

Renal ultrasound

制定部門：腎臟內科

制訂日期：2017年 04月 19日

修訂日期：2019年 05月 22日



Anatomy

- ▶ 腎臟位於腹腔的後上方, 背面有下方的肋骨保護
- ▶ 兩側腎臟的upper pole傾向中線以及偏向後方
- ▶ 成人長10~12公分、寬5~6公分、厚3~4公分, 比握緊的拳頭稍小, 約100~150公克重
- ▶ Renal hilum: renal vein, artery, ureter, lymphatics
- ▶ 一對腎約有200萬個腎元組成

Scanning technique

- ▶ A 3.5-5 MHz probe is typically used to scan the kidney.
- ▶ 看右腎, 請患者仰躺, 將探頭沿著右側腋中線擺在right lower intercostal space
- ▶ 將肝臟當作“acoustic window”, 然後扇狀掃過整顆腎臟
- ▶ 必要時可以請患者吸氣或吐氣, 來讓腎臟上下浮動
- ▶ 要有longitudinal (long axis) + transverse (short axis) views

Scanning technique

- ▶ 想要看左腎, 可請患者仰躺或向右側躺
- ▶ 接著將探頭沿著腋後線擺在left lower intercostal space
- ▶ 探頭的擺位將比右腎更朝向頭側及背面
- ▶ 將脾臟當作“acoustic window”, 然後扇狀掃過整顆腎臟

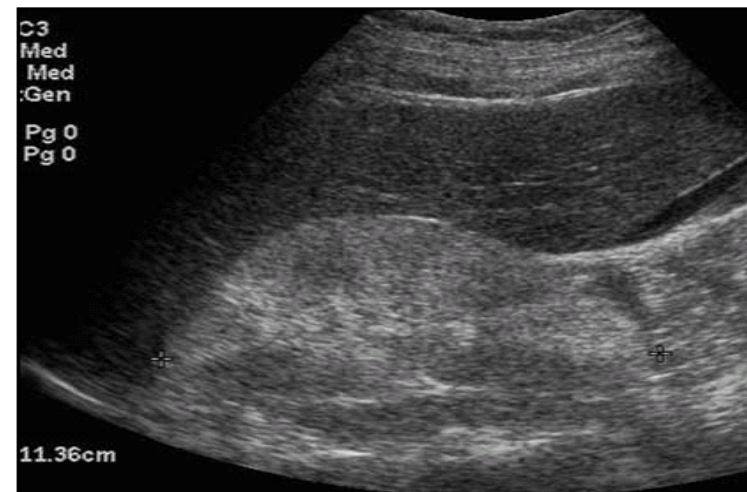
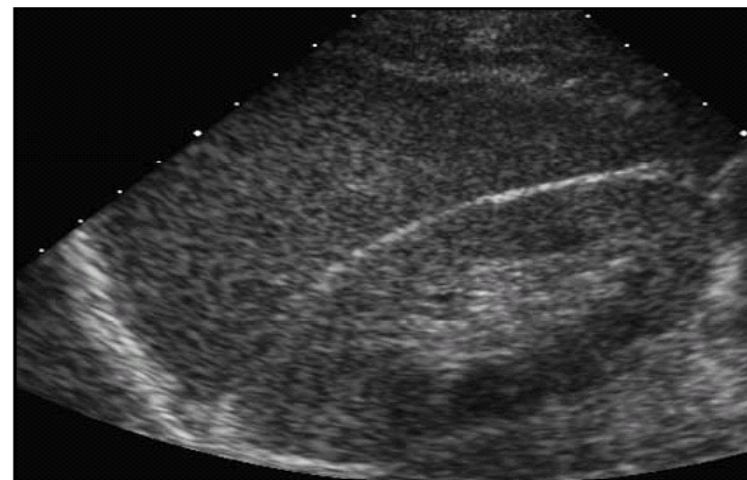
Normal findings

