Rehabilitation of Stroke in Young Adults

Antoinne C. Able, M.D., MSCI
Vanderbilt University Medical Center
Department of Physical Medicine and Rehabilitation
Nashville, TN
• I have no disclosures
Goals

- Review etiology and statistics of stroke in young adults
- Present findings that lead to delayed diagnosis of stroke in young adult population
- Discuss stroke patient concerns for successful rehabilitation
Stroke in Young Adults

- 4% of US strokes occur in adults younger than 45 years old
- Young adult stroke occurs at twice the frequency of SCI but limited recognition as a disease in this population
- In the US, the incidence of stroke is up to 5 times higher in young urban blacks
- Strokes in young adults are particularly devastating
Stroke in Young Adults

- Overall stroke incidence declines
- Incidence increasing in younger adults
  - Improved non-invasive imaging of brain vessels, heart arteries and valves
  - Electrophysiologic testing
  - Genetic diagnostic instrument development
  - Increased rate of thrombolysis
Broad Etiologic Categories

- Atherosclerotic disease 20%
- Cardiac emboli 20%
- Arteriopathies 10%
- Coagulopathies 10%
- Peripartum CVA 5%
- Mitral valve prolapse, migraine, oral contraception 20%
- Unexplained 15%
Case Presentation

- 32 y. o. Caucasian female
- 2 weeks postpartum
- Presented to local ED with complaints of difficulty speaking
- NO other neurologic complaints
- Reported stress of oldest son’s birthday, that he’s recently started kindergarten
Case Presentation

- Remote history of postpartum depression with second son
- Mother had possible CVA at age 40
Case Presentation

• Blood pressure 141/101; Pulse 94
• Respiration 18 Temp 36.7°C
• NO facial asymmetry
• NO motor weakness
  • No pronator drift
  • No finger nose finger deficit
• Sensation intact to light touch and pinprick
Case Presentation

- Patient persists with word finding difficulty and able to sing songs - multiple songs fluently
- Blood chemistry within normal limits
- Decision point
• Patient persists with word finding difficulty and able to sing songs -multiple songs fluently
• Blood chemistry within normal limits
• Decision point
  • Patient relieved that she was not having a stroke
Psychiatry consult

- BP 118/76
- Tearful and emotionally distressed
- Highly variable fluency
  - Stuttering
  - Stringing series of inappropriate words
  - Receptive aphasia (could understand husband and not the examiner)
Discharge Diagnosis

- Acute transient word finding difficulty
- Acute conversion disorder
- Post-partum anemia – resolving
- Discharge to home
- Follow up with psychiatry
- “I got the patient a turkey sandwich”
August 27

- Returns to ED via ambulance
- Unable to perform ADL’s per husband
- Following earlier ED discharge patient continued word finding difficulty but developed transient right sided weakness in upper and lower limbs
- Now with right sided facial droop
• Alert and responded to simple questions
  • Using head nods she would not speak directly to examiner
• Extra-ocular movements were intact
  • required frequent redirection to perform
• Decreased hearing on right
• Unable to close right eye
• Protruded tongue with rightward deviation
• Unable to shrug right shoulder
Case Presentation

- Left upper limb 5/5 but very effort dependent
- Left lower limb 4+/5 in all groups
- No movement in right upper or lower limb
- Deep tendon reflexes
  - intact brachioradialis bilaterally
  - 1+ patella tendon reflexes bilaterally
Case Presentation

- Psychiatry now believes findings not consistent with conversion disorder
- Concerned also about blood loss anemia following pregnancy with transfusion
- Family history of CVA in mother at young age
- Agree with Neurology evaluation
- After medical clearance consider ability of patient to perform ADL’s and care for two toddlers and 2-week old infant
Moved right arm voluntarily with IV placement
Marked facial asymmetry
Discussion with psychiatry who suggest concern for facial droop
Stroke involving cranial nerves would be extremely large and leave her obtunded
Case Presentation

