Liver Tumors 101

Katherine Crow, MS, PA-C

Texas Liver Tumor Center

University Health Transplant Institute/UT Health San Antonio

Objectives

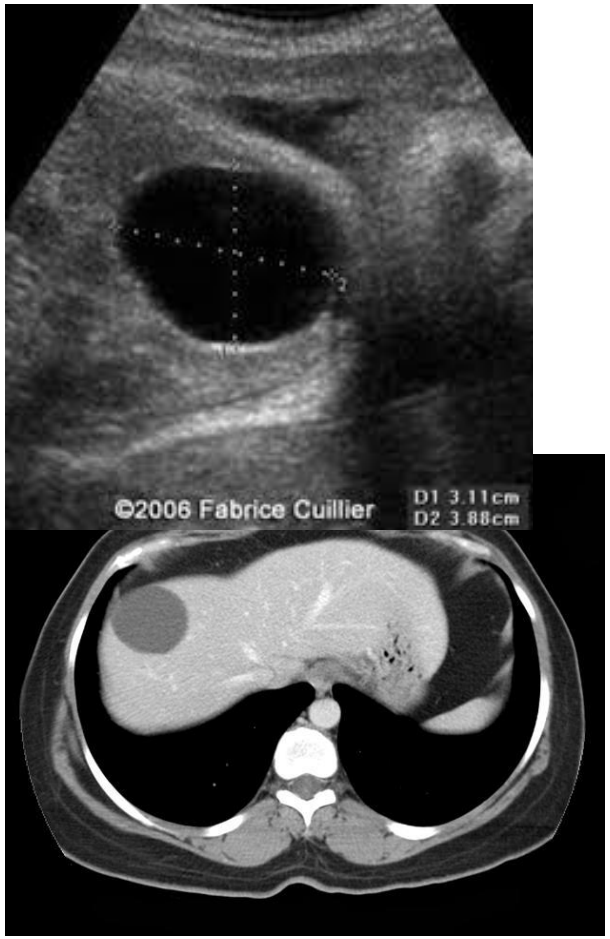
- To differentiate the clinical features and risk factors for benign and malignant liver tumors.
- To recognize imaging studies to differentiate between benign and malignant liver tumors.
- To understand the differences between the treatments offered for benign and malignant liver tumors.

Your Liver

- Largest internal organ
- Located in the upper right side of your abdomen behind the rib cage
- Divided into right and left lobes
- Holds 13% of body’s blood supply
- Only organ that can regenerate

