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Researchers establish new rule to predict risk of stroke, death from surgery that prevents it

DALLAS – Dec. 10, 2010 – It's a medical Catch-22: carotid artery surgery can itself cause stroke, but so can asymptomatic carotid disease if left untreated.

UT Southwestern Medical Center researchers have now developed a clinical risk prediction rule using factors such as sex, race and health history to assess the danger the surgery poses, while a modified version will help patients make a more fully informed choice about whether to have the procedure.

"It may take a thief to catch a thief, but physicians don't want to cause stroke while trying to prevent stroke, so being able to carefully weigh an individual's benefits and risk from carotid surgery is critically important," said Dr. Ethan Halm, chief of the William T. and Gay Solomon Division of General Internal Medicine and senior author of the study published in the journal *Stroke*.

Researchers drew on factors that increase the risk for postsurgical death or stroke for people with silent, or asymptomatic, carotid disease to predict which patients were at highest risk for complications. Those most at risk were female, non-white and had certain neurologic and heart diseases.

The carotid arteries, which run on the sides of the neck, are main blood vessels that supply oxygen to the brain. These arteries can become narrowed by fatty cholesterol deposits called plaque. If pieces of plaque break free, they can lodge in the brain, causing stroke.

In carotid endarterectomy (CEA), one of the most common types of vascular surgery performed in the U.S., surgeons open the artery and remove the plaque. Silent, or symptom-free, carotid artery disease usually is found by chance during unrelated medical tests.

"Asymptomatic patients achieve only a modest benefit from surgery – their chance of stroke decreases from 2 percent annually to 1 percent annually – because they have a lower chance of having a stroke in

the first place," Dr. Halm said. "For patients with several other medical risk factors, the upfront risk of surgery can outweigh any potential long-term benefits."

To create a predictive model to help determine a patient's risk, Dr. Halm and colleagues reviewed cases from the New York Carotid Artery Surgery study (NYCAS). The NYCAS evaluated outcomes of carotid surgeries performed on elderly patients in 167 hospitals in New York state between January 1998 and June 1999. Of the 9,308 surgeries, 6,553 were performed on asymptomatic patients. The average patient was 75 years old. Nearly 75 percent of patients had hypertension; 62 percent had coronary artery disease; and 29 percent had diabetes. Within 30 days of surgery, there were 55 deaths and 165 strokes.

The UT Southwestern researchers found that eight factors were independent predictors of death or stroke – being female, a minority, or severely disabled, or having a history of stroke, having arteries narrowed more than 50 percent, coronary artery disease, congestive heart failure or valvular heart disease.

They assigned each risk factor one point, except for disability which counts as 2. Patients with a score of 0 to 2 are low risk; those with 3 points are at moderate risk; more than 4 are high risk. Using this CEA-8 rule, they determined that one-fourth of the NYCAS patients had a higher probability of death and stroke than the recommended national guidelines.

They then created the CEA-7, a patient-friendly model, that eliminates non-operative stenosis. Patients can also determine their own risk, even if they don't know whether their arteries are more than 50 percent blocked.

"These models are the first for asymptomatic patients and are a practical and easy-to-use tool for doctors and patients to evaluate what is best for them in the long term," Dr. Halm said. "These aren't the only factors a patient should consider – individual health and experience of the surgeon and hospital team count, too – but hopefully with these models, patients and doctors can more accurately individualize the risk of complications."

The authors are now developing an interactive educational program that helps patients better understand the different risks and benefits of surgical versus medical management of asymptomatic carotid disease.

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Other UT Southwestern researchers participating in the study were Dr. Linda Calvillo King, assistant professor of internal medicine; Lei Xuan, biostatistical consultant in clinical sciences; and Dr. Song Zhang, assistant professor of clinical sciences. Researchers from Mount Sinai School of Medicine also participated.

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