

Psychological Consequences of Mild Cognitive Impairment

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Abstract: *The field of ageing and Dementia is focusing on the characterization of the earliest stage of cognitive impairment. Recent research has identified a transitional states between the cognitive changes of normal ageing and Alzheimer's disease (AD), known as mild cognitive impairment(MCI) .Mild cognitive impairment refers to the clinical condition between normal ageing and AD in which persons experience memory loss to a greater extent than one would expect for age, yet they do not meet currently accepted criteria for clinically probable AD. When these persons are observed longitudinally, they progress to clinically probable AD at a considerably accelerated rate compared with healthy age matched individuals. Mild cognitive impairment (MCI), also known as incipient dementia, or isolated memory impairment is a brain function syndrome involving cognitive impairments beyond those expected based on the age and education of the individual, but which are not significant enough to interfere with their daily activities.It is often found to be a transitional state between normal ageing and dementia. MCI can present with a variety of symptoms, but when memory loss is the predominant symptoms it is termed "amnesic MCI" and is frequently seen as a prodromal stage of Alzheimer's disease. Consequently, this condition has been recognized as suitable for possible therapeutic interventional programme., Diagnostic criteria and clinical outcomes of treatment of MCI are available and several multicentre international trails for the same are under way. At the same time recommendation conserving ethical issues in the diagnosis and the management of subjects with MCI have also been made.*

Keywords: *Mild cognitive impairment, Alzheimer's disease, Dimensia, Therapeutic intervention.*

I. Introduction

Ageing today isn't viewed the same as it was 50 yrs ago. Back then, increased forgetfulness in older people was seen as a symptoms of senility, which was thought to be an inevitable part of ageing .Decades of research into brain function, however ,have improved our understanding of age and memory loss. The type of memory loss once considered normal now may be seen as an early sign of disease, or mild cognitive impairment (MCI).

The line between ordinary forgetfulness in an older person and MCI is vague.MCI is usually defined as a loss of cognitive function in people over age 65 that exceeds an occasional wrong name or misplace pair of glasses.MCI can be thought of as a precursor to dementia, which is a catch-all word used to describe serious brain dysfunction such as memory loss in older people. Mild cognitive impairment(MCI) causes light but noticeable and measurable decline in memory or other thinking skills, also known as cognitive abilities. These changes are serious enough to be noticed by the individuals experiencing them and their close friends and family but generally are not severe enough to interfere with the daily life or independent functions of the individual and be defined as dementia. The concept of cognitive impairment intervening between normal ageing and very early dementia as has been in the literature of mild cognitive impairment(MCI) has been proposed to designate an early, but abnormal state of cognitive impairment.MCI has generated a great deal of research from both clinical and research perspectives. Numerous epidemiological studies have documented the accelerated rate of progression to dementia and Alzheimer's disease (AD).

Memory or other thinking problems are greater than normal for these people's age and education, but their symptoms are not as severe as those seen in people with Alzheimer's disease. The type of MCI with memory loss as the main symptoms involves impairment and trouble in planning and organizing or poor judgement.

In contrast to Alzheimer's disease (AD) where other cognitive skills are affected, mild cognitive impairment(MCI) is defined by deficits in memory that do not significantly impact dajly functioning .Memory problems may be minimal to mild and hardly noticeable to the individual.

Comparison of the clinical diagnoses of normal ageing mild cognitive impairment (MCI) ,and Alzheimer's disease (AD) are made with the approximate stage on the rating scales, clinical dementia rating(CDR) and Global determination scale (GDS) as Adapted by the American Medical Association.

II. Review of Literature

The term Mild Cognitive Impairment (MCI) has emerged in the context of the study of aging and implies a descriptive, quantified, behavioral classification. Identifying people with MCI involves specifying those cognitive and behavioral functions to be considered, and the procedure for their quantification. Inherent in the definition is the notion of decline or change in function. MCI typically implies an underlying pathology and poor eventual outcome (e.g., dementia, institutionalization, death). Such a classification is highly important to researchers and clinicians faced with an increasing proportion of older adults in the population, many of whom will be expected to exhibit some form of cognitive impairment that may interfere with their abilities to function independently in society.

According to the World Health Organization (2009), the number of persons aged 60 years and older will increase two-fold to 1.2 billion people by 2025. This finding has important healthcare and caregiver implications as the prevalence of cognitive impairment is positively related to advancing age. In Canada, persons aged 65 years and older represent the fastest growing population, with an 11.5% increase in prevalence between 2001 and 2006 (Statistics Canada 2009) and dementia and cognitive impairment not meeting the criteria for dementia are estimated to affect 8% and 16.8% of Canadians aged 65 years and older, respectively (Graham et al.1997).

