Diagnosis and management of dementia

Dementia will impose an increased social and economic burden in the future.[5]

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Dementia is an acquired syndrome of memory decline with at least one other cognitive deficit in language, visuospatial, or executive function that alters personality, reduces intellect and interferes with functioning in an otherwise alert person. Multiple disease processes can result in a dementia syndrome (Table I). Alzheimer's disease (AD) and vascular dementia (VaD) are the two most common.[1] However, the incidence of HIV-associated dementia (HAD) has grown to as high as 31% in patients with HIV disease (Fig. 1).[2] Less than 2% of cases of dementia are fully reversible.[1]

Table I. Causes of dementia*

Neurodegenerative causes	Potentially 'reversible' causes
Alzheimer's disease	HIV-associated dementia
Vascular dementia	Infections: meningitis, encephalitis
Frontotemporal dementia	Head injury
Parkinson's disease	Normal pressure hydrocephalus
Lewy body dementia	Metabolic disorders: hypoglycaemia
Huntington's disease	Nutritional deficiencies: vitamin B_{12}, folate
Creutzfeld-Jakob disease	Chronic alcoholism

*Modified from Cummings and Trimble.[12]

Age is the strongest risk factor for dementia. Prevalence rises from 1% in 60-year-olds to 50% in those over 95 years.[3] Risk factors for AD include a first-degree relative with AD and the apolipoprotein E-epsilon4 genotype.[4] An increased risk of both AD and VaD is found with cardiovascular risk factors like hypertension.[5]

Senile and pre-senile dementia were terms previously used to classify dementia based on age of onset. AD, now dementia of the Alzheimer's type (DAT) was then a diagnosis by exclusion, being differentiated from the stepwise deterioration of multi-infarct dementia, by its gradually progressive course and insidious onset (Fig. 2). Despite the comprehensive evidence base that exists for the diagnosis and management of dementia, memory lapses in the elderly are still erroneously brushed off at primary care level as 'just senility'.

Common symptoms of dementia

Apathy, a loss of initiation and motivation resulting in social withdrawal and emotional indifference occurs early in VaD and later in 70% of patients with AD.[5] Short-term, and later long-term, memory loss is an early feature of AD whereas executive dysfunction occurs early in VaD. Intellectual decline results from cognitive deficits. Behavioural and psychological symptoms in dementia (BPSD) like wandering, aggression, disruptive vocalisation, hallucinations and delusions are problematic to caregivers (Fig. 3). 'Sundowning' refers to the exacerbation of restlessness and agitation that occurs in the evening.

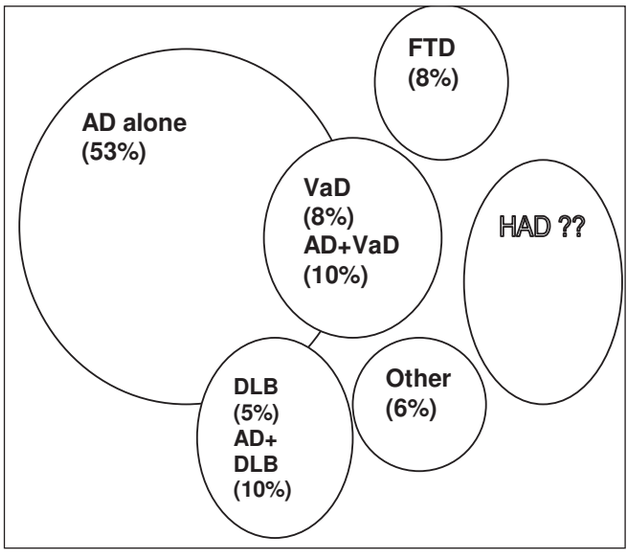

Fig. 1. Prevalence of types of dementia (AD = Alzheimer's disease; VaD = vascular dementia; HAD = HIV-associated dementia; DLB = dementia with Lewy bodies; FTD = frontotemporal dementia (Modified from Lyketsos, et al.[19]*).*

