

SCA 100

OFF-PUMP VERSUS ON-PUMP CORONARY ARTERY BY-PASS SURGERY: A META-ANALYSIS OF CLINICAL OUTCOMES FROM RANDOMIZED CONTROLLED TRIALSBainbridge D¹, Cheng DCH¹, Martin JE², Novick NJ¹*London Health Sciences Centre¹ and Lawson Health Research Institute², University of Western Ontario, London, Ontario, Canada*

Background: In an attempt to avoid the adverse effects of cardiopulmonary bypass, off pump surgery (OPCAB) has gained renewed interest. However, the balance of benefits and risks from randomized controlled trials comparing OPCAB with conventional coronary artery bypass (CCAB) has not been previously assessed.

Purpose: To determine whether OPCAB in patients with single or multiple vessel disease improves the short and long-term risk of death, ischemia, neurologic dysfunction, arrhythmias, infections, organ dysfunction, bleeds, and long-term angiographic patency compared with CCAB.

Methods: A comprehensive search was undertaken to identify all published or unpublished randomized comparative trials of OPCAB versus CCAB in any language. Medline, Cochrane CENTRAL, Embase, DARE, NEED, INAHTA databases were searched from the date of their inception to October 2002. A general internet search was also performed using various search engines, and abstracts of meetings were reviewed for unpublished data. Bibliographies of identified trials and earlier reviews were manually searched for pertinent studies. To meet inclusion criteria, trials of OPCAB versus CCAB needed to be randomized, with at least one pertinent clinical outcome. Two reviewers independently extracted data from each trial and assigned a Jadad quality score (maximum possible score, 5).

The primary outcome was defined as death. Secondary outcomes included stroke, neurologic dysfunction, myocardial infarction, post-operative atrial fibrillation, wound infection, chest infections, respiratory failure, pneumothorax, renal dysfunction, aortic dissection, transfusions, re-exploration for bleeds, recurrence of anginal, need for inotropes, IABP or reintervention, hospital costs, and quality of life. Sensitivity analyses to evaluate the effect of quality on outcomes was planned. Subgroup analyses of the following patient risk groups was planned: pre-existing pulmonary, renal, cardiac or cerebral dysfunction, older age, and patients undergoing repeat revascularizations or requiring conversion from OPCAB to CCAB. Publication bias was explored through visual inspection of funnel plots for each outcome. Odds ratios (95% CI) were calculated for proportions, and standard differences (95% CI) were calculated for continuous data. The fixed effect model was

used, except when significant heterogeneity dictated the need for the random effects model. Breslow-Day test was used to detect heterogeneity between trials, with $p < 0.10$ signifying heterogeneity. Comprehensive MetaAnalysis® was used for statistical analyses.

Results: A total of 36 randomized trials were identified. When duplicate publications of randomized trials were eliminated, the total number of included trials was nineteen, including 1,412 patients. Mean age was 62.8y vs 62.3y, and mean number of grafts was 2.1 vs 2.3 for OPCAB vs CCAB groups, respectively. Median Jadad quality score was 2 (range: 2-3). Statistical heterogeneity was not found in any of the measured endpoints. Clear evidence of publication bias was not found.

No significant reduction was found for early mortality [OR 0.78, 95% CI 0.35-1.74], myocardial infarction [0.85, 95% CI 0.43-1.68], stroke [0.93, 95% CI 0.34-2.55], late neurocognitive dysfunction at 3 months, [0.60, 95% CI 0.35-1.03] and at one to two years [0.88, 95% CI 0.56-1.38], angina recurrence [0.88, 95% CI 0.50-1.56], wound infection [0.67, 95% CI 0.38-1.19], renal dysfunction [0.67, 95% CI 0.14-3.10], pneumothorax [0.88, 95% CI 0.20-3.90], and need for inotropes [0.48, 95% CI 0.34-0.68], IABP [0.73, 95% CI 0.13-3.94], reintervention [0.88, 95% CI 0.50-1.56], or re-exploration for bleeding [0.62, 95% CI 0.62-1.45].

Significant reduction was found for neurocognitive dysfunction within 7 days [0.07, 95% CI, 0.10-0.51], atrial fibrillation [OR 0.46, 95% CI 0.32-0.66], respiratory failure [0.22, 95% CI 0.07-0.70], chest infection [0.33, 95% CI 0.19-0.58], and need for transfusion [0.19, 95% CI 0.13-0.24]. In addition, significant reduction was found for time on ventilator [-0.671 days, 95% CI -0.826 to -0.516], length of ICU stay [-0.42 days, 95% CI -0.561 to 0.242], and length of hospital stay [-0.521 days, 95% CI, -0.353 to -0.869]. Insufficient information was available to provide aggregate estimates of pain, infection, aortic dissection, cardiac arrest, patency, hospital costs, and quality of life. Also, insufficient details were provided to perform sub-analyses of effect by number of vessels grafted, or by patient risk groups. In general, trial quality was not associated with effect size.

Conclusions: The balance of the evidence suggests that OPCAB results in reduced risk of clinically relevant outcomes including early neurocognitive dysfunction, atrial fibrillation, respiratory failure, chest infection, need for transfusion. In addition, ventilator time, and ICU and hospital length of stay were significantly reduced. However, no definitive effect was found for incidence of mortality, myocardial infarction, stroke, angina, wound infection, renal dysfunction, pneumothorax, IABP, inotropes, reinterventions and re-explorations. Further randomized trials will be required to delineate the balance of benefits and risks in relevant patient subgroups.