Preoperative Cardiac Assessment

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Facts and Figures

- In the US- approx. 27 million people undergo non-cardiac surgery per year
- 50, 000 have a perioperative MI
- Approx. 40, 000 perioperative deaths each year- over half due to cardiac events.
- MI, heart failure, arrhythmias most commonly related to perioperative morbidity and mortality.

Aims of preoperative cardiac assessment

1. Medical status and cardiac risk posed by planned non-cardiac surgery
2. Methods to reduce risk of cardiac problems during surgery
3. Identify patients at risk of peripoperative cardiac event
4. Identify patients with a poor long-term prognosis due to cardiovascular disease

History and Physical Examination

History

- Cardiac conditions
- Comorbid conditions
- Functional capacity
- Medications. Allergies. Smoker. Exercise habits.

Physical

- Severe aortic stenosis, elevated jugular venous pressure, pulmonary oedema, and/or third heart sound

Assessment of Functional Capacity

MET= Metabolic Equivalent of a Task

1 MET

Eat, dress, use the toilet
Walk indoors around the house
Walk on level ground at 2 mph (3.2 km/hour)
Perform light housework such as washing dishes.

4 METs

Climb a flight of stairs (usually 18-21 steps)
Walk on level ground at 4 mph (6.4 km/hour)
Run short distances
Perform vacuuming or lift heavy furniture
Play golf or doubles tennis.

>10 METs

Swimming
Singles tennis
Basketball
Skiing.

Cardiac Risk Stratification

HIGH RISK

Unstable coronary syndromes

- Unstable or severe angina
- Recent MI

Decompensated heart failure

Significant arrhythmias

- Mobitz II atrioventricular block
- Third-degree atrioventricular block
- Symptomatic ventricular arrhythmias
- Supraventricular arrhythmias (including atrial fibrillation) with uncontrolled ventricular rate (heart rate >100 bpm at rest)
- Symptomatic bradycardia
- Newly recognized ventricular tachycardia

Severe valvular disease

- Severe aortic stenosis (mean pressure gradient >40 mmHg, aortic valve area <1.0 cm^2, or symptomatic)
- Symptomatic mitral stenosis (progressive dyspnoea on exertion, exertional presyncope, or heart failure).

Cardiac Risk Stratification

INTERMEDIATE RISK

- History of heart disease
- History of compensated or prior heart failure
- History of cerebrovascular disease
- Diabetes mellitus
- Renal insufficiency.

Cardiac Risk Stratification

Risk stratification according to type of non-cardiac surgery:

High-risk surgery

- Emergency major operations, particularly in older people (>70 years)
- Aortic or peripheral vascular
- Extensive operations with large volume shifts.

Intermediate-risk surgery

- Intraperitoneal or intrathoracic
- Carotid endarterectomy
- Head and neck
- Orthopaedic
- Prostate.

Low-risk surgery

- Endoscopic procedures
- Superficial biopsy
- Cataract
- Breast.

Diagnostic Testing

12 lead ECG

- ✓ At least 1 intermediate clinical risk factor and undergoing vascular surgical procedures
- ✓ Known coronary heart disease, peripheral arterial disease, or cerebrovascular disease, who are undergoing intermediate-risk surgical procedures

Echocardiography- LV function

- ✓ Dyspnoea of unknown origin/ worsening dyspnoea with current or prior heart failure

Stress testing

- ✓ Myocardial ischaemia and functional capacity
- ✓ Active cardiac conditions
- ✓ 3 or more clinical predictors of cardiac risk and <4 METs

Coronary Angiography

- ✓ High cardiac risk based on non-invasive testing
- ✓ Angina unresponsive to adequate medical therapy or unstable angina
- ✓ Proposed intermediate-risk or high-risk non-cardiac surgery after equivocal non-invasive test results.

BNP

- ✓ Independently predictive for major adverse cardiac events following elective vascular surgery

Stress Testing

Exercise ECG

Perioperative risk stratification based on exercise ECG:

- Low risk: ability to exercise moderately (4-5 METs) without symptoms; patients who can achieve >75% of maximum predicted heart rate without ECG changes
- Intermediate risk: patients with abnormal ECG response at >75% of predicted heart rate
- High risk: patients with abnormal ECG response at <75% of predicted heart rate.

Stress imaging

Abnormal baseline ECG (e.g., LVH, digitalis effect, left bundle branch block).

Perioperative risk stratification based on stress imaging:

- More than 4 myocardial segments of redistribution indicate significant risk for perioperative events.
- Redistribution in 3 coronary artery territories and reversible LV cavity dilation indicate higher risk of events.
- Total area of ischaemia is more predictive than severity of ischaemia in a given segment.

