Benign liver diseases and how to diagnose them: Fibrosing Nodular Hyperplasia, Hemangioma, Hepatic Adenomas and Hepatic Cysts

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General Considerations in evaluating a liver nodule/lesion

- A history of constitutional symptoms
- - Anorexia
- - Weight loss
- Chronic Liver disease
- A prior history of cancer
- Travel
- Dysentry
- Altered bowel habits
- Oral Contraceptives

Case 1

- 40 year old female patient undergoes a health screen. An ultrasound shows a 2 cm lesion in the liver on a background of fatty liver. The liver is smooth. Normal sized spleen. ALT 51, AST 35, AFP is 7, Hb 12. Platelet 340. She takes Atorvastatin , metformin, and oral contraceptives.



Homogenous hyperechoic well circumscribed lesions

Is Ultrasound sufficient to make a diagnosis ?

Should this lesions be biopsied ?

Should the patient stop oral contraceptives ?

Discuss treatment options

Hepatic Hemangiomas Epidemiology

- Most common liver lesion
- Present in up to 20% of the population
- Typically incidentally detected and patients are asymptomatic
- More common in females (M:F as hish as 1:6**)**
- More frequent in ages between 30-50 years
- Frequently small and less than 40mm
- Generally solitary
- When larger than 10cm these are referred to as giant hemangiomas

Pathophysiology

- Poorly understood pathophysiology
- Believed to be due to a congenital disorder with possible hormone dependence
- Microscopically, they are cavernous spaces lined by endothelial cells over which are fibrous tissue.
- Thus they can become fibrotic nodules
- Sometimes referred to as hepatic sclerosed hemangiomas
- Some degree of fibrosis, calcification and thrombosis can be observed

Size does matter

- Sizes of < 3cm are called capillary hemangiomas
- Sizes of up to 10cm are called cavernous hemangiomas
- > 10cm are giant hemangiomas

- Giant hemangiomas can be associated with pain and coagulopathy as part of the Kasabach-Merritt Syndrome (KMS).
- KMS is caused by trapping of platelets within the capillaries of the hemangioma resulting in thrombocytopenia, consumptive coagulopathy , inflammatory reaction , pain

Diagnosis

- Un-enhanced Ultrasound is sufficient in typical cases in healthy patients

  Homogenous hyperechoic lesion , typically less that 3cm in size with **acoustic enhancement** and well circumscribed with **sharp borders**.

- In oncology or chronic liver disease patients perform CEUS,CT or MRI.

  Contrast enhancement characteristics**– Peripheral enhancement followed by central enhancement in delayed phase.**

- MRI is gold standard – **Hypointense on T1** weighted sequences and **hyperintense on T2** weighted sequences

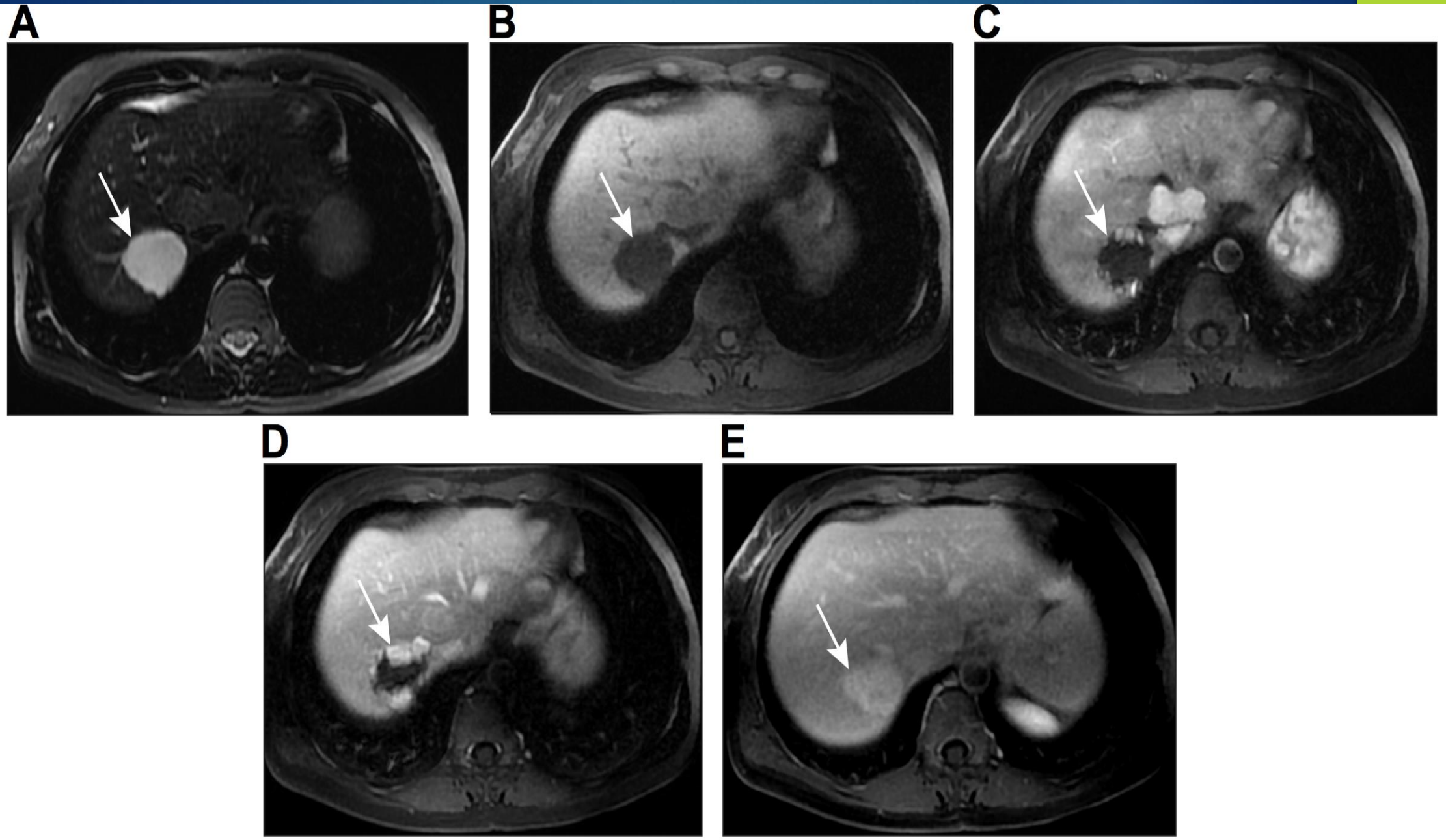
Contrast Enhanced Ultrasound



Homogenous hyperechoic lesion , typically less that 3cm in size with

acoustic enhancement and well circumscribed with **sharp borders**.

Peripheral enhancement followed by central enhancement in delayed phase.


A
B
C
D
E

Atypical imaging characteristics

- Giant Hemangiomas
- Central heterogenecity due to thrombosis
- Acute thrombosis can be identified by CT or MRI
- Other atypical features include rapid filling, slow filling and calcification

- If the stakes are high a liver biopsy may be performed although in most cases this is not necessary.

Management

- Follow up imaging is not required once the diagnosis is certain
- Conservative management for the typical cases
- Not necessary to stop oral contraceptives if hemangioma is stable and asymptomatic
- Trans hepatic embolization for symptomatic hemangiomas or growing lesions (typically giant hemangiomas with KMS)
- Corticosteroids
- Rarely requires surgical resection.

- Is Ultrasound sufficient to make a diagnosis ?

YES is US findings are characteristic and the size is small and there is no background of chronic liver disease

- Should this lesions be biopsied ?

No but with excepptions e.g giant hemangiomas where there is a diagnostic dilemma or atypical imaging features

- Should the patient stop oral contraceptives ?

No

- Discuss treatment options

Conservative therapy.

Case 2

- 50 year old female patient who is status post oopherectomy has been on OCP for the last 10 years. She undergoes a routine health check which detects a vague lesion on US of the liver. MRI suggest a 5cm Focal Nodular Hyperplasia.

