

# Vascular Dementia

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# Objectives

- To understand Vascular Dementia: subtypes, epidemiology, pathophysiology, symptoms, risk factors
- To understand how to evaluate, treat and manage Vascular Dementia
- To understand the prognosis and possible complications of Vascular Dementia
- Key elements of patient and family education



# What is Vascular Dementia?

- Vascular Dementia is any dementia that is primarily caused by cerebrovascular disease; specifically strokes
- Vascular Dementia is the second most common form of dementia, second only to Alzheimer's Disease
- Vascular refers to blood to the brain and intracerebral circulation
- Dementia refers to cognitive difficulty which may effect things like memory, communication, ambulation, learning new information, completing ADLs



# Vascular Dementia

- Is not a normal part of aging
- It is typically caused by long-term, diminished blood flow to the brain, leading to brain ischemia or repeated infarction
- It is often recognized:
  - After symptoms of dementia follow a clinically diagnosed stroke or,
  - After brain imaging for a patient with diagnosed dementia reveals vascular brain injury without a clinical history of stroke



# Mild Cognitive Impairment vs. Vascular Dementia... A progression

- Mild Cognitive Impairment:
  - Common in adults, 65 or older
  - Memory related problems
  - Forgetting names, places, conversations
  - Forgetting where you have placed things
  - Losing train of thought, sense of time or direction
  - Still able to take care of ADLs
- Vascular Dementia:
  - All of the above except now difficulty with ADLs
  - Trouble with language, conversation, repeating questions/stories
  - Odd behaviors, personality changes
  - Balance and coordination difficulty
  - Increased tripping, falls, tremors
  - Wandering, getting lost



# Subtypes

- Mild vascular cognitive impairment
- Stroke-related dementia: Occurs after a stroke (single infarct)
- Multi-infarct dementia: Occurs after a series of small strokes or TIAs
- Binswanger disease or subcortical vascular dementia: caused by extensive microscopic damage to small blood vessels and nerve fibers of the brains white matter
- Mixed dementia: Or multiple-etiology dementia which occurs when vascular dementia is co-occurring with Alzheimer's Disease



# Epidemiology

- In approx. 25-50% of all dementia syndromes, vascular disease is a contributing factor
- Pure vascular dementia is uncommon and accounts for about 10% of all dementia cases
- Mixed or multiple dementia makes up about 30-40%
- Like Alzheimer's disease, the incidence of Vascular Dementia increases with age
- Prevalence is higher in males vs. females
- Prevalence ranges from 0.2% in the 65-70 years group to 16% in those 80 years and older



# Pathophysiology

- Vascular dementia is caused by diseases of the cerebrovascular and cardiovascular systems
- These diseases cause poor blood supply or hypoperfusion and ischemia to brain tissue
- More specifically:
  - Intracerebral hemorrhage
  - Subarachnoid hemorrhage
  - Any cause of ischemic stroke:
    - Cardioembolism
    - Large artery atherosclerosis or
    - Cerebral small vessel disease





# Most common etiology of Vascular Dementia

- Cerebral small vessel disease or small vessel disease (SVD) is the most common neuropathological contributor to Vascular Dementia
  - It is a chronic and progressive vascular disease effecting arterioles, capillaries, veins and deep white matter of the brain
  - Also known or described in imaging as: white matter disease, white matter hyperintensities, white matter changes, chronic microvascular ischemic changes, age related white matter changes
  - SVD is often asymptomatic and incidentally found in imaging

