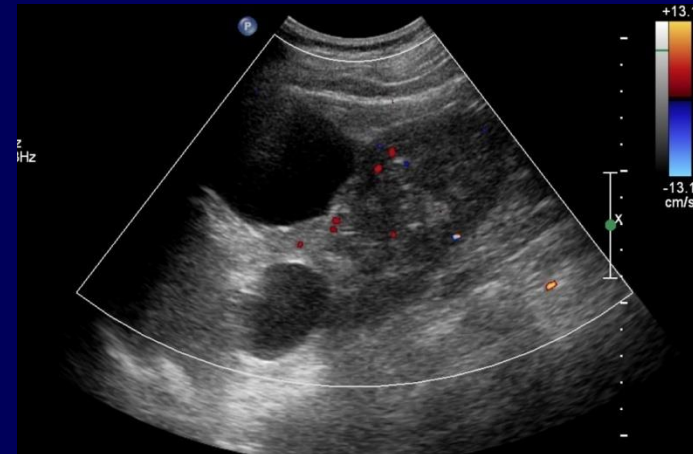
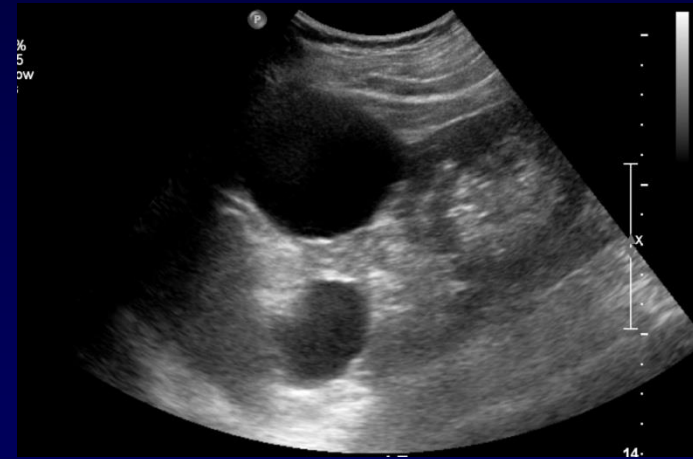
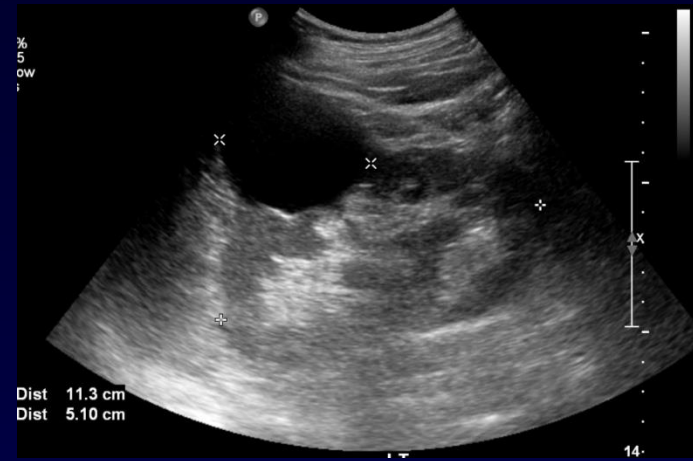
- pelvocaliceal dilatation
- splitting of renal sinus
- increased parenchymal echo in advanced stage
- enlarged kidney
- acute obstruction
 - $RI \uparrow > 0.7$



Focal lesions of the kidney

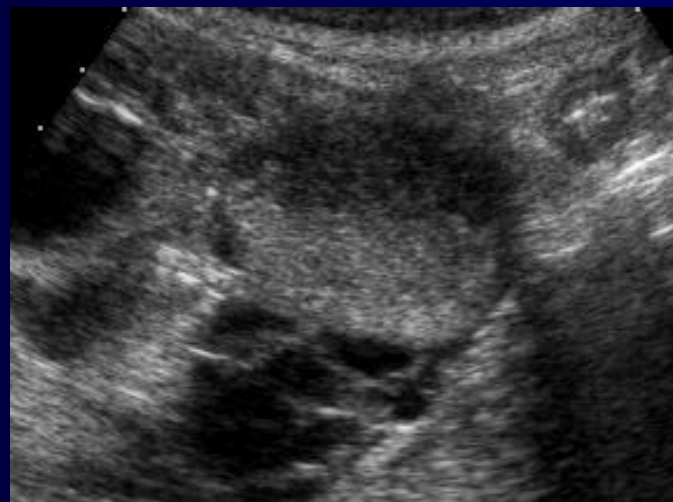
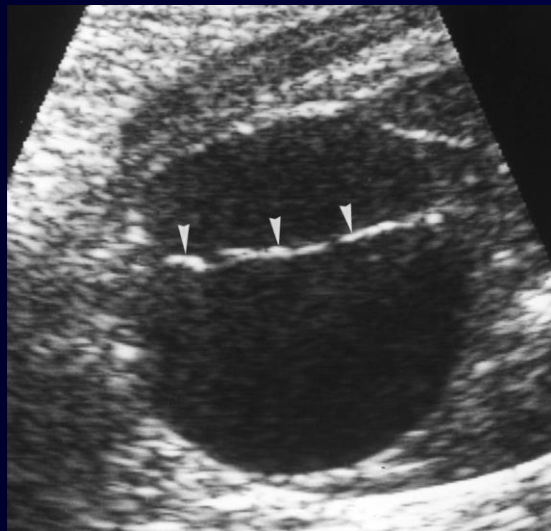
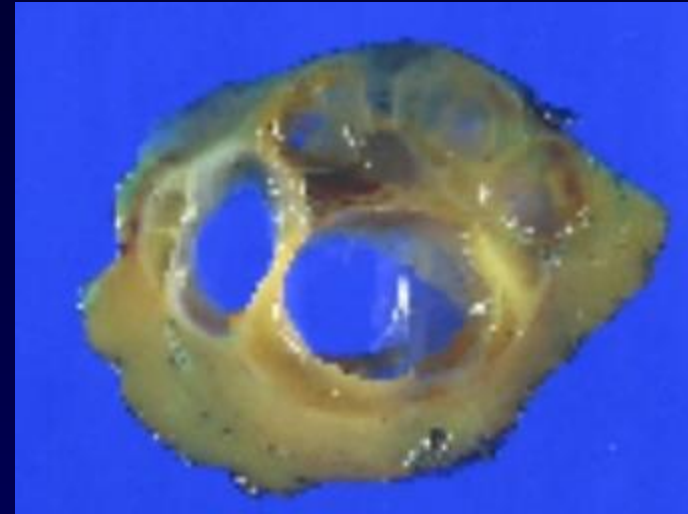
Simple cyst

- anechoic
- inperceptable thin wall
- posterior sonic enhancement
- round or ovoid shape
- no blood flow on Doppler US



Complicated cyst

- regular thickening of cyst wall
- regular and a few septation
- hemorrhage
 - internal hyperechoic
- calcification
 - bright echo in peripheral cyst wall



Autosomal dominant polycystic disease (ADPKD)

- common hereditary renal disease
- progression to renal failure
- bilateral enlarged kidney with innumerable cysts



