

## Management of Post Operative CABG Patients - A Review

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### Abstract:

CABG, abbreviation for coronary artery bypass graft is a type of surgery used to bypass a blockage in one of the blood vessels that supplies the muscle of the heart. The surgery involves cutting the affected coronary artery above and below the blockage, then attaching a small loop of vein (saphenous) or artery (mamillary) at each cut, creating a new circuit, or “bypass,” through which blood may flow. Mortality and complications increase with age (older than 70 years), poor heart muscle function, disease obstructing the left main coronary artery, diabetes, chronic lung disease, and chronic kidney failure. Coronary artery disease diagnosed by scanning angiography, cardiac catheterization, injecting thalium IV, Tissue Doppler stress echocardiography. Three commonly used classes of drugs are the nitrates, beta blockers and calcium blockers. Nitroglycerin (Nitro-Bid) is an example of a nitrate. Unstable angina is also treated with aspirin and the intravenous blood thinner heparin. Aspirin prevents clumping of platelets, while heparin prevents blood clotting on the surface of plaques in a critically narrowed artery. Coronary artery bypass graft (CABG) surgery reestablishes sufficient blood flow to deliver oxygen and nutrients to the heart muscle. In addition to healthy lifestyle changes, remember the importance of regular medical checkups. Early detection and treatment can set the stage for a lifetime of better heart health.

**Key words:** *post operative CABG, cardiac catheterization, pleural effusion, electrocardiography, atrial fibrillation.*

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### INTRODUCTION:

Coronary artery bypass graft surgery, also known as CABG or bypass surgery, can help to restore blood flow to an area of the heart. However, surgery does not stop the progression of atherosclerosis (coronary heart disease), which deposits fatty material into artery walls, narrowing them and eventually limiting blood flow. Off-pump CABG (OPCABG) results in better preservation of left ventricular function in the perioperative period than conventional on-pump CABG (ONCABG). [1] CABG has been routinely used to reduce angina and improve chances of survival in patients with CAD. Since CABG became a recognized standard treatment of CAD, considerable evidence has accumulated concerning the pathogenesis of CAD; the efficacy, risks, and costs of CABG; and the effectiveness of CAD risk factor reduction. [2]

Clinical presentations of coronary artery disease include silent ischemia, angina pectoris, acute coronary syndromes (unstable angina, MI), and sudden cardiac death. [3]

### RECOVERY SYMPTOMS:

The most common recovery symptoms after CABG were chest and leg incision pain, having trouble sleeping, and neck and shoulder or back

discomfort. The most common mood states were confusion, anxiety, and anger, respectively. In addition, Thai CABG patients who had more frequent recovery symptoms also had greater negative mood disturbance.[3]

### SIGNS AND SYMPTOMS:

The most common signs and symptoms are chest pain or chest discomfort, heart palpitations, lightheadedness or dizziness, syncope (fainting/loss of consciousness), fatigue, lethargy or daytime sleepiness, shortness of breath. Chest pain, squeezing, choking and discomfort in chest associated with pain in jaw head and arms is more common. Palpitations (irregular heart beat is another major symptom). [4]

### CABG:

CABG has been routinely used to reduce angina and improve chances of survival in patients with CAD. Since CABG became a recognized standard treatment of CAD, considerable evidence has accumulated concerning the pathogenesis of CAD; the efficacy, risks, and costs of CABG; and the effectiveness of CAD risk factor reduction. Coronary artery bypass grafting (CABG) has been shown to prolong the life expectancy of

several subgroups of patients with coronary artery disease, including those with left ventricular dysfunction. [5]

#### **PATHOPHYSIOLOGY:**

Coronary atherosclerosis is often irregularly distributed in different vessels but typically occurs at points of turbulence (e.g., vessel bifurcations). As the atheromatous plaque grows, the arterial lumen progressively narrows, resulting in ischemia (often causing angina pectoris). The degree of stenosis required to produce ischemia varies with O<sub>2</sub> demand the majority of left main stem stenoses are distal/ bifurcation lesions (at very high risk of restenosis with stents) and the majority of patients also have multivessel coronary artery disease (for which CABG is already a superior therapy to stents), the result is that for most unprotected left main stem stenosis surgery remains the standard of care. CABG is the 'gold standard' therapy for significant left main stem (LMS) stenosis because of the proven survival benefit. [6]