She aske about the following on outpatient clinic

- 1. Use of oral contraceptive pills
- 2. Surveillance of the lesion
- 3. Treatment of the lesion

Focal Nodular Hyperplastic

- Second most common benign lesion of the liver
- Prevalence of up to 3% in autopsy series
- More common in females
- 35-50 year of age
- Typically solitary and less than 5cm
- Can be multiple in 20-30% of cases
- Can co-exist with hepatic hemangiomas in 20% of cases
- Associated with other vascular lesions such as HHT , Budd Chiari, veno-occlusive disorders

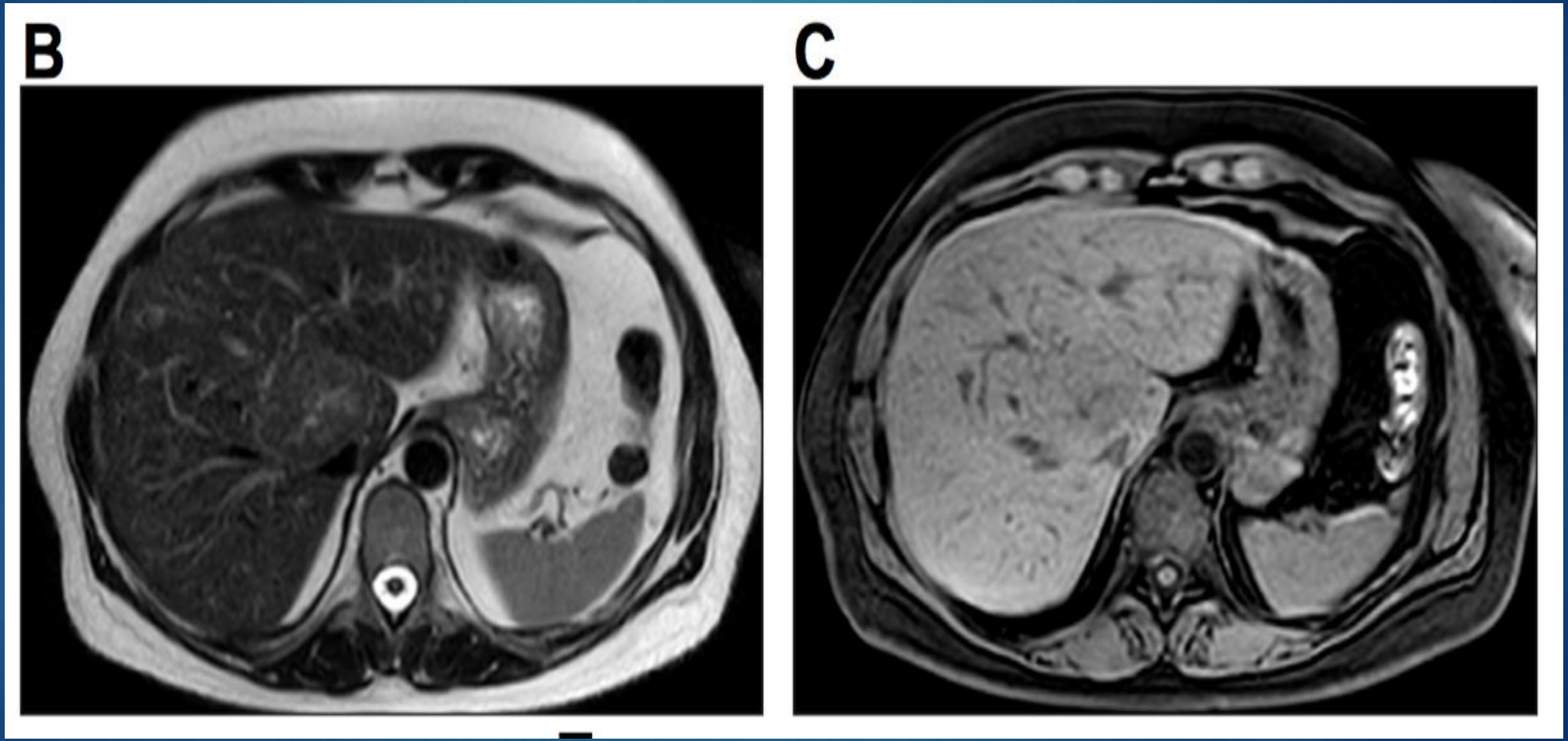
Pathology

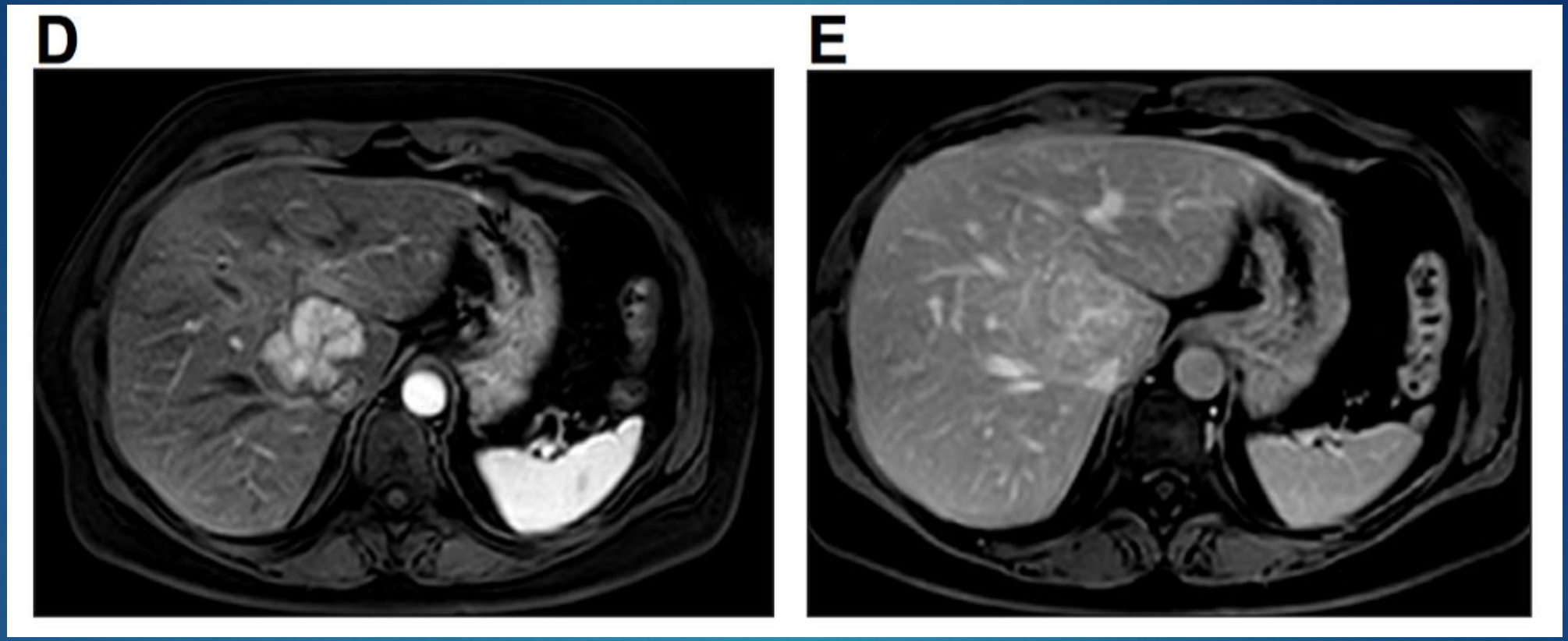
- Caused by hyperproliferation of hepatocytes due to arterial malformation.
- Thought to be a proliferative response to aberrant dystrophic artery
- Lack of somatic gene mutations identified
- Stable in size over many years
- Asymptomatic
- Well circumscribed , encapsulated mass with a central fibrous scar
- Central scar is caused by the dystrophic artery.
- Can also occur without a central scar if less than 3 cm in size or with steatosis.

Diagnostis and Imaging Characteristics

- Seen as a hypoechoic or iso echoic lesion on US. US doppler can demonstrate a spoke wheel appearance of the central artery.
- CEUS, CT and MRI with contrast yield a high diagnostic rate
- **Homogenous** appearance except the central scar
- **Strong homogenous arterial enchancement with central vessel which becomes isointense on portal and venous phase.**
- **Central scar on MRI** which is hypointense on T1 weighted sequences and hyperintense on T2 weighted sequences.
- MRI has the highest specificity of 100% for FNH.
- CEUS is more sensitive for lesions < 3cm in size than MRI.
- Additional value with extracellular hepatobiliary contrast. Hyper intense lesions in the hepatobiliary phase on MRI.