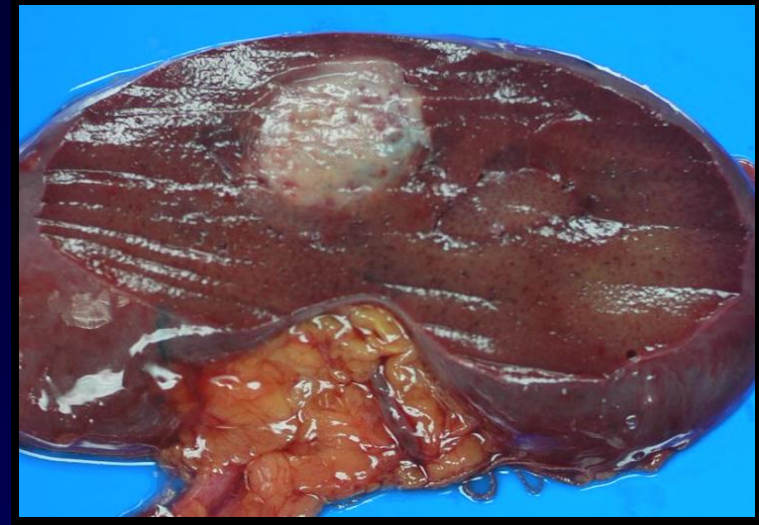
Renal mass

- **Angiomyolipoma (AML)**

- : common benign tumor

- : US findings

- hyperechoic
- similar to renal sinus fat

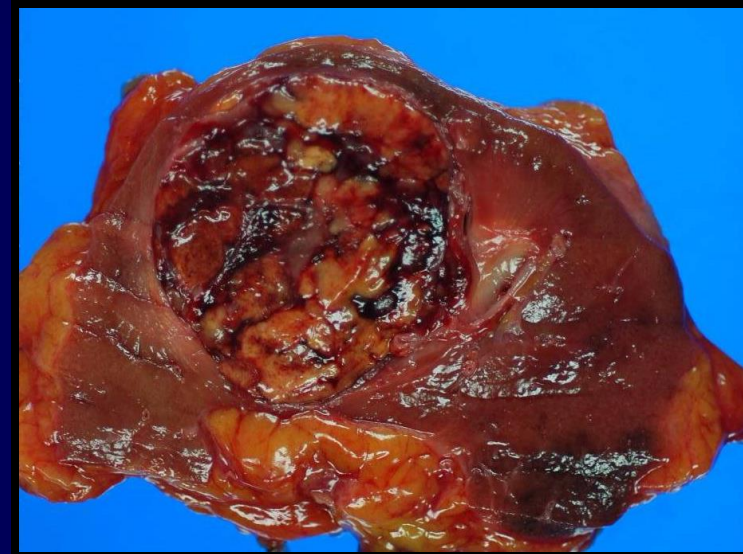


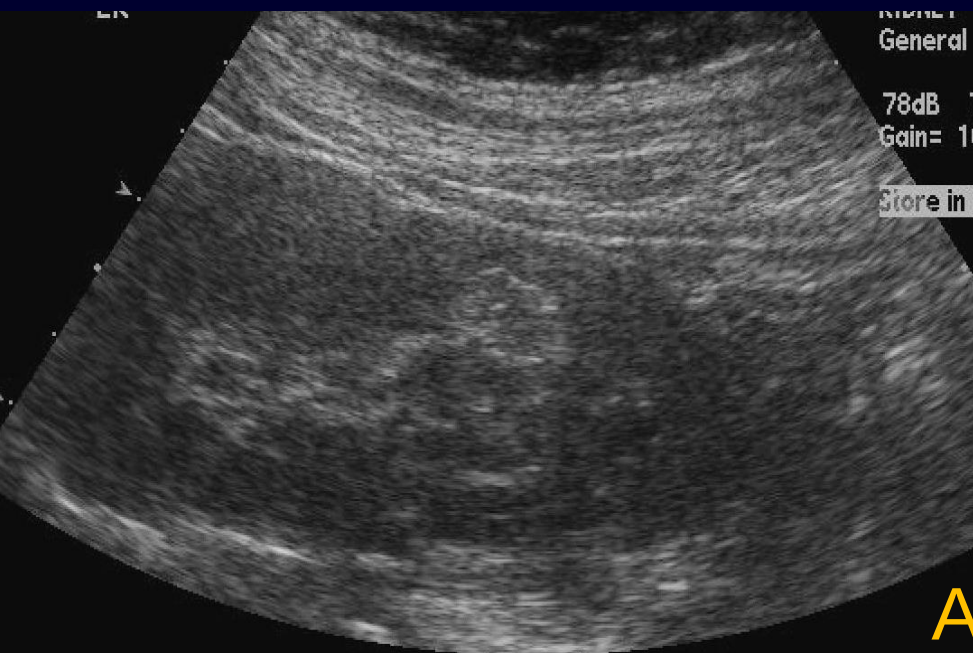
- **Renal cell carcinoma (RCC)**

- : common malignant tumor

- : US findings

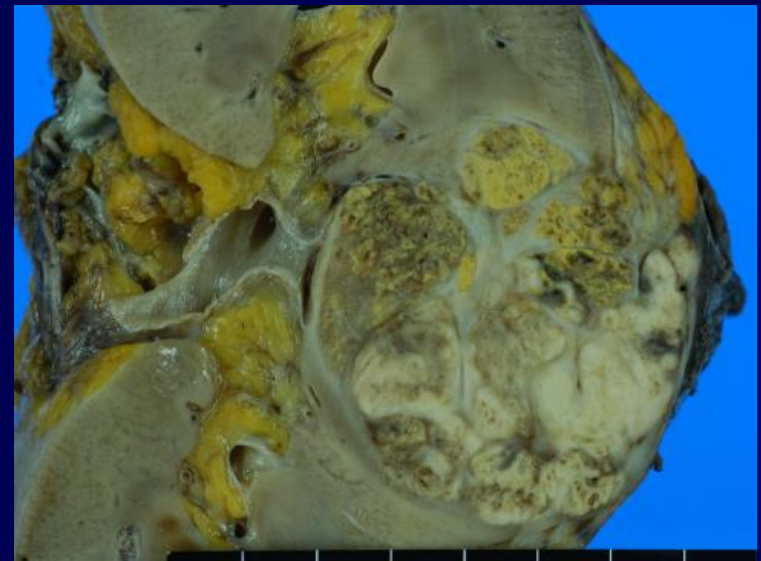
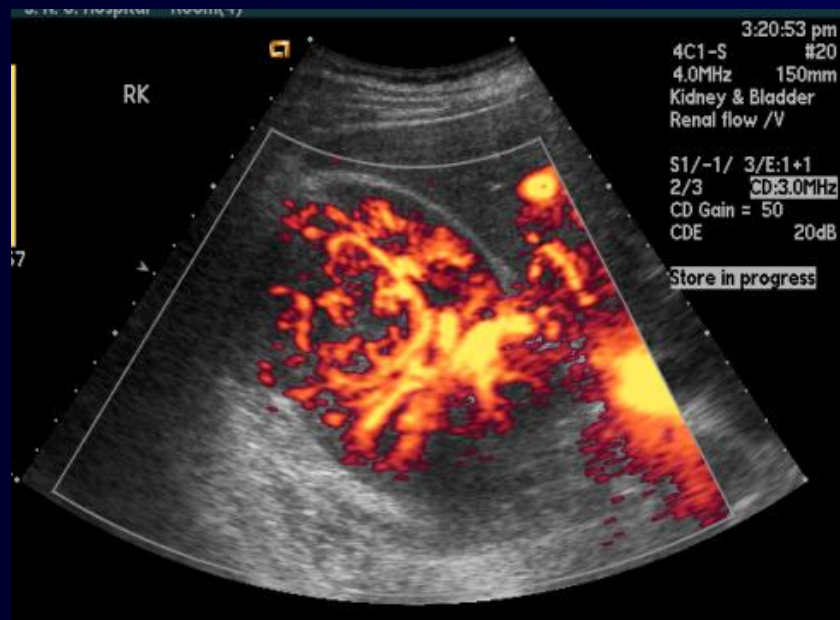
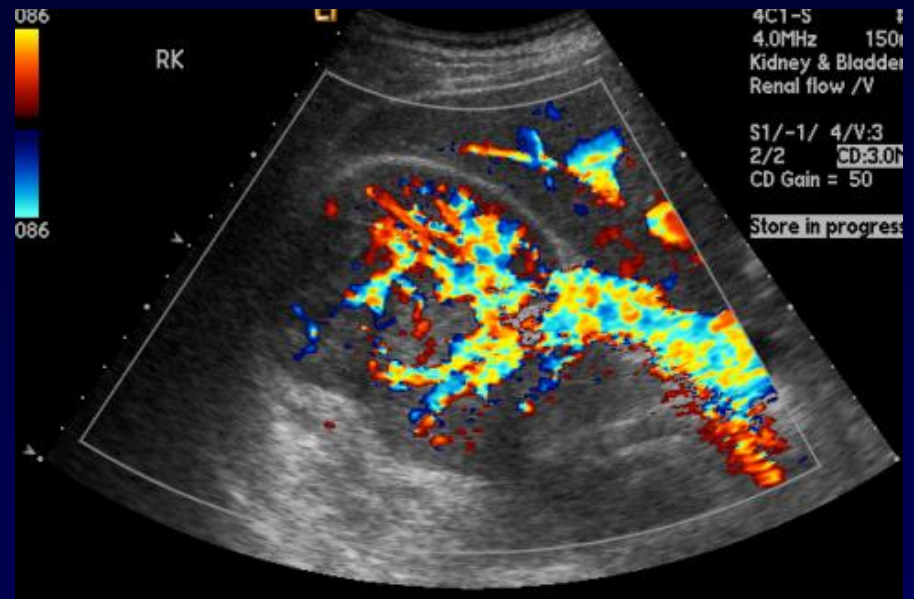
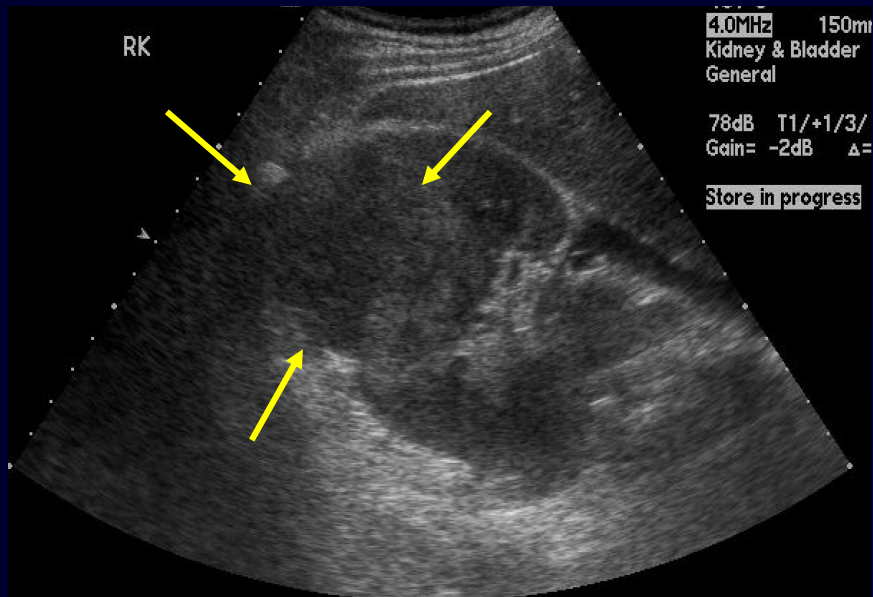
- heterogeneous echo
- intratumoral cyst or calcification
- peritumoral hypoechoic halo





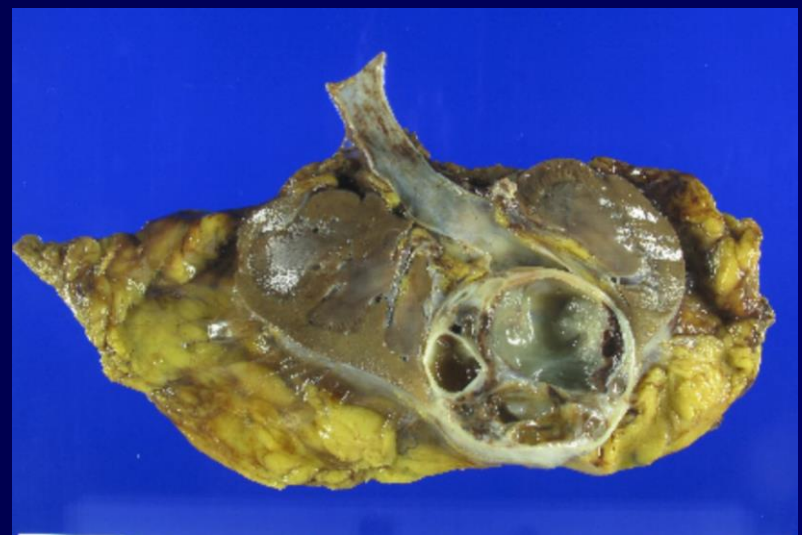
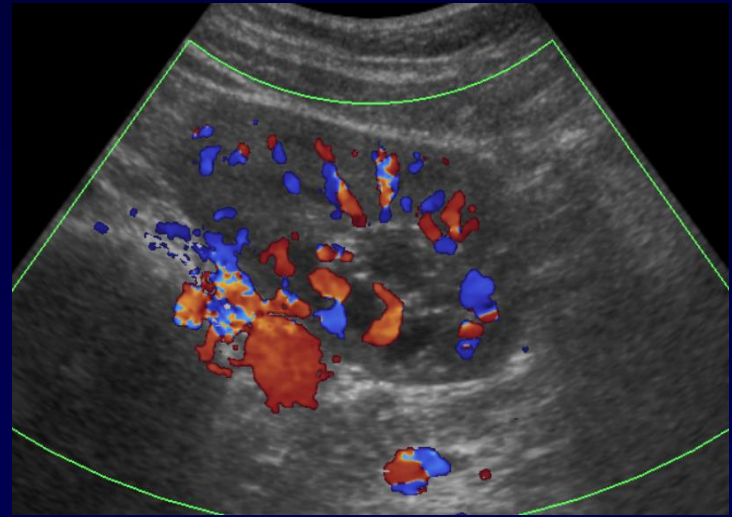
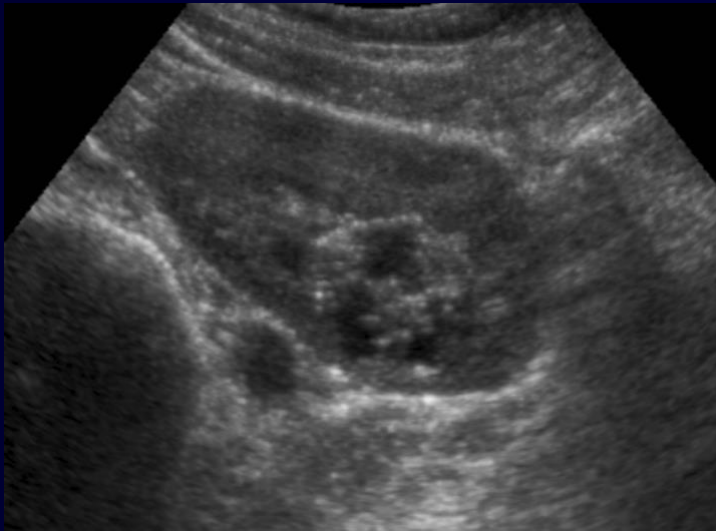
RCC