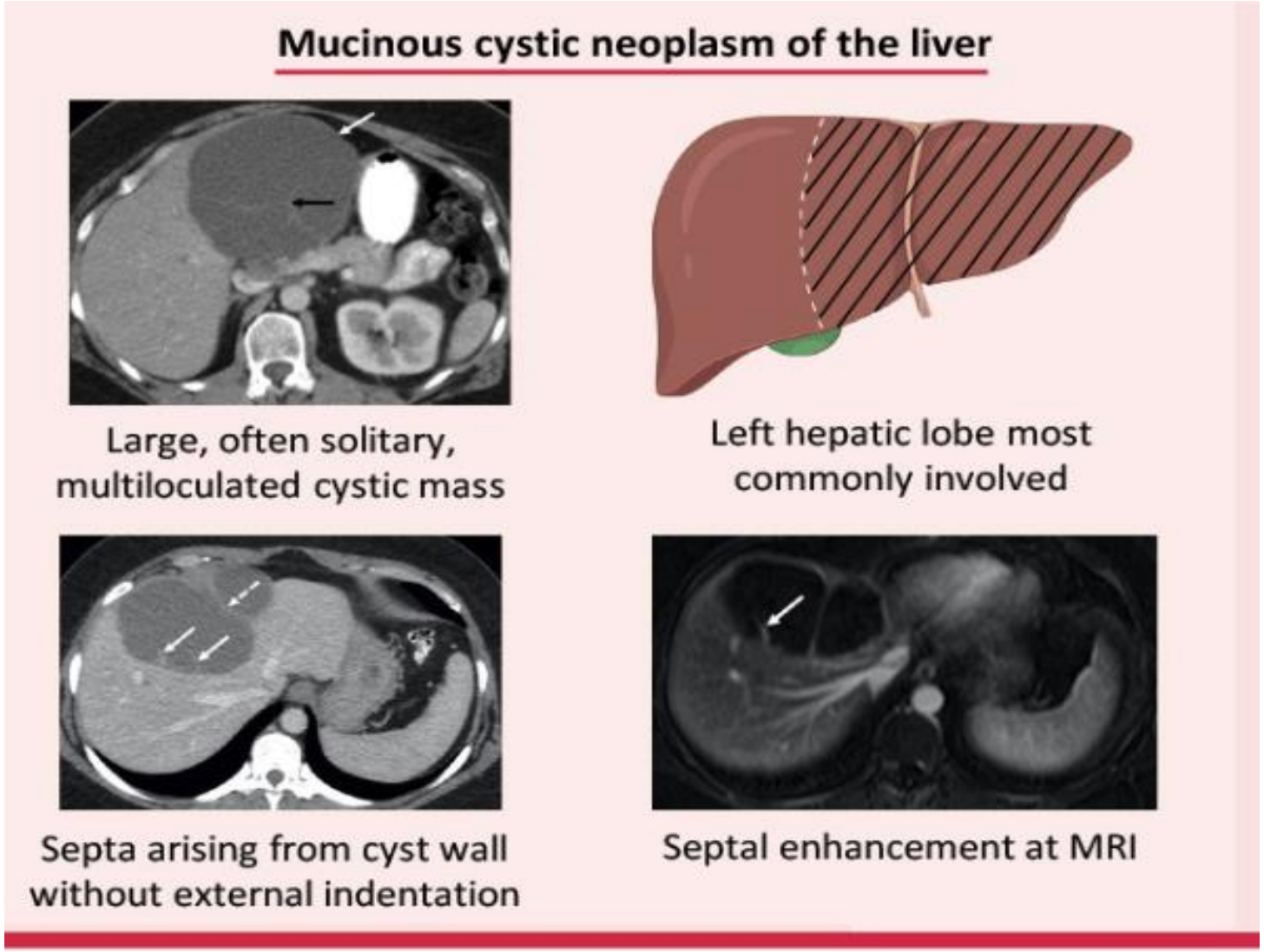
Liver Cysts

Simple



Jones J, Anan R, Deng F, et al. Hydatid cyst signs. Reference article, Radiopaedia.org (Accessed on 07 Sep 2024) https://doi.org/10.53347/rID-19631

Mucinous: MCN

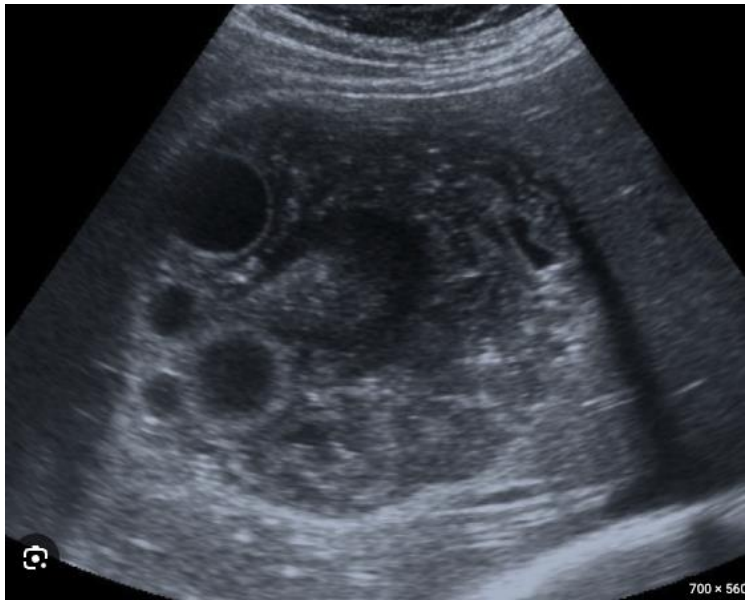


Lee MH et al. Published online: October 1, 2021 https://doi.org/10.1148/rg.2021210011

