

Traumatic brain injury as a risk factor for dementia: Literature Review

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Abstract

Objective: The correlation between traumatic brain injury and dementia.

Method: Review in the MEDLINE, CINAHL and Cochrane databases of published studies in the last 15 years to reach consensus through an expert panel.

Results: Epidemiological studies suggest that traumatic brain injury is associated with dementia, especially with Alzheimer's disease, but this association is not seen in all patients. A 6-year study in California noted that people with traumatic brain injury experienced some years of dementia as opposed to people who were injured but did not show traumatic brain injury. The correlation between traumatic brain injury and dementia is evident especially in older age groups of the population according to the above-mentioned study. In addition to another study that looked at and observed over a long period of 15 patients, it was found that patients who had had a traumatic brain injury or simply lost their consciousness were approximately 50% more likely than the others to develop dementia due to severe injury of the brain. The clinical picture of dementia due to traumatic brain injury has some common features with the other types of dementia due to other pathological causes. Mini Mental State Examination is used to assess dementia, however, in order for the diagnosis to be more reliable, it should be combined with the patient's personality assessment as well as assessing the ability to perform everyday activities and behavior. In recent years, cognitive programs have been implemented as non-pharmaceutical interventions. Their main purpose is to stabilize and improve the cognitive status of patients through the use of cognitive functions that are still at satisfactory levels.

Conclusions: Given the high rates of TBI in the general population, serious measures to prevent dementia should be taken in such incidents and clearly more studies should be carried out and for even longer periods of time in order to fully understand the mechanisms that affect between traumatic brain injury and dementia.

Introduction

Traumatic brain injury is a sudden lesion that the brain is subjected to by a powerful blow, blunt and permeable, creating a particularly serious trauma to the human body. The most common causes are road accidents, racing sports as well as violence. Traumatic brain injury is responsible for many deaths and disabilities, especially among people aged 1 to 44. Injuries can range from mild concussion to permanent brain damage [1,2].

Each year, some 1.3 million people are killed by road accidents, and more than 50 million are injured, making road safety a particularly important global problem that needs immediate response. According to the Department of Social Statistics and the Department of Justice and Public Order Statistics, in September 2016 there were 957 road accidents in Greece. The risk of death as a result of an injury related to road crash is higher at Africa and similar countries with 24.1 per 100,000 inhabitants and lower in the WHO European Region at 10.3 per 100,000 inhabitants. This automatically places the death of a car, ranked 9th in the list of leading causes of death, according to the latest WHO World Road Report. The 2013 road safety report also highlights that in most countries, even those with the best road safety performance, the imposition of more laws is insufficient. Recent studies suggest that it will become the fifth most serious cause of death worldwide by the end of the year 2030 if appropriate compensatory measures are taken against road accidents. Incomplete information from the government to the public to protect them, coupled with the carelessness of the people and sometimes the overestimation of their potential, lead to such accidents [1].

As for the accidents in the field of competition, they have also increased significantly in the last decade. Traumatic brain injury on the pitch has increased interest in both healthcare professionals and the media. Recent research has shown that within one year, 1.7 million traumatic brain injuries were recorded in an area where racing sports were conducted. They also noticed that as youngsters grow in sports, the incidence of craniocerebral injuries is increasing [1].

Traumatic brain injuries with equally high rates are also recorded in episodes of violence. Violence and especially domestic violence can cause serious injuries to the scalp and brain as a result of sudden and powerful head strokes. Research has estimated that severe head and head injuries that cause traumatic brain injury occur in 50% to 90% of the violence. Signs of violence and early symptoms of traumatic brain injury can be perceived from the first few minutes to some days later, according to the National Center for Victims of Crime in Washington in 2011.

Those who survive traumatic brain injury may later experience some complications that may last for some days and for all their lives.

