Elevated Pulse Pressure During the Acute Period of Ischemic Stroke Is Associated With Poor Stroke Outcome

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**Background**—It is controversial which component of blood pressure (BP) during acute period of stroke best predicts outcome. We hypothesized that elevated pulse pressure (PP), the difference between systolic BP (SBP) and diastolic BP (DBP), is independently associated with poor stroke outcome at 3 months.

**Methods**—We analyzed both treatment groups from the Glycine Antagonist (Gavestinel) in Neuroprotection (GAIN) International trial (1455 ischemic stroke cases of mostly moderate severity). Cox proportional hazards and logistic regression modeling corrected for demography, medical history, heart rate, stroke severity, and clinical subtype.

**Results**—Elevated weighted average PP during the first 60 hours was associated with poor outcome by mortality, Barthel index, National Institutes of Health Stroke Score (NIHSS) and Rankin scores. Elevated baseline PP was associated with Barthel index and Rankin score.

**Conclusion**—Elevated PP is associated with poor stroke outcome at 3 months. (Stroke. 2004;35:e153-e155.)

Key Words: ischemia ■ stroke ■ outcome
range) of baseline PP and WAPP was 70 (59 to 80) mm Hg and 69 (57 to 79) mm Hg, respectively.

Elevated WAPP was associated with poor outcome by all outcome measures in univariate analyses and after correcting for prognostic factors (Table). Elevated baseline PP was associated with Barthel index and Rankin score. There was no significant evidence that these associations were different in patients with and without atrial fibrillation.

The Figure presents log-ORs and log-HRs of standardized WA and baseline PP, MBP, DBP, and SBP in predicting poor stroke outcome after correcting for prognostic factors. Although there is a trend for higher values of WASBP and low values of baseline DBP to be associated with poor stroke outcome, this was not statistically significant in many of the models.

Discussion

Our findings showed a clear linear logistic relationship between high baseline PP and WAPP and poor stroke outcome: there was no significant difference between the models that we have presented or generalized additive models that allow any shape of relationship.

The opposite effects of WASBP and baseline DBP on outcome might explain some of the effect of PP on the outcome. Our study confirmed the association of low baseline DBP with poor outcome presented earlier,3,4 but it failed to show any effect of baseline SBP. The effect of WASBP was consistent with the effect of beat-to-beat SBP.5 The confidence intervals for the effect sizes of standardized PP, MBP, DBP, and SBP on outcome overlap substantially (Figure). Thus, we found no evidence of any one BP component being more strongly associated with outcome than the others.

WAPP, however, was the only BP component to be consistently associated with all 4 outcome measures, in comparison to 2 for baseline DBP and WASBP and 1 for WA MBP. Therefore, the role of PP should not be underestimated.

Exclusion criteria controlled only for high DBP, thus we could have encountered a selection bias of PP. The mean PP was higher (74 mm Hg, n=92 vs 72 mm Hg) in the study that failed to detect PP effect in comparison to our results. In a subgroup of patients with SBP <180 at baseline (n=1088), after correcting for prognostic factors, ORs and HRs of PP were not statistically significant, but their confidence intervals overlapped with the results of the entire sample. Reasons for this might be smaller sample and PP range and exclusion of patients with poor prognosis because of extremely high SBP.

Having an observational nature, our study cannot prove a causal relationship of PP with stroke outcome: high PP may be the consequence of potential poor outcome rather than its cause. Results might not directly apply to the general hospital-based population. Medications can selectively alter different components of BP, and thus clarification of their effect is important for BP management in acute stroke care. In conclusion, elevated PP during the acute period of ischemic stroke is independently associated with poor stroke outcome.
at 3 months after correcting for baseline NIHSS score, age, gender, treatment group, heart rate, stroke risk factors, and stroke type.

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References

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