Baptist Health
HEART INSTITUTE

Screening Consequences: Coronary and Aortic Calcification

Christen Johnson, MD
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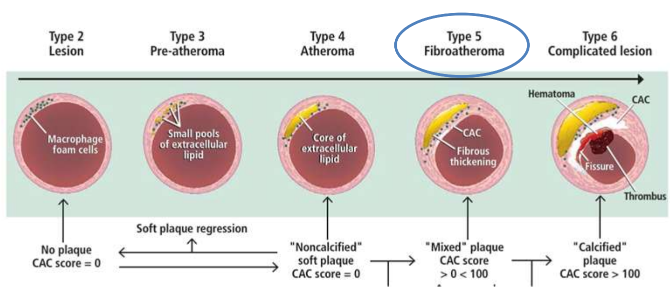
Disclosures: None

Learning Objectives

- Discuss the significance of coronary and aortic calcification in heart disease.
- Review how to interpret calcification findings from screenings.
- Describe the potential risks and benefits of screening for calcification.

Significance of Coronary & Aortic Calcification



- Coronary calcification occurs almost exclusively in atherosclerosis
- Calcium deposits can be quantified to assess extent of disease via Agatston score

Significance of Coronary & Aortic Calcification

TABLE 1

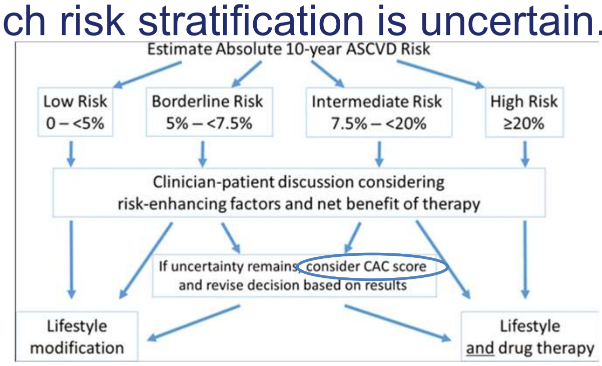
Categories of coronary artery calcium scores

Score	Category
0	No atherosclerosis
1–99	Mild disease
100–399	Moderate disease
> 400	Severe disease

- Calcium deposits can be quantified to assess extent of disease via Agatston score

Benefits of Screening

- ACC/AHA guidelines give the test a IIB recommendation in clinical scenarios in which risk stratification is uncertain.



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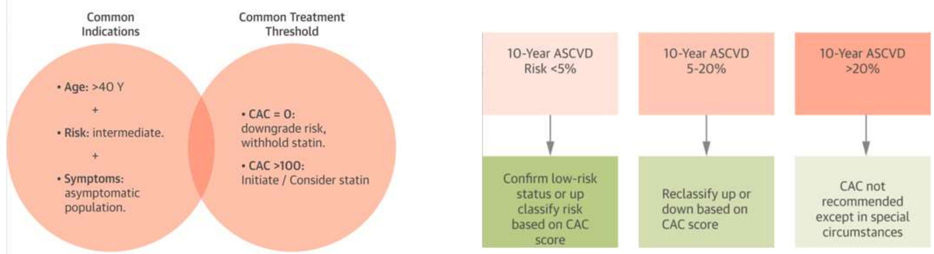
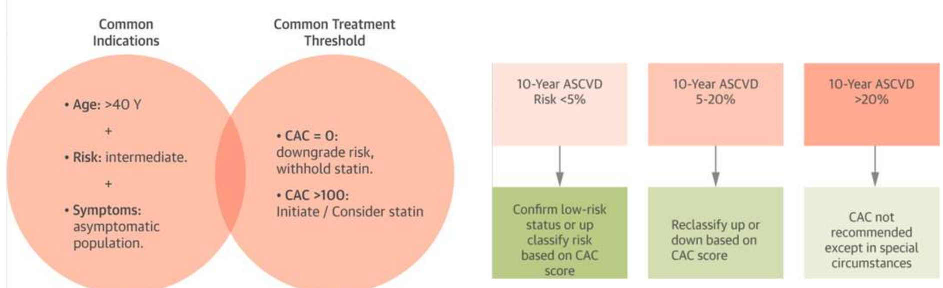
Clinical Utility & Interpretation



2018 AHA/ACC/multisociety cholesterol guideline recommendations

- If the CAC score is 0, it is reasonable to withhold statin therapy and reassess in 5 to 10 years, as long as higher-risk conditions are absent (diabetes, family history of premature coronary heart disease, cigarette smoking)
- If the CAC score is 1 - 99 AU and <75th percentile for the age/sex/race group, it is reasonable to initiate statin therapy for patients ≥ 55 years of age
- If the CAC score is 100 AU or higher or in the 75th percentile or higher for the age/sex/race group, it is reasonable to initiate statin therapy.

