Delirium & Dementia

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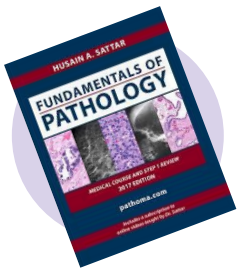
Objectives:

- **Differentiate delirium from dementia**
- **Differentiate MCI from Dementia**
- **Become familiar with common dementia syndromes**

References:
Slides - Black
Doctor's notes - Red
Step up / davidson - Blue
Extra explanation - Grey

Optional:



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Delirium

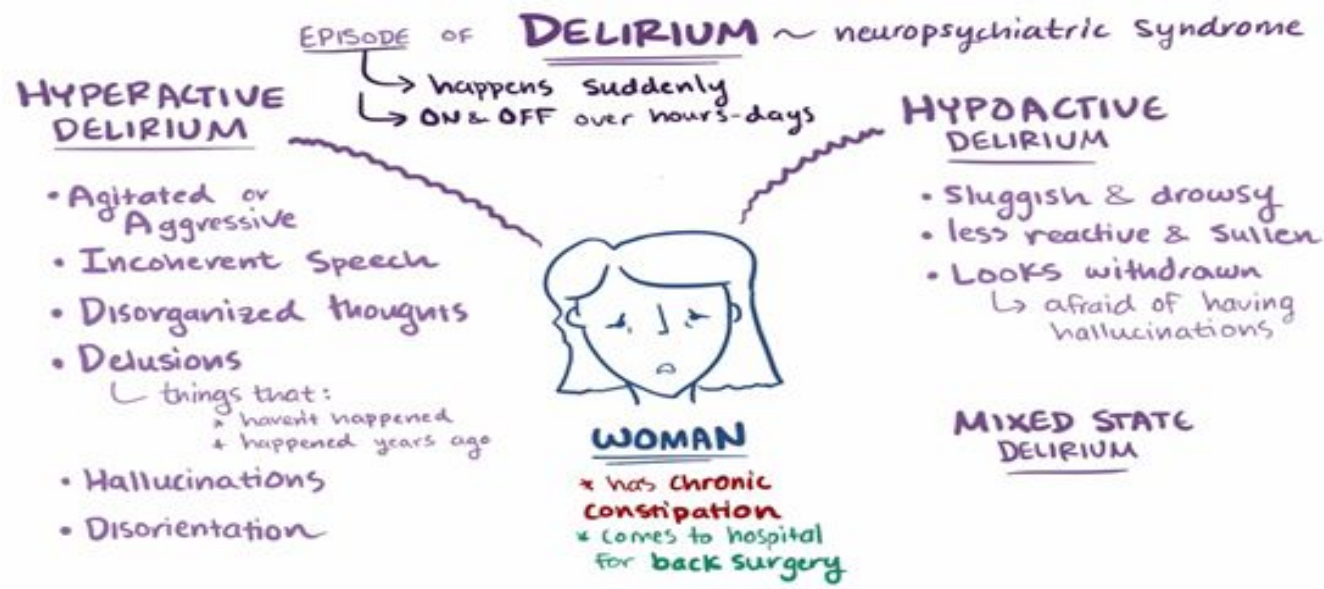
The term "Delirium", usually encompasses the terms of "acute confusional state" and "encephalopathy".

***The Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5)* diagnostic criteria for delirium is as follows:**

- **"Disturbance in attention (ie, reduced ability to direct, focus, sustain, and shift attention) and awareness. Change in cognition (eg, memory deficit, disorientation, language disturbance, perceptual disturbance) that is not better accounted for by a preexisting, established, or evolving dementia."**
  - ❖ **The disturbance develops over a short period (usually hours to days) and tends to fluctuate during the day.**

There is evidence from the history, physical examination, or laboratory findings that the disturbance is caused by a direct physiologic consequence of a general medical condition, an intoxicating substance, medication use, or more than one cause

Delirium, usually encompasses: "Acute confessional state" and "encephalopathy"



It is not normal to have delirium, while this statement is obvious, patients' who have symptoms of delirium are dismissed as being sleepy, tired, or just age related changes.