#### **DIAGNOSTIC PROCEDURES:**

Non-invasive diagnosis of coronary artery disease by quantitative stress echocardiography is best performed using diagnostic models based on segmental velocities at peak stress and adjusting for heart rate, and gender or age. Other techniques are Coronary arteriography, injecting thallium IV, Tissue Doppler stress echocardiography, scanning angiography, cardiac catheterization and ECG: electrocardiography) may detect little, if anything, abnormal between and sometimes even during attacks of angina, even in people with extensive coronary artery disease. During an attack, the heart rate may increase slightly, blood pressure may go up, and with a stethoscope, and doctors may hear a change in the heartbeat. ECG may detect changes in the heart's electrical activity. When symptoms are typical, the diagnosis is usually easy for doctors. The kind of pain, its location, and its association with exertion, meals, weather, and other factors help doctors make the diagnosis.

The presence of risk factors for coronary artery disease also helps establish the diagnosis. [7]

#### **RISK FACTORS:**

Exercise, diet, and tobacco use are the most significant modifiable risk factors

The presence of certain preoperative and postoperative risk factors can be predicted to prolong LOS after CABG surgery. Preoperative length of stay is more difficult to control. Therefore, attention has been directed to curtailing the postoperative length of stay. [8] Various perioperative risk factors for postoperative renal dysfunction and failure have been identified. Among the important preoperative factors are advanced age, reduced left ventricular function, and emergency surgery, preoperative use of intraaortic balloon pump, elevated preoperative serum glucose and creatinine. Most important intraoperative risk factor is the intraoperative haemodynamic instability and all the causes of postoperative low output syndrome comprise the postoperative risk factors. [9] Many factors are linked with SSI at the sternum. Bone wax is frequently used as a haemostatic agent to prevent oozing from cancellous bone. Although bacterial infection in this setting is infrequent, its occurrence is associated with increased morbidity and mortality. [10]

Socioeconomic status was an important factor. Atrial fibrillation increased the total LOS in hospital after CABG. Atrial fibrillation is the most common arrhythmia occurring in patients after CABG. Identification of patients who are at risk for atrial fibrillation and successful treatment to prevent atrial fibrillation is likely to contribute to major reductions in consumption of health care resources in patients with CABG. [11]

Female sex is reported to be an independent predictor of length of stay in hospital. It seems that the most common causes of prolonged length of stay in hospital in females are higher incidence of preoperative risk factors and postoperative complications of CABG in female than male. Therefore, it is important to control these risk factors in female patients before operation. [12], [13]

## COMPLICATIONS:

### 1. Pleural effusion:

More than 85% of patients develop pleural effusions after coronary artery bypass grafting (CABG). Although the majority resolves spontaneously, post-CABG effusions can persist. The cause of these persistent effusions is unknown, and the histology of the pleural changes has seldom been reported. [14]

### 2. Renal dysfunction:

Renal dysfunction is common after coronary artery bypass graft (CABG) surgery. The CABG procedures complicated by stroke have a threefold greater peak serum creatinine level relative to uncomplicated surgery. However, postoperative creatinine patterns for procedures complicated by cognitive dysfunction are unknown. Therefore, we tested the hypothesis that postoperative cognitive dysfunction is associated with acute perioperative renal injury after CABG surgery. Data were prospectively gathered for 282 elective CABG surgery patients. Psychometric tests were performed at baseline and 6 wk after surgery [15]

### 3. Respiratory failure:

There was an increase in respiratory failure after coronary artery bypass graft (CABG) at Baptist Heart Institute during the first three quarters of 2000. Thirteen percent of patients required ventilation over 24 hours. The reintubation rate after initial extubation was 18.3% and the mortality rate in the group was 19.7%. After instituting an advanced care team during the first three quarters of 2002, the prolonged ventilation requirement was 7%; reintubation was 4.2%, and the mortality rate 15.4%. These results suggest that an advanced care team could improve clinical outcome and reduce health care cost. [16]

### 4. Atrial fibrillation:

Atrial fibrillation and atrial flutter (AF) frequently complicate CABG. Studies of drug prophylaxis to prevent AF with  $\beta$ -adrenergic blocking agents administered in fixed doses have had conflicting results.

