Off Pump versus On Pump Coronary Revascularization

A Thesis submitted for Partial fulfillment of
MD Degree in Cardiothoracic Surgery

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2013

Acknowledgement

I wish to express my thanks to **Prof. Dr. Mohamed Magdy Moustafa Ali** Professor of Cardiothoracic Surgery for his kind supervision and support

I am greatly thankful to **Prof. Dr. Gamal Samy Syed Mohamed** Professor of Cardiothoracic Surgery who learnt me a lot

I am also grateful to **Prof. Dr. Mohamed Atia Husain Ahmed** Professor of Cardiothoracic Surgery for his kindness and help

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Introduction

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Ischemic heart disease is defined as insufficient blood supply to the myocardium due to atherosclerosis in the coronary arteries. Classic symptoms of the disease are angina pectoris and myocardial infarction. **Moller CH et al, 2012**.

Ischemic heart disease can be treated with medical therapy, percutaneous coronary intervention (PCI), or coronary artery bypass grafting (CABG). The choice of intervention depends on the degree of disease and symptoms, as well as patient comorbidity, **Moller CH et al, 2012**.

Coronary artery bypass grafting (CABG) surgery reduces mortality in patients with severe ischemic heart disease, especially those with left main, triple vessel, or single/double vessel disease with stenosis of the proximal left anterior descending (LAD) artery. **André Lamy, 2012.**

Coronary bypass surgery performed without the use of cardiopulmonary bypass (off-pump surgery) has been used sporadically since the beginning of the bypass surgery era in 1967, but the use of this strategy increased substantially during the 1990s. The major reason for the increased use of off-pump surgery was the hope that this strategy would decrease perioperative morbidity and possibly mortality by eliminating cardiopulmonary bypass (on-pump surgery).

The fear concerning off-pump surgery has been that the difficulty of operating with the heart beating would lead to less-complete and less-effective revascularization at the time of surgery and worse long term outcomes. These advantages and disadvantages have been examined in several studies that compared the outcomes of patients undergoing off-pump and on-pump surgery. **Whady Hueb, 2008.**

The absence of guidelines for the use of one or the other technique has allowed individual decision-making according to the experience of the surgeon. The rationality for off-pump surgery is reduced morbidity, and reduced adverse effects attributed to on-pump surgery, including an inflammatory response caused by the circulation of blood through the cardiopulmonary circuit and the formation of microemboli. **Whady Hueb, 2008.**

Cardiopulmonary bypass (CPB) has allowed the establishment of coronary artery bypass graft (CABG) surgery as a safe and effective treatment for patient with ischemic heart disease. However, concern has been raised that CPB may be responsible for CABG-related morbidity, and it has been suggested that CABG surgery itself would be safer without CPB. The development of commercially available cardiac stabilization devices resulted in several large, nonrandomized, retrospective case series demonstrating

that CABG surgery can be performed safely without CPB (off pump) and were suggestive of benefits when compared with conventional CABG. **Wojtek Karolak, 2007.**

Aim of the Work

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The aim of the study is to compare the short term outcome of off-pump versus on-pump coronary artery revascularization in terms of mortality, and morbidity like stroke, peri-operative myocardial infarction, renal failure, post-operative bleeding, intensive care unit (ICU) stay, hospital stay, and rate of new post-operative atrial fibrillation.

The results of this study will be discussed and compared to similar studies in the literature.

The aim of this study also is to review the recent literature and updates for both the off-pump and on-pump coronary artery revascularization in terms of patient selection, preparation, technique and management.

In this study also we will try to outline the possible recommendations regarding the off-pump and on-pump coronary artery revascularization.

Review of Literature

Review of Literature

Anatomy of Coronary Arteries

Overview of the coronary arteries in different angiographic projections

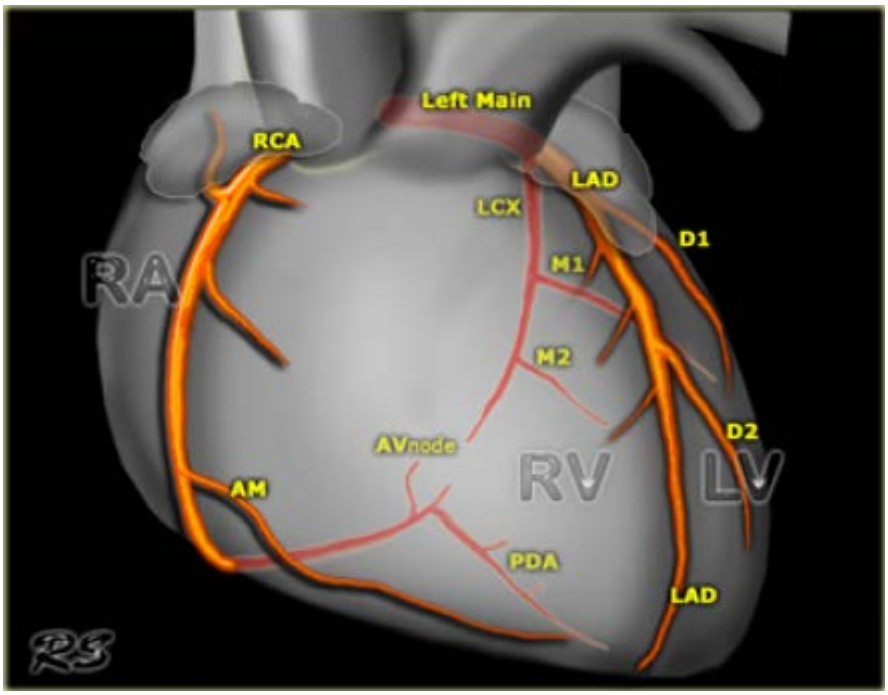

Figure 1: Overview of the coronary arteries in the anterior projection:

