



Original article

# Reconstructing diffusely-diseased LAD using long-opening LAD-Endarterectomy followed by direct LIMA anastomosis versus indirect LIMA grafting to an on-lay saphenous vein patch: Comparative prospective study

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Received 29 March 2016; accepted 4 May 2016

Available online 16 June 2016

## Abstract

**Background:** Surgical revascularization of CAD patients having diffusely-diseased LAD is a difficult surgical problem. Following long LAD-endarterectomy (LAD-LCE), some surgical centers prefer long direct LIMA-to-LAD grafting; others perform LIMA grafts to on-lay SVG patch. Favoring either technique depends on multiple factors and is still questionable. This study was performed to compare the experience and early results of using direct LIMA-to-LAD anastomosis with endarterectomy to indirect anastomosis by LIMA-to on-lay SVGs during standard CABG.

**Methods:** Thirty patients who had IHD with diffusely-diseased LAD coronary vessel were included in a prospective comparative study starting from March 2011 till March 2014, in Kasr al Aini's University Hospitals. All patients had diffusely-diseased LAD for which they were subjected to long opening LAD-CE. Patients were divided into two groups: Group I (15 patients) underwent direct long segment LIMA-to-LAD implantation with CE; while in group II (15 patients) underwent LIMA grafting on an on-lay SVG. Follow-up was done over the first year postoperatively: major cardiac adverse events, death, MI, hospital readmission, reoperation and/or revascularization were followed since discharge and over one year later.

**Results:** Two patients died in each group (total mortality 13%). In group I, one due to refractory LV failure; and one due to refractory ventricular arrhythmias. In group II, a patient died due to mediastinitis and a second patient died due to progressive liver failure. There were no MI, CHF, or CNS complications.

**Conclusion:** LIMA-to-LAD following long-opening LAD-LCE could be safely-performed using both techniques. Both procedures were technically successful to revascularize diffusely-diseased LAD.

**Abbreviations:** CABG, Coronary Artery Bypass Grafting; CAD, Coronary Artery Disease; CE, Coronary Endarterectomy; CHF, Congestive Heart Failure; CNS, Central nervous system; CPB, Cardiopulmonary Bypass; IABCP, Intraaortic balloon counterpulsation. Statistical significance if result <0.05; ICU, Intensive Care Unit; LAD, Left Anterior Descending; LAD-LCE, Left Anterior Descending Long Coronary Endarterectomy; LIMA, Left Internal Mammary Artery; MI, Myocardial infarction; PO, Postoperative; SV, Saphenous vein; SVG, Saphenous Vein Graft.

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Peer review under responsibility of The Egyptian Society of Cardio-thoracic Surgery.

<http://dx.doi.org/10.1016/j.jescts.2016.05.002>

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*Keywords:* Coronary artery disease; Coronary by-pass; Endarterectomy; LIMA patch; Onlay vein patch

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## 1. Introduction

It is well-known that coronary artery bypass graft (CABG) surgery significantly increases life expectancy, so complete myocardial revascularization should be the main goal of the surgical intervention process [1–3]. As there is a growing trend towards the increased use of percutaneous interventions, the number of high-risk and elderly patients referred for CABG operation has increased [4].

Because the diffusely diseased nature of the LAD lesion(s) in the fragile elder patient subset is frequently encountered, complete myocardial revascularization may not be always satisfactorily achieved by conventional bypass techniques [5].

Coronary endarterectomy in the LAD vessel is a procedure that has been proposed as a possible solution for revascularization of a diffusely-diseased LAD [5,6]. However, many surgeons are still avoiding the use of this procedure because of the conflicting and controversial opinions [7–9]. Technically, LAD-CE is done by the traction technique [10]. LIMA-LAD anastomosis is then done. This procedure was accused to be responsible for postoperative mortality ranging between 3 and 11% [4–6]; and postoperative MI ranging between 5 and 14% [5–9]. Moreover, LAD-CE was claimed to result in uncertain mid and long-term PO clinical results [8–11].

Owing to concerns in LAD-CE, cardiac surgeons shifted to focus on new techniques that can avoid its use [12–14]. Recently, different means of LAD reconstruction using LIMA patch long-segmental anastomosis; and indirect LAD patching to a long saphenous vein patch were introduced in this special subgroup of patients to afford complete myocardial revascularization [14–16].

Early results comparing these approaches are still conflicting, and only a limited number of studies have reported the comparative clinical outcome, patency rates, and the incidence of cardiac-related events during postoperative follow-up [11]. Due to these heterogenous and composite nature of the (elder) patient population (having many inter-influencing co-morbidity factors), these studies were not able to provide solid conclusions [15–19].

## 2. Objective

This comparative prospective study reviews our experience and early results of reconstruction of the diffusely diseased LAD by conventional standard CABG. This study compares LIMA-to-LAD direct long anastomosis versus indirect LIMA grafting to an on-lay Saphenous vein patch following long-opening LAD-LCE.

## 3. Patients and methods

### 3.1. Participant patient population

This comparative prospective study was carried out after obtaining the approval of the local ethical committee and patients' written informed consent in Kasr El Aini's University Hospitals, during the time span between March 2011-and-March 2014. Thirty patients with CAD associated with diffusely-diseased LAD among other coronary atherosclerotic lesions were enrolled. All patients underwent elective standard CABG surgical coronary revascularization during which LIMA was grafted to LAD by either of the described techniques after long-opening LAD-CE. All operations were done using CPB under moderate hypothermia and 20-min intermittent blood-enriched antegrade cardioplegia.

### 3.2. Inclusion criteria

Diagnosis of advanced IHD with marked ischemia (>70% stenosis) of multiple coronary vessel together with diffusely-diseased LAD. Diagnosis was reached by clinical examination and investigations (e.g.: ECG, echocardiography, coronary angiography and Thallium study). All patients were submitted for long-opening LAD-CE.

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