Chapter 24
Cerebral Palsy

Overview

• Definition and causes
• How cerebral palsy (CP) is diagnosed
• Clinical characteristics of various forms
• Commonly associated sensory, cognitive, and medical problems
• Management options
• Medical and functional prognoses

Case Study: Jamal

• Born at 28 weeks following maternal chorioamnionitis
• 5 days in NICU
• At 2 weeks, cranial ultrasound: brain white matter abnormality
• At 15 months, not walking, stiff legs, pointed toes

What Is Cerebral Palsy?

• Chronic childhood motor impairment disorder, functional characteristics
• Hallmarks:
  • Limitations in mobility/hand use
  • Neurological dysfunction signs
• Characteristics:
  • Impaired control of movement/posture
  • Nonmotor impairments
  • Medical conditions
• Causes:
  • Developmental disturbances in early brain/fetal development, perinatal development, or first years
  • Prematurity, low birth weight, and other factors underlie development of CP
What Causes Cerebral Palsy?

- Disrupted development of neuronal networks in pathways that control movement (selective vulnerability)
- Understanding of underlying cause vital to management
- Epidemiology
  - Occurrence: 2 in 1,000 in developed countries
  - Increases with decreasing gestation
- Risk factors:
  - Infection
  - Prematurity
  - CP in full-term infants: variety of prenatal, perinatal, genetic factors

Diagnosis

- Clinical, based on motor development delay/neurological exam abnormalities
- Diagnosis for severe: first year; less severe: second year
- Persistent primitive reflexes
- Delayed postural reactions
- Upper motor neuron (UMN) dysfunction
- Walking prognosis
  - Can refer to several levels of ability
  - Gross motor function classification system used to determine prognosis for walking

Forms of Cerebral Palsy

- By phenotypes: bilateral and unilateral
- Spastic CP, most common type
  - Spastic diplegia (legs more affected than arms)
  - Spastic quadriplegia (all limbs, also often trunk/mouth affected)
  - Spastic hemiplegia (one side of body more affected than other)
- Dyskinetic CP
  - Abnormalities in muscle tone in whole body
  - Chorea, athetosis, choreoathetosis, dystonia
- Ataxic CP
  - Impairments of voluntary movement: balance, position
- Mixed CP
  - More than one type of motor pattern present
Establishing Etiology of CP

- Brain imaging
  - Cranial ultrasound
  - Brain anatomic MRI (DWI, DTI, MRS, fMRI)
- Associated impairments
  - Intellectual disability
  - Visual
  - Hearing
  - Speech-language
  - Seizures
  - Feeding and growth
  - Behavior-emotional disorders

Comprehensive Management

- Key starting point: understanding neuroplasticity
- Overview of management
  - Accurate diagnosis and effective treatment
  - Unique medical/rehabilitation interventions for each case
  - Interdisciplinary approach
- Principles of management
  - Rehabilitative, medical, surgical
- Early intervention (EI) and education
  - Home-based EI services (IDEA), inclusive education environment
- Specific rehabilitation techniques
  - Physical, occupational, speech, neurodevelopmental therapy
  - Bracing, splinting, positioning
  - Adaptive equipment

Comprehensive Management (continued)

- Assistive technology
  - Ranges from Velcro to iPad
- Neurocognitive prosthetics
  - Implanted electrodes, cochlear implants, deep brain stimulation (DBS)
  - Managing spasticity and dystonia
  - Improve function, prevent musculoskeletal complications
- Casting
  - Improve gait/weight bearing, range of motion, hand use
- Nerve blocks, motor point blocks, botulinum toxin
  - Localized injections for temporary improvement, 3–6 months
Comprehensive Management (continued)

• Oral medication
  • Improve muscle tone (e.g., trihexyphenidyl, levodopa)
  • Side effects: drowsiness, excessive drooling, others
• Neurosurgical procedures
  • Intrathecal baclofen
  • Drug delivered directly to site of action
  • Selective dorsal rhizotomy
  • Interrupts deep tendon reflex; DBS
• Orthopedic procedures
  • Increase range of motion
  • Contractions, dislocation, scoliosis

Comprehensive Management (continued)

• Complementary and alternative therapies
  • Acupuncture, therapeutic taping, diet/herbal
  • Improvements versus risk
• Transition to adulthood
  • Adolescent challenges
  • Health care providers: pediatrics to adult care
  • Job training and employment
• Adult outcome
  • Challenges: medical care, accessibility, vocational opportunities
  • Increased mortality, comorbid risks

Summary

• CP: chronic motor disorders resulting from malformation/injury to developing brain
• Variable and nonprogressive but permanent impairments
• Varying degrees of disability
• Management: interdisciplinary
• Federal legislation, new treatments, coordination of care = quality of life