

# Original Article: Surgical procedures: Coronary Artery Regeneration

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## ABSTRACT

It is a surgical procedure in which blood vessels from another part of the body are blocked into an artery, thereby removing the blocked flow path and opening a bypass in the area of the coronary occlusion, and blood flowing down the stenosis with this graft again. Is established. That is why it is called a bypass link. Several factors are involved in performing CABG. The number of coronary arteries involved, the degree of failure with left ventricular dysfunction, the presence of other health problems, the patient's symptoms, and the history of treatment. Patients who have drug-resistant unstable angina, chronic stable angina with acute complications that disrupt the patient's life, patients who have positive exercise test and radioisotope scan in addition to angina, patients who have obvious narrowing of the main coronary artery They have the left. Patients with all three major coronary arteries involved. The lower saphenous vein of the knee is mostly used because it is similar in diameter to the coronary arteries and is removed through a longitudinal incision in the inner surface of the leg and thigh and separating its branches. The vein is then examined for sclerosis.

## Introduction

**P**Patients with more than 70% obstruction of the coronary artery and 90% obstruction of the left main artery should undergo coronary artery bypass grafting [1-3]. If the coronary artery occlusion is not significant, blood flow through the coronary artery will be complete by creating

a bypass, and myocardial ischemic circulation may be improved [4-6].

## CABG operation

This operation is performed through the middle sternotomy. Both the saphenous vein and the internal mammary artery are used for the graft. Its blood elements are washed out of the vein and inverted due to the presence of pigeonhole valves and the resulting obstruction of blood

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flow to the vein [7-9]. One end is attached to the proximal anastomosis aorta and the other end to the bottom of the distal anastomotic stenosis. Due to the removal of the saphenous vein, the venous drainage of the said foot is disturbed and edema and swelling are observed in it [10-12]. The severity of swelling and edema decreases over time [13-15]. Wearing elastic stockings to keep the foot up, doing active movements helps to drain the vein in it as much as possible. In Italy, a graft has a longer lifespan if the internal artery is used, which is the second branch separated from the subclavian artery [16-18].

**Note:** Arterial grafts are less likely to develop atherosclerosis because, in addition to being larger in diameter than the saphenous vein, they also have a slower rate of atheroma deposition.

**Note:** The saphenous vein is used in CABG emergency surgery because when one team is having surgery on the chest, the other team can remove the vein from the patient's leg [19-21].

### Vein used

Mostly large saphenous vein and then small saphenous vein are used [22-25].

### Arteries used

The right and left internal mammary arteries, especially the radial arteries [26-28].

### Benefits of using arteries in transplantation

In general, arterial transplants do not undergo atherosclerotic changes as quickly as venous transplants and remain open longer than them.

### Advantages of using internal mammary artery

There is no need to attach it to the aorta, because it is directly connected to the aorta. Therefore, its distal part is separated and connected to the bottom of the stenosis. Its diameter is similar to that of the coronary arteries [29-31]. There is no need for leg incisions and venous circulatory disorders [32-35].

### Disadvantages

Spending more time to separate it in separating the saphenous vein, the two teams act simultaneously. One group separates the saphenous vein and the other group performs a stereotomy and connects the heart to the machine [36-38]. This is usually done by two teams at the same time. While the internal mammary artery is separated, first a sternotomy and placement of the heart on the CPB must be performed and then the artery is removed. The risk of bleeding is higher due to the extensive separation of Lima anastomoses [39-41]. On the other hand, pleural effusion must be placed in the pleural space to prevent compression of the pleura. Sensory damage to the ulnar nerve is also a side effect of using Lima, which can be temporary or permanent [42-45]. Sometimes the length of the detached Lima may not be long enough to reach the bottom of the stenosis. Today, the use of basilic and cephalic veins of the hand is recommended, because the venous disorder caused by its separation is much less than the saphenous vein [46-48]. At the end of the operation, the patient is removed from the CPB and the incision is closed and the patient is transferred to the intensive care unit after the operation [49].

### Invasive methods of coronary artery

Invasive methods for the treatment of angina and coronary artery disease, including intra-coronary stent implantation, atheroma removal and laser myocardial regeneration treatment. All of these methods are classified as cutaneous coronary interventions (PCI) [50-52]. Recurrence of stenosis in 10 to 30% of cases is the greatest limitation of percutaneous transluminal coronary angioplasty.

