Demystifying Cardiac MRI

Michael D. Shapiro
Agenda

- Basic sequences
- Delayed enhancement
Basic Protocol

Scouts
- 3-plane localizer
- Axial SSFP
- Coronal SSFP
- Sagittal SSFP

Cines
- VLA (2-CH)
- LVOT (3-CH)
- HLA (4-CH)
- SAX stack

Inject gado

Delayed enhancement
Creating a 2-CH view
Creating a 3-CH view
Creating a 3-CH view
LVOT

3-CH view
Now we have VLA and LVOT views, how do we get an HLA view?
Creating a 4-CH view
HLA

4-CH view
Creating a SAX Stack
SAX Stack
Delayed Enhancement

- 0.2 mmol/kg (.1 ml/lb)
- Hand injection fine (usually)
- Test shots start at ~8-9 min after injection
- Diagnostic images between 10-20 minutes after injection
Delayed Enhancement

• Options for finding optimal TI
  – Look locker sequence
  – Empiric TI’s of 250, 300, 350 ms

• Views
  – SAX stack
  – 1 VLA, 1 LVOT, 1 VLA
Delayed Enhancement
Delayed Enhancement
Canine infarct at 3 days - BRIGHT IS DEAD!

TTC Staining

DE-MRI

DHE may overestimate infarct size (as compared to TTC staining) because of partial volume effects due to CMR slice thickness.

DE-MRI — Gadolinium Kinetics

Contrast injection

Infarcted Myocardium

Normal Myocardium

First-Pass

DHE

< 1 min

> 10 min

Time
DE-MRI for Infarct Detection

Animal Studies

Dog model with near transmural infarction

SPECT

CMR

Histology

> 75% CMR - 100%
SPECT - 100%

Wagner et al, Lancet 2003
DE-MRI for Infarct Detection

Animal Studies

< 50% CMR - 92%
SPECT - 28%

Wagner et al, Lancet 2003
DE-MRI for Infarct Detection

Clinical Studies

91 patients

> 75% - CMR = SPECT

< 50 % - SPECT missed
47% of subendocardial infarcts

Wagner et al, Lancet 2003
DE-MRI Viability
Clinical Studies

Transmurality vs recovery of function after CABG
LV Recovery

Non-Transmural DHE
Lack of Recovery

Transmural DHE
Thank you