# EVMS EM JC CRITICAL REVIEW FORM: THERAPY ARTICLES

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**Citation**: Linde J, et al. Long-Term Clinical Impact of Coronary CT Angiography in Patients With Recent Acute-Onset Chest Pain: The Randomized Controlled CATCH Trial ACC Cardiovasc Imaging 2015 Dec;8(12):1404-1413.

**Study Objective:** To determine the long-term clinical impact of coronary CTA-guided treatment strategy in patients with recent acute-onset chest pain compared to standard of care (exercise stress, SPECT)

**Study Methodology:** Randomized, controlled, parallel study that took place in Denmark. Patients with acute chest pain (600 subjects) who had normal or non-diagnostic EKGs and 2 normal troponins as well as could be discharged after 24hr observation w/out reoccurrence of chest pain were randomized into two groups: coronary CTA or standard of care SOC (exercise EKG, nuclear myocardial perfusion) guided treatment. Exclusion criteria included: less than 18 y/o, women of childbearing potential not on approved birth control, geographical residence or mental or physical condition that would impair follow-up, plasma creatinine concentrations > 130mg/l, known allergy to iodinated contrast, abnormal chest radiography, and previous CABG. Based on positive findings patients were referred for invasive coronary angiography. Positive coronary CTA is stenosis > 50% in left main coronary artery or stenosis > 70% in coronary arteries > 2mm diameter. If coronary CTA was borderline (stenosis between 50-70%) or nondiagnostic then, a functional test would be added. Positive functional test was based on established guidelines. Groups were followed up in ~18 months and evaluated for the primary endpoint, which was a composite of MI, cardiac death, hospitalization for unstable angina pectoris, late symptom-driven revascularization, and re-admission for chest pain. Secondary endpoint consisted of MACE consisting of composite of all components of primary endpoint minus readmission for chest pain and individual components of the primary endpoint.

| GUIDE | COMMENTS |
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| **I. Are the results valid?** | |
| **A. Did experimental and control groups begin the study with a similar prognosis?** | |
| 1. Were patients randomized? | After consent patients were randomized in a 1:1 ratio to either coronary CTA-guided or functional testing guided groups |
| 2. Was randomization concealed (blinded)? In other words, was it possible to subvert the randomization process to ensure that a patient would be "randomized" to a particular group? | Patients were blinded to group allocation. Post-discharge all patients underwent both coronary CTA and functional testing. The referring physician received either CTA results or in the standard of care group only received the functional testing results and both the patient and physician were blinded from the coronary CTA results. |

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| 3. Were patients analyzed in the groups to which they were randomized? | Yes. All analyses were performed according to the intention-to-treat principle, except that patients who withdrew their consent were excluded. |
| 4. Were patients in the treatment and control groups similar with respect to known prognostic factors? | Patients in the treatment and control groups were very similar in regard to demographic, cardiac risk factors, symptoms, pre-test risk groups, and TIMI scores.<br><br>With exception to HTN which was more prevalent in the coronary CTA group. Also, race was not described in the study. |
| 5. Were patients aware of group allocation? | Patients were blinded to their group allocation. They received both coronary CTA and functional testing post-discharge. |
| 6. Were clinicians aware of group allocation? | Yes. Referring clinicians were also blinded. They only received the results of either the coronary CTA or functional testing.<br>However, if coronary CTA was borderline (stenosis between 50%-70%) or non-diagnostic (due to artifacts, excessive calcifications, or non-evaluable coronary stents) referring clinicians sent recommendation for treating physicians to add a functional test.<br>Treating physicians were not blinded during the follow up period.<br>Also, the decision to perform coronary intervention was left to the interventional cardiologist who were not blinded or part of the study team. |
| 7. Were outcome assessors aware of group allocation? | No. Two dedicated project nurses conducted data acquisition. After completion of data collection, blinded adjudication of clinical endpoints was performed independently by two experienced cardiologists |
| 8. Was follow-up complete? | Yes, follow up was completed.<br>Follow up consisted of a phone interview and electronic record review. Of the initial 299 subjects in the coronary CTA group 14 withdrew consent prior to testing. 257 were assessed by phone interview and electronic records and 28 were assessed by only electronic records. Of the initial 301 subjects in the functional testing group 10 withdrew consent. 261 were assessed via phone interview and electronic records and 30 were assessed by medical records only. |
| **What are the results ?** | |
| 1. How large was the treatment effect? | The treatment effect indicated that coronary CTA led to a significant reduction in the primary composite endpoint compared to functional testing<br>CTA 11% vs SOC 16% = Absolute Risk Reduction 5%<br>NNT=1/ARR= 20 (p=0.04).<br>HR 11/16=.68 (CI (0.40-0.98) Sig. but gets really close to 1 or insignificant.<br>There was also a significant risk reduction in the secondary endpoint when using coronary CTA vs functional testing (composite of primary endpoint excluding readmission for chest pain; p= 0.02)<br>CTA 2% vs. SOC 5% ARR=3% NNT 1/ARR=33<br>HR= 2/5 = 0.4 (CI 0.16-0.95) also wide and close to 1 |

