Blood pressure and risk of stroke in patients with cerebrovascular disease

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There is widespread clinical uncertainty about lowering blood pressure in patients with ischaemic cerebrovascular disease. This often manifests as comparatively high thresholds for starting treatment and modest targets in reducing blood pressure. Concern has arisen partly from reports of a J shaped association between blood pressure and recurrent stroke in these patients.[1] This relation may, however, be because severe strokes are associated both with a fall in blood pressure[2] and independently with a relatively high risk of stroke recurrence, rather than from any adverse effects of low blood pressure itself. If this were true, then people with a history of minor cerebrovascular disease would have direct and continuous relations between usual blood pressure and risk of stroke, as observed in people without cerebrovascular disease.[3]

Data from the United Kingdom transient ischaemic attack aspirin trial[4] provide a unique opportunity to test this hypothesis reliably: the study was large, and blood pressure measurements during follow up allowed usual long term blood pressure to be estimated (thereby avoiding the underestimation of the association that arises from the sole use of baseline blood pressure[3]).

Subjects, methods, and results

The trial included 2435 people from 33 centres. Participants had a recent history of transient ischaemic attack, amaurosis fugax, or minor stroke; their average age was 60 years, three quarters were men, and two thirds were randomly allocated aspirin treatment.

A total of 230 strokes occurred during an average of four years of follow up. In this logistic regression analysis the relative risk of stroke was estimated for four groups defined by baseline diastolic pressures of ≤79, 80-89, 90-99, and ≥100 mm Hg and by baseline systolic pressures of ≤129, 130-149, 150-169, and ≥170 mm Hg, with adjustment for age, sex, smoking, and aspirin treatment. The relative risks were then plotted against the mean usual blood pressure four years after baseline.

The results show direct and continuous relations of both usual diastolic pressure and usual systolic pressure with stroke (fig 1). Each 5 mm Hg lower usual diastolic pressure and 10 mm Hg lower usual systolic pressure was associated with 34% (SD 7%) and 28% (8%) fewer strokes, respectively. The proportions of patients with new stroke during follow up in the four groups defined by baseline diastolic pressure were 7.1%, 10.0%, 14.8%, and 17.3%. Since the range of mean usual diastolic pressure was just 10 mm Hg, each decrease in diastolic pressure of 1 mm Hg was associated with about one less stroke per 100 people over the four year follow up.

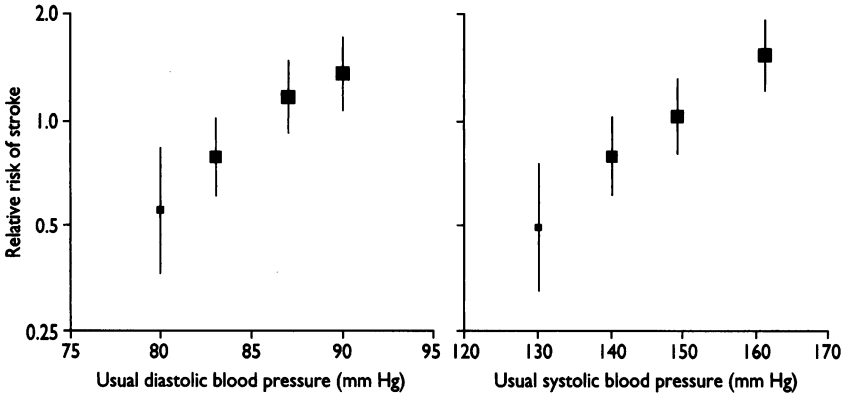

Fig 1—*Relative risk of stroke according to usual diastolic and systolic blood pressure. Vertical lines represent 95% confidence intervals, and solid squares are proportional to number of strokes in each category*

Comment

The results provide no evidence of a J shaped relation between blood pressure and risk of stroke across the range of usual systolic and diastolic blood pressures in patients with ischaemic cerebrovascular disease. Indeed, the strong continuous associations suggest that blood pressure is an important determinant of stroke risk in normotensive and hypertensive people with minor cerebrovascular disease.

A 5 mm Hg lower usual diastolic pressure was associated with about one third fewer strokes, a result comparable to that in studies measuring the incidence of first stroke.[3] The absolute difference in the incidence of stroke associated with such a difference in usual blood pressure was, however, several times larger than that in studies of the incidence of primary stroke.

These results suggest that lowering blood pressure may reduce the risk of stroke in patients with a broad range of cerebrovascular disease. Previous randomised trials have been promising but inconclusive, perhaps because they were small and the blood pressure reductions typically achieved were small.[5]

Remaining uncertainty should be resolved by a new large randomised trial—the perindopril protection against recurrent stroke study (PROGRESS). This study's aim is to determine whether reducing blood pressure in hypertensive and normotensive patients who have had a transient ischaemic attack or minor stroke produces benefits of the size suggested here. In the meantime, however, our data provide reassurance that the epidemiological rationale for expecting blood pressure lowering to reduce the risk of stroke is much the same in people with cerebrovascular disease as it is in others.[3]

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