

## CARDIAC SURGERY IN OCTOGENARIANS

**J. Lomová, T. Kotulák, J. Pirk**

*Cardiocentre, Institute for Clinical and Experimental Medicine, IKEM, Prague, Czech Republic*

**Objective:** In 2007, life expectancy reached 72.1 (M) and 78.5 (F) years in Czech Republic and octogenarians are a rapidly growing segment of the population. This study compares the outcomes of cardiac surgery in octogenarians (OCT) and in younger (CTRL) group of patients.

**Methods:** The database of IKEM was used to review retrospectively 24 591 patients who underwent cardiac surgical procedure from 1994 till 2009. Out of those, 787 (3.2%) were OCT patients, aged 80 to 94 years, the mean age being 82.8 +/- 2.1. Results of 3 types of surgical procedures were analyzed: the patients who had isolated CABG (524 OCT vs. 13 746 CTRL); those with CABG and concomitant mitral or aortic valve replacement or repair, CABG+VALVE (143 OCT vs. 5 926 CTRL); and VALVE procedures only (120 OCT vs. 4 132 CTRL). EuroSCORE was used for risk stratification.

**Results:** Crude hospital mortality was 7.4% (58) for OCT compared with 3.7% (888) for the younger (CTRL) groups, it means it was even lower than predicted by a moderate to high EuroSCORE (9.89 +/- 3.75 OCT vs. 6.27 +/- 3.16 CTRL). The hospital mortality for CABG was 7.1% OCT vs. 2.1% CTRL; for CABG+VALVE 8.4% OCT vs. 6.8% CTRL; and for VALVE isolated 7.5% OCT vs. 4.9% CTRL. Our study shows that emergency operations at OCT created 20% that means equal to CTRL but mortality was higher (17.1% OCT vs. 11.8% CTRL). The incidence of poor LV function (LVEF less than 20%) was about 25-26% in both groups, but mortality was higher for OCT (10.3% OCT vs. 8.6% CTRL). The extreme risk factors for operative mortality among OCT were perioperative heart failure requiring IABC (OCT, 31/16 = 51.6% died) and acute renal failure requiring dialysis or CVVH (OCT, 21/13 = 61.9% died). Stroke rate was similar in the both groups, less than 1%. Ventilator dependency in excess of 48 hours was more frequent in OCT (25.1% OCT vs. 3.1% CTRL), with equal mortality about 21-22% in both groups. Mean length of ICU stay was longer in OCT patients (3.9 +/- 5.8 OCT vs. 2.1 +/- 3.5 days for CTRL).

**Conclusions:** Operative mortality and complications rates for cardiac operations are highest for octogenarians, but acceptable. We believe octogenarians should not be denied the benefits of surgery if they are reasonably good surgical candidates, are physiologically and mentally able to withstand the stress of surgery and have good motivation for improved lifestyle.

## THE OUTCOME AND COMPLICATIONS OF OCTOGENARIANS UNDERGOING CARDIAC SURGERY

F. Mošna, M. Horáček, P. Lukáš, J. Pražák, J. Roith, I. Fedor, R. Šumaj, K. Cvachovec

*Department of Anesthesiology and Intensive Care, University Hospital Motol, Prague, Czech Republic*

**Objective:** The aim of our study was to evaluate outcomes and complications of 80 years older patients undergoing procedures in cardiac surgery and to discuss benefits of these operations for seniors.

**Methods:** The patients of more than 80 years were retrospectively sorted out of all 4061 patients operated for cardiac disease in our department in years 2002 – 2008. The group contained 168 patients. We focused on major important complications occurring during treatment as atrial fibrillation, renal failure, multiorgan failure, cognitive dysfunction and we found out the LOS on our ICU and the hospital LOS, 30-days, 2-years and 5-years mortality of these patients compared to overall mortality of cardiac patients. Additionally we tried to evaluate a benefit of cardiac surgery for these patients comparing their length of life after procedure and life expectancy for their coevals.