Liver Cysts

Hydatid Cyst: Echinococcal cyst

Jones J, Anan R, Deng F, et al. Hydatid cyst signs. Reference article, Radiopaedia.org (Accessed on 07 Sep 2024) https://doi.org/10.53347/rID-19631



Liver Atlas: Case 214: Echinococcosis, cystic (hydatid). Liveratlas.org. Published 2023. https://liveratlas.org/case/214/?modality=us

Ultrasound of echinococcal liver cysts. www.oatext.com. https://www.oatext.com/ultrasound-of-echinococcal-liver-cysts.php

Radiologic Features of Hepatic Cysts

Hepatic/ biliary cystic tumours	Hepatic simple cysts	Echinococcal cysts
Multiloculated cyst	Anechoic	Daughter cyst within main cyst
Internal septation	Smooth borders	Intracystic debris
Enhancing cyst wall	No perceptible wall	Low signal intensity rim on T2-weighted MRI
Calcifications	No septations	
Papillary wall nodules	No enhancement on CT with IV contrast	
Thickened irregular wall	Water attenuation on CT	
Enhancement on CT with IV contrast		
Water attenuation on CT		

Soni, S., Pareek, P., Narayan, S., & Varshney, V. (2021). Mucinous cystic neoplasm of the liver (MCN-L): A rare presentation and review of the literature. *Medicine and Pharmacy Reports*, *94*(3), 366-371. https://doi.org/10.15386/mpr-1543

