

Purchasers need clear evidence of efficacy before they buy services from their inadequate resources. For 40 years the evidence for carotid endarterectomy relied on prolific but inadequate data, so that too many operations were performed in the United States and too few in Britain. We now have the evidence for a selected group of patients in selected units and should not deny any person a sixfold to tenfold improvement in his or her prognosis. No treatment is effective if applied inappropriately, and if an inappropriate denominator is used the benefits of carotid endarterectomy are spuriously shown to be "vanishingly small." A similarly Luddite argument could be applied to appendicectomy for appendicitis if the denominator is taken as pain in the right iliac fossa and account is taken of the fact that appendicitis may resolve spontaneously or with antibiotics.

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- 1 Baird RN, Lambert M. Should carotid endarterectomy be purchased? *BMJ* 1995;310:316-8. (4 February.)
- 2 Wolfe JHN. Vascular training—a template for the future. *Ann R Coll Surg Engl* 1995;77(suppl):67-70.

Should be offered to appropriately selected patients

EDITOR,—Roger N Baird and Mark Lambert debate whether carotid endarterectomy should be purchased.¹ There is no doubt that carotid endarterectomy works.² Starting another trial in symptomatic patients with tight stenoses would be unethical as the two large trials in Europe and North America have proved beyond doubt that this operation is highly successful.³ It is medically indefensible not to offer this operation to appropriate patients; if these patients are denied surgery then before long they will seek compensation in the courts and will undoubtedly win. The question becomes, can the NHS afford the quality service that the treatment of such patients requires?

Firstly, a prompt clinical assessment is required to make sure that only the right patients come to surgery. This requires a careful history so that only those with appropriate symptoms are offered surgery.⁴ We run three cerebrovascular clinics a week. About two patients in every 25 seen come to carotid surgery; most patients do not even have transient ischaemic attacks.

Secondly, patients require careful investigation with minimal risk. In our unit we operate after a non-invasive work up with ultrasound scanning and magnetic resonance angiography in most cases.⁵ Both these tests depend on the operator but in skilled hands are highly accurate.⁵

Finally, the operation should be performed by someone whose patients have a complication rate of less than 5% and preferably less than 3%.³ A national survey by the Vascular Society of Great Britain and Ireland showed a rate of death or stroke after carotid endarterectomy of 3.4% (personal communication). Regular independent audit needs to be performed.

The above considerations, however, do not challenge the validity of the operation.

Carotid endarterectomy will not make a big difference to the overall incidence of first stroke: a 0.5% reduction. Lambert fails to point out, however, that aspirin reduces the overall incidence of stroke by only 1-2%, and we all give aspirin.⁶ There will be no single cure for stroke, which is a multifactorial disease. Treating high blood pressure confers the greatest benefit.⁶

Carotid endarterectomy in an individual symptomatic patient who is fit with a tight (70-99%) stenosis reduces the risk of stroke by 75%.²

We know more about the efficacy of carotid endarterectomy than about the efficacy of almost any other operation because large, properly

controlled trials have been performed. We have no choice but to purchase it or patients will force our hand. It should not be an operation for an elite few. The question is, how do we purchase quality?

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- 2 European Carotid Surgery Trialists' Collaborative Group. MRC European carotid surgery trial: interim results for symptomatic patients with severe (70-99%) or with mild (0-29%) carotid stenosis. *Lancet* 1991;337:1235-43.
- 3 Brown MM, Humphrey PRD, on behalf of the Association of British Neurologists. Carotid endarterectomy: recommendations for management of transient ischaemic attack and ischaemic stroke. *BMJ* 1991;303:636-8.
- 4 Winslow CM, Solomon DH, Chassin MR, Koseoff J, Merrick NJ, Brook RH. The appropriateness of carotid endarterectomy. *N Engl J Med* 1988;318:721-7.
- 5 Young GR, Humphrey PRD, Shaw MDM, Nixon TE, Smith ETSS. Comparison of magnetic resonance angiography, duplex ultrasound and digital subtraction angiography in the assessment of extracranial internal carotid artery stenosis. *J Neurol Neurosurg Psychiatry* 1994;57:1466-79.
- 6 Dennis M, Warlow C. Strategy for stroke. *BMJ* 1991;303:636-8.

