Birth Onset of Brain Injury/Cerebral Palsy
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About Cerebral Palsy

- Emphasis as a motor impairment syndrome differentiates from other conditions resulting from anomalies of brain development and function (e.g., mental retardations, autism).
- Cognitive deficits including mental retardation often co-exist with CP

Types of Cerebral Palsy

- Spastic CP accounts for 70%-80% of cases
- Spastic Diplegia 25%-35%
- Spastic Hemiplegia 35%-40% with spastic CP
- Spastic Quadriplegia 40%-45% with spastic CP
- Dyskinetic CP
- Ataxic CP >5%
Causes of Cerebral Palsy

- Adverse conditions at time of birth
- Oxygen deprivation
- Birth asphyxia
- Prenatal factors (Nelson & Ellenberg, 1985, 1986)

Other Risk Factors

- Group B Streptococcus or Other Bacteria
- Traumatic Brain Injury (TBI)
- Meningitis
- Encephalitis
- Motor Vehicle Accident or Shaken Impact Syndrome

Risk Factors for Full Term Infants

- Intra-uterine growth retardation
- Non-CNS malformations
  (Kuban & Leviton, 1994)
- Meconium aspiration syndrome
Risk Factors for Full Term Infants

- Persistent pulmonary hypertension of newborn with severe hypoxia
- Multiple births (Petterson, Nelson, Watson, & Stanley, 1993; Petterson, Stanley, & Henderson, 1990)

Early Intervention Overview

- Specialized programs
- Examinations by ophthalmologist and audiologist
- Psychological testing before starting school
- Individualized education programs
- Special education programs

Evolution of the Team Process

- The Individuals with Disabilities Education Act (IDEA) [PL101-476]
  - Further expanded mandated education services to include infants and toddlers
  - Amended in 1991 [PL 102-119] and 1997 [PL 105-17] and now guarantees delivery of comprehensive coordinated services for all individuals with disabilities from birth to 21 years of age
Case Manager

• Better acquainted than most physicians with various agencies and services available in a particular community
• Provides opportunities for and removes obstacles to ongoing care
• Integral member of an interdisciplinary team

Vision Problems

• Approximately 40% have abnormality of vision or oculomotor control
• At least 7% have a severe visual deficit

(Evans, Elliot, Alberman, & Evans, 1985)

Vision Problems

• Myopia
• Amblyopia
• Visual field defects
• Cortical blindness
Vision Problems

- Children born prematurely may sustain visual loss
  - Blindness as a consequence of retinopathy of prematurity, caused by oxygen-related damage to vulnerable blood vessels in immature retina (Avery, 1991)

Vision Problems

- Oculomotor disturbances (e.g., strabismus) are also common and may lead to development of amblyopia (Menacker, 1993)

Hearing Problems

- Estimates range from 3% to 10%
- True incidence is probably 20%-25%
- Children born prematurely are at a higher risk
Somatosensory Problems

- Somatosensory deficits (e.g., abnormalities of proprioception, awareness of position of limbs in space) (Molnar, 1992)

Cognitive Problems

- Memory, language processing, problem solving, and attention
- Mental retardation or learning disability in approximately 50-75% of these children

Medical and Surgical Problems

- Increased incidence of:
  - Seizure disorders - in as many as 46% (Murphy et al., 1993)
  - Muscular contractures, hip dislocation, and scoliosis
  - Respiratory, gastrointestinal, and urinary tract dysfunction
Feeding Difficulties

- Poor Nutrition
  - More frequent with severe motor impairment
  - Related to inadequate calorie intake
  - Behavioral, neuromuscular, physiological, and environmental factors contribute

Obstacles to Adequate Nutrition

- Communication difficulties
- Impairments of cognition and fine motor function
  - May limit self-feeding
  - Limit ability to obtain food independently
  - Oral motor dysfunction or dysphagia
  - Affects 50% of all children with CP

Medical Issues Affecting Feeding

- Gastroesophageal reflux (GER)
- Increased intra-abdominal pressure
- Constipation
- Prolonged supine positioning
- Less frequent swallowing
- Delayed gastric emptying
### Assessments

- **GER Assessments**
  - Upper GI series
  - Radionuclide study
  - pH probe and gastroesophageal-duodenoscopy (i.e., endoscopy)

### Complications of Oral-Motor Dysfunctions

- Drooling
  - Skin breakdown around the mouth
  - In extreme cases causes dehydration
  - Social stigma
- Dysarthria
  - Problems with speech production and articulation
- Dysphagia
  - Aspiration