Historically, there have been two approaches to define cognitive decline with age:

1. that which is considered part of the normal aging process, and
2. that which is associated with underlying pathology and considered an atypical or abnormal aging process

From the first perspective, cognitive decline has been described as a natural and normal process experienced by the aged. Kral (1962, 1966) introduced benign senescent forgetfulness (BSF) as an age-related process involving general forgetfulness and difficulty recalling factual information (i.e., names, dates), with preserved global knowledge and intact awareness of deficits. He coined the term malignant senescent forgetfulness (MSF) to describe the rapidly progressing age-related process of memory impairment (both recent and remote memories) and loss of awareness of deficits.

Over time, descriptions of cognitive decline associated with aging have progressed to include detailed diagnostic criteria. For example, the National Institute of Mental Health (NIMH) work group proposed a set of criteria for the diagnosis of "age-associated memory impairment" (AAMI). The NIMH AAMI criteria have been criticized for failing to reflect a decline in cognitive performance and an age- or disease-related process (Davis and Rockwood 2004). For example, persons with low premorbid functioning or limited education may qualify for a diagnosis of AAMI (Davis and Rockwood 2004). Moreover, using the proposed AAMI criteria, the majority of persons aged 65+ years qualify for a diagnosis (Bamford and Caine 1988). To improve the diagnostic criteria, the age range was restricted to apply to persons aged 50-79 years and the NIMH criteria for AAMI was altered to reflect impaired performance (at least one standard deviation below the mean) on at least one memory test, as compared to young adults. The classifications of age-consistent memory impairment (ACMI) and late-life forgetfulness (LLF) also developed.

From the second perspective, cognitive decline is viewed as a pathological process. The aforementioned conceptualizations of cognitive impairment are based on a model of normal aging, rather than a disease-related process, and they fail to address impairment in other cognitive and functional abilities necessary for a diagnosis of dementia. More recently, definitions with specific diagnostic criteria for MCI as a precursor to dementia have been proposed. It is hypothesized that the American, disease-based, definitions of MCI create more attractive conceptualizations of MCI as a precursor to dementia and introduce the opportunity for intervention (Ritchie, Artero and Touchon 2001).

Perhaps the most prominent classification of MCI is Petersen et al.'s (1999) original definition requiring a subjective memory complaint, impaired performance on objective memory tests, intact cognitive function, intact functional abilities, and a non-demented status. Despite the proposed clinical criteria, the diagnosis of MCI is described as being the result of clinical judgment (Petersen 2003). It was further viewed that, for persons "*destined to develop dementia*", MCI represents an intermediary stage on a gradual clinical and pathological continuum from normal aging to dementia. In 1999, Petersen and colleagues reported a conversion rate of 12% from MCI (as defined by their clinical criteria) to AD, in a clinical population. An evidence-based review of the literature revealed a rate of progression ranging from 6% to 25% (Petersen et al. 2001) and subsequently reported a conversion rate of 8.3% in a longitudinal population-based sample.

The contention that MCI is indicative of incipient dementia has received much criticism. It has been suggested that Petersen et al.'s (1999) conceptualization of MCI is too stringent and hinders the accurate and early detection of persons exhibiting MCI who subsequently progress to a dementia other than AD. For example, in a longitudinal, population-based study, the MCI classification was found to be a poor predictor of senile dementia, identifying only 11% of persons who went on to dement (Ritchie, Artero and Touchon 2001).

Moreover, the MCI classification is reported to be unstable, as many (40%) MCI subjects fail to meet MCI criteria the following year and revert to a diagnosis of no cognitive impairment (Ritchie et al. 2001).

Researchers also attribute the instability of the MCI classification to its reliance on impaired memory as the primary symptom (Ritchie et al., 2001). Evidence suggests that the cognitive impairment in MCI often includes deficits in multiple cognitive domains (Morris et al. 2001). Even persons classified with MCI have been found to demonstrate poor performance on measures of executive function, category fluency, and design fluency (Kramer et al. 2006). Moreover, persons exhibiting multiple cognitive impairments have a higher rate of conversion to dementia. Additionally, most individuals diagnosed with MCI exhibit deficits beyond just memory impairment.

Investigators at Massachusetts general hospital, Boston, followed up a group of subjects with a diagnosis of questionable dementia (CDR 0.5) for three years and found that this group progressed to AD at a rate of 6% per year (Daly et al. 2000). This study documented the importance of the clinical interview in the characterization of these subjects.

