How to perform cardiac CT with a Toshiba scan

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Overview

- **INTRODUCTION**
  Acknowledgements
  AZ St. Dimpna
  The need for cardiac CTA

- **CARDIAC CT with a TOSHIBA Aquilion ONE**
  TOSHIBA Aquilion ONE
  Patient preparation
  Scan
  Post Processing

- **STUDY**
  Methods
  Results
  Discussion
  Conclusion
Aknowledgements

Radiologists

Dr. Leyssens G.
Dr. Deraemaeker L.
Dr. Franssens Y.
Dr. Gaens J.
Dr. Vanneste D.
Dr. De Smet I.

Cardiologists

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Dr. Vermeulen J.
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Dr. Salu K.
Dr. El Aidi F.

Radiology technicians

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Verbeek F.
Kestens W.
Milis S.
Geens G.

Toshiba Medical Systems

Mahieu D.
Theeuwes B.
AZ St. Dimpna Geel

- 309 beds

- 90+ medical doctors:
  - 7 radiologists
  - 5 cardiologists
  - 6 emergency doctors

- Department of Cardiology:
  23,258 patient-contacts annually
no cathlab or cardiac surgery
Need for a high yield diagnostic tool in CAD

- easily accessible exam
- low cost exam
- low risk exam
- highly performant exam
⇒ fast track **diagnosis of CAD in selected patients**

AIM (endpoints- therapie)

- reassurance - quest for significant others
- primary and secondary prevention and safe watchfull waiting
- revascularisation (stent/ bypass) after confirmation (coronary angiogram) +/- functional test
MEANS: Start Cardiac CTA

- 320-row CTA system: Toshiba Aquillion ONE: 16 cm coverage: image acquisition of the entire heart within a single heart beat
- Measurements for consistency in quality, safety in dose and contrast
- State of the art continuous education and evaluation and assessment of diagnostic accuracy/ safety.
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- 320 detectors x 0.5 mm = 16 cm coverage, no table movement
- 350 msec rotation time: 180° in 175 msec
- entire heart in one volume within a single heart beat with isophasic contrast
Dose saving features

- Collimation (<16cm)
- Decrease in scan time => lowering dose
- SURE Care (QDS, Boost3D)
- Active Collimation
- Adaptive Iterative Dose Reduction
Retrospective scan mode

- Cardiac Functional Analysis with continuous or modulated exposure

Prospective scan mode

- Target CTA: low dose
Robustness

- **HR < 65 BPM**
  - single-beat prospective
  - data will be acquired between 70% and 80% of the R-R interval

- **HR > 65 BPM**
  - single-beat prospective
  - radiation window is widened: data will be acquired between 30% and 80% of the R-R interval
- Automatic reconstruction & phase selection
- Best Phase
Artefacts

- Artefact-free imaging
  => no stair step artefacts (as seen in step and shoot)
  => less motion artefacts (as seen in multi segmented scans)
Patient preparation and installation

- 3 à 4 hours sober
- No smoking
- No caffeine
- Explanation and relaxation of the patient → direct influence on the heartrate
- 18G catheter
Patient Installation

- dorsal decubitus - comfort
- reassurance and instructions
  - active HR control
  - warmth during injection
  - breath exercise
- ECG leads
Contrast

- Iomeron 400
- Low osmolar (R = 3/1) non ionic monomer
- Decrease in scan time => decrease in dose
- <100 kg: 60 ml @ 6 cc/sec + 20 ml 1/2 @ 4cc/sec
- + 100 kg: 90 ml @ 6 cc/sec
Beta Blockers

- Metoprolol: beta-blocking agent IV, up to 5 x 5mg lowering heart rate to less than 65 bpm to enhance image quality

- Contra-indications:
  - heart rate less than 60 bpm
  - systolic BP less than 100 mmHG
  - cardiac failure or aortic stenosis
  - active bronchospasm (asthma or COPD) or patients on beta-agonists
  - AV block II or III
Vasodilatation

- Nitrolingual Spray to dilate coronary arteries (image quality)
- Nitroglycerine: 1 puff of 48 mg has 0.4 mg Glyceroltrinitrate
- 0.8 mg – 1.2 mg sublingual is OK
Scanograms

- scouts (F/P)
- collimation (carina - apex of the heart)
Scan Parameters

- Clinical acceptance by age

- Scan parameter setup by Body Mass Index

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SURE START

- sure start ROI in descending aorta @ carina
- press buttons simultaneous: contrast and scan
- triggering at interval - then continuous till 180 HU
- registration and analysis of previous and current BH: automatic launch
Reconstruction

- automatic reconstruction of phases by PhaseXact:
- 4 phases:
  - 75%
  - best phase
  - best phase + 20ms
  - best phase + 40ms
Database
- Pick Protocol
ViTREA $f_X$

- Automatic Segmentation and denomination of the 3 main branches:
ViTREA $f_x$

- Multi-orthogonal curved MPR / branch (180°)
  - Interpretation
    - MPR > axial images in determining degree of stenosis
ViTREA $f_x$

- Sending to PACS
ViTREA fx

- Sending to PACS
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  ▪ Dr. Y. Franssens
  ▪ Dr. J. Gaens
  ▪ Dr. D. Vanneste
  ▪ Dr. I. De Smet

▪ CARDIOLOGY Department:
  ▪ Dr. J. Schurmans
  ▪ Dr. J. Vermeulen
  ▪ Dr. E. Govaerts
  ▪ Dr. K. Salu
  ▪ Dr. El Aidi F.

▪ TOSHIBA Medical Systems Belgium
Thanks for your attention