**Results:** The octogenarians represented 4.1% of all patients treated in our department between years 2002 and 2008 with maximum 5.05% in 2005. Since 2006 this percentage had a declining trend. The 30-days mortality was 16.0%, the 2-years mortality between years 2002-2006 was 29.0% and 5-years mortality for 2002 and 2003 was 49.1%. The average survival of the octogenarians after cardiac procedure was 3.9 years compared to 5.9 years of life expectancy for this age in Czech Republic. An atrial fibrillation was observed in 52.1% of the octogenarians, renal failure in 34.9% and sepsis in 16%. The LOS in the ICU was 7.2 days and the hospital LOS was 14.5 days, i.e. significantly longer than the average LOS in our department.

**Conclusions:** The absolute as well as the relative number of the octogenarians operated for cardiac disease is decreasing. In procedure spectrum there is a visible shift from CABG to valve surgery and combined procedures. EuroSCORE is slightly worsening regardless of age. In comparison to the life expectancy of general population is the survival of the octogenarians after cardiac procedures quite pure. For these reasons and considering more frequent complications and the quality of live after procedure the indication of geriatric patients to cardiac surgery should be done very seriously.

## TYPE OF ANAESTHESIA HAS NO EFFECT ON EARLY POSTOPERATIVE OUTCOME IN OCTOGENARIANS UNDERGOING ELECTIVE SURGICAL REVASCLARIZATION

M. Porizka<sup>1</sup>, J. Kunstyr<sup>1</sup>, M. Dobias<sup>1</sup>, R. Spunda<sup>2</sup>, M. Salmay<sup>2</sup>, T. Urban<sup>2</sup>, D. Kameny<sup>3</sup>

<sup>1</sup>*Dept of anaesthesiology, resuscitation and intensive care medicine;* <sup>2</sup>*Departmentt of Cardiac and Vascular surgery, General Teaching Hospital, Prague;* <sup>3</sup>*The First Faculty of Medicine, Charles University in Prague, Czech Republic*

**Objective:** To compare early postoperative outcomes including 30-day mortality in octogenarians undergoing elective surgical revascularization either in combined (thoracic epidural) or general anaesthesia.

**Methods:** We retrospectively collected and analyzed data from octogenarians who underwent elective surgical revascularization in our hospital in the last three years (2006-2008). These patients were divided into two groups. In the first group were patients who underwent surgery in combined anaesthesia (i.e. epidural + general anaesthesia), in the second group were patients who underwent surgery in general anaesthesia alone. We compared demographic, preoperative and postoperative outcome data including major postoperative complications and 30-day mortality between the two groups.

**Results:** There were 56 patients in total: 39 in the combined anaesthesia group (1), 17 in the general anaesthesia group (2). The two groups of patients did not differ significantly in both demographic and preoperative variables. There was also no significant difference in early major postoperative complications and 30-day mortality which was very low (2.6% in group 1, 0% in group 2). Off-pump revascularization without aortic manipulation was performed in 46.2% in group 1 and in 47.1% in group 2. The mean logistic EuroSCORE for group 1 was 12.7% and for group 2 was 10.3%. Type I neurologic complications (stroke) appeared in 5.4% of patients in group 1 and in 0% of patients in group 2. The incidence of type II neurologic complications (delirium) was high in the groups, 20.5% in group I and 29.4% in group 2. There were no neurologic complications related to the use of epidural anaesthesia. The incidence of major pulmonary complications (pneumonia, atelectasis) was 2.6% in group 1 and 0% in group 2. The average ICU length of stay in group 1 was 161 hours and 138 hours in group 2.

**Conclusions:** Our data show that cardiac surgery in octogenarians may have excellent results despite a higher risk of postoperative complications and death in comparison with younger patients. Some previous studies have shown that thoracic epidural analgesia may reduce postoperative pulmonary complications and ICU length of stay in thoracic surgery. We found no significant differences in these important issues in our study. Both types of anaesthesia seem to be a possible option for octogenarians undergoing elective revascularization surgery.

## OFF-PUMP VERSUS ON-PUMP CORONARY ARTERY BYPASS SURGERY: DO ELDERLY PATIENTS BENEFIT MOST?

J. Martin, D. Bainbridge, D. Cheng<sup>1</sup>

<sup>1</sup>*Evidence Based Perioperative Clinical Outcomes Research Group (EPiCOR), Department of Anesthesia & Perioperative Medicine, University of Western Ontario, London, Canada*

**Background:** Age has been recognized as an independent predictor of mortality and morbidity in patients undergoing coronary artery bypass surgery.

