Neonatal Seizures

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Etiology

Etiology	Full term	Preterm	Prognosis
Hypoxic-ischemic encephalopathy	Most common	Common	Variable
Intraventricular hemorrhage (severe)	Uncommon	Common	Poor
Subarachnoid hemorrhage (severe)	Common	Uncommon	Good
Hypoglycemia	Common	Common	Variable
Hypocalcemia	Uncommon	Uncommon	Good
Intracranial infection	Common	Common	Variable
Cerebral dysgenesis	Common	Common	Poor
Drug withdrawal	Uncommon	Uncommon	Variable

Correlation of Timing and Etiology of Neonatal Seizures

Etiology	Most Common Time Of Onset	
	Days 3 To 7	Days 7 To 10
Intracranial hemorrhage	X	X
Hypoxic-ischemic encephalopathy	X	
Hypoglycemia	X (early)	X (late)
Inborn errors of metabolism		X
Intracranial infection		X
Cerebral dysgenesis	X	X
Anesthetic injection	X	
Drug withdrawal		X
Neonatal epilepsy syndromes		X

Neonatal seizure classification and pathophysiology

Seizure Type	Clinical Manifestations	Suppressed by Restraint	EEG abnormalities
Subtle	Oral-buccal-lingual movements Ocular movements Stereotypic pedalling, swimming, stepping Autonomic dysfunction	Common	Variable
Clonic	Rhythmic, slow jerking Focal or multifocal Involves facial, extremity, or axial structures	Uncommon	Common
Tonic	Sustained posturing of limbs Asymmetric position of trunk/neck Focal or generalized	Variable	Focal: common Generalized: uncommon
Myoclonic	Rapid, isolated jerks Involves limbs or trunk Generalized, multifocal, or focal	Variable	Variable
Spasms	Flexor,extensor or mixed	Uncommon	Common

Nonepileptic Behaviors of Newborns

MOVEMENT DISORDER	BRIEF DESCRIPTION
Jitteriness	•Spontaneous or stimulus-sensitive • Flexion and extension of equal amplitude • Diminished by repositioning/flexion of extremity • No associated abnormal eye movements
Benign neonatal sleep myoclonus	• Bilateral or unilateral, synchronous or asynchronous myoclonus • Occurs during active sleep • Not stimulus-sensitive
Stimulus-evoked myoclonus	• Occurs with severe central nervous system dysfunction • Focal or generalized myoclonus • May have cortical spike-wave discharge on electroencephalography
Hyperekplexia ("stiff-man syndrome")	• Rare familial disorder • Hyperactive startle, generalized myoclonus • Severe hypertonia • May have apnea and bradycardia • Responds to benzodiazepines

EVALUATIONS

- History: maternal risk factors, complications of pregnancy, labor, and delivery,
- Physical examination
- Laboratory study

Laboratory study
First line
Glucose
CBC
Serum calcium, sodium, magnesium
ABG
Lumbar puncture, blood culture
Cranial ultrasound scan
EEG
Second line
MRI or CT
Maternal and neonatal samples (urine/hair/meconium) for drug of abuse
Specimens for virology and congenital infection
Serum ammonia, amino acids
Urinary amino acids and organic acids
Consider therapeutic trial or pyridoxin

Ref: Evans . Arch Dis Child Fetal ed. 1999

MANAGEMENT

Correcting the underlying physiologic and metabolic derangements

Controlling ongoing or recurrent seizures.

Acute Treatment of Neonatal Seizures

• Ensure respiration
• Ensure cardiac support
• If hypoglycemic:
• —Glucose 10% solution: 2 mL/kg IV followed by continuous infusion at 5 to 7 mg/kg per minute
• Other specific treatments (as indicated):
— Calcium gluconate 5% solution: 4 mL/kg IV
— Magnesium sulfate 50% solution: 0.2 mL/kg IM
— Pyridoxine 50 to 100 mg IV
• Symptomatic treatment:
— Phenobarbital loading dose: 20 mg/kg IV; additional doses: 5 mg/kg IV (10 to 15 min) to maximum of 20 mg/kg
— Phenytoin 20 mg/kg (1 mg/kg per minute)
— Lorazepam 0.05 to 0.10 mg/kg IV (additional risk to the cardiovascular system exists after barbiturate)

IV = intravenous; IM = intramuscular.

Unnecessary prolongation of therapy for transient disorders should be avoided

Reference

1. Alan Hill.Neonatal Seizures. Pediatric Review 1999
2. Richard Koenigsberger.Neonatal Seizures. Int Pediatr 1999 14(4)204-207
3. Eli M Mizrahi .Acute and chronic effects of seizures in the developing brain: lessons from clinical experience. Epilepsia. 1999 40(Suppl.1):S42-S-50