- CT deferred as etiology believed to be non organic in nature
- Versed did not improved symptoms
  - Also received Ativan for catatonia
- Admitted in stable condition with concern for conversion disorder
- Neurology consultation ordered
August 28

- Neurology consult recommended to obtain brain MRI to discern between CVA and conversion disorder
MRI Results

Large area of acute to subacute ischemia in the distribution of the left MCA and PCA. Affected regions include left occipital lobe, inferomedial temporal lobe, posterior thalamus, posterior frontal lobe and posterior subinsular cortex and insular cortex.
• **Neurosurgery consult**
  • Left hemicraniectomy and duroplasty
Misdiagnosis of Stroke in Young Adults

- N = 57
- Aged 16 – 50
- 8 (14%) misdiagnosed
- < 35 years old ($p = .05$)
- Posterior circulation ($p = .006$)
- Vertebrobasilar territory ischemia had greater rate of misdiagnosis
- Initial evaluation at non-certified stroke center
  - Kuruvilla, 2011
• Overdiagnosis (attributing non stroke condition to stroke)
  • 13% found to have another condition
    • acute confusional state
    • Syncope
    • Seizure
    • Neoplasms
    • Toxins
    • Subdural hematoma
<table>
<thead>
<tr>
<th>Presentation</th>
<th>Discharge Diagnosis</th>
<th>Subsequent Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left sided numbness</td>
<td>Alcohol intoxication</td>
<td>R posterior cerebral infarction</td>
</tr>
<tr>
<td>Acute nausea and vomiting</td>
<td>Inner ear disorder</td>
<td>Left PICA infarction</td>
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<tr>
<td>Acute blurred vision and ataxia, dysarthria</td>
<td>Benign positional vertigo</td>
<td>Left basal pontine infarction</td>
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<tr>
<td>Sudden vertigo, pain headache nausea</td>
<td>Labyrinthitis</td>
<td>right PICA</td>
</tr>
<tr>
<td>Severe acute right frontal headache dysarthria facial droop, clumsiness</td>
<td>Peripheral vertigo</td>
<td>R cerebellar infarction; bilateral vertebral artery dissection</td>
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<tr>
<td>Acute left eye pain</td>
<td>Migraine</td>
<td>Left frontoparietal subcortical infarction</td>
</tr>
<tr>
<td>Seeing spots; worst headache ever; neck pain dizziness</td>
<td>Excluded SAH with CT and lumbar puncture</td>
<td>Right cerebellar infarction; right vertebral artery dissection</td>
</tr>
<tr>
<td>Altered sensorium</td>
<td>New onset of seizure with prolonged postictal state</td>
<td>Left MCA infaction With left ICA dissection</td>
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ED Physicians vs Neurologists

- Neurologic discharges
  - False positive 37%
  - False negative 36.6%

- 4% of 9472 patients with dizziness found to have CVA
• Posterior circulation more likely misdiagnosed
• Often diagnosed with peripheral vertigo
• Dizziness third most common symptom in medical (primary care) clinics
• Challenge for ED physician
• Overreliance on qualitative nature of symptoms
Results of Misdiagnosis

- Increased overall mortality 40% (especially in cerebellar/brainstem infarctions)
- Disabling deficits 50%
Incidences of Stroke in Young Adults

- 3.4 to 11.3 / 100,000 per year
- Up to 22.8 / 100,000 per year in black population
Incidence of Stroke in Young Adults

- 2.4 /100,000 aged 20-24 years
- 4.5 / 100,000 aged 30-34 years
- 32.9 / 100,000 aged 45-49 years
- Aged 20-30
  - More common in women
- > 35 years
  - More common in men
Risk factors for Ischemic Stroke in Young Adults

- Smoking
- Migraine with aura
- Pregnancy / puerperium
- Oral contraceptive
- Illicit Drugs
  - Ferro, 2010
Differential Diagnosis

- Multiple sclerosis
- Somatoform disorders
- Migraine with prolonged aura
- Post-ictal focal deficits
- Neoplasms
- Encephalitis (less often)
CVA Etiology in Young Adults

