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Hemodilution for acute ischemic stroke

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Introduction

Ischemic stroke involves focal hypoperfusion of the central nervous system. Hemodilution could theoretically improve perfusion to the affected area and therefore reduce infarct size.

Objective

Assess the effects of hemodilution on clinical outcomes in patients with acute ischemic stroke.

Methods

We searched the Cochrane Stroke Group Trials Register (February 2014), the Cochrane Central Register of Controlled Trials (Issue 1, 2014), MEDLINE (January 2008 to October 2013) and EMBASE (January 2008 to October 2013). We also searched trials registers, scanned reference lists and contacted authors. We included randomized trials of hemodilution treatment in acute ischemic stroke, started within 72 hours of symptom onset, and which reported clinical outcomes. Two authors assessed trial quality and one author extracted the data.¹

Main Results

We found 21 trials involving 4174 participants matching our selection criteria. Nine trials used a combination of venesection and plasma volume expander. Twelve trials used plasma volume expander alone. The plasma volume expander was plasma alone in one trial, dextran 40 in 12 trials, hydroxyethyl starch in five trials and albumin in three trials. Two trials tested hemodilution in combination with another therapy. Evaluation was blinded in 14 trials. Five trials probably also included some participants with intracerebral hemorrhage. Hemodilution did not significantly reduce death within the first four weeks (risk ratio [RR] 1.10; 95%

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confidence interval [CI] 0.90 to 1.34, Fig 1). Similarly, hemodilution did not influence death within three to six months (RR 1.05; 95% CI 0.93 to 1.20), or death and dependency or institutionalization (RR 0.96; 95% CI 0.85 to 1.07). The results were similar in confounded and unconfounded trials, and in trials of isovolemic and hypervolemic hemodilution. No statistically significant benefits were documented for any particular type of hemodiluting agents, but the statistical power to detect effects of hydroxyethyl starch was weak. Six trials reported venous thromboembolic events. There was a trend towards reduction in deep venous thrombosis, pulmonary embolism, or both at three to six months (RR 0.68; 95% CI 0.37 to 1.24). There was no statistically significant increased risk of serious cardiac events among hemodiluted patients.

Conclusions

We did not find clear evidence of benefit of hemodilution therapy for acute ischemic stroke on clinical outcomes.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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References

1. This paper is based on a Cochrane Review published in The Cochrane Library 2014, Issue 8 (see [www.thecochranelibrary.com]www.thecochranelibrary.com for information). Cochrane Reviews are regularly updated as new evidence emerges and in response to feedback, and The Cochrane Library should be consulted for the most recent version of the review.
2. Chang, TS.; Jensen, MB. Haemodilution for acute ischaemic stroke; Cochrane Database of Systematic Reviews. 2014. p. CD000103 Art. No. <http://dx.doi.org/10.1002/14651858.CD000103>

Figure 1.

Comparison of hemodilution, all types, versus control, on the outcome of death or dependent/institutionalised at 3–6 months.