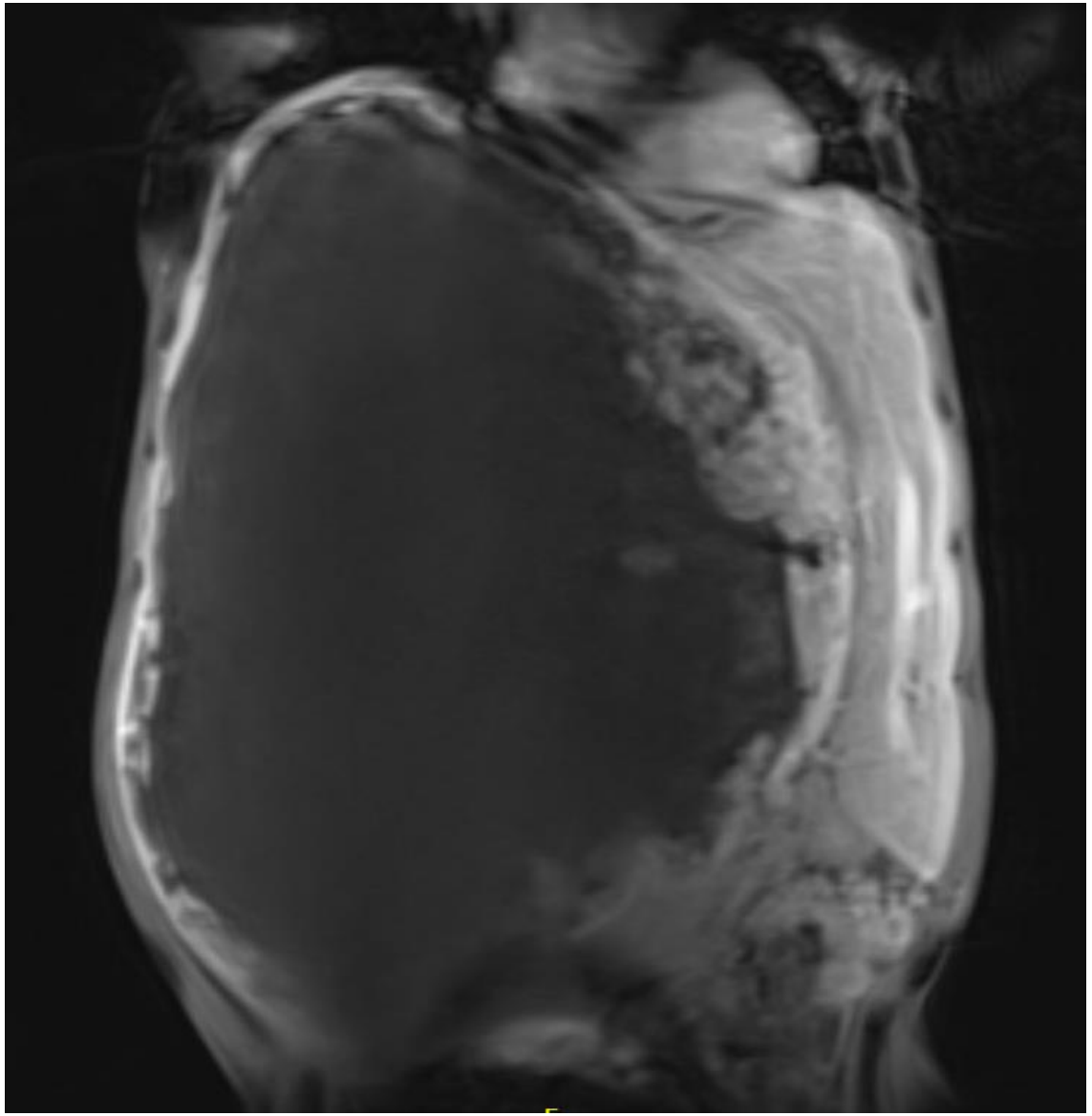
Hepatic Hemangioma

MRI

Typical features include:

- **T1:** hypointense relative to liver parenchyma
- **T2:** hyperintense relative to liver parenchyma, but less than the intensity of CSF or of a hepatic cyst
- **T1 C + (Gd):** often shows peripheral nodular discontinuous enhancement which progresses centripetally (inward) on delayed images
    - hemangiomas tend to retain contrast on delayed (>5 minutes) contrast-enhanced images

Weerakkody Y. Hepatic hemangioma | Radiology Reference Article | Radiopaedia.org. Radiopaedia. https://radiopaedia.org/articles/hepatic-haemangioma-3?lang=us



- 38-year-old female developed a 30 cm cavernous hemangioma of the liver in 18 months.
- The hemangioma grew to 36 cm in size.
- The patient was evaluated at our transplant center for *ex vivo* resection and backup liver transplant.

Pre-Op and Post-Op Images

Hepatocellular Adenoma (HCA)

- Uncommon, 0.003%.
- Found in young women of child-bearing age with history of estrogen-based, oral contraceptive steroid (OCS) use. Occurs less frequently in men.
- Obesity and metabolic syndrome are risk factors.
- Usually solitary, but liver adenomatosis (more than 10 HCAs) does occur.
- Commonly an incidental finding.

- Two main complications are hemorrhage and malignant transformation into HCC.
  - The risk of hemorrhage is directly correlated to tumor size. Lesions ≥5 cm are high risk.
  - The risk of malignant transformation varies between 4% and 8% in the largest tumors.
- In all cases, oral contraception or androgens should be discontinued at diagnosis to facilitate regression.

Imaging Features

Well-marginated and isoattenuating to the liver. With contrast they demonstrate relatively homogeneous enhancement, returning to near isodensity on portal venous and delayed phase images.