Doppler US of RCC



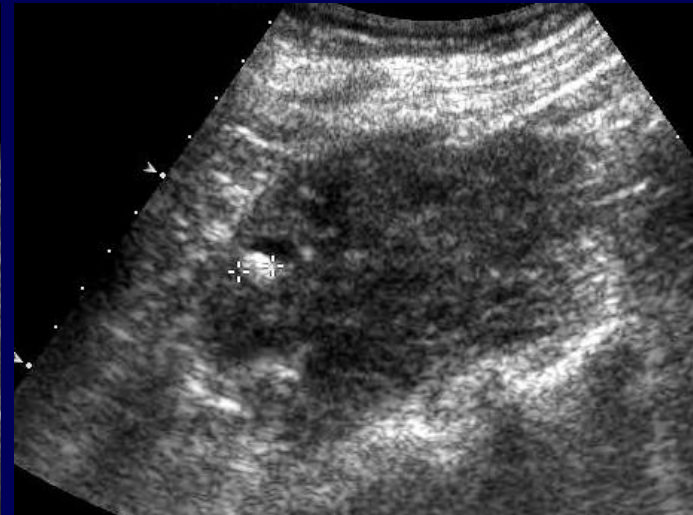
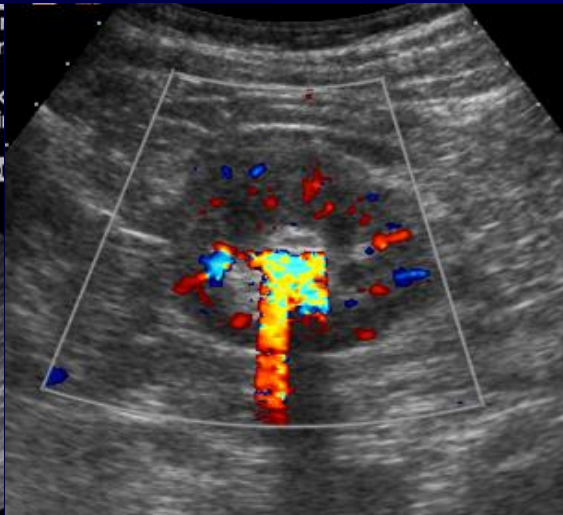
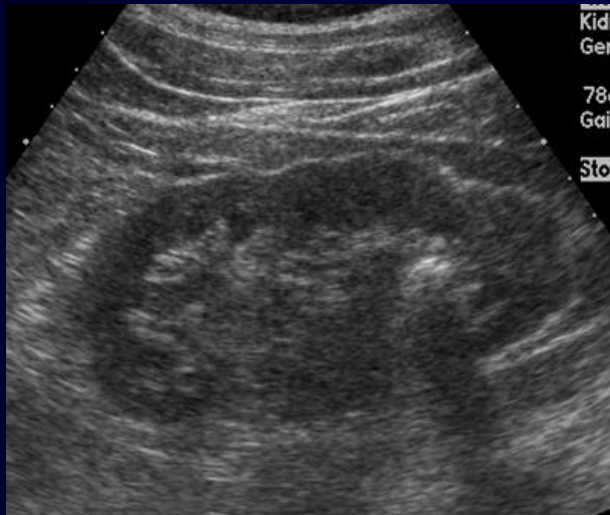
Cystic RCC

- multiple irregular thickened septum with vascularity



Urolithiasis

- US : high sensitivity for the detection of stones
 - hyperechoic nodule or foci with posterior shadowing
 - twinkling artifact on color Doppler US
 - DDx with renal sinus, mesenteric fat, bowel gas, tiny cyst

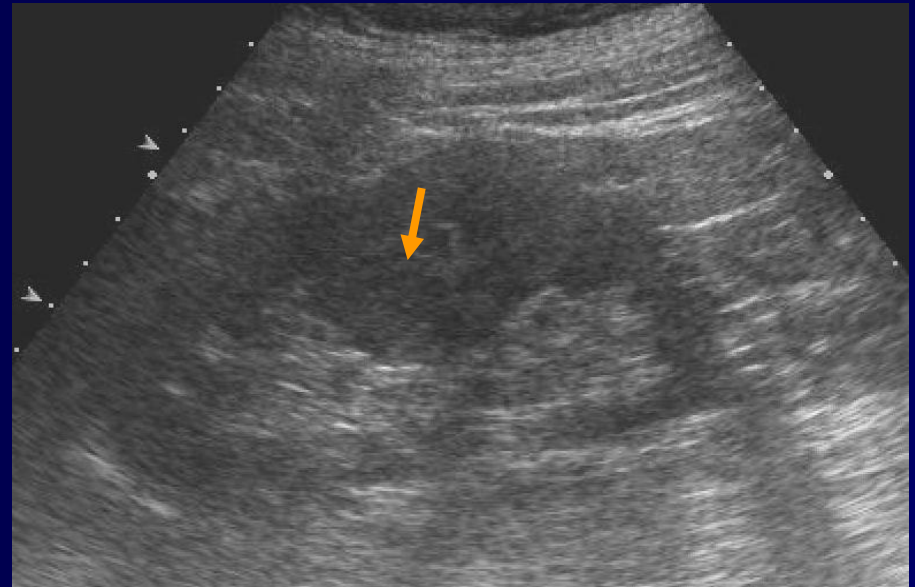
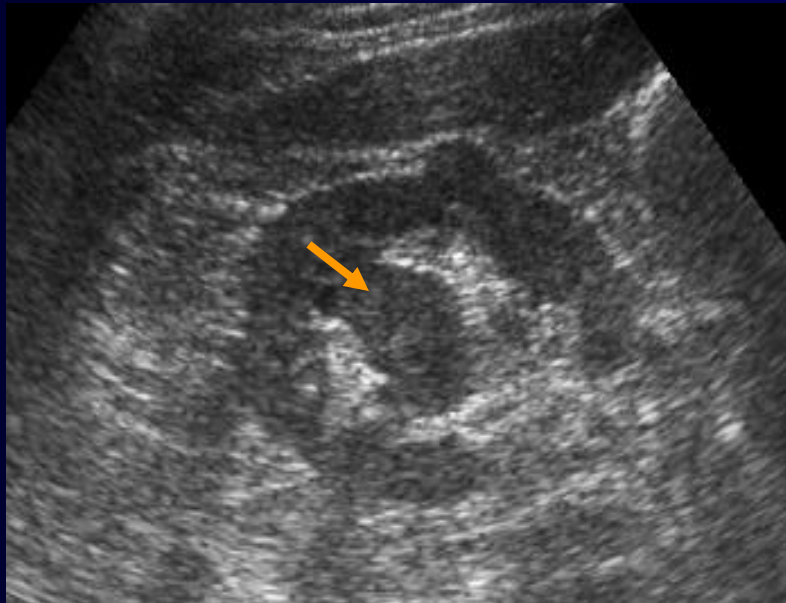


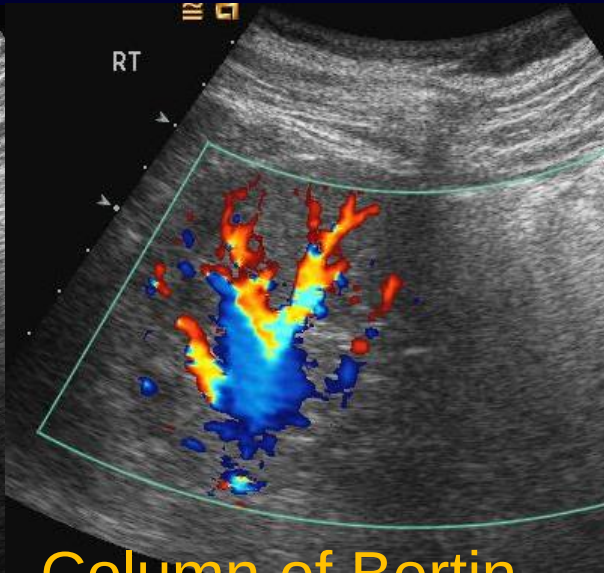
Pseudotumors and normal variations in the kidney

- prominent column of Bertin
- dromedary hump
- fetal lobulation
- localized compensatory hypertrophy of renal parenchyma
- junctional parenchymal defect
- sinus lipomatosis and abnormal echo of sinus fat
- pseudohydronephrosis
- parapelvic cyst

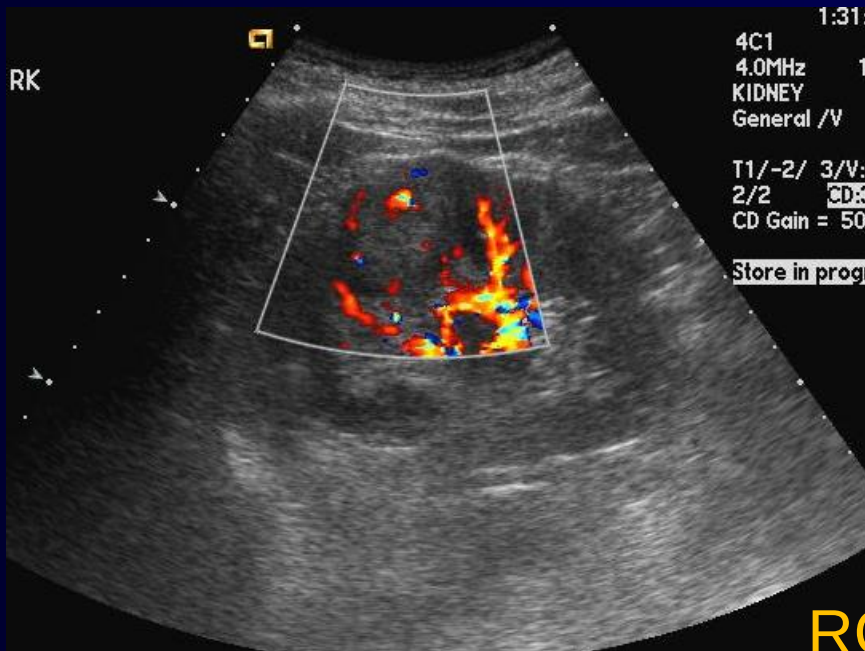
Prominent column of Bertin

- common pseudotumor
- thickened aggregate of cortical tissue
- junction of the upper and middle thirds
- deformity of adjacent calyces
- CDUS is helpful in DDx from true tumor