Perioperative Therapy

- Preoperative revascularisation with coronary artery bypass grafting or percutaneous coronary intervention. Indications:

- ✓ stable angina with significant left main coronary artery stenosis; 3-vessel disease (survival benefit is greater when LV ejection fraction <0.50); or 2-vessel disease with significant proximal left anterior descending stenosis and either an ejection fraction <0.50 or a demonstrable ischaemia on non-invasive evaluation
- ✓ Unstable angina or non-ST-segment elevation MI, or with acute ST-elevation MI

- Beta-blockers- continued in patients with angina, symptomatic arrhythmias and hypertension. Also in patients with high cardiac risk undergoing vascular surgery.

- Statins- evidence suggests a protective effect of perioperative statin use on cardiac complications during non-cardiac surgery. 44% reduction in mortality after non-cardiac surgery.

- Alpha-2 agonists- to control hypertension in patients with known CAD/ 1 or more clinical risk factors. Could improve perioperative cardiovascular events.

Surveillance

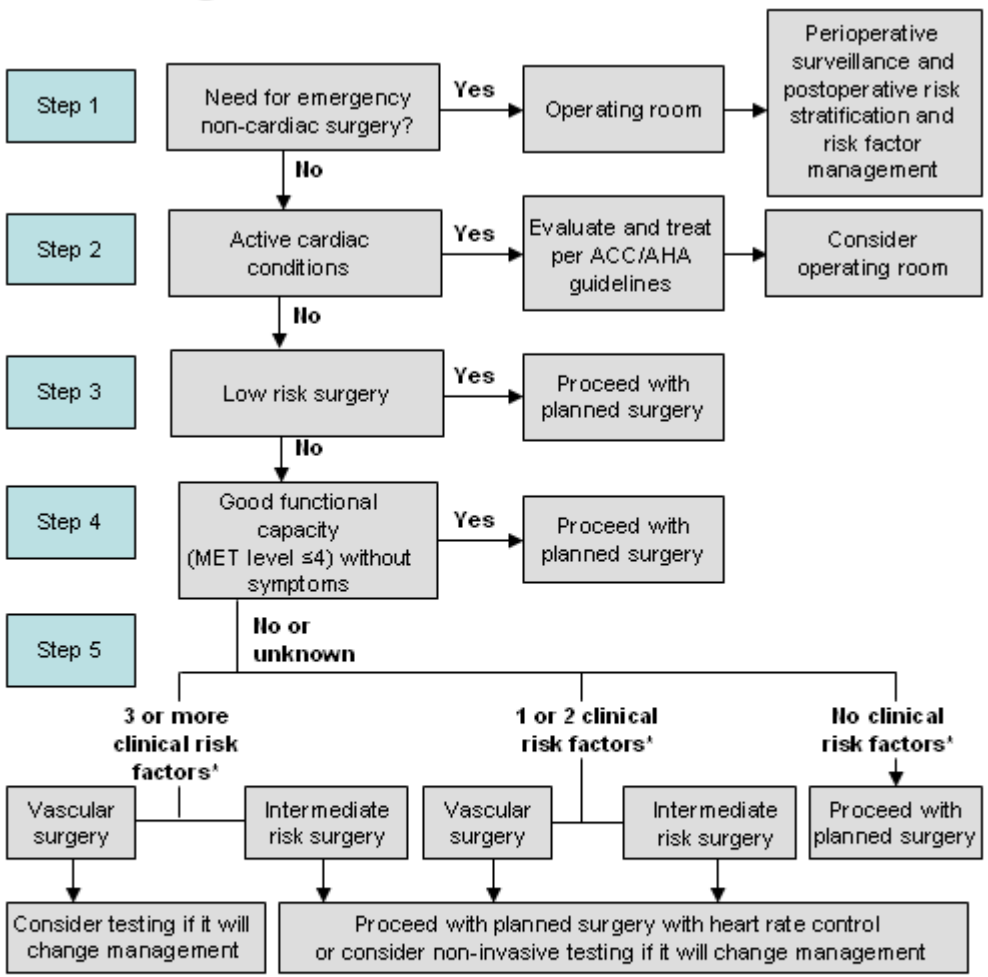
Perioperative myocardial ischaemia:

- Intraoperative and postoperative ST-segment monitoring in patients with known CAD/ those undergoing vascular surgery.

Perioperative MI:

- Postoperative troponin measurement in patients with ECG changes/ chest pain typical of acute coronary syndrome.

Summary



Adapted from Fleischer et al. **"ACC/AHA Guidelines on Perioperative Cardiovascular Evaluation and Care for Noncardiac Surgery: A report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines." J Amer Coll Cardiology 2007;50(17):e159-24.** * Clinical risk factors include ischaemic heart disease, compensated or prior heart failure, diabetes mellitus, renal insufficiency, and cerebrovascular disease.