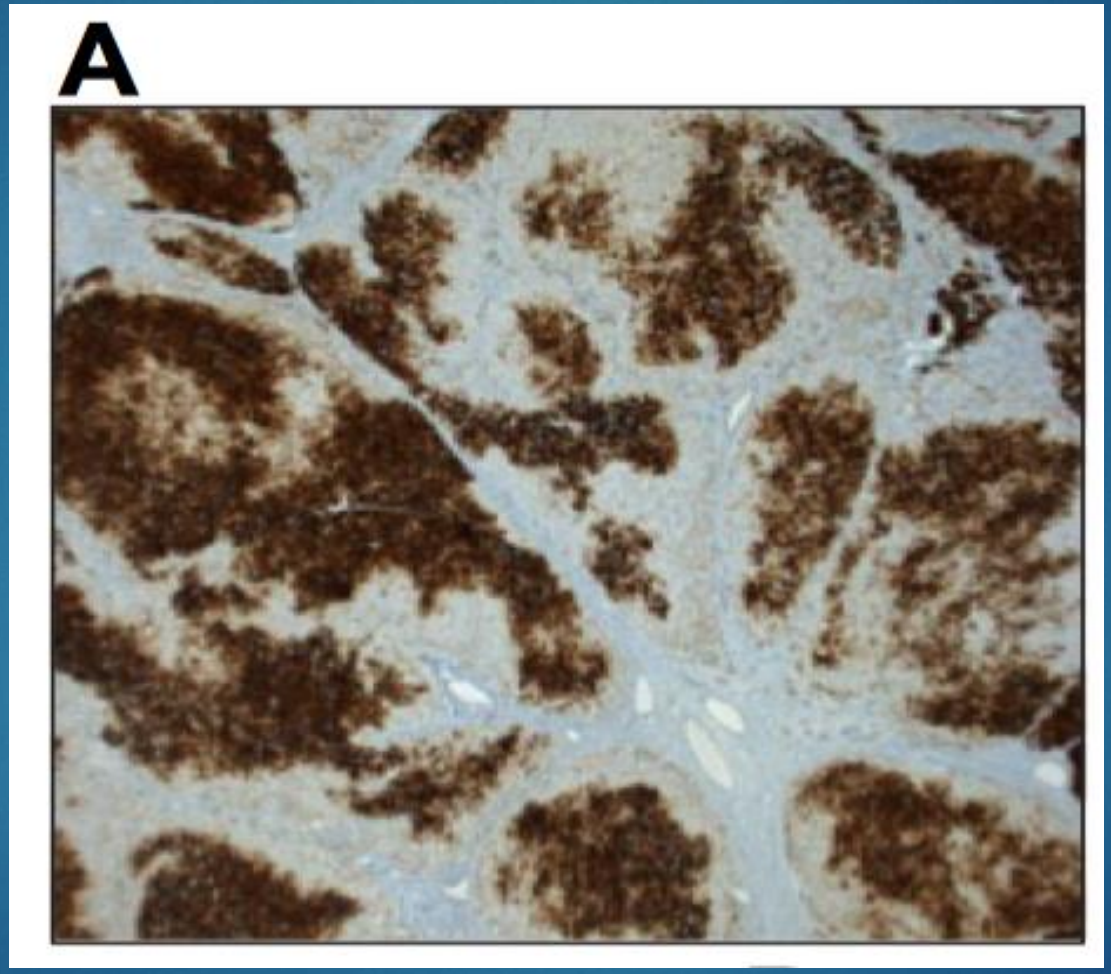
Uncontrasted T2 and T1 weighted MRI sequences





Homogenous, arterial enhancement on arterial phase

Isointense on portal and venous phase


A

Management

- Leave well alone as frequently asymptomatic and no malignant risk.
- Surgery only contemplated if exophytic, expanding or pedunculated.
- No need to discontinue OCP because its not hormone dependent
- No surveillance needed if confident of diagnosis and can be discharged.

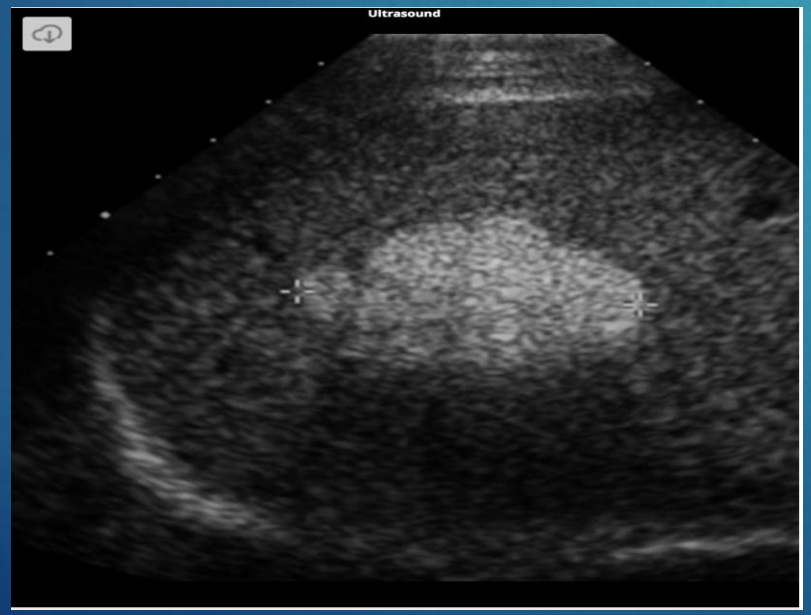
- 1. Use of oral contraceptive pills
- Can continue as there is no relationship between FNH and hormone dependence.

- 2. Surveillance of the lesion
- Not required as FNH has no malignant potential

- 3. Treatment of the lesion
- No treatment required unless symptomatic or in atypical cases

Case 3

- A 40 year old male patient is detected to have a liver lesions on routine health screen with Ultrasound. The lesion in 3 cm in size. The US showed smooth liver, normal sized spleen. ALT 25, AST 20, Platelet 250. HbsAg –ve, HbcAb-ve, HCV Ab-ve. He is a professional body builder.



What other radiological test would you do?

Discuss appropriate management

Is surveillance required in these cases ?

Hepatocellular Adenoma (HCA)

- Prevalence is between 0.001 to 0.004%. 10 times less common than FNH
- Typical age range in between 35-40 years
- Female to male 10:1
- Strong association with OCP
- Also associated with the use of anabolic steroids, androgen steroids in the treatment of aplastic anemia and paroxycmal nocturnal hemaglobinurea, Polycystic ovarian syndrome, Kleinfelter Syndrome, Gylcogen storage disease.

Pathology

- Clonal expansion of benign hepatocytes
- Typically associated with somatic mutations
- Solitary lesions
- Variable sizes , up to 30cm described
- Well circumscribed , well encapsulated, fleshy white to brown in color, may have arears of hemorrhage and necrosis within .
- Can be complicated by rupture, hemorrhage and malignant transformation.
-

HCA Classification

- 1. HCA inactivated for Hepatocyte Necrosis Factor -1a (H-HCA), accounting for 30 to 40% of HCA.
- 2. Inflammatory Adenomas (I-HCA), accounting for 40 to 55% of HCA.
- 3. b-catenin activated HCA (b-HCA), accounting for 10 to 20% of HCA.
- 4. Unclassified HCA