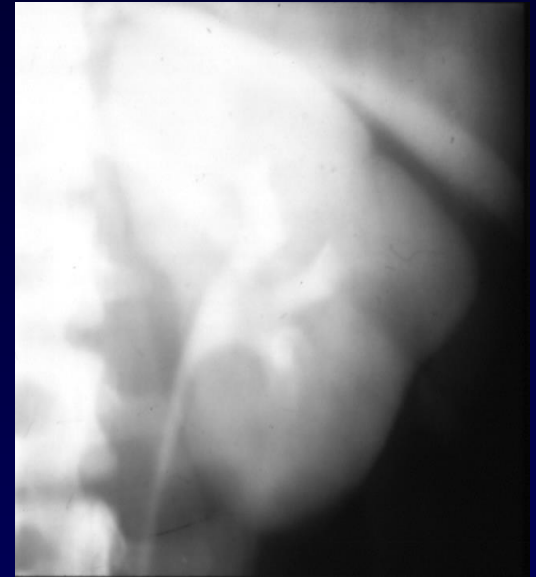
Column of Bertin



RCC

Dromedary hump

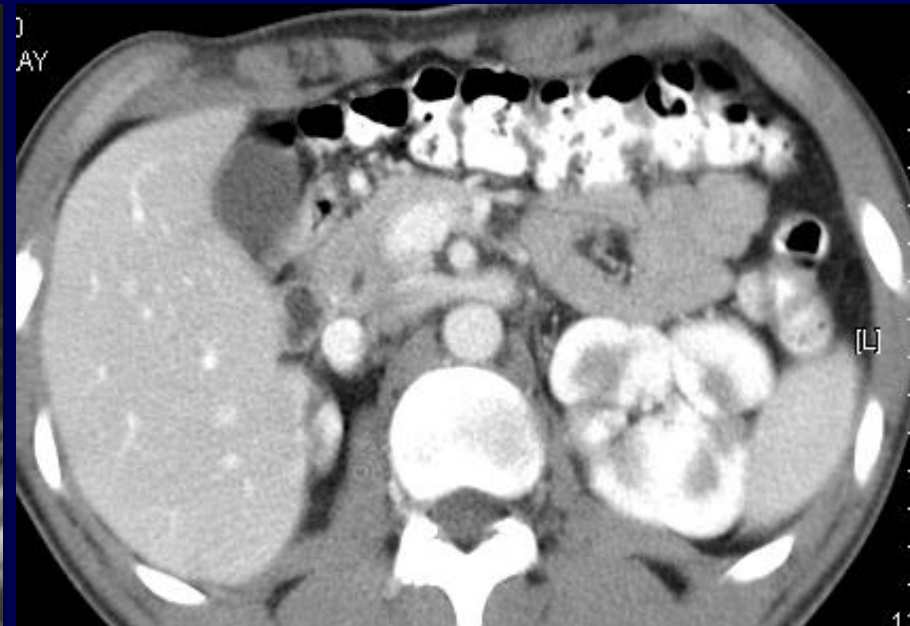
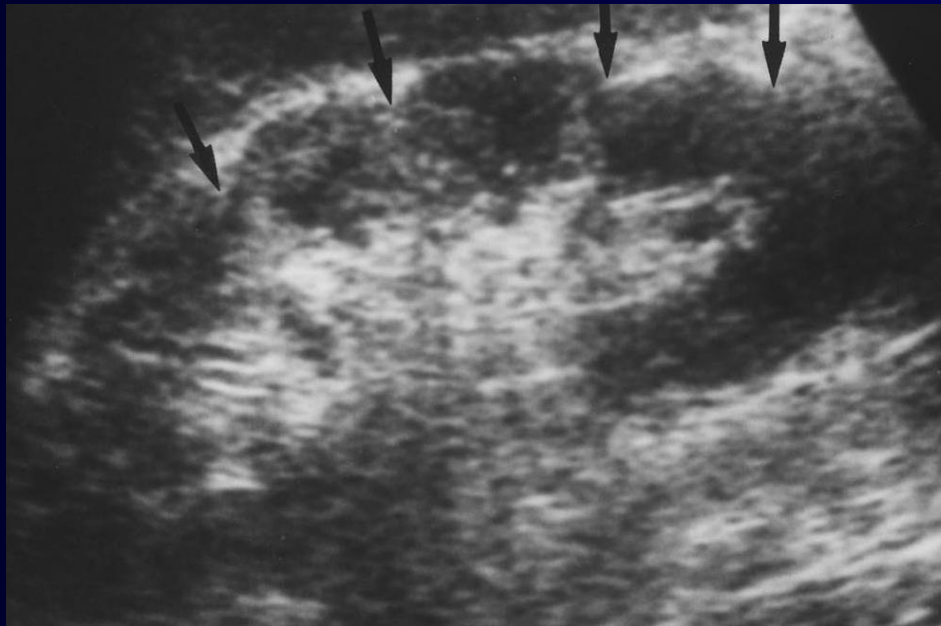
- prominent bulge of the lateral border
- molding by the spleen or liver
- more often in LK



Fetal lobulation

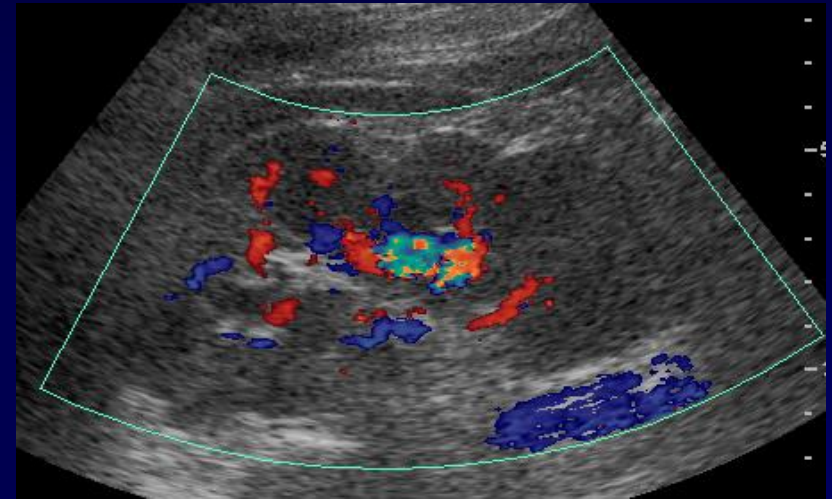
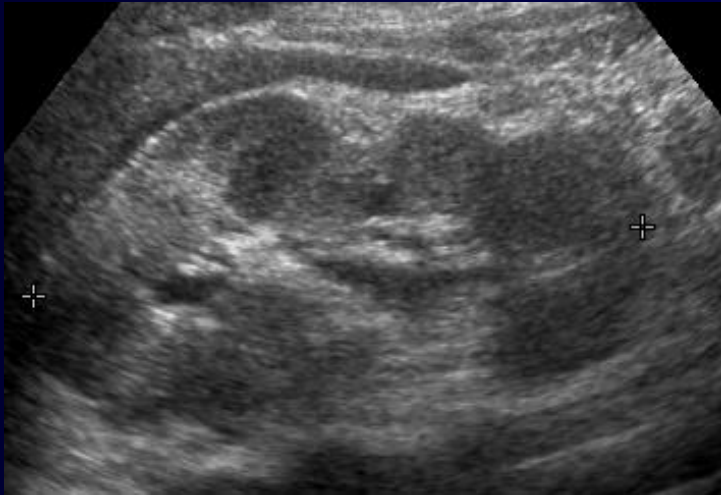


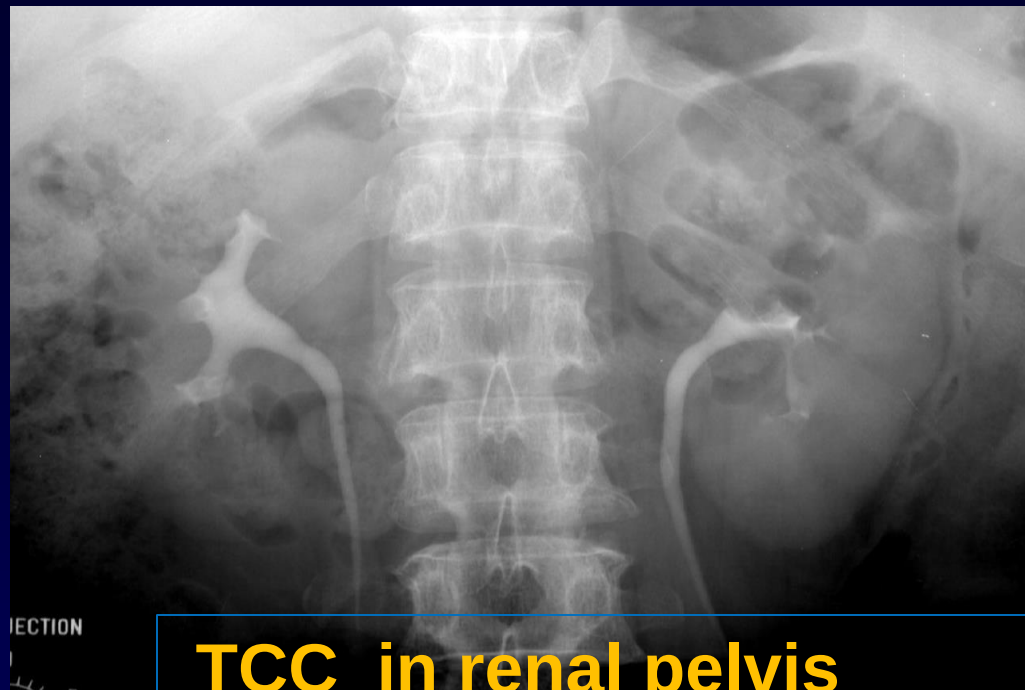
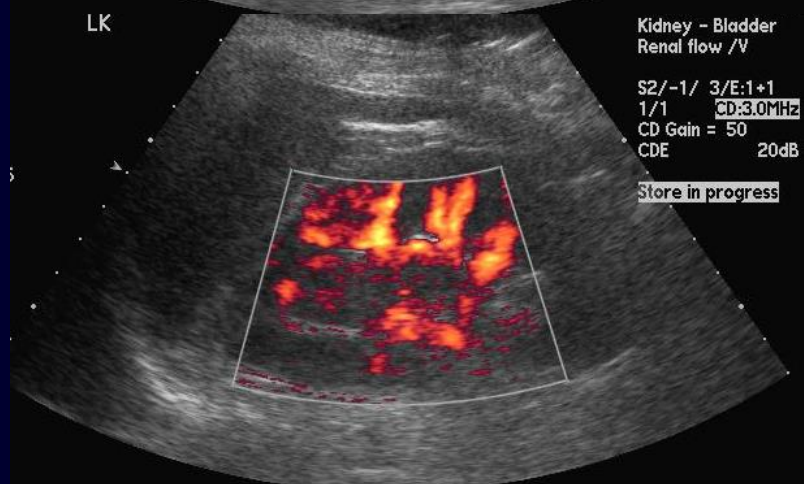
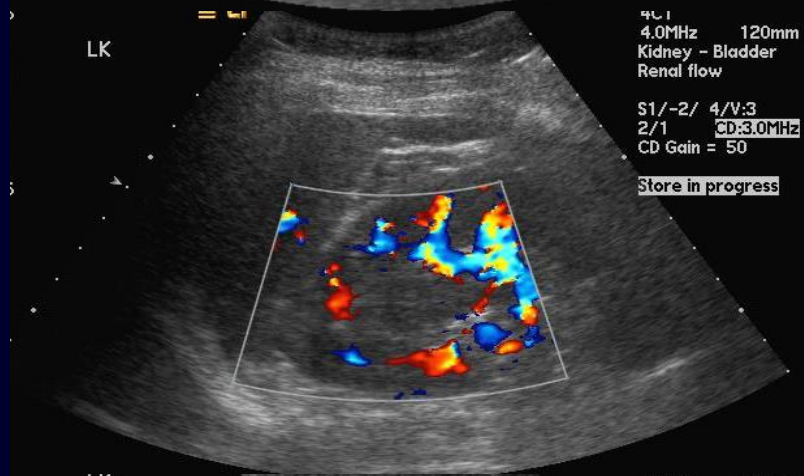
- normal fusion of multiple lobes in fetus
- persistence of grooves separating renal lobules