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Such complications include disturbance of thought, speech, memory as well as the inability to express emotions, the weakness of orientation and the loss of some senses. The above-mentioned effects of traumatic brain injury can well make life difficult for the patient himself, limiting him from his everyday activities and habits, as well as his family environment. Family members play a key role in survival victims as they are their carers who will help them and will accompany them as long as they are alive. Such injuries should be dealt with correctly and quickly because it has been established that most of the victims due to incorrect care and / or transport when they arrive at the hospital are already too late for them and are usually lost and all the hopes of recovery are getting worse [1,2].

Discussion

Introductory Elements

Recent epidemiological studies suggest that traumatic brain injury is associated with dementia and especially with Alzheimer's disease, but this link is not observed in all cases. Dementia and, more specifically, Alzheimer's disease is one of the most serious complications of traumatic brain injury. After many studies in various incidents around the world, it was found that this disease can be caused mainly by severe falls and road accidents, clearly because the effect of force on the brain is stronger and changes in brain function more radical. It should be stressed that from the damage the brain will suffer from a traumatic brain injury, few will be temporary, because most remain for a long time, possibly until the end of the victim's life. One of these problems is dementia. Only one mild brain injury is sufficient to modify the cognitive function of the human being [2-4].

Correlation of traumatic brain injury and dementia

A US study to investigate KIC cases found that 28 million people suffered traumatic brain damage, of which about 56,000 ended up tragically dead in the accident or in the hospital. The most sensitive age groups were and continue to be children under the age of 4, adolescents and young people aged 14-25 years, and the 75-year age group should not be omitted [5].

According to research results, the most common causes of serious forms of traumatic brain injury are falls, road accidents, violence and sports accidents. A study that lasted six years in California, noted that people with traumatic brain injury experienced some years of dementia as opposed to people who were injured but who did not show traumatic brain injury. More specifically, of a total of 51,799 traumatic brain injury patients, 4361 had dementia as opposed to 6610 single injured patients without VEG. The correlation between traumatic brain injury and dementia is evident especially in older age groups of the population according to the above-mentioned study. In addition, in a further study where 15 cases were examined and observed for a long time, it was found that patients who had had a traumatic brain injury or simply lost their consciousness had about 50% greater risk of having dementia due to severe brain injury. It is now well established and there is evidence that in mild and severe KEK most people have developed dementia for years as opposed to patients who have suffered a mild traumatic brain injury or just a minor injury [6].

How does dementia develop?

Although there is evidence that the existence of a link between traumatic brain injury and dementia is feasible, there is no precise evidence that accurately identifies the pathophysiology that leads to this condition. At times many have tried to shed light on this assumption

by giving some explanation, but none of them were sufficient to fully understand this mechanism of reaction. The common point of all the above hypotheses is that there may be a trigger that triggers this reaction that starts at the time of the injury and tends to last as long as necessary to refer the patient's cognitive function of dementia. All the above procedure is done in a slow and steady rhythm, thus provoking the clinical picture of a patient with dementia, and in particular it has many common features with those of Alzheimer's disease. More specifically, the clinical picture of dementia after traumatic brain injury includes loss of consciousness, headache, dizziness, inability to restore recent memory of what happened in the accident and the overall condition for the next 24 hours, nausea and vomiting, ringing ears, confusion, instability, exhaustion, hallucinations, disorientation, blurred vision, which can result in a cataract after a serious eyeball injury, speech disorder, and generally there is an apparent difficulty in communication, frequent and incomprehensible changes in feelings, changes in sleep habits and changes in behavior that are manifest in all forms of dementia [4].

The above symptoms usually begin to manifest from the first few minutes of the injury, but there is also the possibility of a delayed occurrence, such as, for example, the patient's ringing, the exchange of emotions, etc. It is also worth noting that it is not unlikely that patients, who have been victims of traumatic brain injury years ago, develop depression, anxiety and irritability. Studies and observations in dementia patients have shown that when these individuals are forced to perform instructions by doing the simplest activity but feel themselves incapacitated, they exhibit mixed feelings that alternate very quickly and clearly aggressive behavior towards others. In summary, confusion and aggressive behavior are now an accompaniment to any type of dementia [4,7,8].