Diagnosis and imaging characteristics

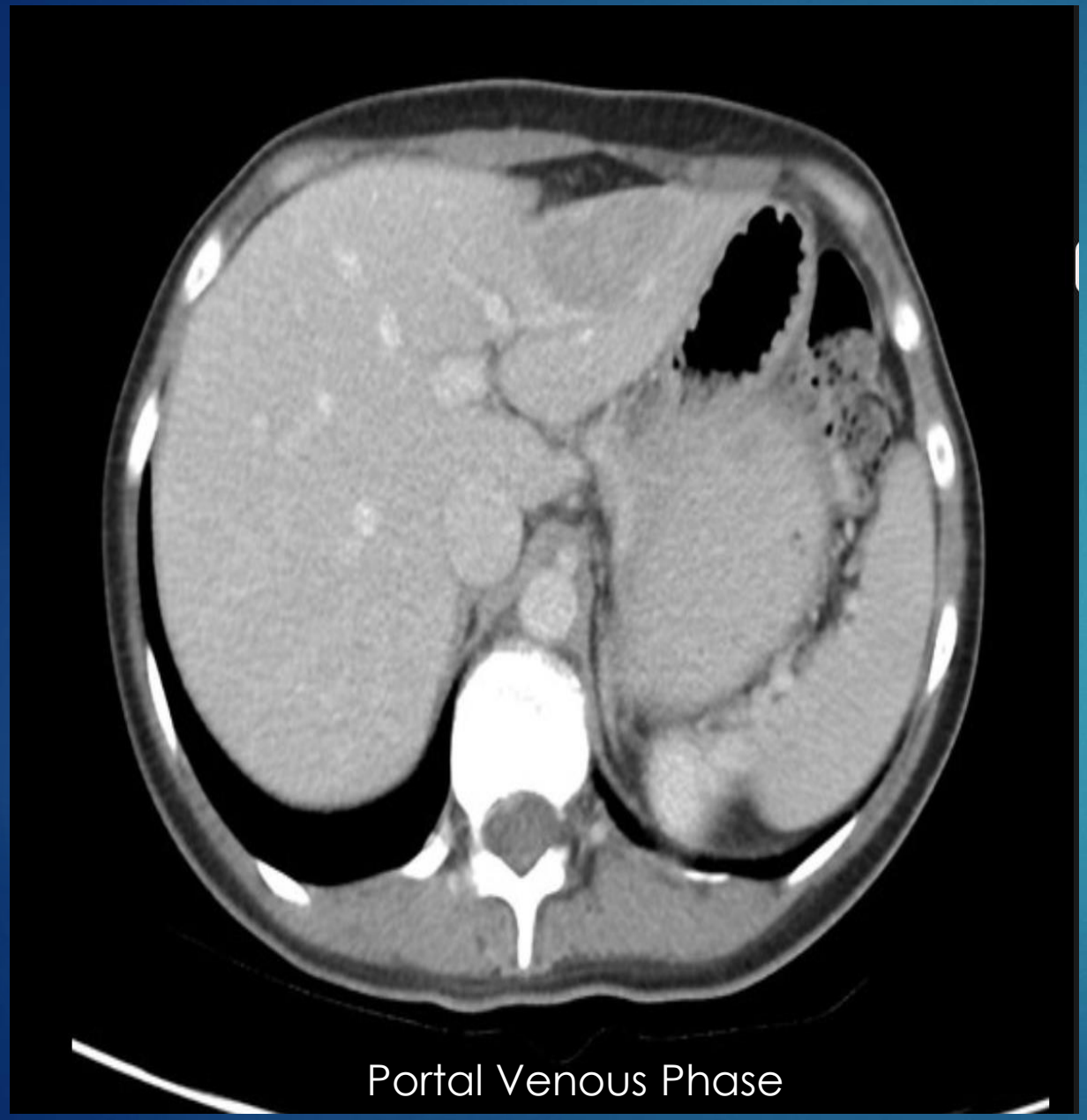
- Radiological characteristics are based on fat and telengiactetic component
- On CEUS, HCA usually shows **homogeneous contrast enhancement** in the arterial phase, typically with **rapid complete centripetal filling**.
- In the **early portal venous phase, it usually becomes isoechoic** or, more rarely, remains slightly hyperechoic.
- CEUS can differentiate HCA from FNH because of the **absence of the central spoke-wheel pattern in** HCA,
- MRI is superior to all other imaging modalities and due to its intrinsic properties to detect fat and vascular spaces it offers an opportunity to subtype HCA up to 80%



