

Head position and cerebral blood flow velocity in acute ischemic stroke: a systematic review and meta-analysis.

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Abstract

BACKGROUND:

Patients with acute ischemic stroke (AIS) have impaired vasomotor reactivity, especially in the affected cerebral hemisphere, such that they may depend directly on systemic blood pressure to maintain perfusion to vulnerable 'at risk' penumbral tissue. As the sitting up position may affect cerebral perfusion by decreasing cerebral blood flow (CBF) in salvageable tissue, positioning AIS patients with their head in a lying flat position could increase CBF through collateral circulation or gravitational force. We wished to quantify the effect of different head positions on mean flow velocity (MFV) by transcranial Doppler ultrasonography (TCD) in AIS patients to assess the potential for benefit (or harm) of head positioning in a clinical trial.

METHODS:

We performed a systematic review and meta-analysis of observational studies with TCD to evaluate differences in cerebral MFV between the lying flat and sitting up head positions in AIS. For each study and each comparison, we obtained the mean value of changes in MFV and its variance.

RESULTS:

A total of 303 studies were identified, but 298 were excluded for varying reasons; 4 papers met the inclusion criteria and 57 patients were included in the meta-analysis for calculation of the overall mean difference in MFV. We found a significant increase in MFV from a bed angle of 30 to 15° (4.6 cm/s, 95% confidence interval, CI, 2.9-6.2, $p < 0.001$) and from 30 to 0° (8.3 cm/s, 95% CI 5.3-11.3, $p < 0.001$) in the affected hemisphere but not on the normal side in AIS patients.

CONCLUSIONS:

In AIS patients, MFV increased significantly in the side affected by the stroke but not in the unaffected side when they were positioned in a lying flat head position at 0 or 15° compared to an upright head position at 30°. The clinical significance of these findings is now undergoing further randomized evaluation in the international multicenter Head Position in Acute Stroke Trial (HeadPoST).