- **T1:** variable and can range from being hyper-, iso-, to hypointense (hyperintense in 35-77% of cases [8])
- **T2:** mildly hyperintense (in 47-74% of cases [2,8])

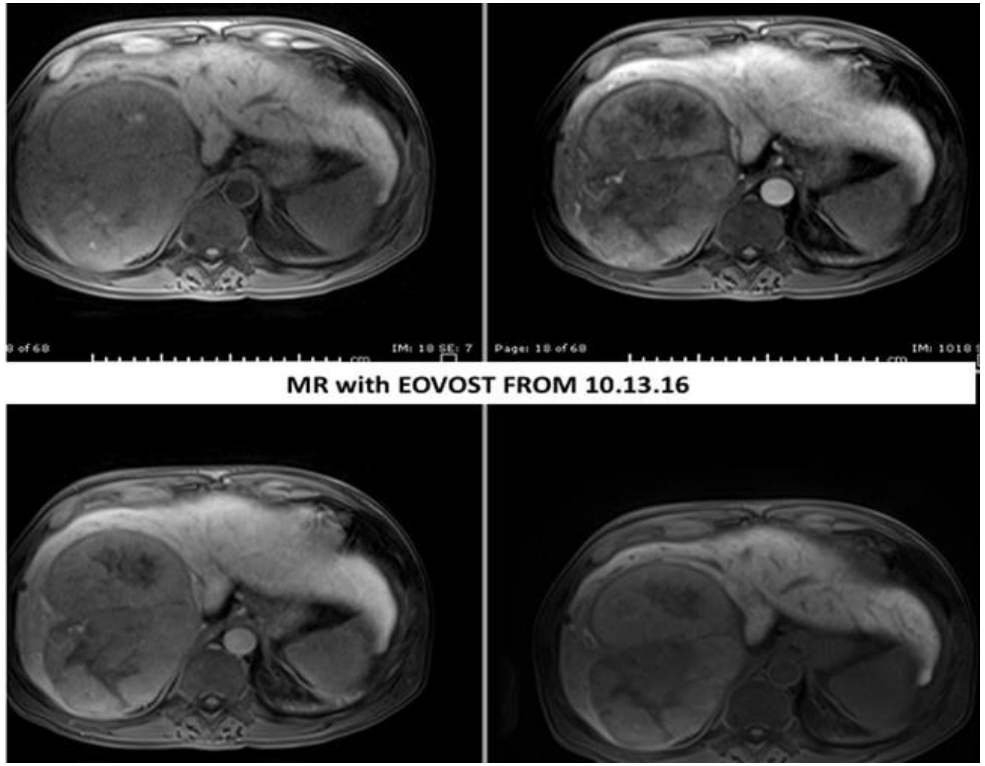
- **T1 C+ (Eovist/Primovist):** usually appears hypointense on hepatobiliary phase (20 mins after injection) due to reduced uptake of Eovist (whereas focal nodular hyperplasia appears iso- to hyperintense)