Localized compensatory hypertrophy of renal parenchyma

- island of unaffected parenchyma in reflux nephropathy
- hypertrophied for the compensation





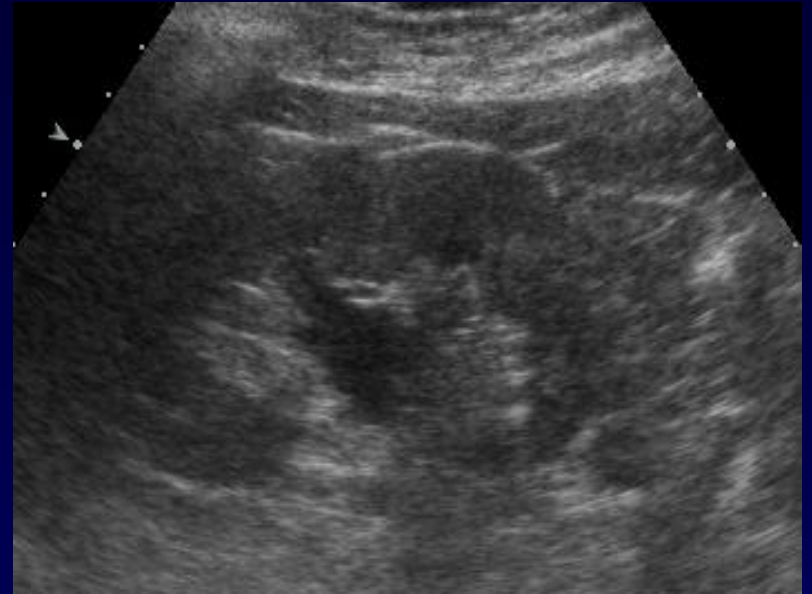
UBOs (unidentified bright object)

- small echogenic foci without posterior shadowing
- tiny stones, tiny cysts, calcified arteries



Pseudohydronephrosis

- parapelvic cysts
 - : cyst in renal sinus
 - : lymphatic obstruction



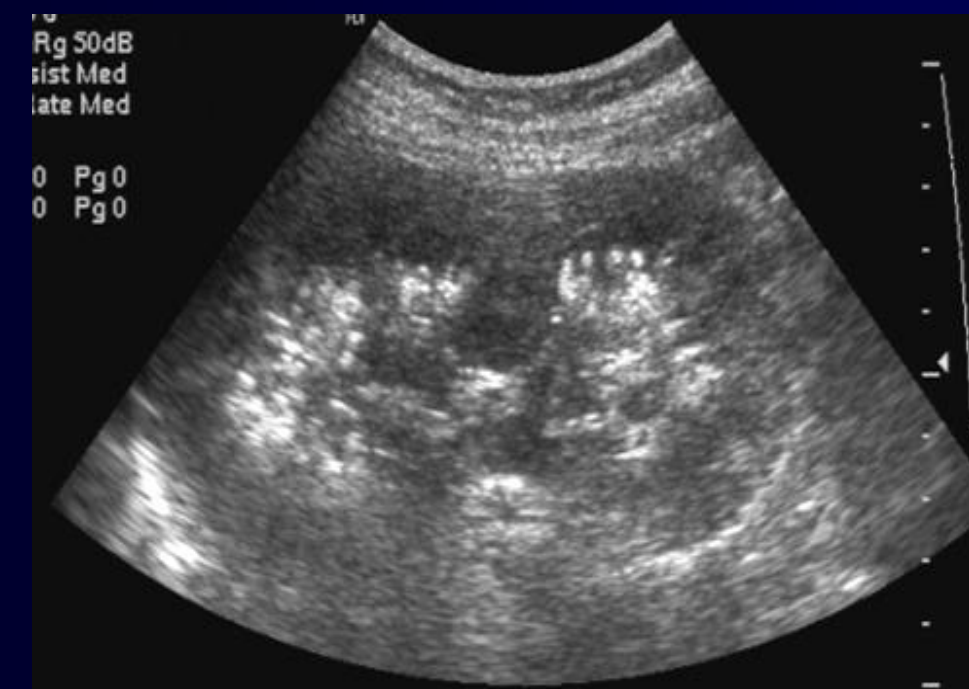
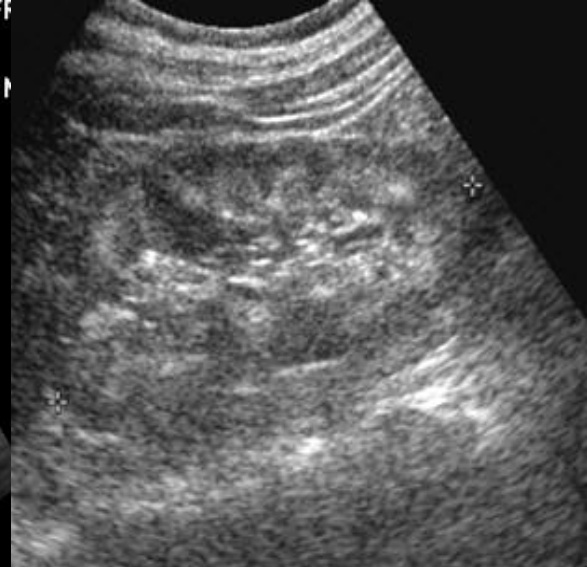
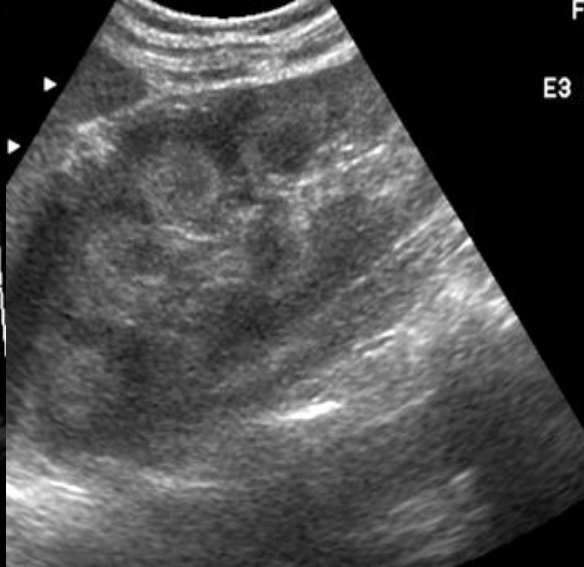
Pseudohydronephrosis

- extrarenal pelvis
: normal variation
: box shaped pelvis



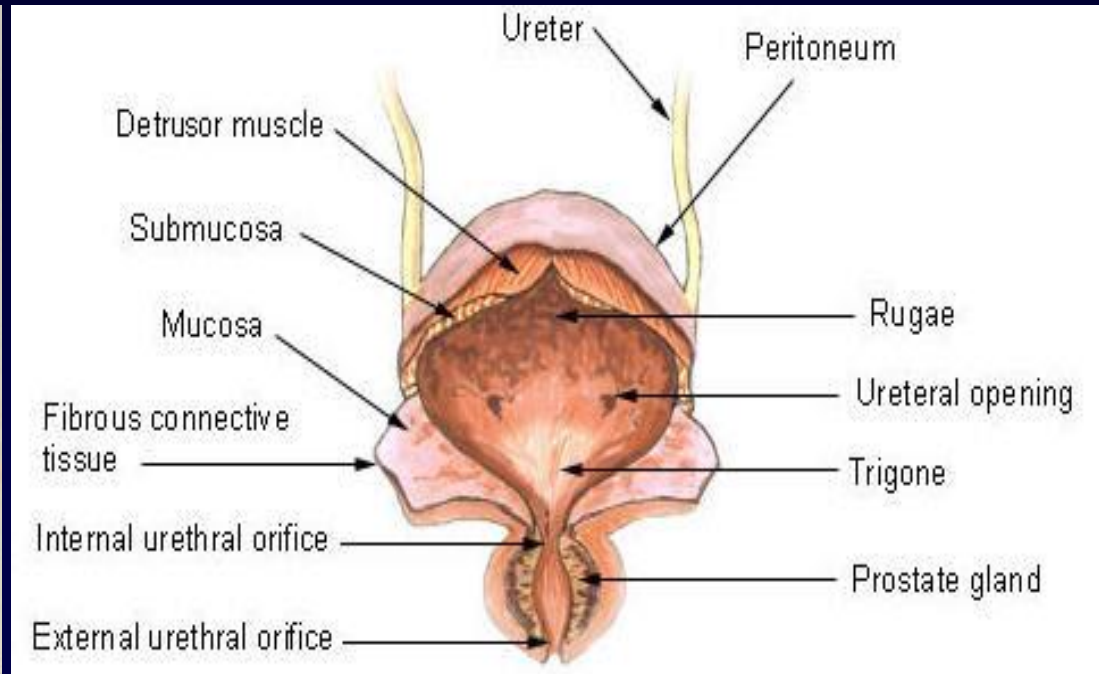
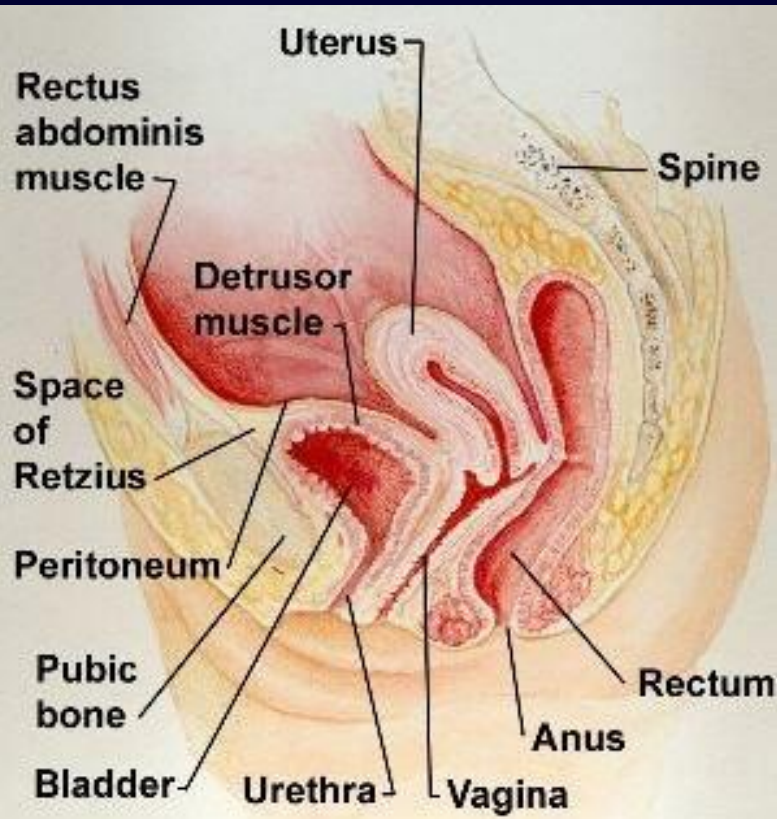
Medullary nephrocalcinosis

