

Coronary Artery Bypass Grafting (CABG): Facts to Know

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In this interview we are discussing about the Coronary Artery Disease (CAD), Coronary Artery Bypass Grafting (CABG), Ischemic Cardiomyopathies, Ischemic Mitral Regurgitation (IMR) - its basics and a general awareness on common queries associated with this condition.

Q. What is CAD?

A. Coronary artery disease (CAD) is the narrowing of the coronary arteries (the blood vessels that supply oxygen and nutrients to the heart muscle), caused by a buildup of fatty material within the walls of the arteries. This buildup causes the inside of the arteries to become narrowed, limiting the supply of oxygen-rich blood to the heart muscle.

It is a group of diseases that includes: Angina, myocardial infarction, and sudden coronary death. It is the most common type in Cardio-vascular diseases. A common symptom is chest pain or discomfort which may radiate to the shoulder, arm, back, neck, or jaw. Usually symptoms occur with exercise or emotional stress, last less than a few minutes, and gets better with rest. Shortness of breath may also occur and sometimes no symptoms are present. The first sign is occasionally a heart attack. Other complications include heart failure or an irregular heartbeat.

Q. What are the risk factors of CAD?

Risk factors include: high blood pressure, smoking, diabetes, lack of exercise, obesity, high blood cholesterol, poor diet, and excessive alcohol, among others. Other risks include depression. The underlying mechanism involves atherosclerosis of the arteries of the heart. A number of tests may help with diagnoses including: electrocardiogram, cardiac stress testing, and coronary angiogram among others.

Q. Is CAD more prevalent in South Asian population?

A. Coronary artery disease (CAD) is one of the most common causes of mortality and morbidity in both developed and developing countries. It is a leading cause of death in India, and its contribution to mortality is rising: the number of deaths due to CAD in 1985 is expected to have doubled by 2015. The incidence of CAD is likely to increase further because of rapid urbanisation and its accompanying lifestyle changes, including changes in diet, physical inactivity, drug and alcohol intake, as well as an increase in the prevalence of DM. And also two main risk factors in this population are hypertension and dyslipidemia. Therefore, there is an immediate need to raise awareness among the general population about these risk factors, promote the correct diet and physical activity, and at the same time develop guidelines for screening and preventive therapeutic programmes to identify and manage individuals at high risk for future CAD.

Q. What are the treatment options of CAD?

A. There are a number of treatment options for coronary artery disease:

- Lifestyle changes
- Medical treatment - drugs (e.g. cholesterol lowering medications, beta-blockers, nitroglycerin, calcium antagonists, etc.);
- Coronary interventions as angioplasty and coronary stent;
- Coronary Artery Bypass Grafting (CABG)

Q. What is CABG?

A. Coronary artery bypass grafting (CABG) is a type of surgery that improves blood flow to the heart.

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Surgeons use CABG to treat people who have severe Coronary Artery Disease (CAD). CABG is the most common type of open heart surgery.

Plaques or fatty material which is present in the arteries can harden or rupture (break open). Hardened plaque narrows the coronary arteries and reduces the flow of oxygen-rich blood to the heart. This can cause chest pain or discomfort called angina.

If the plaque ruptures, a blood clot can form on its surface. A large blood clot can mostly or completely block blood flow through a coronary artery. This is the most common cause of a heart attack. Over time, ruptured plaque also hardens and narrows the coronary arteries.

CABG is one treatment for CHD. During CABG, a healthy artery or vein from the body is connected, or grafted, to the blocked coronary artery. The grafted artery or vein bypasses (that is, goes around) the blocked portion of the coronary artery. This creates a new path for oxygen-rich blood to flow to the heart muscle. Surgeons can bypass multiple coronary arteries during one surgery.

