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Titel des Beitrags: Cerebral air emboli differentially alter outcome after cardiopulmonary bypass in rats compared with normal circulation.

Abstract: BACKGROUND: Cerebral air emboli (CAE) are thought to contribute to adverse cerebral outcomes following cardiac surgery with cardiopulmonary bypass (CPB). This study was designed to investigate the effect of escalating volumes of CAE on survival and neurologic and histologic outcomes. In addition, the effect of xenon administration during CAE on these outcomes was determined.

METHODS: With institutional review board approval, four groups were studied (n = 15). In two CPB-CAE groups, rats were subjected to 90 min CPB with 10 repetitively administered CAE. Rats in two sham-CAE groups were also exposed to CAE but not to CPB. Rats were randomly assigned to sequential dose cohorts receiving CAE ranging from 0.2 to 10 microl in a dose-escalating fashion. Groups were further subdivided into xenon (56%) and nitrogen groups. Rats with severe neurologic damage were killed; others were neurologically tested until postoperative day 7, when infarct volumes were determined. Survival and neurologic and histologic outcomes were tested with logistic regression analyses (P< 0.05).

RESULTS: This study demonstrates a dose-dependent relation between CAE volumes and survival, neurologic outcome, and histologic outcome. For all outcomes, CPB adversely affected the dose-effect curves compared with sham-CAE groups (P< 0.05). Xenon demonstrated no impact on either
outcome. CONCLUSIONS: This study describes the successful incorporation of CAE in a rodent CPB model and allows identifying suitable CAE volumes for subsequent studies. CAE exhibit a differential effect on outcome in rats undergoing CPB versus those not exposed to CPB. Perioperative administration of xenon remained without any effect on outcome.