

The role of coronary artery bypass grafting in patients with ischemic cardiomyopathy in the current era

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Coronary artery bypass grafting (CABG) is widely accepted as the preferred treatment for left main or multi-vessel coronary artery disease, but benefit of CABG in patients with left ventricular dysfunction is not established. The most recent American College of Cardiology Foundation/American Heart Association 2013 Heart Failure Clinical Practice Guidelines state that either CABG or medical therapy is reasonable treatment for patients with severe left ventricular dysfunction (ejection fraction <35%), heart failure, and significant coronary artery disease; the indication is class IIa and level of evidence B (1). Some of the most persuasive evidence for the management of this serious condition comes from the Surgical Treatment for Ischemic Heart Failure (STICH) trial, published in 2011 (2). That trial was a multicenter, non-blinded, randomized study, in which more than 1,200 patients with an ejection fraction of 35% or less were assigned to medical therapy alone or medical therapy plus CABG; the median length of follow-up was about 5 years. It was found that patients assigned to CABG had lower rates of death from cardiovascular causes, death from any cause, and hospitalization for cardiovascular causes.

Recently, the STICH investigators updated their follow-up data to 10 years through the Surgical Treatment for Ischemic Heart Failure Extension Study (STICHES) (3). They demonstrated benefit of CABG in patients with left ventricular dysfunction by showing that the rates of death from any cause, death from cardiovascular causes, and death from any cause or cardiovascular hospitalization were significantly lower over 10 years among patients who underwent CABG in addition to receiving medical therapy than among those who received medical therapy alone.

Thus, the conclusions of the initial STICH trial has been strengthened by the longer follow-up time and greater number of events included in the STICHES trial.

Ischemic cardiomyopathy, the most common type of dilated cardiomyopathy, results from myocardial infarction or extensive coronary artery disease, and is associated with shorter survival than is non-ischemic cardiomyopathy (4). The number of patients with ischemic cardiomyopathy is rapidly growing as advances made in the management of acute coronary syndromes are transforming acute coronary artery disease to a chronic disease. It may be expected that the well-designed STICHES trial, with its long follow-up period, will have a strong impact on upcoming guidelines regarding the role of CABG in patients with ischemic cardiomyopathy.

As the STICHES investigators mentioned, there has been a substantial decline in mortality associated with CABG (3). The decline likely can be attributed to the combined effects of improvements in patient selection, perioperative care and surgeons' skills; frequent use of arterial grafts; and the use of updated evidence-based medicines, such as statins and anti-platelet agents. The STICH trial was conducted from 2002 to 2007, so it is likely that CABG performed nowadays has lower operative mortality than that in the era when the STICH trial was conducted. As more data are being accumulated from around the world, the operative risks associated with CABG also now can be more precisely estimated by reference to the Society of Thoracic Surgeons database.

Despite improved outcomes with CABG, however, some patients with ischemic cardiomyopathy are ineligible for CABG for various reasons. First, the patients' coronary

anatomy may not be amenable to CABG; patients with previous CABG, multiple stents, or myocardial infarction often have poor target vessels for CABG, and patients with previous CABG, radiation or vein stripping, or peripheral vascular disease do not have good conduits for CABG. Second, patients with impaired left ventricular function are often frail and debilitated, with major comorbidities, such as diabetes mellitus and kidney, lung, and cerebrovascular disease. Understandably, these patients have increased surgical mortality and morbidity, as they may not tolerate the major invasive procedures of sternotomy and cardiopulmonary bypass, and postoperative rehabilitation.

In the meantime, new techniques or devices in the treatment for heart failure caused by ischemic cardiomyopathy have been developed. As shown in the STICHES trial, the treatment options of left ventricular assist device, cardiac resynchronization therapy, and percutaneous coronary intervention using new-generation drug-eluting stents are available (3). According to the recent guidelines, mechanical circulatory support, including left ventricular assist devices, is a class IIa indication for heart failure treatment in carefully selected patients (1) and it is expected to play a major role in the treatment of heart failure. Percutaneous coronary intervention is usually not recommended for patients with complex three-vessel disease who are good candidates for CABG (5). However, the superiority of new-generation drug-eluting stents over first-generation stents has made the stents a good alternative to CABG in patients who would not otherwise tolerate surgery. Indeed, the 2014 edition of the European Society of Cardiology/European Association for Cardio-Thoracic Surgery guidelines include unrestricted use of the new-generation drug-eluting stents, as well as other new indications for the treatment of left main and three-vessel coronary artery disease (6).

The STICH and STICHES trials showed a clear benefit of CABG in patients with ischemic cardiomyopathy. Thus, patients with coronary artery disease amenable to CABG should undergo surgery, as long as their coronary arteries are anatomically suitable and the patients can tolerate the procedure. However, CABG is still a big operation, with associated risks and complications. Therefore, in the current era, the question is what is the best option for patients with ischemic cardiomyopathy who are not surgical candidates? Future research needs to focus on new technologies or devices with possible advantages over conventional treatment. There is still a huge gap in our knowledge of many fundamental aspects of heart-failure care.

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Footnote

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