Indications of prophylactic coronary revascularization in patients undergoing major vascular surgery: the saga continues

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This editorial refers to 'A clinical survival score predicts the likelihood to benefit from preoperative thallium scanning and coronary revascularization before major vascular surgery'† by G. Landesberg et al., on page 533

ACC/AHA Guidelines

When considering a patient for major vascular surgery, a careful pre-operative clinical risk evaluation and subsequent risk-reduction strategies are essential to improve post-operative outcome. The ACC/AHA TaskForce published therefore Practice Guidelines for Perioperative Cardiovascular Evaluation for Non-cardiac Surgery in 1996 and an update in 2002.1 Furthermore, due to increasing evidence of the beneficial effect of beta-blocker use in the perioperative period, the guidelines section on perioperative beta-blocker therapy is recently updated.2 The core of the ACC/AHA guidelines is an algorithm, which summarizes the stepwise evaluation of clinical parameters used to assess the need for further cardiac testing. According to the algorithm, after assessing the urgency of the surgery and the cardiac status of patients having previous coronary revascularization within 5 years or previous cardiac evaluation within 2 years, the patients are classified as major, intermediate, or minor clinical predictors of increased perioperative cardiovascular risk. The need for cardiac testing is then determined by an assessment of the functional status of the patient and the surgery-specific risk. Patients scheduled for major vascular surgery with only minor clinical predictors and adequate functional capacity represent a low-risk population and further evaluation is unnecessary. However, in patients with intermediate clinical predictors or patients with minor clinical predictors and reduced functional capacity, additional non-invasive evaluation should be considered before undergoing major vascular surgery.

The main purpose of performing pre-operative cardiac risk assessment is to identify patients at high risk for perioperative cardiac events. In general, two strategies have been used in an attempt to reduce the incidence of perioperative myocardial infarctions and other cardiac complications: pre-operative coronary revascularization and pharmacological treatment. With respect to prophylactic coronary revascularization, ACC/AHA guidelines recommend revascularization only for subgroups of high-risk patients with unstable cardiac symptoms or those for whom coronary artery revascularization offers a long-term benefit.

Risk stratification

Landesberg et al. developed a long-term survival score (LTSS) comprised of seven predictors that independently determine long-term survival: age ≥ 65, diabetes, cerebrovascular disease, ischaemic heart disease, congestive heart failure, ST-depression on pre-operative ECG, and renal insufficiency.3 They validated their LTSS with bootstrapping and demonstrated that LTSS is a good prognostic factor for 3 years and long-term mortality. On the basis of their LTSS, all patients in the study were divided into low, intermediate, and high risk groups (0–1, 2–3, and ≥4 predictors, respectively). This LTSS has a considerable number of risk factors in common with the well accepted Revised Cardiac Risk Index,4 which is a commonly used perioperative risk-stratification approach in the selection of non-invasive cardiac testing and medical treatment in the intermediate-risk patients. Although this Revised Cardiac Risk Index is nowadays a commonly accepted risk stratification tool, the current ACC/AHA guidelines do not incorporate this risk score. The addition of age, as suggested in the LTSS of Landesberg et al., is known to make a more valid prediction of cardiovascular mortality in non-cardiac surgery.5

Prophylactic coronary revascularization

Current guidelines are based on different retrospective studies that assessed the overall benefit of coronary revascularization for decreasing perioperative cardiac risk
of non-cardiac surgery.\textsuperscript{6,7} Recently, a large, multiple-centre, randomized clinical trial [Coronary Artery Revascularization Prophylaxis (CARP) trial] was conducted by McFalls et al.\textsuperscript{8} to evaluate the benefit of coronary revascularization before elective vascular surgery. All patients scheduled for elective vascular surgery were randomized after undergoing coronary angiography to revascularization or no revascularization. Importantly, patients with left main disease and poor LV function were excluded. The incidence of morbidity cardiac events during the revascularization phase of the trial was 1.7% and they found no overall difference in death rate after 2.7 years. In contrast, this study of Landesberg et al. demonstrated that the intermediate-risk group (LTSS 2–3) had better long-term survival following pre-operative coronary revascularization [hazard ratio 0.48; 95% confidence interval (CI) 0.31–0.75]. However, no statistically significant effect of pre-operative coronary revascularization was observed in the perioperative period, at 6 months or at 1 year follow-up in this group. Pre-operative coronary revascularization showed also no beneficial effect at short or long term in both low-risk patients (LTSS 0–1) and high-risk patients (LTSS ≥ 4). As the authors mention, their study is limited by its retrospective nature and large randomized trials are needed to give exclusive recommendations in this area.

These results are in line with the recently published results of the DECREASE-II study.\textsuperscript{9} This randomized, multicentre study in patients undergoing major vascular surgery was conducted to assess the value of pre-operative cardiac testing in intermediate-risk patients receiving beta-blocker therapy with tight heart rate control. Patients assigned to no testing had similar incidence of cardiac death or myocardial infarction at 30 days as those assigned to testing (1.8 vs. 2.3%; odds ratio 0.78; CI 0.28–2.1). These studies demonstrate that intermediate-risk patients undergoing major vascular surgery are at relatively low perioperative risk and do not benefit from pre-operative cardiac testing and revascularization in the short-term follow-up.

