Stroke in Special Populations

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Disclosures

• The authors of this presentation have no disclosures
Objectives

- Verbalize the Etiologies of Stroke in Women
- Identify Stroke Risk Factors Specific to Women
- Verbalize the Etiologies of Stroke in Children
- Identify Stroke Risk Factors Specific to Children

Overview of Women & Stroke

- Stroke in the population
  - Prevalence- all cases
  - Incidence- new cases
  - Mortality trends
- Stroke subtypes
  - Risk factors
  - Special circumstances for women
- Stroke treatment
  - Special indications
  - Acute stroke therapy
Women & Stroke Prevalence

6.8 Million Americans - **56% women** - have had a Stroke
~ 13 Million have had a Silent Stroke

- Highest prevalence
- African-American
- Lower income, education
- Southeastern “stroke belt”
- Oldest ages - projected to increase 20% by 2030

**More younger women** than men

- Pregnancy, oral contraceptives

**Lifetime risk 1 in 5 women, 1 in 6 men**

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Women & Stroke Incidence

795,000 strokes each year - 77% first events, 23% recurrent strokes

*Every 40 seconds someone in the US has a stroke*

Decline in stroke incidence over the past 50 years

- Lifetime risk at age 65 reduced from ~18% to 15%

**Rates of stroke are increasing for men and women <55 yr**

**Race confers a major risk for men and women**
Women & Stroke Subtypes

Over age 50, women have twice the risk of SAH
Eur Neurol 2001;45:199-205, Stroke 2003; 34: 1581

Women and Stroke Mortality

1 in 7 die of heart disease or stroke
Women represent 60% of stroke deaths
1 in 30 die of breast cancer

2015 Women and CVD Fact Sheet
Women & Stroke Risk Factors

- Vascular risk factors are as common in women as in men
  - Some are **more common** in women
    - Hypertension
    - Hyperlipidemia
    - Diabetes
    - Obesity

- Vascular risk factors impact stroke for both genders
  - Some studies confer a **higher risk** in women
    - Atrial Fibrillation
    - Diabetes
  - Some studies confer a **lower risk** in women
    - Carotid Stenosis

**Hypertension**: Most important risk factor for stroke
- Highly prevalent
- Impact on both Ischemic and Hemorrhagic stroke

**Hyperlipidemia**
- Over age 50 yrs, half of women have elevated cholesterol, which is more than men
- HDL levels decline with age, smoking, obesity, sedentary lifestyle

*Stroke 2014;45:1545-1588*
Women & Stroke Risk Factors

Diabetes:
• Over age 45 yrs, twice as many women develop DM as men
• Highest in Native American, Blacks
• Gestation DM persists in 10% and increases DM risk later in life
• 1/3 of cases are not diagnosed

Obesity:
• Linked to Diabetes and doubles the stroke risk for women
• Risk of Ischemic Stroke is increasing among women aged 35-54 yrs
• Almost 3-fold increase over 10 years despite increased use of medical therapies to reduce risk

Atrial Fibrillation
• Women had a 4.6x increased risk of developing Afib
• Telemetry in Acute Ischemic Stroke
  • 5-18% exhibit Atrial fibrillation within the first few days
    - half within the first 48 hours
  • 50-70% of those with known PAF are in sinus rhythm at the time of their stroke
• Prolonged Cardiac Monitoring
  • additional 4-29% exhibit AF with prolonged cardiac monitoring
  • 40-80% of PAF episodes are asymptomatic

Women & Stroke Risk Factors

Oral Contraceptives

- 10.7 US million women aged 15-44 years use the pill
- Relative risk with low dose OC’s small 1.4-2.0x that of non OC users
- Incidence rises steeply in women aged 45-49
- May be harmful in women who have additional risk factors:
  - Cigarette smoking
  - Prior thromboembolic events
  - Avoid birth control pills with HTN to reduce the risk of stroke

Pregnant Women & Stroke

- Uncommon
- Stroke risk is highest in 3rd trimester and postpartum
  - (34/100,000 deliveries) vs (21/100,000) in young women
- Physiological Changes of Pregnancy:
  - Venous stasis
  - Edema
  - Hypercoagulability

Stroke 2014;45:1545-1588
Pregnant Women & Stroke

• Hypertension in pregnancy
  • Leading cause of both hemorrhagic and ischemic strokes
  • Chronic HTN - low-dose aspirin and calcium supplements reduce the risk of preeclampsia
  • Gestational HTN - Treatment if BP > 160/100 mmHg with consideration of maternal and fetal side effects
    • Contraindicated: Atenolol, Angiotensin receptor blockers and direct renin inhibitors

Pre-eclampsia

• Severe HTN, local thrombosis, endothelial dysfunction, vasospasm, platelet activation
• Risk Factors:
  • Black women
  • Pre-existing HTN
  • DM
  • Obesity
  • Multiple births
• Can occur with moderate HTN
• Warrants close monitoring to reduce the risk of ICH, seizures, pulmonary edema, renal failure, coagulopathy
• Eclampsia - Seizure occurs
  • Most frequent cause of ICH in pregnancy
  • A history of preeclampsia is a risk factor for future stroke
Menopausal Women & Stroke