- ❖ **BEING OLD ≠ Being confused or mentally impaired**

Important clues to recognize delirium:

- **Patient will not be able to give you a history**
- **Rapid development of symptoms (hours or days).**
- **Change in level of consciousness**
- **When the patient appears awake, assess level of attention**
- **Poor content of conversation and/or other cognitive deficits (memory loss, disorientation, abnormal language), neuropsychiatric symptoms such as hallucinations (visual, auditory somatosensory…etc) and delusions of harm.**

The opposite, hypervigilance, may occur in substance withdrawal (eg: alcohol or sedative)

❖ Causes of Delirium

- **Metabolic, examples include dehydration, hyponatremia, hypocalcemia, abnormal thyroid functions, liver and/or renal impairments, hypoglycemia .**
- **Toxic: ETOH and drugs of abuse.**
- **Infectious: UTI, pneumonia, or infections that result in systemic manifestations.**
- **Side effects of drugs or the abrupt discontinuation of certain drugs like benzodiazepines.**
- **Post surgery (anesthetics, pain)**
- **Disorders of the central nervous system (large strokes, Post-seizures, infections)**

Extra: theories (not proven) on mechanism of the causes:

- **increase overall number of Neurotransmitters (acetylcholine -Dopamine -norepinephrine - Glutamate)**
- **Neuronal membrane does not depolarize right**
- **inflammatory cytokines**

❖ What can look like delirium?

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- **Non-convulsive seizures (inside the brain no convulsion present like)**
- **Sundowning behavior (circadian rhythm is disturbed) the reserve there clock which is odd for an old person.**

- **Dementia**
- **Psychiatric disorders (they have impaired cognitive function with strange behaviors unlike schizophrenia which doesn't have cognitive impairment**
- **Aphasias**
- **Transient Global Amnesia (they repetitive forget resolve after 24 hrs)**

❖ Delirium management

The choice of the investigations should be guided by your history and clinical examination findings

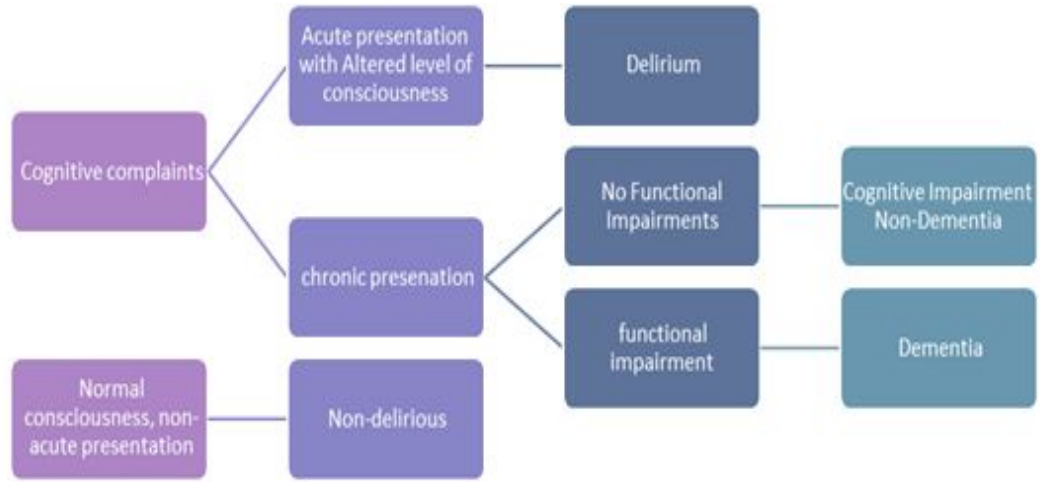
There many causes of delirium, so an initial investigation may include (but not limited to) the following:

- **CBC, electrolytes, urea, creatinine, LFT, ESR, TSH +/- Auto-immune evaluation**
- **Arterial blood gases**
- **Urinalysis and toxicology screen**
- **Chest X-ray, EKG**
- **CT head, EEG, Lumbar Puncture**

Extra :

these patient must be identified early to avoid complication like falling which can cause head trauma , broken bones , and bruises and bleeds which prolong their stay and infections exposure lead to increases in mortality rate.

Dementia vs Delirium Cognitive Impairment?



