

Review

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Review

Similarity Between Symptoms of Dementia and Brain Tumors and the Impact of Diagnostic Delay

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Abstract

Objective: To identify and highlight similarities between the symptoms of brain tumors and dementia in the elderly, questioning the delay in obtaining a diagnosis at the onset of symptoms and the impact of this delay on treatment and the patient's quality of life. Furthermore, the study aims to demonstrate the need to make information about elderly health more accessible and without ageism, empowering caregivers and family members to recognize early signs of cognitive decline. **Literature Review:** The final sample consisted of 24 articles reporting signs and symptoms of dementia and brain tumors located in various areas of the brain, in-depth descriptions of both pathologies, case studies of patients, and government informational booklets intended for healthcare professionals. **Final Considerations:** There are similar symptoms between brain tumors and dementias, although some patients also experience symptoms specific to each condition. Nevertheless, screening is necessary to correctly diagnose the disease and define specific treatments and actions for each case, without age-related bias. Health professionals must be able to identify abnormal cognitive changes in patients to initiate screening and appropriate treatment as early as possible. As for caregivers and family members, when they notice changes such as personality shifts or cognitive decline, they play an essential role in guiding the elderly person to seek medical care, helping to prevent complications or a worsening of quality of life.

Keywords: brain tumor; dementia; early detection; elderly health

Introduction

The current lack of knowledge about elderly health can impact several diagnoses, and when combined with insufficient clinical investigation, it may result in a significant decrease in the patient's quality of life.

This article discusses how health professionals manage patients who present symptoms that are common to several diseases and often misleading. When focusing on Dementia -one of the most common diseases among the elderly (15,20)- and Brain Tumors -which may not present all expected symptoms immediately-, it becomes clear that there is a lack of information regarding precise diagnosis, not only among professionals, but also among patients and caregivers (17).

There is a need for further research and clinical studies on age-related health issues to better understand what might be considered atypical. A deeper understanding of these similarities may enhance differential diagnosis, help prevent delays in treatment, and, for dementia cases, improve care during cognitive decline.

Methodology

This study is an integrative literature review aiming to explore similarities between the symptoms of dementia and brain tumor and their influence on diagnostic delay. The integrative review method was chosen due to its flexibility in including diverse types of studies, allowing a comprehensive understanding of the topic.

A structured search was conducted in June 2024 in the following electronic databases: PubMed, SciELO, BIREME and Google Scholar. The search strategy combined keyword, using the following terms in English, Spanish and Portuguese: “dementia”, “cognitive decline”, “brain tumor”, “neoplasms”, “diagnostic delay”, “demência”, “tumor cerebral”, “erro de diagnóstico” AND “demência”, “neoplasias”, “câncer”.

Inclusion criteria were: Articles published recently, in English, Spanish or Portuguese, full-text availability, relevant to the topic, studies presenting clinical base about the theme. Exclusion criteria were: Editorials, letters, or opinion papers, animal studies, preview, close access articles about other type of tumor than brain tumor, articles about brain tumor in brain locations that doesn't affect the cognitive or social areas.

A total of 42 articles were initially identified. After exclusions, 31 articles were selected for full reading. Based on relevance to the objective, 24 studies and official documents from government institutions such as the Brazilian Ministry of Health, the *Instituto Nacional do Câncer - INCA* (Brazilian National Cancer Institute), and the World Health Organization were included in the final analysis.

Data were organized in a spreadsheet and analyzed through thematic synthesis, identifying common patterns related to symptom overlap, clinical misinterpretation, and delays in appropriate diagnosis or treatment, but also studies showing how the early diagnostic is important, scientific information about tumor and dementia were used to create a union of information about both diseases separately.

This review followed ethical research practices, respecting intellectual property, and proper citation of all sources. Approval from a Research Ethics Committee was not required, because all data were obtained from open-access platforms, and no practical or field experiment was conducted, in full compliance with research law.

Discussion

The discussion presented in this literature review addresses the lack of investigation into cases diagnosed as age-related dementia, combined with misinformation about symptoms, which can easily be confused with signs of brain tumors. It also highlights the current need for new articles and guidelines to inform the populations about both diseases.

When an elderly person begins to show early signs of a neurological problem, they often face various situations such as caregivers and family members questioning whether these signs are simply age-related rather than symptoms of a pathological condition. As the condition progresses, the elderly persons' life is affected in many areas (such as social interactions, hobbies, household tasks, mobility...), and only after that, relatives begin to suspect something more serious. Suspicion typically arises when they notice personality changes (3), which changes completely the individual's behavior and way of thinking. At this point, caregivers may face long waiting lists and overbooked doctors' schedules, increasing the time without a precise diagnosis. This delay can affect treatment for both dementia and brain tumors. In the case of brain tumor, such neglect may lead to premature death and life-threatening symptoms such as seizures. Dementia is more prevalent in low and middle-income countries (3), which may also explain the lack of adequate diagnosis in Brazil.

