Non-contrast MRI for liver lesion characterisation: A more cost effective option?

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Background
Our institution performs non-contrast MRI for characterisation of incidentalomas of the liver. If the reporting radiologist cannot make a confident diagnosis on the non-contrast sequences, the patient is recalled for contrast. The aim of this study was to determine the recall rate for contrast and therefore the cost difference compared to performing contrast MRI in the first instance.

Rationale
The most common incidentalomas of the liver are haemangiomas and cysts. These two benign entities can be identified on non-contrast MRI by their very high T2 signal (equal or greater to T1) and T2 shine-through effect on diffusion weighted imaging. Therefore, non-contrast MRI can be used to diagnose these lesions.

Reducing population exposure to gadolinium is important as there are both known short term risks (nephrogenic systemic fibrosis) and an unknown long-term safety profile. Furthermore, the contrast sequences take around ten minutes to perform therefore this protocol potentially saves time and reduces exposure of patients to gadolinium based contrast.

Method
Retrospective review at a single university hospital. All non-contrast MRI liver examinations performed for incidentaloma characterisation in the period 01/01/14 to 03/01/15 were included. The time stamp on the planning and final sequence was noted and scan time calculated accordingly.

Results
- 85 patients were included in the study.
- 13 patients (15%) were recalled for contrast.
- Contrast examination confirmed the diagnosis suspected on non-contrast examination in 12 of the 13 patients.
- At 1 year follow-up of imaging records, none of the lesions classified as benign on non-contrast imaging were proven to be malignant.
- Average length of the post-contrast sequences was 11 minutes

Analysis
- Compared to an approach of performing contrast enhanced imaging on all patients, we could have saved 13 hours of scanner time during the study period (11 minutes saved for 72 patients).
- However, due to the protocols assigned to the scans, some patients had the non-contrast sequences repeated on the recall contrast examination. This led to a reduction in time saved to approximately 8 hours with a potential of 5 additional hours to be saved.

Conclusion
- Non-contrast MRI is able to characterise the vast majority of incidental liver lesions into benign or malignant categories.
- Performing non-contrast MRI as first line with selective post-contrast MRI saves scanner time and reduces exposure of patients to gadolinium based contrast.

Case 1 – Benign lesion, not recalled
76 year old male with colorectal cancer. Staging CT detected numerous low attenuation lesions.

Top left: T2 HASTE - High signal lesion.
Bottom left: T2 fat sat – High signal lesion.
Top right: DWI (b800) minimal high signal.
Bottom right: ADC map – High signal.
Diagnosis: Cysts

Case 2 – Malignant lesion, not recalled
57 year old with no known malignancy.

Top left: T2 HASTE – Mildly hyperintense.
Bottom left: T2 fat sat – Mildly hyperintense.
Top right: DWI (b800) - High signal.
Bottom right: ADC map – Low signal.
Diagnosis: Metastases

Case 3 – Malignant lesion, recalled for characterisation
78 year old with no known malignancy.

Top left: T2 HASTE – Malignancy.
Bottom left: T2 fat sat – Malignancy.
Top right: DWI (b800) - High signal.
Bottom right: ADC map – Low signal.
Recalled for contrast.
Diagnosis: Probable Hepatocellular Carcinoma