# PROGNOSTIC VALUE OF CHRONIC OBSTRUCTIVE PULMONARY DISEASE IN CORONARY ARTERY BYPASS GRAFTING SURGERY

THESIS

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# Abstract

In this study, Estimates based on the presence of airflow limitation are most accurate, since symptoms and self-report clinician diagnosis lack sensitivity and specificity. FEV1 /FVC < 0.7, in combination with a FEV1 < 60% of predicted value, in an individual with cough, sputum production or dyspnea and exposure to risk factors confirms the diagnosis.

Cases of COPD could be under diagnosed in the presence of a other severe disease such as coronary artery disease. In the present study, COPD was defined when the FEV1/FVC was <0.7. Absolute FEV1 in litres has been used by other studies but FEV1 in percentage of predicted value is a more reliable parameter because it is adjusted to patient's age and size.



## Key Words:

Farced Vital Capacity – Electrocardiogram .

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***Samy Mahmoud Amin***

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# Abbreviations

| | |
|---|---|
| CABG | Coronary artery bypass graft |
| COPD | Chronic obstructive pulmonary disease |
| FEV1. | Forced expiratory volume in first second. |
| FVC | Farced vital capacity. |
| PFT | Pulmonary function test |
| ABGs | Arterial blood gasses |
| ICU | Intensive care unit |
| LAD | Left anterior descending artery. |
| LCA | Left coronary artery. |
| LCX | Left circumflex artery. |
| LIMA | Left internal mammary artery. |
| LM | Left main coronary artery. |
| LVF | Left ventricle function |
| MI | Myocardial infarction. |
| NYHA | New York Heart Association. |
| AHA | American heart association |
| CCSC | Canadian Cardiovascular Society Classification |
| O2 sat. % | O2 saturation percent. |
| $PaCO_2$ | Partial pressure of CO2. |
| $PaO_2$ | Partial pressure of O2. |

| | |
|---|---|
| ECG | Electrocardiogram |
| pTCA | Percutaneous transluminal coronary angioplasty. |
| RCA | Right coronary artery. |
| IABP | Intra aortic balloon pump |
| SD | Standard deviation. |
| SVG | Saphenous vein graft. |
| IHD | Ischemic Heat Disease |
| EF | Ejection Fraction |
| IgE | Immunoglobulins E |

# Introduction

Coronary artery bypass grafting (CABG) is a safe and effective surgical intervention that is performed successfully with advanced technology methods and distinctive strategies for a wide range of patients. Recently, CABG has been performed even on elderly patients with comorbid medical problems such as Chronic Obstructive Pulmonary Disease (COPD) more than in the past. ***(Naunheim Ks et al., 1988).***

COPD is characterized by airflow limitation and its diagnosis is confirmed with respirometry.Assessment of the severity of the preoperative pulmonary dysfunction is performed using the respirometry too. ***(Pawels R et al., 2001).***

COPD was defined when a compatible clinical picture was observed when there was a chronic obstruction to the airflow and when other conditions with similar symptoms were ruled out. Obstruction to the airflow was confirmed with respirometry when the post bronchodilator FEVI/FVC was < 0.7. A restrictive disease was diagnosed when FEVI/VC was > 0.85 in conjunction with other respirometric characteristics. ***(Mannino DM et. al., 2002).***

Chronic Obstructive Pulmonary Disease (COPD) has been identified as an important preoperative risk factor for morbidity and mortality in patients undergoing CABG. This comorbidity has been generally considered by most of the operative risk scores, but its functional severity has seldom been addressed by these models. ***(Medalion B et. al., 2004).***

## Hypothesis

COPD can be of deleterious prognostic factor but this effect is directly related to the degree of functional severity. Sever obstructive lung disease is detected with FEV1< 70%.Patients with sever COPD may have higher incidence of complications with CABG surgery especially with cardio pulmonary bypass & median sternotomy e.g. lung injury, atelectasis, prolonged ventilation, ICU stay, hospital stay, arrhythmias, in hospital mortality....etc.

## Aim

Our objective in this study is to analyze the prognostic relevance of COPD on CABG patients considering preoperative pulmonary function parameters, in-hospital mortality & complications related to COPD & its degree of functional severity.

