The American Association for Thoracic Surgery and The Society of Thoracic Surgeons reasoning for not endorsing the 2021 ACC/AHA/SCAI Coronary Revascularization Guidelines

Joseph F. Sabik III, MD, Faisal G. Bakaeeen, MD, Marc Ruel, MD, MPH, Marc R. Moon, MD, S. Christopher Malaisrie, MD, John H. Calhoon, MD, Leonard N. Girardi, MD, and Robert Guyton, MD, for the American Association for Thoracic Surgery and The Society of Thoracic Surgeons

The American Association for Thoracic Surgery (AATS) and The Society of Thoracic Surgeons (STS) have decided not to endorse the 2021 American College of Cardiology/American Heart Association/Society for Cardiovascular Angiography and Interventions (ACC/AHA/SCAI) Coronary Artery Revascularization Guidelines as they do not reflect our interpretation of the best treatment for patients with ischemic heart disease. The AATS and STS have three areas of concern with the guidelines as written: (1) downgrading of coronary artery bypass grafting (CABG) in the treatment of three-vessel coronary artery disease (CAD); (2) lack of recognition of the superior long-term benefits of CABG vs percutaneous coronary intervention (PCI) in decreasing repeat reintervention and postprocedural myocardial infarctions; and (3) awarding a Class of Recommendation (COR) I to the radial artery as a CABG conduit.

Our main objection to these guidelines is the decrease in the COR (strength) from I (strong) to IIb (weak) for CABG to improve survival compared with medical therapy in patients with three-vessel CAD and normal left ventricular function. This two-level decrease in COR, as well as the decrease in COR from class I to class IIa (moderate) for CABG to improve survival in patients with three-vessel CAD and mild to moderate left ventricular dysfunction, is not supported by available evidence and if adopted would bring a disservice to patients with multivessel CAD. The International Study of Comparative Health Effectiveness With Medical and Invasive Approaches (ISCHEMIA) trial was cited by the guidelines committee to support these downgrades.

There are several reasons why ISCHEMIA (as well as other studies cited in the guidelines) should not be used to decrease the recommendation of CABG in the treatment of multivessel CAD. The ISCHEMIA study was designed to compare an initial conservative strategy (often but not always consisting of optimal medical therapy) to an initial invasive strategy (consisting of angiography and often but not always of revascularization by either PCI or CABG) to treat patients with moderate or severe ischemia. The trial found no significant difference in the primary composite endpoint of death from cardiovascular causes, myocardial...
infarction, hospitalization for unstable angina, heart failure, or resuscitated cardiac arrest. It did demonstrate that both CABG and PCI improved symptoms. However, the ISCHEMIA trial was not designed nor powered to determine whether CABG (representing only 26% of all revascularizations and performed in only 20% of the patients in the initial invasive strategy group) improved survival.

The follow-up was short (median 3.2 years) and, strikingly, there were more patients in the initial invasive strategy group who received optimal medical therapy alone (21%) than who received CABG (20%). There were also more patients in the initial conservative strategy group who received revascularization (n = 544) than patients in the initial invasive strategy group who received CABG (n = 530). The choice of PCI vs CABG was left to local heart teams and, as a result, CABG may have been grossly underutilized, given that 42% of the trial participants had diabetes and 71% had multivessel CAD. Therefore, appropriate comparators to the small minority of patients who received CABG—plausibly owing to the severe extent of their CAD—cannot, by design and due to the lack of angiography in the initial conservative strategy group, be produced from the ISCHEMIA trial. Despite the above shortcomings, the ISCHEMIA study did demonstrate a trend toward improved survival with multivessel CAD in the initial invasive strategy group.

In addition, patients enrolled in the ISCHEMIA study were not representative of patients with multivessel CAD for whom a heart team would recommend CABG as the preferred revascularization strategy. Fewer than half of the patients had stenosis of the proximal left anterior descending artery, and the cardiovascular mortality was low with or without intervention (approximately 6% at 5 years). That is hardly surprising, as clinicians enrolled patients who they believed had equipoise between revascularization and medical therapy alone. Subsequent analyses of the ISCHEMIA trial revealed that the intervention was ineffective in treating patients with a higher burden of CAD and diabetes mellitus, with markedly increased mortality from those two conditions despite thorough adjustment for comorbid factors.

