

Memory process in patients with ischemic left ventricular dysfunction

Heart failure is a complex syndrome characterized by hemodynamic and neuro-hormonal alterations. In recent literature a relationship between heart failure and the presence of cognitive disorders, in particular in the domain of the attentional-executive functions, was reported and associated with neuroradiological modifications. Although different studies present very heterogeneous data, it was found that patients with heart failure show a higher risk of developing dementia. It has been proposed that two mechanisms may explain the onset of cognitive disorders: 1) chronic cerebral hypoperfusion related to reduced cardiac output, and 2) the formation of microemboli due to atrial fibrillation or thrombus at ventricular level. Among the factors that contribute to this complex picture the presence of left ventricular dysfunction (i.e. a reduced cardiac capacity measured by ejection fraction) might have a crucial role although it is not yet fully understood. Most of the studies were conducted in patients with moderate or severe heart failure, therefore in a context of co-morbidity which can be rather complex. In the absence of advanced-stage disease, it is still unclear how the cardiac hemodynamic changes affect brain functional performance in elderly people. From a prevention perspective it would be useful to be able to detect sub-clinical signs of cognitive decline in patients with cardiac disorders, but who do not yet have a marked decompensation, that is to say when patients are substantially asymptomatic from a clinical point of view. Electrophysiological measures, such as event-related potentials (ERPs), might be useful in characterizing cognitive involvement associated with ventricular dysfunction. Indeed ERPs make it possible to determine the electrical activity in the brain during the execution of a task and to identify which areas are specifically involved. Based on these premises, a study was conducted in which behavioural measures and electrophysiological recordings were combined to assess the impact on cognitive performance of ventricular dysfunction (reduced ejection fraction) which is not associated with notable cardiac decompensation.

Two groups of patients with clinically stable coronary artery disease associated with heart failure were investigated: the first group with left ventricular dysfunction [ejection fraction < 40%], the second without left ventricular dysfunction [ejection fraction > 55%].

The patients were subjected to a verbal memory protocol in which lists of words to be memorized were presented. Immediately after this set presentation, the same words (old) were presented along with new words, i.e. words that were not on the memorized list. The subjects' task was to indicate whether each word belonged to the original list or not. ERPs were recorded during the behavioural task.

The results showed a dissociation between behavioural data and electrophysiological data. In particular, the two groups of patients showed no significant differences in memory task performance, and no differences in neuropsychological assessment were found. Regarding the ERPs, it is known from the literature that a positive component – in the range 350 to 550 ms after stimulus presentation – is larger for previously stored stimuli (old) with respect to stimuli seen for the first time (new). This old/new effect, which is particularly evident in the frontal sites, was present in the group of patients without ventricular dysfunction while it was not observed in patients with dysfunction.

These preliminary data suggest that ERPs can be useful in detecting functional anomalies that cannot be observed at behavioural level. Early identification of small sub-clinical signs of cognitive decline may help plan preventive treatment for clinically asymptomatic patients with ventricular dysfunction.

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