### Assessments

- **Oral-Motor Dysfunctions**
  - Consultation with a speech-language pathologist or feeding specialist
  - Modified barium swallow
  - Fiberoptic Endoscopic Evaluation of Swallowing (FEES)
Feeding Complications

• Managing Feeding Problems
  – Sometimes GER cannot be controlled by positioning or medication
  – Surgery may become necessary because prolonged reflux can lead to failure to thrive, recurrent aspiration pneumonia, and gastroesophageal bleeding

Managing Feeding Problems

• Managing Feeding Problems
  – Fundoplication
    • Operation in which top of stomach is wrapped around opening of esophagus
  – Placement of gastrojejunostomy tube (GJ-tube)

Dental Problems

– Ensuring adequate dental care critical
– Greater risk for dental problems than children without developmental disabilities
– Abnormal oral-motor reflexes
  • Tonic bite reflex
  • Tongue-thrust reflex
Primary Respiratory Disorders

- Increased incidence of primary respiratory disorders
- Asthma especially prevalent among children born prematurely (Batshaw & Bernbaum, 1997)

Musculoskeletal Problems

- Timely referral to an orthopedic specialist vital in well-child care
- X-rays to monitor the status of hips at regular intervals
- Greater degree of motor impairment = greater likelihood of hip dislocation at early age (as early as 2-3 years of age)

Musculoskeletal Problems

- Contractures
- Scoliosis
- Both tend to worsen with time and become more pronounced during periods of rapid linear growth (e.g., during the adolescent “growth spurt”)
Upper Extremity Abnormalities

– Can involve nonoperative modalities such as OT, PT, splints, and adaptive equipment (Skoff & Woodbury, 1985)

Hydrocephalus

• VP Shunt Complications
  – Prone to mechanical problems
    • Clogged and disconnected tubing
    • Malfunctioning valves
    • Serve as breeding place for bacterial growth

Complications and Early Intervention Factors

• Urinary Problems
  – Incontinence
  – Urgency
  – Frequency
  – Difficulty initiating void
  – Urinary retention
  – Urinary tract infection
Intervention Strategies for Treatment of Spasticity

• Goals of Treatment
  – Improve seating and positioning
  – Improve motor performance
  – Improve ability to perform activities of daily living
  (Dormans and Pellegrino 1998)

Spasticity Interventions

• Baclofen Pump
  – Demonstrated efficacy in controlling severe spasticity and managing dystonia
• Botulinum Toxin
  – Average duration of the effect is 2-3 months
  – Procedure can be repeated
• Serial Casting

Orthopedic Surgery

• Contracture resulting from spasticity most common deficit leading to orthopedic surgery
• Many children with hemiplegia require Achilles tendon lengthening at approximately 4-8 years of age
Functional Mobility

• Can include standard manual wheelchair, power wheelchair, or other specialized methods of transportation (e.g., scooters, mobile standers)

Supplements to Therapeutic Activities

• Aquatic therapy
  – Relaxation
  – Decrease gravitational forces on movement
  – Joint conservation in practicing motor activities

Supplements to Therapeutic Activities

• Therapeutic Horseback Riding (Hippotherapy)
  – Has advantage of enhancing motor development
  – Relaxation
  – Facilitation of balance and righting reactions
Cognitive Issues

- May be focal but often diffuse injury
- May see Self Stimulatory Behaviors, Aggression, Impulsivity
- Motor Impairments affect ability to measure cognitive abilities
- Interaction between motor and cognitive deficits exacerbate both
- May have Cognitive Deficits and MR

Behavioral Issues

- May Resemble TBI
  - Self Stimulatory Behaviors
  - Aggression
  - Impulsivity
- Family Issues
  - Similar to TBI
  - May See Irrational Guilt in Cases of Perinatal Brain Injury

Self Stimulatory Behaviors

- Often seen in individuals with CP and MR
  - Aggression
  - Impulsivity
  - Stereotypes
  - Self Injurious
- May improve with physical exercise program
Sexuality Issues

- Issues of Puberty
  - In children with CP tends to begin younger and end later than in typical development
- Contraception
- Psychosexual Development
  - Children with disabilities more likely to be sexually abused (rate 2.2 times higher)
- Provide appropriate education

Challenges of Birth Onset Brain Injury/CP

- Impaired Movement
- Cognitive Issues
- Behavioral Issues
- Sensory Deficits
- Social Isolation
- Family Issues