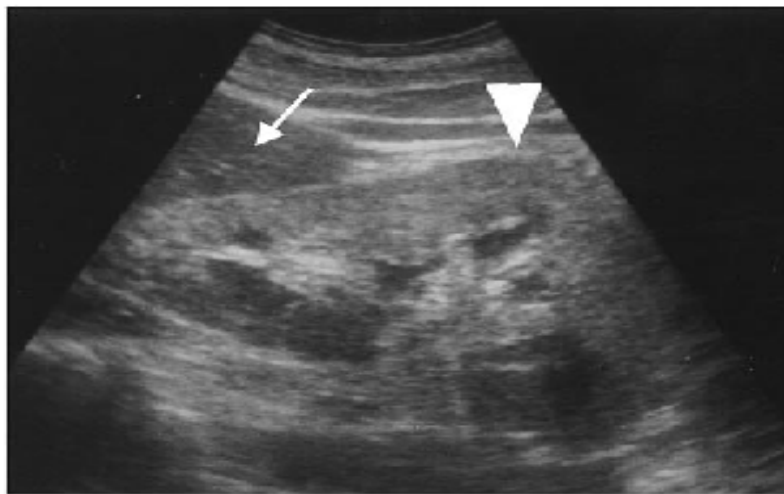
- ▶ 腎臟的外層看起來是灰黑色的, 主要由renal cortex and pyramids組成
- ▶ 腎臟中央的區域, the renal sinus, 看起來較亮 (echogenic), 主要是calyces, renal pelvis and the renal sinus fat
- ▶ 正常的腎臟超音波不應該看到上三分之一的輸尿管

Renal parenchymal disease

- ▶ Grade 1: 腎臟的音波強度與肝脾相等, 皮質與髓質仍清晰可分
- ▶ Grade 2: 腎臟的音波強度高過肝脾臟, 皮質與髓質仍清晰可分
- ▶ Grade 3: 腎臟的音波強度增強, 沒有皮質與髓質的明顯區分

