MR Abdominal Imaging

- Liver Imaging
- MR Enterography

MR Liver Imaging

Historical Perspective

- Feridex
- Teslascan

Supraparamagnetic Iron Oxide
Kupffer Functioning: Uptake-Hypo
T2 Shortening

Manganese Based Agent
Functioning Hepatocytes-Hyper
Both Sensitive, NOT Specific

Neither agent allowed for Dynamic Imaging.

Liver Imaging

Arterial
Hepatocellular

Current Techniques and Contrast Agents

- Rapid imaging of entire liver using
  - Nonenhanced imaging
  - T1w and T2w sequences
  - Fast imaging techniques
- Use of IV CAs provide
  - More accurate characterization of liver lesions of all histologic types
  - Better assessment of full extent of malignant liver lesions
  - Characterization of extrahepatic disease
- Nonspecific ECF Gd CAs
  - Available longest and utilized for greatest number of clinical applications
  - Have best documented safety profile
- Use of Gd CAs are now considered essential for comprehensive MRI evaluation of the abdomen

Dynamic Imaging

- More accurate characterization of all liver lesions
- Better assessment of extent of malignant liver lesions
- Characterization of extrahepatic disease


Dynamic Imaging

- Pre Contrast
- Hepatic arterial phase
- Portal-venous phase
- Equilibrium phase


Dynamic Imaging

3D Spoiled GRE w/Fat Saturation

Free MRA/MRV

Courtesy Philips Medical
Study and Conclusion

- 41 patients with primary or secondary liver lesions
- Images evaluated for:
  - Confidence in lesion detection
  - Lesion number, character, and diagnosis
  - Enhancement pattern
  - Lesion-to-liver contrast
  - Benefit of dynamic and delayed scans
- Overall, compared with 0.1 mmol/kg Magnevist, 0.05 mmol/kg MultiHance was:
  - Equivalent for dynamic imaging
  - Superior for delayed imaging

Delayed Imaging: Hepatocellular Phase

Biliary Excretion

Multihance Delayed – 2hrs

Functioning Hepatocytes: Hyperintense

Primovist – 20minutes

50%
Delayed Phase Performance:
Eovist
MultiHance

Conclusion: The diagnostic performance of gadoxetic acid-enhanced MRI and gadobenate dimeglumine-enhanced MRI for preoperatively detecting HCC is quite similar.
Crohn’s Disease

- Inflammatory disease of the GI tract
- Can occur anywhere in the GI tract
- Most common location is the terminal ileum
- Thought to be an autoimmune disease
- Evidence of genetic link
- More common in western industrialized nations
- Smokers more than 2x likely
- Most often presents in teens to late 20’s
- Another peak in 50’s to 70’s

MR Enterography

Why MR?

Patient’s with Crohn’s Disease will require many radiologic follow up examinations over the lifetime of their disease.....
MR Enterography

Non-Ionizing Radiation
High Contrast Resolution

Contrast Agents

- VoLumen
  - Dilates bowel
  - T1 Dark
  - T2 Bright

- Gadolinium
  - T1 highlight Bowel wall
  - Fill lumen
  - abnormal inflammation
  - lesions
**Prep**

1 Day Prior
- Noon: Ducolax®
- Light meal @ dinner
- NPO after midnight

**MRE Prep**

- Arrive 3-4 hours prior to exam
- Total 1350 ml of VoLumen
  - may use crystal lite
- Start drinking 450ml VoLumen per hour
- Start IV

**Peristalsis**

Peristalsis is a series of organized muscle contractions that occur throughout the digestive tract. Peristalsis is also seen in the tubular organs that connect the kidneys to the bladder.

Peristalsis is an automatic and important process that moves food through the digestive system. It also moves urine from the kidneys into the bladder, and bile from the gallbladder into the duodenum.

Peristalsis

Scopolamine (0.4 mg total) above 45 kg
- Hydrated with Lactated Ringers
- 5 ml/kg Lactated Ringers
- Administered over 2-5 min when setup on table

Glucagon (1 mg total over 45 kg)
- Administered just prior to Dynamic
- Half life 8-18 minutes

MRE Prep

Have the patient use the restroom prior to the exam

Explain the exam thoroughly

Images acquired in either breath-hold (expiration) or w/without navigator-trigger

Prep

Patient positioned prone
- Arms over head
- Comfort is critical

Protocol

- Scout: BH - Expiration
- Gradient In/Out Axial BH
- T2 HASTE/SSFSE BH
  - Coronal w/wo Fat Sat
  - Sagittal wo Fat Sat
  - Ax w/Fat Sat
- T1 2D sGRE w/Fat Sat
Protocol

- Dynamic- Set Up Injector
- Dynamic Series- LAVA/VIBE/THRIVE
- Post T1 Fat Sat- 2 planes  
  Coronal & Axial (2D)
- Hi-Res 3D VIBE  
  Sagittal (if fistula is suspected)

MRE Images: PRE

- In/out phase axial-BH
- 2 Sets- Upper-Lower
- Overlap data sets to ensure continuity

MRE Images: PRE

- T2 HASTE/SSFSE  
  Coronal

MRE Images: PRE

- T2 HASTE/SSFSE  
  Coronal w/Fat Sat
MRE Images: PRE

- T2 HASTE/SSFSE
  - Sagittal

- T2 HASTE/SSFSE
  - Axial
  - Overlapping data sets for continuity

MRE Images: PRE

- T2 HASTE/SSFSE
  - Sagittal
  - Hi Res w/Fat Sat non breath-hold

- T2 HASTE/SSFSE
  - Axial
  - Hi Res w/Fat Sat non breath-hold
MRE Images: PRE
- T1 Axial (BH w/ fat sat)

DYNAMIC SERIES: Injector
- Injector
  - Weight Based Dose
  - Injection Rate
    - 0.5 ml/sec
    - 10 cc Saline

DYNAMIC SERIES: Injector
- Dynamic- 7 total 3:16
- VIBE
  - Coronal/SPAIR
- 16 sec BH
- 14 sec Rest

MRE Images: POST
- T1 Axial BH
- FS
MRE Images: POST

- T1 Sag BH (2D)
- FS

Summarize

MR Enterography

- Non-Ionizing Radiation
- MRI has superior contrast
- Hardware Advancements
  - Temporal Resolution
  - Spatial Resolution
- Contrast Media
  - Oral
  - IV

MRI and CT Education:

www.t2star.com

Thank You!!!!!!!