**Objective:** To determine whether off-pump bypass surgery (OPCAB) provides significant advantages to elderly patients compared to conventional coronary artery bypass surgery (CCAB), and to explore whether an age threshold exists above which OPCAB may be too risky.

**Methods:** A comprehensive search was undertaken to identify all comparative trials, whether randomized or observational, of OPCAB versus CCAB in patients over 65 years of age. Meta-analysis of patient characteristics was undertaken to identify any baseline characteristic imbalances. Metaregression was performed to explore the impact of baseline demographics on outcome estimates. All clinically relevant outcomes and resource related outcomes were analyzed using the random effects model.

**Results:** A total of 22 studies met the inclusion criteria, including 1 randomized trial and 21 non-randomized studies that enrolled 6795 patients over the age of 65 years. Patients undergoing OPCAB were on average older than patients undergoing CCAB (+0.45 years, 95%CI 0.36 to 0.54 years), but had significantly fewer grafts performed (-0.57 grafts, 95%CI -0.82 to -0.33). Despite these differences, OPCAB significantly reduced the risk of death within 30 days (OR 0.60, 95%CI 0.42-0.85) and at 1 to 3 years' follow up (OR 0.49, 95%CI 0.24-1.00) compared with CCAB. Significant reductions in risk of stroke (OR 0.42, 95% 0.26 to 0.67), myocardial infarction (OR 0.63, 95% CI 0.42-0.94), atrial fibrillation (OR 0.78, 95%CI 0.65-0.93), low cardiac output syndrome (OR 0.54, 95%CI 0.33-0.89), prolonged ventilation (OR 0.62, 95%CI 0.40-0.96), transfusion incidence (OR 0.30, 0.12-0.70) and renal insufficiency (OR 0.56, 95%CI 0.36-0.86) were also found for OPCAB versus CCAB. Concerns about longevity of grafts for OPCAB versus CCAB were not borne out by differences in reintervention rates (OR 0.40, 95%CI 0.09 to 2.76), and risk of angina recurrence was similar between groups at 1 to 3 year follow-up (OR 0.70, 95%CI 0.38-1.28). Neurocognitive dysfunction was not significantly reduced with OPCAB versus CCAB, but was poorly reported in the clinical trials. The survival benefit of OPCAB over CCAB increased with increasing age, and was strongest for octogenarians. Similarly, the benefit of OPCAB for reduction in stroke risk was highest in octogenarians.

**Conclusion:** Elderly patients benefit significantly from an off-pump approach to coronary artery bypass surgery. Clinically relevant reductions in risk of the most devastating complications of surgery, including death, stroke, atrial fibrillation, respiratory failure and renal insufficiency, are achieved with preferential use of OPCAB instead of CCAB. There is no threshold age above which OPCAB is too risky compared to CCAB

## PERIOPERATIVE BLOOD REQUIREMENT FOR OFF-PUMP CABG OPERATIONS COMPAIRING WITH A DIFFERENT AGE GROUP

L. Acar<sup>1</sup>, D. Sungar<sup>1</sup>, A.S. Koprulu<sup>1</sup>, T. Sener<sup>2</sup>, H. Gercekoglu<sup>2</sup>  
*Department of Anesthesiology,<sup>1</sup> and Cardiovascular Surgery<sup>2</sup>, Universal Hospital Kadikoy  
Istanbul/TURKEY*

**Objective:** The aim of this study is to evaluate the effect of age on perioperative and postoperative transfusion requirements in patients undergoing off-pump CABG operations.