Renal parenchymal diseases

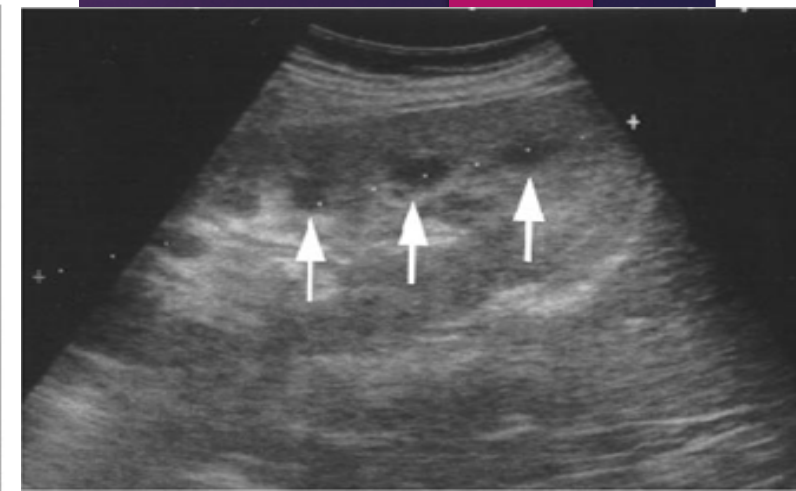




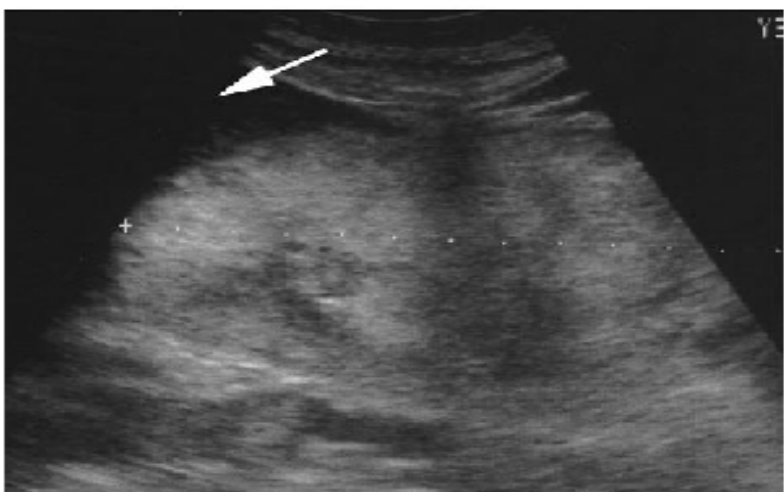
Diabetic nephropathy,



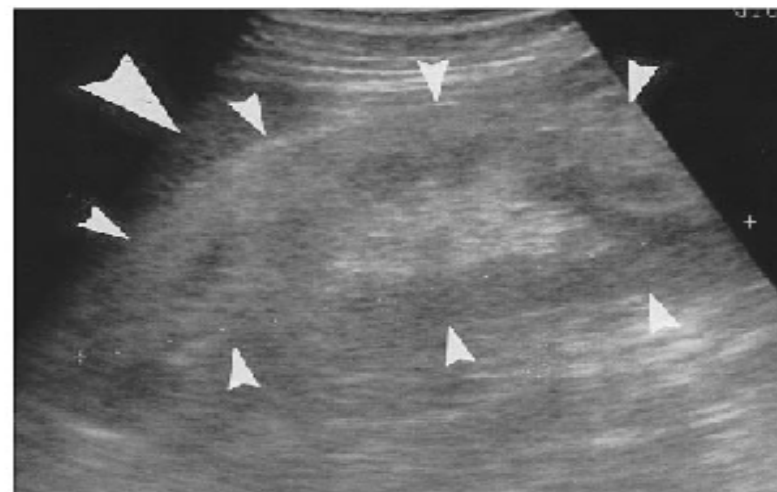
Glomerulonephritis.



Acute tubular necrosis.



acute membranoproliferative glomerulonephritis.



amyloidosis.



Leukemic infiltration

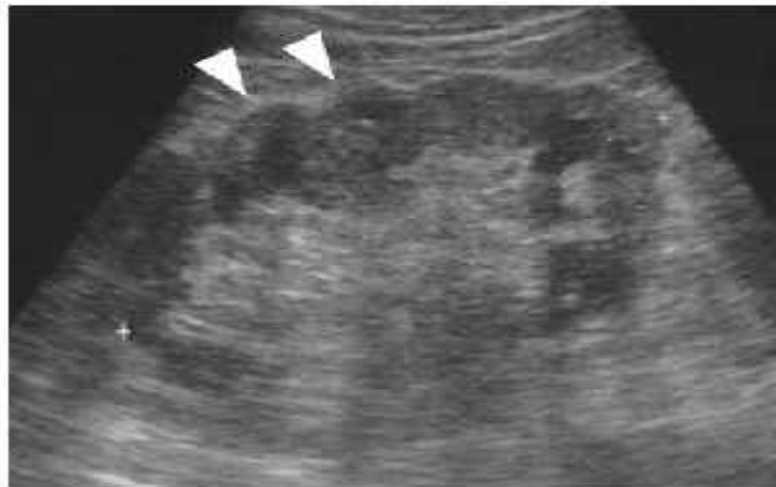
Chronic renal failure.