Another study (Killiany et al., 2000) demonstrated the usefulness of magnetic resonance imaging based volumetric measurement of the entorhinal cortex in predicting progression in individuals with questionable dementia.

A study (Ritchie et al., 2001) from France applied a modified version of MCI criteria to a population of subjects being observed longitudinally and found that neuropsychological criteria for MCI when retrospectively applied, were unreliable in characterizing the progression of subjects over time. Similarly a study from Sweden demonstrated the reliability of impaired glucose metabolism and a cognitive measure of visuospatial performance in predicting progression from MCI to AD (Morris et al., 2001).

Finally a recent evidence-based medicine practice review on early detection and MCI by the American Academic of Neurology recommended that subject with MCI be identified and followed up because of their increased risk for developing AD.

III. Symptoms and Diagnosis

Experts classify MCI based on the thinking skills affected. MCI that primarily affects memory is known as “amnesic MCI” after the Greek word for “forgetfulness”. MCI that ethically effects thinking skills other than memory is known as “non-amnesic MCI”. Research suggests that amnesic MCI is about twice as the non-amnesic type. MCI that affects more than one thinking skills is known as “multiple domain MCI”. Mild cognitive impairment describes one set of symptoms rather than a specific medical condition or disease. A person with MCI has subtle problems with one or more of the following-

- Memory loss
- Frequent difficulty remembering simple things
- Language disturbance
- Difficulty following a conversation or basic instructions
- Frequently losing train of thought.
- Feeling overwhelmed when attempt to make plans or decisions.

In MCI, these symptoms are noticed by the individuals and those who know them. If the person with MCI has taken cognitive function tests, their problems will be seen in test results over time. Any decline will be greater than the gradual decline that many people experience as part of normal, healthy ageing and the condition gradually worsens over time. Additionally and perhaps because of the cognitive symptoms many people with MCI experience depression, anxiety, irritability or apathy. For unknown reasons, MCI appears to affect men more than women.

The diagnosis of MCI requires considerable clinical judgement. And as such a comprehensive clinical assessment including clinical observation, neuroimaging, blood tests and neuropsychological testing are best in order to rule out an alternative diagnosis. Although no single feature of the general physical examination characterizes MCI, the following should be included in the overall assessment of the patient:

- Evaluation of mental status
- Examination for the presence of potential causative comorbid conditions
- Examination for the presence of sensory and motor deficits as potential causes.

No specific diagnostic studies exist for mild cognitive impairment. However, most clinicians perform a basic work up at minimum to exclude potential treatable causes. Research is going in the search for biologic markers that may help differentiate between the large number of conditions that may progress from MCI to full dementia.

Brain imaging with magnetic resonance imaging (MRI) or computed tomography (CT) is often performed in patients with MCI. In general MRI is preferred, as whole brain and hippocampal volume on MRI

can predict progression from MCI to Alzheimer disease (AD). However, there are no established parameters to integrate this finding into the routine diagnosis and management of MCI.

IV. Causes of MCI

The causes of MCI are not yet completely understood, but it appears some of the same risks for Alzheimer's disease are risk for MCI. These include the following:

- Being 65 or older
- Having a family history of MCI, Alzheimer's diseases, or another form of dementia
- Having certain medical conditions such as high blood pressure, diabetes, stroke, high cholesterol, or heart disease
- Substance abuse, alcohol abuse
- Lack of exercise.
- Sleep disorder
- Depression
- Psychological stress.

V. Treatment

Currently, there is no specific treatment for MCI. Some doctors recommend taking medications currently prescribed for early-stage or moderate Alzheimer's disease to try to maintain cognitive abilities in MCI, but research studies have not provided clear-cut evidence on the benefits. However some studies involving drug trials have shown preliminary evidence that drug treatments can effectively delay the progression to dementia. Cognitive training i.e exercising the mind and memory has been suggested as useful for MCI and it is important to maintain a healthy diet, have regular physical exercise and maintain good general health particularly controlling blood pressure, lowering cholesterol level and stopping smoking to prevent the occurrence of MCI.

In most cases a person diagnosed with MCI will not undergo any medical treatment as such, but will be regularly monitored for changes in his/her memory. Counselling may assist people with MCI to find way to adjust to the changes they are experiencing and to learn about ways to compensate for their memory difficulties.

VI. Ethical Issues

The concept of MCI raises several ethical issues. The primary ethical questions concern the strength of the evidence that MCI is a valid pathologic condition, and whether the benefits of establishing this new category outweigh the risk to patients. Making an accurate diagnosis is a key element in the practice of medicine and has several benefits. It helps clinicians identify specific conditions and aids in the choice of appropriate treatment.

