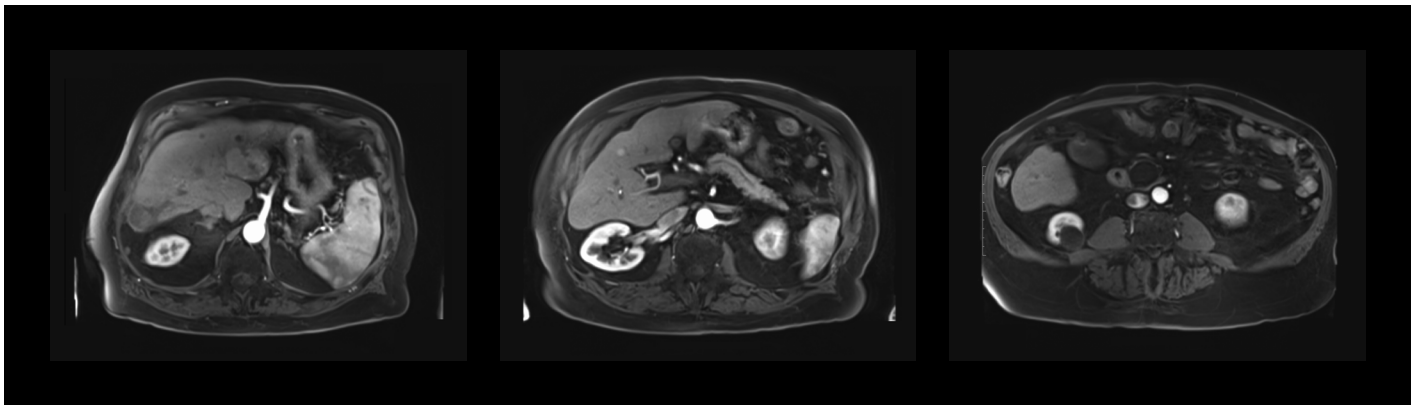


CASE STUDY

MRI of the liver



Images and content are courtesy of:

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All clinical protocols and decisions remain the responsibility of the healthcare provider. Information contained in this booklet may be abridged and should be used in alignment with institutional protocols and good clinical judgment.



MRI of the liver

Medical history of the patient

80 year-old male patient with a history of liver cirrhosis and portal hypertension. The patient has known bifocal hepatocellular carcinoma located in segment 7 (right lobe) and segment 3 (left lobe). Both HCCs have previously been treated by trans-arterial chemoembolisation (TACE).

Preliminary diagnostics

The patient has undergone several contrast-enhanced abdominal CT before.

Indication for MRI

An MRI examination was requested to follow up both HCCs (in right lobe and left lobe) after chemoembolisation (TACE).

Scan protocol includes

MRI: 3T

1. 3D T1 Dixon for in-phase and out-of-phase
2. Axial 3D T1 GE Dixon
3. Coronal T2w SSTSE
4. Axial DWI with 3 b-values: 50, 400 and 800.
Reconstruction of the adc map
5. Axial T2w with FS and motion artefacts reduction
6. Axial 3D T1 GE with FS before contrast injection
7. Axial 3D T1 GE with FS after contrast injection at the arterial phase
8. Axial 3D T1 GE with FS after contrast injection at the venous phase
9. Axial 3D T1 GE with FS after contrast injection at a delayed phase
10. Coronal 3D T1 GE with FS after contrast injection at a delayed phase

Injection protocol

Patient weight 82 kg

GBCA injection

Gadobutrol 0.1 mmol/kg	7.5 mL – 2 mL/sec
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0.9 % NaCl	40 mL
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Administration mode	With injector
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Findings of the MRI examination

In the right lobe (S7), there is a complete response after TACE. No residual tumour (no enhancement) can be seen.

In the left lobe (S3), a mass, measuring 4.7 cm and showing a hyper-enhancement at the arterial phase, can be seen after embolisation. It suggests residual/recurrent HCC, which must be embolised again.

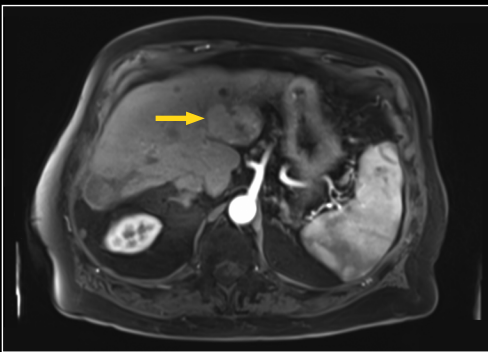
A new lesion is appearing on this MRI in the 4b/5 segments. It is a round-shape hyper-vascular lesion, measuring 0.7cm in diameter, without washout, which is suspicious for early HCC or dysplastic nodule.

