Mediterranean-style diet to prevent postoperative atrial fibrillation: Role of antioxidants?

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During the past several decades, numerous epidemiologic studies and clinical trials have outlined a clear link between diet and cardiovascular events. Nowadays, physicians always tell their patients that “you are what you eat.” A Mediterranean type of diet was first reported to be a healthy diet by Keys and colleagues.1 Today, the Mediterranean diet has been globally recognized as one of the healthiest diets in terms of its prevention of cardiovascular disease and metabolic syndrome.2,3 People living in the Mediterranean area choose olive oil as the main source of dietary fat, with moderate consumption of ethanol, low consumption of meat and meat products, and high consumption of vegetables, fish, fruits, nuts, whole grain, and legumes. Research has shown that the major components of the Mediterranean diet have potential protective properties, such as antioxidation and antiinflammation.4,5

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The relationship between Mediterranean-style diet and arrhythmias has recently been investigated in several case-control studies. The ATTICA epidemiologic study reported that long-term fish consumption is associated with protection against arrhythmia in healthy persons in a Mediterranean region. The other case-control study (800 subjects) further demonstrated that adherence to a Mediterranean diet and intake of antioxidants influence spontaneous conversion of atrial fibrillation. Specifically, low adherence to the Mediterranean diet was associated with the development of persistent atrial fibrillation. In contrast, high adherence to the Mediterranean diet was associated with prevention of atrial fibrillation.

New-onset postoperative atrial fibrillation (POAF) continues to be among the most common complications after cardiac surgery, leading to significant morbidity and cost. Cardiopulmonary bypass during cardiac surgery often occurs with significantly increased oxidative stress of ischemic myocardium. In particular, the patients who exhibited POAF were associated with a significantly larger-amplitude increase of oxidant stress. Multiple randomized controlled trials have recently been performed to analyze if antioxidant supplementation, such as N-acetylcysteine, polyunsaturated fatty acids, and antioxidant vitamins may potentially prevent POAF. However, the results of these reports are very controversial.

In this issue of the Journal, Costanzo and coworkers from Italy examined the possible association between long-term intake of antioxidant-rich food and incidence of POAF in patients undergoing cardiac surgery. They reported that long-term consumption of antioxidant-rich foods reduces the incidence of POAF. Obviously, investigation into the potentially protective effects of a “whole-diet approach” rather than of individual dietary nutrients on the development of POAF for cardiac surgery patients is very interesting and important. This pilot study suggests that patient adherence to heart-healthy diet patterns may be beneficial for preventing POAF. However, the postoperative anti-atrial fibrillation effects of the heart-healthy diet may be attributable to more than its antioxidative effect. Multiple beneficial properties, such as anti-inflammation, iron depletion, increases in nitric oxide production, and decreases in thromboxane A-2 may contribute to the anti-POAF effects of the heart-healthy diet. Thus, further studies replicating these results and exploring the underlying mechanisms are necessary.

The authors performed a careful statistical analysis on the relatively small study cohort. In this retrospective observational study, 217 consecutive patients undergoing cardiac surgery, mainly coronary artery bypass grafting and valve replacement or repair, were recruited for analysis. Total antioxidant capacity was measured in foods by the trolox equivalent antioxidant capacity assay. They found that patients in the highest tertile of dietary total antioxidant capacity had a lower risk than patients in the 2 lower tertiles ($P = .048$). Clearly, the major limitation is that the cohort of this study was relatively small, as multiple variables, such as gender, age, comorbidities, surgical procedures, modification of ischemia/reperfusion, and pre-, peri- and postoperative medications might all affect the power analysis and results. Thus, it should be noted that marginal, statistically significant differences ($P = .048$) do not always reflect biological significance, especially in this type of complex study with numerous variables.

Although the authors addressed some limitations in this study, a number of other limitations should be considered. Genetic predisposition for electrophysiologic and conductance abnormalities, prior ischemia/infarction and right and/or left atrial enlargement, low contractile and metabolic reserves, differences in procedures of myocardial protection, types of cardiopulmonary bypass, and myocardial temperature might all shed some light on results of the study. In addition, the current study did not measure the alterations of serum inflammatory biomarkers for POAF between the study groups. Thus, a word of caution should be permitted with regard to the interpretation of results, given the presence of those multiple (measured and unmeasured) confounding factors. Therefore, large, randomized, multicentered clinical trials will be required to conclusively determine the potential benefits of high levels of adherence to a heart-healthy diet for prevention of POAF in patients undergoing cardiac surgery.

Irrespective of these limitations, The Polyphenols Observational Study is a substantial contribution to the current knowledge base regarding heart-healthy diets and prevention of POAF in cardiac surgery patients. Thus, the findings may affect clinical practice, mainly by changing patients’ dietary habits before and after cardiac surgery, to potentially prevent the life-threatening, postoperative arrhythmias that can occur in cardiac surgery patients.

References