EDITORIAL

The Significance of One Occluded Internal Carotid Artery

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One-third of patients who develop internal carotid occlusion will die or have disabling cerebral symptoms. The results of urgent carotid thromboendarterectomy in patients with established internal carotid occlusion were disappointing. Extracranial to intracranial bypass in symptomatic patients with internal carotid artery occlusion produced high numbers of strokes and was not of benefit. Attention turned to the prevention of internal carotid occlusion rather than cerebral revascularisation. Miller, a Canadian neurologist, noted that some patients experienced transient ischaemic attacks as a warning of impending internal carotid occlusion. He suggested that surgical intervention to the internal carotid artery would prevent stroke.

Recently the North American Symptomatic Carotid Endarterectomy Trial (NASCET) and the European Carotid Surgery Trial (ECST) demonstrated that patients with a symptomatic internal carotid stenosis >70% who had carotid endarterectomy were significantly less likely to develop a stroke than patients on best medical treatment. The ability of surgeons to prevent stroke and death by carotid endarterectomy depends on the balance between the variable risks of internal carotid disease and of carotid endarterectomy. The greater the risk of disease and the lower the risk of surgery, the more efficacious carotid endarterectomy becomes. Significantly higher morbidity and mortality rates for carotid endarterectomy have been found in women, the elderly (age >75 years), and patients with internal carotid occlusion. Does this mean that patients with internal carotid occlusion should not undergo carotid endarterectomy? The answer to this question is likely to be different for symptomatic and asymptomatic patients.

Symptomatic patients

In symptomatic patients approximately six carotid endarterectomies need to be performed to prevent one stroke. In major multicentre studies the risk of any stroke or death following carotid endarterectomy is just over 7%. Despite this, the continuing risk of stroke in these patients even on antiplatelet therapy is so high that at 3 years carotid endarterectomy has reduced their stroke and death risk from 22% to 12%.

What is the effect of contralateral occlusion? Internal carotid occlusion leads to increased intraoperative electroencephalographic ischaemia on contralateral internal carotid artery cross-clamp. Many authors have suggested that patients with internal carotid occlusion have a higher perioperative stroke risk than other patients. In a systematic review Rothwell and colleagues examined all studies published since 1980 which related the risk of stroke and death to various preoperative clinical and angiographic characteristics, including unpublished data on 1729 patients from the ECST. This thorough work demonstrated that patients with contralateral occlusion undergoing carotid endarterectomy carried an intraoperative stroke risk twice that of other patients. This effectively doubles the number of carotid endarterectomies that would be required to prevent one stroke unless the stroke risk of these patients is correspondingly high.

There are few reports of the natural history of stroke in symptomatic patients with an occluded internal carotid artery. In a study of 47 patients with internal carotid occlusion, followed up for 34 months, the stroke rate ipsilateral to the occlusion was 5% per annum. The authors suggested that these stroke events were due to embolic events from thrombus in the internal carotid stump. The natural history data detailing stroke risk in patients with a contralateral internal carotid should be available from the control...
arms of both the NASCET and ECST trials. This data is, however, unpublished and long overdue.

There is circumstantial evidence for a high stroke risk in patients with impaired cerebral perfusion, such as patients with internal carotid occlusion. Experimentally, ischaemic brain tissue is more susceptible to embolic infarction. Stroke patients with decreased collateral circulation from internal carotid occlusion have bigger cerebral infarcts than stroke patients with an intact collateral circulation. The risk of stroke, however, remains greatest ipsilateral to the occlusion. Paradoxically, microemboli can pass to the contralateral hemisphere in patients with internal carotid occlusion. In addition it is unclear whether patients with an internal carotid occlusion and a contralateral symptomatic stenosis between 50 and 70% are more at risk of stroke than patients with a unilateral symptomatic 70% stenosis. Despite patients with contralateral internal carotid occlusion making up 5-10% of studies of carotid endarterectomy the risk of ipsilateral or contralateral strokes without surgery is unknown.

Asymptomatic disease

It remains to be determined whether patients with asymptomatic disease contralateral to an internal carotid occlusion would benefit from carotid endarterectomy. In asymptomatic patients the balance of risks between surgery and medical treatment is less clear. The recent Asymptomatic Carotid Atherosclerosis Study (ACAS) reported an estimated risk of death or any stroke in surgical patients of 5.1% and 11% for patients treated medically. If carotid endarterectomy was performed with a perioperative mortality of less than 3% then patients with a >60% carotid stenosis should undergo carotid endarterectomy. Carotid endarterectomy for asymptomatic stenosis has not been widely adopted in Europe as there are doubts about the quality of the evidence. The ACAS 5-year all stroke and mortality rate after surgery was low at 5.1%. If duplex ultrasound had been used instead of carotid angiography this rate might have been lower still! The ipsilateral stroke rate of asymptomatic patients in the medical arm of the trial was high, 2.2%. Bock et al. in a large study suggested that asymptomatic patients have a much lower ipsilateral stroke risk of 1% per annum. More recent work carried out in Bristol demonstrated that patients with a unilateral asymptomatic stenosis >70% alone have an ipsilateral stroke risk in the first year after presentation of 1%. This unpublished study of

564 patients with asymptomatic disease and an average follow-up of 41 months showed that bilateral disease was the most important risk factor for stroke. Patients with asymptomatic disease and >40% contralateral disease (asymptomatic or symptomatic) had a first year all stroke risk of between 2 and 9.6% depending on the degree of ipsilateral disease. The stroke rate ipsilateral to the asymptomatic disease was, however, only 2%. The all stroke risk of patients with asymptomatic stenosis >40% and a contralateral occlusion was 7.55%. There was marked stratification of all stroke risk with respect to degree of ipsilateral asymptomatic disease; no events for patients 40–70%, 10.8% for patients 70–90% and 14% for >90%. It remains to be seen if the results of the European counterpart of the ACAS trial, the Asymptomatic Carotid Surgery Trial (ACST) will confirm these findings. The subgroup data from the ACST must be published and will reveal the effect of an occluded internal carotid artery on the stroke risk of asymptomatic patients.

In a recent editorial in this journal Matzsch called for a reappraisal of carotid surgery for the prevention of stroke — operating on patients more quickly and expanding the indications for carotid endarterectomy. Vascular surgeons are seeking to do this by identifying patients with a high risk of stroke who would benefit from carotid endarterectomy. Symptomatic and asymptomatic patients with internal carotid occlusion may have a higher risk of stroke than other patients. The only conclusive data concerning patients with internal carotid occlusion is that symptomatic patients undergoing carotid endarterectomy have twice the stroke risk of other patients. This fact needs to be balanced with data that should be published from the control arms of large randomised studies past, present and future. Only this way can the significance of the occluded internal carotid artery be known.

References

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