### Coronary artery stent

After PTCA, the treated area may be partially or completely closed, which is called restenosis. If

the coronary artery intima is damaged, the response begins as a process of acute inflammation [52-54]. The process may involve the release of vasoconstrictor mediators to form clots and scars. A coronary artery stent is replaced to counteract this risk [55].

### Stent

Is a metal mesh tissue and protects the vessel wall, which is at risk of sudden blockage? The stent is placed on the balloon at the end of the angioplasty catheter. When a balloon catheter is inserted into a coronary artery and inflated, the stent presses against the vessel wall and opens the artery duct [56-58]. The balloon catheter is removed, but the stent remains inside the artery. Eventually, the stent is covered with endothelial tissue and becomes part of the vessel wall. Because of the risk of thrombosis in the stent, the patient is taking antiplatelet drugs such as Plavix and aspirin [59-61]. These medications are taken daily for at least 3 to 6 months to reduce the risk of thrombosis. If the desired result is not achieved in stenting (vessel diameter is less than 3 mm) [62-64], the patient should take anticoagulants continuously. Some stents contain drugs such as sirolimus or paclitaxel that may minimize the formation of thrombosis or scar tissue. These types of stents have increased the success rate of PCI [65].

### Antrectomy

An invasive procedure that removes an atrium or plaque from a vessel wall by cutting with abrasion, which may be done with PTCA. The direct atrectomy method and the transuminal excision method are the use of a catheter through which the lesion is cut and its parts are removed [66-68]. In rotational atrectomy, a catheter is used with a piece of diamond (drill) inserted into the tip, which rotates like a dental drill and crushes the lesion. To obtain a satisfactory result, it is necessary to pass the catheter several times and repeat the operation.

Post-atrectomy care is similar to post-PTCA care [69-71]. The use of PTCA therapy and stent implantation causes cellular reactions in the coronary artery, which causes cell proliferation in the intima layer of the artery and can eventually lead to arterial occlusion. For treatment, it reduces the incidence of obstruction and prevents re-narrowing of the arteries by inhibiting smooth muscle cell proliferation [72-75]. Brachi therapy is derived from the Greek word (braki in short meaning). It is done using gamma or beta rays by placing a radioisotope in the lesion. The radioisotope may be operated through a catheter or implant with a stent [76-78]. Another method suggested for opening the intravenous duct is the use of photocoagulation lasers (argon and carbon dioxide) using high-frequency radio waves to destroy atrophic plaques, which, although the result of the laser is more successful, but in general It does not have many fans [79].

### Complications of PCI

Possible complications during PCI include detachment of vascular layers, perforation of the vessel wall, sudden blockage or spasm of a coronary artery, acute myocardial infarction, acute dysrhythmias such as ventricular tachycardia, and cardiac arrest [80-82]. Complications after PCI include sudden occlusion and vascular complications such as bleeding at the catheter entrance site, retroperitoneal hematoma bleeding, pseudoaneurysm, venous arterial fistula, arterial thrombosis, and terminal embolism [83].

### Care after PCI

Patient care is similar to cardiac catheter care. Most patients go to the hospital on the same day as the PCI. If there is no complication, they will be discharged the day after work. The patient is given heparin while doing the work [84-86]. The patient is carefully monitored for possible

bleeding. In some patients with unstable lesions at risk of sudden vessel occlusion after sheath removal and re-use of heparin or intravenous infusion of GpIIb / IIIa inhibitor [87].

**Note:** If hemostasis is achieved, the cover sheath will be removed. Homeostasis After the sheath is removed by direct hand pressure, a mechanical pressure device such as a C-shaped clamp or an air pressure device (such as a femstop) is provided [88].

### Myocardial infarction MI

Myocardial infarction is the most common diagnosis in industrialized countries. A process in which parts of the heart are permanently damaged due to reduced coronary blood flow. In most cases, the cause of myocardial infarction is acute obstructive lesion of the coronary artery due to atherosclerosis and organized thrombosis [89].

### Causes of myocardial infarction

Coronary artery spasm (a sudden contraction or narrowing) of the coronary artery is hypoxia due to acute anemia, anemia or hypotension, increased oxygen demand due to high heart rate, thyrotoxicosis, and cocaine consumption. Extent of damage to the following factors, including the amount of myocardial damage due to blockage of arteries, the occurrence of complete or incomplete blockage in the affected vessel, internal factors that can spontaneously block obstructive thrombosis, the amount of blood reaching the affected tissue Oxygen depends on the myocardial tissue whose blood supply is disrupted [90].