Small echogenic



Thin cortex



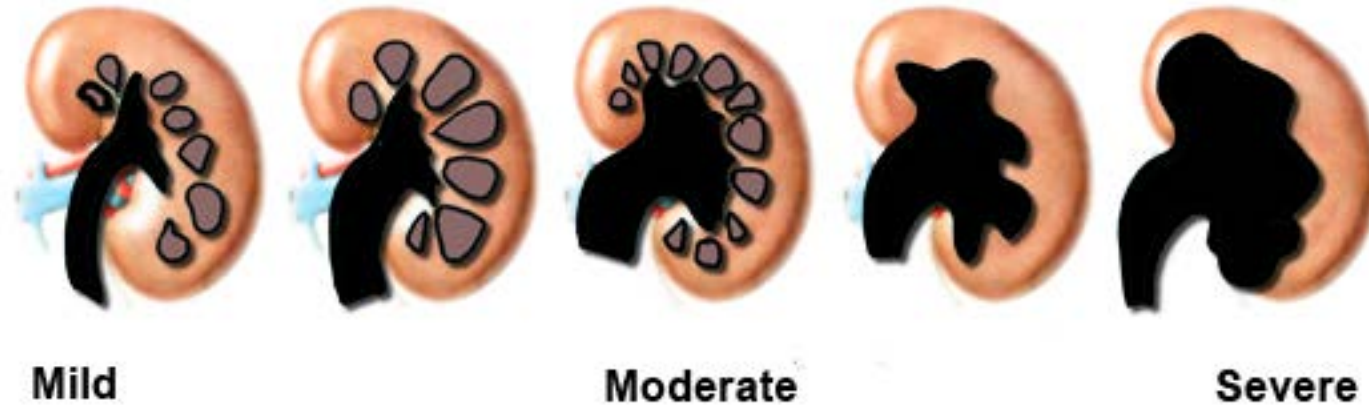
accentuated lobulation