The similarity of symptoms with other conditions has already been studied. For instance, the 2020 article *Semiología de Las Alucinaciones Em Tumores Del Sistema Nervioso Central* reported a wide range of symptoms, from nonspecific to highly characteristic, associated with brain tumors and primary psychiatric disorders. This highlights how symptoms like headaches, hallucinations, personality changes, and unusual behavior can mislead diagnosis (1).

Dementia

As a generic term for a group of diseases, dementia is characterized by progressive deterioration that primarily affects the individual's independence and daily routine. In general, dementia cases involve loss of functionality, making it necessary to seek help from others. The condition must affect

two or more cognitive domains (which may include memory, language, executive function, attention, visuospatial abilities, or calculation) and/or cause behavioral changes (13,21,22). Dementia severely impacts the ability to perform daily activities and was the 7th leading cause of death globally in 2021(24), it is also one of the most common diseases among the elderly population (15,20), requiring constant care.

According to the Brazilian Ministry of Health, dementia is underdiagnosed mainly due to lack of knowledge about the condition and the stigma that it is part of the normal aging process. When cognitive decline is mild, it may be dismissed as age-related, but clinical evaluation is still necessary for that (3).

Although there is agreement on the importance of an accurate, early, and personalized diagnosis, this is not always achieved. Imaging and laboratory tests to rule out other conditions are sometimes overlooked. The misconception that memory problems are a natural part of aging, combined with insufficient professional training, contributes to diagnostic delays (3,15), this is especially problematic for elderly people living alone. It is estimated that only 4% to 16% of dementia patients can recognize the symptoms of the disease themselves (15).

The twelve risk factors associated with dementia and responsible for 40% of global cases include: low education level, hypertension, hearing loss, obesity, traumatic brain injury, alcohol abuse, depression, physical inactivity, diabetes mellitus, air pollution, smoking and social isolation (3).

With an estimated annual cost of US\$ 1 trillion, dementia affects more than 50 million people worldwide, Alzheimer Disease International also says that this number is expected to reach 152 million by 2050(14). Dementia affects between 12.5% and 17.5% of individuals older than 60 years old, from the age of 65 onward the prevalence and incidence increase exponentially (3,13). The northeast region of Brazil has the highest prevalence according to the Delphi Consensus, also, Brazil is expected to reach 8.74 million cases of dementia by 2049(3). The WHO estimates 139 million people worldwide will be living with dementia by 2050 (23).

The most common symptoms include memory problems (e.g., forgetting recent events, misplacing objects, repeating the same questions, and more), difficulty performing daily tasks, reduced self-care, confusion regarding time and location, decline in social skills (including moral judgment, speech problems and decision making), personality changes, emotional disturbances, and loss of interest in hobbies (15,19).

It is essential to emphasize that dementia is not a normal part of aging and to reinforce the importance of family members seeking medical help when symptoms appear (15). Additionally, the type of dementia must be considered, as there are not only primary degenerative dementias but also vascular, lesion-related and toxic-metabolic types.

Brain tumor

Tumors can be classified as benign or malignant, the malignant tumors are also referred to as cancer (7). Cancer is a general term used for a group of diseases characterized by uncontrolled cell growth that invades nearby tissues and organs, according to the *ABC do Câncer* guide published by INCA in 2020 (13). Cancerous cells do not die like normal cells, instead, they continue multiplying abnormally and grow uncontrollably, dividing rapidly and aggressively (13).

Benign tumors grow slowly and are expansive, with clearly and well-defined borders. Unlike malignant tumors, benign ones do not invade adjacent tissues, although they can compress neighboring organs and structures. Malignant tumors, on the other hand, tend to be more autonomous, invade nearby tissues, may metastasize, can be resistant to treatment, and can lead to death of the host. (8,13)

Despite receiving less public attention compared to other cancer types, there were 9.355 deaths from central nervous system (CNS) cancer in Brazil in 2020 (12), additionally, CNS cancer ranks 11th among the most common types of cancer (4,13,12).

Risk factors for brain tumors include not only lifestyle aspects (such as smoking, alcohol consumption, high-fat diets...) (14,21), but also other factors like family history, exposure to noxious

materials, weakened immune system, metabolic syndromes like diabetes and hypertension, heart problems, and more (21). Generally, cancer has diverse causes, internal or external to the body, modifiable or not, and tumors can begin in different cell types (10,13).

The symptoms may include headaches (present in 71% of CNS tumor cases (5)), difficulty walking or balancing, motor weakness, hemiplegia, dizziness, nausea, loss of consciousness, blurred or lost vision, loss of neurological functions, behavioral and personality changes, and seizures. Some of it are similar to those seen in dementia, such as memory problems, confusion, altered perception of their environment, reduced temporal and spatial awareness, difficulties performing tasks and attention deficits (5,6,11). CNS tumor frequently cause cognitive deficits (7).

Tumors located in the frontal lobe region often produce psychiatric-like symptoms in their early stages, such as personality changes, unusual behaviors, disinhibition, and intrusive thoughts in some patients (1). More advanced cases of CNS tumors may also involve a range of complications, such as edema, seizures, endocrinopathies, and more. However, not all individuals present all symptoms, and it's important to note that diagnosis typically occurs between 6 to 17 months after symptom onset (16).

