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CORRESPONDENCE

Letters to the Editor

Routine Intraoperative Completion Angiography After Coronary Artery Bypass Grafting or Routine Intraoperative Transit Time Flow Measurement to Check Graft's Quality?

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We have read with great interest the study by Zhao et al. (1), which concluded that intraoperative coronary angiography should perhaps eventually become the standard of care for coronary artery bypass grafting (CABG) surgery. We ask, is it really necessary to perform it routinely? They showed that a hybrid operating room is useful and provides a good quality control of CABG surgery. The hybrid revascularization procedure is certainly indicated for specific patient conditions (e.g., poor conduits, ungraftable vessels, stenting of the left subclavian artery). However, we have some concerns about the conclusion of this study.

Our group has begun to assess the surgical results of CABG surgery using transit time flow measurement. Our experience indicates that a meticulous method of assessing intraoperative flow measurements can improve the quality of the surgery performed and increases the accuracy of diagnosing technical problems with newly constructed bypass grafts for both off- and on-pump procedures (2). The transit time flow measurement has already been demonstrated to be safe, easy to perform, reproducible, and cheap. In a patent coronary graft, the hemodynamics are similar to those physiologically observed in the coronary circulation: blood flows mainly during diastole with minimal systolic peaks taking place during the isovolumetric ventricular contraction (QRS complex) (3).

In accordance with the interesting editorial comment (4), we do not currently see any clinical evidence that justifies the need to check all performed CABG with an immediate post-operative angiography, with the consequent significant increase in the costs and morbidity, when there is already available a useful and cheap device to assess the quality of the revascularization. We consider the post-operative angiography a very important tool that should be reserved for specific cases only (e.g., post-operative ischemia, low cardiac output syndrome, technical problems during surgery).

Finally, Zhao et al. (1) showed that the routine use of angiography revealed graft defects in 89 patients (12%) of their study population of 366 patients; they performed a total arterial revascularization with either double internal thoracic artery or radial artery in only 2% of cases. These data are completely in contrast to the general trend that is ongoing in cardiac surgery as recently shown by the SYNTAX (Synergy between PCI with Taxus and Cardiac Surgery) trial and registry (27.6% and 16.1%, respectively) (5).

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Reply

We appreciate the comments of Drs. Colli and Ruyra regarding our paper (1) and the indications for routine completion angiography after coronary artery bypass grafting (CABG) surgery. We agree with Dr. Colli and colleagues that the transit time flow meter (TTFM) is a valuable tool to assess intraoperative graft patency. Moreover, it is relatively inexpensive and readily available in those centers that do not have an operating room with angiography capability. The TTFM, however, has several limitations. It is reasonably accurate in defining graft integrity only at the extremes, which is either patent or occluded, while it cannot define location of the defect either within the conduit or at the anastomosis. Moreover, it cannot discriminate between the influences of the conduit versus the native coronary arteriolar bed. Also, the normal range values have very large variability because TTFM measures the mean graft flow, which is influenced by the systemic arterial pressure, cardiac output, type of conduit used (vein conduit vs. arterial conduit), residual antegrade coronary flow, resistance of the distal coronary bed flow, competitive native flow, and, finally, blood hematocrit (2). Thus, for those grafts with values between the abnormal and normal range, there is a lack of sensitivity for objective clear cutoff values.

For the reasons mentioned in the preceding text, coronary angiography can identify a higher rate of defective grafts compared with TTFM (3). The rate of graft revision based on TTFM is between 1% to 8% (2). These rates are well below the average 20% to 30% 1-year saphenous vein graft (SVG) failure rate reported in the literature (2,4). The PREVENT IV (PRoject of Ex-vivo Vein graft ENgineering via Transfection IV) trial, a multicenter randomized study of 3,041 patients, has confirmed the clinical impact of vein graft failure. In this study, the common end point of death and new myocardial infarction was 0.9% in patients with patent SVG, while for patients with at least 1 occluded SVG this adverse outcome was 14% ($p < 0.001$) (4).

In order to improve the long-term outcomes of CABG surgery, graft patency is a key factor. Grafts fail early primarily because of technical errors that could be corrected at the time of the surgery. While the TTFM and other techniques such as intraoperative fluorescence imaging are steps toward improving graft patency, they can identify only a limited number of graft defects, mostly occlusive abnormalities, and cannot reliably identify significant (>50%) nonocclusive graft flow abnormalities. These significant graft abnormalities have important clinical impact on the long-term benefits provided by CABG surgery. For the reasons mentioned in the preceding text, routine angiography after CABG has low periprocedural morbidity. It seems that it should perhaps eventually be routine if available in a hybrid suite.

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The SoS Acronym

The term "acronym" has been used since World War II. It refers to an abbreviation created from the first letters of each word in a series of words. Typical examples are NATO (*North Atlantic Treaty Organization*) and SOS (*Save our Souls*).

Acronyms are frequently being used to refer to clinical trials, often with some difficulty. Occasionally even the PI (*Primary Investigator*) cannot remember the background of such abbreviations.

In 1995 we embarked in a clinical trial comparing 2 treatment options for myocardial revascularization, the use of stents versus surgery. We simply called the trial SoS (*Stent or Surgery*) (1). The results of this trial have been published in leading journals, and the study is still ongoing.

In the March 27, 2009, issue of the *Journal* (2), another SOS trial was published. The authors decided to use the same, previously employed acronym to describe a comparison of different stents for the treatment of saphenous vein grafts. The acronym SOS stands in this context for "a randomized controlled trial of a paclitaxel-eluting stent versus a similar bare-metal stent in saphenous vein graft lesions: the SOS (Stenting of Saphenous vein grafts trial);" the association, apart from the infringement with previous and future SOS publications, seems far-fetched.

Even in the absence of legal guidelines, the reutilization of established acronyms (in particular, if they are still in use) should be discouraged. Authors and editors ought to adopt some common sense to avoid confusion.

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Reply

Acronyms are an important component of clinical trials and may serve several roles, such as facilitating reference to the trial, creating enthusiasm about the trial, and promoting recruitment. SOS is a brief and memorable acronym that is particularly well suited for trials, as it invokes a call for help to which many patients might respond. Indeed, SOS is a widely used trial acronym: a search for SOS in the clinical trials website on July 13, 2009, retrieved 28 results, ranging from the "Stent or Surgery" trial (NCT00475449) to "Systems of Support to Increase Colon Cancer Screening and Follow-up" (NCT00697047) to "Stroke Oxygen study" (ISRCTN52416964) or the "SAFE OR SORRY?" trial (NCT00365430).

In 1987, the Swedish Obese Subjects study was initiated, and over the ensuing 2 decades it critically evaluated the effects of