Preoperative Anemia Increases Surgery Risks

BY MITCHEL L. ZOLER
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ORLANDO — Anemia is a potent risk factor for patients undergoing surgery.

Patients who were anemic just prior to coronary artery surgery, elective vascular surgery, or endovascular aortic aneurysm repair had a significantly increased risk of death or major cardiac events in results from three separate studies reported at the annual scientific sessions of the American Heart Association.

One possible explanation for these findings is that anemia is a marker for inflammation and frailty in surgery patients, said Dr. Nicolas A. Diehm, a vascular physician at the Swiss Cardiovascular Center in Bern, Switzerland, who presented one of the studies. None of the studies addressed whether treatments that resolve anemia might reduce the risk, but Dr. Diehm was skeptical whether interventions could lead to any rapid improvements in a patient's prognosis. "Treatment does not reduce the inflammatory burden," he said in an interview.

"Treatment of preoperative anemia has not been shown to reduce risk [following surgery], so this is not yet a standard procedure," agreed Dr. Martin Dunkelgrun, a vascular surgeon at Erasmus Medical Center, in Rotterdam, the Netherlands, who presented another one of the studies at the meeting. The best approach to take today for patients with significant anemia prior to surgery is to reconsider the need for surgery, if the operation is elective, or to give patients who are proceeding to surgery "the best work-up they can get," Dr. Dunkelgrun said.

Dr. Dunkelgrun's study reviewed records for 1,211 patients who underwent elective, open vascular surgery at Erasmus Medical Center during 1990-2006. Preoperatively, 399 patients had anemia, defined as a serum hemoglobin level of less that 13 g/dL in men and less than 12 g/dL in women. The average age of all 1,211 patients was 68 years, and 77% were men.

The prevalence of heart failure (a left ventricular ejection fraction of less than 35%) in the total group was 21%, 30% had chronic kidney disease (defined as an estimated glomerular filtration rate of less than 60 mL/min per 1.73 m^2), and 23% had diabetes. The prevalence of each of these comorbidities was significantly higher in patients with anemia, compared with those without anemia: heart failure was diagnosed in 25% of the anemia patients, 39% had chronic kidney disease, and 29% of the anemia patients had diabetes.

To analyze the impact of anemia on adverse outcomes—cardiovascular death or myocardial infarction—the patients with anemia were divided into tertiles of mild, moderate, or severe anemia. All patients with severe anemia had serum hemoglobin levels of less than 9.0 g/dL.

The incidence of an adverse outcome during both the first 30 days after surgery and throughout an average follow-up of 3.8 years was significantly worse in the patients with anemia than in patients with normal hemoglobin levels. The rate of death or MI also increased as the severity of anemia worsened.

Adjusted Relative Risk for Cardiovascular Death or Myocardial Infarction

	30-Day Follow-Up	Average 3.8-Year Follow-Up
Anemia (reference: not anemic)		
Mild	1.8	2.4*
Moderate	2.3*	3.6*
Severe	4.7*	6.1*
Glomerular filtration rate (reference: 90 mL/min per 1.73 m^2 or greater)		
<30	4.7*	2.6*
30-59	3.0*	2.2*
60-89	1.3	1.5*
Heart failure (reference: left ventricular ejection fraction ≥35%)		
<35%	2.5*	2.4*

*Statistically significant difference relative to reference values.

Note: Based on data for 399 patients with anemia and 812 patients without anemia who underwent elective, open vascular surgery.

Source: Dr. Dunkelgrun

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In multivariate analyses that controlled for patients' age, gender, and clinical parameters at baseline, patients with anemia had a significantly increased risk for adverse outcomes, both perioperatively and long term. The relative risk for patients with severe anemia was comparable to the increased risk for death or MI faced by patients with heart failure or chronic kidney disease (see box).

The study presented by Dr. Diehm on patients undergoing endovascular repair of abdominal aortic aneurysms used data collected on 711 consecutive patients who underwent endovascular aneurysm repair (EVAR) during March 1994–November 2006 at the Baptist Cardiac and Vascular Institute in Miami. Anemia was defined by the same criteria used in Dr. Dunkelgrun's study, and was present in 218 patients. The average age of all patients in the study was about 76 years. The patients in the anemia group were significantly older and were more likely to have concurrent cardiac, renal, and pulmonary disease.