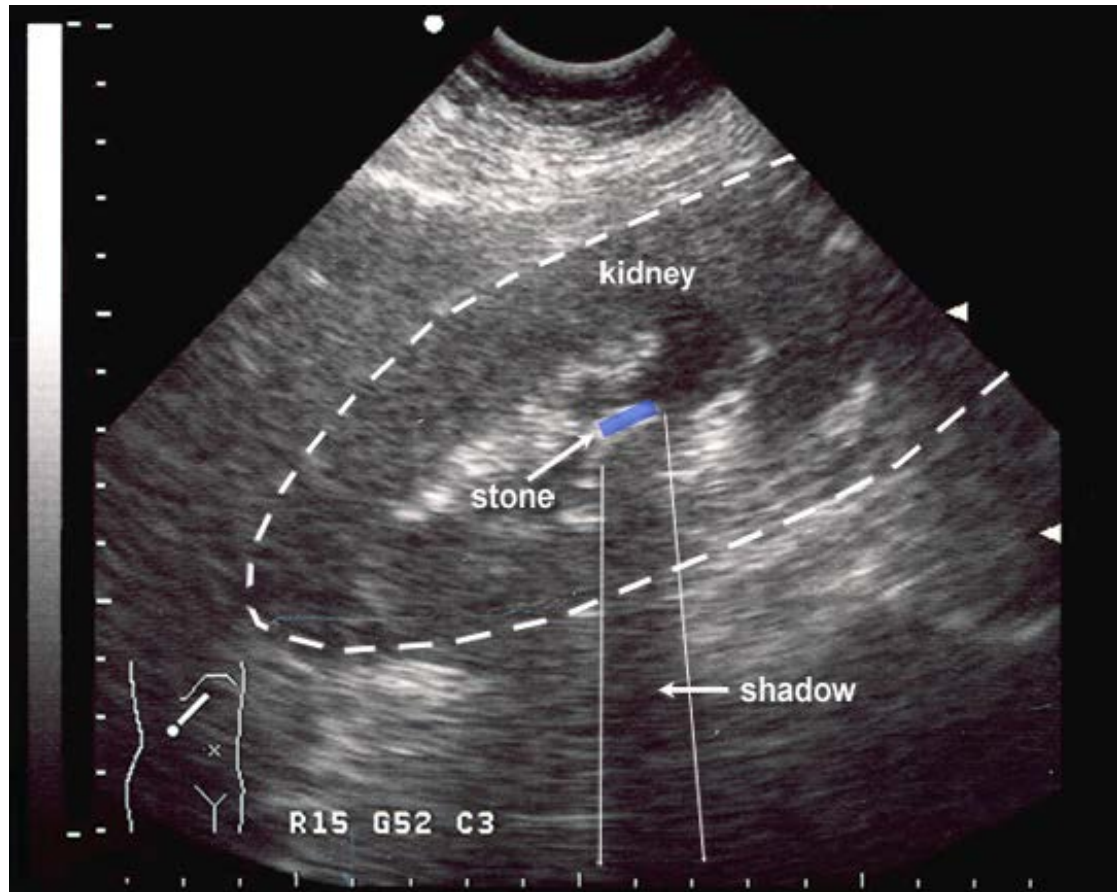
Cortical atrophy

Pathology: hydronephrosis