Diagnostic issues

Memory lapses with age, so differentiating between benign and pathological change is important. Age-related cognitive decline refers to any one cognitive deficit that is noticed by an objective, reliable source that causes the MMSE score to drop one standard deviation below the normal for that age.[5] With mild cognitive impairment (MCI), which occurs in 12% of over 70s, there is objective memory impairment despite normal cognition and basic activities of daily living (BADL). The amnestic subtype of MCI has a 60% likelihood of progressing to AD.[5]

Clinical distinction between AD and VaD is also challenging. Autopsies show 90% of AD patients have cerebrovascular pathology and 33% of VaD patients show AD brain changes.[6] The incidence of mixed dementia is 20% of 6.8 million dementia patients in the USA.[5] Other causes of memory impairment like delirium, an altered state of consciousness due to medical conditions and depression, which presents with a pseudodementia that resolves with antidepressants, must be considered.

Table II. *DSM-IV-TR* criteria for dementia, Alzheimer's type*

- A. Multiple cognitive deficits including both:
  - memory impairment, and
  - at least one of the following: aphasia, apraxia, agnosia, disturbance in executive functioning
- B. Significant functional impairment
- C. Course: gradual onset, continuing decline
- D. Absence of neurological, medical or psychiatric condition
- E. Absence of delirium

*Modified from American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders*, 4th ed.[15]

Table III. Staging of Alzheimer's disease

Stage	Characteristic	MMSE score	Placement
Mild	Noticeable cognitive defects; independent living	20 - 26	Can live at home alone
Moderate	Cognitive decline; dependence on caregivers; physical changes	10 - 19	Needs supervision
Severe	Total dependence on caregivers for basic activities of daily living; personality deterioration; loss of control of body functions	< 10	Placement in frail care advisable or 24-hour nursing required at home

Clinical features

Alzheimer's disease (Table II)

AD is the most common form of late-onset dementia. Memory difficulty is associated with disorientation or language dysfunction. Staging of the disease, which is based on ADL functioning, should be a priority during clinical assessment (Table III). Early deficits in word-finding difficulty are compensated for by the use of synonyms or definitions, so normal living is possible.[12] Forgetting names, appointments and whether something has been done, losing things, difficulty with driving, cooking, household chores and personal finances are harder to conceal.[12] Uncharacteristic behaviour, paranoia and confusion in unfamiliar places prompt presentation to medical professionals.

By the moderate stage, BADLs like bathing, dressing, grooming, feeding and using the toilet, require supervision. Disorientation in familiar surroundings, loss of interest in the outside world, delusions, hallucinations and aggression follow.

The severe stage is a total deterioration in BADL and complete dependence on others. Even close family members are not recognised, causing caregiver distress. Medical complications including dehydration, malnutrition, aspiration, pressure sores, seizures and injuries from falls are common.[5]

Vascular dementia (Table IV)

VaD, which is associated with a higher mortality than AD, can be cortical or subcortical. Disease may be focal, secondary to a thrombosis or embolus, or diffuse from hypertension.[7] Multiple cortical infarcts can affect neural nets, a single strategic infarct like an anterior cerebral artery infarct can cause specific deficits and small-vessel disease can produce Binswanger's disease and lacunar state.[7,8] Onset is usually abrupt and a fluctuating or stepwise progression occurs, except in subcortical ischaemic vascular dementia where there may be a slow, progressive decline.[7]

VaD patients have patchy deficits with better free recall when compared with AD.[3] Apathy early in the disease, verbal fluency deficits and perseveration are more suggestive of VaD due to frontal lobe involvement. Strategic infarcts in the Wernicke or Broca areas cause dysarthrias, dysphasias and aphasias. Clinically, besides changes in personality, there may be unsteady gait, hyperreflexia, an extensor plantar response, hemiparesis, hemisensory deficits, visual field defects, diplopia and pseudobulbar syndrome. Executive function deficits in organising thoughts and initiating tasks are common.[3,7,8]

