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Morphologic substantiation of Alzheimer's disease stages by using Tomography Dementia Rating Scale (TDR)

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Background: To determine dementia stages, "The Clinical Dementia Rating scale" proposed by J.C. Morris is widely used in the world clinical practice. Alzheimer's disease (AD) development is accompanied by temporal and fronto-parietal brain regions atrophy increase which in turn causes dementia development. To determine AD dementia stages, we propose to complement the scale by objective CT and MRI morphological data showing atrophy severity in accordance with the clinical stage. Since fronto-parietal regions allocation is difficult, we calculated temporal regions atrophy, focusing on bone formations. The resulting scale was named The Tomography Dementia Rating scale (TDR).

Methods: The research included 108 patients:

- 49 aged 34-80 with AD various stages - Test Group;
- 59 aged 28-78 with various kinds of brain lesions with dementia but without AD (moderate and severe vascular dementia, Parkinson's atherosclerosis, Binswanger's disease, Parkinson's disease) - Control Group.

All patients underwent MRI, CT with subsequent temporal lobes atrophy degree calculation, brain scintigraphy (SG), rheoencephalography (REG), cerebral angiography (MUGA).

Results: CT and MRI among all patients with AD revealed that brain characteristic objective morphological features were temporal lobes atrophic changes of 4-62% at various AD stages. These data made it possible to make a scale allowing certain atrophic changes determination at each AD stage:

- Preclinical AD stage (those with high probability of AD inheritance, growing memory disorders, immediate relatives suffering from AD, without dementia or cognitive impairment) - TDR-0: temporal lobes atrophy with 4-8% tissue mass decrease.
- Early AD stage - mild dementia - TDR-1: temporal lobes atrophy with 9-18% tissue mass decrease (corresponds to CDR-1).
- Average AD stage - mild dementia - TDR-2: temporal lobes atrophy with 19-32% tissue mass decrease (corresponds to CDR-2).
- Late AD stage - severe dementia - TDR-3: temporal lobes atrophy with 33-62% tissue mass decrease (corresponds to CDR-3).

These atrophic changes are not observed among patients with other cerebral lesions.

Conclusions: The morphologically determined scale of AD-TDR stages is an effective method for objectively determining AD stage by means of widespread CT and MRI. At the same time, this scale allows to differentiate AD from other diseases that are accompanied by the development of cerebral neurodegenerative changes complicated by dementia and cognitive impairment. The scale is easily applicable to medical institutions allowing correct and objective AD stage determination in clinical practice.

Biography

Ivan V. Maksimovich, MD, Head Physician of Clinic of Cardiovascular Diseases named after Most Holy John Tobolsky (Moscow, Russia) since 1993. One of the major problems the clinic deals with is the diagnosis and treatment of various brain lesions including Alzheimer's disease. For a long time I have fully concerned myself with the diagnosis and treatment of Alzheimer's disease. Over the past 15 years I have published over 60 scientific works on this subject. ISTAART member, ESC member, EAPCI member, WSO member, ESO member, EPA member.

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