Brain Disorders/Neurological

Effect of hyperbaric oxygenation on intracranial pressure elevation rate in rats during the early phase of severe traumatic brain injury.


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Intracranial pressure (ICP) was monitored to evaluate the therapeutic effect of hyperbaric oxygen (HBO(2)) treatment following traumatic brain injury (TBI). This subject is controversial. The aim of our study was to determine whether HBO(2) treatment has a therapeutic effect on ICP dynamics and survival following severe fluid percussion brain injury (FPBI) in rats. Changes in ICP level were analyzed every 30 min during an 8-h monitoring period following trauma and at the end of experiment (20 h). The control (A) and experimental (B) groups consisted of 7 and 4 rats, respectively. Group B was subjected to 1.5 atmospheres absolute (ATA) 100% oxygen for 60 min beginning 2 h after FPBI. No significant differences in ICP were noted between groups A and B before and after HBO(2) treatment until 3.5 h after trauma. At 4 h, for the first time, the difference became significant (P = 0.025; n = 11) and remained significant (P < 0.05) for all measurement points until end of monitoring, when mean ICP values reached 37.17 +/- 14.25 and 20.25 +/- 2.63 mm Hg in groups A and B, respectively.

Linear approximation models showed different trends (b1 = 3.80 +/- 0.23; r(2) = 0.65, P < 0.001 and b1 = 1.56 +/- 0.25; r(2) = 0.77, P < 0.001) for groups A and B, respectively. Covariance analysis confirmed significant differences between slopes for groups A and B (F = 148.04, P < 0.001; df = 2,177), i.e., a significant difference in mean rate of ICP elevation. By the end of the experiment, 3 out of 7 rats from group A had died, but none from group B.

We conclude that the application of HBO(2) during the early phase of severe FPBI significantly diminished ICP elevation rate and decreased mortality level.

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