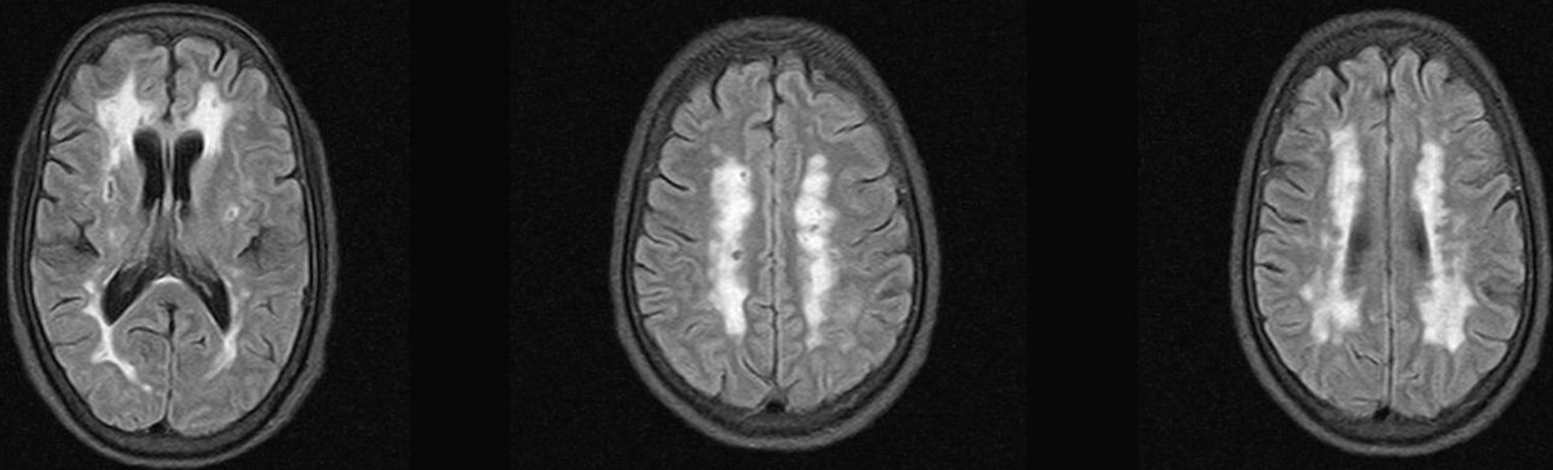


# Common causes of SVD

- Arteriosclerosis
  - Age-related hardening/stiffening of arteries
- Atherosclerosis
  - Narrowing due to plaque buildup
- Cerebral amyloid angiopathy (CAA)
  - Buildup of amyloid deposits in the blood vessels causing microhemorrhages

