Poster Walk: Surgical Questions around ACS

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Minimal invasive extracorporeal circulation circuits demonstrate advantages compared to conventional extracorporeal circulation in redo coronary artery bypass grafting: a propensity score analysis

P.P. Heinisch1, G. Erdoes2, F. Fisler1, M. Mihalyjö3, B. Gahljö4, H.-J. Jenn4, F. Schönhoff4, L. Englberger4, A. Kdamer1, C. Huber3, T. Carrel1
1Cardiovascular Surgery | Cardiovascular Research Institute Basel (CRIB), 2Cardiac Surgery, 3Department of Anaesthesiology and Pain Medicine, 4Institute of Social and Preventive Medicine, Inselspital Bern, Berne, 4Department of Cardiovascular Surgery, Geneva University Hospital, Geneva, Switzerland

Introduction: Minimal invasive extracorporeal circulation circuits (MiECC) are an alternative to conventional extracorporeal circulation (CECC) which has been demonstrated to be associated with fewer complication and improved outcome for aortocoronary bypass grafting (CABG). No data is available for redo-CABG with MiECC. This is the first study comparing the perioperative outcomes of redo-CABG with MiECC versus CECC using propensity score analysis.

Methods: A total of 106 patients underwent isolated redo-CABG with MiECC (n=49) or CECC (n=57) between January 2004 and December 2016. Age, logistic EuroSCORE, hypertension, preoperative renal disease, myocardial infarction within 90 days before surgery and 3-vessel disease were used to construct a propensity score. Using inverse probability of treatment weighting (IPTW) based on propensity modelling (Figure P36-1), 44 patients, who underwent CABG with MiECC could be compared with 46 patients, who underwent CABG with CECC. Primary outcome was 30-day mortality, secondary endpoints included major adverse cardiac or cerebrovascular event (MACCE) or conversion to standard cardiopulmonary bypass.

Results: The mean age was 64.8 ±13.8 for MiECC and 65.5 ± 8.6 for CECC (p= 0.804). The rate of emergency redo-CABG with immediate intervention was 10.4% (n=5) for MiECC and 17.1% (n=8) for CECC. Compared with the CECC group, there was shorter bypass time (p= 0.034) and cross clamp time (p< 0.05) in the MiECC group. The incidence of postoperative atrial fibrillation (p= 0.021) and re-exploration (p= 0.046) was higher in der CECC group. Transfusion rate was at 3.8 in the MiECC group and 5.3 in the ECC group (p=0.197). All cause 30-day mortality was equal in both groups before and after IPTW.

Conclusions: Using propensity score estimation and IPTW, we did not observe significant differences in terms of survival and further outcomes in patients who undergo CABG with CECC or MiECC. The observed significant lower rates of reinterventions and atrial fibrillations as well as the trend towards lower transfusion requirements in using MiECC are advantageous in redo-CABG surgery.

Figure: P36-1: Probability to receive MiECC in either group with a sufficient overlap between the groups.

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Early diagnosis of myocardial infarction in patients with a history of coronary artery bypass grafting

1Cardiovascular Research Institute Basel (CRIB) | Cardiac Surgery, 2Cardiovascular Research Institute Basel (CRIB), University Hospital Basel, Basel, 3Emergency Department, Kantons hospital Luzern, Luwerne, Switzerland, 4Department of Cardiology, University of Illinois at Chicago, Chicago, IL, United States, 5Critical Care Research Group, The Prince Charles Hospital, Brisbane, QLD, Australia, 6De-
Abstracts

- Department of Cardiology, Herzzentrum Leipzig, Leipzig, Germany.
- Laboratory Medicine, University Hospital Basel, Basel, Switzerland.
- Emergency Department, Hospital Clinic, Barcelona.
- Emergency Department, Hospital Clinico San Carlos, Madrid, Spain.
- Emergency Department, Kantonsspital Liestal, Liestal, Switzerland.
- Department of Cardiology, School of Medicine with the Division of Dentistry in Zabrze, Zabrze, Poland.
- Emergency Department, University Hospital Zurich, Zurich.
- Department of Cardiology, University Hospital Bern (Inselspital), Berne, Switzerland.

Introduction: The early diagnosis of acute myocardial infarction (AMI) can be particularly challenging in patients with a history of coronary artery bypass grafting (CABG) due to possibly altered chest pain sensation and pre-existing electrocardiographic abnormalities.

Method: Final diagnoses were adjudicated by two independent cardiologists among patients presenting to the emergency department with symptoms suggestive of AMI. Thirty-four chest pain characteristics (CPC), four electrocardiographic variables and hs-cTnT/I concentrations were compared against the adjudicated final diagnosis. Patients were stratified according to the presence or absence of previous CABG.

