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The Impact of Co-Morbidities in Assessment and Management of Cardiac Intervening Patients

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ABSTRACT

The patients who undergo Coronary Artery Bypass Graft surgery or Percutaneous Transluminal Coronary Angioplasty have co-morbid conditions that could negatively influence their survival. Diabetes Mellitus, COPD, Rheumatoid Arthritis, Anxiety and Depression could affect the outcome. Diabetes Mellitus is a risk factor for coronary artery disease. COPD patients could experience pneumonia and atrial fibrillation as complications. Rheumatoid arthritis patients are highly prone to inflammatory process which is the underlying pathology for atherosclerosis and can be a prognostic factor for CAD as well as chances for increased re-occlusion in patients undergoing coronary revascularising procedures. Anxiety and depression are negative emotions that adversely affect the outcome of patients. The co-morbid conditions should be effectively evaluated and managed.

Keywords: Coronary artery bypass grafting, Percutaneous trans-luminal coronary angioplasty, diabetes mellitus, chronic obstructive pulmonary disease, rheumatoid arthritis, anxiety.

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INTRODUCTION

Ischemic heart disease (IHD) is the number one killer of both men and women. It occurs in coronary arteries due to occlusion or spasm, in case of a variant angina, or due to atherosclerosis. Coronary Artery Bypass Grafting (CABG) and Percutaneous Transluminal Coronary Angioplasty (PTCA) are revascularising methods used in IHD patients. These invasive strategies are mainly employed in patients with repeated presentations of IHD despite therapy. In the event of prolonged chest pain and ischemic ECG changes which can be unrelieved by nitrate therapy or calcium channel antagonists, one may assume total occlusion of a coronary vessel and steps should be taken to restore blood flow either through PTCA or CABG. The decision of CABG or PTCA for revascularization is based on the extent of IHD and ventricular function of heart. PTCA involves the insertion of a guide wire and inflatable balloon into the affected coronary artery and enlarging the lumen of the artery by stretching the vessel wall. CABG become an accepted and commonly used approach for the management of IHD when introduction of saphenous vein graft replacement For the severe occluded arteries by Favorolo and Garret in 1967.

Complications of CABG and PTCA

PTCA involves a guide wire and an inflated balloon into the affected coronary artery and enlarging the lumen of the artery by stretching the vessel wall. This frequently causes atheroma plaques fracture by stretching inelastic components and denudation of the endothelium which results in loss of nitric oxide and other vasodilators and exposure of plaque contents to the vascular compartment. Consequently, immediate vascular recoil, platelet adhesion and aggregation, mural thrombus formation, smooth muscle proliferation and synthesis of extra cellular matrix may give rise to acute occlusion and early or late restenosis. In CABG, operative mortality is reported to range from 1-3% and is related to the number of vessels involved and pre-operative ventricular function. Neurologic dysfunctions is relatively common in post- operative CABG patients (6%), but are clinically significant and resolve with time[1]. Despite all these risk profile in CABG and PTCA, the mortality rate is declining owing to an increased experience and improved surgical strategy. This suggests that the proportion of patients who remain at increased risk of adverse outcomes should have special care requirements after CABG and PTCA[2].

Prevalence of co-morbidities

From various studies it was found out that approximately 35% patients who underwent CABG or PTCA had Diabetes Mellitus, 25 % had Peripheral Vascular Disease (PVD), 18% had Chronic Obstructive Pulmonary Disease (COPD), 12 % had moderate to severe renal failure.

Approximately 20.3 % were obese of which 6% were severely obese. 19.3% patients had Peptic Ulcer Diseaseand2.5%had cancer[2-4].

Table 1: The Average Prevalence of Various co-Morbid Conditions from Different Studies

Co-morbid condition	% prevalence
Diabetes Mellitus	35%
Peripheral Vascular Disease	25%
COPD	18%
Renal Failure	12%

