Critical Review Form

Meta-analysis

64-Slice computed tomography angiography in the diagnosis and assessment of coronary artery disease: systematic review and meta-analysis, *Heart* 2008; 94: 1386-93

Objective: **"The purpose of our study was to review the literature about the diagnostic performance of multidetector CT angiography for assessment of symptomatic coronary artery disease, with conventional coronary angiography as the reference standard."**

Methods: **This was a meta-analysis. Authors reviewed English only publications from MEDLINE, EMBASE, BIOSIS, SCI, COCHRANE and three other technology/informatics journals. A modified QUADAS was used to asses for publication quality. Heterogeneity was reported on the pooled sensitivities and specificities of patient level results.**

Guide	Question	Comments
I	***Are the results valid?***	
1.	Did the review explicitly address a sensible question?	Yes, however chest pain is common and has variability among patients who are ruled for CAD. The authors fail to define the pretest probability of disease in the patient cohort they aim to study.
2.	Was the search for relevant studies details and exhaustive?	MEDLINE, EMBASE, BIOSIS, SCI, COCHRANE and three other technology/infomatics journals. The search was limited to English publications.
3.	Were the primary studies of high methodological quality?	40 total studies. The larger question is were the studies truly powered to determine sound evidence. The largest of the studies enrolled 124 patients. There are no RCTs and several are abstracts. The lowest prevalence of heart disease ~ 15% but some reported rates high as 90%.
4.	Were the assessments of the included studies reproducible?	Used a modified QUADAS (Fig 2) with reported additional questions. No forest plot to assess publication bias was included. No inter-observer kappa reported to assess inter-reviewer reliability (disagreements resolved on consensus basis).

II.	***What are the results?***	
1.	What are the overall results of the study?	The following are pooled patient level data: Sensitivity 99% (95% CI; 97 – 99%) Specificity 89% (95% CI; 83 – 94%) NPV 100% (95% CI; 86 – 100%) PPV 93% (95% CI; 64 – 100%) The median prevalence of CAD was 58%. Below are pooled *segment level* data: SENS 95% CI / SPEC 95% CI / NPV (range) / PPV (range) 1) LM: 95% (84-99) / 100 (99-100) / 100% (90-100) / 100% 2) LCX: 85% (69-94) / 93 – 100% / 93 – 100% 3) LAD: 95 – 100% / 95 – 100% 4) Stents: 89% (68 – 97%) / 94 (83-98) / 96 (71-100%) / 77% (33-100)
2.	How precise are the results?	95% CIs reported are broad. 2% patients not evaluable 11/78 (1-3%)
3.	Were the results similar from study to study?	Yes, when you download the supplement they are similar. However authors report heterogeneity in the specificity of the studies.
III.	***Will the results help me in caring for my patients?***	
1.	How can I best interpret the results to apply them to the care of my patients?	The results from this meta-analysis likely do not pertain to ED physicians since if our suspicion of CAD is high enough, we tend to admit our patients to their doctors for further work up. Our roles typically do not involve the identification of worsening disease among patients with a high prevalence of CAD unless they sustain an acute event. In those scenarios we treat and leave the rest of the diagnostic work up to the specialists. But the study is interesting in that MDCTA appears to identify coronary calcification among patients with a high prevalence of disease.
2.	Were all patient important outcomes considered?	Some of the included studies did NOT report their diagnostic properties taking into account unobtainable cases. Furthermore issues such as radiation and further testing were not considered.
3.	Are the benefits worth the costs and potential risks?	This study cannot answer this question for ED physicians since we're unlikely to order a MDCTA when working with patients with known CAD.

Limitations

1) **There was no forest plot to assess publication bias.**

2) **The QUDAS instrument was modified but not validated. Authors did report their results.**

3) **The pre-test probabilities of the patients in several studies was not disclosed nor considered leading to likely significant heterogeneity in the studies chosen. The appendix of the study reports prevalence of CAD from as low as 15% in some studies to as high as 90% in others. This likely explains the heterogeneity among the specificity as well as the broad CI reported.**

Bottom Line

ED physicians are not likely to use MDCTA in patient populations with a very high likelihood of CAD so the results of this meta-analysis should be interpreted with caution since there is likely poor external validity. However, it's interesting to note the high sensitivity in this population but low specificity. To put these findings into perspective, D-dimer for PE also had similar diagnostic properties. What was first championed as a great diagnostic tool ended up driving up the use of adjunctive testing. Only recent decision rules aid in identifying who should have a d-dimer to begin with. Will MDCTA follow this pathway in populations with a high risk of CAD or will current strategies (cardiac catheterization, stress testing, etc.) remain the standard?