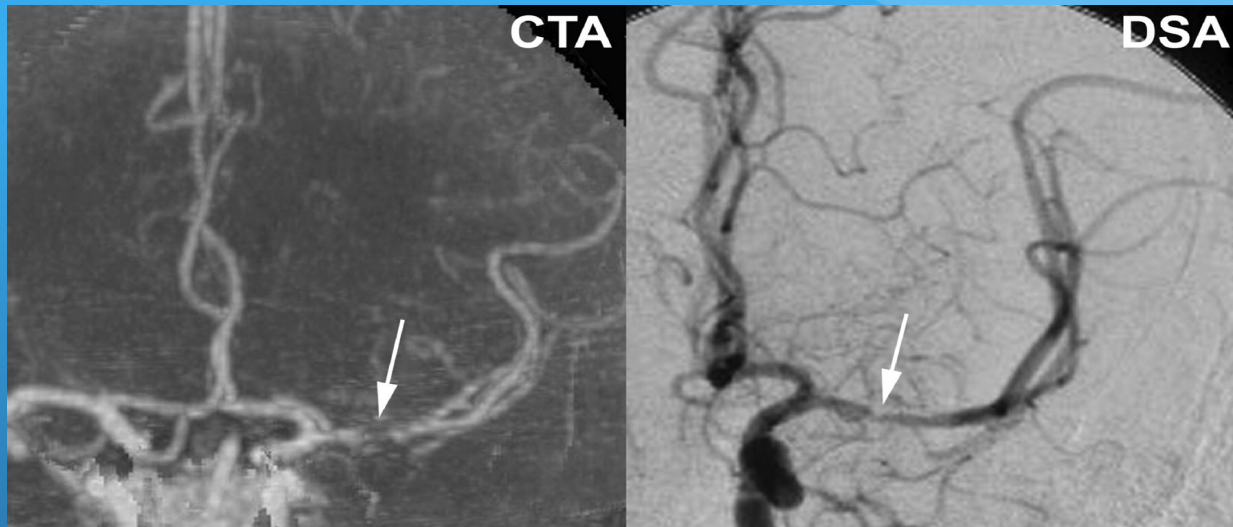


# Subcortical Arteriosclerosis



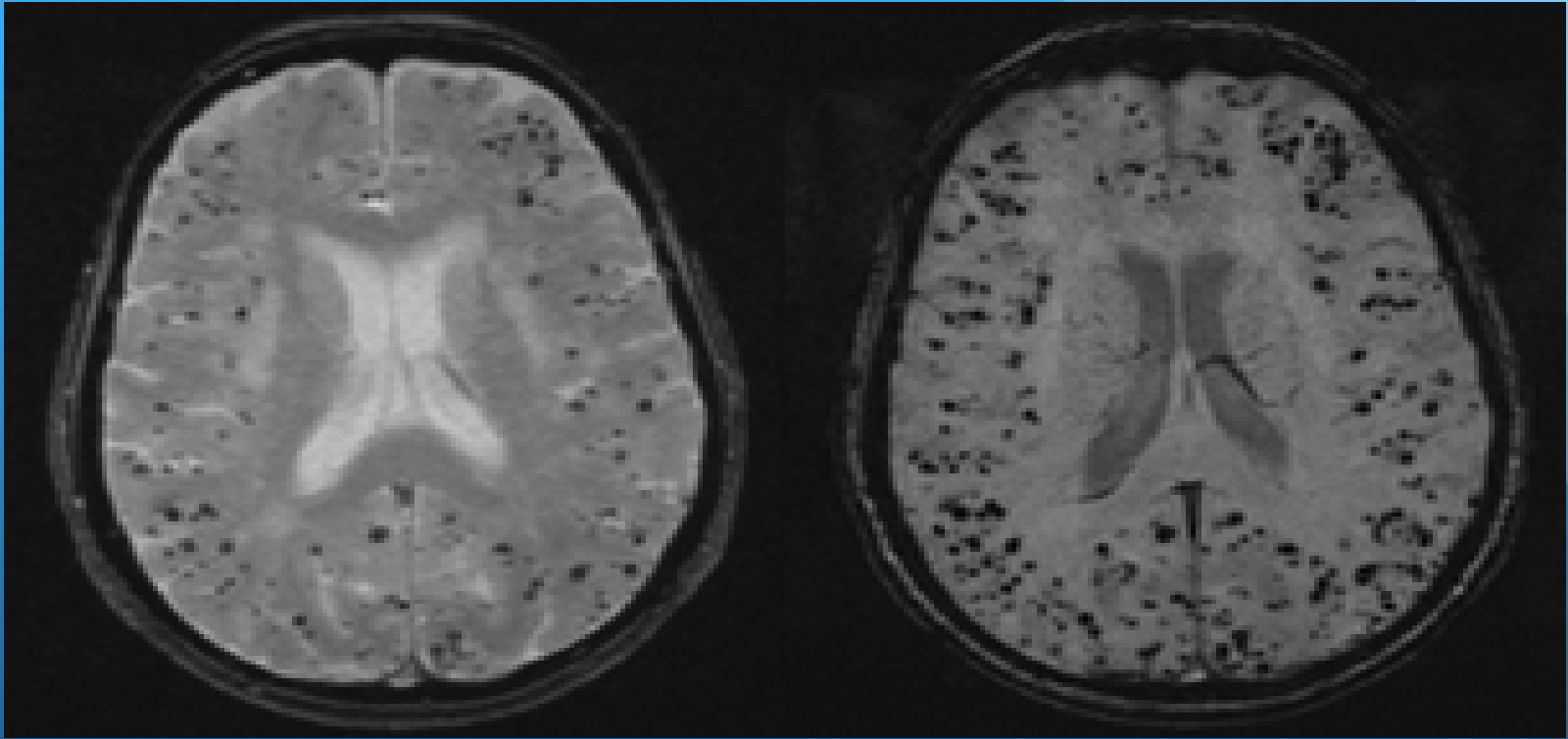
- The most common cause of SVD
- Often used synonymously with atherosclerosis, but describes hardening of arteries
- Due to aging, hypertension and other stroke risk factors
- Affects subcortical brain regions, i.e. basal ganglia, corona radiata
- Typically consists of multiple lacunes or extensive, confluent white matter lesions