# History of Coronary Artery Surgery

Coronary artery bypass grafting (CABG) is the most common procedure performed in adult cardiovascular surgery nowadays.

The history of coronary bypass surgery began in 1910 when **Alex Carrel** hypothesized that angina pectoris could be treated with an indirect anastomosis between the descending aorta and the left coronary artery: using a preserved carotid artery, he attempted this procedure on a dog, but was unsuccessful due to ventricular fibrillation in the animal **(Carrel, 1910).**

**Sabiston** of Duke University applied this innovative technique to the clinical arena 52 years later in 1962 when he attempted the first coronary artery bypass, utilizing the greater saphenous vein. The patient died 2 days later as a result of cerebrovascular accident attributed to a thrombus formed at the saphenous vein to aortic anastomoses **(Sabiston, 1974).**

In 1964 at Baylor College of Medicine, **Green** performed the first successful saphenous vein - coronary artery bypass procedure on a 42-year-old man. The patient returned 7 years later with an angiogram which revealed that the vessel had remained open and functional **(Green et al., 1972).**

In 1966, while physicians where experimenting with bypass procedures involving the saphenous vein, **Kolessov,** a Russian surgeon, performed the first successful coronary artery bypass using the internal mammary artery (IMA). By the middle of the year, he had performed 6 of

these operations **(Kolessov, 1967).** Many surgeons out side Russia, however, remained unaware of his accomplishment.

One year later, **Favaloro** reported that CABG utilizing the great saphenous vein autografts had been successfully performed on 53 out of 55 patients at the Cleveland Clinic **(Favaloro, 1968).** By late 1968, **Green** became the first American surgeon to repeatedly use the IMA as his primary bypass conduit. He successfully implanted internal mammary to coronary artery anastomosis in 165 patients during the next 3 years. However, the short-term follow-up of the IMA and saphenous vein graft (SVG) was not dramatically different **(Green, 1972).** With the greater clinical difficulty of using the IMA as well as concerns about its flow capacity, many surgeons continued to use the SVG as their primary conduit of choice.

The great saphenous vein continued to be the conduit of choice for more than 20 years. It is easily harvested, has a diameter similar to that of the coronary arteries, is generally available in large quantities, and has a better flow than the internal mammary artery **(Flemma et al., 1975).** It is also less dependent on homodynamic factors in the patient and less responsive to vasoconstriction related to inotropic agents. As time elapsed, however, it became increasingly evident that the greater saphenous vein graft has several distinct disadvantages.

Early patency studies showed a one-month occlusion rate of approximately 10%, a 2-4% per year occlusion rate in the first 5 years and a doubling of this rate to 4-8% per year after the fifth year **(Grondin et al, 1984).**

By 1980, a survey showed 87% of surgeon still preferred the SVG as their primary conduit **(Miller, 1981).** Longer term follow-up, however, showed clearly that the use of a single IMA graft, usually to the left anterior descending artery, has increased long-term patency, over the SVG, translating into improved survival and decreased cardiac morbid events. By the middle of 1980's, cardiac surgeons were beginning to understand the limitation of saphenous vein grafts and they turned to the internal mammary artery as a possible surgical solution. Subsequently, a surge in the use of IMA as well as the use of bilateral and sequential IMA graft has occurred.

Prolonged patency and resistance to atherosclerosis are the most appealing features of the IMA. Patency rate of 95% after ten years were reported in several prominent studies (e.g. **Lytle et al., 1985).** In addition, atherosclerosis has been demonstrated to occur less frequently in the IMA than in the great saphenous vein, 4% as compared to 26% **(FitzGibben, 1986).**

**Cameron** and co-workers performed a 15 year follow-up study and documented significant decrease in anginal recurrence, non-fatal postoperative myocardial infarction and reoperation. Survival rates improved if at least one internal mammary graft was used in both the short and long-term **(Loop et al., 1984). Dr. He and his colleagues** published a study in 1994 indicating that fewer patients who received IMA bypasses experienced postoperative low cardiac output, neurologic deficits, pulmonary complications, intra-aortic balloon pumping or prolonged respiratory support.