Results: Among 4015 patients (3686 without previous CABG and 329 with previous CABG), incidence of AMI was significantly higher in patients with previous CABG (35% vs. 18%; p<0.001). Three CPC’s (9%) showed a different diagnostic performance (interaction p<0.05) with loss of diagnostic value in patients with previous CABG: chest pain aggravated by breathing (likelihood ratio [LR] 1.09 [95%CI, 0.73-1.65] vs. 0.51 [95%CI, 0.43-0.61] in patients without CABG), chest pain aggravated by emotional stress [LR 1.40 [95%CI, 0.91-2.15] vs. 0.68 [95%CI, 0.58-0.81]), and chest pain area >3cm (LR 0.93 [95%CI, 0.82-1.06] vs. 1.07 [95%CI, 1.04-1.11]). Similarly, two (50%) electrocardiographic findings showed a different diagnostic performance (interaction p<0.05), again with loss of diagnostic value in patients with prior CABG: chest pain branch block (0.80 [95% CI, 0.34-1.86] vs. 2.11 [95%CI, 1.44-3.10]) in patients without CABG, T-inversions 1.25 [95%CI, 0.85-1.84] vs. 2.82 [95%CI, 2.35-3.39]). The diagnostic accuracy of hs-cTnT/I was high in patients with prior CABG, but significantly lower compared to patients without prior CABG (hs-cTnT: AUC 0.87 [95%CI, 0.82-0.91] vs. AUC 0.94 [95%CI, 0.93-0.95]; hs-cTnI: AUC 0.85 [95%CI, 0.81-0.89] vs. AUC 0.94 [95%CI, 0.93-0.95]; p<0.001 for both). In patients with history of CABG, the hs-cTnT/I 0/1h-algorithm maintained high negative and positive predictive value, but had lower efficacy with more patients remaining in the observe zone (e.g. 50% vs. 21% for hs-cTnT, p<0.01). Time to discharge was significantly longer in patients with prior CABG (6h vs. 5h, p<0.001).

Conclusion: History of CABG substantially impacts on AMI incidence and the diagnostic performance of CPC, ECG and hs-cTnT/I. Attention to CABG-specific performance seems mandatory.

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Microplegia versus Cardioplexol® in coronary artery bypass surgery with minimal extracorporeal circulation: comparison of two cardioplegia concepts

Univ. Hosp. Basel, Switzerland

Introduction: The aim of this study was to compare the combined use of the Myocardial Protection System® (MPS®) and our institutionally refined microplegia (warm blood cardioplegia) with Cardioplexol® (low-volume, cold crystalloid cardioplegia) in coronary artery bypass grafting (CABG) using the minimal extracorporeal circulation.

Method: The analysis focussed on propensity-score matched pairs of patients in whom microplegia or Cardioplexol® was used. Primary endpoint outcomes were sensitivity cardiac troponin T (hs-cTnT) postoperative day 1 and peak values during hospitalization. Furthermore, we assessed creatine kinase (CK) and creatinine kinase-myocardial type (CK-MB) as well as safety endpoints.

Results: 56 patients who received microplegia and 155 patients who received Cardioplexol® were included. The use of the microplegia was associated with significantly lower geometric mean (reference range) peak values of hs-cTnT (233 (194-280) ng/L vs. 362 (315-416) ng/L; p=0.001), CK (539 (458-633) U/L vs. 719 (645-801) U/L; p=0.011), and CK-MB (13.8 (9.6-19.9) μg/L vs. 21.6 (18.9-24.6) μg/L; p=0.026); and a shorter length of stay on the intensive care unit (1.5 (1.2-1.8) days vs. 1.9 (1.7-2.1) days; p=0.011). Major adverse cardiac and cerebrovascular events occurred with roughly equal frequency (1.8% vs. 5.2%; p=0.33).

Conclusion: The combined use of the MPS® and our institutionally refined microplegia was favourable compared to Cardioplexol® in isolated coronary artery bypass surgery using minimal extracorporeal circulation. It was associated with lower peak values of hs-cTnT,CK, and CK-MB and with a shorter length of stay on the intensive care unit, and has therefore become the routine cardioplegia for this kind of operation in our clinic.

