TRA MEDICAL IMAGING

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Coronary CTA with Calcium Score
TRA / DINW Outpatient

Reviewed By: Daniel Verdini, MD
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In accordance with the ALARA principle, TRA policies and protocols promote the utilization of radiation dose reduction techniques for all CT examinations. For scanner/protocol combinations that allow for the use of automated exposure control and/or iterative reconstruction algorithms while maintaining diagnostic image quality, those techniques can be employed when appropriate. For examinations that require manual or fixed mA/kV settings as a result of individual patient or scanner/protocol specific factors, technologists are empowered and encouraged to adjust mA, kV or other scan parameters based on patient size (including such variables as height, weight, body mass index and/or lateral width) with the goals of reducing radiation dose and maintaining diagnostic image quality.

Indication: Chest pain, shortness of breath, concern for coronary artery disease, anomalous coronary artery, equivocal or abnormal stress test, heart failure, etc.

Breathing Instructions:
Perform a practice run with the patient to ensure understanding
- To be done while patient is lying on the CT table after hooking up EKG leads PRIOR to acquiring images
- Choose cardiac package breathing instructions

Patient Position:
- Supine: Cardiac breathing (Hyperventilation), Feet down with arms above head
- Female patients: Attempt breast displacement by moving breasts laterally and superiorly which may be secured in some cases with the CT binder strap.

Beta Blocking
- For patients with resting HR > 75bmp
- Night before the exam: long acting, metoprolol succinate, 100mg PO
- 2 hrs before exam: short acting, metoprolol tartrate, 50mg PO if HR 75-84, 100mg if HR > 84, pt should also bring with them to the exam

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Nitroglycerin

- *Contraindications* (do not give nitro and call radiologist)
  - Ingestion of phosphodiesterase inhibitors (Viagra, Cialis, etc.) in last 24 hours
  - History of severe aortic stenosis or hypertrophic cardiomyopathy
  - Currently taking medications (timolol or brimonidine) for closed angle glaucoma

- If without contraindications, then:
  - If systolic blood pressure is >100mmHg and no contraindications on screening questions, can give nitroglycerin (0.8 mg total dose) without calling Radiologist
  - If systolic blood pressure is <100mmHg, call Radiologist due to risk of hypotension
  - Arterial acquisition should be done 4-7 minutes after SL NTG is given. NTG can be given before the Ca score acquisition
  - Transdermal nitroglycerin (preferred method for inpatients, (0.8mg/h = 2 x 0.4mg/h)) needs to be applied at least 45 minutes prior to the CTA acquisition

- *Administration (SL = sublingual)*
  - Sublingual tablets: confirm with patient tablets have dissolved prior to scanning
  - Sublingual spray: Ensure spray tube is primed by spraying away from patient prior to administering SL spray
  - Transdermal patch: must be applied > 45min prior to acquisition

Scan Range (CC Z-AXIS): Carina through base of heart, center on both frontal (for superior border) and lateral (for inferior border) scouts/topograms

- If patient has had bypass (CABG) or aortic evaluation also needed, then extend coverage to top of chest (*and scan caudocranial*)

IV Contrast:

- Exam requires IV to be antecubital or more central in location (no forearm, wrist, hand IVs)
- Ideally, IV should be in right antecubital (AC) fossa; left AC is 2nd choice
- IV **must** be rated for 5cc/sec or higher; default rate is 6cc/sec

Acquisitions:

TWO acquisitions total typically = Non-contrast and IV contrast enhanced CTA

NOTES:

- If pt is < 40 yo and **not** from ER, call Radiologist to see if non-contrast necessary
- Rarely, delayed phase may be necessary (in patient with history or suspicion of thrombus or mass)
- Proceed with cCTA regardless of calcium score

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- If outpatient coronary CTA, can let patient go if scan includes complete coverage of coronary tree with no significant skip artifact. If any questions on quality, then call Rad to clear the patient after multiphase has crossed over to VIA

1. ***Non-contrast***
    - kV: 120
    - Prospective EKG gating at 300ms
    - Acquisition slice thickness: 1.25 – 1.5mm

2. ***CTA Coronary with IV contrast***
    - **kV and mA:** Siemens**:** Care kV for BMI < 30, kV fixed at 120kV for BMI > 30, Care dose
    - Contrast bolus:
        - Trigger delay with HU threshold of 100HU in the descending aorta
    - ECG Gating:
        - **Dose modulated Retro:** Max mA window 200-440ms, ramp down to 20% outside of max window

Series and Reformats (ALL RECONS NEED TO GO TO VIA & TRA PACS):

1. **Non-contrast:**
    - 3mm (slice thickness) x 1.5mm (increment) ST kernel
    - NOTE: Please process calcium scores on every **coronary** CTA (any exam where Nitro is given), EXCEPT if there has been prior coronary artery bypass grafting and/or stents

2. **CTA Coronary with IV contrast:**
    - CTA: *Axial* "Best systole" (I31 or I41 kernel; FOV around heart)
        - 0.8mm if BMI < 30
        - 1mm if BMI > 30
    - ➔ If patient has Ca score > 1000, or presence of stent, if scanner has iMAR option, then please do a 2nd Best systole recon "iMAR BS"
    - CTA: *Axial* "Best diastole" (I31 or I41 kernel; FOV around heart)
        - 0.8mm if BMI < 30
        - 1mm if BMI > 30
    - "Multiphase": *Axial* "Multiphase" (same FOV) 200- 440ms increments of 20ms
        - 0.8mm if BMI < 30
        - 1mm if BMI > 30
    - "Function": *Axial* "Function"(same FOV) – 0- 90% in Increments of 10%
        - 2mm thickness

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- Chest / Full FOV (soft tissue/standard kernel, full FOV)
    1. *Axial* 2 mm slice thickness (I30 kernel) “FFOV”
    2. *Coronal*: 2 x 2mm slice thickness “Coronal”
    3. *Sagittal*: 2 x 2mm slice thickness “Sag”
    4. *Axial* 10 x 2 MIPS (soft tissue/standard kernel, full FOV) “MIPS”

- Dynamic “Dyn” – see PDF on web site for making cine series with 10 images from Function series