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Institute for Human Development

Bridge Brief
A Research to Practice Resource

Early Detection of Cerebral Palsy

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The Bridge Brief is a publication of the Institute for Human Development (IHD). The IHD is a research and training program located at Northern Arizona University and part of a national network of University Centers for Excellence in Developmental Disabilities (UCEDD).

2019 - Issue 1

Introduction

Cerebral Palsy (CP) is a disorder of movement and posture that results in physical disability of varying severity, with a range of presentations and comorbidities. CP is caused by a non-progressive insult to the brain either prenatally or early after birth.There is no diagnostic test specific to CP. Early in infancy, motor signs typical of CP may not yet have developed or are difficult to detect. Many clinicians are hesitant to make the diagnosis until certainty is apparent, often not until 2 years or older.[1,2] However, specific interventions targeted to impairments in CP, if implemented in early infancy, can influence the developmental trajectory and harness brain plasticity for improved outcomes later in life.[3] For this reason, early diagnosis is imperative, and taking a "wait and see" approach before making a diagnosis misses a critical window of opportunity.[2]

Implications for Practice

Although many children with CP have a history of specific risk factors such as premature birth or neurological injury or insult, 50% of children with CP had no discernable risk factors in their birth or newborn history.[3] As a result, many of these infants are not identified as needing close follow-up and are not seen in infant high-risk clinics. Instead they are monitored for development by their regular pediatricians rather than developmental pediatricians or neurologists. Clinicians and therapists working with young infants need to be familiar with risk factors and motor signs for CP in order to assist with referrals to specialists for diagnosis and management to initiate evidence-based interventions as early in life as possible. At less than 6 months age, an infant can be assigned an interim diagnosis of high risk of CP if he or she displays the essential criterion of motor dysfunction, and either a) abnormal neuroimaging or b) a clinical history consistent with high risk, or both a and b.[1]

Neuroimaging

An infant's medical history, especially one with identifiable risks at birth, may include neuroimaging by magnetic resonance imaging (MRI). MRI findings that are most highly associated with development of CP include white matter injury such as periventricular leukomalacia (PVL), deep gray matter injury (including lesions of the thalamus or basal ganglia, and intraventricular hemorrhage (IVH) grade III-IV), and brain maldevelopments including lissencephaly, schizencephaly, and/or cortical dysplasia.[1] Although consideration of MRI findings is an important part of screening for CP, 12-14% of children with cerebral palsy have no identified abnormalities on MRI,[3] so a normal MRI finding does not preclude a diagnosis of CP.

Medical, Family, and Birth Risk Factors for Cerebral Palsy

Red flags from an infant's history can be grouped according to time period of occurrence: preconception risks, pregnancy risks, perinatal/neonatal risks, and early infancy risks.[1-3] Risks identifiable prior to conception include low socioeconomic status, maternal age (young or older), and/or maternal history of stillbirth or miscarriage.[1,2] Pregnancy risks can include maternal disease such as thyroid disorder, complications such as preeclampsia or bleeding in 2nd/3rd trimester, infections or inflammation, birth defects, intrauterine growth restriction (IUGR), placental abnormalities, premature (especially less than 28 weeks gestational age) or late preterm (32-36 weeks) birth, and/or multiple births. Risks occurring at birth or during the neonatal period include hypoxic event (examples include neonatal encephalopathy, hypoxic-ischemic encephalopathy (HIE), and birth asphyxia), stroke, periventricular leukomalacia (PVL), IVH grades III-IV, bronchopulmonary dysplasia (BPD), respiratory distress syndrome (RDS), necrotizing enterocolitis (NEC), meconium aspiration, congenital malformations, umbilical cord prolapse or cord around neck, seizures, hypoglycemia, jaundice, and/or infections. During the early postnatal period red flags for CP include infections, accidental/non-accidental injuries, stroke, meningitis, and/or home oxygen requirement.[1,2]

Although not all infants with any of these risk factors will develop CP, clinicians and therapists should note any of these which are present in an infant's history as part of a thorough screening for CP. An infant with multiple risk factors should be monitored closely for the potential of developing CP.

Assessment of Motor Concerns

The presence of motor dysfunction is an essential criterion in the diagnosis of CP.[1] At initial screening of an infant, concerning motor signs include significantly delayed motor skill acquisition for age, poor quality of movement (including decreased coordination, involuntary movement patterns, or decreased variability of movement patterns so that the infant performs the same movements repeatedly), loss of motor skills previously attained, and poor strength and endurance.[2] The American Academy of Pediatrics recommends that when screening for motor issues, four questions should be asked of parents or caretakers of infants and toddlers: 1) Is there anything your child is not doing that you think he or she should be able to do? 2) Is there anything your child is doing that you

are concerned about? 3) Is there anything your child used to be able to do that he or she can no longer do? and 4) Is there anything other children your child's age can do that are difficult for your child?[4] A positive answer to any of these questions should prompt further evaluation to assess for neuromotor concerns.

As almost half of all children with CP do not have concerning risk factors in their birth or early infancy history, issues are often first noted during clinical examination at follow up appointments. Specific clinical signs have been identified as high-risk factors for the development of CP, and should prompt referral to specialists when they are detected. These signs include an infant who displays early handedness before 12 months, hand fisting beyond 4 months, leg stiffness between 6 and 12 months, persistent head lag or poor head control beyond 4 months, inability to sit unsupported after 9 months, and asymmetry in posture or movement.[5] An infant with any of these clinical markers should be evaluated further for possible CP or other neuromotor dysfunction.

Clinical motor assessments with the highest predictive ability to detect CP include the Prechtl Qualitative Assessment for General Movements (GMA) and the Hammersmith Infant Neurological Examination (HINE). The GMA has the highest sensitivity (98%) for the detection of CP in infants up to the age of 5 months. This assessment involves observation of an infant's movements at rest to assess for the presence or absence of specific patterns at various ages.[1] For infants over 5 months, or when GMA trained providers are not available, the HINE has high predictive ability (about 90%) for cerebral palsy.[1] The HINE is a relatively simple and quick assessment tool for infants between 2 and 24 months that can be used by all clinicians familiar with motor development.

The trajectory of motor milestone achievement in the first year of life is an accurate predictor of cerebral palsy in high-risk preterm infants, which can be measured with the use of relatively simple developmental assessments such as the Developmental Assessment of Young Children (DAYC).[1,6] In a study by Maitre et al.,[6] a decrease in motor scores of 2 standard deviations or more between longitudinal assessment times at 6 months and at 12 months on the DAYC was associated with an 83.4% probability of developing CP. Thus, the use of developmental motor assessments over time is a more accurate predictor of CP than a single assessment score.

Summary

Working with young infants poses a challenge in the detection of motor presentations which may be indicators for CP. Often these infants do not yet show typical signs of CP such as changes in muscle tone or posturing when they are very young, as the brain is still changing in its response to any injury. Screening for CP in the young infant should include review of a combination of risk factors, including results from neuroimaging (MRI), medical, family, and birth history, and clinical assessment of motor concerns, including use of specific tests when available.[1,3] When concerning signs exist, at minimum a diagnosis of "high risk of CP" should be assigned in order to access services and initiate specific interventions to harness brain plasticity, as early in life as possible, for best results.[1]

References

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About the Author

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