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Report on neuroimaging of preterm infants reviews modalities, timing, prognostic value

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Neuroimaging of the preterm infant is commonly performed in the neonatal intensive care unit (NICU), where timely and focused studies can be used for diagnostic, therapeutic and prognostic information. The studies help identify neonates with brain injury who may require therapeutic intervention or who may be at risk for neurodevelopmental impairment.

A new AAP clinical report, *Routine Neuroimaging of the Preterm Brain* from the Committee on Fetus and Newborn, Section on Neurology and Section on Radiology, reviews the modalities of imaging available to the clinician and summarizes optimal timing of examinations and their prognostic value. The report is available at <https://pediatrics.aappublications.org/content/early/2020/10/10/peds.2020-029082> and will be published in the November issue of *Pediatrics*.

Risks, screening exams, timing

Infants born at or before 30 weeks' gestational age are at significant risk for germinal matrix/intraventricular hemorrhage (GM/IVH) as well as ischemic white matter injury. Risk of severe injury is inversely related to gestational age, with the most immature infants having the highest rate of injury. The more moderate preterm infants with gestational age after 30 weeks are less likely to have significant injury unless they have additional risk factors.

Since most cases of IVH occur within the first three days of life, screening by 7-10 days is recommended. Sequential cranial ultrasonography appears to have the best yield for identifying lesions associated with cerebral palsy. This includes screening at 4-6 weeks for periventricular leukomalacia and again at term-equivalent age for evidence of ventriculomegaly.

Imaging techniques

Although CT imaging was the original method described for preterm brain imaging, it no longer is recommended because of radiation risks. Cranial ultrasonographic imaging is the standard technique and includes views from



the anterior and mastoid fontanelles. Imaging through the mastoid fontanelle can help identify cerebellar hemorrhage, with significant hemorrhage occurring in up to 9% of preterm infants.

MRI has become increasingly popular as a means of identifying brain injury in the preterm infant and can provide the most detailed imaging of the brain while avoiding the radiation risks associated with CT scan. MRI studies may be performed in the preterm population at term-equivalent age without the use of any sedating medications.

However, as the AAP Choosing Wisely campaign identified, evidence is insufficient that routine brain MRI at term-equivalent age improves long-term outcomes, and the results' effects on an individual family are uncertain.

Communication between the NICU inpatient team and the pediatric outpatient providers regarding neuroimaging results and follow-up plans is recommended.

Recommendations

- Infants born at a gestational age at or before 30 weeks and selected infants born after 30 weeks who are believed to be at increased risk for brain injury on the basis of risk factors should be screened for IVH with cranial ultrasonography.
- Routine cranial ultrasonographic screening is recommended by 7-10 days of age for infants born at or before 30 weeks' gestational age. Screening before 7 days of age may be indicated for those with clinical signs and symptoms suggestive of significant brain injury. Repeat the screening at 4-6 weeks of age and at term-equivalent age or before hospital discharge.
- Infants with abnormal cranial ultrasonography findings should have repeat serial cranial ultrasonography as clinically indicated based on chronologic as well as gestational age.
- Standard cranial ultrasonographic screening includes views from the anterior and mastoid fontanelles. Additional posterior fontanelle and vascular imaging can be performed for additional information.
- CT no longer is considered a part of routine imaging techniques of the preterm brain.
- On the basis of available evidence, MRI for infants born at less than 30 weeks' gestational age is not indicated as a routine procedure. MRI may be offered at term-equivalent age to the high-risk infant after a conversation with the family regarding the limitations of this test for estimation of long-term prognosis.

Dr. Hand is a lead author of the clinical report and a member of the AAP Committee on Fetus and Newborn.