Menopause
- Before age 42 – increased risk of stroke
- Clinical trials - No consistent findings
- Hormonal Replacement Therapy (HT)
  - Increased risk found with tested forms
  - Insufficient data to assess the risk of long term HT in women <50 years of age
  - Should not be used for primary or secondary prevention of stroke

Women and Stroke Treatment

No Difference is Acute Treatments
- IV TPA
- Endovascular Therapy

<table>
<thead>
<tr>
<th>Trials</th>
<th>Time to reflow, (%)</th>
<th>mRS ≤ 2 at 90 days (%)</th>
<th>Mortality at 90 days (%)</th>
<th>ICH (%)</th>
<th>NNT to be independent</th>
</tr>
</thead>
<tbody>
<tr>
<td>MR CLEAN &lt; 6h (233/267)</td>
<td>332 min, 75%</td>
<td>33 vs 19</td>
<td>19 vs 18</td>
<td>8 vs 6</td>
<td>7</td>
</tr>
<tr>
<td>ESCAPE &lt; 12h (165/150)</td>
<td>241 min, 73%</td>
<td>53 vs 29</td>
<td>10 vs 19</td>
<td>4 vs 3</td>
<td>4</td>
</tr>
<tr>
<td>EXTEND-IA &lt; 6h (35/35)</td>
<td>248 min, 86%</td>
<td>71 vs 40</td>
<td>9 vs 20</td>
<td>0 vs 6</td>
<td>3.2</td>
</tr>
<tr>
<td>Swift Prime &lt;6h (98/97)</td>
<td>252 min, 88%</td>
<td>60 vs 36</td>
<td>9 vs 12</td>
<td>5 vs 7</td>
<td>4</td>
</tr>
</tbody>
</table>
Women and Stroke Treatment

• Present later to the Emergency Department
  • Less likely to be in the window for IV tPA
• Older at presentation; those > 75 yrs have
  • Poorer pre-morbid functional status
  • Multiple co-morbidities
  • Less social support
• More severe strokes, more likely due to Atrial fibrillation
  • Worse functional outcome at hospital discharge
  • Worse functional outcome at 5 yrs

IV tPA Treatment in Pregnant Women

• Case by case basis
• No clinical trials
• Does not cross the placenta
• Risks:
  • Maternal hemorrhage
  • Placental hemorrhage
  • Premature delivery
Women and Stroke Treatment

Carotid Stenosis
• Differences in anatomy and plaque composition from men
• However recommendation for prevention of stroke for women with carotid disease (symptomatic and asymptomatic) remains same as for men
• Need further clinical trials

Low-Dose Aspirin for Primary Prevention
• Ischemic stroke significantly reduced by 24%
• Recommended if ≥ 65 yrs, if blood pressure controlled and low risk of GI hemorrhage
• May be reasonable for women <65 yrs

Women and Stroke Treatment

Anticoagulation for A- Fib
• Screening
  • Educate on taking pulse, followed with EKG
• Risk stratification
  • CHA₂DS₂VASc or other scale that take gender into account
• Treatment
  • For CHA₂DS₂VASc = 1, antiplatelet therapy is reasonable
  • For CHA₂DS₂VASc ≥ 2, anticoagulation is recommended

Stroke 2014;45:1545-1588
Nursing Implications

• Refocus the Message to Health and Wellness
   .....not Disease Management and Illness

Healthy Behaviors
• Healthy diet
• Physical Exercise
• Non-smoking
• Avoidance of drugs and moderation in alcohol

Health Factors
• Regular medical care
• Awareness of risk factors
• Management of risk factors
• Medications are to help you reach your health goals.

What are your goals to stay healthy?
How can I help you achieve your health goals?
   Ideal goals are small, simple, realistic and achievable.

Childhood Stroke

• Background
  • 2000 – Workshop of pediatric experts to identify challenges
    • Relatively rare – multi institution collaboration & clinical trials
    • Lack of knowledge – delay diagnosis
    • Numerous Etiologies
    • No specific guidelines for evaluation or treatment
Childhood Stroke

• International Pediatric Stroke Study Group (IPSS)
  • Founded January 2003
  • 11 co-investigators (Canada, US, UK)
  • Objective – provide data via clinical trials for stroke 0-18 years of age
  • Voluntary, Funded by NIH grants and Child Neurology Society Fund
  • Multi-center, multi-national cohort
    • Initially observational
    • Vehicle for research funded studies – central database
Childhood Stroke

• 4967 patients enrolled as of February 2016
• 215 centers in 54 countries
• Publications
  • 22 IPSS papers
  • 14 abstracts
  • 12 proposals in progress
• 5 active funded grants