❖ Dementia (Major Neurocognitive Disorder) (DSM V)

"Evidence of significant cognitive decline from a previous level of performance in one or more cognitive domains";

1. **Learning and memory**
2. **Language (the ability to perform grammatically correct sentences)**
3. **Executive function (if you do a complex executive task that is not a routine example: traveling arrangement from planning to booking to traveling)**
4. **Complex attention (shifting between tasks) like someone talking to you when you and your working you cut your working to talk and the resume after but in dementia they don't return forget the task**
5. **Perceptual-motor (apraxia which means they are unable to practice example on that is person forgetting how to a screwdriver or hammer or any other tool)**
6. **Social cognition**

Must rule out :

- **The cognitive deficits interfere with independence in everyday activities**
  The cognitive deficits do not occur exclusively in the context of a delirium
- **The cognitive deficits are not better explained by another mental disorder (eg, major depressive disorder, schizophrenia)**

❖ Major dementias

Neurodegenerative:	Other:
• Alzheimer's Disease • Lewy Body Dementia • Parkinson's Disease Dementia • Frontotemporal Dementia • Huntington's Disease	• Vascular Dementia • Normal Pressure Hydrocephalus • Creutzfeldt-Jakob Disease • Wernicke-Korsakoff Syndrome • Secondary to infection or systemic illness

Alzheimer's Disease

Uncommon under the age of 60. it can be either sporadic (90-95%) or familial (5-10 with earlier presentation)

Present as:

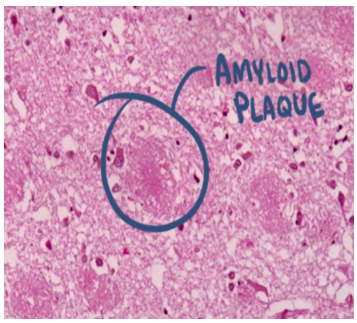
- Decreased memory and new learning is the hallmark of the condition
- Language impairment: Word finding difficulties with circumlocution and anomia.
- Executive dysfunction
- Apraxia, Unawareness of illness
- Visual-spatial impairments (losing ability of navigation getting lost)
- Passivity, apathy > agitation
- Delusions (unshakeable belief that doesn't follow social norms like there is someone in the house or someone is stealing of money note that isn't as imagine , outrageous or dramatic as other psychiatric disorder like schizophrenia)
- Depression: low mood usually can cause memory impairment like when your sad or depressed you not as mentally sharp as when you're in normal mood it's tricky to know which is which (patient is having depression or Alzheimer's sense each can cause the other)
- Circadian rhythm disturbances (sundowning)
- Weight loss (they lose weight due to loss of appetite)

❖ Pathophysiology:

2 mechanisms one outcome

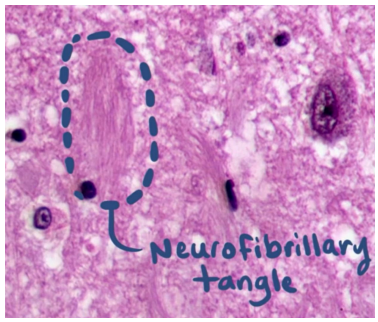
1. Defects in the mechanisms for clearing amyloid beta results in its accumulation and form senile plaques

(these amyloid beta plaques are outside the neurons which disrupt neuron to neuron signaling ,cause inflammation ,or cause an angiopathy)



2. Abnormal accumulation of hyperphosphorylated tau protein results in accumulation and the formation of neurofibrillary tangles.

(tau protein is what hold the microtubules in the neuros if it get hyperphosphorylated the cell inner function disturb leading to apoptosis)

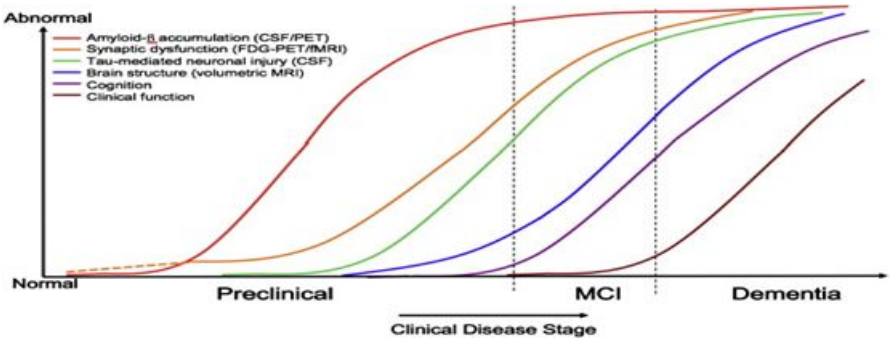


Tangles and plaques are pathological hallmarks in Alzheimer's disease

- The resultant loss of neurons and synapses is responsible for the clinical profile
- The neuronal loss in the basal forebrain region is responsible for a cholinergic deficit.