**Methods:** Three vessel off-pump CABG were performed in 51 patients between Jan 2007-February 2009. The patients were divided into two **age groups**. Group I: Mean age was 55±7.3 (n=30), Group II: Mean age was 71± 3.9 (n=21). In both age groups, off-pump CABGs were performed by one surgical team. Anaesthesia was induced with etomidate, fentanyl and vecuronium, maintained using remifentanyl infusion, vecuronium and isoflurane. Packed red blood cell (PRC) and fresh frozen plasma were used for blood replacement. The patients were extubated under circumstances of adequate gas exchange, consciousness level, muscular power and no significant bleeding or any arrhythmia. Peroperative blood loss, amount of transfused liquids, postoperative transfusion requirement and time to extubation were analysed between groups. Statistical analyses were evaluated by chi-square test and Mann-Whiney U test using SPSS 15.0 for Windows program. A level of  $p < 0.05$  was considered significant.

**Results:** Data are shown table 1.

	Group I (n=30)	Group II (n=21)	P value
Age(years)	55 ± 7.3	71 ± 3.9	p < 0.001
Sex (M/F)	26/4	11/10	p = 0.003
Euroscore	1.5 ± 1.5	4.1 ± 1.3	p < 0.001
Extubation (h)	7.03 ± 3.6	9.4 ± 3.7	p < 0.001
Intraop PRCs(units)	1.1 ± 0.8	1.5 ± 1.1	n.s.
Postoperative PRCs(Units)	1.0 ± 0.6	0.7 ± 0.7	n.s

**Conclusions:** This study showed that even extubation time prolongs with older age the requirement for transfusion during intra- and postoperative period do not increase in off-pump CABGs.

## HAEMOSTATIC PROFILE IN ELDERLY PATIENTS UNDERGOING CARDIOPULMONARY BYPASS DOES NOT DIFFER FROM YOUNGER POPULATION

R. Hájek, O. Zuščík, J. Růžičková, I. Fluger, R. Zezula, K. Příkrylová, K. Maderová, J. Šána  
*Dept of Cardiac Surgery, University Hospital, Olomouc, Czech Republic*

**Objective:** There are some data that haemostatic profile of elderly patients is different from normal younger population, especially the trend to hypercoagulation in perioperative period in elderly patients exists. Thromboelastography (TEG) is reliable and useful method to describe global haemostatic profile in cardiac surgical patients.

**Methods:** In prospective study two groups of elective adult cardiac surgical patients undergoing cardiopulmonary bypass (CPB) were studied: Group A – young patients (age < 70), group B – elderly patients (age ≥ 70). Standard CPB with mild hypothermia, capillary oxygenator and heparin 3mg/kg was used. Chronic anticoagulation medication was withdrawn according to common guidelines. No prophylactic antifibrinolytics were used. Patients were monitored with standard haemocoagulation tests (Quick, aPTT, thrombin time, fibrinogen, platelets) and thromboelastography (TEG® Haemoscope 5000, kaolin activated). Four blood samples for TEG were tested: 1<sup>st</sup> after induction (native), 2<sup>nd</sup> after aortic X-clamp release (heparinase), 3<sup>rd</sup> and 4<sup>th</sup> 10min after protamine administration (native and heparinase). Blood loss volume and number of transfusions were also measured. Statistical analysis was performed by SPSS v.15, using non-parametric Mann-Whitney and Shapiro-Wilk, p=0.05.

**Results:** Mean age of Group A 61.1±6.6, group B 75.6±3.4 years, there was more men (79.5% vs. 59.1%) in younger population. The other demographics and distribution of procedures type were comparable. There was no difference in CPB duration (74.8 vs. 80.9 min). No difference in laboratory tests before (Quick 85.7 vs. 83.5, aPTT 26.85 vs. 28.9, TT 13.43 vs. 13.46, FBG 3.48 vs. 4.40, plt 229 vs. 212) and after (Quick 58.4 vs. 56.5, aPTT 30 vs. 31, TT 18.85 vs. 18.31, FBG 2.46 vs. 2.61, plt 145 vs. 135) as well as TEG parameters before (R 5.06 vs. 5.37, MA 68 vs. 69, CI 2.29 vs. 2.15) and after (R 4.83 vs. 5.13, MA 62 vs. 63, CI 1.59 vs. 1.45) were found. Perioperative blood loss volume (356 vs. 360 ml) was not different as well as postoperative blood loss volume (802 vs. 906 ml). Number of RBC (0.55 vs. 1.14; p=0.011) but not FFP (0.23 vs. 0.41; p=0.175) transfusion were higher in the group B.

