Stroke Impact to Learning in the Child/Adolescent Stroke Patient

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November 11, 2016
Presentation Objectives

1. Identify potential areas of cognitive change in children and adolescents post stroke.
2. Learn of brain development factors impacting recovery and cognitive functioning.
3. Learn strategies for enhancing return to school and socialization for children and adolescents post stroke.
Disclosure

I have no actual or potential conflict of interest in relation to this program/presentation.
Incidence

- 1:2300-5000 perinatal ischemic
- 1:6000 including delayed presentation and hemorrhagic stroke (Murias et al)
- 1:4000 live births
- 11:100,000 birth to age 18 (NSA)
- 12: 100,000 newborns
- 12:100, 00 in children (ASA)
Risk Factors

ASA & NSA Website

- Congenital heart defects
- Sickle-cell disease
- Immune disorders
- Diseases of the arteries
- Abnormal blood clotting
- Head or neck trauma
- Maternal history of infertility
- Maternal infection in the fluid surrounding an unborn baby
- Premature rupture of membrane during pregnancy
- Pregnancy related high blood pressure in the mother
Risk Factors
ASA & NSA Website

• Abnormalities of the arteries in the brain;
• Chickenpox and other infections;
• Anemia caused by a diet that is deficient in iron;
• Sickle cell disease;
• Certain types of congenital heart disease, such as valve abnormalities;
• Autoimmune disorders, such as lupus or type 1 diabetes;
• Problems with blood clotting; and
• Excessive consumption of energy drinks containing high levels of caffeine.
Perinatal Stroke
Murias et al

- 60% - Cerebral Palsy (mostly spastic hemiplegia)
- 30%-60% - Epilepsy
- 25% - Language Delay
- 22%-Behavioral (Attention, hyperactivity, behavior problems)
- Left MCA CVA more common
- While there are risk factors, idiopathic etiology is common
Neonatal Stroke
Muriyas et al

- Neonatal hemorrhagic stroke has higher mortality rates
- Motor deficits: 8-38%
- Language or cognitive concerns: 16-44%
- Poor outcome seen more often with intraparenchymal lesions and particularly with large lesion or involving multiple compartments
Delayed Presentation
Muriás et al

• Delayed Presentation
  – Asymptomatic in the neonatal period
  – Presentation in late infancy or toddlerhood with
    • Delayed motor milestones
    • Early hand preference
    • Symptomatic epilepsy
Neuroplasticity
Murias et al

In adults, recovery related to:
• diaschisis and reversal,
• functional adaptation by augmentation of complementary undamaged skills
• neuroanatomical recovery
Neuroplasticity
Murias et al

• Potential regeneration can vary depending on stages of brain development intersecting with multiple processes of brain maturation such as neuronal maturation, myelination, synaptogenesis, and normal neuronal pruning
• Developmental processes change also related to brain location and function
• Neurological networks impacted by the timing of injury relative to stage of development-missed opportunity for optimum development
Age and Impact

• Murias et all review: Better outcome for stroke at age 5-10 versus 0-5 and 11-18
• However, research review shows variability possibly related to methodological differences
• Allman and Scott study of unilateral ischemic CVA, ages 1-6 performed better than <age 1 and 6-16
Impact

• Murias et al:
  – Good recovery of simple language, visual and sensory-motor skills
  – Impact on more complex skills

• General consensus:
  – Language skills more intact
  – IQ tends to be normal but not as strong as age matched controls
Impact
Murihas et al

• While Left CVA in adults typically impacts language, in perinatal CVA, studies suggest atypical localization of language into other brain regions
• Lower visual spatial test performance related to motor skill delays and impairment
• Executive Functions
  – Attention more impacted
  – Cognitive flexibility and information processing—bilateral versus unilateral lesion
Impact
Muriyas et al

• Language skills may evidence delays early but tend to catch up by school age

• Studies suggest decline in IQ over time for some increasing deficits, possible causes:
  – Specific developmental functions cannot be assessed earlier than it would normally appear leading to emerging areas of difficulty
  – Cumulative impact of seizures, interfering with ongoing learning
Impact

• Everts et al:
  – Attention
  – Anxiety
  – Learning problems
  – Impulsivity
  – Processing speed
Outcomes Predictors

- Murias et al review:
  - Correlation with cognitive functions and symptomatic epilepsy
  - Greatest risk with ongoing seizures and abnormal EEG
  - Cortical lesion has more impact on IQ than restricted to subcortical lesion
  - Greater risk if cortical and subcortical lesion
Outcome Predictors

• Allman & Scott:
  – Kids with persistent neurological deficits evidenced poorer neuropsychological findings

• Everts et al:
  – Motor and cognitive sequela more sever in early childhood CVA versus mid to late CVA
  – Processing Speed impairment related to size of lesion
Quality of Life

• Muria et al:
  – Children report better quality of life than adults with CVA
  – Parental rating of QOL of their child related to cognitive functions
  – Kids with CVA reported concerns of autonomy, relationship with parents and social acceptance.
  – Parents reported concerns with mood and social supports
Planning for the Future

