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EDITORIAL

An Unexpected Correlation Between Non-Invasive Intracranial Pressure Waveform Assessment in Hypertensive Patients. Could This Be the Link Between Hypertension and Cerebrovascular Diseases as Well as Cognitive Impairments?

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ABSTRACT

A collaborative, interdisciplinary approach within the medical field is of paramount importance, aiming towards fostering an environment conducive to healthy aging in patients. It is incumbent upon us to thoroughly assess the ramifications of cardiovascular influence on cerebral functions and to instigate therapeutic interventions at an early stage, or preferably, preventive measures. This text emphatically reinforces the substantial influence of arterial hypertension on the central nervous system, concurrently suggesting a feasible methodology for its measurement. The aim of this publication is to foreground this problem, thereby catalyzing scientific dialogue, advocating for research proposals, and potentially instigating a reconsideration of our patient care approaches.

The current scenario

The aging of the population necessitates the search for methods to individualize patient care, with the aim of ensuring a good quality of life in old age. The evaluation of these patients needs to be carried out systematically since all organs are interconnected, and a reduction in the efficiency of one organ can lead to damage in another. The collaborative relationship between the heart and the brain is increasingly being studied to minimize the risks of developing cognitive impairment and dementia in the later stages of life.

According to World Health Organization, hypertension is the main cause of death all around the world as well as one of the leading risk factors associated with cerebrovascular diseases and cognitive decline[1].

The association between hypertension and cognitive impairment has long been discussed in the literature. Several studies have shown that patients who have experienced cardiovascular alterations throughout their lives are at a higher risk of cognitive impairments as they age. A study involving 1167 patients with type 2 diabetes and vascular alterations demonstrated a direct relationship between these alterations and neuropsychological test results, highlighting the impact of cardiovascular changes on the cognition of these patients[2]. Another study revealed that elevated blood pressure in young patients plays a significant role as a risk factor associated with changes in brain structures and functions. This study examined a group of 885 participants over a period of 30 years and observed that individuals with higher blood pressure exhibited reduced cerebral blood flow in the gray matter. Using data of 16806 participants from the HRS (Health and Retirement Study) and ELSA (English Longitudinal Study of Ageing), Li et al[3], reported that cumulative blood pressure over life was associated with the incidence of cognitive decline, dementia and mortality.

These findings indicate that blood pressure elevation increases the risk of small vessel diseases and decreased cerebral perfusion over time [4]. In addition, cognitive impairment when associated with frailty lead increased risk of adverse cardiovascular outcomes including death in older adults with cardiovascular disease[5].

A meta-analysis with a total of 4076 participants emphasized the importance of blood pressure management as a key preventive measure in reducing age-related cognitive abnormalities before the onset of clinical dementia[6]. The need to improve blood pressure control as a strategy for preventing cognitive decline was also demonstrated in another study involving 7874 Chinese patients over the age of 60. Both the group of non-hypertensive patients with higher systolic pressure and the group of hypertensive patients with reduced diastolic and mean arterial pressures, as well as increased arterial pulse pressure, were associated with an accelerated rate of cognitive decline[7]. A systematic review analyzing 50 studies with a total of 107,405 participants further supports the introduction of early blood pressure measurement and management, even in patients without clinical hypertension, to reduce the risk of cognitive impairment typically associated with aging[8].

Preliminary results from a study conducted in Brazil are alarming[9], as they reveal a high prevalence of reduced intracranial compliance in long term treated hypertensive patients evaluated non-invasively with brain4care validated device[10–16]. These results are currently being prepared for publication and will serve as a warning to the medical community, emphasizing the need for combined monitoring of blood pressure and non-invasive intracranial pressure waveform in hypertensive patients as well as the need to review the concept of cerebral autoregulation and the vascular brain barrier capacity to protect brain tissue in blood pressure elevations. This strategy may have the potential to allow for tailored therapy for each patient, individualizing treatment and bringing more precision to clinical management, thereby increasing the chances of minimizing the risks of cerebrovascular diseases, cognitive impairments and dementia in old age.

* ***In memory of Prof. Sérgio Mascarenhas.***

Conflict of Interest

Gustavo Frigieri declares that he is cofounder and scientific director of brain4care.

Weimar K.S. Barroso declares that he is Brazilian National Council for Scientific and Technological Development Researcher, Grant/Award Numbers: 313481/2020-2.

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