**Conclusions:** No differences in haemostatic profile measured with standard laboratory tests and TEG were found in immediate perioperative period.

## TRANSCATHETER AORTIC VALVE REPLACEMENT IN GERIATRIC HIGH-RISK PATIENTS

G. Erdoes<sup>1</sup>, R. Basciani<sup>1</sup>, T. Pilgrim<sup>2</sup>, C. Zobrist<sup>1</sup>, P. Wenaweser<sup>2</sup>, S. Windecker<sup>2</sup>, T. Carrel<sup>3</sup>, B. Eberle<sup>1</sup>

<sup>1</sup>University Dept of Anesthesiology and Pain Medicine, <sup>2</sup>University Department of Cardiology, and <sup>3</sup>University Department of Cardiovascular Surgery, University Hospital, Bern, Switzerland

**Objective:** Transcatheter aortic valve implantation (TAVI) emerges as an alternative to high-surgical-risk AVI in geriatric patients with severe symptomatic aortic stenosis. The aim of our study was to define characteristics of TAVI anesthesia for geriatric high-risk patients at our institution.

**Methods:** With IRB approval, 170 high-risk patients (EuroScore 23.5±14.7%) were screened for aortic valve replacement. Of this cohort, 26 % underwent medical treatment; 24 % surgical AVR; and TAVI, 50% [transfemoral 67, transapical 18]. TAVI was performed in general anesthesia (GA) or local anesthesia with sedation (MAC: monitored anesthesia care). Outcomes were assessed prospectively.

### Results:

Anesthesia characteristics of the TAVI group are given in Table 1:

	%	Vasopressor	Conversion to GA	CPR	Extubated
MAC	55%	33% *	8%	10%	93% *
GA	45%	100% *	n/a	3%	66% *
Total	100%	64%	4%	6.5%	81%

CPR=intraprocedural; Chi<sup>2</sup> Test: \*=p<0.05

Mortality of the TAVI group during the procedure was 2 %; in-hospital, 6 %; at 30 post-procedural days, 8 %; and at 6 months, 24 % (vs. surgical AVR 31%, or medical treatment 43%; p = 0.22).

**Conclusions:** TAVI is a viable alternative to surgical AVR for geriatric patients with severe symptomatic aortic stenosis; risk-adjusted mortality is comparable to surgery. GA for this procedure is associated with increased vasopressor and resource use; with regard to safety, however, outcomes did not differ between GA and MAC.

## **CARDIOPULMONARY BYPASS AND CEREBRAL PROTECTION MANAGEMENT DURING PULMONARY ENDOARTERECTOMY: A SINGLE CENTRE 15-YEARS EXPERIENCE**

M Morsolini<sup>1</sup>, P Totaro<sup>1</sup>, S Nicolardi<sup>1</sup>, D Berwick<sup>1</sup>, E Milanese<sup>2</sup>, A Degani<sup>3</sup>, M Maurelli<sup>2</sup>, AM D'Armini<sup>1</sup>, M Viganò<sup>1</sup>

<sup>1</sup>*Division of Cardiac Surgery;* <sup>2</sup>*Division of Cardiac Anesthesia;* <sup>3</sup>*Service of Cardiovascular Perfusion;* St. Matteo University Hospital, Pavia, Italy

**Objective:** Pulmonary endarterectomy (PEA) is the treatment of choice for chronic thromboembolic pulmonary hypertension. A bloodless surgical field is mandatory to achieve a true endarterectomy with the removal of all thrombotic materials. Since the beginning, deep hypothermic circulatory arrest with aortic cross clamping has been the technique of choice to combine a bloodless surgical field with a satisfactory cerebral protection. Alternative strategies have been recently proposed. We report our 15-years single Centre experience.

**Methods:** Over 15-years period we performed 223 PEAs. Strategy for cerebral protection has changed during study period. We started performing a single period of deep hypothermic circulatory arrest (HCA) for each side, according to the original San Diego technique (Group A 83 patients). In 2003 we began to perform shorter periods (10-15 min) of deep HCA interrupted by short periods of perfusion ( $\geq 5$  min), monitored by cerebral near-infrared spectroscopy (NIRS) (Group B 68 patients). More recently we used NIRS-monitored intermittent periods of moderate HCA (Group C 72 patients). In this study we analyzed the postoperative outcomes according to the different strategies.