# Large Artery Atherosclerosis



- Atherosclerotic plaque builds up in carotids causing large artery atherosclerosis
  - This leads to a gradual decrease in flow to brain, causing chronic ischemia; or if there is acute hypoperfusion with a cardiovascular etiology this could cause stroke
- Plaques can break off and drift deeper in the brain and cause complete blockage of smaller arteries; this is often described as artery to artery embolus
- Tiny perforating arteries can be completely blocked by atherosclerotic plaque building within them

# Cerebral Amyloid Angiopathy



- The 2<sup>nd</sup> most common type of cerebral small vessel disease
- Caused by beta-amyloid deposits in small arteries
- Causing loss of vascular integrity
- Leading to large symptomatic and small asymptomatic hemorrhages
- Typically located in the cortex or subcortical white matter

# Risk Factors for SVD

- The SAME as for stroke
- Age
- Hypertension
- Diabetes
- Elevated cholesterol
- Decrease physical activity
- High BMI; Low BMI may be included here due to its possible contribution to cardiac arrhythmia
- Smoking
- Coronary artery disease
- Atrial fibrillation
- ETOH or Illicit drug abuse



# Factors that increase the risk of new dementia after stroke:

- Pre-stroke factors:
  - Age, race, low education, diabetes, a.fib
- Stroke factors:
  - ICH, aphasia, left hemisphere location, multiple or recurrent strokes
- Stroke complications:
  - Incontinence, confusion, seizure
- Low brain reserve:
  - General atrophy, medial temporal lobe atrophy, beta-amyloid deposition



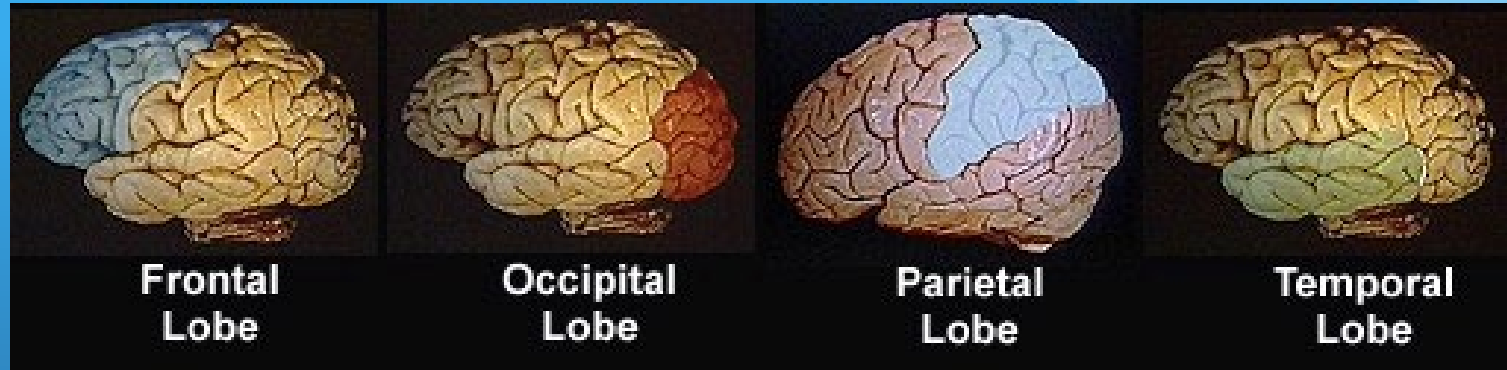
# Symptoms of Vascular Dementia

- Slowing of thinking or analyzing a situation
- Inability to concentrate, trouble paying attention
- Difficulty with problem solving, organizing thoughts
- Confusion
- Slurred Speech
- Lack of bladder control
- Depression or apathy
- Poor memory
- Difficulty with activities of daily living
- Unsteady gait, restlessness or agitation
- Symptoms of Vascular Dementia can appear suddenly or brain function may decline with each subsequent stroke





