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Investigation of the protective effect of Heparin pre-treatment on Cerebral Ischaemia in Gerbils

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The interruption of cerebral blood circulation may cause stroke characterized by high Neurological Deficits (NDs) as a result of neuronal dysfunction or destruction. Heparin may exert a neuroprotective effect against cerebral ischaemia/reperfusion injury. Objective: The objective of this study was to investigate the mechanism underlying the effects of heparin pre-treatment on cerebral injury in the gerbil. Materials and methods: A total of 80 healthy Mongolian gerbils were randomly divided into four groups to establish cerebral ischaemia model by bilateral carotid artery occlusion: control (no anaesthesia and surgery), sham (no occlusion), non-anticoagulation (occlusion), and anti-coagulation treatment groups (50IU/100g heparin pre-treated, occlusion). Gerbils were anesthetized with 40mg/kg pentobarbital sodium through intraperitoneal injection before operation except for the control group. Then, the ND and Histopathological Damage (HD) scores were determined. The percentage of Tumour Necrosis Factor (TNF)-a- and interleukin (IL)-1b-positive cells were calculated based on immunohistochemical results. The mRNA and protein levels of caspase-9, caspase-8, FasL, and calpain were evaluated with real-time Polymerase Chain Reaction (RT-PCR) and western blotting, respectively.

Results: Compared with non-anticoagulation group, heparin pre-treatment (50IU/100g) delayed the onset of dyspnoea ($p<0.05$), and showed a significant decrease in ND ($p<0.01$), mortality rate ($p<0.05$), HD ($p<0.01$) and percentage of positive cells for TNF-a, IL-1b ($p<0.01$) in cerebral ischaemia gerbils. Besides, the expression levels of caspase-9, caspase-8, FasL, and calpain were reduced after pre-treatment with 50IU/100g heparin. Discussion and conclusions: The damage caused to gerbil brain was reduced upon pre-treatment with heparin, possibly through the amelioration of neuronal cell apoptosis and expression of TNF-a and IL-1b. These findings are expected to provide a new breakthrough in the study and treatment of cerebral ischaemia.

Biography

QingShan Ye has done thousands of cases of anesthesia work, no patients have adverse reactions and complications. The resuscitation anesthesia of a large number of critically ill patients was successfully organized. By adhering to the principle of "never give up" until the last minute, a large number of patients were pulled back from death. He is a high-level professional and technical talent of Ningxia hui autonomous region, the director of the medical quality control center of Ningxia anesthesiology, and the person in charge of the construction of the national key clinical anesthesia department of the health department of People's Hospital of Ningxia Hui Autonomous Region.

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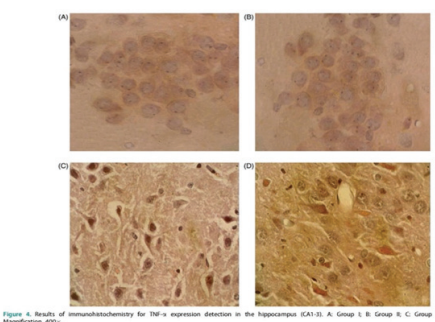

Figure 4. Results of immunohistochemistry for TNF-a expression detection in the hippocampus (CA1-3). A: Group I; B: Group II; C: Group III; D: Group IV. Magnification, 400×.

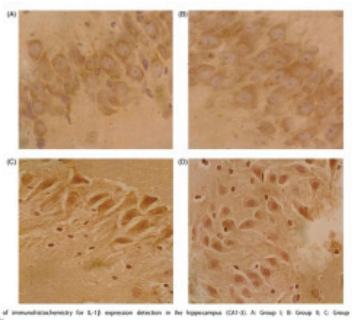

Figure 5. Results of immunohistochemistry for IL-1β expression detection in the hippocampus (CA1-3). A: Group I; B: Group II; C: Group III; D: Group IV. Magnification, 400×.