Coronary artery disease; angina or heart attack?

Prof. Ralph Stewart
Auckland Heart Group
Nurse Practitioner Symposium
11 May 2013
PROGRESSION OF ATHEROSCLEROSIS

**Significant structural disease but stable:**

**Minimal or no disease:** troponin undetectable or very low

**ACS and other acute situations**

*Modified from Libby P Circ 104:365, 2001*
How to identify the patient at risk?
Look for evidence of atherosclerotic disease
CT coronary calcium score
Percutaneous coronary intervention
A patient with stable angina

What is angina?

What features help distinguish symptoms of CAD from other conditions?
Angina

- Location
- Character
- Duration of episode
- Precipitating and relieving factors
- Associated symptoms
- Duration and time course since onset
Treadmill exercise test

ST segment depression on exercise caused by sub-endocardial ischemia
Drug treatment for myocardial ischemia: beta-blockers

- Reduce heart rate
- Reduce systolic blood pressure
- Decrease contractility

- Beta 1 selective usually preferred
Drug treatment: nitrates

- Nitrates > NO > increase cGMP
- Relaxation of smooth muscle
- Vasodilation
  - Coronary arteries to increase coronary flow
  - Veins to reduce preload
  - Arteries to reduce afterload
Vessel pathology in myocardial infarction and stable coronary artery disease

Normal artery

Artery narrowed by atherosclerosis

Blood flow

Plaque

Fibrin

Red Cells

White Cells

Platelets

Plaque
Myocardial infarction

Symptoms

ECG changes

Detection of rise and/or fall of troponin with at least one value above the upper reference limit

Imaging evidence of loss of viable myocardium or regional wall motion abnormality
ACS diagnosis

Plaque disruption or erosion

Thrombus formation with or without embolisation

Acute cardiac ischaemia

No ST segment elevation

Markers of myocardial necrosis not elevated

Unstable angina

ST segment elevation

Elevated markers of myocardial necrosis

Elevated markers of myocardial necrosis

Non-ST segment elevation myocardial infarction (Q waves usually absent)

ST segment elevation myocardial infarction (Q waves usually present)

Acute coronary syndromes
Differential Diagnosis for Chest Pain

• Cardiac
  – Eg Myocardial ischaemia or infarction

• Pericardial
  – Eg Pericarditis

• Pulmonary & Pleural
  – Eg Pneumonia, pneumothorax, pulmonary embolism, pleurisy

• The aorta
  – Eg Aortic dissection

• Gastrointestinal
  – Eg Oesophageal spasm

• Musculoskeletal
  – Eg Costochondritis
Aortic Aneurysm  v  Aortic Dissection
Distinguishing stable from unstable coronary artery disease

• Chest pain – new onset, variable pattern, symptoms at rest

• ECG – changes of acute ischemia or infarction, dynamic ECG changes

• Troponin T or I elevation with rise and or fall
1. High specificity for myocardium
2. Not found in blood of healthy individuals
3. Clinical utility: Diagnostic (MI), and prognostic
Acute Coronary Syndromes

- Ruptured Fibrous Cap
- Large Lipid Core
- Thrombus
- Athero- and Thromboemboli

Embolization
Percutaneous coronary angioplasty and stenting
1. Oxygen-poor blood leaves the heart to enter the heart-lung machine.

2. Heart-lung machine pumps and adds oxygen to the blood before it returns to the body.

3. Oxygen-rich blood returns to the body, skipping the heart and lungs.

Aorta:
- Blood bypasses heart chambers and lungs.
Simvastatin: Vascular Event by Duration of Follow-Up

Survival free of event (%)

55 ± 5.8 less per 1000 allocated simvastatin
(log rank 2p<0.00001)
Effects of statins on major vascular events by duration of treatment

<table>
<thead>
<tr>
<th>Year/Outcome</th>
<th>Events (% p.a.)</th>
<th>RR (CI) per 1 mmol/L reduction in LDL-C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Statin/more</td>
<td>Control/less</td>
</tr>
<tr>
<td>Year 0–1</td>
<td>3497 (4.3)</td>
<td>3952 (4.8)</td>
</tr>
<tr>
<td>Major vascular event</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year 1–2</td>
<td>2112 (2.8)</td>
<td>2645 (3.6)</td>
</tr>
<tr>
<td>Major vascular event</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year 2–3</td>
<td>1763 (2.8)</td>
<td>2318 (3.7)</td>
</tr>
<tr>
<td>Major vascular event</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

CTT Collaboration, Lancet, 2010;376:1670-81
Reducing Cardiovascular Risk with Multiple Medical Therapies

The graph shows the relative risk of major cardiovascular events based on the number of medications used. The medications include:

- None
- + aspirin
- + statin
- + high dose statin
- + clopidogrel
- + β-blocker
- + ACEI/ARB

As the number of medications increases, the relative risk decreases.
Mortality by Medication Adherence

Laufs. Eur Heart J 2010
Coronary artery disease: key points

Understand the atherosclerotic disease process and the factors which influence it

Recognise the symptoms of CHD

Distinguish stable from unstable CHD

Know the treatments which reduce the risk of CV events