- Left Main or left coronary artery (LCA)

- Left anterior descending (LAD)
  Diagonal branches (D1, D2)
  Septal branches

- Circumflex (Cx)
  Marginal branches (M1,M2)

- Right coronary artery

- Acute marginal branch (AM)
- AV node branch
-Posterior descending artery (PDA)

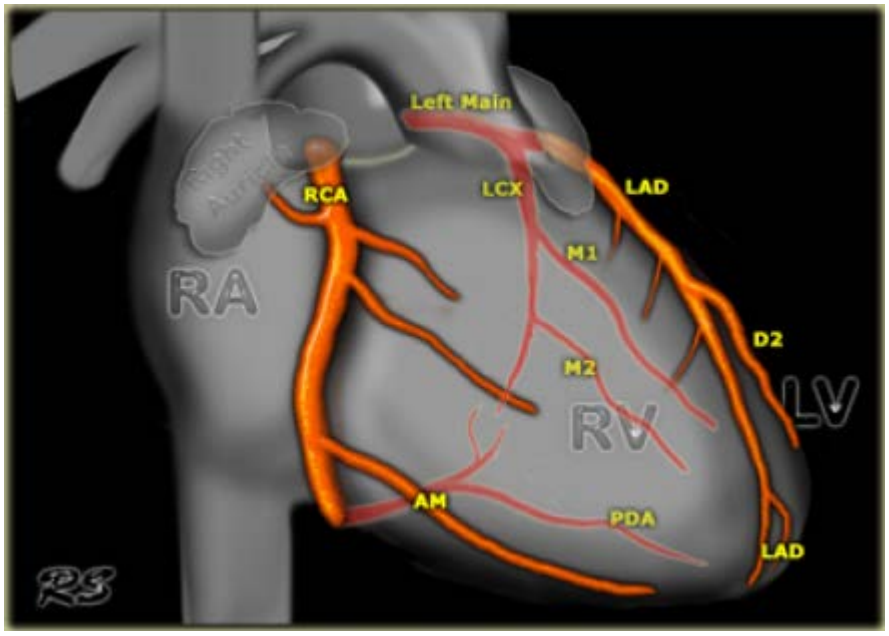

Figure 2: Overview of the coronary arteries in the right anterior oblique projection:

- Left Main or left coronary artery (LCA)

- Left anterior descending (LAD)

  Diagonal branches (D1, D2)
  Septal branches

- Circumflex (Cx)

  Marginal branches (M1,M2)

- Right coronary artery

- Acute marginal branch (AM)
- AV node branch
-Posterior descending artery (PDA)

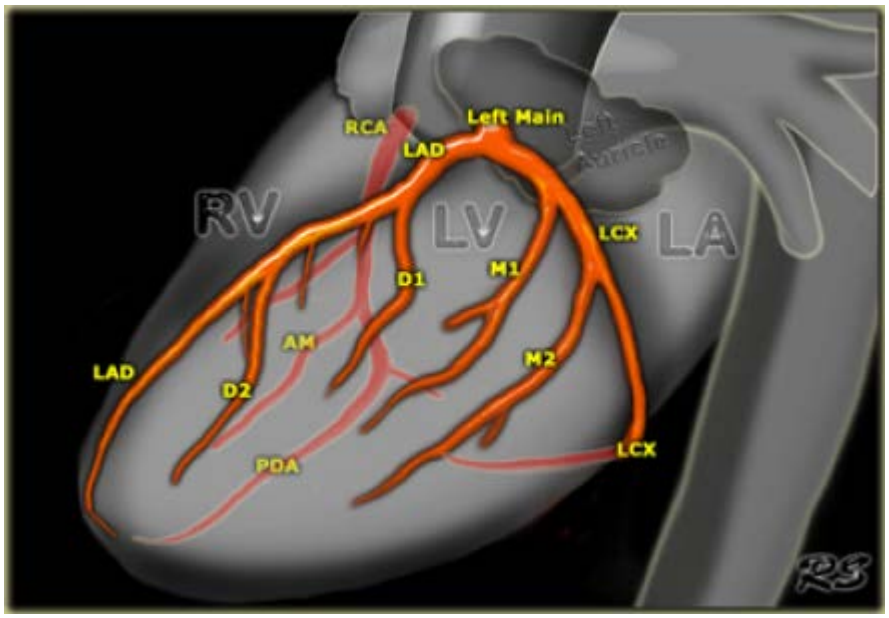

Figure 3: Overview of the coronary arteries in the lateral projection:

- Left Main or left coronary artery (LCA)

- Left anterior descending (LAD)

  Diagonal branches (D1, D2)
  Septal branches

- Circumflex (Cx)

  Marginal branches (M1,M2)

- Right coronary artery

- Acute marginal branch (AM)
- AV node branch
-Posterior descending artery (PDA)