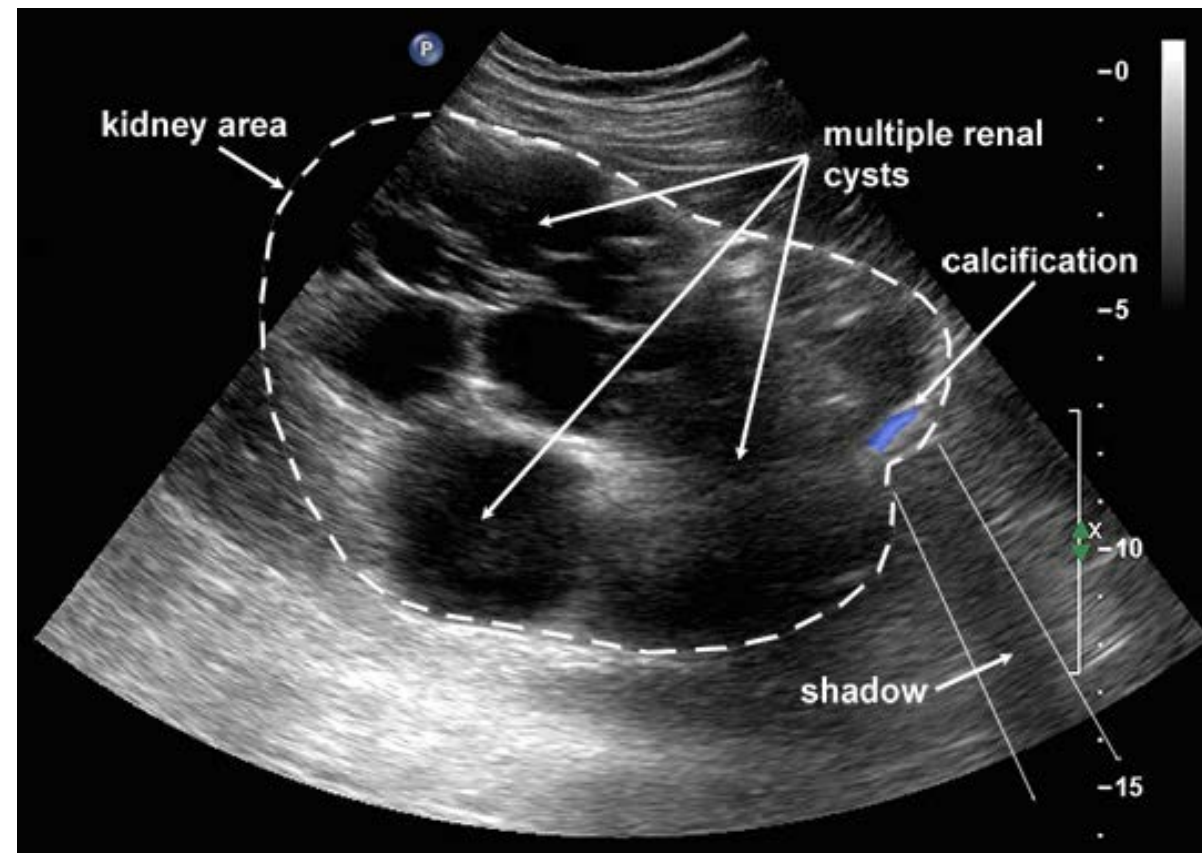
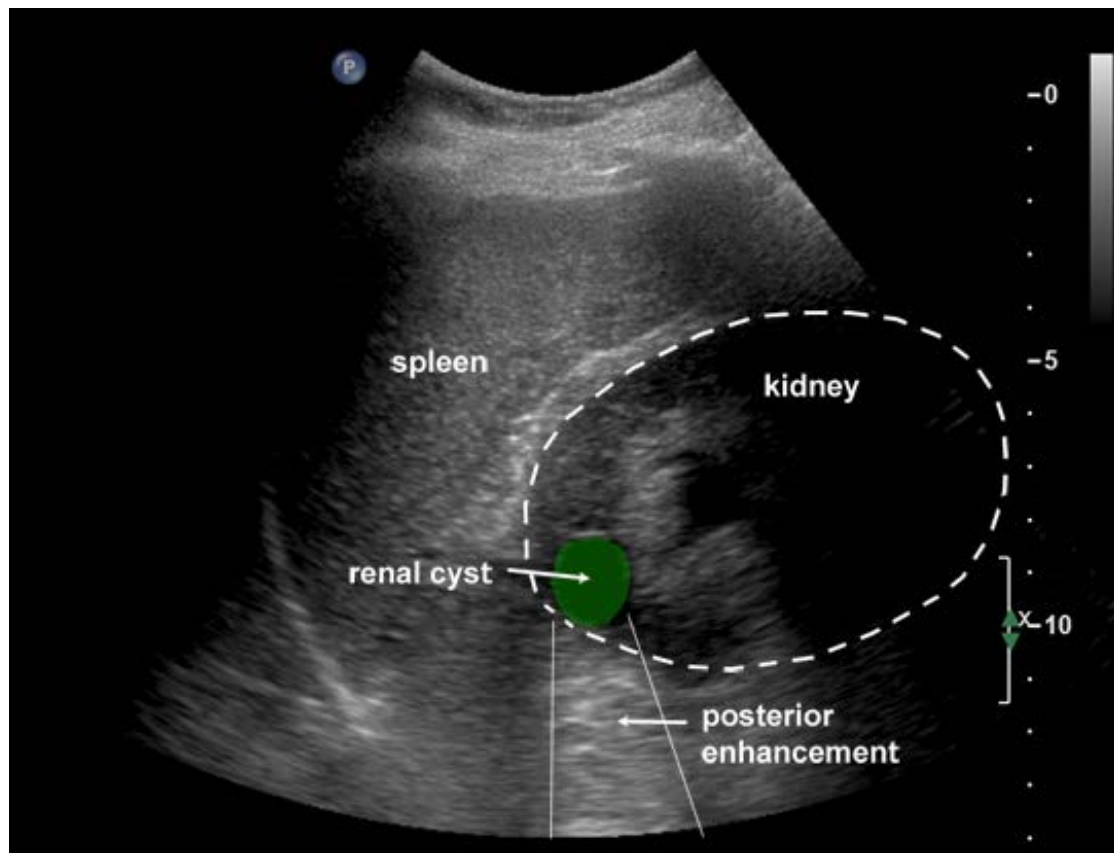
Degrees of Hydronephrosis



