Early Decompressive Hemicraniectomy in Older Patients With Nondominant Hemispheric Infarction Does Not Improve Outcome

H. Bart van der Worp, PhD; L. Jaap Kappelle, PhD

Space-occupying edema formation is an important cause of death in young patients with large hemispheric infarcts. This complication appears to occur less frequently in elderly patients with similar-sized infarcts, in part because edema may be compensated for by brain atrophy.1 Because the risk of stroke increases almost exponentially with age, space-occupying hemispheric infarcts are still frequently observed in patients older than age 60 years.

In a meta-analysis of 3 small randomized trials that compared surgical decompression with conservative treatment in patients with space-occupying infarction, surgery within the first 48 hours of symptom onset increased the chance of a favorable functional outcome at 12 months, defined as a score on the modified Rankin scale ≤3, from 24% to 40%.2 However, each of these trials used an upper age limit of 55 or 60 years. Similar trials have not been performed in older patients.

The upper age limit of 60 years in the trials was not without a reason: observational studies have strongly suggested that age is a main predictor of benefit from surgical decompression.1 In a recent review of uncontrolled studies, just 6 (8%) of 72 patients older than age 60 years had a favorable outcome after surgery, as compared with 77 (54%) of 143 younger patients.3

The results of these observational and uncontrolled studies should be interpreted with caution for several reasons, of which selection bias is probably the most important. In the most recent review, only 18% of the patients older than 60 years and 30% of the younger patients had an infarct in the left hemisphere,3 suggesting considerable selection bias in both age groups and larger bias in older patients.

We think that the prognosis with regard to functional outcome of this 70-year-old woman is poor, independent of how she is treated. There is no evidence whatsoever that she will benefit from surgical decompression. Surgery is likely to reduce the risk of death but, especially in elderly patients, survival alone should not be considered the most important outcome. In patients aged 60 years or younger included in the randomized trials, the 50% reduction in case fatality after surgery was at the expense of an increase in severe disability (modified Rankin scale, 4 or 5) at 12 months from 6% to 40%.2 Because of the more frequent presence of comorbidities and cognitive disorders, and reduced neuronal plasticity, the risk of survival with severe disability probably will be greater in older patients. This is consistent with the results of the observational studies mentioned. Performing an invasive and aggressive treatment should be based on evidence of benefit from randomized trials, and such evidence is currently lacking. For this reason, we would not recommend surgical decompression.

Our reluctance to recommend surgery in this woman makes the answer to the question of when this should be performed redundant. One observational study has suggested that outcome after surgical decompression is better if performed within 24 hours after stroke onset than when delayed. By contrast, the timing of surgery did not affect outcome in a systematic review of other observational studies.1 In the randomized trials, performing surgery on day 2 rather than on the first day had no effect on its benefit.4 HAMLET was the only randomized trial that allowed surgery up to and including the fourth day after symptom onset.2 In the 25 patients included in this trial after 48 hours, no benefit of surgery was observed. However, the trial was underpowered to detect a difference in this subgroup.

Despite the lack of conclusive data on the optimal timing of surgical decompression, we think that in patients aged 60 years or younger, this should be performed as soon as there are convincing clinical and radiological signs of life-threatening edema formation. In our experience and that of others, irreversible signs of cerebral herniation may develop within hours after neurological deterioration, and delaying surgery therefore probably will increase the chance of a poor outcome. Mild midline shift alone lacks sufficient predictive value to select candidates for surgical decompression, but lesion volume on diffusion-weighted imaging >82 mL in the first 6 hours of stroke appears to predict severe edema..
formation with sufficient certainty.\(^1\) For patients aged 60
years or younger without an early MRI, the joint inclusion
criteria used in recent randomized trials are helpful.\(^4\) Case
fatality was 71% in patients who fulfilled these criteria in the
first 45 hours of stroke onset and were treated conservatively.\(^2\)
Whether the clinical prognostic criteria also apply to patients
older than 60 years remains to be tested.

Clearly, the clinical dilemma outlined here calls for a
randomized trial of surgical decompression in elderly patients
with space-occupying infarction. The trial DESTINY II,
coordinated by our opponents, hopefully will provide conclu-
sive answers to the issues raised.

Disclosures

None.

References

1. Huttner HB, Schwab S. Malignant middle cerebral artery infarction:
clinical characteristics, treatment strategies, and future perspectives.
HB, HAMLET investigators. Surgical decompression for space-occupying
cerebral infarction (the Hemicraniectomy After Middle Cerebral Artery
infarction with Life-threatening Edema Trial [HAMLET]): a multicentre,
3. Arac A, Blanchard V, Lee M, Steinberg GK. Assessment of outcome
following decompressive craniectomy for malignant middle cerebral artery
infarction in patients older than 60 years of age. *Neurosurg Focus.* 2009;
26:E3.
GJ, Schmiedeck P, Schwab S, Rothwell PM, Bousser MG, van der Worp
HB, Hacke W, DECIMAL, DESTINY, and HAMLET investigators. Early
decompressive surgery in malignant infarction of the middle cerebral
artery: a pooled analysis of three randomised controlled trials. *Lancet

**KEY WORDS:** cerebral infarct, edema, hemicraniectomy
Early Decompressive Hemicraniectomy in Older Patients With Nondominant Hemispheric Infarction Does Not Improve Outcome
H. Bart van der Worp and L. Jaap Kappelle

Stroke. 2011;42:845-846; originally published online February 3, 2011;
doi: 10.1161/STROKEAHA.110.603605

The online version of this article, along with updated information and services, is located on the World Wide Web at:
http://stroke.ahajournals.org/content/42/3/845