Functional Vascular Imaging of the Chest

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Disclosures

No financial disclosures

Will discuss “off label” use of gadofosveset
Functional Vascular Imaging

- MRI
- Ultrasound (Doppler)
- Catheter based Angiography
- Nuclear medicine
Functional Vascular Imaging

MRI

- Time-resolved MRA
- Blood pool contrast agent
- Phase contrast
Time-Resolved MRA

Partial filling of K space

Balance between temporal resolution & spatial resolution
Time-Resolved MRA

MIP
Time-Resolved MRA

Each time point:

- Comprised of a stack of images
- Often demonstrate details of anatomy better than MIP
Time-Resolved MRA

Balance between temporal resolution & spatial resolution

Blood pool contrast agent
Gadofosveset (Ablavar)

Reversible binding with serum albumin (80-90%)
Extended intravascular retention
Increased relaxivity

Lower Gd dose: 0.03 mmol/kg vs 0.1 mmol/kg

Primarily renal excretion
Gadofosveset (Ablavar)

First pass imaging
- Greater relaxivity
- Perform similar to conventional agents

Equilibrium imaging
- Claim up to 1 hour imaging window
- Obtain greater resolution
- ECG triggering
- Respiratory navigation
Gadofosveset (Ablavar)

“Safety and effectiveness of Ablavar in patients under 18 years of age have not been established.”

Rigsby et al. 2014
“can be safely administered in a population of children and young adults”

• Screen for long QT syndrome

• Hypersensitivity reactions (0.46%)

Flow dynamics & Equilibrium

17-year-old, Fontan assessment

Time resolved MRA (TWIST) 3.3 second partition

Equilibrium (3D Navigator-Gated, IR FLASH) 1.5 mm isotropic
Flow dynamics & Equilibrium

9-year-old with PAPVC (RUL to SVC)

Pulmonary arteries

Pulmonary veins/systemic arteries
Flow dynamics & Equilibrium

9-year-old with PAPVC (RUL to SVC)

Time resolved MRA (TWIST)  Equilibrium (3D Navigator-Gated, IR FLASH)
Vascular Anatomy

15-year-old with double aortic arch
Thrombus Evaluation

18-year-old, catheter associated thrombus
Thrombus Evaluation

18-year-old, catheter associated thrombus and RLL PE

Pulmonary Embolism
Anatomy & Hemodynamics

12-year-old, LUL PAPVC

Qp:Qs = 1.4
Anatomy & Hemodynamics

7-year-old, aortic coarctation
Delayed upstroke and ↑ Diastolic Flow

Waveform:  

Collateral Flow: Flow diaphragm > Flow post stenosis

7-year-old, aortic coarctation
Summary

Time-resolved MRA: temporal flow assessment

Blood pool contrast agent (Ablavar): equilibrium phase/anatomy

Phase contrast imaging: hemodynamic assessment