Table IV. *DSM-IV-TR* criteria for vascular dementia*

- A. Multiple cognitive deficits including both:
  - memory impairment, and
  - at least one of the following: aphasia, apraxia, agnosia, disturbance in executive functioning
- B. Focal neurological signs and symptoms or radiological evidence of cerebrovascular disease assessed to be aetiologically related to the dementia
- C. Cognitive deficits cause significant impairment in functioning and a decline from previous level of functioning
- D. Absence of delirium

*Modified from American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders*, 4th ed.[15]

HIV-associated dementia

The HI-virus is neurotropic, but since HAART, HIV-associated dementia, which is predominantly subcortical, occurs mainly in the advanced stages or in severe immunosuppression. Forgetfulness, slowing of responses and difficulties in multitasking occur early while other cortical function is relatively preserved (Table V).[9] Without significant immunosuppression, non-HIV-related causes for memory loss like vitamin B_{12} deficiency, metabolic conditions and adverse drug interactions must first be excluded.[9]

Other dementias

Dementia with Lewy bodies (DLB) presents with parkinsonism, delusions, visual hallucinations and fluctuating alertness. Cognitively, deficits in attention, visuospatial reasoning and frontal-subcortical function are observed.[10] Comparatively, memory is

significantly worse in AD, while visuospatial function and executive abilities are worse in DLB.[11]

Forty per cent of patients with idiopathic Parkinson's disease have frontal-subcortical dementia, in which frontal executive functions and memory retrieval are the most impaired.[12] Lewy bodies are found in the cortex at autopsy, suggesting that this represents a variant of DLB.

In frontotemporal dementia early behavioural changes precede the loss of memory. Onset is insidious and progressive, typically between 45 and 65 years. Disinhibition, poor impulse control, poor grooming and hygiene can occur.[13]

Huntington's disease begins generally in middle life. Neuropsychiatric symptoms of depression, apathy, aggression, disinhibition and social disintegration may predate the chorea.[5]

Creutzfeld-Jakob disease is rapidly progressive in middle life, although a young-onset form exists. Prodromal psychiatric symptoms are followed by myoclonus and possibly seizures, extrapyramidal signs, cerebellar ataxia, and cortical blindness.[9]

Young-onset dementia (YOD) occurs in about 67 - 81/100 000 in the 45 - 65-year old age group.[12] Although AD, VaD and HAD occur, the differential diagnosis includes mainly genetic and metabolic disorders. Pyramidal, extrapyramidal, cerebellar or peripheral nerve involvement provides key diagnostic clues. Drugs and toxic exposures must be considered. In 10% of cases the condition is due to chronic alcohol abuse.[5]

Table V. Clinical features of HIV-associated dementia (HAD)*

Cluster of symptoms	Presentation
Neurological	• Motor symptoms: weakness, altered fine motor skills (handwriting) • Unsteady gait • Tremor • Visuospatial memory and coordination difficulties • Impaired verbal memory (word-finding) • Impaired attention and concentration • Mental slowing
Psychiatric	• Psychomotor retardation (slowed speech) • Personality changes (aggression, suspicion) • Social withdrawal • Apathy • Irritability • Depression • Mania • Psychotic symptoms (paranoia) • Anxiety, obsessive or panic symptoms

*Modified from Davis, *et al.*[9]

Clinical assessment

The clinical diagnostic process should not focus on any single set of criteria. Clinical history, physical and neurological examinations and neuropsychological tests including the Mini Mental State Examination (MMSE) (Table VI), the modified HIV dementia scale in HIV disease (Table VII), the Hachinski dementia scale in vascular risk (Table VIII) and the geriatric depression rating scale (Table IX) in the presence of a depressive process, should be done. Investigations including full blood count (FBC), thyroid function (TFT), urea and electrolytes (U&E), erythrocyte sedimentation rate (ESR), C-reactive protein (CRP), syphilis serology, calcium serum level, fasting glucose, lipid profile, vitamin B_{12}, folate, HIV serology and brain imaging, are considered appropriate management.[14]