A 1.5 cm cystic lesion can also be seen in the pancreatic head, most likely a branch-duct Intraductal Papillary Mucinous Neoplasm (IPMN).

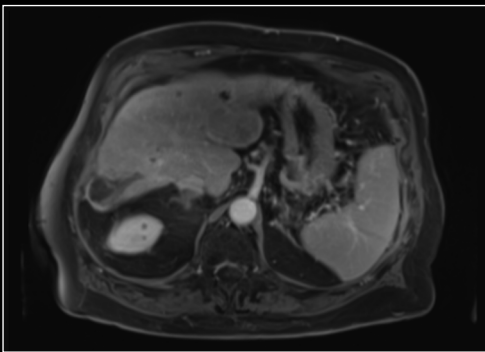
An incidental note is also made of a circumscribed adenomyomatosis of the fundus of the gallbladder.

Status post TACE with partial embolisation of a 4.7 cm HCC in left liver lobe (S3)

Axial 3D T1 GE at arterial phase



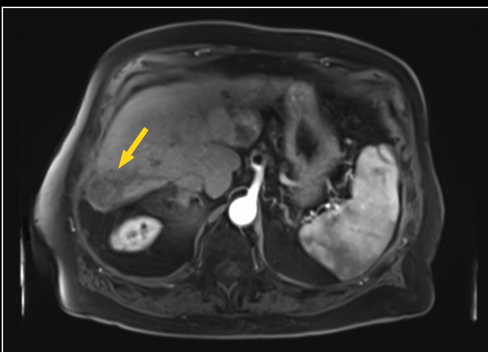
Axial 3D T1 GE at delayed phase



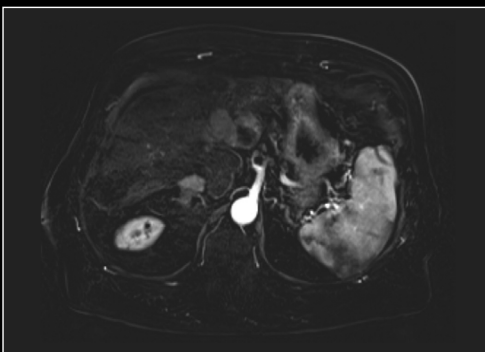
Status post TACE with partial embolisation of a 4.7 cm HCC in left liver lobe (S3)
Now moderately hyperintense enhancement at arterial phase, typical for tumour recurrence (yellow arrow). Wash-out of tumour (hypointense relative to liver parenchyma) is seen in the respective image in the delayed phase after 3 minutes, which is also typical for HCC.

Status post TACE of HCC in right lobe (S7)

Axial 3D T1 GE at arterial phase

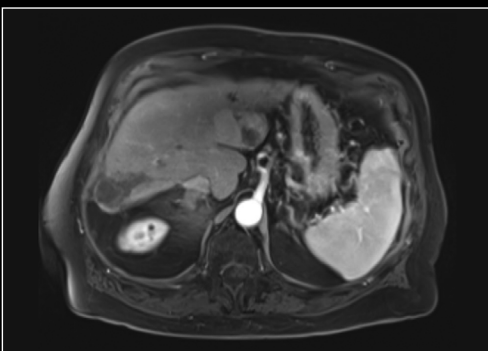


Subtraction of arterial phase

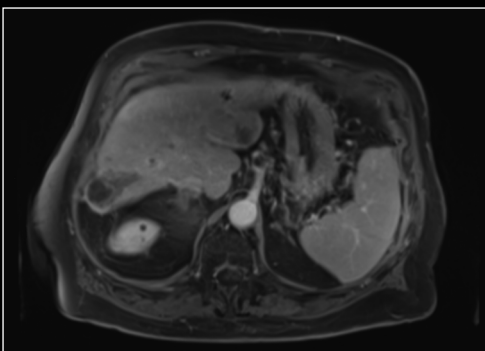


Status post TACE with partial embolisation of a 4.7 cm HCC in left liver lobe (S3)
Now moderately hyperintense enhancement at arterial phase, typical for tumour recurrence (yellow arrow). Wash-out of tumour (hypointense relative to liver parenchyma) is seen in the respective images in the delayed phase after 3 minutes, which is also typical for HCC.

