

Brain compliance revisited

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Abstract

Traumatic brain injury (TBI) is one of the major contributors to death and disability worldwide. Approximately 5 million patients every year are diagnosed with severe TBI that requires extensive neurocritical care and poses a significant socioeconomic challenge due to associated medical costs and loss of autonomy. Intracranial pressure (ICP) is one of the cornerstones of modern neurocritical care in severe TBI, as elevated mean ICP is strongly correlated with higher mortality, but monitoring of mean ICP alone is not sufficient to improve the patients' outcome. It has been suggested that the current management approach could be improved by measurement of cerebrospinal compliance, i.e., a quantitative index of the cerebrospinal system's ability to buffer intracranial volume increases without ICP elevation. However, direct methods of compliance assessment are poorly suited to continuous monitoring in the intensive care unit. In recent years, there has been an increasing interest in estimating compliance indirectly based on the pulsatile cardiac-related component of the ICP signal called the ICP pulse waveform. This presentation will discuss the approaches proposed so far to derive the information on cerebrospinal pressure–volume relationships from the ICP pulse waveform and their potential clinical significance in TBI.

About the lecturer

Agnieszka Kazimierska received her PhD degree in biomedical engineering from Wrocław University of Science and Technology in 2022. She currently works at the *BrainLab* Neuroengineering Lab led by prof. Magdalena Kasprowicz, at the Department of Biomedical Engineering, Faculty of Fundamental Problems of Technology. Her primary research topic is biomedical signals related to blood flow and pressure in the human brain in patients with intracranial pathologies. She is involved in projects related to development of new analysis methods using advanced signal processing tools and artificial intelligence, investigation of the pulsatile components of intracranial pressure and arterial blood pressure signals and their clinical significance in traumatic brain injury, and studies on age-related changes in the intracranial volume-pressure balance.