Cerebrospinal Fluid Marks Brain Damage With Cardiac Arrest

By Mark L. Fuerst

Measuring cerebrospinal fluid biomarkers may help determine the amount of a patient’s brain damage and complement clinical assessments.

Measuring cerebrospinal fluid biomarkers in patients with cardiac arrest may help determine the amount of their brain damage and complement clinical assessments, according to the results of a new study.

“Biochemical markers in both blood and cerebrospinal fluid can give a good reflection of the size of brain damage after a cardiac arrest. The levels are more marked in the patients with a poor outcome,” Hans Rosen, MD, of the Department of Neurology at the Institute of Neuroscience and Physiology in Gothenburg, Sweden, told ConsultantLive at a packed poster session at the American Academy of Neurology annual meeting in Philadelphia.

“This fact could be used as a way to determine the size of brain damage as a complement to the clinical assessment in the difficult task to determine the prognosis in this patient group,” Dr Rosen continued. Clinical examination is of primary interest, but neuroimaging with computed tomography and MRI, electroencephalography, and evoked potential add valuable information, he said.

Dr Rosen and colleagues set out to investigate the levels of various cerebrospinal fluid biomarkers related to neuronal damage, inflammation, and amyloid metabolism among cardiac arrest survivors. “These patients typically have a poor outcome,” he said. “Early in the process it is important to discern which patients have a poor prognosis. Cerebrospinal fluid can give a reflection of the biochemical status of the brain.”

The levels of neurofilament protein are increased in the cerebrospinal fluid in a variety of diseases, including multiple sclerosis and amyotrophic lateral sclerosis, as well as in the first month after a cardiac arrest, he said.

Dr Rosen reported on a controlled trial that measured cerebrospinal fluid levels of neurofilament protein, total Tau protein, hyperphosphorylated Tau, and YKL-40, a secreted glycoprotein that has been implicated in tumor angiogenesis, in 42 patients from Sahlgren University Hospital in Gothenberg, Sweden. These measurements were taken in half of the patients about 14 days after a cardiac arrest; the other half were age-matched, neurologically healthy controls. The patients were monitored for 1 year.

The researchers compared biomarker levels between patients with a poor/good outcome according to the Glasgow Outcome Scale, activities of daily living, and a mini-mental state examination. Patients who survived a cardiac arrest showed a very pronounced increase in cerebrospinal fluid levels of neurofilament proteins, total Tau, and YKL-40 compared with healthy controls. Patients with a poor outcome according to the outcome and daily living scales had higher levels of YKL-40.

In conclusion, Dr Rosen said, “In this descriptive study of cerebrospinal fluid biomarkers in patients surviving a cardiac arrest, levels of neurofilament protein and total Tau were substantially increased in patients with poor outcome, according to all outcome measures. The results encourage further studies to determine the prognostic accuracy of the biomarkers in larger groups.”

Further research should emphasize detecting these biomarkers in serum, which would increase their clinical usefulness, he added.

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