Pathology: stones



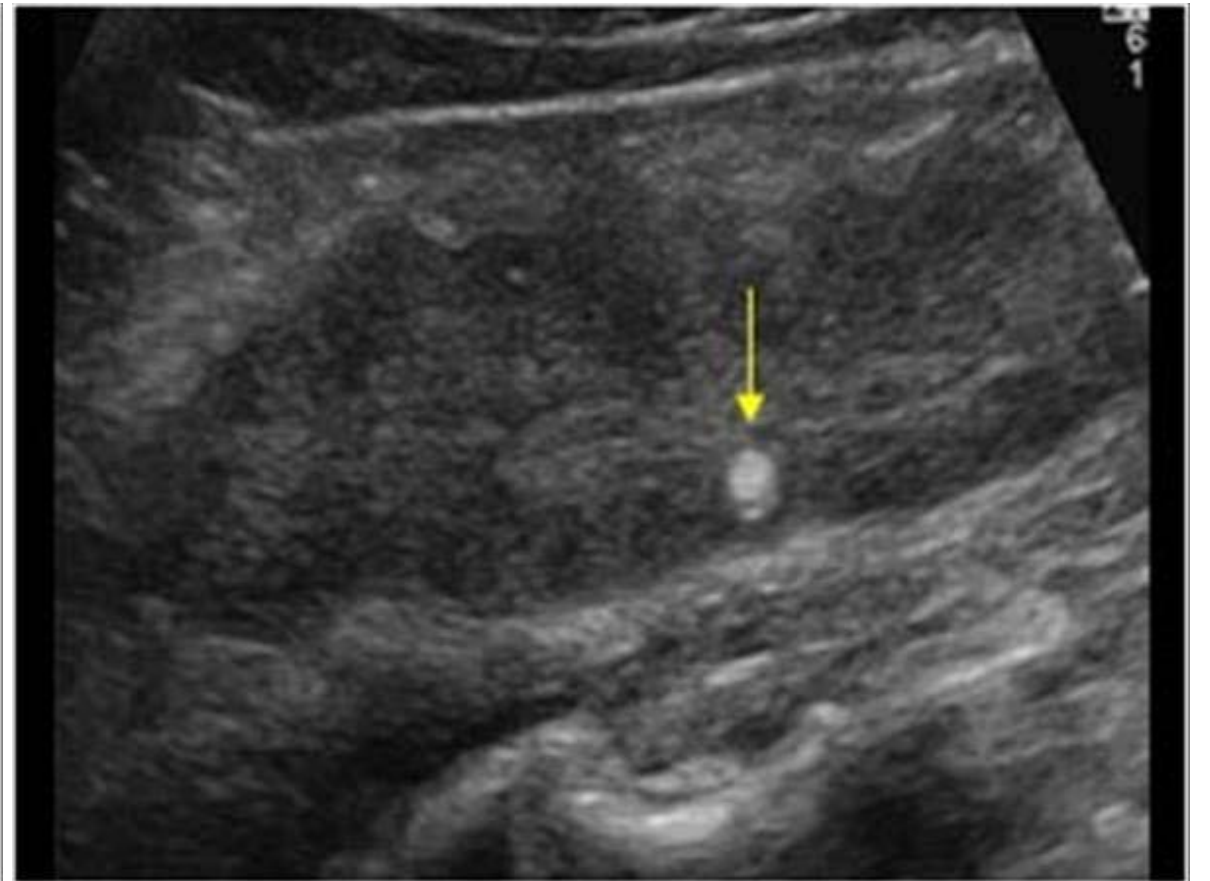
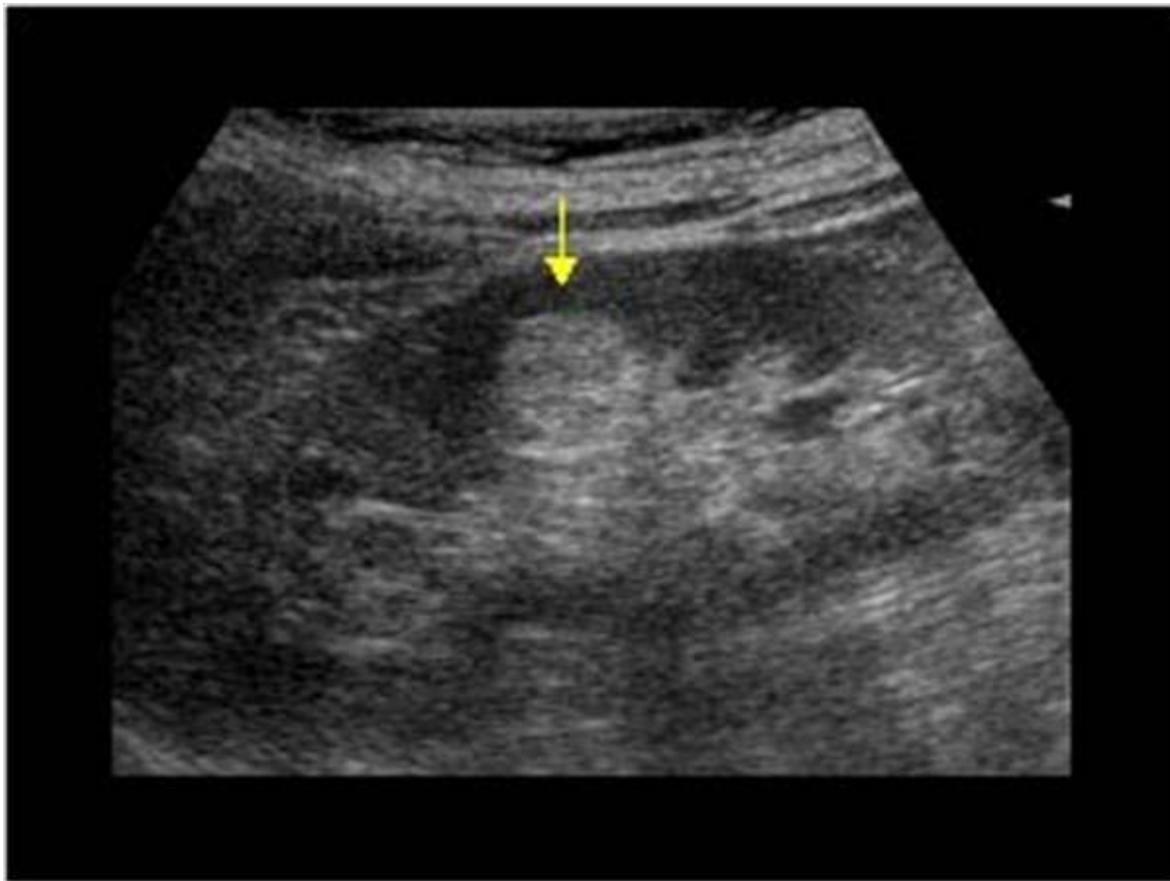
Pathology: cysts



