

Introduction to MSCT of Liver lesions

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MSCT (& MRI) of liver lesions

- Introduction
 - Diagnostic problem
 - Perfusion characteristics of liver parenchyma
- Perfusion patterns of prevalent liver lesions
- MSCT and MRI protocols

Liver imaging goals

A. Detection malignant lesions

- Pts with primary tumor: Metastases?
- Pts with cirrhosis: HCC?

Optimize sensitivity for lesion detection

B. Characterize detected lesions

- high incidence cyst, hemangioma, FNH, adenoma, fatty change.

Optimize characterization of each lesion

Liver lesions

- Large differences in biological behavior
 - large/small
 - many/few/solitary
 - sharply marginated/diffuse
 - hypo/hypervascular
- Large variation in imaging appearance
 - Perfusion differences essential

Liver lesions

- Small precontrast ΔHU liver and solid lesions
- Large differences in perfusion
 - Liver
 - 1 / 4 Arterial blood supply
 - 3 / 4 Portal blood supply
 - Lesions
 - Amount of perfusion dependent on type of lesion
 - Only arterial blood supply

4 type of liver lesions

A. Hypovascular rel. to liver parenchyma

1. Avascular

- Cyst

2. Solid, hypovascular

- Adeno/squamous cell carcinoma metastases

4 type liver lesions

B. Hypervascular rel. liver parenchyma

3. Solid, hypervascular

- Malignant

- HCC; mets melanoma, endocrine, RCC

- Benign

- FNH, Adenoma

4. Vascular space

- Hemangioma

Transient Hyperaemic Attenuation Difference; THAD

Hyperintense in art phase and isointense in portal phase

1. Obstruction of portal branch with compensatory arterial hyperaemia
 - Thrombus, tumor
2. Arterio-portal shunting
 - Tumor (HCC)
 - AVM

MSCT liver

Scan parameters

- **Tube**

- 120 kVp (obese: 140 kVp)

- mAs

- Screening, follow-up: 150–175 mAs

- Staging: 200–250 mAs

- **Slice thickness & interval**

- 2mm (Cine, MPR)

- 5mm/4mm (PACS)

MSCT liver

Contrast parameters; principles

- How much ?
 - HU Portal phase ~ gr Iodine (mg/mL x mL)
- How fast ?
 - HU Arterial phase ~ mg Iodine/sec
- When ?
 - Triggered
 - Art $A_{0^{100 \text{ HU} + 25^{\text{sec}}}}$
 - Port $A_{0^{100 \text{ HU} + 60^{\text{sec}}}}$
 - Equil $A_{0^{100 \text{ HU} + 3^{\text{min}}}}$

MSCT liver protocols

- **Screening liver & abdomen**
 - Portal phase, (opt: arterial)
 - 45 gr Iodine (150 mL^{300 mg/mL}); 3 ml/sec (5mL/sec)
- **Chronic liver disease; HCC ?**
 - Arterial, portal and equilibrium phase
 - 45–60 gr I; 5 mL/sec
- **Pre-operative colorectal metastases**
 - Arterial, portal and equilibrium phase
 - 60–80 gr I (200 mL^{300–400 mg/mL}); 5 mL/sec
- **Characterizing (probably malignant) lesion**
 - Arterial, portal and equilibrium phase
 - 45 gr I; 5 mL/sec

MRI Protocol

- In- & expiratory Survey
 1. T1 precontrast
 - T1 TFE (in, out of phase)
 - T1 MPRE (+ cor, sag)
 2. T2 fb TSE
 3. T1 Fatsat THRIVE + Gd
 - Pre,20,60,180,300 sec.
 - (+ 10 min if Gd EOB is used)

MSCT Liver: conclusions

- **MSCT faster, more consistent**
 - Better timing different phases
- **MSCT thinner sections**
 - Interactive reading in Cine-mode and MPR
 - Optimize noise vs partial volume effect
- **MSCT liver = cross-sectional liver angiography**
- **MSCT & MRI liver = powerful diagnostic tools**