- fine calcium deposits in the renal medulla
- etiology
 - : renal tubular acidosis, medullary sponge kidney, hyperparathyroidism, sarcoidosis, diuretics
- US findings
 - : hyperechoic medulla with/without posterior shadowing



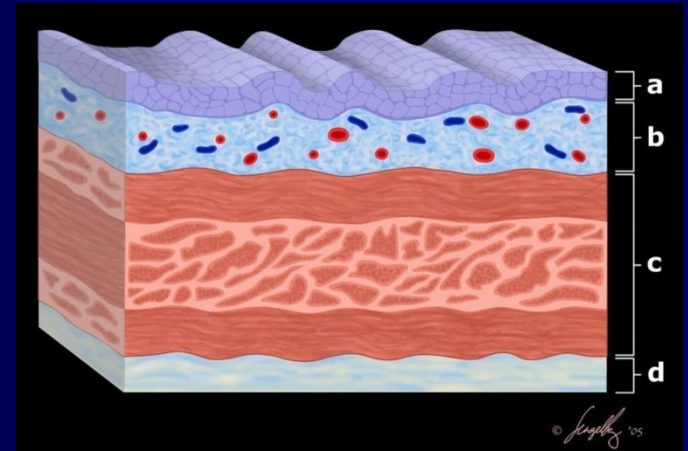
US of the Bladder

Anatomy



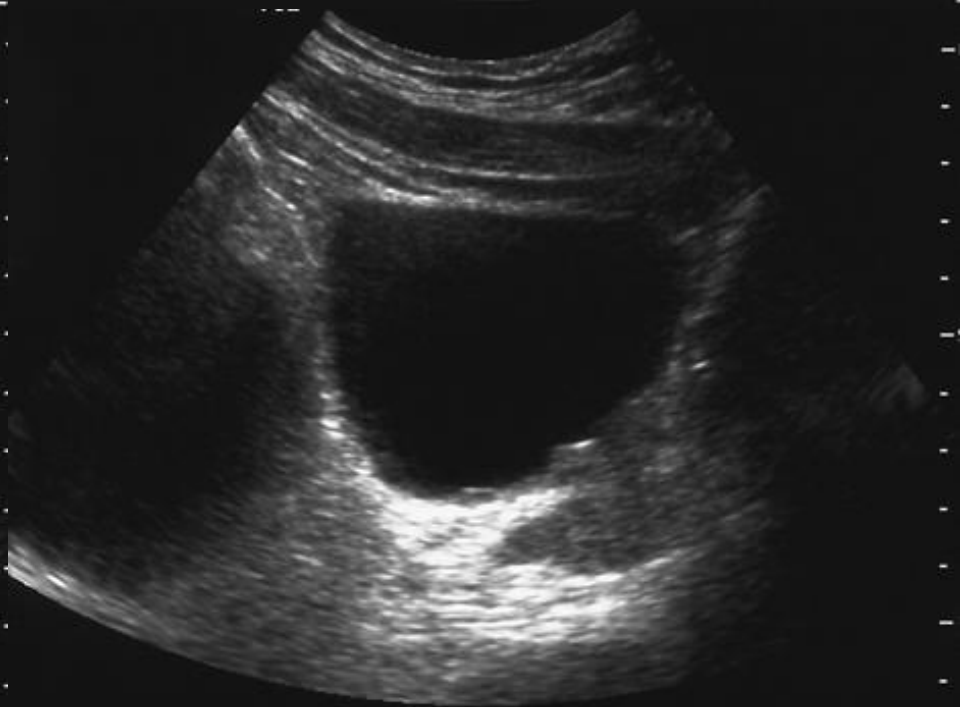
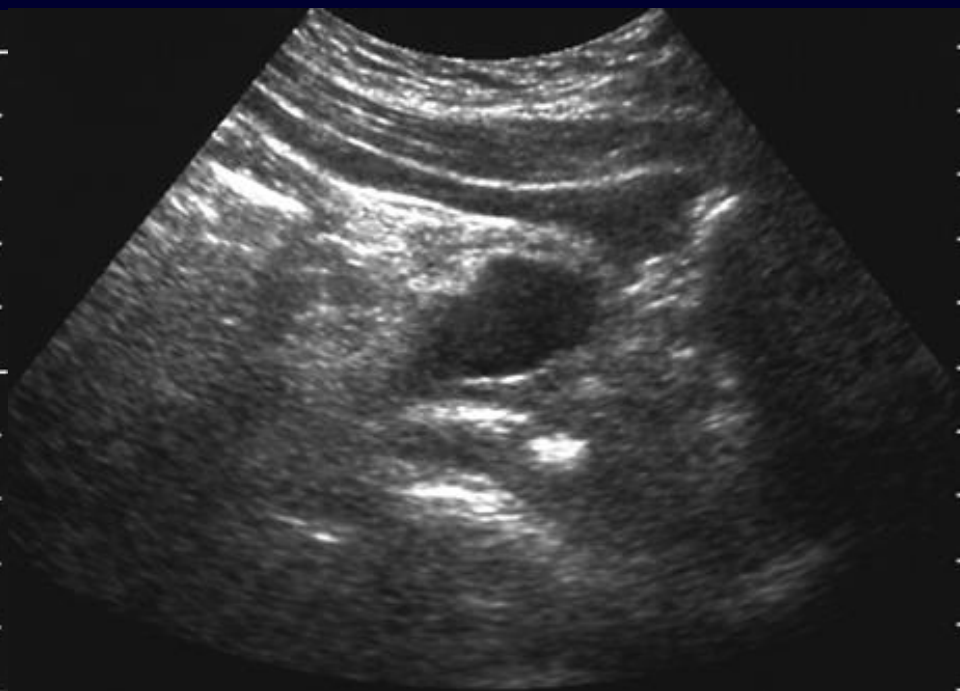
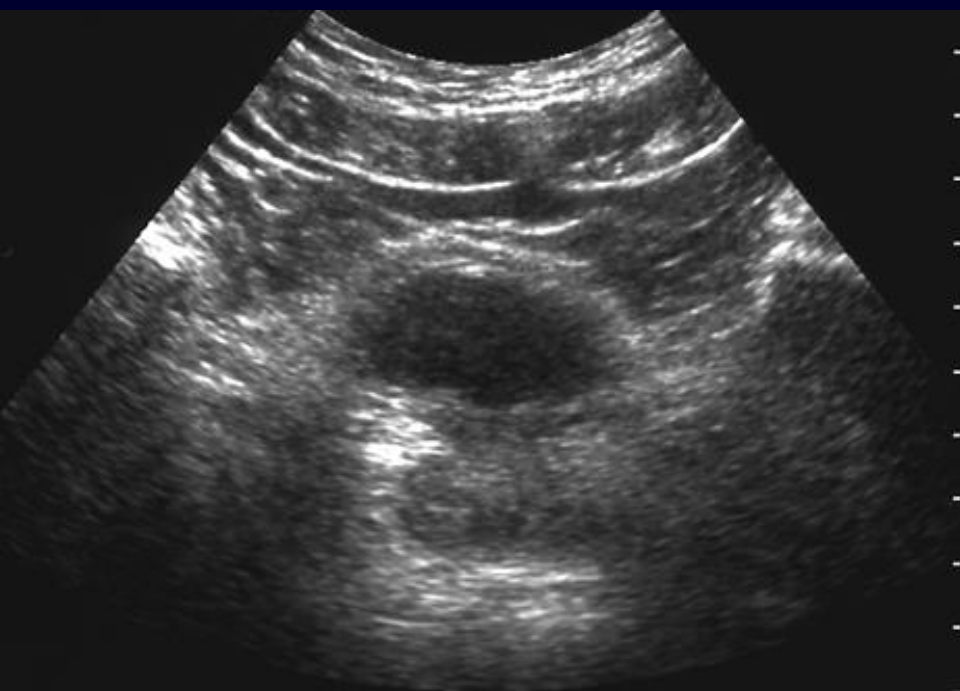
bladder wall – 4 layers

- urothelium (transitional epithelium)
- submucosa
- muscularis propria
- serosa



Preparation of bladder US

- 2-5 MHz convex probe
- supine position of patient
- not NPO
- bladder filling of 300 - 500 ml
 - : acoustic window to visualize deeper structure
 - : displace air-filled bowel out of lower pelvis
 - : anatomical landmark
 - : fixation of uterus



Technique of Bladder US

- axial / sagittal scan
 - : craniocaudal and lateral angulation
 - : normal bladder wall
 - smooth and thin
 - 3-5 mm when well distended state
 - : bladder neck in midsagittal plane
- oblique scan: (optional)
 - : ureterovesical junction

