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Oral Presentation

Polytrauma with and without Neurotrauma: Experimental Animal Studies with Clinical, Immunological and Histopathological Features

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Abstract

Although the majority of the patients with traumatic brain injury presents with injuries involving the extremities, there was a clear paucity of adequate experimental polytrauma models. To close this gap, we conducted several studies to establish two different polytrauma mice models including both closed and open traumatic brain injury. Male C57BL mice with a mean weight of 23g were anesthetized with ketamine and xylazine. The anaesthetized animals were subjected to a controlled cortical impact (CCI) (n=20) over the left parietotemporal cortex using rounded-tip impounder for application of a standardized brain injury. Following fracture of the right femur using a guillotine, a hemorrhagic shock was induced via blood aspiration. The control groups included animals with isolated CCI (n=20) and animals with fracture of femur plus hemorrhagic shock (n=20). The second model included weight-drop injury with femure fracture and hemorrhagic shock (n=20), isolated weight-drop (n=20), femure fracture and hemorrhagic shock (n=20). All subjects were sacrificed 96 hours following trauma. Intracardial blood samples were taken before. Brain, kidney, liver, lung and spleen were taken for histopathological examination. The inflammatory response measured by Il-6, TNF α , CD⁴⁺ and CD⁺⁸ cells was stronger in the polytrauma group, in comparison with the control groups. Within the histopathological investigations, polytraumatized animals differ from those with a single trauma (traumatic brain injury or femur fracture with hemorrhagic shock) with various severity. The findings of the studies show that such polytrauma models can be standardized resulting in a reproducible damage. These models fulfill the requirements of a standardized animal model. It allows adequate analogies and inferences to the clinical situation of polytrauma in humans. It opens promising capabilities for more evaluation of possible posttraumatic drug therapy, heterotopic ossification and also studies with knock-out mice.

Keywords: Polytrauma Models, Immunological, Histopathological.

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