One hundred patients were randomized to receive metoprolol or placebo following CABG. There was no significant difference between the incidence of AF in the metoprolol (24%) and placebo (26%) groups. Metoprolol is not efficacious for the prevention of post-CABG AF even when dosage is titrated to achieve clinical evidence of  $\beta$  blockade. It is likely that the adoption of a continuous cardioplegia technique caused a reduction in our incidence of post-CABG AF. [17]

## MANAGEMENT

### Post CABG pain:

Post-CABG pain (PCP) is a group of pain syndromes with a high prevalence, and with a negative effect on mood and performance of daily activities. The risk of developing PCP and its potential consequences should therefore be discussed with every patient prior to CABG surgery [18]

### Treatment:

The treatment of patients with coronary artery disease continues to evolve; all three strategies – medical therapy, surgical revascularization, and percutaneous coronary intervention – have changed. Medical therapy with intense risk-factor modification and treatment with a statin, aspirin, and angiotensin-converting enzyme (ACE) inhibitors, should be used unless contraindicated. Surgical therapy has also changed with the introduction of minimally invasive, beating heart surgery. Percutaneous coronary intervention has perhaps changed the most radically with adjunctive therapy – glycoprotein IIb/IIIa inhibitors, thienopyridines, and reliance on stent implantation. [19].

Antiplatelet therapy — Clopidogrel (Plavix®) and aspirin are antiplatelet medications that is given to help prevent the formation of blood clots that can block the graft.

Beta blockers — Beta blockers slow the heart rate, lower blood pressure, and decrease the heart's demand for oxygen.

Nitrates — A nitrate, either as short-acting nitroglycerin, or as a long-acting preparation (isosorbide mononitrate or dinitrate). These

drugs dilate coronary blood vessels, bringing more blood to the heart muscle. ACE inhibitor can reduce the incidence of ischemic events after CABG. Ischemic events include death, repeat bypass surgery, angioplasty or stent placement, heart attack, ischemic stroke, transient ischemic attack (TIA), or recurrence of angina. Lipid lowering therapy — almost all patients are given a medication to lower lipids after CABG. [20]

### **CARE AT HOME AFTER BYPASS SURGERY**

Care after bypass surgery aims to reduce the risk factors for heart disease and includes strategies to help patients and family members to stop smoking, control high blood pressure, improve cholesterol levels, begin exercising regularly, and reduce stress. Some of these changes can be made by adjusting lifestyle habits through diet and exercise. However, lifestyle changes alone may not be adequate and medications are often needed. [20]

### **CLINICAL SITUATIONS WHICH SHOULD ALERT ANESTHESIOLOGIST**

The following examples should potentially alert anaesthesiologists regarding need to evaluate and provide further testing.

1. Patients with acute coronary syndromes, such as unstable angina or decompensated heart failure from ischaemia are at high risk of developing further decompensation, myocardial infarction, and death during the perioperative period. Such patients should not undergo non cardiac surgery.
2. If surgery is emergent consider stabilization by pharmacologic and mechanical interventions and proceed for surgery without delay. Consider risk stratification in the postoperative period. Avoid further testing unless the results will impact perioperative management.
3. Patients with critical aortic stenosis may be asymptomatic and evaluation of systolic ejection murmur is warranted. Patients with critical aortic stenosis may have a high risk of undergoing elective non cardiac surgery.