**Note:** A profound imbalance occurs between myocardial oxygen demand and oxygen supply in MI. The terms coronary heart disease (MI) is all synonymous, but the term myocardial infarction is more common.

### People at risk

Patients with unstable angina, prismsmetal angina, and those with multiple coronary artery risk factors.

### Pathophysiology

Myocardial cells are able to tolerate ischemia for up to 20 minutes before cell death. Due to the high metabolism in myocardial cells, symptoms of ischemia appear 8-10 seconds after the reduction of blood supply. Ischemia causes not enough blood and oxygen to reach the myocardial cells. As a result, cellular anaerobic metabolism takes place, which results in the production of lactic acid and the creation of an acidic environment in myocardial cells. Under these conditions, the activated lysosome enzyme damages the cell, releasing cardiac enzymes into the interstitial space. These enzymes enter the venous circulation through the lymphatic system. Acidosis and hepatic impairment are two major factors in reducing the heart's contractile capacity and can cause arrhythmias in the heart's conduction system. Ischemia alters the ability of cell membranes to penetrate vital electrolytes and exacerbates the heart's ability to contract [91].

### Specific laboratory results of enzymatic changes in acute infarction

CPK contains three types of enzymes:

**A) CK-MM skeletal muscle:**

**B) CK-MB myocardium:** CKMB is the most specific indicator of acute MI. It starts to increase in 4-6 hours and reaches its peak in 12-24 hours and remains high for 3-4 days. When the CPK-MB in MI increases and peaks, it reaches more than 6 times its normal level.

**C) CK BB brain tissue:** To prepare a CPK sample, 5-7 cc of venous blood should be collected and hemolysis of the sample should be avoided. Mention the number of times the patient has had intramuscular injections in the last 48-24 hours. This test does not require

fasting. Troponin is a protein found in the myocardium that regulates the process of myocardial contraction. It has 3 isomers (I-T-C). Troponin I is one of the important enzymes for the detection of myocardial infarction. Troponin may remain high for 7 to 10 days after MI. Troponin T may be elevated for 10-10 days after MI.

**Note:** In patients with suspected myocardial infarction who see a doctor late, it is better to use troponin instead of LDH and its isoenzymes. Troponin I is not present in the blood of healthy people, but following MI can reach 20 times its normal level.

Relaxation before using nitroglycerin (due to vasodilation) reduces venous return, thereby reducing cardiac output, reducing coronary blood flow, and predicting the possible effects of mitral valve stenosis on mitral valve regurgitation.

### Clinical manifestations of decreased activity tolerance

Persistent and resonant systolic murmur with shortness of breath Low-resonant diastolic murmur attacks at night. After rejection of atrial fibrillation, the clinical manifestations of dyspnea are activity intolerance. Valves undergoing repair (valvopathy) are more efficient than replacing artificial valves and patients do not need to receive continuous anticoagulants. Esophageal echocardiography is usually performed at the end of valve repair to evaluate the effectiveness of the procedure. Most valve repair procedures require general anesthesia and cardiopulmonary bypass. Commissurotomy is the most common method of valve repair. Mitral valve repair is prohibited for patients with left atrial or ventricular thrombosis, severe aortic dilatation, severe mitral valve insufficiency, lumbar thoracic sclerosis, large vascular rotation, and other heart problems requiring surgery. All patients

develop some degree of mitral regurgitation after the procedure.

### Conclusion

Clinical signs, laboratory results, ECG changes. Clinical examination is guiding, but not sufficient to confirm the diagnosis. The prognosis depends on the severity of coronary occlusion and the extent of myocardial injury. History of current symptoms, history of previous illness, history of risk factors, family history of disease.

The autonomic nervous system tries to compensate for suppressed cardiac function, but this further creates an imbalance between myocardial oxygen supply and demand. An ischemia that lasts more than 35 to 45 minutes damages myocardial cells. Each area of infarction or necrosis is surrounded by a damaged area. There is also an area around the affected area called the ischemia. The final size of the M1 area depends on how many ischemic areas become the affected area as the blood supply continues to decrease and how much of the damaged area becomes the necrotic area. It turns. Evaluation of diagnostic findings the diagnosis of MI is usually made on the basis of current disease history, ECG, laboratory test results (such as serial tests).

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