Childhood Stroke

• Inter-rater Reliability of Pediatric NIH Stroke Scale (Ped NIHSS)
  • Multicenter study (2007-2009)
  • Validation of a reliable acute clinical stroke scale
• Classification and Diagnostic Evaluation - CASCADE Study (2012)
  • Development of comprehensive consensus based classification system for childhood arterial ischemic stroke
• Pediatric Stroke Outcome Measure – PSOM (2012)
  • Objective, disease specific outcome measure containing 115 items
  • Uniform way to evaluate response to treatment
Childhood Stroke

- NIH Funded Studies
  - Vascular Effects of Infection in Pediatric Stroke (VIPS 2010-2014)
  - Biomarkers of Hypercoagulability in Childhood Stroke (BICS)
  - Thrombolysis in Pediatric Stroke (TIPS 2010-2013)
    - First prospective treatment trial in acute pediatric stroke – determine safety, base dose and feasibility of treatment with IVtPA
    - Negative study, but did lead to support for the need of pediatric stroke centers
Childhood Stroke Background

• Incidence: more common than pediatric brain tumors
  • 4000-5000 children a year suffer stroke in US
  • Perinatal stroke occurs in about 1:4000 term live births
  • Ischemic stroke vs. Hemorrhagic stroke
  • Male > Female
  • Black > White

• Mortality: Among top 10 causes of death in children
  • > 50% of survivors suffer some neurological or cognitive impairment
  • 5-year recurrence risk 20%

Childhood Stroke

International Paediatric, Stroke Study

Age at Time Of Stroke for AIS
N = 1856

Mean age of childhood presentation of AIS is ~4-6 years
Childhood Stroke

• Mechanisms underlying pediatric stroke – critical to develop treatments
  • > 30% Arteriopathy has emerged as predominant underlying mechanism
    • Greatest predictor of recurrence
  • 14.8% - cryptogenic
  • 29.7% - cardiac
    • Congenital vs. Acquired Heart Disease
    • Associated with Intervention

Predictors of Arteriopathies:
- Early school age (5-9 years)
- Recent upper respiratory infection
- Sickle cell disease
Childhood Stroke

- Transient or Focal Cerebral Arteriopathy
  - Most common
  - Unilateral intracranial arteriopathy associated with basal ganglia stroke
  - Junction of distal ICA and proximal MCA & ACA.

Childhood Stroke

- VIPS Study
  - International case control study, prospectively enrolled 355 confirmed cases of AIS (Age 29 days – 18 years) and 354 stroke-free controls
  - Infection in the week prior to stroke reported in 18% of cases vs 3% controls
    - 6.3 fold increase in stroke risk (p<0.0001)
    - URI most common
    - Under vaccination (p < 0.0004)
  - Prevalence similar across subtypes: arteriopathic, cardioembolic, and idiopathic

*Is serologic evidence of acute herpes virus associated with an increased risk of acute ischemic stroke in children?*
Childhood Stroke

• Acute herpes virus infection was more common in stroke cases (31%) than controls (18%)
• HSV1 and VZV were significantly more likely to be present in acute cases
• No difference in stroke subtype
• High recurrence rate in spite of antithrombotic therapy, highest in first few weeks – 3 months

Childhood Stroke

• Dedicated Pediatric Stroke Centers
  • Right treatment, right person, right time
  • Comprehensive standardized stroke care path
  • Starts with education and recognition with rapid triage
  • Appropriate neuroimaging
    • Angiogram vs CTA
  • Access to expertise

*No randomized control trials for acute treatment*
Clinical Presentation - Neonatal

- Focal seizure in a well infant > 12 hours of life
- Neonatal encephalopathy
- Irritability, poor feeding
- Diffuse neurological signs
  - Focal neurological deficits = uncommon
- Late presentation
  - Motor asymmetry
  - Early hand preference (abnormal before age 12-18 months)

Clinical Presentation - Child

- Weakness or numbness on one side of the body
- Confusion, difficulty speaking or understanding
- Change in vision, double vision
- Difficulty walking, unsteadiness (gait ataxia)
- Acute onset severe vertigo, without associated illness/fever
- Seizures
- Worst headache of life
**Documentation**

- What did child look like on presentation?
- How did that change during first minutes to hours?
- When was patient last seen normal?

**Assess Cognition, Child > 5 yo**

- Assess orientation (person place time)
- Memory
  - Short term: What did you have for breakfast?
  - Long term: What is your teacher’s name?
- Speech
  - Fragmented, no verbal continuity, slurred
  - Expressive vs. Receptive aphasia
- Perception / Ataxia (finger – nose)
- Four Part Command
Level of Consciousness

• What is the patient’s activity when you enter room?
• What stimulus was required to waken the patient?
• How does the patient respond?
  • Chatty, slow to answer, incomplete response, no response
  • What is patient’s response in absence of stimulation?

Pearls of Wisdom

• LOC most important part of neuro exam
• To stimulate someone, get them upright
• Describe the LOC, what behavior the patient exhibits
• **ASK FAMILY**: Is the patient behaving like him/herself?
• Instructions PEDS NIHSS