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Vasogenic Edema and Permeability Changes Induced by Unsaturated Fatty Acid Emulsion

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목적 : Triolein emulsion has been reported to disrupt the blood-brain barrier temporarily. We compared the disruption effect of unsaturated fatty acid (oleic and linoleic acid) emulsion on the blood-brain barrier in cats.

대상 및 방법 : The fat emulsion was made with 0.05 ml of oleic acid or linoleic acid and 20 ml of normal saline. The internal carotid artery was infused with oleic acid emulsion in 14 cats (Group 1) and linoleic acid emulsion in 12 cats (Group 2). Gd-enhanced T1-weighted (Gd-T1WI), diffusion-weighted (DWI) and additional apparent diffusion coefficient map (ADC map) MR imaging was scheduled at 1 hour, 1 and 4 days, and 1 week after infusion. If the lesion shows no contrast enhancement on Gd-T1WIs and isointensity on DWIs and ADC maps, no further imaging was obtained and the brain tissue was removed immediately for light (LM) and electron microscopic (EM) examinations.

결과 : The lesions appeared as isointensities or mild hyperintensities on DWIs, isointensities on the ADC maps, and contrast enhancements on Gd-T1WIs at 1 hour in both groups. These MRI findings were less evident at day 1 in Group 1. In Group 2, the lesion showed all isointensities at day 1. LM findings revealed minor necrosis and demyelination in one cat of Group 1 and three cats in Group 2. EM examinations showed minimal findings in the cortical lesion in Groups 1 and 2.

결론 : Infusion of oleic or linoleic acid emulsion into the carotid artery of cats revealed vasogenic edema of the brain and reversible changes as depicted on MR images. Histologic examinations showed minor evidence of necrosis or demyelination. These results could be used as a basic model for research of the reversibility of cerebral fat embolism, of the chemotherapeutic effect of the brain tumors or of drug effect on the disrupted blood-brain barrier.