Abstract

Temporal lobe epilepsy is the most common form of epilepsy and hippocampal sclerosis represents the main underlying structural abnormity. Approximately 20% of TLE cases are non-lesional due to absence of any obvious epileptogenic lesion and tetanus toxin model is traditionally considered as a model of non-lesional temporal lobe epilepsy. The main aim of this study was to evaluate the presence of the cell damage and to determine its spatiotemporal profile. Tetanus toxin was stereotaxically injected into CA3 subregion of dorsal hippocampus in adult male Wistar rats. Brain tissue was extracted 4, 8 and 16 days following the surgery. Postfixed brains were sectioned to 50 μm slices and labeled using Nissl's and FluoroJade B staining (FJB). Hippocampal sclerosis was present only in animals from D16 group, however, it was localized mainly in contralateral CA1 area. Additional finding was decreased Nissl's staining in contralateral hippocampus which corresponded with the presence of FJB positive neurons. In animals from group D8, we have identified presence of FJB positive neurons predominantly in ipsilateral hippocampus. In D4 animals, cellular degeneration was absent. To examine the non-lesional nature of tetanus toxin model, we have performed blind study, when Nissl's staining were reviewed independently by two experience of neuropathologists. Results suggest that from the perspective of classical neuropathology the tetanus toxin model can be still classified as a non-lesional. This study brings new findings on morphological properties of tetanus toxin model. Neuronal loss is present in specific hippocampal subregions. The cell loss has specific time dependent spatial patter. Qualitatively this pattern differs from morphological findings observed in lesional models of temporal lobe epilepsy. Finally, presence of microscopic cell loss must be always considered when this model is used for experimental purposes.

Key words: cell loss, hippocampus, hippocampal sclerosis, temporal lobe epilepsy, tetanus toxin model