• Initiating therapy upon diagnosis of neurological effects and developmental delay
  – Missouri Department of Elementary and Secondary Education (dese.mo.gov)
  – First Steps and ECSE Comparison Chart
<table>
<thead>
<tr>
<th>Components</th>
<th>First Steps</th>
<th>Early Childhood Special Education</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ages Served</td>
<td>Birth to Age 3</td>
<td>3 to 5 year olds</td>
</tr>
<tr>
<td>Program Goals</td>
<td>Support the family to meet the developmental needs of their child with a delay or disability as identified in the Individualized Family Service Plan (IFSP).</td>
<td>Support the child with a disability to meet his/her educational goals as identified in the Individualized Education Plan (IEP).</td>
</tr>
<tr>
<td>Eligibility</td>
<td>Infants and toddlers who have a newborn condition, diagnosed medical condition or a developmental delay.</td>
<td>Preschool-age children who have a disability that meets one of 13 categorical disabilities (see Missouri State Plan for Special Education).</td>
</tr>
<tr>
<td>Services</td>
<td>Services are provided to support the family’s ability to meet their child’s developmental needs.</td>
<td>Services are specially designed instruction to support the child’s educational needs.</td>
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<tr>
<td>Location</td>
<td>Services are provided in natural environments, such as a child’s home or other places in the community.</td>
<td>Services are provided in the “least restrictive environment” or alongside children who are not disabled. Removal of the child from the regular education environment occurs only when the nature and severity of the disability is such that education in regular classes with the use of supplementary aids and services cannot be achieved satisfactorily.</td>
</tr>
<tr>
<td>Plans</td>
<td>An IFSP is developed by the team, including the parents, and includes outcomes based on the family’s concerns and priorities. The plan is reviewed every six months.</td>
<td>An IEP is developed by the team, including the parents, and includes the child’s educational goals, services and placement, including how progress will be measured. The plan is reviewed at least once per school year.</td>
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<tr>
<td>Cost</td>
<td>Parents may pay a monthly family cost participation fee.</td>
<td>Services listed in the IEP are the responsibility of the school district and are provided at no cost to the parent.</td>
</tr>
</tbody>
</table>

Parents may pay a monthly family cost participation fee.

Services listed in the IEP are the responsibility of the school district and are provided at no cost to the parent.
Related services are such developmental, corrective and other supportive services as required to assist the child to benefit from special education and include:

- Audiology
- Counseling services
- Early identification and assessment of disabilities in children
- Medical services (for evaluation purposes)
- Occupational therapy
- Orientation and mobility services
- Parent counseling and training

- Physical therapy
- Psychological services
- Recreation
- Rehabilitation counseling services
- School health services
- Social work services
- Speech-language pathology
- Transportation
Planning for the Future

• Continued review, revision and refinement of IEP to meet the needs of the child regarding:
  • Brain growth and maturation
  • Changing physical abilities, medical issues (seizures)
  • Increasing demands of school
  • Emotional and social development
  • Cognitive development
Planning for the Future

• Consultation and care by rehabilitation specialists and services
  – Physiatry
  – Neurology
  – Medical Rehabilitation Services (OT, PT, SLP)
  – Urology
  – Orthopedics
  – Assistive Technology
  – Vision
  – Neuropsychology/Rehabilitation Psychology
Planning for the Future

• External and school based rehabilitation services
• Social integration
  – Adaptive sports
  – Community based groups (4H, BS, GS, etc)
  – Summer Camps
  – Integration in community activities
  – Social skills development groups
• Psychological Adjustment
  – Developing friends of all ability levels
  – School counselor support
  – Being a part of writing and telling your story
  – Learning to be a self advocate
  – Individual and/or family counseling
Planning for the Future
For Adult Services

- State Vocational Rehabilitation Program Services
- College student services
- State based waivers and support services for independent living
- Long term supports-Special needs planning
Return to School Considerations

• Sensory motor- spastic hemiplegia
  – Left CVA- right hand effects- most individuals will/would be right hand dominant
  – Accessibility in school (Classrooms, halls, lockers, desks, playground/gym, lunch room, labs)
  – Manipulation of school materials (writing, typing, carrying books, cutting, pasting)
  – Self care: toileting and dressing; handling food items
  – Ambulation effects including speed (getting from point A to point B in time allowed in busy hall)
Return To School Considerations

• Occupational Therapy
  – Pencil use
  – Assistive technology
  – Manipulation of school based materials
  – Address field of vision in manipulating school work

• Assistance in self care may be needed
  – Paraprofessional, nursing

• Physical Therapy
  – Playground modifications and help
  – PE modifications
  – Modify space to ambulate- distance between classes, locker
Return to School Considerations
Cognitive Effects

• Attention
  – Preferential Seating
  – Decrease external distractions around student
  – Decrease items on page
  – Break longer tasks into shorter tasks
  – Provide cues to stay on/return to task
Return to School Considerations
Cognitive Effects

• Processing Speed
  – Allow extended time for tasks
    • Avoid speed tasks like “2 minute math”
    • Reduce items required if a timed test
    • Extended time for tests including standardized tests
  – Help student estimate and monitor time to complete tasks
  – Decrease homework as the child needs more time at home for life tasks
Return to School Considerations
Cognitive Effects

• Visual Spatial
  – Focus on establishing organizational skills
    • Planner calendar
    • Established place for school items, materials at home
    • Labeling placement of items
    • Outline for essays
  – Reduce visual clutter
  – May need assistance with organization tasks involving sequencing and assembly
Return to School Considerations
Cognitive Effects

- Executive functions:
  - Help with analysis tasks: book reports
  - Better with multiple choice, matching versus long essay
  - Break tasks into smaller steps and define steps and processes
  - Use outlines or mind maps to organize thoughts
References


References