ATL

CT
TV

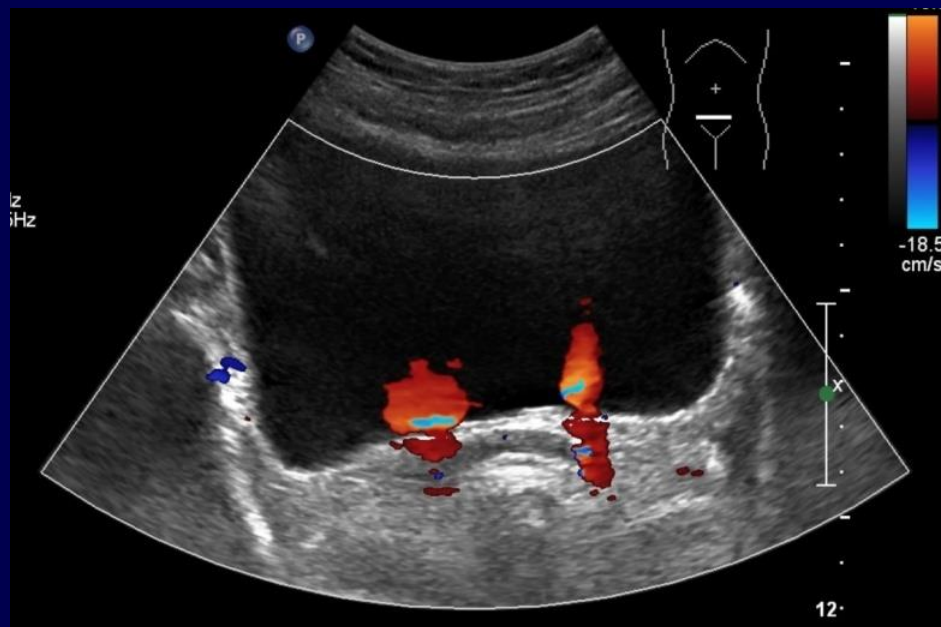
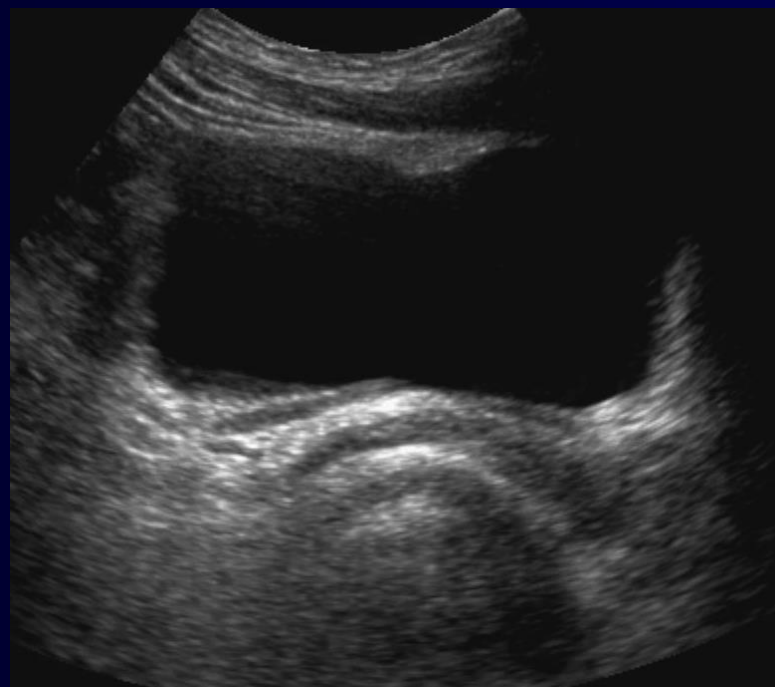
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axial scan

ATL

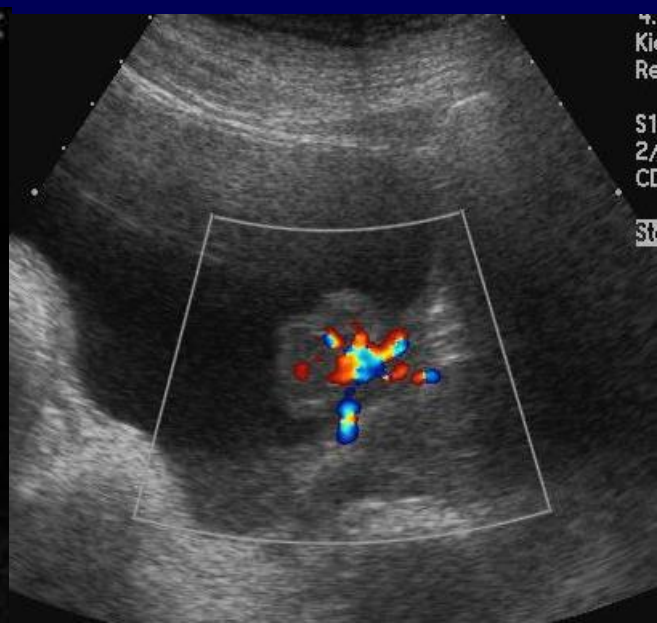
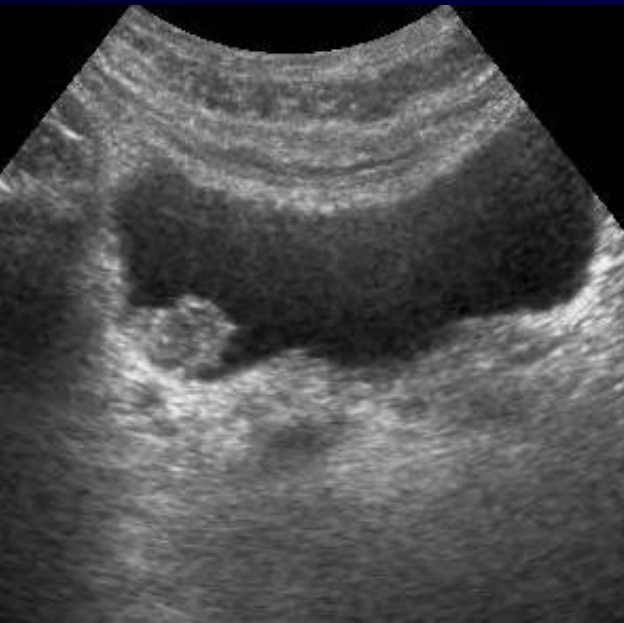
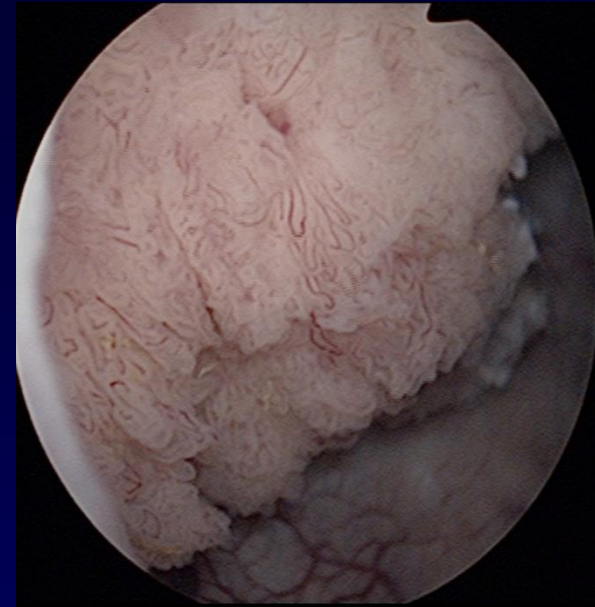
T

sagittal scan



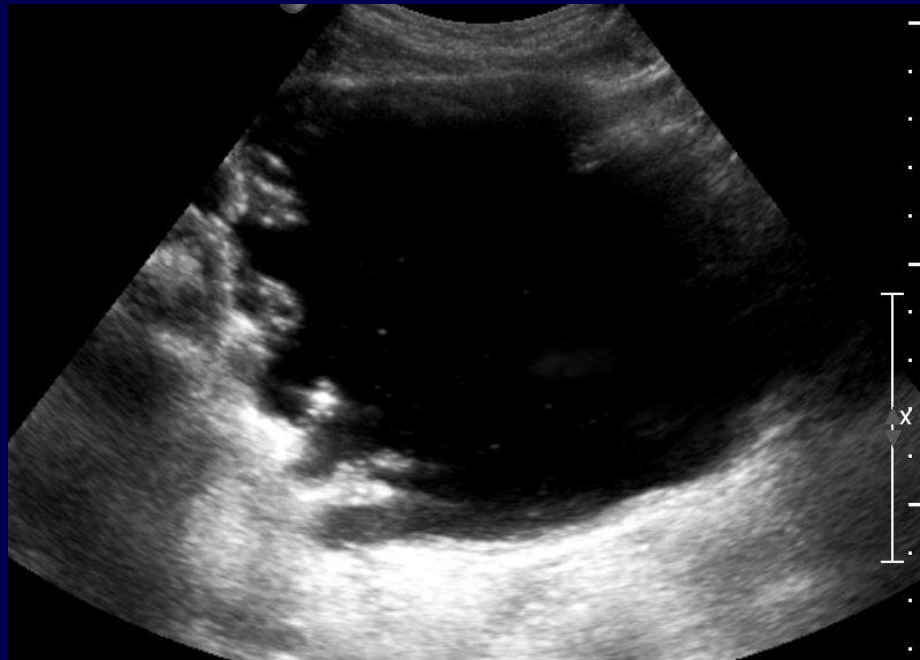
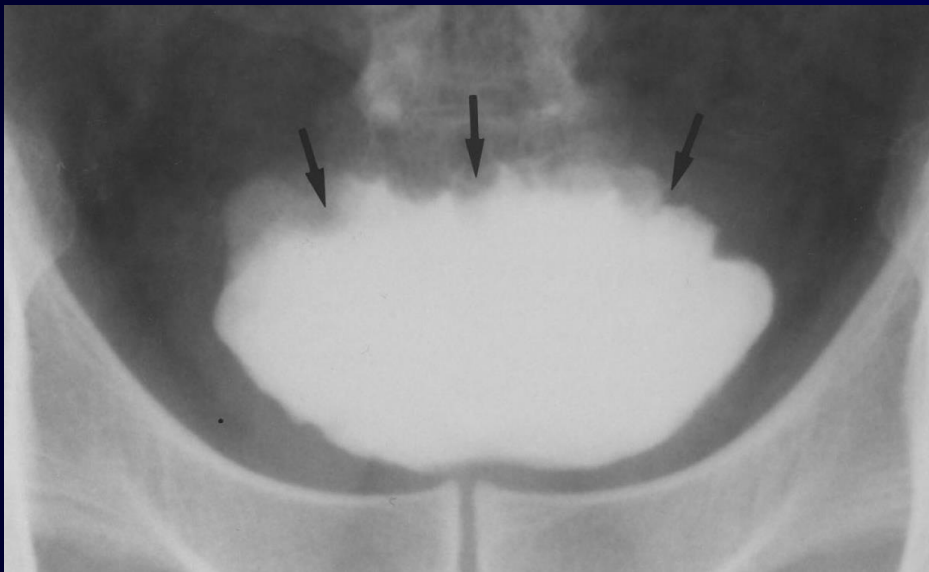
Bladder tumor

- transitional cell carcinoma: 90%
 - multifocal (1/3)
 - trigone, base, lateral wall
 - papillary or infiltrative pattern
 - vascular pedicle on CDUS



Cystitis

- etiology
 - infection/inflammation
 - : bacterial, tuberculosis, fungal
 - mechanical
 - : stone, catheterization, foreign body
 - neurogenic bladder
 - drug or radiation induced
 - BPH
- US findings
 - : smooth or nodular, diffuse bladder wall thickening



Bladder stone

- due to urinary stasis and foreign body
 - BPH, neurogenic bladder, urethral stricture
 - suture material, catheter
- US findings
 - echogenic foci with posterior shadowing