# Location matters

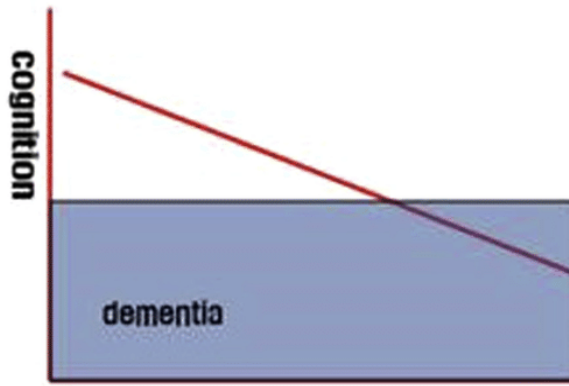
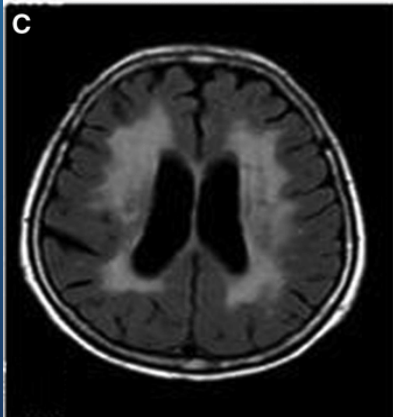
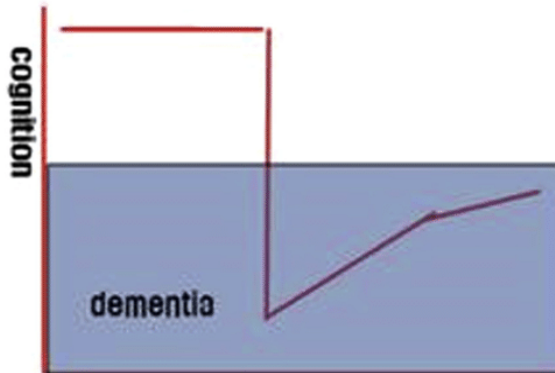
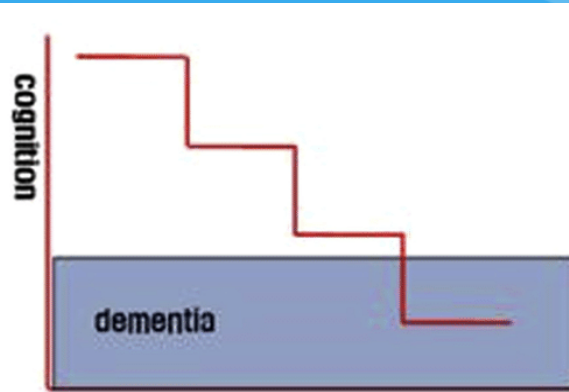
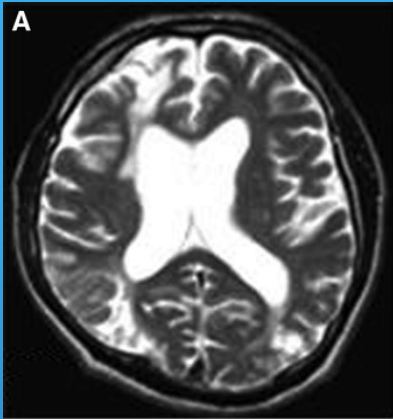


- Frontal: movement, counting, spelling, decision making; may see personality changes, apathy, aphasia
- Occipital: visual information (reception, interpretation), hallucinations, decreased vision or loss
- Parietal: sensory information, parasthesias, depth perception, hand-eye coordination, physical location, neglect or proprioception
- Temporal: hearing, smell, memory, visual recognition of faces and languages; unable to form new memories; have memory loss that is promptable; aphasia

# Trajectory of cognitive decline in Vascular Dementia

- Cognitive decline:
  - Can worsen over time or progress quickly
  - Can progress in a stair step fashion
  - Is most often prompted by stroke