Gravity Assessment and Diagnostic Dementia Tests

In general, there are many causes that can cause dementia, such as VEGF, but also many types of dementia such as vascular disease, which are difficult to identify. But whatever its types, signs and symptoms do not cease to be the same, with very few differences. Nowadays, as easy as treating doctors to identify a dementia, it is so difficult for them to identify the type of dementia. The assessment of dementia following traumatic brain injury is based on typical questions and remarks such as:

- Questions about the conditions of the accident.
- Assessing the level of consciousness and whether there is confusion.
- Neurological examinations for the correct assessment of memory, thinking, sensation (vision, touch, hearing), balance, reflexes and other indicators of proper brain function [5].

In addition, imaging examinations will be needed to help control the smooth functioning of the brain, because for a patient who suffered from a KIC one year ago, it is certain that brain function will be affected. Many claim that for a dementia diagnosis to be valid, a biopsy of the brain must be preceded, but this is no longer the case nowadays. In adult adults, they apply intelligence tests that prove the mental state of humans and make it easier for them to identify that they are suffering from dementia, while older people beyond these tests also apply imaging techniques. Also, mental illnesses, including depression and psychosis, may produce the same symptoms as delirium and dementia for this must be differentiated [9,10].

In recent years, special tests have been developed, lasting 5-15 minutes, which can determine to a satisfactory degree the dementia the patient suffers from. Many types of tests have been discovered but only one is widely known and reliable so far and this is the Mini Mental State Examination (Annex I). Of course, in order for the diagnosis to be more reliable, it should be combined with the patient's personality assessment, as well as assessing the ability to perform day-to-day activities and behaviors [11-13].

Modern ways of coping

Patients with mild traumatic brain injury usually do not need any more treatment than resting and monitoring the symptoms at home. Patients who have experienced moderate to severe traumatic brain injury will require prolonged clinical care, surgery, medication as well as special support from healthcare professionals for their gradual and smooth return to society. More specifically, the aforementioned group consists of:

- Physiotherapist, to address motor problems,
- Speech therapist, to address the problems of speech,
- Psychologist, for the psychological support of both the patient and the family,
- A social worker, to deal with the in-family problems arising from the forced re-adaptation of roles,
- A nurse to learn and teach the patient and the family to prevent complications as well as to change the home space so that their daily routine is easier in the event of disability and other motor problems [5].

Along with the work of the supportive group, a patient with dementia due to traumatic brain injury is in need of appropriate medication [14]. Eg:

a) Acetylcholinesterase inhibitors (donepezil, rivastigmine, galantamine). These inhibitors are provided by written medical guidance to patients suffering from Alzheimer's, Parkinson's and Vascular Dementia. However, their results are not always satisfactory in the above cases [15-17].

b) NMDA (or memantine) receptor blockers or NMDA receptor blockers of glutamic acid excitatory neurotransmitter. Many times, due to the different mechanisms of functioning of acetylcholinesterase and memantine receptors, doctors recommend combining them without always having the desired results [18,19].

The above substances have the ability to improve mental functions up to 12 months in 2/3 of patients. At this point, it should be noted that the sooner treatment begins with the appropriate treatment, the sooner we will have the desired results, which in most cases can last for more than a year. In dementia, besides the problem of poor state of memory, other problems such as anxiety, depression, aggressive behavior, etc. have to be addressed. In depression for example an important role plays serotonin, a neurotransmitter of the human brain. Low serotonin levels have been shown to be involved in depression. Therefore, drugs are used that selectively inhibit serotonin re-uptake, thereby increasing serotonin free levels, thereby curing depression [16,20].