Preoperative angiography is outdated

EDITOR,—I am surprised that Mark Lambert should minimise the impact of carotid endarterectomy¹ as its benefits have been more than proved in randomised controlled studies. Much of his criticism seems to hinge on his contention that angiography causes stroke in 1% of patients and that if this figure is added to the surgical morbidity and mortality the whole thing becomes worthless. He does not seem to accept or understand that most centres these days do not perform angiography before carotid endarterectomy. In my centre, for example, we have performed angiography in few cases in the past seven years and operate on many patients with carotid stenosis. Duplex scanning is all that is required in most cases and has no mortality.

Lambert mentions that, of over 97 000 strokes each year, only 154 can be prevented by carotid endarterectomy. He fails to mention that the remaining cases (>96 000) cannot be prevented, even if the usual preventive measures are undertaken. What he seems to be saying is that good results cannot be achieved by most people and that we should therefore ignore this operation, which has an excellent record of saving people from strokes. What he should be saying is that we should try to increase the number of centres offering an excellent service and reap the benefits of prevention of stroke.

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Efficacy is proved

EDITOR,—We are surprised by the negative attitude of Mark Lambert, who suggests that more than 5000 symptomatic patients with stenosis of >70% each year should be denied the benefit of carotid surgery.¹ The efficacy of carotid surgery in symptomatic patients with stenosis of >70% has been proved in both European and Northern American trials.^{2,3} In addition to giving an inadequate and selective review of the literature, Lambert fails to realise the possible difference in the prevalence of the disease between different communities. For example, he mentions that 40% of patients with a transient ischaemic attack are not

fit for investigations. He quotes this figure from an article by Hankey *et al*, who studied 485 consecutive patients with transient ischaemic attacks between 1977 and 1986.⁴ They did not have non-invasive ultrasonography for screening, and angiography was performed only in patients who were potential candidates for carotid endarterectomy on clinical grounds.

In our experience under a tenth of patients are unfit for surgery, which, although technically demanding for the surgeon, is relatively stress free for the patient and can even be performed under local anaesthesia. Hankey *et al* stated clearly in their article that their findings should not be applied to other medical centres without consideration of the possible differences in the prevalence of carotid artery disease, the efficacy and reliability of duplex ultrasonography, the local rate of complications of cerebral angiography, and the local cost of the imaging procedures.

We also dispute the correctness of the statement that 20% of patients are missed by non-invasive tests. In Bristol we performed duplex scanning two days before triplanar selective carotid arteriography in 103 symptomatic patients.⁵ The results were independently scored and classified as normal, <25% stenosis, >25% stenosis, >50% stenosis, >75% stenosis, and occlusion. Twenty eight arteries had >50% stenosis (sensitivity 92%, specificity 91%), 21 had >75% stenosis (sensitivity 95%, specificity 96%), and 10 were occluded (sensitivity 100%, specificity 95%). For all grades of stenoses ultrasound examination showed good correlation with arteriography ($\kappa=0.854\pm 0.026$ (perfect agreement gives a maximum value of 1; inverse correlation gives $\kappa < 0$)). A similar audit of more than 200 colour Doppler scans performed by the vascular studies unit in Sheffield has shown that only 1% of carotid stenoses >70% (that is, those requiring operation) were missed. In addition, the rate of stroke from non-selective digital subtraction arch arteriography is much less than 1%, and many centres now proceed to surgery on the basis of duplex scanning and computed tomography alone.

The debate about whether resources should be diverted from treatment to prevention applies to many diseases: no one would suggest that coronary artery bypass surgery prevents many myocardial infarctions in the population as a whole. We agree with Lambert about the benefits of primary preventive measures for stroke. We believe strongly, however, that carotid endarterectomy should be purchased for symptomatic patients.

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- 2 European Carotid Surgery Trialists' Collaborative Group. MRC European carotid surgery trial: interim results for symptomatic patients with severe (70-99%) or with mild (0-29%) carotid stenosis. *Lancet* 1991;337:1235-41.
- 3 North American Symptomatic Carotid Endarterectomy Trial Collaborators. Beneficial effect of carotid endarterectomy in symptomatic patients with high-grade carotid stenosis. *N Engl J Med* 1991;325:445-53.
- 4 Hankey JH, Warlow CP, Sellar RJ. Cerebral angiographic risk in mild cerebrovascular disease. *Stroke* 1990;21:209-22.
- 5 Aldoori MJ. Ultrasound and related studies in carotid disease. Bristol: University of Bristol, 1986. (PhD thesis.)

Continuous ambulatory electrocardiography in elderly people

EDITOR,—Mayer Bassan¹ did not read our article carefully.² We did not recommend routine Holter monitoring for elderly people to stratify their risk