Diabetes Mellitus

In approximately 35% of patients undergoing CABG and PTCA, diabetes mellitus was present. Among the 1504 non-insulin treated diabetes, there were 270 deaths. Analyses from Bypass Angioplasty Revascularization Investigation (BARI) showed that diabetes with subsequent Q-wave Myocardial Infarction fare better after CABG than after Percutaneous Coronary Intervention (PCI). In Patients with poor Left Ventricular function and diabetes mellitus CABG is indicated than PCI and also for those who have failed PTCA. Although internal mammary artery and vein graft patency appeared to be similar in diabetes and non- diabetes, restenosis is markedly higher in diabetes. Diabetes mellitus has been associated with development of cardiovascular diseases. The incidence of diabetes ranges from 12-38% in CABG patients and is a strong predictor of risk of death and mediastinitis. Renal failure and PVD which are diabetic co-morbidities have also been associated with increased short term morbidity and mortality with CABG surgery and also have a significant impact on both the annual incidence of death and long term survival. Survival among diabetic subjects was significantly worse than among non-diabetic subjects. Annual incidence of death among diabetic subject was 5.5 deaths per 100 persons. However when patients with diabetes only (incidence rate=4.4) were compared with those with diabetes and PVD (incidence rate=8.40) or diabetes and renal failure (16.3) or both (26.3) a marked survival difference was noted. Adding ≥ 1 of these co-morbid conditions to diabetes increased the risk of death from two fold to more[5].

Chronic Obstructive Pulmonary Disease

The incidence of Chronic Obstructive Pulmonary Disease (COPD) in patients having CABG varies from 4-27% in different studies. Previous results have suggested that patients with COPD under going CABG experiences some increased morbidity and mortality risks following study. Researchers have found COPD patients to have a longer ICU length of stay, increased risk of prolonged ventilation, post-operative congestive heart failure and stroke. From a cohort study the patients with COPD diagnosis who underwent CABG has significantly longer hospital stay

(6.7±6.0days vs. 5.9±6.1days, p<0.05), more likely to significantly elevate their creatinine after surgery, more prolonged ventilation, more likely to get pneumonia and significantly more mortality. From a large multicenter study it was found that patients with COPD alone have a longer Hazard ratio for death when compared with other comorbidities[6-11]. From a study of 191 patients, 129 male patients and 62 female patients underwent CABG who had COPD with FEV1 (Forced Expiratory Volume in1st second) less than 75% of predicted value, showed higher hospital mortality and morbidity rate. Complications included atrial fibrillation and pneumonia. Complication of atrial fibrillation may be due to high prevalence of other well-established risk factors including advanced age, cardiopulmonary bypass use and beta blocker withdrawal[12]. In the minority of patients with severe COPD, who are receiving steroid and > 75 years, the hospital mortality rate is exceptionally high[13].

Rheumatoid Arthritis

Rheumatoid arthritis (RA) is a chronic progressive disease involving multiple organ systems. The most common cause of death in patients with RA is Coronary Artery Disease (CAD).The rapid progression of CAD in RA patients is due to the difficulty in controlling inflammatory processes as well as to changes in vascular endothelial cells caused directly by treatment with steroids. In treating CAD patients with RA, possible adverse effects should be carefully considered. RA can be considered as an independent risk factor for Myocardial Infarction (MI), Cerebro Vascular Accident (CVA) and probably for Congestive Heart Failure (CHF)[14-16]. From a study of 11,572 patients RA was associated with an increased risk for current MI of 2.1andlife time MI of 1.28[17]. Several studies have now demonstrated an association between markers of inflammatory activity and manifestations of cardio vascular diseases. The higher level of c-reactive proteins (CRP), the infiltration of t-cells and macrophage in the initiation of atherosclerotic lesion where all point towards the association between RA and CAD. Those who have higher sensitivity for CRP are at increased risk for CAD, in fact greater than lipid and homo cysteine level. Another study found an increase in thrombotic markers in RA patients compared to community controls[18-22]. In a cohort study of 603 matched individuals with RA, the risk of unrecognized MI constitutes upto 30%ofMIs in community[23]. Several pathologic mechanisms have been implicated including individual difference in pain perception and generalized hyposensitivity to myocardial ischemia. According to the inflammation- based hypothesis, there is higher production of anti-inflammatory cytokines with lower expression of CDIIb /CD18 adhesion molecules on phagocytes among patients with asymptomatic ischemia. The RA patients are more inclined to link their chest pain to RA than MI and may not consult physician. RA subjects are less likely to undergo CABG because of less

identification[24-27)]. From a study of 35 RA patients who have under gone PTCA 58.54% are male, 41.46 % are female. 43.33 % of people belong to age group 50-59 and 56.67 % belong to > 60[28]. From a study it was found that among patients with MI, RA was associated with an increased use of thrombolysis and PTCA[29].

