

Alzheimer's (Dementia) & Other Neurodegenerative Disorders

Dementia is a clinical diagnosis of progressive global intellectual impairment with 90% correlation at autopsy; some rare forms of dementia, such as after head trauma, do not progress: Alzheimer's disease is thought to be the most common cause of dementia

ANESTHETIC CONSIDERATIONS:

- Considerations for the elderly patient
- Cognitive dysfunction and associated issues
 - Consent
 - Cooperation
- Considerations of Co-morbid disease - osteoarthritis, CVD, HTN, RA, renal disease, DM, hypothyroidism
- Impact of medications (e.g. anticholinesterases) on anesthetic
- High risk of postoperative cognitive dysfunction
 - Avoid medications which may worsen dementia/exacerbate postoperative delirium

ANESTHETIC GOALS:

- Acquire adequate history and ascertain degree of associated disease
- Avoid medications which will worsen dementia in the perioperative period

HISTORY

- From 3rd party – looking for reversible causes of delirium
- CVS: 10% of those with dementia have CAD and generalized atherosclerotic disease
- CNS:
 - MME testing memory, language, attention, judgment, etc.
 - History of falls → subdural hematoma, normal pressure hydrocephalus (dementia, incontinence, gait disturbance)
- ENDO: hypothyroidism (can mimic or exacerbate dementia)
- GI: EtOH consumption, hepatomegaly, spider angiomas, asterixis
- DRUGS: polypharmacy exacerbating delirium
 - Patients may be taking cholinesterase inhibitors such as tacrine, donepezil, rivastigmine and galantamine
 - These may prolong the effect of succinylcholine (decreased metabolism/breakdown) and cause a relative resistance to non-depolarizing NMBAs (more ACh at NMJ and non-depol NMBAs are competitive at the receptor therefore more resistant)

PHYSICAL

- **VITALS**
- **CVS** – standard exam
- **RESP** – standard exam

INVESTIGATIONS

- **Labs**
 - CBC, lytes (↓ Na, ↑ Ca), BUN, Cr, TSH, LFTs, serum B₁₂, ABG
- **Imaging**
 - ECG
 - CT / MRI head → cerebral atrophy

OPTIMIZATION

- Patient most likely cannot give consent or a history; determine if guardian or surrogate identified

ANESTHETIC OPTIONS

- Local, regional, general
 - Local or regional may be difficult without cooperation

ANESTHETIC SETUP

- **Drugs**
 - Centrally acting anticholinergics (atropine, scopolamine) and sedatives best avoided; glycopyrrolate is acceptable
- **Equipment**
 - Standard CAS

MANAGEMENT OF ANESTHESIA

- **Induction**
 - Avoid sedatives, centrally acting anticholinergics (atropine)
 - Cervical ROM may be limited by arthritis
 - Propofol may offer most rapid recovery
 - May have prolonged effect with sux and relative resistance to non-depol NMBAs
- **Maintenance**
 - No one technique or agent best
 - Use short acting drugs / narcotics
 - Sevo and Des perhaps preferable (as low solubility and rapid offset)
 - Isoflurane has been shown to cause amyloid beta protein generation and aggregation in isolated human neurons (unknown effect clinically)
 - Maintain CPP
- **Emergence**

- Extubate when awake; orientation postoperatively may be further impaired by drugs

DISPOSITION & MONITORING

- Pain management – avoid long acting narcotics, sedatives
- Poor candidates for regional anesthetics or for PCA in postoperative period

COMPLICATIONS

- Delirium – provide familiar person / family member

PATHOPHYSIOLOGY

- People within US: 4 million +
- Affects 5-8% > 65 y; 15-20% > 75 y; up to 50% >85 y
- Dementia is a clinical diagnosis of progressive global intellectual impairment with 90% correlation at autopsy; some rare forms of dementia, such as after head trauma, do not progress
- 2 types
 - Early-onset < 60yo
 - May be due to missense mutations on up to 3 genes leading to autosomal dominant inheritance
 - Late-onset > 60yo – genetic inheritance minor role
- Alzheimer's disease (degenerative disease of the cholinergic CNS) is thought most common cause of dementia; > 50% of all cases in the US are Alzheimer's or vascular (including multi-infarct dementia)
 - Pathological hallmarks of Alzheimer's include irreversible neuron loss and cortical atrophy; histology reveals increased numbers of **neurofibrillary tangles** in the cortex and presence of **amyloid-rich senile plaques**
 - Progressive cognitive impairment causing problems with **memory, apraxia, aphasia and agnosia**
- Vascular dementia (multi-infarct dementia) differs from Alzheimer's disease by its onset, clinical features and subsequent course
 - Often follows a succession of TIAs or more major stroke with vessel occlusion the most common cause, producing a variety of cognitive deficits depending on the area of ischemic damage; dementia results from the involvement of several vessels supplying the cortex and subcortical structures
- Another 10% due to alcohol abuse; multiple metabolic and other causes for the few secondary (reversible) dementias, most notably severe hypothyroidism
- Time from onset of symptoms until death 2-15 y (average 8 y)
- Dementia in young people may be due to HIV (more than 30% of all HIV cases)

ATAXIA (FRIEDRICH'S)

- **Considerations**
 - **Kyphoscoliosis** often present so **restrictive lung strategy**
 - Successful spinal and epidural reported in addition to GA
 - **Skeletal weakness** but not denervated so no exaggerated hyperkalemic response to SCh
 - Increased risk of **postoperative ventilation** due to restrictive pattern and weakness
 - **Cardiomyopathy** in 10%; awareness of cardiac depression
 - Unpredictable response to NDNM blocking drugs (PNS to monitor)
- **Features**
 - Autosomal recessive
 - Degeneration of posterior columns and corticospinal and posterior spinocerebellar tracts
 - Usual onset in childhood
 - Dysarthria, nystagmus, skeletal muscle weakness, proprioceptive sensory loss, areflexia, ataxia of limbs, Babinski's sign
 - Pes cavus and scoliosis
 - Cardiomyopathy
- **Key Points**
 - CVS – LV hypokinesia, concentric and asymmetric hypertrophy, cardiomyopathy (severities of heart and neurologic manifestations are not proportional)
 - RESP – severe scoliosis, neuromuscular impairment (non-cardiac dyspnea)
 - MSK – Pes cavus, scoliosis
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HUNTINGTON'S CHOREA

- **Considerations**
 - **Decreased plasma cholinesterases** – may have prolonged effects with Sux
 - May be **sensitive to non-depolarizing NMBAs**
 - Pulmonary **aspiration risk** due to pharyngeal muscle dysfunction
 - Dementia, psychosis, mood alterations
 - Delayed wakening reported
 - Dopamine blockers commonly used for outpatients:
 - Consider butyrophenone (droperidol, haloperidol) or phenothiazine (chlorpromazine) for pre/postoperative sedation & movement control
- **Features**
 - Degeneration of caudate, putamen and globus pallidus
 - Deficiencies of ACh and GABA in basal ganglia
 - Autosomal dominant trinucleotide (CAG) repeat disorder and appears around age 40 y
 - Late onset in 25% of patients at around 63 y
 - Choreaathetosis, progressive dementia, behavioral changes
 - Psychiatric problems (depressed mood, psychosis)
 - Death after an average of 17 years

REFERENCES

- Roizen & Fleisher – Essence of Anesthesia Practice – p14, 109, 145, Barash 6th, Coexisting 5th, Miller 7th