The rates of death, aneurysm rupture, or need for follow-up open surgery during the first 30 days after EVAR were not significantly different between the anemic and normal patients. But during an average long-term follow-up of 48 months, patients with anemia were significantly more likely to die. In a multivariable analysis that controlled for baseline demographic and clinical differences, patients had about a 13% increased risk of long-term mortality for each 1-g/dL reduction in their serum hemoglobin level, Dr. Diehm said.

The third reported study on anemia and surgical risk reviewed data collected on 14,574 patients who were entered in the Coronary Artery Surgery Study (CASS) registry during 1974-1979. These patients, a subgroup of the more than 25,000 patients in the registry, all had data available on their hematocrit and serum creatinine levels at baseline. The average age of all patients was about 53 years, and about three-quarters were men.

The study group included 2,338 patients (19%) with anemia, defined as a serum hematocrit of less than 39% in men and less than 36% in women. The patients with anemia had a significantly lower level of creatinine clearance, compared with the nonanemic patients.

During the first 5 years following surgery, the incidence of death was 16% in patients with anemia and 12% in nonanemic patients, a statistically significant difference, reported Dr. Malini Madhavan, a physician at the Mayo Clinic in Rochester, Minn. A significant 4% difference in mortality between the anemic and nonanemic patients also was seen after 10 and 15 years of follow-up, indicating that after an early increase in risk linked to anemia mortality rates were then similar in both subgroups.

"Anemia caused most of the risk [for increased death] early, and then the relative risk remained stable. We don't know why," said Dr. Patricia J. Best, senior investigator for the study and a cardiologist at the Mayo Clinic. ■

Stenting Stands Up to Surgery in Unprotected Left Main Disease

BY BRUCE K. DIXON
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Treatment of unsupported left main coronary artery disease with stent-supported percutaneous intervention results in favorable early outcomes when compared with surgical revascularization, according to results from the ongoing LE MANS prospective, randomized study.

At 1 year, there was a lower risk of 30-day major adverse cardiac and cerebrovascular events (MACCE) and other major adverse events, after PCI, compared with coronary artery bypass grafting (CABG), said Dr. Pawel E. Buszman and coinvestigators at the University Center in Katowice, Poland, and the American Heart of Poland satellite centers in Poland's Silesia region.

At 2 years' follow-up, freedom from MACCE was similar in the two groups, the researchers reported.

The trial enrolled 105 patients with greater than 50% left main stenosis, with or without multivessel disease. Those with total occlusions were excluded. Patients were evenly randomized to PCI or to CABG, and there were no crossovers. The mean age of both arms was 61 years. Men comprised 60% of the PCI arm and 73% of the CABG arm (J. Am. Coll. Cardiol. 2008;51:538-45).

The average number of diseased vessels was two in both arms. In the CABG group, an average of three arteries were grafted, compared with an average of two arteries dilated in the PCI group, a significant difference. In addition to being left main bypass naive, all patients were deemed by both the principal interventional and surgical investigators to be technically eligible for either procedure, the researchers said.

At 30 days, there were no deaths in the PCI group and two deaths in the CABG group. Over the same period, both major adverse events and MACCEs were significantly more common in the CABG arm (28% versus 8%, and 13% versus 2% respectively). Hospital length-of-stays were 7 days and 12 days, respectively.

However, the number of repeat revascularizations at 1 year was significantly higher in the PCI arm, at 15, compared with 5 in the CABG group.

At 1 year, left ventricular ejection fraction improved only in the PCI group, the investigators said. "Both groups demonstrate similar improvement in angina and good long-term functional capacity on exercise stress testing," they explained.

The actuarial 1-year survival was lower in surgical patients, but the difference did not reach statistical significance: 92.5% for CABG and 98% for PCI.

"The importance of our study is that it provides the first randomized, prospective data comparing percutaneous stenting with surgery in unprotected left main artery disease," said Dr. Jack L. Martin, the U.S.-based coauthor of the article. "Importantly, major adverse events—including respiratory infection, the need for respiratory support, renal failure, and the need for blood transfusion—were much lower in the percutaneously treated patients," said Dr. Martin, chief of interventional cardiology in the Main Line Heart System, Philadelphia.

The study's size was smaller than the investigators would have liked because at the time of approval, stenting for left main disease was not an accepted treatment, Dr. Martin explained in an interview, noting that American Heart Association and American College of Cardiology guidelines state that left main stenting should only be done when the patient is not a good candidate for bypass surgery.

LE MANS was sponsored by the Polish Ministry of Science and Informatics. Dr. Martin reported no conflicts of interest. ■