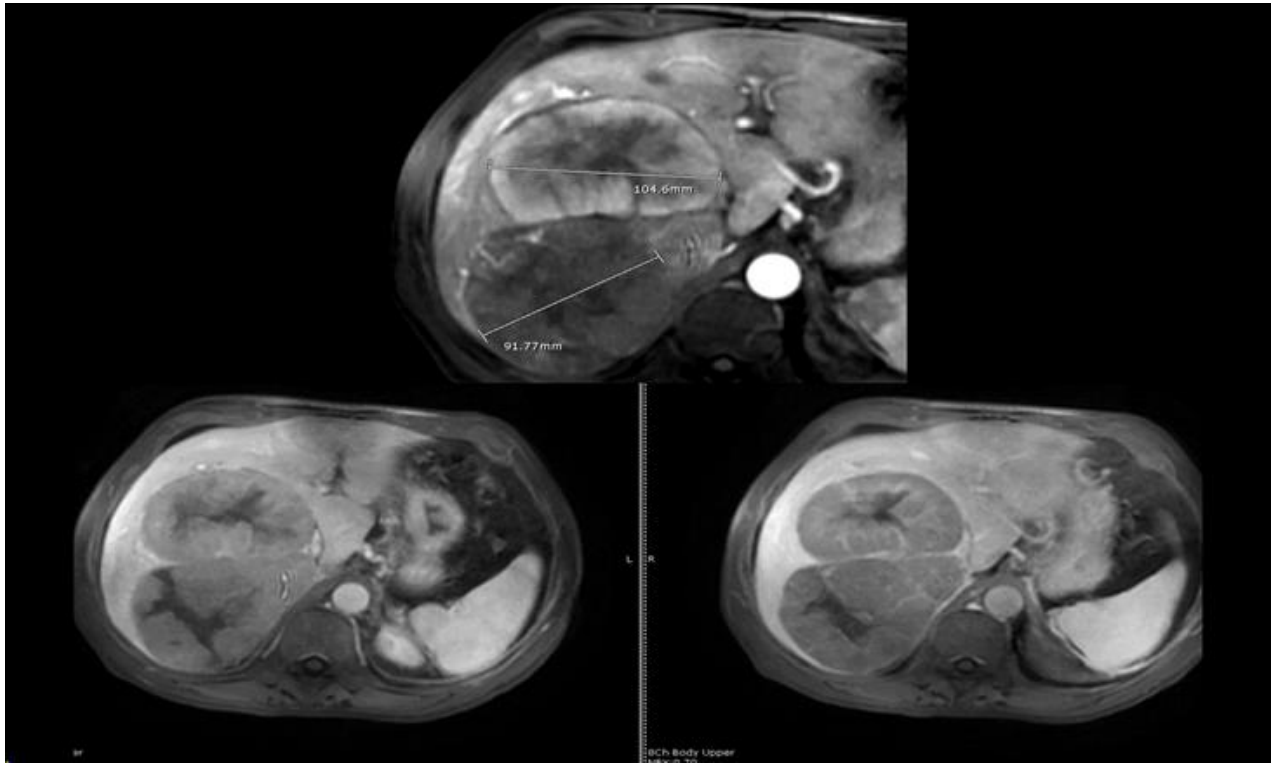
Jacob DK. Hepatic adenoma | Radiology Reference Article | Radiopaedia.org. Radiopaedia. https://radiopaedia.org/articles/hepatic-adenoma

Focal Nodular Hyperplasia (FNH)

- Hyperplastic response to a vascular anomaly, resulting in disorganized growth of hepatocytes and bile ducts.
  - 8% of all liver neoplasms
  - 80% of cases in women of reproductive age
  - 80% are solitary and smaller than 5 cm
  - Usually found incidentally
- Masses are sharply demarcated from the normal liver but lack a true capsule.
- Very rarely hemorrhages or undergoes malignant transformation.

FNH on Imaging





- MRI: Multiple focal hepatic lesions including 2 larger lesions measuring 12.1 x 9.3 cm and 11.2 x 7.1 cm in the right lobe of liver with central scars demonstrating iso/hyperintensity on the delayed Eovist images suggesting presence of functioning hepatocytes within the lesions.
- Appearance **most consistent with FNH** (**focal nodular hyperplasia).**

FNH Treatment

- FNH may be monitored with serial imaging. Significant change in size or number of lesions should prompt re-evaluation.
  - Resection of large and symptomatic lesions recommended
- HCA less than 5 cm may be monitored in women. In males, should be resected.
  - Withdrawal of OCP/androgens.
  - Locoregional therapy may be used as primary therapy or prior to resection.
  - Resection of unresponsive masses or >5cm recommended.