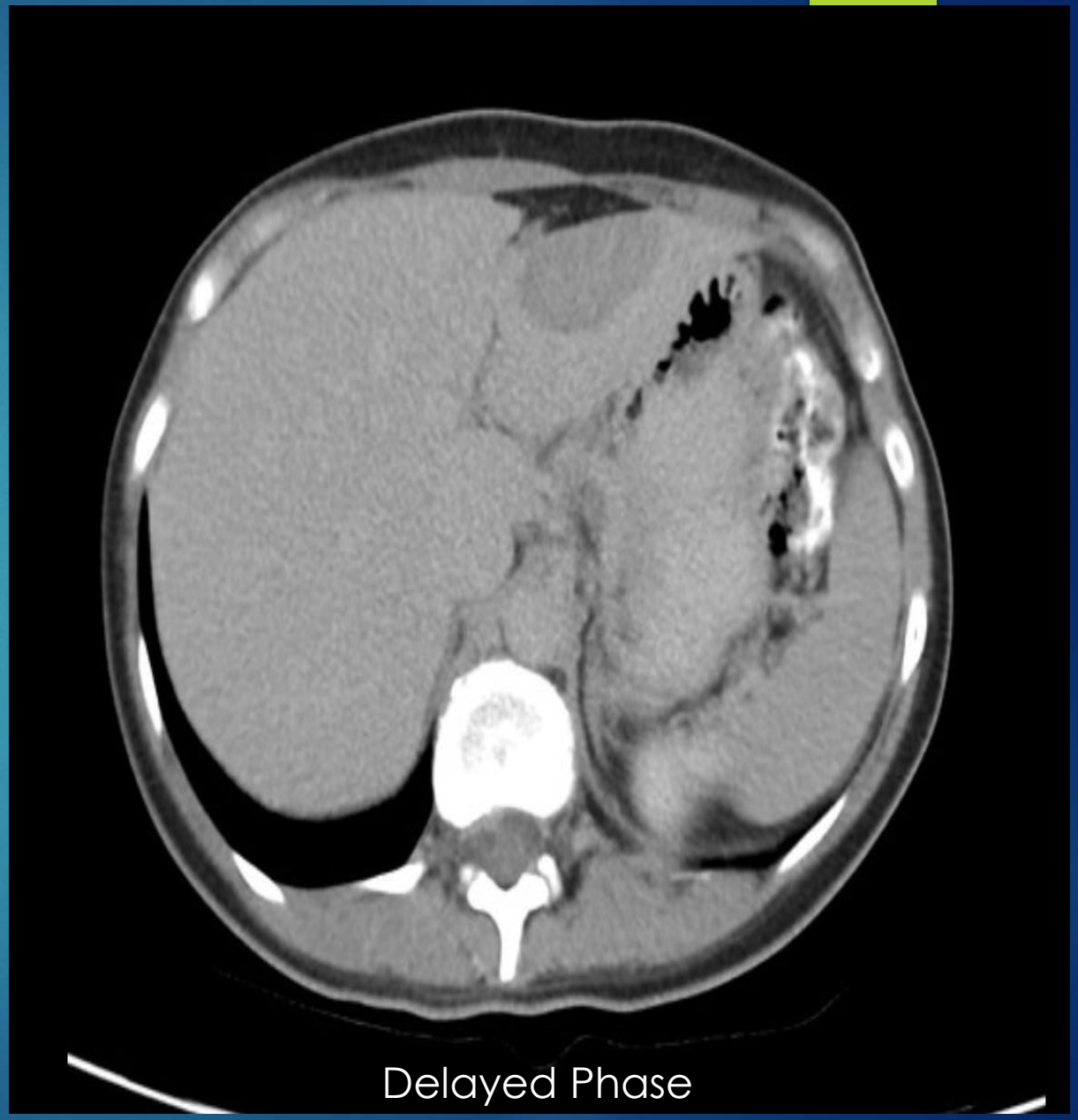
Non Contrast Phase



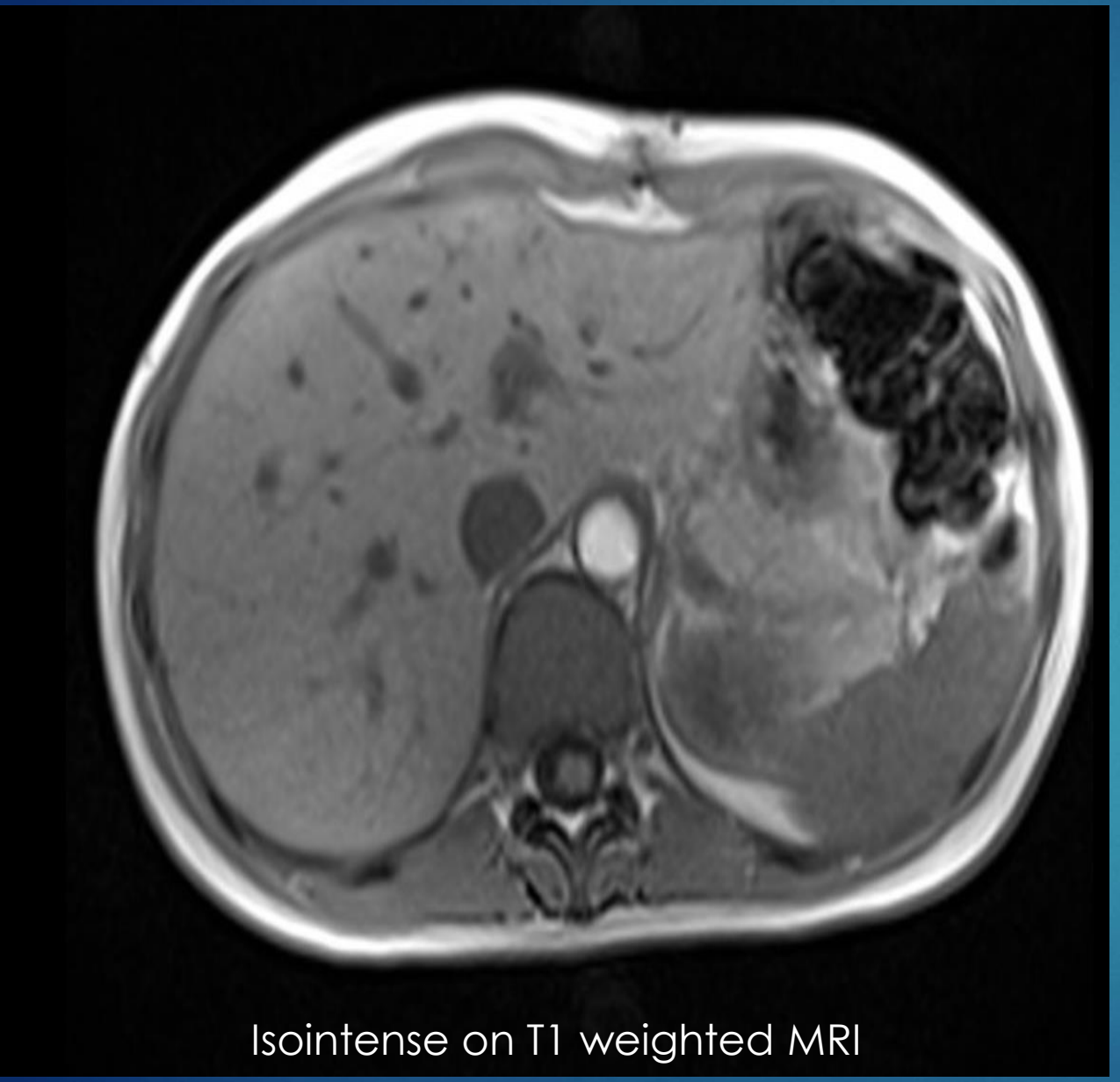
Arterial Contrast Phase



Portal Venous Phase



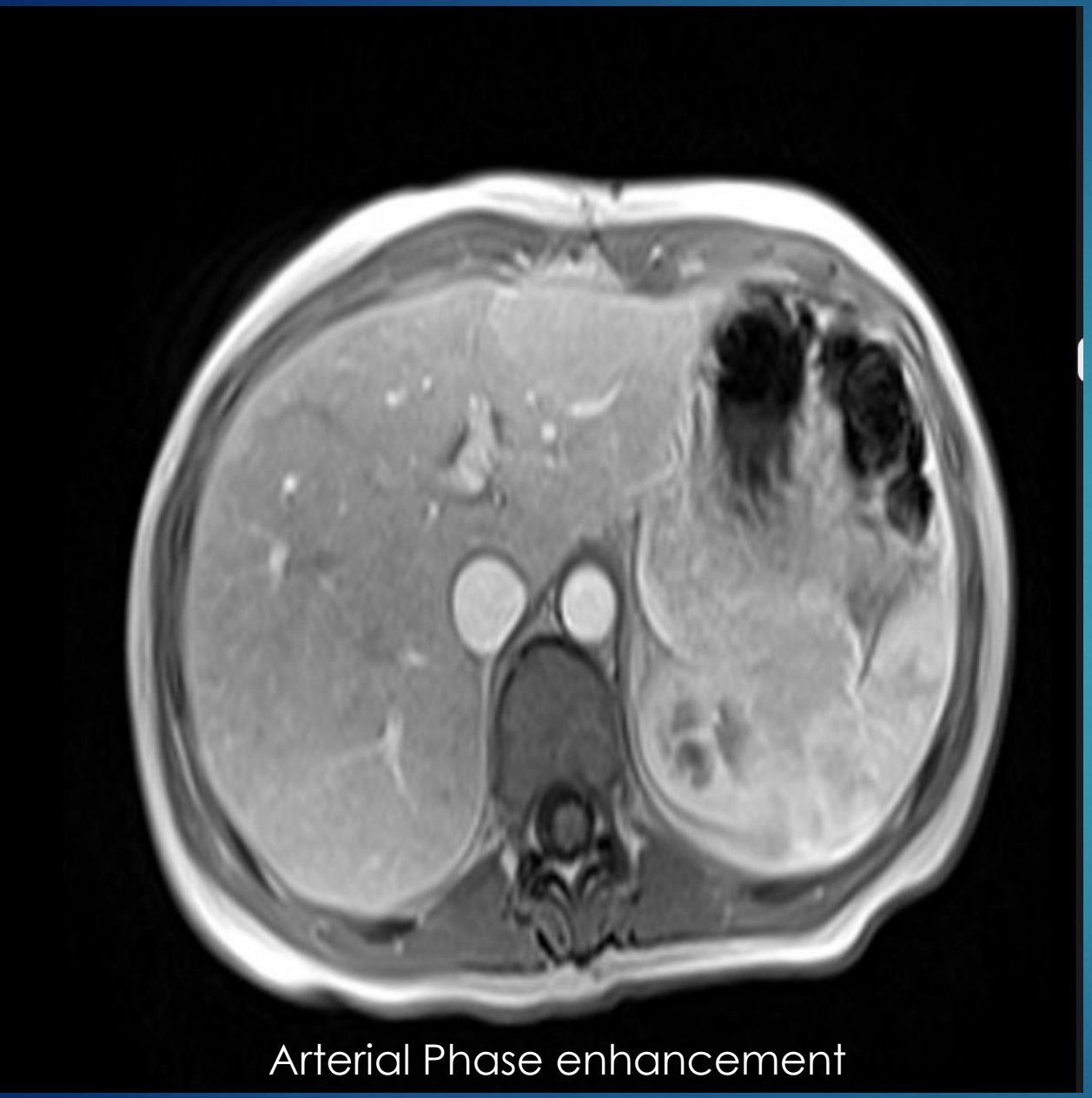
Delayed Phase



Isointense on T1 weighted MRI



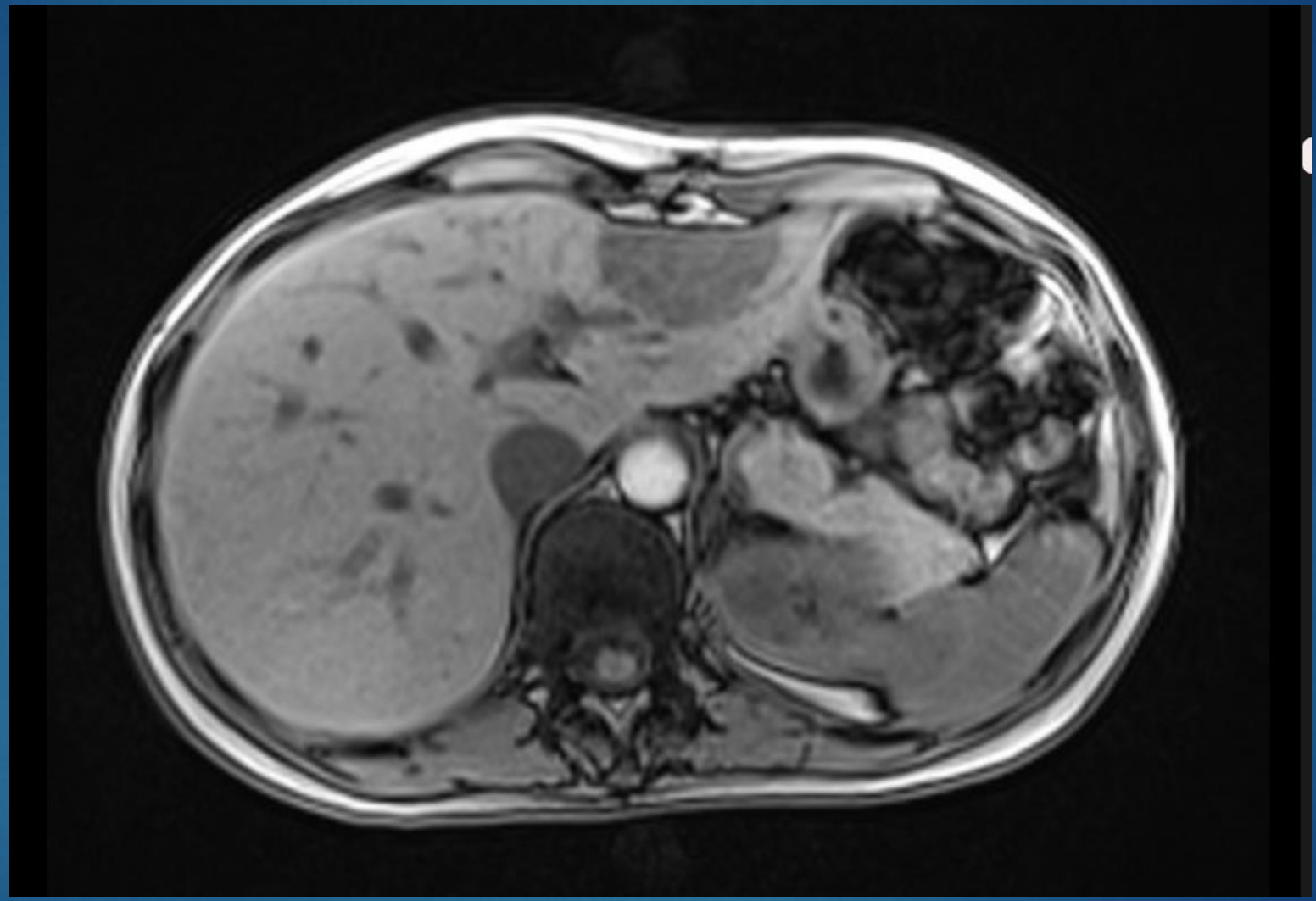
Hyperintense on T2 weighted MR



Arterial Phase enhancement



Portal Venous Phase Hypointense



T1 out Phase

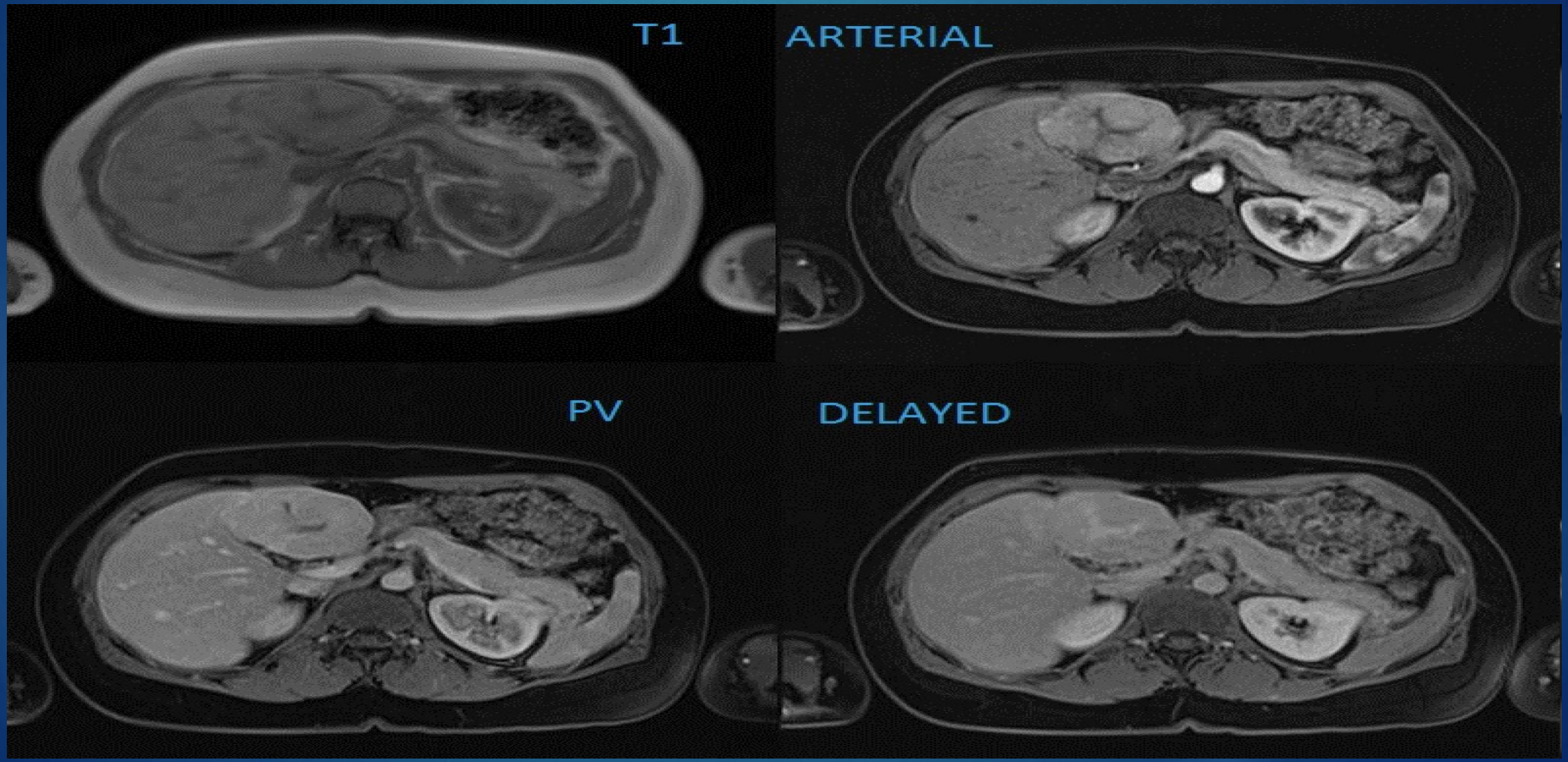