❖ Major risk factors

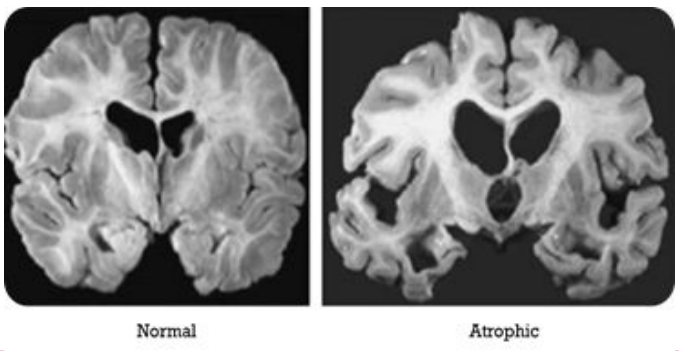
- Increasing age
- (APOE ε4) The E4 allele for Apolipoprotein E on chromosome 19 (which
- Down Syndrome (almost all of them around 40s) cause :increase amyloid beta plaques
- Specific inherited types (PSEN-1 or 2)
- Mid-life vascular risk factors (DM, HTN, Hyperlipidemia, Lack of exercise) especially DM
- Brain trauma

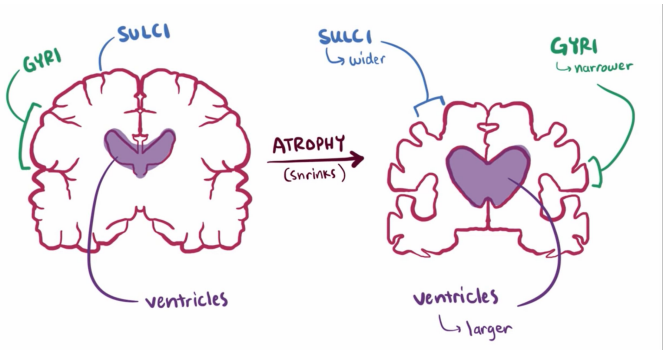


- Note that the level of amyloid tangles and plaques is high in Alzheimer patients but someone with high level of amyloid plaques and tangles might not develop Alzheimer's
- Note: Ach inhibitors centrally active like() it temporally control symptoms

❖ Diagnosis of alzheimer's (Diagnosis is clinical)

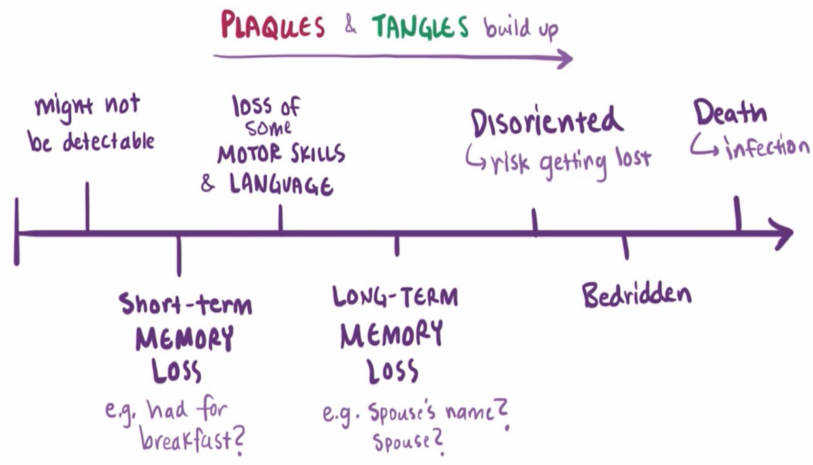
- Rely on history and cognitive/neuropsychological assessments that demonstrates a slowly progressing cognitive disorder which causes impairments in daily life.
- Brain structure on MRI may demonstrate medial temporal atrophy bilaterally
- PET scans can demonstrate decreased metabolism in temporal and parietal regions
- Cerebrospinal fluid might show low Amyloid beta, and elevated Tau (not specific)





More shirking in brain mostly temporal horns they get larger that's why the memory impairment is the major presenting symptom
MCI (mild cognitive impairment) present as forgetting can work live normally with reminders it can be perusal state