**Results:** During study period we became more confident to the procedure and our referral increased substantially. Group C patients were older and had a shorter length of disease. The number of HCA periods increased significantly during study period ( $2\pm 1$ ,  $4\pm 1$  and  $8\pm 3$  for A, B and C respectively) as did also the total HCA time ( $26\pm 15$ ,  $51\pm 29$  and  $78\pm 30$  min respectively). Despite higher preoperative risk, Group C patients had a better outcome in terms of time of mechanical ventilation and incidence of reperfusion edema and tracheostomy. Furthermore, despite increased time of total HCA time, moderate hypothermia and intermittent HCA allowed a reduced incidence of neurological events (17, 16 and 6 % for Group A, B and C respectively).

**Conclusions:** Intermittent periods of moderate HCA seem to guarantee the better combination of accuracy of surgical procedure and cerebral protection thus allowing for favourable postoperative outcomes. We therefore support such strategy as technique of choice during pulmonary endarterectomy.

**Topic:** Optimizing perioperative patient management

## PULMONARY ENDARTERECTOMY FOR THROMBOEMBOLIC RIGHT HEART FAILURE IN THE ELDERLY

M. Morsolini, G. Silvaggio, S. Nicolardi, D. Berwick, C. Monterosso, A.M. D'Armini, M. Viganò  
*Division of Cardiac Surgery, St. Matteo University Hospital, Pavia, Italy*

**Objective:** European population is aging and an increasing number of old pts affected by chronic thromboembolic pulmonary hypertension (CTEPH) are referred for pulmonary endarterectomy (PEA). As outcomes after PEA in the elderly have never been reported, we sought to compare our early postoperative results in pts older than 70 years with those from younger pts.

**Methods:** At our Centre 223 PEA were performed from April 1994 to March 2009. We compared in a prospective analysis all pts aged less than 70 years (Group I, 170 pts, mean±SD age 50±14 yrs) with patients over 70 years old (Group II, 53 pts, mean±SD age 75±4 yrs). Preoperative, operative and early postoperative data were analyzed. In Group II we observed a higher number of pts with at least one major comorbidity (67.0% vs. 37.8%, p<0.05), such as NIDDM, chronic renal insufficiency, COPD, arteriopathy, chronic AF.

**Results:** A total of 223 patients underwent PEA during the study period. The proportion of patients older than 70 years increased from 10.8% (from April 1994 to December 2002) to 31.4% (from January 2003 to January 2009). Early postoperative results are shown in Table (PVR: pulmonary vascular resistance).

**Conclusions:** In our experience we never considered age as a contraindication to PEA. Early hemodynamic results after PEA are excellent and not affected by age. However, as expected, early after surgery older pts are more susceptible to infections, with a consequent higher early postoperative mortality and longer postoperative hospital stay. Moderate versus deep hypothermia and shorter periods of circulatory arrest seem reduce early morbidity and mortality in older pts: from January 2008 up to date, out of 49 PEA performed, none of the 18 pts over 70 years old died.

Outcome	< 70 yo (n=170)	≥ 70 yo (n=53)	p value
Hospital mortality (%)	7.6 (13/170)	13.2 (7/53)	<0.05
PVR preop (dyne*cm*sec <sup>-5</sup> )	1070±496 (149-2248)	1096±575 (265-2776)	NS
PVR postop (dyne*cm*sec <sup>-5</sup> )	277±141 (85-727)	315±160 (84-800)	NS
Postoperative PaO <sub>2</sub> /FiO <sub>2</sub>	253±97 (90-588)	230±81 (64-388)	NS
Reperfusion edema (%)	9.4 (16/170)	13.2 (7/53)	NS
Infections (%)	33.5 (57/170)	43.4 (23/53)	<0.05
Transient neurological events (%)	15.2 (24/158)	13.2 (7/53)	NS
Postoperative hospital stay (days)	16±12 (4-73)	23±18 (7-84)	NS