Hepatocellular Carcinoma (HCC)

- 90% of primary liver cancers
  - 80% arise in the setting of cirrhosis or liver scarring caused by hepatitis infection, or steatotic liver disease (SLD)
  - HCC can develop without cirrhosis
- Risk factors
  - Smoking: 20-86% increased risk of HCC for 30 years after smoking cessation
  - Obesity: 1.5 to 4.5 times higher risk and contributes to 10% of worldwide HCC cases
  - Diabetes alone, even without obesity, almost doubles the risk of HCC
- Treat HCV for cure. Decreases HCC risk
- Treat chronic HBV if indicated

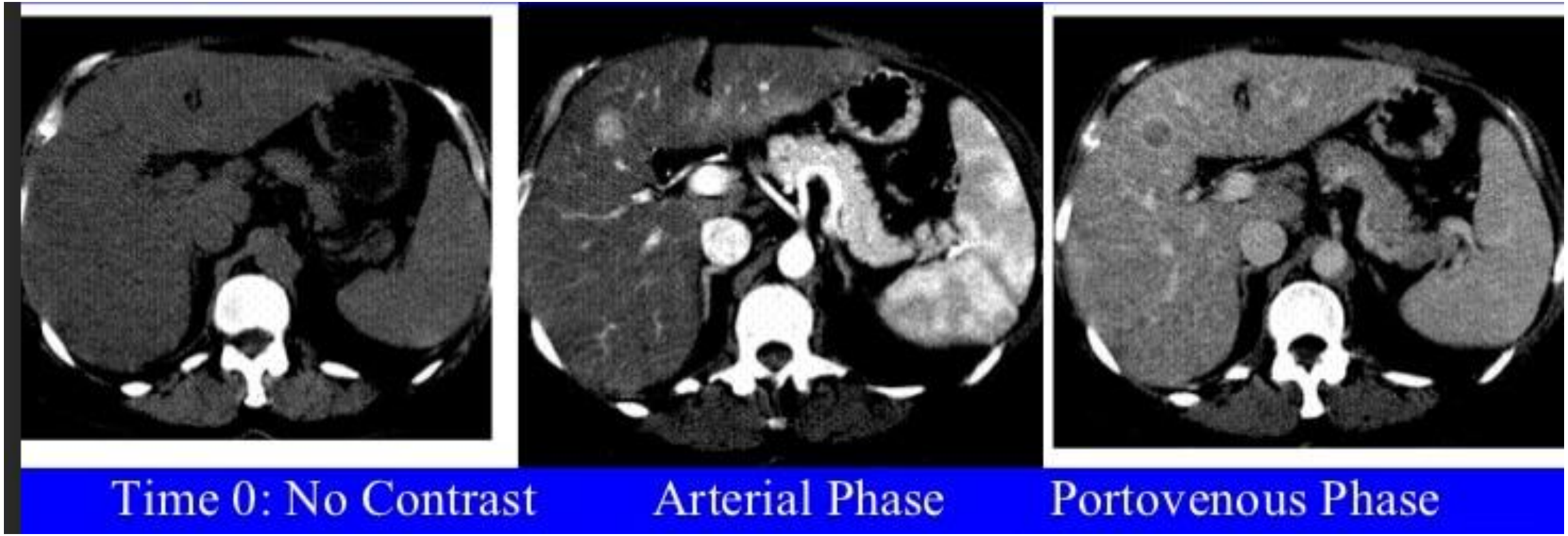
Cholangiocarcinoma (CCA)

- Second most common after HCC
- Risk Factors
  - Primary Sclerosing Cholangitis (PSC)
  - Untreated HCV
  - Alcoholic liver disease
  - Steatotic liver disease
  - Gallstone disease
- Tumors appear in the liver parenchyma or in the intrahepatic bile ducts