❖ Progression of the diseases:



Early stage	Mild forgetfulness poor concentration change in personality
interme diate stage	Progressive memory loss visuospatial impairment
later stages	Forget family names paranoid delusion
advance stage	Forgetting their name complete dependence on other incontinence (bladder\bowel) death usually due to infections

❖ Lewy Body Dementia

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Second most common cause of "degenerative" dementia.

usually was misdiagnosed as parkinson's or alzheimer's depending or the presentation

Core clinical features includes

- **visual hallucinations (there see or hear actually things they say I see not I think), parkinsonism (they have the symptoms like rigidity stamping or shuffling gait)**
- **fluctuations in cognitive ability and level of consciousness. (sometimes they walk up normally sometimes you can get them out of bed of how tried they are)**
- **Other symptoms include visual spatial impairment)can't orient themselves example can't position themselves to sit on a chair) More prominent in lewy body dementia than Alzheimer's.**
- **short term memory**
- **sensitivity to neuroleptics**
- **REM sleep behavior disorder and autonomic dysfunction (present as partner of patient complain of getting hit or kicked in sleep)**

Pathologically

there are "Lewy Bodies" present in neurons, which are the result of abnormal synuclein protein accumulation. in the cortices not basal ganglia which is the difference between it and parkinson's

Diagnosis

- **is primarily clinical**
- **PET scan may show decreased occipital lobe metabolism**
- **Myocardial scintigraphy may be abnormal due to abnormal cardiac sympathetic innervation**

Parkinson's Disease Dementia is similar to LBD. The difference is that a clear history of PD with NO cognitive impairment precedes the development of dementia by at least a year.

How to know is in what presented 1st in Parkinson's the tremors and Parkinson's symptoms comes first than after some years visual spatial , short memory start while in Lewy body dementia its symptoms 1st than parkinsonism (stiffness and rigidity)

❖ Vascular Dementia

- **Occurs secondary to a single stroke in a region important to cognition such as hippocampus or thalamus, or a large stroke that affects multiple lobes.** (usually effect 3,5,6 layer of the cerebral cortex)
- **Recurrent strokes that accumulate over time, there is a step-wise development of cognitive deficits. (white matter disease)**
- **Slowly progressing cognitive deficits due to subclinical progression of small vessel disease**
- **Associated with vascular risk factors (HTN, DM, Hyperlipidemia, & smoking)**
- **Frequently coexists with Alzheimer's disease**

❖ Frontotemporal Dementia

- **Mean age of onset is 58 , used to called "pick diseases "**
- **Preferentially involves the frontal and temporal lobes, symptoms depend on the region (lobe) involved, therefore there are variants::**

❖ Clinical features:

- **Behavioral Variant is associated with personality changes, inappropriate social behaviors (disinhibited), lack of insight, Binging on certain foods, emotional blunting, rigid and cannot adopt to new situations, along with decreased attention modulation.**
- **Primary Progressive Aphasia (they start talking slower ,pronounce words wrong ,forget names of things)**
- **Semantic Dementia (forgetting things he already know like time words he know , words from internal dictionary ect)**

❖ Pathophysiology:

- **Common pathological inclusions include hyperphosphorylated tau protein, TDP-43 protein, or FUS protein**

❖ Diagnosis:

- **MRI shows atrophy in the frontal lobes (may be asymmetric) :Behavioral variant**
- **MRI may show focal left frontal atrophy :Progressive nonfluent aphasia Patients present first with a non-fluent type of aphasia (similar to a Broca's lesion).**
- **MRI may show focal left temporal atrophy: Semantic dementia (temporal variant of FTD): Usually have intact fluency, but comprehension is impaired and decreased naming ability.**

❖ Normal Pressure Hydrocephalus

A rare disorder

(Wet,Wobbly and Wacky)
However these features are not unique to NPH.

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❖ Presenting symptoms

- **Gait impairment,**
- **Urinary incontinence**
- **Dementia**

Dementia is of a subcortical type, where there is executive dysfunction, and psychomotor slowing first. Other features of cognitive impairment develop later on.

