

Are There Differences in Expected and Actual Results with Carotid Endarterectomy?

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The rapid growth in the performance of carotid endarterectomy (CEA) was largely supported by the results of the North American Symptomatic Carotid Endarterectomy Trial (NASCET) and the Asymptomatic Carotid Atherosclerosis Study (ACAS). These trials notwithstanding, the safety (ie, actual outcomes) of CEA continue to be challenged by some. It is argued that these multicenter trials were carried out in large, tertiary referral centers, and the operations were performed by highly vetted surgeons, and that in addition, there were a number of patient exclusionary factors. It has therefore been purported that these results may not truly reflect the anticipated outcome of the operation as performed in the surgical community at large.

Expected Results

Numerous studies published since the completion of NASCET and ACAS have documented outcomes superior to these trials. A clear assessment of the reported outcomes requires consideration of several factors, such as the rigor of perioperative surveillance for complications, the time period of CEA performance, surgeon case volume, hospital CEA volume, and the surgical indications. Although clinical trials that include routine postoperative surveillance by a neurologist reflect the most sensitive methodology for capturing adverse events, the assumption that favorable outcomes of CEA in numerous contemporary reports reflect substantial numbers of “missed” strokes is not supported by any credible data. Indeed, at a time when reimbursement is linked to comorbidity and the complexity of clinical care, it is clear that there is a strong incentive for institutions to capture all adverse events that complicate the patient’s course, and clearly postoperative mortalities are not going to be missed.

Actual Results

Medicare

In a report of CEAs performed across the United States in 1992, 30-day mortality was 2.5% among low- and 1.7% among high-volume hospitals, which was comparable to the 1.5% mortality documented in NASCET and ACAS hospitals. In a subsequent analysis of the impact of surgeon volume using this database for all procedures performed in 1996, 30-day mortality ranged from 2.8% among the lowest volume to 1.4% among the highest volume surgeons. In another national analysis of CEA procedures performed from 1994 through 1999 using the Medicare database, operative mortality ranged from 1.7% in very low- and low-volume hospitals to 1.5% in high- and very high-volume hospitals. Another investigation of the Medicare experience documented a significant reduction in mortality over the past decade, from a mean of 1.95% in 1991, to 1.44% in 1995, to 0.89% in 2000. In a report of all CEAs performed upon 4,120 Medicare beneficiaries in the state of Ohio in the mid-1990s, the

in-hospital mortality was 1.0%, the 30-day mortality was 1.8%, the 30-day nonfatal stroke incidence was 3.0%, and the 30-day stroke and mortality rate was 4.7%. The 30-day stroke and death rates were 2.4% among asymptomatic patients, and 4.8% and 7.1% among those presenting with a previous stroke or TIAs, respectively. These exemplary results reflect the influence of symptomatic status and surgical volume on outcome, since more than 80% of the operations were performed by moderate to high volume operators.

National Experience

These actual results have been confirmed in broader population-based series. For example, in an analysis of the National Inpatient Sample (NIS), 35,821 patients with a mean age of 71 years underwent CEAs performed by 2,330 surgeons in 372 hospitals. The in-hospital mortality and stroke rates were 0.61% and 1.45%, respectively. Mortality rates varied from 1.1% among low-, 0.63% among moderate-, and 0.44% among high-volume surgeons. Perioperative stroke rates were 2.0% among low-, 1.63% among moderate-, and 1.1% among high-volume operators. These excellent results further reflect the influence of surgical experience on outcome since 82% of the operations were performed by moderate or high-volume surgeons.

These outcomes have been documented in the state of Maryland in a study of all CEAs performed in all acute care hospitals from 1992 to 1996. Among 9,918 patients with a mean age of 69, the in-hospital mortality was 0.9% and the stroke rate was 1.7%. These excellent results also highlight the influence of clinical indications as well as surgeon and hospital case volume on outcome. Specifically, 86% of the operations were performed by high-volume surgeons (> 30 per year), 97.8% of the operations were carried out in high volume hospitals (> 50 cases per year), and 82% of the patients were asymptomatic preoperatively.

Conclusions

In the hands of experienced vascular surgeons in contemporary practice, the actual results of a CEA are superior. At a time when board certified vascular surgical specialists are available in most communities in this country, a strong case can be made for the concentration of carotid surgery in the hands of the most highly-skilled surgical specialists. Such a strategy will ensure that expected results are met by actual outcomes data.

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