Table VI. The Mini Mental State Examination*

- Orientation: First, ask the patient the date, day, month, year, and season. The maximum score is 5.
  Second, ask the patient their current location, i.e. clinic, floor, town, province, and country. The maximum score is 5.
- Registration: Name 3 objects (e.g. apple, penny, table), and ask the patient to repeat them. The maximum score is 3.
- Attention: Ask the patient to spell the word 'world' backwards or to subtract 7 from 100 serially backwards (stop after 5 answers). The maximum score is 5.
- Recall: Ask the patient to remember the 3 objects from the registration portion of the test. The maximum score is 3.
- Language
  - Ask the patient to identify a pencil and a watch. The maximum score is 2.
  - Ask the patient to repeat the phrase 'no ifs, ands, or buts'. The maximum score is 1.
  - Ask the patient to follow a 3-step command. The maximum score is 3.
  - Ask the patient to read and obey the phrase 'close your eyes'. The maximum score is 1.
  - Ask the patient to write a sentence. The maximum score is 1.
  - Ask the patient to copy a set of interlocking pentagons. The maximum score is 1.
- Scoring: The maximum score possible is 30. Generally, any score less than 24 is considered abnormal, but the cut-off varies with the patient's level of education. Because the results for this test can vary over time it is important to record the date and time of the assessment.

*Modified from Folstein, *et al.*[16]

Management

Principles of management are:

- establish the diagnosis of dementia;
- stage the severity;
- assess available support.

Causally linking risk factors is important for patients with VaD. Early diagnosis is essential. Identification of patients with potentially reversible conditions, or with at-risk conditions like MCI, is crucial to a better prognosis. In progressive disorders early decision-making, the planning of appropriate treatment, early psychosocial intervention, and caregiver training will improve quality of life outcomes. Early initiation of drug treatment in AD stabilises the level of functioning present at the time of diagnosis and promotes quality of life for patient, caregivers and families.[5] An MMSE every 6 months in MCI patients can help document changes over time.

Pharmacological options (Table X)

Reversible acetylcholinesterase inhibitors (AChEI) like donepezil, galantamine, and rivastigmine, and the N-methyl-D-aspartate (NMDA) receptor modulator memantine,

Table VII. The modified HIV dementia scale*

Score (maximum)

Memory – registration
Give 4 words to recall (dog, hat, green, peach), 1 second to say each; then, ask the patient to repeat all 4.

___ (6) Psychomotor speed
Ask patient to write alphabet in upper case letters horizontally, and record time in seconds.

___ (4) Memory – recall
Ask for 4 words from registration above; give 1 point for each correct word. (For words not recalled, prompt with a cue.)

___ (2) Constructional
Ask patient to copy 3-dimensional cube (below); record time in seconds.

___ (12) Total

*Source: Davis, *et al.*[9]

Table VIII. Hachinski ischaemic scale*

Clinical features	Score	Clinical feature	Score
Abrupt onset	2	Emotional incontinence	1
Stepwise deterioration	1	Hypertension	1
Fluctuating course	2	History of stroke	2
Nocturnal confusion	1	Associated atherosclerosis	1
Preservation of personality	1	Focal neurological symptoms	2
Depression	1	Focal neurological signs	2
Somatic complaints	1	Total	18

*Source: Hachinski V, *et al.*[17]

