

Perinatal Asphyxia from the Obstetric Standpoint

Diagnosis and Interventions



Christina A. Herrera, MD^{a,b,*}, Robert M. Silver, MD^{a,b}

KEYWORDS

- Perinatal asphyxia • Cerebral palsy • Neonatal encephalopathy
- Hypoxic ischemic encephalopathy • Birth asphyxia

KEY POINTS

- Perinatal asphyxia refers to deprivation of oxygen severe enough to cause neonatal encephalopathy as a result of events surrounding birth.
- Perinatal (birth) asphyxia is often interchangeably used with terms that describe the neonatal sequelae, such as hypoxic-ischemic encephalopathy and cerebral palsy.
- Apgar scores, umbilical cord gas pH, base deficit, lactate, and neuroimaging can aid in determination of the timing of injury.
- Emergent obstetric complications, such as umbilical cord prolapse, placental abruption, or uterine rupture, are associated with the highest risk for intrapartum-associated perinatal asphyxia.
- Screening modalities, such as ultrasound and antenatal testing, can aid in prediction of a compromised fetus but are most useful in the setting of chronic maternal/fetal conditions.

INTRODUCTION

Balancing the safety of the mother and fetus is a major challenge for clinicians, particularly when the risks and benefits are not equivalent. For instance, a vaginal delivery is almost always safer for the mother but may not be optimal for the fetus. Complications during delivery can lead to poor neonatal outcomes in otherwise normal fetuses. Birth asphyxia is a general term for neonatal encephalopathy resulting from events during labor and delivery. Although some cases of asphyxia are preventable, our ability to predict those fetuses at risk remains poor.¹

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^a Department of Obstetrics and Gynecology, University of Utah, Salt Lake City, UT 84132, USA;

^b Department of Maternal Fetal Medicine, Intermountain Healthcare, 121 Cottonwood Street, Murray, UT 84157, USA

* Corresponding author. Division of Maternal Fetal Medicine, Department of Obstetrics and Gynecology, University of Utah, 30 North Medical Drive, Room 2B200, Salt Lake City, UT 84132. E-mail address: Christina.Herrera@hsc.utah.edu

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Perinatal (birth) asphyxia is a general term referring to neonatal encephalopathy related to events during birth. It is often interchangeably used with terms describing the neonatal sequelae such as hypoxic-ischemic encephalopathy and cerebral palsy (CP). Asphyxia refers to a deprivation of oxygen long enough to cause neurologic injury. Neonatal encephalopathy is a clinical syndrome of neurologic dysfunction manifested by abnormal level of consciousness or seizures, difficulty maintaining respiration, and depression of tone and reflexes.² The likelihood that the encephalopathy incurred as a result of birth increases when specific criteria are met.

The American College of Obstetrics and Gynecology (ACOG) gave this opinion:

*Intrapartum asphyxia implies to fetal hypercarbia and hypoxemia, which, if prolonged, will result in metabolic acidemia. Because the intrapartum disruption of uterine or fetal blood flow is rarely, if ever, absolute, asphyxia is an imprecise, general term. Descriptions such as hypercarbia, hypoxia, and metabolic, respiratory, or lactic acidemia are more precise for immediate assessment of the newborn infant and retrospective assessment of intrapartum management.*³

Perinatal asphyxia with acute hypoxia-ischemia may result in neonatal signs, which are temporally proximal to delivery. The Apgar score, umbilical cord gas, neuroimaging, and multiorgan dysfunction can be used to help determine whether the injury is consistent with a peripartum event (Table 1).²

Other factors can help distinguish timing of injury resulting from an acute event. For instance, severe obstetric complications, such as uterine rupture, abruptio placentae, umbilical cord prolapse, or fetal exsanguination, are strong risk factors for birth asphyxia. Additionally, progression from a normal, category I (Fig. 1) fetal heart rate pattern to a category III (see Fig. 3) pattern is suggestive of a hypoxic-ischemic intrapartum event.⁴ Importantly, there should be no evidence of other causes, such as maternal/fetal infection, fetal anomalies, aneuploidy, or genetic syndromes, which may affect neurodevelopment or cause aberrant fetal growth. Lastly, CP of the spastic quadriplegic or dyskinetic type (as opposed to other subtypes) is more suggestive of perinatal injury.

INTRAPARTUM SCREENING AND DIAGNOSIS

Intrapartum electronic fetal heart monitoring (EFM) during labor was designed to prevent perinatal asphyxia. Unfortunately, despite the use of EFM, CP rates have not decreased over the past 3 decades.⁵ A 3-tier fetal heart rate interpretation system was proposed by the National Institutes of Child Health and Development (NICHD) in 2008 and is still widely used today.⁶ Category I tracings represent a normal fetal heart rate pattern. Category II tracings are indeterminate and require further evaluation. Intervention depends on the clinical situation. Category III tracings are abnormal and warrant prompt evaluation, intervention, and consideration of urgent delivery (see

Table 1
Neonatal signs of perinatal asphyxia

Apgar score	Less than 5 at 5 and 10 min of life
Umbilical arterial cord gas	Less than 7.0 and/or base deficit \geq 12 mmol/L
Neuroimaging ^a	Deep nuclear gray matter or watershed cortical injury
Organ dysfunction	Multisystem organ failure
CP	Spastic quadriplegic or dyskinetic type

^a MRI is the most sensitive test.

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