"Coronary CTA: A How To"

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CT Coronary Angiography

"Pretty pictures, but not much more useful than a third wheel on your bicycle."

Cathy DeAngelis, Editor
JAMA Audit Commentary, July 26, 2006

Outline

• Preparation
• Indications
• CT Coronary Protocol
• Reconstruction and Reporting
• Cost-effectiveness
• Accuracy of CT and MRI

Preparation

• Preparation is the key
• Sinus rhythm
• Course and duration
• Radiation and contrast agent
• 10 s breath hold (submaximum inspiration)

Nitroglycerine

• Always use it:

Dewey et al. RoFo 2006 (Georg Thieme Verlag)
Nitroglycerine

- Always use it:

[Image]

Dewey et al. RöFo 2006 (Georg Thieme Verlag)

Preparation

- Nitroglycerin contraindications:
  » Inhibitors of phosphodiesterase
  » Severe aortic stenosis
  » Hypertrophic obstructive cardiomyopathy
  » Hypotension (<100 mm Hg)
  » Intolerance

[Image]

Dewey et al. RöFo 2006 (Georg Thieme Verlag)

Indications

- Low to intermediate likelihood
  » Equivocal stress test
  » Atypical symptoms
- After bypasses

[Image]

Dewey et al. RöFo 2006 (Georg Thieme Verlag)
### Possible Indications
- Cardiac function, thrombus
- Suspected anomalies
- Acute coronary syndrome

### No Indications
- Coronary stents and plaques
- Myocardial viability

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### Bypasses

- Accuracy of about 90%
- Excellent depiction of distal anastomoses

Stents

- Successful (LAD; 3.5 mm)

Stents

- Limited (LAD; 4.0 mm)

Stents

- Accuracy of about 70-80%\(^1\)
- Only **BIG** stents ($\geq$ 3.5 mm)
- Only 50% of the small guys\(^2\)


CT Protocol

- 64 by 0.5 mm collimation
- Sinus rhythm
- Good ECG?
### CT Protocol

- **80 cc, right brachial, 4.0-5.0 flow**
- **Saline chaser**
- **1.3-1.7 g iodine per s**
- **Calculation of volume:**

\[
[\text{Scan length (s)} + 10] \times \text{Flow} = 80 \text{ cc}
\]

*Cademartiri et al. Radiol Med (Torino) 2004*

### Beta blocker complications:
- Hypotension
- Bradycardia
- Asthma
- Slow injection
- Have atropine on board

### Nitroglycerin suggestions:
- 0.8-1.2 mg glycerol trinitrate
- 5 mg isosorbide dinitrate

### Nitroglycerin complications:
- Hypotension
- Tachycardia

### Breath hold trial:
CT Protocol

ECG Editing

Lung Recons

Reconstruction

ECG Editing

Temporal Resolution

- Halfscan reconstruction
- Dual-source CT
- Multisegment reconstruction
- Lower HR better images
Reporting

Curved MPRs

Coronary Segments

Austen et al. Circulation 1975

Curved MPRs

Quantification of Stenoses

Dewey et al. Invest Radiol 2007
Angiographic Emulation


Recap of the Protocol

Recap

- 64 by 0.5 mm
- Sinus rhythm
- No beta blockers up to 70 bpm
- Nitro
- 80 cc, 4.0-5.0 flow
- 10 s breath hold
- Curved MPRs

Accuracy for CAD

MSCT or MRI?

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<th>MSCT</th>
<th>MRI</th>
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<tr>
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Some things to keep in mind …

- Pretest likelihood determines utility
- CT better than MRI
- CT good for 20-60% likelihood

Cost-effectiveness
Summary

- Rule out CAD
- MSCT > MRI
- Sinus rhythm
- No betablockers up to 70 bpm
- Dual-source or multisegment
- CT most cost-effective
- Patients prefer CT