  - **The typical gait has been described as "magnetic"**
  - **The patient may shuffle their feet on the ground with a normal or wide base, some may have some features of parkinsonism.**

- **Patients who present with gait impairment > cognitive impairments have better prognosis if identified early.**

❖ Pathophysiology:

- **It usually results from impaired CSF absorption at the level of the arachnoid villi.**
- **In Secondary NPH, there is usually a history of a previous meningitis, inflammatory disorder, or subarachnoid hemorrhage. Idiopathic NPH is when there is no preceding explanation for the condition. Interestingly they don't have.**

❖ On MRI:

- **The MRI brain may also show dilated ventricles (however CSF pressure is normal)**

❖ Treatment

- **Some patients will improve after a lumbar puncture that removes 30-50 cc of CSF. If this test is positive, than a CSF shunting procedure is performed.**

❖ Creutzfeldt-Jakob Disease

- **Rare, 1 in a million**

Present as:

- **Any picture of cognitive impairment may occur**
- **rapidly progressing dementia, disease duration usually 6 months. Myoclonic jerks may occur.**
- **neurological symptoms like parkinsonism, ataxia, field defects, spasticity, hyper-reflexia, and + Babinski.**
- **Pathophysiology:**
- **It is a prion disorder and can be transmitted but not infectious (transmissible spongiform encephalopathy)**
- **Prions are abnormally formed proteins that induce pathological transformations in other proteins.**
- **It has been transmitted after the use of surgical equipment or growth hormones**

❖ Diagnosis

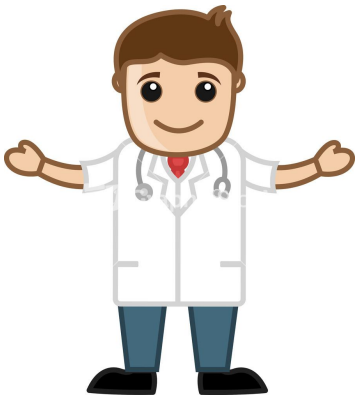
- **MRI may show abnormal signal intensity in the basal ganglia and cortical ribbon**
- **EEG shows characteristic periodic sharp wave complexes**

❖ Management:

- No treatment, patients die within a year.
- The bovine variant CJD has been linked to consumption of beef (UK outbreak in the 90s)

❖ Other causes of dementia

- **HIV Associated neurocognitive disorder**
- **Syphilis**
- **Vitamin B12 deficiency**
- **Autoimmune disorders (eg: SLE)**
- **Alcohol leading to wernicke-Korsakoff's syndrome, characterized by confabulations to compensate for amnesia**
- **Cholinesterase Inhibitors**
- **Drugs such as Donepezil, rivastigmine and galantamine which increase the presence of central nervous system acetylcholine help with cognitive and behavioral symptoms in Alzheimer's dementia**
- **Does not stop disease progression, but may provide transient clinical stability**
- **NMDA receptor antagonist, memantine, is helpful in advanced alzheimer's disease**
- **No treatment available for MCI**



Case by the doctor

Case

73 year old male retired judge. Presents with 1 year history of cognitive concerns Trouble recalling names He can completely forget a discussion Forgets the location of previously placed tools Only recalls fragments of a previous doctor visit 2 weeks earlier. Does not follow the dates as accurately as he used to and indicates that this is because he is retired.

Sometimes he is repetitive with questions. Confusion about how to do things especially when tired. His ability to use household appliances is also affected. Tried putting on his shirt while still on the hanger

What cognitive domains are affected in this case?

Learning and memory :

- **Trouble recalling names**
- **He can completely forget a discussion**
- **Forgets the location of previously placed tools**
- **Only recalls fragments of a previous doctor visit 2 weeks earlier**

Perceptual-motor (apraxia)

- **His ability to use household appliances is also affected.**

Executive function

- **Tried putting on his shirt while still on the hanger**

what does he have ?

alzheimer’s disease

Summary tables:

