Decompressive surgery for cerebral oedema after stroke: evidence at last

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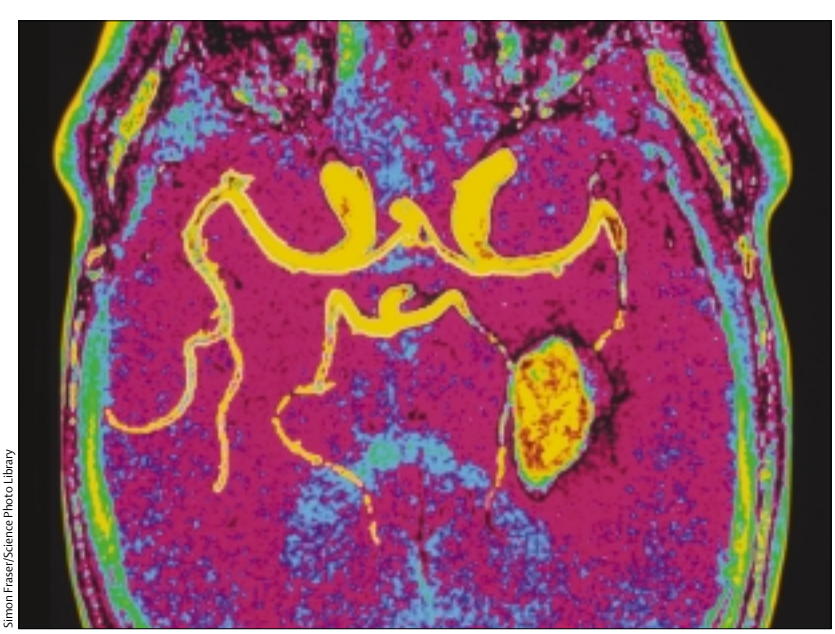
The high early case fatality among patients with large, space-occupying cerebral infarctions calls for new effective treatments. The poor prognosis is, at least in part, a consequence of cerebral oedema, which can cause raised intracranial pressure, herniation, and death.[1] Release of the restriction of the dura mater and cranial vault to allow the infarcted brain tissue to swell would therefore be a reasonable approach.

The evidence for benefit of decompressive surgery has been weak, and clinical use of the procedure has varied.[2] Experimental studies have shown clear beneficial effects on tissue salvage and early case fatality,[3,4] and many observational studies have likewise indicated a much lower early case fatality among patients given surgical treatment than among those given standard medical treatment.[5] Many experts, encouraged by these very promising results, have implemented surgical treatment in clinical practice.[2] Others, in view of the lack of randomised controlled trials, have favoured a more conservative approach.[2]

That three randomised controlled trials can now be reported is a remarkable achievement. Despite the very different opinions and practices, it has been possible to do three trials in three European countries and to plan in advance a pooled analysis of the data. This analysis,[6] published in this issue of *The Lancet Neurology*, for the first time gives valid estimates of the effects of decompressive surgery. The trials are small but point in the same direction and together show a large beneficial effect on both of the two major outcome variables: case fatality at 1 year and unfavourable outcome at 1 year (defined as a modified Rankin Scale score of 5–6). As a point of slight concern, randomisation was not entirely successful in achieving balance between the treatment groups in all trials, but overall, balance was acceptable and results of adjusted analyses did not make any difference to the results.



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Coloured MRI scan showing a cerebral infarction

The pooled analysis shows that, along with a clear beneficial effect on survival, there was an increase in the number of patients with a modified Rankin Scale score of 3 or 4—ie, moderate or moderately severe disability. In other words, the positive effect on unfavourable outcome, defined as a score of 5–6 or 4–6, is driven solely by a much lower number of deaths in the surgically treated group and translates into an increase in the number of patients with major disability. This finding raises the question of how to define and measure the net benefit of treatment. Interventions that produce worthwhile benefits often carry definite risks (eg, thrombolysis for acute ischaemic stroke, or endarterectomy for carotid stenosis). If the different outcomes (ie, death, survival with major disability, and survival without major disability) had equal weights, the net benefit could be calculated as the sum of positive and negative outcomes. In real life, however, patients assign different values to these outcomes, and patients will need to trade off the chance of treatment success against the risk of survival with major disability.[7] The size of the net benefit of decompressive surgery can therefore be assessed on an individual basis only.

Other unanswered questions relate to the generalisability of the results: the mean age of patients in the pooled analysis was around 45 years and extrapolation of the results might not be possible for older patients who may be at lower risk of increased intracranial pressure (due to brain atrophy), more prone to complications of surgery, and have other attitudes towards risk.[8] The effect of surgery might also depend

on the timing of the intervention. The pooled analysis did not show any difference between patients treated early (0–23 h) or late (24–48 h), but one of the three trials (HAMLET, which has a longer time window) is still ongoing and will probably provide more information.

The pooled analysis takes us a big step forward in that it provides estimates of the effectiveness of decompressive surgery. Overall, it saves lives, albeit at the cost of more patients with moderate or moderately severe disability (but not severe disability). Centres that have already adopted this technique will undoubtedly feel encouraged to continue using it. Other centres will now have the evidence they need to take it up. Still, in order to guide the management of individual patients, we need more information about patients' utility values for different outcomes after stroke and about the effects of treatment in different types of patients and in different time intervals after stroke onset. It is hoped that some of these questions will be addressed in later reports from the three trials or from future trials.

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I have no conflicts of interest.

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Deep-brain stimulation for dystonia: new twists in assessment

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Primary generalised dystonia is a disabling neurological disorder that affects children and young adults for whom no effective medical treatment is available.[1,2] Involuntary muscle spasms produce widespread abnormal movements and postures that can ultimately become devastating. Unlike secondary dystonia in Wilson's disease and certain childhood metabolic brain disorders, primary dystonia is unaccompanied by other neurological findings. Genetic forms of primary generalised dystonia have been identified, but the cause is usually unknown.[1,3] Neuropathological abnormalities have not been identified, but abnormal neuronal firing patterns[4] and metabolic activity[5] occur in the globus pallidus.

Therapeutic benefit of pallidal deep-brain stimulation (DBS) is thought to be due to disruption of abnormal patterns of pallidal neuronal activity.[4,6] DBS of the globus pallidus internus has been successfully used for treatment of dystonia but, until recently, evidence for efficacy has been limited to uncontrolled retrospective studies.[2,6] Although controlled surgical trials are more difficult to undertake and can be controversial, these trials with the use of blinded assessments are better than methods used to assess movement disorder surgery[7] because placebo effects have occurred after fetal-tissue transplant surgery for Parkinson's disease[7] and medical treatment of dystonia.[2,8] The long-term follow-up study by Vidailhet and co-workers published in this issue of *The Lancet Neurology*[9] is a prospective but uncontrolled study reporting the 3 year follow-up results of a multicentre trial of bilateral pallidal DBS in 22 patients with primary generalised dystonia. In their previous publication[10] about the same patient cohort followed up for 12 months after surgery, standardised video recordings were rated by a single investigator unaware of treatment allocation 3 months after surgery. The findings showed significant improvement in dystonia with stimulation on compared with stimulation off. Open assessment of dystonia and quality-of-life assessments showed that benefit was maintained at 12 months.

Follow up was excellent in this multicentre trial. All 22 patients were reassessed 3 years after surgery, at which time 17 patients were receiving bilateral DBS