MRCP Techniques

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No disclosures
Objectives

- To demonstrate a technique for performing MRCP with 2D & 3D sequences
- To illustrate the advantages of thick-slab vs. thin-slab 2D acquisitions
- To illustrate the advantages of 3D MRCP
- To discuss the use of secretin and contrast-enhanced MRCP
General Considerations

- Heavily T2 – weighted sequence
- 1.5T MR; multi-channel surface coil
- NPO 4 hours
- No oral contrast material
- No antiperistaltic agents
- Performed as part of an abdominal MR
- Operator dependent, radiologist intensive
MRCP Sequences

- **RARE** (Rapid acquisition with relaxation enhancement)
  - Fast spin-echo or turbo spin-echo
- **RARE Variants**
  - Half-Fourier acquisition single-shot turbo spin-echo (HASTE)
  - Single shot fast spin-echo (SSFSE)
- **3D RARE**
  - Isotropic images with respiratory triggering
MRCP Techniques

Overview

- **2D MRCP**
  - Thick slabs (4-8 cm) (TE > 700ms)
  - Multi-section thin slabs (2-5 mm) (TE ~100ms)
  - Post-processing as necessary – MPR & MIP

- **3D MRCP**
  - Thin slab acquisitions (1 mm)
  - Respiratory-triggered
  - Isotropic images
  - Post-processing with MIP
2D MRCP Technique

Thick Slabs

- RARE sequence
- Breath-hold, fat suppression
- 4-8 cm, single section
- Coronal & axial planes

Purposes

- Comprehensive view of BD/PD
- Guide for thin-slab acquisitions
2D MRCP Technique
Multi-Section, Thin Slabs

- Half-Fourier RARE sequence
- Breath-hold, fat suppression
- 13-20, 4 mm sections
- Coronal plane (0°, 30° LAO, 30° RAO)
- Purpose
  - Depicts fine details of BD/PD
Multi-Section, Thin Slabs

Pancreatic Duct
Beware of Pitfalls of MIPs

Obscuration of Stones

MIP

Thick slab
2D MRCP Technique
Thick Slab-Advantages

- Rapid acquisition
- Comprehensive view of BD/PD
- Allows for assessment of diffuse ductal disease
2D MRCP Technique

*Thin Slab-Advantage*

- Provides fine details of BD/PD
3D MRCP Technique

- Generates 3D isotropic images
  - 3D RARE sequence
  - Single volume acquisition
  - 1 mm sections
  - Respiratory triggering; 4-8 minute acquisition
  - Post-processing with MIP

3D MRCP MIP

Biliary Trifurcation & PD Loop
3D MRCP Technique

**Advantages**

- Decreased margin of error related to single volume acquisition
- Thinner sections (1mm) compared with 2D MRCP
- Manipulation of 3D data sets allows viewing in any projection & facilitates analysis of complex ductal anatomy
Contrast-Enhanced MRCP

- T1-weighted, fat saturated sequences
- IV contrast material shortens T1 relaxation time of bile
  - Gadobenate dimeglumine (Gd-BOPTA, Multihance)
  - Gadoxetic acid disodium (Gd-EOB-DTPA, Eovist)
  - Mangafodipir trisodium (Mn-DPDP, Teslascan) – no longer available in US
- Image 15 min – 2 hours after injection
- Yields high signal intensity images of the biliary tract
- Useful in detecting bile duct leaks
Suspected Bile Duct Leak
Confirmed with CE-MRCP

T1 FS pre-contrast

T1 FS post-contrast
Secretin MRCP

- Adjunct to standard MRCP
  - to improve PD depiction
  - to assess exocrine function
- Obtain baseline thick slab MRCP prior to secretin administration
- Administer secretin IV in a dose of 0.2 mcg/kg over 1 minute
- Obtain thick slab MRCPPs q 30 sec for 10 minutes after secretin administration
Summary

- Attention must be directed to the details of performing the MRCP technique
- **2D & 3D MRCPs** provide useful & often complementary information with each offering advantages & disadvantages
- **Contrast-enhanced MRCP** is useful in depicting bile duct leaks
- **Secretin MRCP** is useful as a problem-solving tool & as a means of determining exocrine function