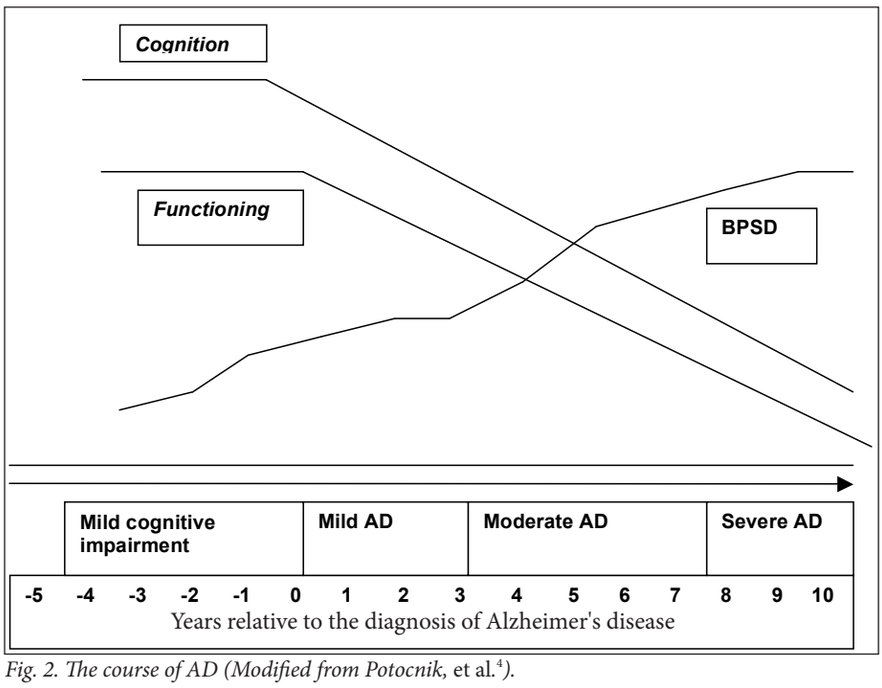

Fig. 2. The course of AD (Modified from Potocnik, et al.[4]*).*

are two of the drug options available. Vitamin E has shown efficacy at a dose of 1 000 µg daily in some patients.[5] AChEIs reduce neuropsychiatric symptoms. Apathy shows the most consistent response.[8] Switching within the class is a good option where there is intolerance.[5] The treatment goal of the early initiation with an AChEI is stability of symptoms. Improvements may be noted but no change is a positive outcome in AD. The decision to terminate treatment should be individualised, but a general guideline is when the MMSE falls below 10. Compliance is critical as functioning drops acutely on withdrawal of AChEIs. Memantine has efficacy in moderate to severe AD and, used together with donepezil, improves behavioural problems.[5] Cost-effectiveness of pharmacological intervention in AD is well documented. Treatment results in lower total health care costs for patients and caregivers and delayed nursing home placement.[5] Six-monthly MMSE scoring is important when AChEIs are used to plot disease progression and adjust doses.

The mainstay of therapy for patients with HAD is HAART.[9] With mild cognitive deficits, memantine and low-dose selegiline have been used successfully.[5] Modification of vascular risks can delay the onset of dementia.[3] Identification of target high-risk groups is therefore a priority. Lifestyle changes may involve diet, exercise, stress reduction, control of hyperlipidaemia and cessation of smoking. Anticoagulants should be considered for atrial fibrillation, antiplatelet agents after transient ischaemic attacks or non-haemorrhagic stroke and carotid endarterectomy for severe carotid stenosis.[3,7,8] There is growing evidence of cholinergic involvement in VaD, and donepezil has shown efficacy above placebo.[8] Recommended doses for VaD mirror those for AD.

Table IX. Geriatric depression scale*

Choose the best answer for how you have felt over the past week:

1. Are you basically satisfied with your life? YES / **NO**
2. Have you dropped many of your activities and interests? **YES** / NO
3. Do you feel that your life is empty? **YES** / NO
4. Do you often get bored? **YES** / NO
5. Are you in good spirits most of the time? YES / **NO**
6. Are you afraid that something bad is going to happen to you? **YES** / NO
7. Do you feel happy most of the time? YES / **NO**
8. Do you often feel helpless? **YES** / NO
9. Do you prefer to stay at home, rather than going out and doing new things? **YES** / NO
10. Do you feel you have more problems with memory than most? **YES** / NO
11. Do you think it is wonderful to be alive now? YES / **NO**
12. Do you feel pretty worthless the way you are now? **YES** / NO
13. Do you feel full of energy? YES / **NO**
14. Do you feel that your situation is hopeless? **YES** / NO
15. Do you think that most people are better off than you are? **YES** / NO

Answers in **bold** indicate depression. Although differing sensitivities and specificities have been obtained across studies, for clinical purposes a score > 5 points is suggestive of depression and should warrant a follow-up interview. Scores > 10 are almost always depression.

