

How to set up a minimally invasive coronary revascularization program

Sotirios Marinakis, Elly Chaskis, Serge Cappeliez, Karim Homsy, Yasmine De Bruyne, Claire Viste, Steeve Dangotte, Adrien Poncelet, Christophe Lelubre, Badih El Nakadi
CHU Charleroi, Lodelinsart, Belgium

ISPPC
CHU de Charleroi

Background:

Minimally invasive procedures for coronary revascularization have been performed for over 20 years; however, their technical complexity, steep learning curves and absence of training programs explain the weak acceptance of these techniques. The aim of this study is to describe the step-by-step learning process on how to establish a minimally invasive coronary artery revascularization program.

Methods:

All patients who benefited from an endoscopic atraumatic coronary artery bypass (Endo-ACAB) in our hospital, from July 2018 to May 2020 (n=30) were identified. We did not apply any physical characteristics or other comorbidities as exclusion criteria. Baseline demographics, peri, postoperative and laboratory data were extracted from each patient's medical records. A single surgeon operated all patients. These results were compared to our left internal mammary artery (LIMA) to left anterior descending artery (LAD) off pump coronary artery bypass (OPCAB) cohort (n=23).

Results:

Twenty-eight of 30 patients were planned for a single LIMA-LAD Endo-ACAB. The remaining two had a T-graft double Endo-ACAB. Ten patients had a hybrid revascularization with the culprit lesion being treated first. Three patients were converted to sternotomy because of a LIMA lesion during thoracoscopic harvesting. We accounted three major adverse cardiovascular events (MACE). Demographic, peri and postoperative data showed no significant differences between the Endo-ACAB and the OPCAB group.

Conclusion:

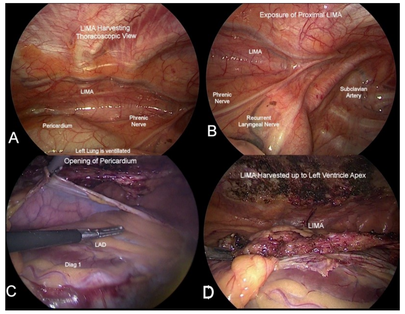
Endo-ACAB is a technically demanding operation, however, it can safely be introduced in centers with no previous experience with no extra cost in terms of morbidity or mortality. Thoracoscopic LIMA harvesting is the most demanding surgical skill to acquire.

Central Message:

The new era of hybrid revascularization nudges cardiac surgeons to adopt new skills in coronary surgery. It is high time minimally invasive coronary bypass grafting (MICS-CABG) becomes the mainstream for at least one vessel disease. MICS-CABG can safely be introduced in centers with no previous experience with no extra cost in terms of morbidity or mortality.

Keywords:

Endo-EACAB, MICS-CABG, Hybrid Coronary Revascularization



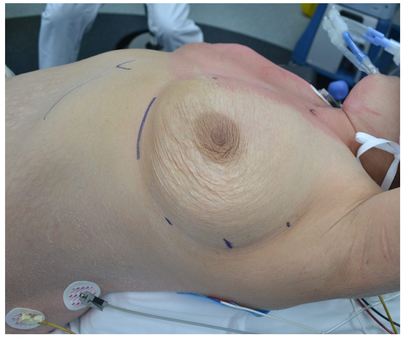




Table 1: Patients' Demographics

Abbreviations: BMI, Body Mass Index; AF, Atrial Fibrillation; NYHA, New York Heart Association;

	EACAB (n= 30)	OPCAB (n= 23)	*p* Value
Age in years, median (IQR)	**62 (57.8- 71)**	**63 (56- 77)**	**0.634**
BMI, median (IQR)	**26.6 (23.9- 30.8)**	**28.7 (25.3- 34.6)**	**0.208**
Male Gender, n (%)	**22/30 (73)**	**19/23 (83)**	**0.349**
Euroscore II, median (IQR)	**1,04 (0,68- 1,79)**	**1,08 (0,75- 1,85)**	**0.719**
Creatinine clearance, medi-	**94,7 (63- 110,3)**	**84,3 (72- 117)**	**0.729**
Dialysis, n (%)	**1 (3)**	**0**	**0.776**
Diabetes, n (%)	**8/30 (27)**	**6/23 (26)**	**1**
Tobacco history, n (%)	**19/30 (63)**	**6/23 (26)**	**0.001**
Hypertension, n (%)	**22/30 (73)**	**14/23 (61)**	**0.384**
Hypercholesterolemia	**26/30 (87)**	**15/23 (65)**	**0.098**
Preoperative AF, n (%)	**1/30 (3)**	**1/23 (4)**	**1**
Chronic Lung Disease, n (%)	**2/30 (6)**	**2/23 (9)**	**1**
Cerebrovascular accident, n	**0**	**0**	-
Recent myocardial infarc-	**6/30 (20)**	**3/23 (13)**	**0.715**
Urgent surgery, n (%)	**6/30 (20)**	**4/23 (17)**	**1**
NYHA I + II, n (%)	**27/30 (90)**	**18/23 (78)**	**0.272**
Good LVEF (>50%), n (%)	**21/30 (70)**	**18/23 (78)**	**0.547**
Reoperation, n (%)	**0/30**	**1/23 (4)**	**0.434**