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Blood flow assessment by transit time flow measurement and its prognostic impact in coronary bypass surgery

L. Niclauss, J. Schwitter
CHUV, Lausanne, Switzerland

Objective: Off pump coronary artery bypass graft (CABG) surgery allows an estimation of native (competitive) coronary flow, indicating severity of stenosis, which may have an impact on graft patency. Intra-operative transit time flow measurement (TTFM) is largely applied for graft evaluation (ESC-guidelines). Cardiac magnetic resonance imaging (MRI) enables a FU of myocardial perfusion and bypass graft flow.
Abstracts

Multi-slice computed tomography for quality control in asymptomatic patients after coronary artery bypass grafting

M. Schmiady1, J. Barthelmes2, D. Reser2, H. Alkadhi4, F. Maisano2, M. Genoni1, A. Plass1

1Cardiac Surgery, University Hospital Zurich, 2Cardiology, 3Cardiac Surgery, 4Radiology, Universitätsspital Zürich, Zurich, Switzerland

Introduction: Assessment of the outcome after surgical coronary revascularization in asymptomatic patients is challenging due to the lack of objectifiable factors. New generations of multi-slice computed tomographs, having effective scan times and multi-row detector array systems, enable rapid imaging of coronary arteries under very low radiation exposure. We evaluate the diagnostic value of multi slice computed tomography (MSCT) as a quality assessment tool in asymptomatic patients after coronary artery bypass grafting (CABG).

Methods: 211 consecutive patients having undergone multi-slice computed tomography after coronary artery bypass grafting within 10 months were studied. 73 patients underwent conventional CABG with heart lung machine and 138 off-pump CABG. Median age at operation was 78.5 (37-85) years respectively. A total of 640 grafts were used, including 316 internal thoracic arteries (ITA), 60 radial arteries (RA) and 264 vein grafts. Two independent observers assessed bypass grafts and non-grafted coronary artery segments at MSCT.

Results: The mean number of anastomoses per patient was 3 (1-6). There was no hospital death. All patients were asymptomatic and had no clinical signs of ischemia. CABG showed a 97.2% (622/640) patency rate (5 ITA, 1 RA and 12 vein grafts were occluded or had a significant stenosis). After discussion in an interdisciplinary coronary board two patients underwent re-do surgery with off-pump revision of the occluded graft and two patients underwent successful stentimplantation during heart catheter examination. In five patients decision was made against revascularization of the involved segment due to small vessel size. Seven patients will be followed up with PET CT scan 3 month postoperative.

Conclusion: Multi slice computed tomography is a non-invasive and save tool for the evaluating of graft patency during early post-operative follow up of Coronary artery bypass grafting. Owing to the high negative value of this noninvasive approach and the low radiation exposure of recent device generations it may be routinely used for quality assessment after Coronary artery bypass grafting in asymptomatic patients. Findings should be discussed in an interdisciplinary team of cardiac surgeons, cardiologists, anesthesiologists and radiologists in order to identify the best strategy for each patient.

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Complete arterial aortic no-touch off-pump coronary artery bypass grafting: best strategy to reduce adverse neurological outcomes?

M. Schmiady1, D. Reser2, H. Rodríguez3, M. Genoni2, F. Maisano2, A. Plass3

1Cardiac Surgery, University Hospital Zurich, 2Cardiac Surgery, 3Universitätsspital Zürich, Zurich, Switzerland

Objectives: Neurologic complications after coronary artery bypass grafting remains a main concern. Extracorporeal circulation and aortic manipulation are the main causes of neurological events during coronary artery bypass surgery. Use of an off-pump anaortic technique, which leaves the ascending aorta untouched, should turn off this risk factors and result in reduction of perioperative neurologic damage. We investigate our postoperative results using complete arterial aortic no-touch techniques.

Methods: From May 2017 to June 2018 116 patients underwent complete arterial revascularization using off pump anaortic technique in our hospital. Of these, 97 patients had a three-vessel coronary disease (83.6%), 19 patients (16.4%) suffered from a coronary two vessel disease. Median age at operation was 62.9 years (41.1 years - 84.8 years). Left ventricular EF was 48.5% (15-81%). All pa-
Patients received complete arterial revascularization using bilateral internal mammary arteries.

**Results:** The mean number of anastomoses per patient was 3.0 (2-5). Median operation time was 196 minutes (112 minutes - 370 minutes). Conversion rate to extracorporeal circulation was zero. There was no hospital death. 13 patients (11.2%) showed a postoperative delirium, which was treated with medication. No patient developed a stroke or had focal neurological deficits. One patient needed operative re-exploration because of bleeding and 5 patients (4.3%) developed a sternal wound infection. 16 Patients (13.8%) developed postoperative arterial fibrillation treated by medication or cardioversion.

**Conclusion:** In the hand of an experienced surgeon, aortic no-touch coronary artery bypass grafting is safe and shows excellent neurologic outcomes. All patients were completely revascularized without the need of additional surgery time.