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| | There was no statistically sig difference for ANY one of the components of Primary or Secondary outcomes.<br><br>Coronary CTA also had a significantly lower incident of normal ICA compared to functional testing ((14/29) 29% vs (23/36) 64%) which implies coronary CTA appears more accurate and functional testing puts patients at an increased risk for false negatives. Referral for ICA was 37% in CTA and 22% in standard.<br><br>After index evaluation more patients were treated with ASA and other platelet inhibitors in the CTA group.<br><br>Overall the treatment effect was slightly hindered by the size of the study, but it did indicate significant results in the primary and secondary endpoints as well as the diagnostic ability when referring to ICA.<br><br>Also, there was not a significant effect on cardiac death and myocardial infarction between the two groups. (cCTA 2 vs functional 8; p=.06) |
| 2. How precise was the estimate of the treatment effect? (CI's?) | 95% Confidence intervals were used in the subgroup analysis with regard to primary endpoint and MACE.<br>The intervals overall were slightly wide which may be contributed to small sample size.<br>In the subgroup analysis there was only statistical significance in the primary endpoint and MACE in the NO history of CAD subgroup and in the MACE of intermediate pre-test probability. |
| III **How can I apply the results to patient care?** | |
| 1. Were the study patients similar to my patient? | Race was not described in the demographic details of the test subjects which could lead to a difference between the test subjects and the patients in this area. Also, BMI was lower than average BMI. I believe a study with a much larger sample size and documentation of more diversity between subjects would be beneficial. Also, this study with outpatient noninvasive testing requires very strong patient compliance and unfortunately many patients in our population are often lost to follow-up. I believe patient compliance in our population would not be as good as the subjects in this study. However, I do believe the coronary CTA would benefit our patient population as well based on the results. |
| 2. Were all clinically important outcomes considered? | No. The most important clinical outcomes were considered: MI, cardiac death, hospitalization for UAP, late symptom revascularization, and readmission for chest pain. I would have liked to take into account and compare the long-term economic analysis or ED LOS. No reporting on radiation dosage or contrast loads and mal effects. |
| 3. Are the likely treatment benefits worth the potential harm and costs? | Yes, I strongly believe the benefits are worth the potential harm and cost. What may be unclear is which pre-test probability group is best served without predisposing to additional downstream testing and potential harms. Coronary CTA is non-invasive and has shown statistically significant benefits. I believe a larger sample size trial is necessary to investigate the true benefit. Also, this trial eludes to other randomized trials when coronary CTA was used in early triage and led to reduced length of stay in hospitals, |

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| | reduced time to diagnosis and reduced overall cost. I believe coronary is a safe modality and, in this trial, has shown to lead to less false negatives compared to functional testing as well as overall lower MACE. |

**Limitations:**

- The sample size is small, and diversity of the subjects is unclear. A larger sample size could have improved the confidence intervals and the precision of the test results.
- The use of functional tests in 52 of the 285 patients in the coronary CTA group slightly confounds the results and did not clearly define the group that needed functional testing.
- Treating physicians were not blinded and could order further post-index medical treatments and noninvasive or invasive testing which could not be controlled for.
- CTA patients had higher number of interventions likely to favor better long-term outcomes. This included aspirin, other platelet inhibitor, calcium channel blockers, and diuretics which may also played a role in post-index events.
- Low PTP patients represented only 21% of all those enrolled. The Low to Intermediate and Intermediate PTP's had a lot of crossover (15%-50% and 15% to 80% respectively.

**Clinical Bottom Line:** Coronary CTA appears to show long term benefits compared to standard functional testing for the described composite outcomes. .Coronary CTA had better diagnostic referrals for ICA with high rates of revascularization (60%) in those referred for ICA compared to functional testing which had a 30% revascularization rate suggesting higher false positives. Overall, this study is promising for the diagnostic abilities of coronary CTA. I believe further large-scale studies in a more diverse patient population can help improve upon some of the limitations of this study, but coronary CTA appears very promising.