4. Patients with dyspnea on mild exertion are at high risk of developing perioperative ventricular dysfunction, myocardial ischaemia and MI. Consider additional monitoring and testing as they have high probability of extensive CAD.
5. Watch for peripheral vascular disease as they have a high association with CAD.[21]

### **MONITORING OF CABG ASSOCIATION**

There are continuing reasons to monitor the association of CABG with possible postoperative cognitive change. First, the technology associated with CABG is constantly changing, and the efficacy of these changes in terms of cognitive outcomes should be determined. Second, there is increasing use of other interventions for coronary artery disease, such as "off-pump" CABG and coronary artery stenting procedures. [22]

### **CONCLUSION**

Health care system is designed to meet the health care needs of target population. Most of the CABG patients are hospitalized so it is the duty of health care providers to give best management of CABG related complications and it includes coagulopathy, systemic inflammatory response and perfusion to brain, kidney and liver. After CABG all patients should begin taking aspirin, and patients with a history of myocardial infarction should also be given a beta-blocker, unless it is contraindicated. ACE inhibitors should be used in high-risk patients. All patients should be encouraged to change their diet and pursue a rehabilitation program involving exercise and stress management. Cessation of smoking is especially important. Weight reduction may also be helpful. Statins should be used to achieve targets for LDL cholesterol (preferably a level of 60 to 85 mg per deciliter, but certainly less than 100 mg per deciliter). In addition, patients should be screened for depression, since it is common and treatable. Depressed patients should be informed that treatment of depression is likely to improve their ability to concentrate. So it has been concluded that pharmaceutical care plan is

important to reduce the morbidity and mortality and to increase the desired therapeutic outcomes.

## RECOMMENDATIONS

Heart disease can be improved — or even prevented — by making certain lifestyle changes. The following changes can help anyone who wants to improve their heart health:

- Pharmacists should more involve in modifying patient behavior and physician prescribing behaviors and practices.
- Pharmacist should told about, drug-drug interactions, incorrect drug dosage or duration of drug treatment, drug-allergy interactions, clinical abuse ,the name and description of the medication, the route, dosage form, route of administration and duration of therapy.
- Stop smoking. Smoking is a major risk factor for heart disease, especially atherosclerosis.
- Control blood pressure. Ask doctor for a blood pressure measurement at least every two years. He or she may recommend more frequent measurements if blood pressure is higher than normal.
- Check cholesterol. Most people should aim for an LDL level below 130 milligrams per deciliter (mg/dL), or 3.4 millimoles per liter (mmol/L).
- Keep diabetes under control. If a person has diabetes, tight blood sugar control can help reduce the risk of heart disease.
- Eat healthy foods. A heart-healthy diet based on fruits, vegetables and whole grains — and low in saturated fat, cholesterol and sodium — can help to control weight, blood pressure and cholesterol. Eating one or two servings of fish a week also is beneficial.
- Manage stress. Reduce stress as much as possible. Practice healthy techniques for managing stress, such as muscle relaxation and deep breathing.
- Practice good hygiene habits. Staying away from other people when they are sick and regularly washing your hands can not only

prevent heart infections but also can help prevent viral or bacterial infections that can put stress on your heart if you already have heart disease.

- In addition to healthy lifestyle changes, remember the importance of regular medical checkups. Early detection and treatment can set the stage for a lifetime of better heart health.
- Pharmacists are a useful source of help and advice to any prescriber, particularly on matters of pharmacology, drug usage and product selection in case of CABG so there presence is necessary for effective drug therapy.

