

## Clinical Review: Managing chest pain of recent onset

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### How much do you know about managing chest pain?

1. A 48 year old man comes to ER complaining of dull central ache in his chest for the last 3 hours. On examination he looks sweaty and clammy, pulse 100bpm, BP 130/90. Heart sounds normal.  
What investigations are essential?
  - a) ECG
  - b) ECG + troponin I
  - c) ECG + troponin I + CKMB
  - d) ECG + troponin I + CKMB + electrolytes
2. All of the investigations done come back as normal.  
What should you do now?
  - a) Send the patient home and advise to return if pain increases
  - b) Observe in ER for a few hours and if pain settles send home
  - c) Repeat ECG in 4 to 6 hours
  - d) Repeat ECG and troponin in 4 to 6 hours
3. A 58year old diabetic man presents with chest pain for the last 4 hours. Pulse 100bpm, BP 140/90, heart sounds normal, chest clear. Oxygen saturation 96%. 12-lead ECG shows ST depression in I, aVL, V1-3 and T wave inversion in these leads.  
How would you manage this patient?
  - a) Aspirin 300mg stat, oxygen, morphine 2mg IV, streptokinase
  - b) Aspirin 300mg stat, morphine 2mg IV, unfractionated heparin IV
  - c) Aspirin 300mg stat, morphine 2mg IV, refer for angiography and glycoprotein IIb/IIIa inhibitor
  - d) Clopidogrel 300mg stat, oxygen, morphine 4mg IV
4. A 60 year old lady non-diabetic lady has just recovered from an MI and is ready to go home. Chest is clear and heart sounds are normal. BP is 130/80. What drugs should be prescribed for secondary prevention?
  - a) Aspirin, Beta blocker, Statin
  - b) Aspirin, ACE inhibitor, Statin,
  - c) Aspirin, Amlodipine, Clodipogrel, ACE inhibitor
  - d) Aspirin, ACE inhibitor, Beta blocker, Statin

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A patient may present with either acute chest pain (a suspected acute coronary syndrome (ACS) or stable recurrent chest pain (angina). If the patient is currently in pain, or has had pain in the last 12 hours, they may have an ACS. The first and most important part of the history is to distinguish between possible cardiac causes of chest pain and non-cardiac causes. Features in the history which suggest a cardiac cause include:

- Nature of the pain (dull ache, heaviness, crushing)
- Pain in the chest (or arms, back or jaw) lasting more than 15 minutes
- Associated nausea and vomiting, marked sweating or breathlessness
- Previous history of pain worse on exertion and relieved by rest (stable angina)
- Previous angina now getting pain with little or no exertion (unstable angina)
- Risk factors for Cardiovascular disease: smoker, known hyperlipidaemia, known diabetes

A thorough clinical examination should be done assessing haemodynamic stability, evidence of heart failure or cardiac shock, evidence of non-coronary causes of chest pain, e.g. aortic dissection

Essential initial investigations are a resting 12-lead ECG and blood should be taken for troponin I or T. Other useful investigations are blood glucose, creatinine and haemoglobin. A second blood sample for troponin should be taken 10-12 hours after history of onset of chest pain.

#### **Results of 12-lead ECG:**

1. Regional ST-segment elevation or new LBBB – acute STEMI is likely and the patient should be considered for thrombolytic treatment if available or angioplasty.
2. Regional ST – segment depression or deep T wave inversion, suggests NSTEMI or unstable angina
3. Any Q waves or T wave changes – may be Unstable angina or NSTEMI
4. A normal resting 12 lead ECG does not exclude ACS. If there is clinical suspicion of ACS then the ECG should be repeated some hours later

#### **Interpretation of a raised troponin I or T**

The troponin level needs to be interpreted according to the number of hours since onset of symptoms. A raised troponin, whilst highly suggestive of an ACS, could also be caused by pulmonary embolism, aortic dissection or myocarditis.

In patients with normal 12-lead ECG, and normal troponin, but with a clinical history suggestive of cardiac chest pain, ongoing monitoring and repeat testing after some hours is recommended.

#### **Immediate management of a suspected acute coronary syndrome**

1. Pain relief with IV morphine 2-4mg re-evaluate every 5 – 15 mins. May also try nitroglycerine
2. Aspirin 300mg stat and thereafter continue at low dose
3. Clopidogrel 300mg can be used instead of aspirin if there is known aspirin hypersensitivity. In patients with high risk of mortality then clopidogrel should be used as well as aspirin for a 1 year period as long as there is no increased bleeding risk.
4. Do not routinely give oxygen but monitor pulse oximetry. If SpO<sub>2</sub> is < 94% give oxygen, or in COPD patients try to maintain an SpO<sub>2</sub> of 88-92%. This is based on a recent Cochrane analysis which suggests oxygen may be harmful in some patients.<sup>1</sup>

#### **NSTEMI management**

In addition, where there is NSTEMI, current NICE guidelines recommend that the patients at high risk of further adverse cardiac events should be considered for early intervention with coronary angiography as well Glycoprotein IIb/IIIa inhibitor therapy, and antithrombin therapy (fondaparinux or unfractionated heparin).