Clinical Utility & Interpretation



- SCCT guidelines recommend statin therapy consideration in those with calcium score of >0 (especially if 55 years or older)
- Consider Aspirin + HIST in those with calcium score of >100
  - NNT of 173 vs. NNH 442

Clinical Utility & Interpretation

- Nasir et al found 57% of intermediate risk patients based on Framingham score had CAC score of 0
- NNT for statin initiation in those of intermediate risk with score of 0 is ~223 vs. ~46 for those with score of >100

Clinical Utility & Interpretation

- Strong predictor of incident cardiovascular events across different races beyond traditional risk factors
- MESA trial
  - 6,814 participants
  - found CAC has better discrimination and risk reclassification than the ABI, hsCRP, and family history.
  - event rates varied from 1.3% - 5.6% for CAC of 0 and from 13.1% - 25.6% for CAC >300.

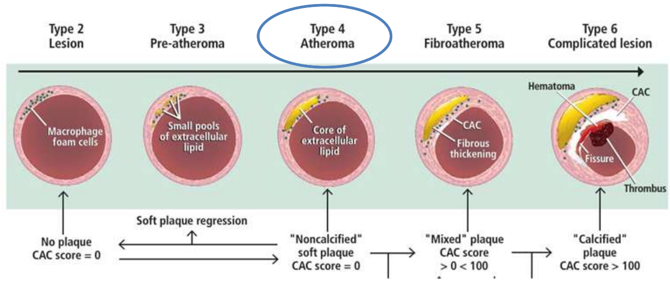
Benefits of Screening

- Useful in diagnosing subclinical CAD and guiding initiation of statin and aspirin therapy
- Useful in predicting risk of future cardiovascular events and death
- High negative predictive value (~98%)
  - True value is in the power of 0
    - Score of 0 strongly associated with absence of obstructive CAD
- Low cost (< $100) and easily performed
- 10-15 mins| non-contrast CT

Risks and Considerations of Screening

- Downstream costs
  - Triggered testing for incidental noncardiac findings
- Specificity for obstructive CAD is low (~44%)
- Radiation Exposure (0.5-1.5 mSv)

Potential Pitfalls of Screening



- Unable to rule out the presence of noncalcified plaque with tendency to be more unstable and prone to rupture.
- Calcification does not necessarily mean there is clinically relevant coronary stenosis
  - Positive remodeling can accommodate vessel diameter expansion without luminal narrowing

Potential Pitfalls of Screening

- Presence or absence of symptoms should guide the clinician on whether to pursue stress testing or invasive coronary angiography based on AUC

In which clinical scenario would coronary artery calcium screening be most appropriate?

A. 42 year old man experiencing exertional chest pain and unremarkable EKG.
B. Asymptomatic 57 year old woman with family history of premature CAD and intermediate ASCVD risk with reluctancy to begin statin.
C. Asymptomatic 45 year old man with diabetes mellitus and unremarkable EKG.
D. Asymptomatic 23 year old obese woman with LDL-C 193 mg/dL and unremarkable EKG.

Calcification of Aorta

- Reflects systemic atherosclerosis
- Aortic arch calcification is significantly and independently related to increased risk of CHD in both sexes

Aortic Valve Calcification

- Degree of aortic valve calcification is a strong predictor of clinical outcome, even when evaluated qualitatively by echocardiography
- Quantitation of aortic valve calcium is especially useful in patients with low-flow, low-gradient AS of unclear severity.
  - Sex-specific Agatston unit thresholds for diagnosis of severe AS
    - 1300 in women
    - 2000 in men.

Aortic Calcification

- Ascending aorta calcification (porcelain aorta) may be prohibitive for SAVR
- Medical therapy does not delay the progression of disease
  - Prospective RCTs have consistently shown that statins do not slow progression or reduce aortic valve events
  - ACEI and ARBs with conflicting data

Key Points

- Screening tool that assists with risk-stratification of patients
- High negative predictive value
- Allows detection of subclinical CAD and helps guide therapies
- Assists with prediction of cardiac events
- Aortic Valve calcification can be helpful in specific cases of LFLG AS

Key Points

- If asymptomatic and CAC score >0, consider statin
- If asymptomatic and CAC score >100, consider aspirin
- If symptomatic, do not order CAC scoring→Ischemic Eval
- If CAC score >0 and discovered to have symptoms →Ischemic Eval

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Thank You