A) Related to multiple infarcts:  
Step-wise pattern of decline

B) Related to a focal lesion:  
Sharp decline with some recovery

C) Related to white matter disease:  
Slow downward progression

# Evaluation: History

- Thorough history from patient, family and caregivers
- Focusing on cognitive and functional deficits, onset of symptoms and their progression
- Instrumental ADL's: cooking, driving, finances, medication management
- Basic ADL's: dressing, bathing, toileting
- Past medical history, current medications, sx history
- Physical exam with focused neurological exam



# Evaluation: Cognitive screening and Neuropsychological testing

- Cognitive screening identifies objective evidence of cognitive impairment that distinguishes between mild cognitive impairment or dementia:
  - Montreal Cognitive Assessment (MOCA); 10 minutes; 30 points, available online and in multiple languages; quickly determines impairment in thinking and need for further dementia work up; good for mild symptoms
  - Folstein Mini-Mental State Examination; not as sensitive as the MOCA; 7-8 minutes, 30 points; good for more pronounced symptoms
  - DSM V criteria for major neurocognitive disorder
- Rule out other etiologies of cognitive decline
  - Depression
    - Geriatric depression scale or PHQ-9
  - Thyroid disorder
  - Medications
  - Alcohol abuse
  - Infectious causes



# Evaluation: Labs, Imaging

- Labs: contributing metabolic or endocrine disorders
  - CBC
  - CMP
  - Thyroid panel
  - RPR
  - Vitamin B12
- Imaging: structural brain imaging
  - CT: chronic strokes; SVD, hemorrhage
  - MRI (more sensitive): strokes, SVD, hemorrhage, CAA



# Treatment

- No cure
- Focuses on management of conditions that cause stroke:
  - With management of the underlying risk factors there is opportunity to slow the progression of Vascular Dementia and the cognitive decline that ensues
  - With the identification of risk factors and early modification could reduce the risk of developing Vascular Dementia
- The FDA has not approved any drugs to treat specific symptoms of Vascular Dementia, but medications that are approved for the treatment of Alzheimer's, such as, Acetylcholinesterase inhibitors (Aricept) and, NMDA inhibitors (Namenda), have been studied and found to be of some benefit in the setting of vascular dementia
  - As the use of these medications can be considered off label, and carry a GI side-effect profile plus multiple other side-effects, it is important to have risk vs. benefits conversations with patients and caregivers, if considering these medications



# Management

- Elimination of medications that are unnecessary or can exacerbate symptoms (i.e., anticholinergics)
- Identify and optimize co-morbidities (i.e., hypertension, diabetes, hyperlipidemia)
- Encourage smoking cessation, decreasing alcohol use
- Assess for geriatric syndromes, like falls, depression and urinary incontinence





# Prognosis

- Overall, patients with Vascular Dementia have a shortened life expectancy
- Those with stroke have the highest mortality, with a 39%, 5 year survival rate
- Eventually, there may be need for a high level of care secondary to decline in physical and mental abilities
- These patients are at risk of death from both cerebrovascular and cardiovascular disease



# Complications

- Delusions, paranoia, hallucinations
- Aspiration pneumonia
- Depression
- Falls
- Gait instability
- Pressure ulcers
- Repeated hospitalizations
- Increased stress on caregivers
- Death



# Patient/Family Education

- It is important to counsel patient and family re:
  - Secondary prevention
    - Healthy diet
    - Exercise
    - Cognitive stimulation
    - Socialization
  - Safety while optimizing independence
    - Driving
    - Medication management
    - Cooking
  - Advance care planning
  - Financial management
  - Caregiver burden



# Summary... Vascular Dementia

- The second most common type of Dementia
- Caused by long-term diminished blood flow to the brain, causing ischemia and stroke, secondary to cerebrovascular and cardiovascular disease
- SVD is the most common cause
- Risk factors are the same as stroke risk factors
- There is no cure
- Protection from development and management of Vascular Dementia both center around optimizing risk factors of SVD and stroke



Thank you for listening...



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