Bosniak renal cyst classification system

Category I	Benign simple cyst with imperceptible wall that does not contain septa, calcifications or solid components. Water attenuation is seen at CT and the contents are anechoic at US. No enhancement is seen with contrast agents	No intervention needed
Category II	Benign cystic lesion that may contain a few thin (<1 mm) septa (Fig. 26.5A) in which perceived but not measurable contrast enhancement may be found at CT. Likewise, a few microbubbles of contrast agent may be seen in the septa at US. Fine calcification or a short segment of slightly thickened calcification may be seen in the septa. Hyperdense cysts on CT of less than 3 cm size and with no complexity or enhancement are in this group too	No intervention needed
Category IIF	Cysts may contain multiple thin (<1 mm) septa. There may be minimal thickening of wall or septa (Fig. 26.5B), which may contain calcification that may be thick and nodular (Fig. 26.5C). Perceived but not measurable enhancement of thin septa at CT or a few microbubbles seen at US are allowed but there are no enhancing soft tissue components. Totally intrarenal, non-enhancing, hyperdense cysts of less than 3 cm at CT are included in this group	Lesions are thought to be benign but follow-up is needed to prove the stability of the lesion. Risk of malignancy 5%

Pathology: hamartomas



Pathology: miscellaneous

- ▶ Pyelonephritis: 通常超音波下大致為正常, 有時可見 hypoechoic cortex
- ▶ Renal mass: may have any echotexture (hyperechoic, anechoic etc.), 而且在腎臟的任何地方都有可能出現
- ▶ Transplant kidney: a normal echotexture kidney, 通常在骨盆腔可見
- ▶ Chronic renal failure: 腎臟的size會縮小, 音波強度明顯增加

Notes

- ▶ Renal cysts 常容易與hydronephrosis被搞混: peripheral versus central
- ▶ 喝水脹尿的患者或孕婦有可能出現mild hydronephrosis without obstruction: usually bilateral presentations
- ▶ 千萬別將脹大的膽囊誤以為是renal cyst
- ▶ 通常有multiple renal cysts的患者, 肝臟也會有cysts
- ▶ Hamartoma versus angiomyolipoma (AML)

Reference:

- ▶ Atlas of renal ultrasonography, 2002, 呂嘉陞
- ▶ Uptodate: simple and complex renal cysts in adults



Thanks for your attention~

Let's do it!!!