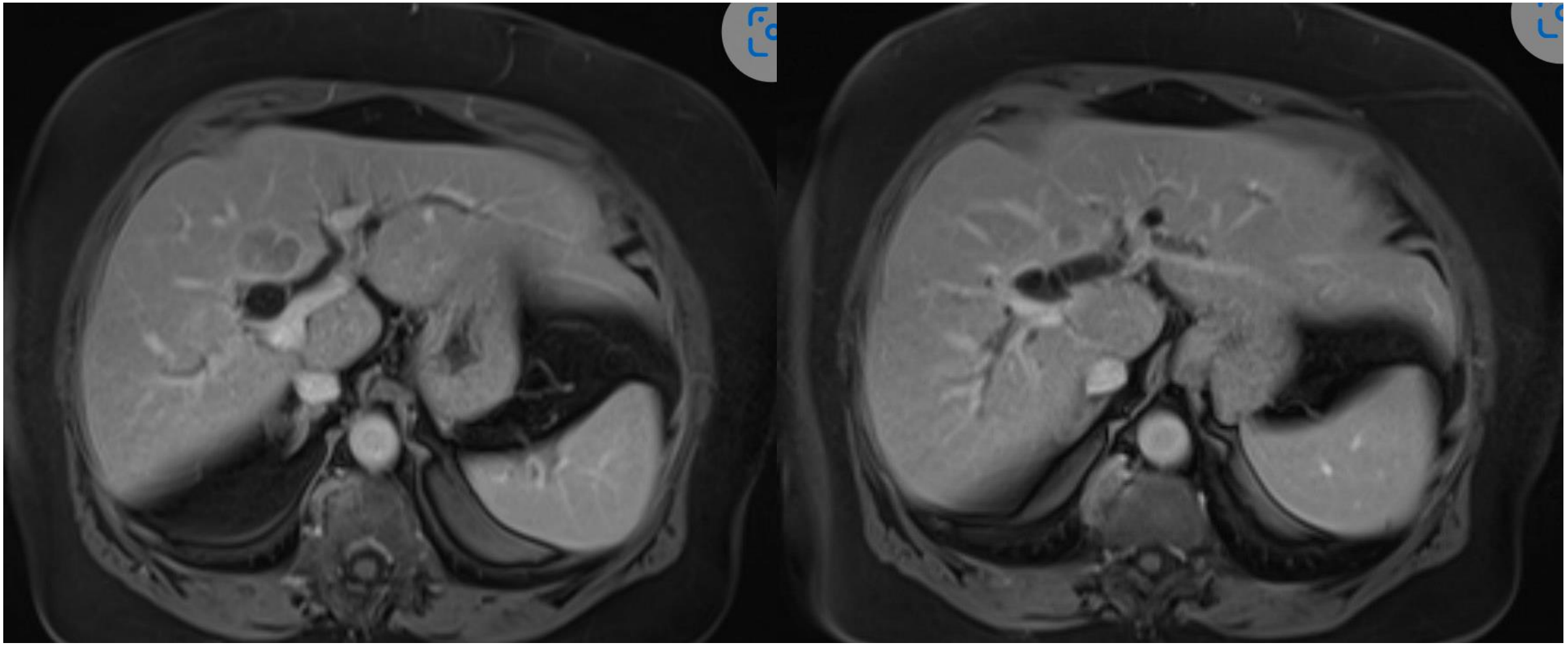
Vithayathil M, Khan SA. Current epidemiology of cholangiocarcinoma in Western countries. *Journal of Hepatology*. 2022;77(6):1690-1698. doi:https://doi.org/10.1016/j.jhep.2022.07.022

Imaging Diagnosis of HCC: LiRads 5

- 3 phase or 4 Phase CT scan



Imaging of Cholangiocarcinoma



Treatment

HCC

- Transplant: Living and deceased
- Interventional radiology
  - TACE: Transarterial chemoembolization
  - TARE: Transarterial radioembolization
  - Ablation: Burning the tumor with microwaves or radiofrequency
- Radiation oncology
- Surgical resection
- Medical oncology

Cholangiocarcinoma

- Transplant: Very selective
- Surgical resection
  - Considered the only potential cure
- Medical oncology
  - Moving to doublet chemotherapy with the addition of immunotherapy.
- Locoregional therapy
- Radiation oncology
- Combination therapy
- Molecular testing is important