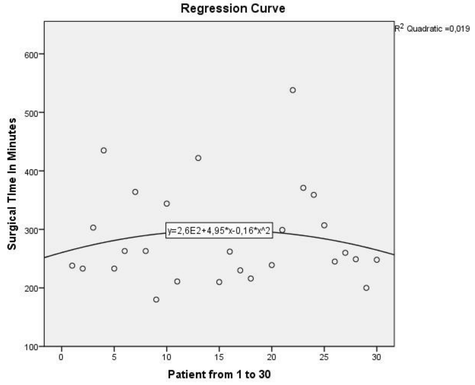


Table 2: Perioperative and postoperative data

Abbreviations: CABG, Coronary Artery Bypass Graft; AF, Atrial Fibrillation; MACE, Major Adverse Cardiac Event.

	EACAB (n= 30)	OPCAB (n= 23)	*p* Value
Single vessel CABG, n (%)	**28/30 (93)**	**23/23 (100)**	**0.499**
Hybrid Revascularization, n (%)	**10/30 (33)**	**1/23 (4)**	**0.015**
Conversion to sternotomy, n (%)	**3/30 (10)**	**Not Applicable**	-
Conversion to on-pump CABG, n (%)	**2/30 (7)**	**2/23 (9)**	**1**
Surgery duration, median (IQR) (min)	**263 (233- 316)**	**No Available Data**	-
Postoperative length of stay, median (IQR) (days)	**7 (6- 9)**	**8 (7- 9)**	**0.490**
Intensive Care Unit length of stay, medi- an (IQR) (hours)	**42 (22- 68)**	**24 (24- 30)**	**0.436**
Postoperative intubation time, median (IQR) (hours)	**8 (5- 14)**	**No Available Data**	-
Drain output at 24h, median (IQR) (ml)	**345 (200- 533)**	**No Available Data**	-
Need for transfusion, n (%)	**7/30 (23)**	**1/10 (10), No transfusion data before 2014**	**0.412**
Deep Wound Infection, n (%)	**0/30**	**1/23 (4)**	**0.434**
New onset postoperative AF, n (%)	**8/30 (27)**	**4/23 (17)**	**0.519**
Reoperation for bleeding, n (%)	**1/30 (4)**	**1/23 (4)**	**1**
Target vessel revascularization, n (%)	**1/30 (4)**	**0/23**	**1**
Stroke, n	**0/30**	**0/23**	-
Myocardial Infarction, n (%)	**2/30 (7)**	**0/23**	**0.499**
Mortality at 30 days, n	**0/30**	**0/23**	-
MACE at 30 days, n (%)	**3/30 (10)**	**0/23**	**0.249**

Table 3: Laboratory data

		EACAB (n= 30)	OPCAB (n= 23)	*p* Value
Hb g/dL, median (IQR)	Pre-op	**13.6 (12.4- 15.4)**	**14.1 (12.7- 15.3)**	**0.876**
	Day 1 post-op	**11.6 (10.2- 13.1)**	**12.1 (10.7- 13.6)**	**0.572**
Plat x 1000/m^3, median (IQR)	Pre-op	**243 (192- 280)**	**223 (177- 263)**	**0.282**
	Day 1 post-op	**196 (136- 221)**	**182 (169- 215)**	**0.862**
Creatinine clearance, median (IQR) (ml/ min)	Pre-op	**95 (63- 110)**	**84 (72- 117)**	**0.729**
	Day 1 post-op	**103 (65- 124)**	**100 (71- 106)**	**0.852**
Troponin, median (IQR)	Pre-op	**0.005 (0.002-**	**No Available Data**	-
	Day 1 post-op	**0.275 (0.07- 1.052)**	**No Available Data**	-