At this point, we should not omit the anxiolytics, which help to calm the patient, who due to tension and stress may be led to depression. All of the above drugs should be given as a measure and always at the correct doses as the complications they can cause can be as dangerous as those of the VCC, such as death [7].

Can it be prevented?

Dementia due to traumatic brain injury, as well as any type of dementia, does not have any special mechanism of prevention beyond good observation of patients from the family environment or from the elderly caregivers for the first signs and symptoms. Studies suggest that there are a number of factors that if properly applied can reduce the risk of dementia.

More specifically, healthy Mediterranean diet, control of blood pressure, body weight, blood sugar and cholesterol levels benefit both the brain and the cardiovascular system. In addition, systematic exercise as well as mental activity as well as participation in social activities help to prevent dementia [21].

In the last few years, appropriate mental empowerment programs have begun to be applied worldwide as non-pharmaceutical interventions. Their main purpose is to stabilize and clearly improve the cognitive status of patients through the use of cognitive functions that are still at satisfactory levels [21-23].

These programs are mainly based on the various and safe activities in which the patient can participate. Through this participation, it is achieved:

- Independence
- Autonomy
- The utilization of cognitive functions that remain at satisfactory levels
- Maintaining cognitive functions
- Strengthening self-confidence
- Mobilizing the patient
- The expression of emotions
- Improving family ties
- Improving quality of life [23].

Conclusions

Given the high rates of HPV in the general population, serious measures to prevent dementia should be taken in such incidents and clearly more studies should be carried out and for even longer periods of time in order to fully understand the mechanisms that affect between traumatic brain injury and dementia. Scientists have been very busy in recent years with traumatic brain injury and dementia, so our knowledge of the subject has increased dramatically. Strong and credible efforts are being made to make even more information available on this epidemic, and new more effective interventions are expected in the near future.

Conflicts of interest

We declare that we do not have any conflict of interest with the above mentioned manuscript submitted to

Mini Mental State Examination (MMSE): a typical example [24].

1. Orientation

I will ask you a few questions to see how your memory is:

- What year do we have?
- What season?

- What month?
- How much of the month do we have?
- Which day of the week?
- In which country are we in?
- Which city;
- In which region or address?
- Are you in the most part at the moment?
- On which floor

2. Recording

I will tell you 3 words that I want you to repeat after me and remember them when I ask them again:

- Lemon
- Key
- Pencil

3. Concentration / possibility of numbering acts

Remove from 100 successive 7 units at a time / Alternatively: Write the word "door" upside down:

- 93-r-
- 86-o-
- 79-o
- 72-d-

4. Reflection

Please repeat the 3 words I asked you before:

- Lemon
- Key
- Pencil

5. Definition

We show the patient 2 objects and we ask them to name them - what is it?

- Clock
- Pencil

6. Repeal

Ask the patient to repeat after you:

- "Not if or not"

7. Implementation of three stages

Give the patient a white sheet of paper and tell him:

- Take the paper in your right hand
- Fold it in the middle
- Leave it on the floor

8. Reaction

Show the patient a paper that says "Close Your Eyes":

- Please do as it says on the paper that I'm showing you

9. Auto writing

Give the patient paper and pencil and say:

- Please write a complete (must contain a subject - verb)

10. Copy

- Ask the patient to copy a two-pronged pentagon shape

MMSE, as mentioned earlier, is one of the most widely discussed and globally accepted short-term test, through which the patient's cognitive function is determined, with an excellent score of 30 points in the overall score. In recent years, its use in clinical practice has increased sharply, as a special diagnostic tool, in epidemiological studies and even in clinical research to monitor the course of the disease in order to assess the effectiveness of therapeutic interventions. It is logical, as in any test-test, so in MMSE, there are drawbacks, such as:

its low sensitivity to the diagnosis of Mild Cognitive Disorder and the differentiation of severe and very severe dementia

- Its sensitivity to age
- Educational level and nationality
- The lack of information on the upper-function fields required in the diagnostic criteria of dementia.

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