Delirium	Dementia
Disturbance in cognition over a short period of time(hrs. to days) with no preexisting dementia usually caused by underlying medical condition	**Evidence of significant cognitive decline from a previous level of performance in one or more cognitive domains**
Present as ● **Change in attention** ● **Change in cognition** ● **Non-convulsive seizures** ● **Sundowning behavior** ● **Dementia** ● **Psychiatric disorders** ● **Global transient amnesia**	**Present as** **Altering in** ● **Learning and memory** ● **language** ● **executive** ● **complex attention** ● **perceptual-motor** ● **social cognition**
Caused by : ● **Alerted metabolic status** ● **Drugs and toxins** ● **Infection** ● **Post-surgery** ● **Cns disorder**	**Caused by** ● **Neurodegenerative** ○ **Alzheimer's Disease** ○ **Lewy Body Dementia** ○ **Parkinson's Disease Dementia** ○ **Frontotemporal Dementia** ○ **Huntington's Disease** ● **Other:** ○ **Vascular Dementia** ○ **Normal Pressure Hydrocephalus** ○ **Creutzfeldt-Jakob Disease** ○ **Wernicke-Korsakoff Syndrome** ○ **Secondary to infection or systemic illness**
Management : ● **ABCDE** ● **Routine tests** ● **Find and treat underlying cause**	**Management:Depends on the cause**

Summary of dementia diseases

Disease	Presentation	Pathology	Risk factors	Management
Alzheimer's Disease	- Decreases in memory -Language impairment - Apraxia - Visual-spatial impairment - Delusion - Depression - Sundowning	- amyloid beta plaques -neurofibrillary tangles	- age - APOE (ε4) - vascular risk factors(HTN,DM) - Brain trauma	diagnosis clinical MRI : shirking in brain mostly temporal horns
Lewy Body Dementia	-Visual hallucinations -Parkinsonism -Fluctuate in congestion and level consciousness -REM sleep behavior	lewy body in the cortex		clinical PET scan
Vascular Dementia	- Memory loss - Cognitive deficits	stoke to cognitive areas	- HTN - DM -Hyperlipidemia - smoking	
Frontotemporal Dementia	- Abnormal behavior - Primary progressive aphasia - Semantic dementia	inclusions of phosphorylated tau , TDP-43 ,FUS proteins		clinical MRI atrophy of frontal lobes or temporal lobes
Normal Pressure Hydrocephalus	-Gait impairment, -Urinary incontinence -Dementia	impaired CSF absorption		The MRI brain may also show dilated ventricles removal cc of CSF
Creutzfeldt-Jakob Disease	- Cognitive impairment - Neurological symptoms like parkinsonism - Rapidly progressing dementia	Prions are abnormally formed proteins that induce pathological transformations in other proteins.	MRI abnormal signal intensity in the basal ganglia and cortical ribbon EEG :periodic sharp wave complexes No treatment, patients die within a year.	

MCQ's

Q1: A 79-year-old man is admitted to the hospital for an elective total knee replacement. He lives by himself and performs all of his activities of daily living. His medical history includes degenerative joint disease, coronary heart disease, and hypertension. He has no history of psychiatric problems or alcohol and drug history. In the evening, several hours after an uneventful surgical procedure, the patient becomes diaphoretic
and tachypneic. He is alert, but also agitated and confused, and cannot give full attention to the hospital staff and their questions. He does remember his name, but does not believe that he is in a hospital. Which of the following is the most likely diagnosis?
(A) Brief psychotic episode
(B) Delirium
(C) Dementia
(D) Normal aging
(E) Pseudodementia

Q2: A 69-year-old man is taken to his GP by his concerned wife. She complains that he has not been himself for the last year. He has slowly become withdrawn and stopped working on his hobbies. Now she is concerned that he often forgets to brush his teeth. She has noticed he sometimes struggles to find the right word and this has gradually become more noticeable over the last couple of months. She presented today because she was surprised to come home to find him naked and urinating in the living room last week. He has a history of hypertension and is an Ex-smoker.
The most likely diagnosis is:
A. Depression
B. Frontotemporal dementia
C. Alzheimer's disease
D. Vascular dementia
E. Lewy Body disease

Q3: A 77-year-old white man is brought to the clinic by his daughter, who says that her father is having trouble remembering important family occasions and difficulty managing his finances. These behaviors have progressively worsened in the past year, but her father denies that anything is wrong. He has no history of depression, anxiety, or head trauma. Neurologic examination is normal. His medical history is significant for type 2 diabetes mellitus diagnosed 20 years ago and atrial fibrillation. An uncle was diagnosed with Parkinson's disease at the age of 60 years. Which of the following is the most likely diagnosis?
(A) Alzheimer's disease
(B) Delirium
(C) Dementia with Lewy body
(D) Progressive supranuclear palsy
(E) Vascular dementia

Answers:1.B, 2.B, 3.A

Thank you

If you have any question please contact with us at:
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