Taken together, the above indicates that the ISCHEMIA trial initial invasive strategy intervention, which very seldom consisted of CABG, was not an effective one, and in our view represents a step backwards in having failed to address the cardiac risk burden both from advanced CAD and diabetes mellitus.

Not given important consideration by the committee in downgrading the recommendations for CABG in patients with three-vessel CAD was the Synergy Between Percutaneous Coronary Intervention With Taxus and Cardiac Surgery (SYNTAX) trial. Patients enrolled in SYNTAX were representative of patients a heart team would refer for revascularization. The SYNTAX trial found a 40% higher mortality among patients with triple-vessel disease with PCI compared with CABG. If CABG was no better than medical therapy in improving survival, then PCI would have to be dangerous compared with medical therapy.

Similar results were found in the Evaluation of XIENCE Versus Coronary Artery Bypass Surgery for Effectiveness of Left Main Revascularization (EXCEL) trial, and more recently, in the very early results of the Fractional Flow Reserve Versus Angiography for Multivessel Evaluation 3 (FAME 3) trial, where 50% better freedom from death, myocardial infarction, repeat revascularization, or stroke was observed among the patients randomly assigned to CABG vs PCI. If CABG did not improve survival over medical therapy, how would one explain the survival benefits of CABG over PCI in the EXCEL trial, without suggesting that PCI causes harm compared with medical therapy? Despite this, the committee not only downgraded the COR for CABG in the treatment of three-vessel CAD, but also gave an equal COR of IIb for PCI and CABG in patients with three-vessel CAD and normal ventricular function.

Another weakness of using trials such as ISCHEMIA in making determinations of the benefits of CABG vs medical therapy is the assumption that PCI and CABG are equivalent revascularization strategies. Indeed, PCI and CABG are inherently different revascularization strategies with distinct long-term effects on the coronary blood flow. Whereas PCI treats only the flow-limiting lesion, CABG creates a surgical collateral distal to the target stenosis that can be protective if a future coronary event occurs, such as plaque rupture or coronary occlusion, not only in target stenosis area but also along the entire length of the coronary artery proximal to the bypass graft anastomoses. The impact of CABG on survival cannot be ascertained from trial, such as ISCHEMIA, in which the majority of revascularization procedures performed were PCI and not CABG.

Surprisingly, the committee did not value earlier randomized trials and observational studies (that were valued in past ACC/AHA guidelines) comparing CABG to medical therapy. These studies support a strong recommendation for CABG in the treatment of multivessel CAD. Cited as a reason not to consider these trials is that these trials do not reflect the advancements made in medical therapy. However, they also do not reflect the advancements made in CABG such as better guidelines-directed medical therapy, myocardial protection, arterial grafts, and off-pump surgery, and constitute the best available evidence demonstrating superiority of CABG vs medical therapy in patients with ischemic heart disease.

A patient-level meta-analysis of these randomized studies by Yusuf and colleagues demonstrated CABG prolongs survival vs medical therapy in patients not only with three-vessel CAD, but also in those with left main disease and one- or two-vessel CAD with proximal left anterior CAD.
descending artery disease. That meta-analysis was disregarded by this guidelines committee. That meta-analysis also demonstrated the importance of the need of following patients for sufficient time to appreciate the benefit of CABG. In this study, interactions terms were not statistically significant at 5 years; however, they were at 10 years. Therefore, no observed value of CABG over medical therapy at 5 years or less should not be surprising, and emphasizes the importance of following patients longer than patients were followed in studies such as ISCHEMIA.

