Neurocognitive Disorders: Workup, Differential Diagnosis and Clinical Management
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Outline

- Six Cognitive domains
- Functional Neuroanatomy
- Cognitive screening tools
- Case study: Alzheimer's disease
- Post-exam

Six Cognitive domains

1. Attention
   - Simple
   - Sustained (“vigilance”)
2. Language
   - Aphasias (Wernicke’s/Broca’s)
   - Anomias
3. Memory
   - Retrograde
   - Anterograde
Six Cognitive domains (continued)

4. Executive functioning
   - Planning
   - Sequencing
   - Organizing
   - Problem solving

5. Visuospatial
   - 2 dimensional objects
   - 3 dimensional objects

6. Orientation

Brain anatomy (overview)

Frontal lobe functions

- Executive functioning (planning, sequencing, organizing, problem solving)
- Emotional processing
- Initiation of activity, inhibition of behavior
- Reasoning (judgement)
- Processing speed
Temporal lobe functions

- Memory
  - encoding
  - retention
  - retrieval
- Understanding
- Language

Parietal lobe functions

- Visuospatial ability
- Naming
- Distinguishing left from right
- Recognizing faces/objects
- Sensory processing
- Calculations

Occipital lobe functions

- Vision
- Visual interpretation
Cognitive Domains by Lobe

- Attention
- Concentration
- Processing speed
- Executive function
- Reaction time
- Working memory
- Spatial function
- Learning
- Language

Cognitive Screening tools for NCDs

- Mini-Cog
- MMSE
- SLUMS
- MoCA
- Others

Mini-Cog
Mini-Cog

- Intended as screening, not diagnostic test
- Takes ~3 minutes to complete
- 2 components:
  - 3 item recall
  - Clock draw
- Cognitive domains tested/points assigned
  - Memory (3)
  - Executive functioning (2)
  - Attention/Orientation.Language/Visuospatial (all 0)

Mini-mental status examination (MMSE)

- Developed by Marshall Folstein in 1975
- Intended as a research tool, Copyrighted
- Takes ~5 minutes to complete
- Scored from 0-30
- Cognitive domains tested/points assigned
  - Attention (5)
  - Language/commands (11)
  - Memory (3)
  - Executive functioning (0)
  - Visuospatial (1)
  - Orientation (10)
Saint Louis University Mental Status Examination (SLUMS)

- Takes between 8-10 minutes to complete
- Intended as a clinical/research tool
- Better than MMSE for detecting milder NCDs
- Scored from 0-30
- Cognitive domains tested/points assigned
  - Attention (2)
  - Language/commands (3)
  - Memory (13)
  - Executive functioning (7)
  - Visuospatial (2)
  - Orientation (3)

Montreal Cognitive Assessment (MoCA)
MoCA (continued)

- Intended as a clinical/research tool
- Takes ~10 min to complete
- Non-copyrighted, available for free online (mocatest.org), anyone can administer
- Better than MMSE for detecting milder NCDs
- Scored from 0-30
  - 0-9: severe cognitive impairment
  - 10-17: moderate cognitive impairment
  - 18-26: mild cognitive impairment

MoCA (continued)

- Cognitive domains tested/points assigned
  - Attention (6)
  - Language/repetition (6)
  - Memory (5)
  - Executive functioning (6)
  - Visuospatial (1)
  - Orientation (6)

Cognitive screening tools

Clinical pearls

- SLUMS/MoCA, though longer than Mini-cog/MMSE, are more sensitive in identifying earlier or less common NCDs
- Cognitive tests can be used to not only screen for cognitive impairment but track changes over time
- When doubt remains as to diagnosis, patients can be referred for neuropsychological testing and/or neuroimaging for more nuanced diagnosis
Case study: Alzheimer’s Disease

Epidemiology

- Most common cause of dementia
  - ~1% affected at age 60
  - Dementia risk doubles every 5 years after 65
- Insidious onset and course
  - Onset in late 50s to mid 60s
  - Average survival 8-10 years after diagnosis
  - 7th leading cause of death

Pathology

- Plaques
- Tangles

Natural Course and Symptoms

- Normal
- Mild Cognitive Impairment
- Alzheimer’s Disease
Case study: Alzheimer's Disease

Neuroimaging

MCI → Alzheimer's (early)

Normal → Alzheimer's (late)

Case study: Alzheimer's Disease

Remember the lobe functions...

Case study: Alzheimer's Disease, Natural Course and Symptoms (continued)

- Earlier features
  - forgetfulness, word-finding difficulty
  - getting lost, difficulty manipulating objects
  - apathy, depression
  - complex tasks/IADLs (e.g. finances, medications)

- Later features
  - amnesia, language
  - agitation, wandering, incontinence
  - simple tasks/ADLs (e.g. feeding, clothing, bathing)
Conclusions

- The brain is divided into 4 lobes that govern 6 cognitive domains
- Knowledge of lobe functioning can predict range of clinical symptoms and help determine type of NCD
- Familiarity with bedside cognitive assessment tools can aid clinicians in rendering a diagnosis and monitoring course of illness