In the context of Nepal, most patients will not have access to coronary angiography or glycoprotein therapy. Unfractionated heparin can be used where there is not thought to be a significant bleeding risk. A recent Cochrane analysis suggested that low molecular weight heparin was better than unfractionated heparin in the management of NSTEMI, but it is more expensive and harder to access.

Low molecular weight heparins reduce the number of heart attacks and cause fewer complications after an acute coronary syndrome compared to unfractionated heparin.<sup>2</sup>

### STEMI management

In addition to the immediate management as above, where there is ST elevation of  $>0.1\text{mV}$  in two or more contiguous precordial chest leads or at least 2 adjacent limb leads on the 12 lead ECG, it is not necessary to wait for results of troponin studies to come back before initiating reperfusion therapy.

There has been some debate as to whether Percutaneous Coronary Intervention (PCI) or fibrinolysis is the better option for patients. The key factor is the speed at which reperfusion can occur. While there is more risk of side effects from fibrinolytic agents, the time required to get to a centre where PCI is available, means that for most Nepali patients, fibrinolysis is the better agent. Time from first presenting at hospital to reperfusion is ideally within 60 minutes for fibrinolysis and 90 minutes for PCI.

In the absence of contraindications, fibrinolytic agents should be administered to patients with an STEMI presenting within 12 hours of onset of symptoms, or within 12 – 24 hours if there are continuing symptoms of ischaemic chest pain.

**Table 1.** Contraindications for administration of fibrinolytic agents.

Absolute contraindications	Relative contraindications
Any prior intracerebral haemorrhage	History of chronic severe poorly controlled hypertension
Known structural cerebral vascular lesion	Severe uncontrolled hypertension on presentation ((SBP $>180$ or DBP $>110$ )
Known malignant intracranial lesion	History of prior ischaemic stroke more than 3 months ago, dementia
Ischaemic stroke within 3 months	Traumatic or prolonged ( $>10\text{min}$ ) CPR
Suspected aortic dissection	Major surgery $<3\text{weeks}$
Active bleeding (excluding menses)	Pregnancy
Significant closed head trauma within 3 months	Active peptic ulcer
	Prior exposure (within 5 days) or allergic reaction to streptokinase/anistreplase

Give oral beta-blockers early unless there is some contraindication. IV beta blockers may be used if there are tachyarrhythmias or uncontrolled hypertension.

### Important secondary prevention issues

Before discharge, it is extremely important that all patients be given advice regarding lifestyle issues. The latest evidence suggests that patients should be encouraged to eat more fruit and vegetables, less meat and to use vegetable oil for cooking rather than ghee. Patients should take at least 7g of Omega 3 fatty acids per week – this can be as oily fish (2-4 portions per week) or as supplements. There is no evidence of benefit from antioxidant supplements or folic acid to reduce CVS risk.

Any patient who smokes needs advice and help to stop. Physical activity is important. Patients should aim to do 30 minutes per day of exercise that makes them slightly out of breath. In patients with heart failure who struggle to achieve this, they should still be encouraged to gradually build up their exercise tolerance. Many patients will worry about sexual activity, though they will rarely ask about it. Reassure all patients that there is no increased risk of further MI from sexual activity and they can resume normal sex when they are comfortable (usually around 4 weeks).

As part of secondary prevention of further MI all patients should be given an ACE inhibitor, low dose aspirin, a beta blocker and a statin. These should be given unless there are contraindications, and should be continued indefinitely.

Cardiovascular risk factors should be controlled, particularly diabetes and hypertension. The target BP for patients without diabetes or renal disease is 140/90 or less. Patients with diabetes or renal disease have lower BP targets.

Summary: Checklist before discharge (ABCDE)	
1.	ACE inhibitor and Aspirin
2.	Beta blocker and BP control
3.	Cholesterol control (Statin) and Cigarette smoking cessation
4.	Diet and Diabetic control
5.	Exercise

### People presenting with stable chest pain

This part of the review addresses how to assess and diagnose intermittent stable chest pain in people with suspected stable angina. Stable angina may be diagnosed based on clinical assessment alone or clinical assessment plus diagnostic testing (where there is uncertainty).

Take a detailed clinical history and examination as discussed previously

Anginal pain is:

- constricting discomfort in the front of the chest, or in the neck, shoulders, jaw, or arms
- precipitated by physical exertion
- relieved by rest within about 5 minutes.

Three of the features above are defined as typical angina. Two of the three features above are defined as atypical angina. One or none of the features above are defined as non-anginal chest pain.

Use clinical assessment and the typicality of anginal pain features listed below to estimate the likelihood of CAD (see table 2). Men are more likely to have angina than women, but the definition of anginal pain is the same. There is a greater likelihood of chest pain being due to coronary artery disease where:

- increasing age
- male sex
- cardiovascular risk factors including:
  - a history of smoking
  - diabetes
  - hypertension
  - dyslipidaemia
- family history of premature CAD
- other cardiovascular disease
- history of established CAD, for example previous MI, coronary revascularisation.