In addition, the 2018 ESC/EACTS Guidelines on myocardial revascularization have a Class I recommendation for CABG with three-vessel CAD. They also have a Class I recommendation for CABG in patients with one- or two-vessel CAD with proximal left anterior descending artery stenosis. The present ACC/AHA/SCAI guidelines are at odds with the European guidelines, and greatly undervalue the benefit of CABG for patients not only with three-vessel CAD but also for those with one- or two-vessel CAD with proximal left anterior descending artery stenosis.

A secondary objection to these guidelines is the grouping of PCI and CABG as equivalent revascularization strategies in decreasing ischemic events. Several recent randomized studies, including SYNTAX, EXCEL, and the Nordic-Baltic-British Left Main Revascularization Study (NOBLE) have clearly demonstrated the superiority of CABG over PCI in decreasing repeat reintervention and postprocedural myocardial infarction. Grouping CABG and PCI together implies they have equivalent long-term benefit, which neglects to recognize the long-term benefits of CABG in addition to survival. These benefits of CABG are likely due to the different revascularization procedure of CABG and PCI, as previously discussed in this editorial.

An additional area of concern for the AATS and STS relates to the COR I of radial artery as a conduit in CABG. The radial artery COR is similar to the COR for internal mammary artery grafting and higher than for bilateral internal mammary artery grafting (2a). The data cited to support this recommendation are based on a meta-analysis of six relatively small randomized studies. Patients enrolled in these six studies were judged by experienced clinicians to be suitable for radial artery use: generally requiring at least a 75% stenosis of a circumflex artery with a good distal vessel or a tighter stenosis of a right coronary artery, also with a good distal vessel. Also excluded were patients with poor left ventricle or right ventricle function who were likely to require inotropic support in the early postoperative period. The proposed guideline has no such qualifiers, and as a Class I recommendation, it strongly suggests that nonuse of the radial in preference to a saphenous vein conduit in essentially all patients with multivessel disease is a departure from optimal care. The AATS and STS support increased arterial grafting and the radial artery as a bypass conduit. But that its COR is similar to internal mammary artery and higher than bilateral internal mammary artery grafting, especially without appropriate qualifiers, does not appear justified. This should be a COR IIa recommendation and should include appropriate qualifiers.

In summary, the AATS and STS do not support the 2021 ACC/AHA/SCAI guidelines. Downgrading the recommendations for CABG in treating patients with three-vessel CAD is not justified, considering there is no evidence to warrant a departure from the previous recommendation, as that would ignore previously established evidence in the absence of no new evidence invalidating them. In addition, the AATS and STS believe the present guidelines do not value the long-term benefits of CABG that have been demonstrated in many randomized studies. These benefits of lowering the need for repeat revascularization and postprocedural myocardial infarction are not appreciated in the current guidelines. The radial artery COR of I, rather than COR IIa with appropriate qualifiers, strongly suggests that it should be used in essentially all CABG procedures. This strong suggestion is not justified by present studies.

Given the inherent value to patients and practitioners of evidence-based guideline documents, the AATS and STS felt compelled to withdraw support for the recently published 2021 AHA/ACC/SCAI Coronary Revascularization Guidelines. This decision is based on the significantly different interpretation of the data related to the three areas of concern outlined in this editorial.

Challenges in the guideline development process must also be addressed to ensure equitable representation by multidisciplinary experts across specialties. For these guidelines, surgeons were a minority on the writing committee, and only a majority is needed for guideline approval. Furthermore, the AATS and STS were each allowed only one representative with all other surgeons on the writing committee being chosen by ACC/AHA. The AATS and STS believe that there should be equal representation of surgeons and cardiologists on the writing committee, and that the surgical representatives should be chosen by the surgical societies.

The AATS and STS also respect the right of the surgeons on the writing committee to remain as authors on these guidelines, despite the surgical societies not endorsing the guidelines. They undoubtedly worked hard and honorably while following the present guideline writing process. However, the process changes suggested here would ultimately lead to better alignment of the surgical representatives with the surgical society’s interpretation of the available evidence and thereby encourage transparent deliberation around best evidence. These changes will ultimately lead to guideline development that is fair to all parties, and the best short- and long-term clinical outcomes for patients.
References