*Source: Yesavage, *et al.*[18]

Table X. Pharmacological options for AD

Drug	Mode of action	Dose
Donepezil (Aricept)	Acetylcholinesterase inhibitor (AChEI)	Start with 5 mg, increase up to 10 mg
Galantamine (Reminyl)	AChEI and nicotinic receptor modulator	12 mg twice daily
Rivastigmine (Exelon)	AChEI and butryl cholinesterase inhibitor	Start with 1.5 mg twice daily, increase up to 6 mg twice daily
Memantine	NMDA agonist-antagonist	Start with 5 mg daily, increase to 10 mg twice daily

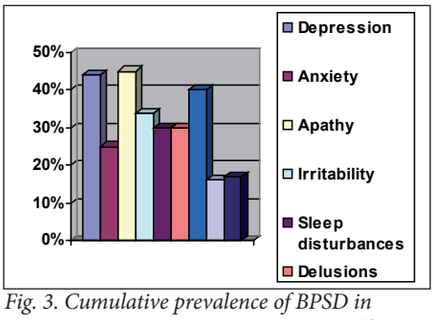

Fig. 3. Cumulative prevalence of BPSD in dementia (Modified from Lyketsos, et al.[19]*).*

Depression is a feature that commonly accompanies AD and escitalopram, a selective serotonin receptor inhibitor (SSRI), has been used effectively. Tricyclic antidepressants are of limited usefulness because of sedation and anticholinergic side-effects. BPSD are associated with a poor outcome: reduced ability to care for self and time to institutionalisation and a lower rate of survival with increased caregiver burden and economic costs.[5] Atypical antipsychotics are useful in managing BPSD. Low-dose olanzapine, 5 - 10 mg daily, reduces psychosis and agitation with no significant increase in extrapyramidal side-effects. Risperidone, which is registered for BPSD, is effective at 0.5 - 1.5 mg/day. Quetiapine, 25 - 100 mg daily, is a feasible alternative and may produce fewer extrapyramidal side-effects.

Non-pharmacological options

Environmental change, caregiver and family support are important. Homes should be modified early on to ensure safety. Diaries and other forms of reminders assist in functioning optimally. Medicolegal issues should be a priority after diagnosis: discussion around driving, firearm possession, wills, living wills and decisions about placement should occur early with the patient, caregiver and family. Caregivers should be encouraged to attend caregiver support groups and to take advantage of respite care offered by community organisations, as it reduces caregiver burden.

The late stages of AD and most dementias are marked by complete functional dependence. Patients are non-ambulatory, unable to communicate needs and may be unable to feed themselves. End-of-life issues must be addressed with patients and family members before this stage is reached, as many people have strong feelings regarding use of intravenous hydration or nasogastric or percutaneous gastrostomy tubes for life support.[5]

Conclusion

The prevalence of dementia is rising as health care improves and the aged population grows older and increases. Dementia will impose an increased social and economic burden in the future.[5] The diagnosis of dementia is mainly clinical and must include cognitive assessment. Treatments that delay the progression or improve the symptoms of AD should be started early to improve the prognosis. The management of neuropsychiatric symptoms with atypical antipsychotics is also important for improving the quality of life for patients and caregivers. In patients with HIV disease, HAART is the best treatment option to reduce HAD. Clinicians must recognise cognitive decline early in their patient population, preferably at the level of MCI, and commence treatments that will delay or prevent the onset of dementia.

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In a nutshell

- Dementia is an acquired impairment in memory with one or more cognitive deficits that affect personality and intellect resulting in impairment in functioning.
- Alzheimer's disease (AD), vascular dementia (VaD) and HIV-associated dementia (HAD) are the three most common dementias.
- Behavioural and psychological symptoms of dementia are associated with a poor outcome.
- The MMSE can be used to stage AD.
- Three acetylcholinesterase inhibitors and memantine are currently available to treat AD.
- Treatment of risk factors like hypertension, diabetes, hyperlipidaemia and the cessation of smoking is important in the management of VaD.
- The introduction of HAART has significantly reduced the incidence of HAD.