US of the Scrotum

음낭초음파 적응증

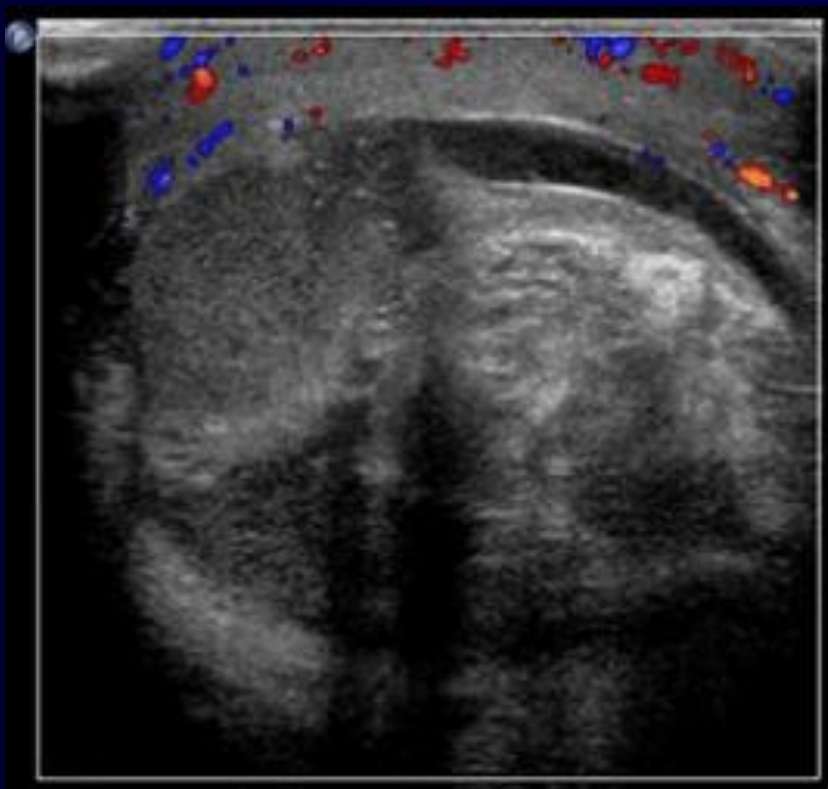
- 음낭 종물의 평가
- 고환의 크기 및 비대칭성
- 고환 외상과 음낭통
- 음낭 내 고환 이외의 구조 이상 판별
- 급성 음낭 환자에서 고환 염전과 급성 고환/부고환염의 감별
- 잠복고환의 진단 및 추적
- 정계정맥류

음낭초음파 방법

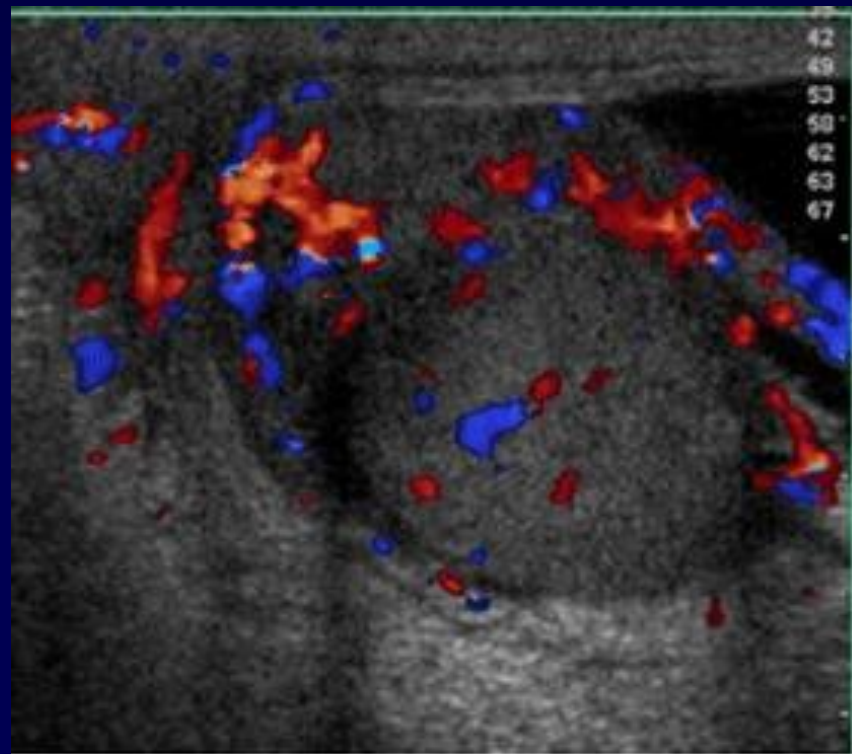
- 먼저 시진과 촉진을 병행 (이상소견 및 통증)
- 따뜻하고 편안한 환경에서 음낭을 받쳐줄 수 있게 대퇴부에 수건을 걸쳐고 진행
- 고환 및 부고환 확인하고 크기 측정, 비교
- 급성음낭시에는 도플러로 고환과 주변 구조 평가, 증상이 있는 쪽과 없는 쪽을 비교
- 필요 시 발살바나 세워서 진행

급성 음낭종의 감별

- 고환 염전

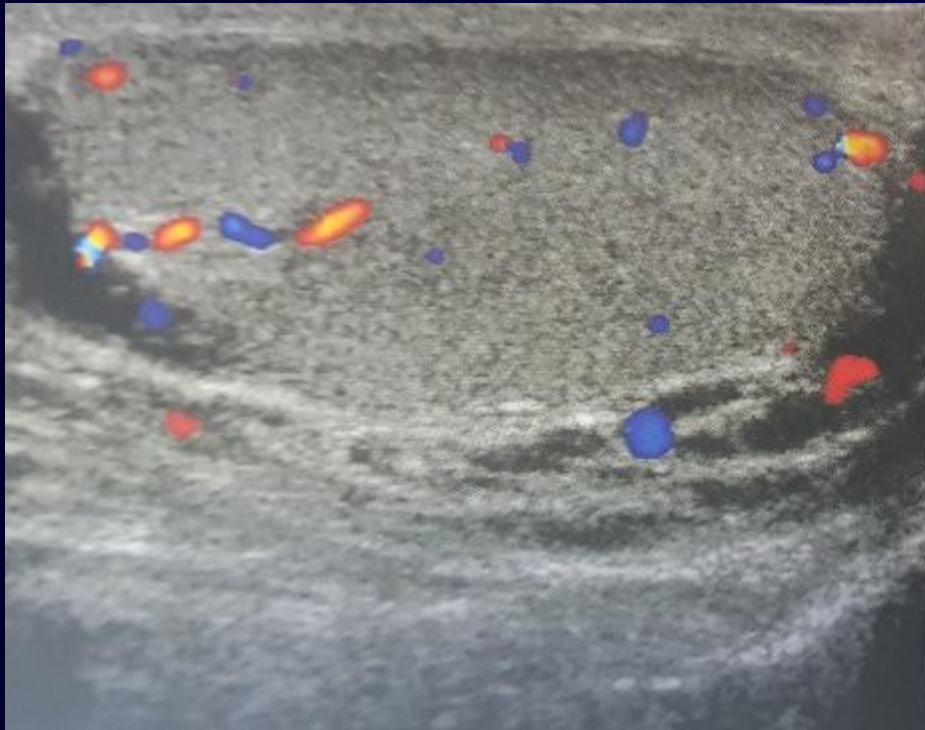


- 급성 부고환염

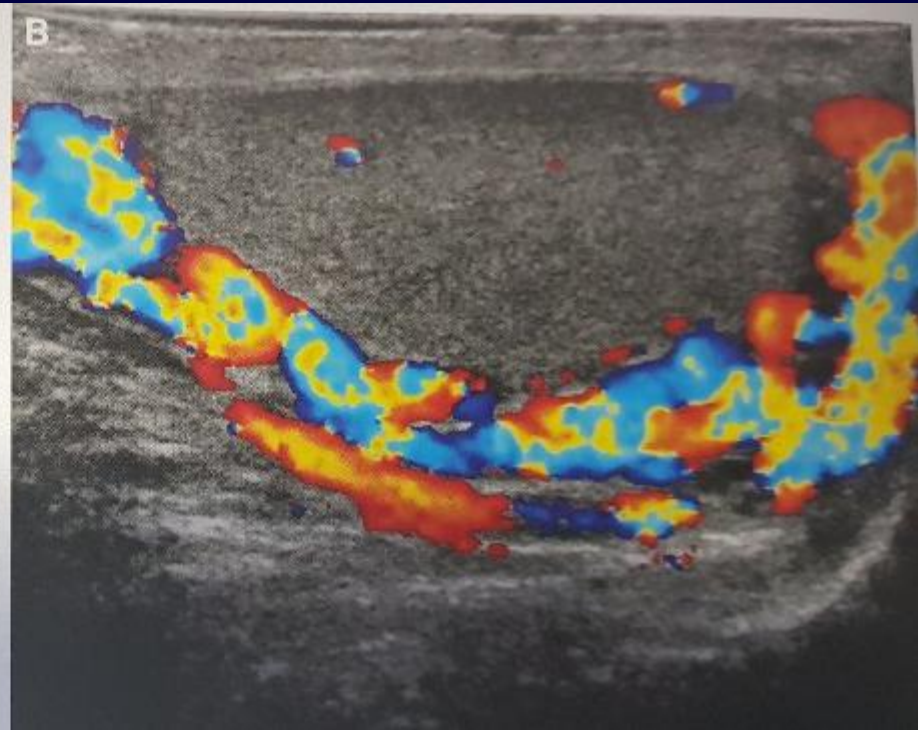


정계정맥류

- 평상시



- 발살바



초음파는 의사에게는 제2의 청진기



비뇨기 초음파 급여

- 하복부·비뇨기 초음파 검사는 그간 4대 중증질환(암·심장·뇌혈관·희귀난치) 등에 한해 제한적으로 건강보험이 적용
- 건강보험 보장성 강화대책('17.8월)에 따라 '18.4월 간, 담낭 등 상복부 초음파에 이어 '19.2월부터는 콩팥(신장), 방광, 항문 등 하복부·비뇨기 초음파에도 건강보험을 확대 적용

하복부, TRUS

환자부담금	구분	의원	병원	종합병원	상급종합
보험적용 이전*	최소~최대	4~8만 원	5~11만 원	7~14만 원	9~19만 원
	평균	5만6900원	7만7200원	9만6500원	13만9100원
보험적용 이후**	외래(30~60%)	2만6300원	3만2900원	4만2800원	5만3400원
	입원(20%)	1만7500원	1만6400원	1만7100원	1만7800원

신장 부신 방광

환자부담금	구분	의원	병원	종합병원	상급종합
보험적용 이전*	최소~최대	4~8만 원	6~11만 원	7~17만 원	8~21만 원
	평균	5만6300원	7만9200원	10만5800원	15만5000원
보험적용 이후**	외래(30~60%)	2만3600원	2만9500원	3만8400원	4만8000원
	입원(20%)	1만5700원	1만4700원	1만5300원	1만6000원