Axial 3D T1 GE at venous phase

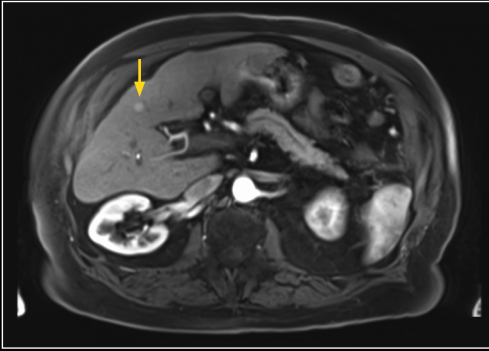


Axial 3D T1 GE at delayed phase

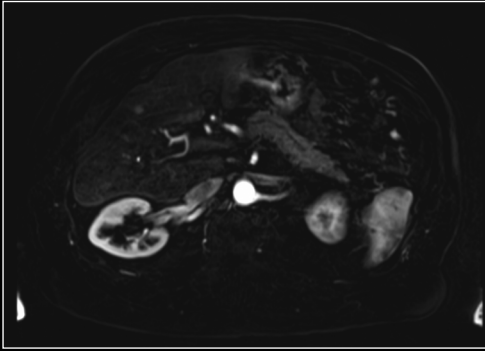


Lesion in S4b/5

Axial 3D T1 GE at arterial phase



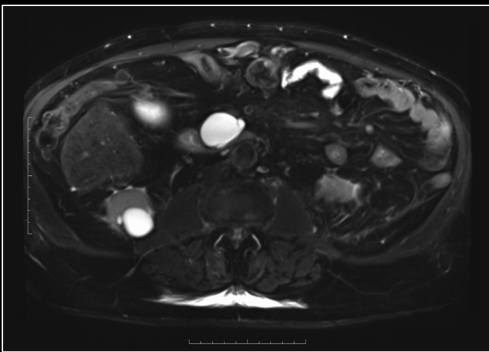
Subtraction of arterial phase



Lesion in S4b/5
Newly appearing round lesion, 0.7 cm large, hyperintense at arterial and portal/venous phases without washout (yellow arrow). Suspicious for early HCC or dysplastic nodule.

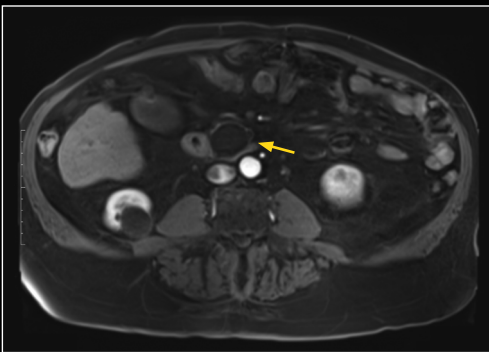
Cystic lesion

Axial T2w sequence with FS

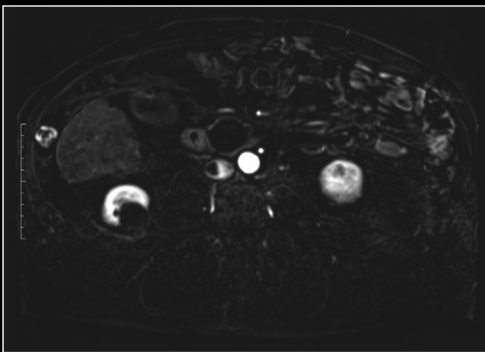


Cystic lesion
Cystic lesion of 3.5 cm in size in the pancreatic head (yellow arrow).

Axial 3D T1 GE at arterial phase



Subtraction of arterial phase



A good arterial phase enhancement is important for the assessment of patients with liver cirrhosis. Therefore, a standard-dose extracellular gadolinium is preferable to a liver-specific agent. Subtraction images of arterial phase help to find small hyper-enhancing nodules.



Diagnosis and therapy or follow-up:

Hepatic cirrhosis with portal hypertension.

According to the Liver Imaging Reporting and Data System (LI-RADS) and according to the Treatment Response (LR-TR) algorithm developed by (LI-RADS), the lesions can be classified:

- HCC post TACE in S7: LR-TR non-viable
- HCC post TACE in S3: LR-TR viable
- Lesion S4b/5 (under 1 cm diameter): LR-3

Abbreviations:

adc: apparent diffusion coefficient

DWI: Diffusion-Weighted Imaging

FS: fat saturation

GE: gradient echo

HCC: hepatocellular carcinoma

MR: magnetic resonance

MRI: magnetic resonance imaging

SSTSE: Single Shot Turbo Spin Echo

TACE: trans-arterial chemoembolisation