EVMS EM Critical Review Form
Therapy Articles

Resident: Lauren Gallion Date: 11/25/20

Citation: Burris A, et al. Triple Rule Out Versus Coronary CT Angiography in Patients With Acute Chest Pain: Results From the ACIC Consortium JACC Cardiovasc Imaging 2015 Jul;8(7):817-25

Objectives: The objective of this study was to evaluate the diagnostic yield of the coronary CTA versus the triple rule out (TRO) scanning in patients with acute chest pain.

Methodology: This is a retrospective "quality improvement", industry sponsored (BCBS) database study in which 12,834 patients in both an ED (64%) and inpatient (36%) setting underwent coronary computed tomography scanning versus triple rule out computed tomography scanning at 53 Michigan institutions to evaluate the cause of acute chest pain. Scan findings, imaging qualities, and demographic characteristics were compared between coronary CTA and TRO scans. The primary outcome was diagnostic yield (obstructive CAD >50%, PE, or AD) with secondary outcomes of image quality, dosage of radiation, and contrast load. Ordering physicians did not have specific criteria on which scans to order, and choice was based on their clinical judgement.

Guide		Comments
I.	**Are the results valid?**	
A.	**Did experimental and control groups begin the study with a similar prognosis (answer the questions posed below)**	
1.	Were patients randomized?	No, this was a retrospective analysis of an established healthcare database.
2.	Was randomization concealed (blinded)?	As above.
3.	Were patients analyzed in the groups to which they were randomized?	Yes (not randomized, but patients were obviously analyzed based on the imaging they received). There is no mention of whether there were any missing data and how they handled missing date.
4.	Were patients in the treatment and control groups similar with respect to known prognostic factors?	TRO group had more women, were younger, less history of CAD, more ED patients, lower CAD pretest probability, lower frequency of tobacco use, family history of CAD, HTN, HLD.
B.	**Did experimental and control groups retain a similar prognosis after the study started (answer the questions posed below)**	
1.	Were patients aware of group allocation?	Yes, as they received a different imaging study.
2.	Were clinicians aware of group allocation?	Yes

3.	Were outcome assessors aware of group allocation?	Yes. No mention whether data analysis was done in a blinded fashion, namely the are unaware of the objectives of the study. This is one area that can be blinded in retrospective studies.
4.	Was follow-up complete?	There was no mention of any follow-up criteria including potential harms from larger contrast loads. No mention of Major Adverse Cardiac Events (MACE).
II.	**What are the results (answer the questions posed below)?**	
1.	How large was the treatment effect?	There was no difference in the primary outcome of composite of >50% coronary stenosis, PE and AD. The PE and AD numbers were too small to make a difference in the composite outcome. Receiving a TRO scan was not predictive of diagnostic yield. PE and AD were more often detected on TRO than CTA in ED patients, but not inpatients. Nondiagnostic studies were more often reported with TRO. Radiation was significantly higher in TRO, and contrast volume was also higher for TRO.
2.	How precise was the estimate of the treatment effect?	17.4% for TRO and 18.3% for CTA in composite diagnosis of obstructive CAD, PE, AD (p=0.37). TRO for PE alone (1.1 and 0.4% respectively with P 0.0004) and AD alone 1.7 (1.1% p=0.046 respectively) were statistically significant though no CI's were provided.
III.	**Can I apply the results to patient care (answer the questions posed below)?**	
1.	Were the study patients similar to my patient?	Uncertain. No race demographics were reported. Mean age was 52 in CTA and 53 in TRO, which seems similar to the Norfolk population. - Average BMI was 30, which his MUCH lower than the average BMI seen at Norfolk general. Only about 40% for either group had a BMI greater than 30. This would change our diagnostic accuracy. - % of patients with DM (13.4/12.5), HLD (46.2/43.3), and HTN (46.8/49.9) was also seemingly lower than our population - Some patient's had a history of CAD, MI, PCI, and even CABG. These patient's would not qualify for our ED evaluation. - Only 64.5% of these patients were ED patients. - Most were intermediate/high risk by Diamond-Forester and low risk by Framingham risk score. (DF takes into account age, gender, and characteristics of chest pain while Framingham focuses on risk factors. Seems similar to our

		patients, though we use the Heart score so we cannot directly compare. No mention how they collected the DF scores.
2.	Were all clinically important outcomes considered?	They studied diagnostic ability, radiation dose, and contrast dose, as well as non-diagnostic scans. It would have been interesting to look at missed diagnoses and further required imaging and other downstream testing on non-diagnostic scans. They also did not study the renal effects of the higher contrast load on the patient. No follow-up data on MACE , LOS or economic analysis. No population analysis of potential long-term harms from radiation exposure.
3.	Are the likely treatment benefits worth the potential harm and costs?	Possibly. For assessment of CAD, CCTA appears to be highly sensitive. Unless you have high pre-test probability for either PE or AD, it does not seem as though TRO would be worth the risks of higher radiation, higher contrast loads, and more frequent non-diagnostic studies.

Limitations:

- The study's patient population is likely different from the population at SNGH. BMI which was determined to be factor predisposing to non-diagnostic studies. No reporting of race. Also, approximately 30% of both groups had prior CAD including PTCA and CABG which confounds data as we are not performing ED CTA's in high risk patients.
- This was a retrospective study, so practice patterns and CT protocols were not standardized.
- CT's ranged from 64-320 slice scanners. Would be helpful to have reported data analysis by type of scanner.
- No blinding of data analysis which could predispose to reporting bias.
- Likely underpowered to report on differences between CTA and TRO as TRO represented only 12% of all patients. The diagnostic yield for PE was 1.1% (usual yield 9-19%) which suggests patients were very low risk for PE and underwent unnecessary TRO's.
- No reporting of pre-test probability for PE in those undergoing TRO.
- The image quality rating scale is also quite subjective, so it is difficult to compare whether all studies would be read as non-diagnostic between multiple radiologists.

Bottom Line:

- TRO was not found to have a statistically significant diagnostic yield compared to coronary CTA when evaluating for composite diagnoses of CAD, PE and AD. It was better at identifying AD and PE however it was likely underpowered as TRO represented only 12% of the study population.