Routine ECG screening in asymptomatic patients

Introduction

- Coronary artery disease (CAD) is the leading cause of death in both men and women.
- Some resting ECG abnormalities are associated with an increased risk for CAD events, but whether adding ECG to conventional risk factors leads to improved stratification of individuals is unknown.
- ECG are ineffective screening tests for CAD due to their poor sensitivity and specificity (Ann Intern Med. 2015;162(6):438.)

- 30-50% of individuals with a normal coronary arteriogram have ECG abnormalities.
- 30% of individuals with angiographically proven CAD have a normal resting ECG.
- “Screening” refers to testing for a disease or condition in asymptomatic persons to identify the condition before it manifests clinically.
- This short-note does not cover use of ambulatory ECG monitoring (i.e. holter) or exercise ECG.

Recommendation in healthy individual (to screening for coronary artery disease)


- Recommends against screening in asymptomatic adults at low risk for CAD.
- Insufficient evidence to recommend against or for in asymptomatic adults at intermediate or high risk for CAD

ECG screening in individual with hypertension

- ECG is recommended in all new diagnosed HT patients to screen for organ damage. (ESC 2013)
- LVH is found in 1 in 4 of patients with HT and associated with increase of CV risk morbidity and mortality. (Circ. 1994;90:1786-1793.)
- Other findings may include LVEF, ventricular overload ‘strain’ pattern, atrial fibrillation

ECG screening in individual with DM

- Routine screening for CAD in asymptomatic patients with DM is not recommended (ADA 2016)
- May consider perform in > 40 yo, DM > 15 y, end organ damage (microvascular, macrovascular), or other cardiac risk factors
- A recommendation suggests that a repeat resting electrocardiogram (ECG) should be performed every 2 years in patients with type 2 diabetes rather than just in individuals at high risk for cardiovascular (CV) events.

ECG screening for preop evaluation

- Recommend a preoperative 12-lead ECG in patients with known CAD, significant arrhythmia, PAD, CVA or other structural heart disease, except for those undergoing low-risk surgery (risk of major adverse cardiac event <1 percent). (ACC/AHA 2014 Guidelines on Perioperative CV Evaluation)
- ECG is not useful in asymptomatic patients undergoing low-risk procedures
- The usefulness of postoperative screening of high-risk patients using ECG (and troponin) is uncertain (2014 AHA/ACC guideline on the perioperative evaluation)

ECG screening in individual with FH of sudden death

- Recommend routine ECG screening in 1st-degree relatives (parents, siblings and children) of anyone who has died under 40 years of age from an inherited cardiac condition or unexplained cardiac death (NHS –UK 2005)
- This may include condition such as HCM, Brugada, LQT, ARVD, etc.

ECG screening in individual with FH of HCM

- Recommend routine ECG screening in first-degree
  - < 10 yo q 3-5 years
  - 10-20 yo q 6-12 months
  - > 20 yo q 5 yrs or stop screening

ECG screening in athletes

- Principle is supported by AHA but does not support national mandatory screening in athletes, (Circ 2007;115:1643–55.)
- ESC and International Olympic Committee recommends systematic preparticipation screening for young competitive athletes, including a FH, SH, physical examination, and 12-lead ECG. (Eur Heart J. 2005;26:516–24.)
- Mass screening of young athletes (aged <40 years) with ECGs is still controversial.
- AHA/ACC recommend 14-element check point (see table).

ECG screening in high risk occupations (e.g. pilot, bus driver, heavy equipment operator, etc.)

- Sometime are required by regulatory agencies or governing bodies such as International Olympic Committee (IOC) (Uptodate)

Other

- Class IIa recommended for screening ECGs in children before administration of stimulant medications (to Rx ADHD) to avoid heart rhythm disturbances. Circ. 2014;130:1303-1334
- Other special population that may subject to ECG screening in some country include Military Personnel, Sickle cell, etc.

Potential Harms of Detection

- Unnecessary invasive procedures, overtreatment, and labeling.

Summary

- ECG is ineffective screening tests for the presence of CHD due to their poor sensitivity and specificity.
- The ECG should always be evaluated in clinical context.
- For cardiovascular disease screening, one may consider screening for high blood pressure, lipid disorder, peripheral artery (carotid, aorta), hypertension, and obesity.

Recommend reading

- Assessment of the 12-Lead ECG as a Screening Test for Detection of Cardiovascular Disease in Healthy General Populations of Young People (12–25 Years of Age). A Scientific Statement From AHA/ACC. Circulation. 2014;130:1303-1334.