## REFERENCES:

- [1]. Cardiovascular News. Heart Views. 2008. 9:2-5.
- [2]. David K. Cundiff Coronary Artery Bypass Grafting (CABG): Reassessing Efficacy, Safety, and Cost General Medicine, 2002 4(2).
- [3]. Ketsarin Utriyaprasit and Shirley Moore Recovery Symptoms and Mood States in Thai CABG patients. *Journal of transcultural nursing*. 2005, 16: 97-106.
- [4]. Richard N. Fogoros, M.D. Key Symptoms of Heart Disease. 2009, 112, 954-958
- [5]. Christakis GT, Weisel RD, Fremes SE, Ivanov J, David TE, Goldman BS, Salerno TA. Coronary artery bypass grafting in patients with poor ventricular function.J Thorac Cardiovasc Surg. 1992, 103
- [6]. Keogh BE, Kinsman R. Fifth national adult cardiac surgical database report 2003. Dendrite Clinical Systems. 2004, 130, 348-352.
- [7]. Maitra G, Ahmed A, Rudra A, Wankhede R, Sengupta S, Das T. Renal Dysfunction after Off-Pump Coronary Artery Bypass Surgery-Risk Factors and Preventive Strategies. *Indian J Anaesth* 2009; 53: 401-7
- [8]. Robicsek F, Masters RN, Littman L, Born GV. The embolization of bone wax from sternotomy incisions. *Ann Thorac Doering LV, Esmailian F, Imperial-Perez F, Monsein S. Risk factors of heart diseases. 2002; 28: 249-253*

- [9]. Determinants of intensive care unit length of stay after coronary artery bypass graft surgery. *Heart Lung* 2001; 30:9-17. *Surg* 1981; 31:357-359.
- [10]. Ancona C, Agabiti N, Forastiere F, Arca M, Fusco D, Ferro S, et al. Coronary artery bypasses graft surgery: Socioeconomic inequalities in access and in 30 day mortality. 2000; 54:930-5.
- [11]. Tamis JE, Steinberg JS. Atrial fibrillation independently prolongs hospital stay after coronary artery bypass surgery. 2000; 23:155-9.
- [12]. Butterworth J, James R, Prielipp R, Cerese J, Livingston J, Burnett D. Female gender associates with increased duration of intubation and length of stay after coronary artery surgery: CABG clinical benchmarking database participants. 2000; 92:414-24.
- [13]. Athanasiou T, Al-Ruzzeh S, Del Stanbridge R, Casula RP, Glenville BE, Amrani M. Is the female gender an independent predictor of adverse outcome after off-pump coronary artery bypass grafting? 2003; 75:1153-60
- [14]. Y. C. Gary Lee, MBChB, Marcelo A. C. Vaz, MD, Kim A. Ely, MD, Edward C. McDonald, MD, Philip J. Thompson, MBBS, FCCP, Jonathan C. Nesbitt, MD, FCCP and Richard W. Light Symptomatic Persistent Post-Coronary Artery Bypass Graft Pleural Effusions Requiring Operative Treatment. 2001; vol 119: 795-800
- [15]. Madhav Swaminathan, Brian J. McCreath, Barbara G. Phillips-Bute, PhD\*, Mark F. Newman, Joseph P. Mathew, Peter K. Smith, James A. Blumenthal, and Mark Stafford-Smith, Serum Creatinine Patterns in Coronary Bypass Surgery Patients With and Without Postoperative Cognitive Dysfunction. 2002; vol. 95 no. 1 1-8
- [16]. Siby P. Saha, Norma Lake, Cindy Browning and Victor A. Ferraris coronary artery bypass grafting Springer New York international journal of angiology. 2005; Volume 14, (3)
- [17]. Daniel L. Paull, Seattle. 83rd Annual Meeting of the North Pacific Surgical Association, Seattle, Washington, 1997; (vol.173), issue 5.
- [18]. Eisenberg E et al. Prevalence and characteristics of post coronary artery bypass graft surgery pain (PCP). *Pain*.2009; 92(1-2):11-7:
- [19]. David R Holmes Jr Current Controlled Trials in Cardiovascular Medicine. 2001; 2:263-265
- [20]. Julian M Aroesty, MD. Recovery after coronary artery bypass graft surgery (CABG) 03 February 2010 21:40
- [21]. Mangano DT, Goldman L. Preoperative assessment of patients with known or suspected coronary disease. 1995; 333: 1750-6. †
- [22]. Barry SJ, Zeger SL, Selnes OA, et al. Quantitative methods for tracking cognitive change 3 years after coronary artery bypass surgery. 2005; 79:1104-1109