Coronary Artery Disease: Medical Management vs. Percutaneous Coronary Intervention

Samir Raza, BESc Candidate (Meds 2010) and Jaffer Syed, MD, FRCP

Case

Mrs. G, a 55 year old female, presented to her family doctor one year ago with chest pain on exertion. The pain was described as sharp in nature, radiating to both arms and was not accompanied by shortness of breath. Symptoms initially appeared following weight lifting at the gym. Currently, she is able to carry out all activities of daily living (ADLs) without limitation. Chest pain is elicited by brisk walking or carrying groceries up stairs, placing her in Canadian Cardiovascular Society (CCS) class I-II. She has a blood pressure of 130/72, heart rate of 60, and BMI of 27. She is a non-smoker with well controlled dyslipidemia. Upon investigation, MIBI stress testing demonstrated moderate-sized inferior wall ischaemia consistent with right coronary artery (RCA) disease. Her current medications include ECASA, atorvastatin, ezetimibe (antilipemic), bisprolol (beta-blocker), perindopril (ACE inhibitor), and a nitroglycerine spray. Following discussion with the patient, it was decided that coronary angiography and possible percutaneous coronary intervention (PCI) was not indicated at this time as symptoms were mild and a satisfactory quality of life was maintained. Mrs. G was encouraged to use her nitroglycerine spray prophylactically.

Discussion

Coronary Artery disease (CAD) is the leading cause of death in the developed world with 1/3 of all deaths attributed to CAD\(^1\). Blood flow through the coronary arteries becomes impaired by two mechanisms:

1. Stenotic lesions
2. Endothelial dysfunction

Fixed atherosclerotic plaques cause a narrowing of the coronary arteries. This stenosis causes an increase in vascular resistance and thus, a decrease in coronary blood flow. Atherosclerotic plaques may also be associated with endothelial dysfunction and paradoxical coronary vasoconstriction. During times of physical or emotional stress, a mismatch in myocardial oxygen supply and demand (myocardial ischemia) may result from both epicardial stenosis and endothelial dysfunction. Myocardial ischemia often (but not universally) manifests clinically as angina pectoris \(^2\).
Signs and Symptoms

Angina pectoris is the hallmark symptom of CAD. It is frequently described by patients as a diffuse retrosternal tightness or pressure in the chest lasting for a few minutes. In women it is not uncommon for the pain to be described as sharp. It commonly radiates to the shoulders and arms. Patients often hold a clenched fist over their chest to describe the pain, this is known as “Levine’s sign”. Anginal symptoms are elicited by physical/emotional stress, eating, and exposure to cold.

Diagnosis

In addition to the clinical findings mentioned, there are a variety of tests available to aid in the diagnosis of CAD. Table 1 lists the different modalities.

Table 1. Diagnostic studies and corresponding positive findings for CAD.

<table>
<thead>
<tr>
<th>Modality</th>
<th>Finding</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECG / Exercise Stress Test</td>
<td>ST depression, T wave inversion</td>
</tr>
<tr>
<td>Nuclear studies (MIBI scan)</td>
<td>Poor radionuclide accumulation in ischemic areas. Radionuclide accumulates in proportion to degree of perfusion of viable myocardial cells.</td>
</tr>
<tr>
<td>Exercise Echocardiography</td>
<td>Stress-induced regional wall-motion abnormality</td>
</tr>
<tr>
<td>Coronary Angiography</td>
<td>Stenotic coronary artery seen on fluoroscopy during injection of contrast agent</td>
</tr>
</tbody>
</table>

CAD can lead to and/or exacerbate heart failure. The New York Heart Association (NYHA) Functional Classification system is commonly used to classify the severity of heart failure. This classification system is based upon the degree of physical limitation experienced by the patient. Table 2 lists the NYHA system.

Table 2. NYHA Functional Classification system for heart failure.

<table>
<thead>
<tr>
<th>Class</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Patients with no limitation of activities; they suffer no symptoms from ordinary activities</td>
</tr>
<tr>
<td>II</td>
<td>Patients with slight, mild limitation of activity, they are comfortable with rest or mild exertion</td>
</tr>
<tr>
<td>III</td>
<td>Patients with marked limitation of activity; they are comfortable only at rest</td>
</tr>
<tr>
<td>IV</td>
<td>Patients who should be at complete rest, confined to bed or chair; any physical activity brings discomfort and symptoms occur at rest</td>
</tr>
</tbody>
</table>

Medical Management vs. PCI

Treatment of CAD involves medical management to control symptoms of ischemia as well as control of coronary risk factors, and occasionally revascularization (PCI or CABG). The goals of treatment are threefold:

1. Decrease frequency and severity of anginal episodes
2. Prevent myocardial infarction
3. Prolong survival

Medical management of ischemic symptoms of CAD often involves a combination of three anti-ischemic medications: nitrates, beta blockers, and calcium channel blockers. Nitrates are
primarily used prophylactically and as needed for acute symptom relief. For secondary prevention purposes, ASA, statins, and ACE-inhibitors or angiotensin-receptor blockers (ARB) are strongly recommended.

Revascularization involves either percutaneous coronary intervention (PCI) or coronary artery bypass grafting (CABG). Traditionally, PCI has been indicated for discrete single or double vessel disease whereas CABG has been the mainstay of treatment for left-main or multi-vessel disease. However, advances in interventional techniques and the advent of drug eluting stents have resulted in increasing numbers of patients with complex, multi-vessel and left main disease being treated via PCI. Current literature suggests that PCI in stable CAD offers improved symptom relief as compared to medical therapy alone, but it does not prolong survival. In the case of Mrs.G, her nuclear MIBI findings suggested single vessel CAD, and PCI could potentially be appropriate for relief of unacceptable symptoms. However, given the additional risks associated with any invasive procedure, angiography and revascularization (CABG or PCI) is generally indicated in only three situations:

1. Medical therapy has not adequately improved patient’s symptoms
2. Unacceptable adverse effects associated with medication
3. Patients who are suspected to have high-risk CAD

The cornerstone of management of CAD is aggressive medical therapy. When this fails, or non-invasive testing suggests a high-risk pattern of CAD, coronary angiography is indicated. Angiographic findings, patient age, co-morbidities, and patient preferences, are some main factors considered when deciding upon the appropriate route of revascularization.

Conclusion

Mrs.G presented with a one year history of chronic stable angina. Symptoms were well-controlled on medical therapy alone, and non-invasive testing did not suggest a prognostically significant pattern of CAD. Based on these considerations, continuance of medical therapy was recommended. Prophylactic use of nitroglycerin spray was encouraged, as was continued coronary risk factor reduction.

References


Inspiration

Location: University Hospital in London, ON.
Program: Non-credit elective.