

PERFLUOROCARBON-BASED OXYGEN CARRIER IN TREATMENT OF PATIENTS WITH ACUTE SPINAL CORD INJURY

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The previous experiments showed that the perfluorocarbon-based blood substitute with gas transporting function, known as "Perftoran" is capable to reduce spinal cord (SC) damage and protect medullar tissue against ischemia in acute spinal cord injury (SCI). Perftoran (Pf) is an emulsion of perftormethyl cyclohexil-pyperidin, stabilized by Proxanol 268. Its particles have an average size of 0.07 mcm and possess high absorb capacity. Oxygen solubility is 7 vol.%. Pf accelerates the process of O₂ delivery and CO₂ elimination, increases cerebral blood flow and inhibits serum elastase activity (SEA). 44 acute SCI patients, with paraplegia as a result of Th 6 - LI vertebrate trauma without full rupture of SC were investigated and operated on surgical decompression within 8-72 h. All the patients were randomly assigned in two groups and evaluated according to ASIA impairment scale. The injured SC of 20 patients was lavaged by flow of the saline - macrodex solution /SMS/ t-34°C in subdural space for -20 min after SC decompression and opening of dura mater (1st group). The lavage of injured SC of 24 patients was performed after the same surgery by oxygenated Pf for ~20 min. (2nd group). The oxymetric measurements, which were made in the SC injured area, have shown the increase of O₂ saturation in cerebrospinal fluid of subpial space up to 103±9.5 mm/Hg in 2nd group and up to 41.5±6.7 mm/Hg in 1st group. The same increase of O₂ saturation is possible in neighboring SC as well. The microvascular network as well as SC vessel's sizes increase significantly during Pf extra-vascular oxygenation in contrast with SMS lavage. I/v 100-200 ml. Pf were injected during post operation period 4-5 times every 2 days in spite of satisfactory level Hb ~100gm/l and Hct ≈ 32%, for depression the SEA. The patients of 1st group received traditional blood substitute in the same volume. From 24 patients 14, under Pf treatment more or less began to walk 4-7 weeks later. Only 5 of 20 patients could do so in 1st group. SEA decreases significantly in 2nd group but shows no change in 1st group.

Our results postulate that the local and temporary medullar oxygenation by Pf can carry oxygen to SC tissue to remove vascular spasm in damage area, restore its microcirculation and recuperate function. At the same time the Pf inhibits elastase activity and protect injured tissue against secondary metabolic damage. Perfluorocarbon-based blood substitutes can be effective for local oxygen delivery during surgery invasion to create anti-ischemic protection.