In addition, the establishment of a diagnosis enhance communication among clinicians, help provide information to patient, identifying a need for understanding and support, and stimulate research. On the other hand, labelling patients with a disease has psychological and psychosocial consequences. Therefore, investigators and clinicians who are proposing MCI as a syndrome must developed the data needed to convince sceptics that it is a valid entity.

Amnesic MCI progress to AD at a high rate, hence it is associated with significant morbidity, potential economic loss to individuals and society, and frustration and distress in caregivers. Mild cognitive impairment, therefore, is the appropriate target for treatment to improve symptoms to reverse or prevent the condition.

VII. Coping with MCI

Mild cognitive impairment can make one feel frustrated. To cope with the frustration, some of the techniques are listed to help compensate for any memory decline that interfere with enjoyment of life.

- Learn more about MCI and share the knowledge with the patients.
- Discuss with the family members and other trusted persons
- Find constructive way to release anger and frustration. Exercise, talk with close friends and with a counsellor and consider joining support group for people with memory loss. Encourage the the family members to seek out counselling and support to meet patient's need.
- Continue to explore way to fulfil needs for intimacy and closeness. Participate in family events as are able and keep in touch with friends. The desire for close relationships with other continues throughout life.
- Ask the physician for exercise program that best fits the needs exercise contributes to good physical health, can reduce stress, and helps keep brain as healthy as possible.
- Keep mind active doing things that they enjoy. Work on puzzles, read the newspaper, play cards, listen to music, write in a journal, learn about something new.
- Increase the the awareness of MCI research projects and clinical trials of new medications.

- Focus on the present abilities and avoided working about what might happen in the future. Know that there are many ways to live an active and productive life.
- Take good care of body. Keep hydrated by drinking plenty of water, eat a low fat healthy diet with plenty of fruits and vegetables.
- Maintain an updated list of medications and contact information.
- Decrease consumption of alcohol, it can have a negative effect on mental abilities.
- Continue to engage in social activities with friends and family.
- Talk with friends and trained counsellor for their feelings.

A study from Sweden demonstrated the reliability of impaired glucose metabolism and a cognitive measure of visuospatial performance in predicting progression from MCI to AD (Morris JC, Storandt M, Miller JP, et al. Mild Cognitive Impairment represents early stage Alzheimer's disease. *Arch Neurol*. 2001; 58: 397-405). Finally a recent evidence-based medicine practice review on early detection and MCI by the American Academic of Neurology recommended that subject with MCI be identified and followed up because of their increased risk for developing AD.

VIII. Implications & Conclusion

The implication of detecting MCI can be viewed as mostly positive. Many people with MCI are very much aware of their memory problems and are often concerned that they have dementia. Knowing that they have MCI confirms to them that their memory concerns are valid and they can feel reassured to know that having MCI does not necessarily mean they will develop dementia.

Knowing that they are at a higher risk of developing dementia also allow people with MCI to plan for the possibility that they may deteriorate in the future, to evaluate their support systems and to make important legal, financial and personal decisions such as powers of attorney. They can also take steps to establish and maintain a healthy lifestyle.

Regular monitoring is critical since the borderline between normal age related memory difficulties and dementia will vary for each individual. Detection and monitoring of MCI allow dementia to be identified at an early stage. Given that most of the drugs currently used to treat Alzheimer's disease are most effective in the early stages of the condition, early identification of dementia means that the person can make their choice about taking this medication at the most optimum time. People can then also be assisted with information and support services.

As new treatments for dementia become available, it is likely that detection of MCI will become even more important. In addition, approaches to prevent dementia can be expected to be potentially helpful to those with MCI.

The construct of MCI is becoming an increasingly important clinical entity. MCI can be viewed as a precursor stage to many dementias, and its types may predict specific dementia subtypes. Most literature pertains to the amnesic MCI subtype, which is useful for identifying individuals likely to develop Alzheimer's disease in the future. The American Academy of Neurology has recently performed an evidenced-based medicine Review of the literature and concluded that MCI is a useful clinical Construct and that persons with MCI should be identified and monitored due to their increased likelihood of progressing to dementia. On the Research side, the concept of MCI has influenced virtually all aspects of research on aging and dementia, including clinical aspects, neuropsychology, epidemiology, neuroimaging, neuropathology, mechanisms of disease, and clinical trials. This awareness among people is to be developed so as to prevent the occurrence of the condition.

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