Any health care intervention is more effective, and more cost-effective, in high-risk patients. Laupacis et al. described the number needed to treat (NNT), a very useful tool in clinical decision making. The NNT quantifies the volume of patients that must be treated to prevent one adverse outcome based on the average risk reduction of the procedure. When making decisions about which patients with carotid stenosis may benefit from revascularization, this concept is extremely helpful. The goal, obviously, is to identify patients who will benefit from therapy, and avoid harming patients who will not benefit.

Endarterectomy for asymptomatic carotid stenosis is a surprisingly contentious issue. As reviewed by Feasby, there are striking national differences in its application: in the United States 72.5 percent of endarterectomies were for asymptomatic stenosis, compared to 36 percent in Canada and 31 percent in Australia. Differences this profound raise the question of which is the more appropriate approach.

Carotid endarterectomy is clearly beneficial for patients with severe (i.e., greater than 70 percent) symptomatic stenosis, but patients with moderate or asymptomatic stenosis are at lower risk, and will benefit less from endarterectomy. The Asymptomatic Carotid Artery Surgery (ACAS) trial showed a statistically significant benefit of surgery for patients with greater than 60 percent asymptomatic stenosis, but the number needed to treat to prevent one event in two years was very high, approximately 67. As in the European Asymptomatic Carotid Surgery Trial (ACST) trial reported recently, there was no benefit of surgery for the first four years, and no benefit in women.

Furthermore, the surgical risk in ACAS and ACST—a three percent risk of morbidity or mortality—was substantially lower than in average practice. Such complication rates are seldom seen outside highly selective clinical trials. In a large regional survey of Medicare records, endarterectomy carried a 5.2 percent 30-day rate of stroke or death, so that in approximately 60 percent of states there was no benefit of endarterectomy for asymptomatic patients.

Carotid stenting also carries a substantial risk: in the CAVATAS trial, the risk of stenting was 10 percent, and in SAPHIRE, in which two-thirds of patients were asymptomatic, the procedural risk of stenting with distal protection was five percent, with a one-year event rate of 10 percent.

Weighing the Risks
Consensus guidelines for revascularization in patients with asymptomatic carotid stenosis are somewhat different if written by neurologists vs. neurosurgeons. In Canada, the neurologists’ guidelines recommend that endarterectomy not be considered routinely for asymptomatic patients; surgical guidelines recommend that consideration should be given to each of the following:

(1) Patient presentation, age and medical condition.
(2) Plaque characteristics such as degree of narrowing, the presence of ulceration and any documented worsening of the plaque over time.
(3) Other cerebral arterial stenoses or occlusions, or cerebral infarcts identified through neuroimaging.
(4) Surgical complication rates at the institution.

According to the guidelines, CEA should not be considered for asymptomatic stenoses unless the combined stroke and death rate among patients of the surgeon is below three percent. These recommendations reflect earlier evidence that patients with ulcers identified angiographically were at higher risk in the NASCET study; the relative risk for ulcer versus no ulcer ranged from 1.24 (95 percent CI 0.61 to 2.52) to 3.43 (CI 1.49 to 7.88) as stenosis increased from 75 percent to 95 percent. However, angiography, which shows the lumen, but not the wall, is a poor way to detect ulceration; the sensitivity was only 46 percent judged against ulcers found at surgery. We have found that three-dimensional ultrasound, which gives high-resolution images of the wall, is very effective at demonstrating the presence of ulcers and fissures (see Figure 1).

Obviously, patients with asymptomatic carotid stenosis, on average, have such a low risk that they stand to benefit very little from endarterectomy, and will most likely be harmed by stenting, with present levels of risk from stenting. They cannot benefit from procedures with a risk of three percent or more.

It would therefore be useful to have methods for determin-
Routine revascularization for asymptomatic carotid stenosis exposes patients to unnecessary risks in exchange for ill-defined benefits.

By J. David Spence, MD, London, Ontario

Fig. 1. The arrows show ulceration and fissures in carotid plaques, visualized by 3-D ultrasound. (Images courtesy of Dr. Vadim Beletsky.)

Routine revascularization for asymptomatic carotid stenosis exposes patients to unnecessary risks in exchange for ill-defined benefits.

8. Rothwell PM, ACST; which subgroups will benefit most from carotid endarterectomy? Lancet 2004; 363(9400):1122-1123.

September 2005
Practical Neurology 29