In 81% of low-grade gliomas, patients experience seizures, which are often associated with oligodendrogliomas. These tumors commonly appear as non-enhancing lesions with low attenuation on imaging tests (16).

According to the study Neuropsychological Assessment in Patients with Brain Tumors: Systematic Review of the Literature, which reviewed 31 studies involving patients with brain tumor in different regions and types, after cognitive tests (such as Wechsler Intelligence Scale, Mini Mental State Examination, Hopkins Verbal Learning Test, and more), 18 of the studies reported memory dysfunctions. Of these 18, 12 cases were gliomas (tumors originating from glial cells) ⁷. In other words, one of the most recognizable symptoms of dementia (memory loss) is also frequently observed in brain tumor cases due to the involvement of brain regions responsible for memory.

Clinical Case Review

The article Brain Tumor-Associated Dementia, published in 2005, illustrates this issue by reporting the clinical case of a 75-year-old patient identified as Mr. G., whose family noticed progressive cognitive decline over three months. He presented difficulty naming objects, memory problems, mental slowing, word-finding difficulties, disorientation, confusion, personality changes, frequent headaches, and various other physical symptoms. The patient had a family history of close relatives with brain tumor and lung cancer (17).

On the Mini-Mental State Examination, he scored 27 out of 30. He was a healthy man, a non-smoker, did not consume alcohol excessively, and held a bachelor's degree. After clinical evaluations, Mr. G. had a CT scan that revealed an irregular mass in the left frontal lobe, approximately 4 cm in size (17).

Following additional tests, he was diagnosed with glioblastoma multiforme and referred to surgery. The procedure led to improvement in symptoms, especially headaches. He was discharged home and began radiotherapy five days per week for a total of four weeks. However, his cognitive functions soon began to deteriorate again, along with his general condition. A new CT scan revealed hydrocephalus, which was treated, followed by a diagnosis of thrombosis that was also managed. Despite several procedures, MR. G. passed away 10 weeks after the brain tumor diagnosis (17).

The tumor developed over the three-month period without being diagnosed, the patient suffered symptoms while his family believed these changes were part of normal aging, however, the fast growth of the tumor contrasts with the typically slow progression of dementia, and the patient could have died from the tumor even without ever receiving a diagnosis, due to the delay in seeking medical attention. This rapid progression is often linked to brain disorders caused by infections and inflammations, neoplasms, degenerative diseases and cerebrovascular disorders. Although Mr. G.'s symptoms in the case study manifested as personality changes, memory issues, speech problems and confusion, there are also situations where epileptic seizures, headache and sudden motor changes

may be reported. In Mr. G.'s case, relatives reported the onset of symptoms three months before the appointment, which means, if they had enough information, they could have sought medical help months earlier.

Unfortunately, glioblastoma is one of the most fatal neoplasms, with especially poor outcomes in patients over 60 years old, most of whom do not survive more than one year after diagnosis (17). Even in palliative cases, early medical intervention can improve the patient's condition and reduce associated symptoms.

To illustrate the lack of information, 43.2% of family and caregivers of people with dementia believe there are not enough reliable sources of information about the condition, and 1/3 of healthcare professionals think dementia is a natural consequence of aging (3). This reveals a serious gap in knowledge among both professionals and the general population. Understanding the similarities in signs and symptoms between dementia and brain tumors can significantly improve these statistics. Early diagnosis allows an immediate start of treatment, ensuring an improvement in the patient's quality of life (9). Furthermore, every healthcare professional is responsible for the success of the actions taken to control the disease (13) and must be trained to recognize signs and symptoms.

Final Considerations

The main objective of this study was to present the similarities between dementia and brain tumors in elderly individuals. Since both conditions involve brain dysfunctions, a correct diagnosis may be delayed due to misinformation, which compromises appropriate treatment and care, that may even result in premature death in cases of aggressive tumors.

Although cognitive tests play a fundamental role in early detection, they are often overlooked or used in isolation by healthcare professionals. Combined with delays in looking for medical care, this contributes to worsening the condition of elderly patients.

Additionally, there is a significant lack of research on aging, dementia and brain tumors, compounded by societal prejudice against the elderly, these factors result in scarce and superficial information, which impairs proper medical evaluation and intervention.

Recommendations

Based on this study, it is recommended that healthcare professionals closely monitor the aging process of elderly patients and guide caregivers and family members to seek medical care as soon as any cognitive or social changes are noticed, this contributes to diagnosing the condition in its early stages, before it reaches an advanced level and compromises critical areas.

In addition, hospitals must ensure that their multidisciplinary teams are up-to-date, attentive to signs and symptoms, and trained to request appropriate diagnostic tests, only after ruling out other pathologies should age-related explanations be considered.

Lastly, there is a noticeable scarcity of recent studies on brain tumors, which may contribute to the misinterpretation or underestimation of the disease, therefore, this area is suggested for further studies.

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