Q. What is On Pump CABG?

A. On-pump CABG is a time-honored procedure that is performed while the heart is stopped. The blood supply must be provided to the rest of the body when the heart is stopped. Therefore, surgeons use the cardiopulmonary bypass machine (also known as the heart-lung machine or the pump), an artificial circulation system that does the work of the heart and the lungs. Pipes (cannulas) are placed in the heart to drain impure blood to the pump, where it is purified and pumped back into the patient. Thus, the heart can be safely stopped with specialized medications that not only keep it stopped but also nourish it when it is still. The bypass grafts are then constructed. At the end of the procedure, the heart is restarted. When it resumes adequate function, the cardiopulmonary bypass machine is disconnected after the pipes are withdrawn from the heart.

Q. What is Off-pump CABG or OPCAB?

A. Off-pump CABG is considered the newer method of performing CABG. This procedure is performed with the heart beating and without the use of the heart-lung machine. Once the chest has been opened, the area around the artery to be bypassed will be stabilized with a special type of instrument. Special devices can mechanically stabilize the relevant part of the heart

so that the suturing can be performed on a relatively immobile platform. The rest of the heart will continue to function and pump blood through the body. The doctor will perform the bypass graft procedure by sewing one end of a section of vein over a tiny opening made in the aorta, and the other end over a tiny opening made in the coronary artery or internal mammary artery just below the blockage. Many grafts can be performed, depending on how many blockages the patients have and where they are located.

While definitely eliminating the placement of special pipes for the machine, use of artificial circulation, and excessive manipulation of the aorta, this technique introduces a new complexity of attaching grafts to the heart while it is constantly moving and filled with blood, a situation similar to threading a needle on a rocking boat.

Q. What are the current indications of CABG?

A. Indications are:

- Unstable Angina.
- Disease of the left main coronary artery (LMCA).
- triple vessel disease (LAD, LCX and RCA)
- left ventricular dysfunction (i.e. low ejection fraction)
- Diabetes mellitus
- Diffuse disease not amendable to treatment with a PCI

Q. What is Ischemic Cardiomyopathy and its symptoms?

A. Ischemic cardiomyopathy (IC) is a condition that occurs when the heart muscle is weakened. In this condition, the left ventricle, which is the main heart muscle, is usually enlarged and dilated. This condition can be a result of a heart attack or coronary artery disease, a narrowing of the arteries. These narrowed arteries keep blood from reaching portions of your heart. The weakened heart muscle inhibits your heart's ability to pump blood and can lead to heart failure.

Symptoms of IC include shortness of breath, chest pain, and extreme fatigue. If you have IC symptoms, you should seek medical care immediately.

Treatment depends on how much damage has been done to your heart. Medications and surgery are often required. You can improve your long-term outlook by making certain lifestyle changes, such as maintaining a healthy diet and avoiding high-risk behaviors, including smoking. CABG in this subset is challenging but offers definite survival advantage. The other options include

heart transplantation and placement of ventricular assist devices.

Q. What is Ischemic Mitral Regurgitation?

A. Ischemic mitral regurgitation (MR) is a complication of coronary heart disease, and its broad definition includes a spectrum of disorders including chronic MR post myocardial infarction (MI), acute MR (or acute worsening of MR) with acute MI (ST elevation or non-ST elevation), and reversible MR due to myocardial ischemia.

Ischemic mitral regurgitation is a distinctive valve disease in that, unlike with organic valvulopathies, abnormalities of the left ventricle are not the consequence, but the cause of the valve disease. Ischemic mitral regurgitation is more a pathology of the muscle than the valve and the characteristics of the underlying coronary disease are important determinants of clinical presentation and prognosis.

Ischemic mitral regurgitation is a frequent complication of left ventricular global or regional pathological remodeling due to chronic coronary artery disease. It is not a valve disease but represents the valvular consequences of increased tethering forces (papillary muscles displacement leading to a more apical position of the leaflets and their coaptation point) and reduced closing forces (reduced contractility, dyssynchrony of the papillary muscles, intra-left ventricular dyssynchrony). Although mitral regurgitation has an unloading effect and reduces impedance, the volume overload begets further left ventricular dilatation, increases ventricular wall stress leading to worsened performance. Ischemic mitral regurgitation is characteristically dynamic: its severity may vary with hemodynamic conditions. Both the severity of ischemic mitral regurgitation and its dynamic component worsen prognosis. When it is severe, it requires valve repair or replacement along with CABG.