Management

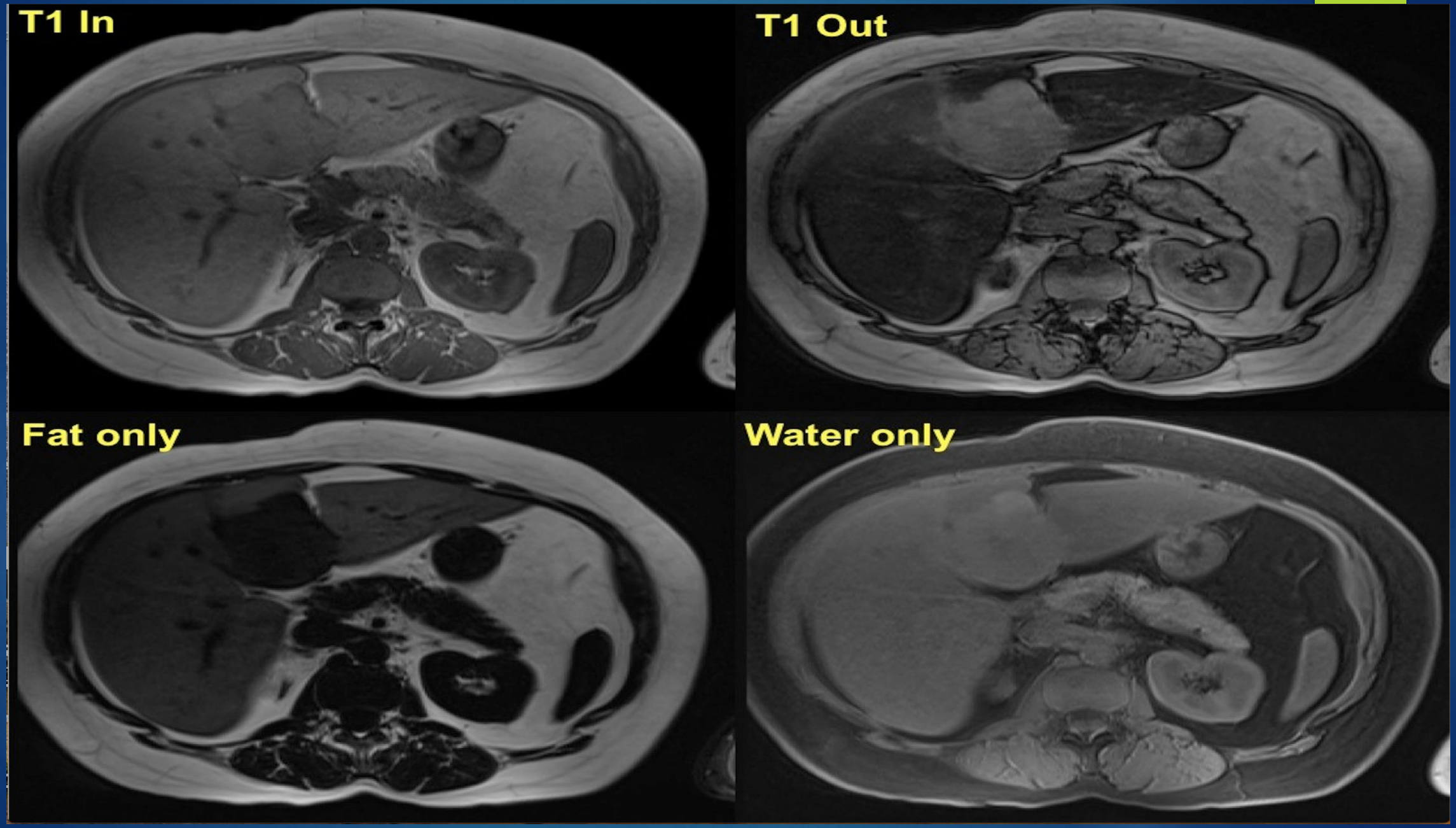
- Management of HCA is based on Size, Location, Gender and the risk of malignant transformation
- HCA > 5cm are at risk of hemorrhage and rupture and should be resected
- Exophytic HCA are at risk of rupture and should be resected
- Men with HCA regardless of size have a high risk of malignant transformation and should be resected.
- Discontinue OCP in all cases
- B-HCA subtype are associated with a high risk of malignancy and should be resected

Management

- Smaller tumours can be treated with ablation
- HCV in pregnancy requires close follow up every 6-12 weeks to monitor size. For growing lesions, embolization can be considered.
- Work closely with the OBGYN specialist
- In women , lesions less than 5 cm should be reassessed in 12 months with annual surveillance
- Biannual US is recommended in HCA beyond 10 years