It has to be noted that pre-operative revascularization can even be harmful for the patient because of progression of coronary artery disease during stress of surgery\textsuperscript{10} and postponement of the non-cardiac procedure. Importantly, the cumulative risk of prophylactic coronary revascularization and non-cardiac surgery has to balance the risk of non-cardiac surgery alone. An important implication of the study of Landesberg et al. and other described studies is that coronary revascularisation may be safely postponed to the post-operative period for selective patients, because no beneficial effect of pre-operative coronary revascularization was seen in the immediate post-operative period. A shift from pre-operative to post-operative management is therefore recommended in these patients in order to prevent cardiac complications in the long term. An accurate post-operative risk score consisted of weighted risk factors based on regression coefficients and the addition of biomarkers as B-type natriuretic peptide and high-sensitive CRP may be effective for better post-operative risk stratification and subsequent adapted care.\textsuperscript{11} We would like to stress that post-operative patients at high risk of cardiac complications should be seen by the physician on a regular basis to optimize treatment with medical therapy and if necessary revascularization.

Guidelines in practice

Successful perioperative evaluation and management of patients undergoing non-cardiac surgery requires careful teamwork and communication between surgeon, anaesthesiologist, cardiologist, and the patient’s primary care physician. With this respect, guidelines play an essential role and should be straightforward, uniform, and based on recent scientific evidence. The algorithm proposed in the ACC/AHA guidelines had to rely predominantly on observational data and expert opinion because there were no randomized trials to help define the process. It is important to update guidelines on a regular basis to reflect the most recent clinical evidence and furthermore, guidelines should be easy to use in clinical care.

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References


A rare case of single giant cardiac hamartomas in an adult patient

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We describe a 48-year-old man who was referred to our hospital because of increasing dyspnoea and fatigue. He had no comorbidities or history of cardiovascular disease. Physical findings at admission were within normal limits, except for a pulse rate of 105 b.p.m.

The 12-lead ECG showed diffused ST depression, with T-wave inversion in V1–V6 leads. Chest radiography revealed cardiomegaly and a pericardial effusion. Cardiac-gated magnetic resonance confirmed the presence of a mass located at the lateral wall and at the apex of the left ventricle (Panels C–E). The size of the mass was estimated to be 4.5 × 5 cm². There was no evidence of an extra-cardiac primary site or distant metastasis. A biopsy of the cardiac tumour, guided by echocardiography, showed a tumour cytologically similar to a hamartoma. In fact, it was composed of enlarged, vacuolated cells with sparse cytoplasm that resembled altered myocytes. Cells stained strongly with periodic-acid Schiff stains because of their high glycogen content. 'Spider cells', characterized by a centrally located nucleus with radial extensions to the cell periphery, were evidenced (Panel F). The patient remains alive and asymptomatic after 18 months of follow-up.

Cardiac hamartomas are a rare type of benign tumour affecting the heart. They represent up to 90% of cardiac tumours in infants and children and are usually discovered in patients <1 year of age. Although rare, such benign tumours of skeletal and cardiac muscles can occur in the adult. In the heart, they may be associated with the syndrome of tuberous sclerosis in 50–86% of cases. Because the majority of cardiac rhabdomyomas regress spontaneously, surgery is not routinely required. However, patients with life-threatening symptoms, usually those secondary to left ventricular outflow tract obstruction or refractory arrhythmias, respond well to surgical excision.

Panel A. Transthoracic echocardiography. Parasternal short-axis view. A solid hyperechoic mass located in the apical and lateral left ventricular myocardium, protruding into and deforming the ventricular chamber, is evidenced (arrows). In addition, moderate circumferential pericardial effusion is evident.

Panel B. Transthoracic echocardiography. Apical two-chamber view. A solid hyperechoic mass located in the apical and lateral left ventricular myocardium, protruding into and deforming the ventricular chamber, is evidenced (arrows). In addition, moderate circumferential pericardial effusion is evident.

Panel C. T1-weighted short-axis gradient-echo MRI images showing a large mass with low-intensity tissue signal in the left ventricular myocardium at the level of lateral and apical walls (arrows).

Panel D. T1-weighted long-axis gradient-echo MRI images showing a large mass with low-intensity tissue signal in the left ventricular myocardium at the level of lateral and apical walls (arrows).

Panel E. T2-weighted short-axis gradient-echo MRI image. The recordings were performed 20 s after gadolinium contrast infusion, demonstrating poor perfusion of the left ventricular mass, without significant hyperenhancement of tumour during first-pass contrast infusion (arrows).

Panel F. Hamartomas, microscopic features. High-power photomicrograph (original magnification, × 300; H&E stain) demonstrates typical vacuolated cells of rhabdomyoma. Cytoplasmic streaming is a typical artifact that results in ‘spider cells’ (arrows).