- Arterial dissection
- Vasculopathy
- cardiogenic source (PFO)
Specific Diseases associated with Ischemic CVA in Young Adults

- Arterial dissection
- Patent foramen ovale
- Infections
- Vasculitis
- Connective tissue disorders
- Non inflammatory arteriopathies (rare)
- Hematological disorders
- Monogenic diseases (Rare)
- Cryptogenic stroke
• Survival rate
  • 42% - 97.1%

• Mortatility in black population
  • 38%
Predictors of poor outcome

- Limited studies available
- Cardiac origin (mitral stenosis, rheumatic heart disease)
- Alcohol intake (excessive)
  - Tiamkao, 2011
Predictors of Unfavorable Outcome

• National Institutes of Health Stroke Scale Score
• Anterior Circulation Stroke
• Diabetes mellitus
• Limited studies on causes of stroke and outcome
Stroke in young Adults

- 4.9% of stroke patients 18-44 y.o.
  - 4.2% ischemic
  - 19.1% SAH
  - 6.9% ICH
- 4.7 – 11.6 days average length of stay
- Most were routinely discharged to home
  - Ellis, 2011
Rehabilitation of Stroke Patients

- Multidisciplinary Team approach
- High patient and family motivation
- Goals determined by patient needs/environment
- Begin as soon as possible
Rehabilitation of Stroke Patients

- Organized In-patient Rehabilitation Unit
- Early Supported discharge skill teams
- Therapy based rehabilitation in the home
- Therapy in long term care facilities
- Outpatient therapy facilities
Rehabilitation of Stroke Patients

- Traditional
  - Motor impairment
  - Communication /cognitive deficits

- Novel Therapies
  - Stem cell therapy
  - Transcranial magnetic stimulation
  - Transcranial direct stimulation
  - Motor imagery
  - Virtual reality
  - Novel robotic exercises
  - Drug augmentation
Unmet Needs of Young Stroke

• Information about their stroke
• Financial assistance
• Assistance with Non-care activities
• Help with maintaining intellectual fulfillment
• Personalize stroke information to specific situation
  • Low, 2003
Patient Centered Needs

- Shock
- Fear of recurrence
- Attitude to life/Coping
- Reclaiming normality/Return to work
- Sense of Difference
- Tiredness
- Cognitive effects
- Social difference /Relationships
  - Lawrence, 2012
Patterns of Relationships

• Negative outcome among CVA caregivers are common early and may persist for years

• Lower preparedness for caregiving correlated with depression and stress

• Clinicians should build on caregivers’ strength while identifying threats to adaptations to promote healthy outcome

• Race, health, age and relationship to survivor are significantly related to outcome

  • King, 2010
Partners of Young Stroke Survivors

- Changed lives
  - Domestic tasks
  - Relationships with survivor
  - Family roles
  - Employment
  - Social life

- Coping
  - Problem focused
  - Social comparison
  - Social support
    - Buschenfeld, 2009
Rehabilitation Experiences of Young Stroke Patients

• Frustrated
  • Fatigue
  • Demands of family life after stroke
  • Economic responsibility

• Outside and invisible
  • Lacked information
  • Age-adapted interventions
  • Distant feeling from other patients

• Participants sympathetic to rehabilitation healthcare providers
  • Roding, 2003
In Summary

- Stroke incidence decreasing overall
- Stroke incidence significantly increased in those age 20-54 (Kisssela, 2012)
- Increased incidence in younger population worrisome
- Substantial productive life year lost
- Immense health care expense over time
In Summary

• Misdiagnosis of CVA in young adults occurs in up to 14%.
• Delay in diagnosis result in:
  • Preclusion of administration of thrombolytic therapy
  • Mortality related to hydrocephalus
  • Disabling deficits in nearly 50% of survivors
Conclusions

- In the spectrum of care of the young adult stroke patient attention given towards making correct diagnosis at the onset results in neurologic preservation.
- Throughout the continuum of care clinicians may develop skills to be more attentive to needs of young adult CVA survivors and their care providers to foster successful return to community.