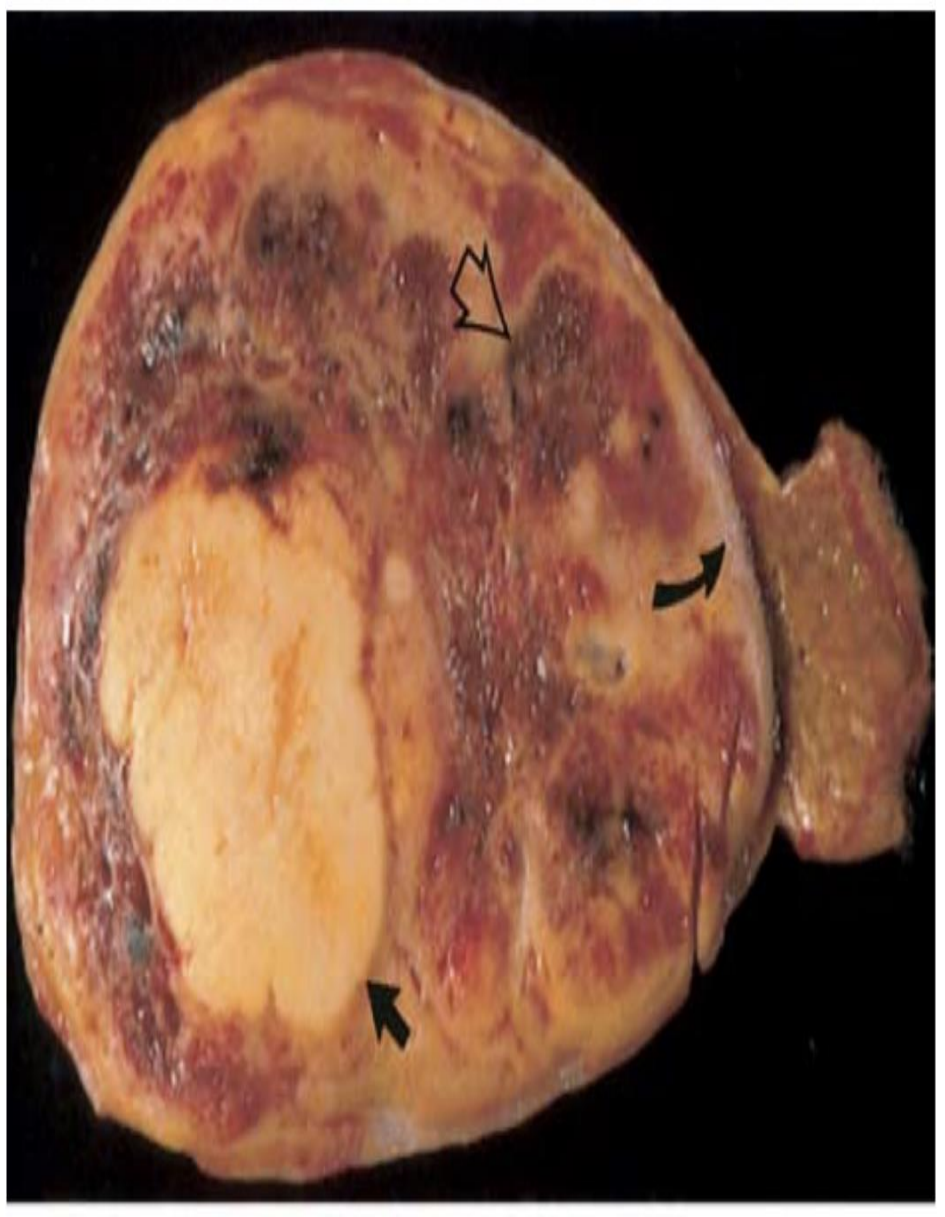
Describe the lesion on MRI

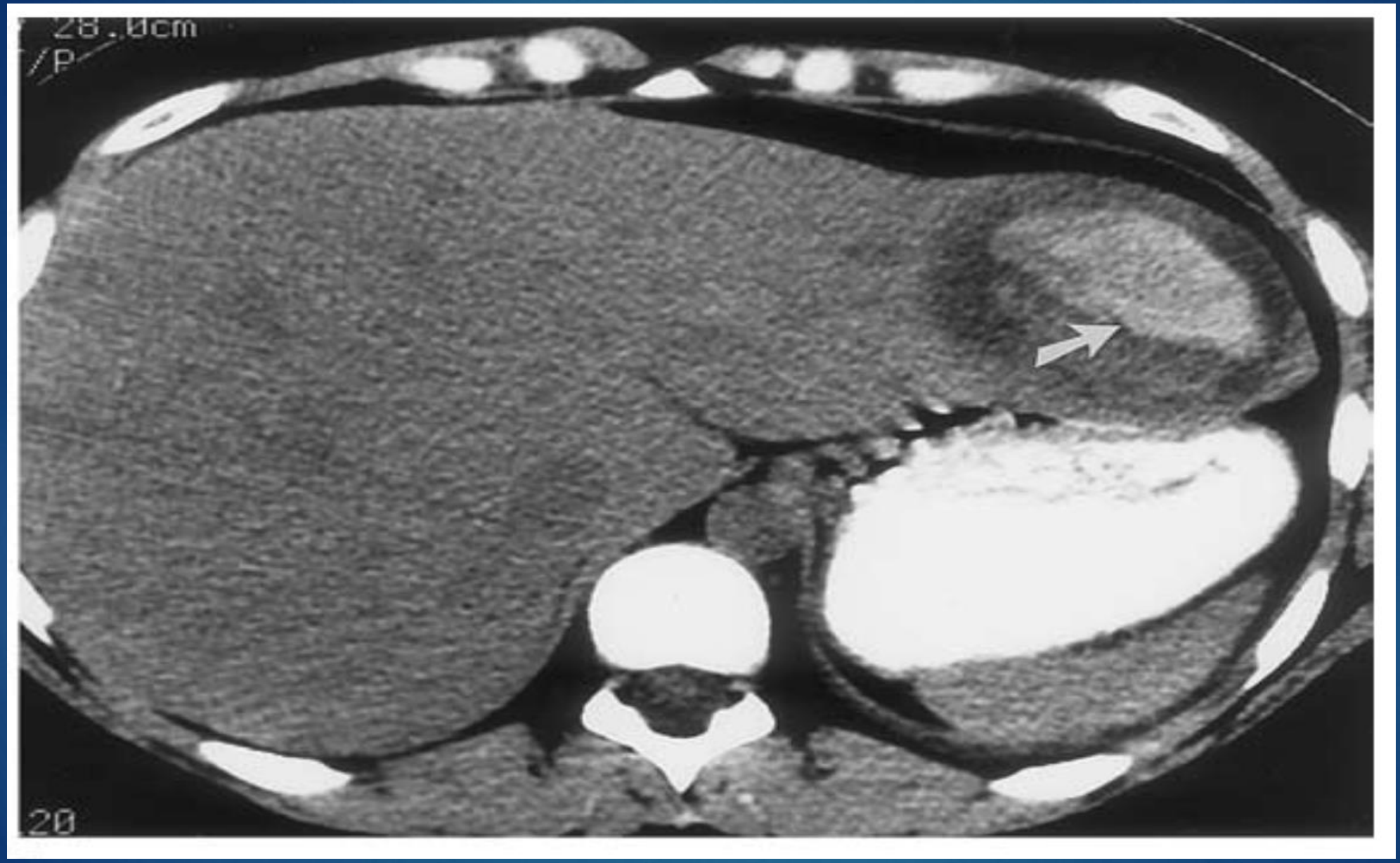


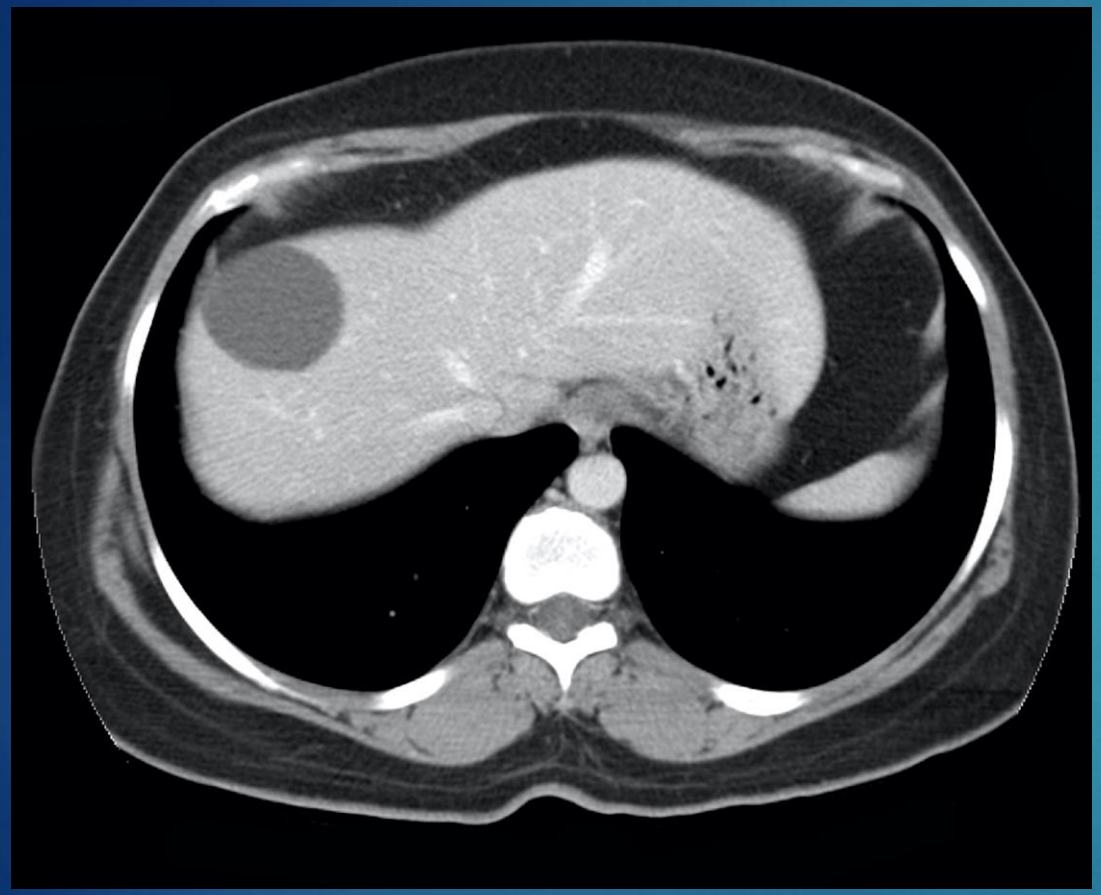

T1 In
T1 Out
Fat only
Water only



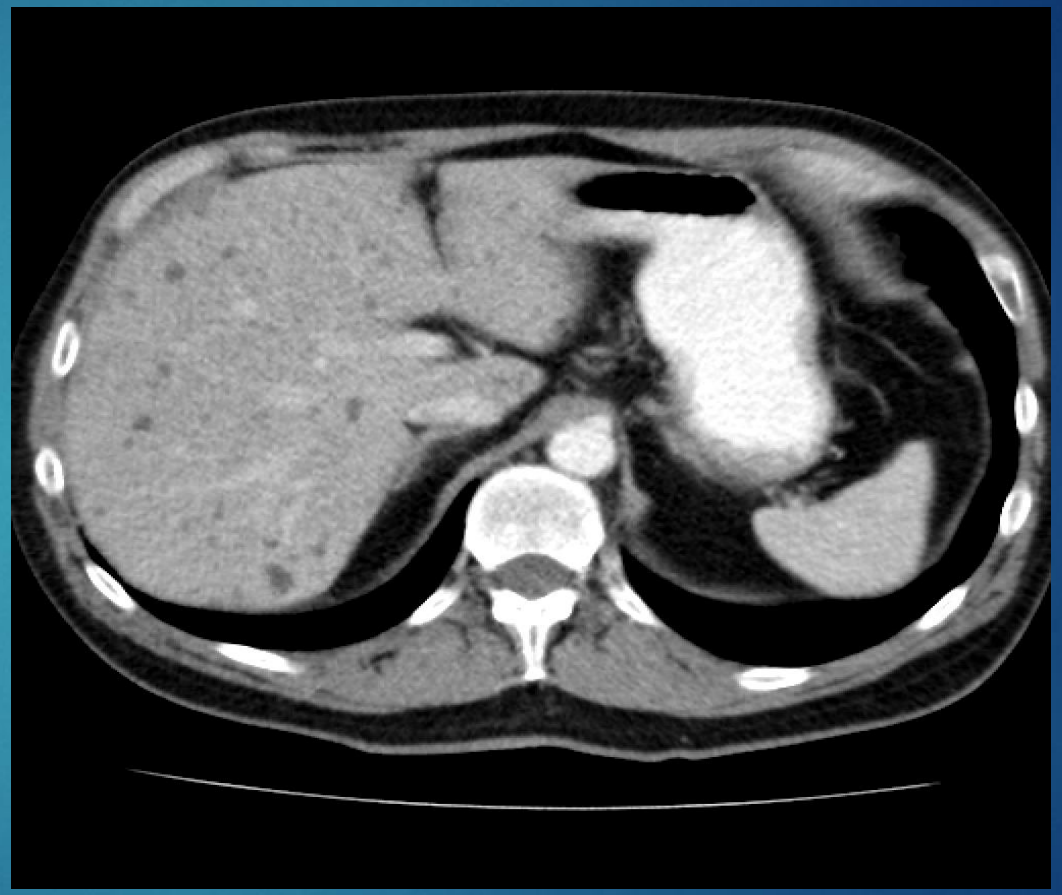





28.0cm
/P
20



Simple Hepatic Cyst



Biliary Harmatomas

Polycystic Liver disease



Hydatic Cysts