If people have features of typical angina based on clinical assessment and their estimated likelihood of CAD is greater than 90% (see table 2), further diagnostic investigation is unnecessary. Manage as angina.

Where the clinical history is “non-anginal” and there are no risk factors for CVS disease, look for other causes of chest pain as indicated. If chest pain is non-anginal but there are CVS risk factors, these risk factors should be managed accordingly.

Where stable angina can't be ruled out on history alone, a resting 12 lead ECG and a haemoglobin should be checked. Anaemia will exacerbate any ischaemic heart disease (IHD). A normal 12 lead ECG does not exclude

IHD.

In patients with unproven coronary artery disease, in whom stable angina can't be diagnosed on clinical assessment alone, calculate the likelihood of CAD using table 3 and considering the result of the ECG.

**Table 2.** Percentage of people estimated to have coronary artery disease according to typicality of symptoms, age, sex and risk factors

Age (years)	Non-anginal chest pain				Atypical angina				Typical angina			
	Men		Women		Men		Women		Men		Women	
	Lo	Hi	Lo	Hi	Lo	Hi	Lo	Hi	Lo	Hi	Lo	Hi
35	3	35	1	19	8	59	2	39	30	88	10	78
45	9	47	2	22	21	70	5	43	51	92	20	79
55	23	59	4	25	45	79	10	47	80	95	38	82
65	49	69	9	29	71	86	20	51	93	97	56	84

For men older than 70 with atypical or typical symptoms, assume an estimate > 90%.

For women older than 70, assume an estimate of 61–90% EXCEPT women at high risk AND with typical symptoms where a risk of > 90% should be assumed.

Values are per cent of people at each mid-decade age with significant coronary artery disease (CAD)<sup>1</sup>.

Hi = High risk = diabetes, smoking and hyperlipidaemia (total cholesterol > 6.47 mmol/litre).

Lo = Low risk = none of these three.

The shaded area represents people with symptoms of non-anginal chest pain, who would not be investigated for stable angina routinely.

Note:

These results are likely to overestimate CAD in primary care populations.

If there are resting ECG ST-T changes or Q waves, the likelihood of CAD is higher in each cell of the table.

Adapted from Pryor DB, Shaw L, McCants CB et al. (1993) Value of the history and physical in identifying patients at increased risk for coronary artery disease. *Annals of Internal Medicine* 118(2): 81–90.

If the estimated likelihood of CAD is 61–90% the first line diagnostic test is coronary artery angiography.

With an estimated likelihood of CAD of 30–60% the first line diagnostic test is functional imaging e.g. stress echocardiography or myocardial perfusion scintigraphy with single photon emission computed tomography

With an estimated likelihood of CAD of 10–29%, CT calcium scoring is the first line test.

Significant coronary artery disease is defined on angiography as >70% stenosis of more than 1 major coronary artery segment, or >50% stenosis of the left main coronary artery.

In most parts of Nepal, none of these diagnostic options are available and it may be necessary to pragmatically start therapy for angina and review the response to treatment. Where the patient can afford it and has access to care, angiography is an important diagnostic as well as potentially therapeutic agent.

\*The latest NICE guidelines state that "Exercise stress testing should not be used to diagnose or exclude angina in patients without known coronary artery disease (e.g. previous MI). It can be used in patients with known CAD instead of functional imaging." This is because exercise stress testing has 80% sensitivity and only 70% sensitivity. However in the context of Nepal, exercise stress testing is the most advanced technique we have available to us.

### **Management of suspected stable angina**

Initially give just low dose aspirin until a diagnosis is made. If a clinical diagnosis has been made, or the patient is unable to access further diagnostic tests then the treatment options include:

#### *Non-pharmacological therapy*

Explain the diagnosis clearly to the patient including things that will make it worse, exertion, emotional stress, exposure to cold and eating a heavy meal

Find out what their ideas, concerns and expectations are about their illness.

Assess the need for lifestyle change (particularly diet, exercise and smoking)

#### *Drug therapy*

Use a short acting nitrate for symptom relief

Give a beta blocker or a calcium channel blocker as first line treatment for stable angina.

Where symptoms are not controlled on one of the above, then the other may be added. If the patient can't tolerate these or symptoms are still not controlled add a long-acting nitrate.

Give drugs for secondary prevention of MI (low dose aspirin, ACEI, statin, treat hypertension)

Treat any anaemia as this will exacerbate symptoms

Address tachycardia (using a beta blocker) or LVH (using an ACE inhibitor) as these will also exacerbate symptoms.

Patients not responding to medical management should be referred for more invasive treatments after proper counselling and explanation of what this entails.

### **References**

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CG 48 MI: secondary prevention, May 2007

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CG95: Chest pain of recent onset March 2010

CG 126: Management of stable angina, July 2011

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2. Magee K, Sevcik WW, Moher D, Rowe BH Unfractionated heparin

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3. ACC/AHA Guidelines for the Management of Patients With ST-Elevation Myocardial Infarction—Executive Summary

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ANSWERS:

1 b, 2 d, 3 b if no access to c or patient doesn't have enough money, 4 d

For a full explanation please read the Clinical review article on managing chest pain.