Anxiety and Depression

Anxiety is a negative emotion that occurs in response to perceived and may have medical or psychological consequences when it is persistent or severe. Anxiety is considered to be a risk factor for development of coronary heart disease (CHD) and associated with cardiac mortality as sudden cardiac death. It is probably under-diagnosed or little is unknown. In a literature, 142 consecutive patients undergoing CABG 34.7% were clinically anxious before their operation while 24.7 % were anxious afterwards. Gallagha et al reported that anxiety level did not change from before to after surgery remaining low to moderate. Given the negative impact of anxiety in cardiac patients, it is essential that clinician should accurately determine that which patients are anxious and manage them effectively. In congruent with prior research reports women have higher anxiety than men. In a study anxiety scores reduced from before to 18 months after that. It has also shown higher anxiety before surgery was associated with worse mental health. Identifying patients likely to experience anxiety symptoms before CABG surgery and to highlight risk group will enable as to design specific interventions that predominantly focus on reduced patients anxiety and improve quality of life[30]. The risk of sudden cardiac death is elevated by anxiety disorder. Pathophysiologically ventricular arrhythmias are considered to explain this phenomena[31].

In a study conducted anxiety and depression has significant correlation with age and as age increases depression and anxiety scores was also increased. The prevalence of depression in patients with diagnosed CHD is quoted between 20-40 % [32-33]. Depression is regarded as an independent risk factor for atherosclerotic deposits in coronary arteries. The pathophysiological processes to explain this relationship are hypercholesterolemia and related to insulin resistance, sympathetic vagal disbalance, related to disturbed regulation of blood pressure and an unfavorable lifestyle like cigarette smoking[34]. Depression does not only account for a raise in first time CHD manifestation, but it is also related to the success of secondary and tertiary prevention[35]. Pre-surgical as well as post-surgical depression increases physical and psychosocial morbidity 6 months and 5 years after CABG surgery[36-37]. Depression is strongly co-related with the presence of angina with in a CHD population. Treatment of depression has been shown to reduce chest discomfort, ischemia and utilization of medical care. The depression scores of patient with a cardiac history (MI, PCI or CABG) seem to remain stable over the six month follow up period,

whereas the level of depression in patients without a cardiac history decreases overtime. A number of studies showed that depression may be a predictor of angina and in other cases depression may be the result of the angina condition[38-42]. Previous studies has demonstrated repeatedly that depression is significantly related to morbidity and mortality after cardiac events. Therefore it is important, both from a clinical and a research perspective to assess depression after a patient has experienced a cardiac event[43-44]. From a study of total of 204 participants 22% had major depression. 28(14%) of 204 depressed participants reported not taking their medication as prescribed compared with 40 (5%) of 736 non-depressed participants. Twice as many depressed participants as non-depressed participants (18% vs 9%) reported forgetting to take their medication. 9% of depressed participants and 4% of non-depressed participants reported deciding to skip their medication. The relationship between depression and non-adherance persisted after adjustment for potential confounding variable including age, ethnicity, education, social support and measures cardiac disease severity[45].

CONCLUSION

There is a significant relationship between the wellness of the patient after the coronary revascularization procedure and the co-morbid condition they suffer. The commonly found comorbidities are diabetes mellitus, chronic obstructive pulmonary disease, peripheral vascular disease, renal insufficiency, rheumatoid arthritis, anxiety, depression etc. Diabetes mellitus is a chronic risk factor for CAD and also act as a cause for the re-occlusion of graft or stented blood vessel. COPD worsens the outcome of patients after CABG or PTCA. Rheumatoid Arthritis act as a factor for re-occlusion after CABG or PTCA since it act as risk factor for CAD. The psychological factors such as anxiety and depression directly and indirectly act as the factors for re-occlusion after CABG and PTCA by their influence on the physiological system. Therefore the management after CABG and PTCA may not be a procedure based care; but an over-all care that considers the co-morbid and psychological factors of the patient which will improve the quality of life of the patient and decreases the chances for re-occlusion. Since CABG and PTCA are costly procedures, decreasing chances of re-occlusion can have an impact on the financial level by preventing the need of a further procedure.

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