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Effect of dexmedetomidine on cerebral vasospasm and associated biomarkers in a rat subarachnoid hemorrhage model

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Background & Aim: The α2 adrenergic agonist dexmedetomidine has huge potential for protecting against cerebral vasospasm, a leading cause of death and disability after Subarachnoid Hemorrhage (SAH). Biomarker assay in SAH is recently emerging as a tool for predicting vasospasm and outcomes. We investigated the effects of dexmedetomidine on vasospasm with the assessment of biomarkers in a rat SAH model.

Methods: Male Wistar rats were randomly assigned to sham (n=10), SAH (n=10) or SAH+DEX (n=10) groups. The SAH and SAH+DEX groups received 0.3 mL injections of autologous blood into the cisterna magna followed by intraperitoneal injections of normal saline or 10 μg/kg dexmedetomidine. Forty-eight hours later, neurological deficits as well as the Basilar Artery (BA) wall thickness and Cross-Sectional Area (CSA) were measured. Cerebrospinal Fluid (CSF) and blood samples were obtained to assess concentrations of interleukin (IL)-6, C-Reactive Protein (CRP), Endothelin (ET)-1 and S100-β using enzyme-linked immunosorbent assays.

Results: The SAH and SAH+DEX groups exhibited deteriorated neurological function and structural and morphological BA vasospasm. The SAH+DEX group showed an improved neurological function score (52% decrease), a 10% reduction in wall thickness and a larger BA CSA (by 157%). Compared to the sham group, CSF levels of IL-6 and CRP in the SAH and SAH+DEX groups, as well as serum IL-6 and CRP levels in the SAH group were significantly elevated. The SAH+DEX group showed significantly lower CSF IL-6 levels compared to the SAH group. Serum and CSF levels of ET-1 and S100-β were similar among all groups.

Conclusion: Dexmedetomidine administration reduced the severity of cerebral vasospasm and improved neurological function in SAH rats, which may be closely linked to reduced CSF IL-6 level.

Biography

Dong Woo Han has completed his PhD in 2005 from Soonchunhyang University College of Medicine, South Korea. He is a Professor in the Department of Anesthesiology and Pain Medicine, Yonsei University College of Medicine, South Korea. He has published more than 60 papers in reputed journals and has been serving as an Editorial Board Member of Korean Society of Anesthesiologists.

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