A multimodal prognostic evaluation of preterm and term infants with neonatal encephalopathy in a prospective follow-up study

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ICNC 2022
17th INTERNATIONAL CHILD NEUROLOGY CONGRESS
ANTALYA, TURKEY | OCTOBER 3-7, 2022

INTRODUCTON

Neonatal encephalopathy (NE) with or without neonatal seizures is associated with high rates of neonatal death, disability, and post-neonatal epilepsy

OBJECTIVES

- To assess the functional outcomes of infants with NE

- To investigate the net impact of neonatal seizures on functional neurodevelopmental outcomes in preterm and term neonates with NE

Table I. Semiology of seizures and neonatal EEG characteristics (n=26)

n (%)	Preterm neonates with seizure (n=13)	Term neonates with seizure (n=13)	p value
Age at seizure onset (days), mean (SEM)	17.9 (8.6)	16.5 (6.6)	0.899
Seizure semiology (Volpe's classification)			0.847
Clonic	5 (38.5)	4 (30.8)	
Tonic	2 (15.4)	2 (15.4)	
Subtle	3 (23.1)	5 (38.5)	
Myoclonic	3 (23.1)	2 (15.4)	
aEEG background characteristics			0.555
Normal	1 (7.69)	6 (100.0)	
Abnormal	12 (92.3)	0 (0.0)	
aEEG score mean (SEM)	4.23 (0.64)	5.23 (0.94)	0.200
Electroclinical seizure on aEEG	7 (53.8)	4 (30.8)	0.408
cEEG			1.00
Normal	5 (38.5)	4 (30.8)	
Abnormal	8 (61.5)	9 (69.2)	
1h-cEEG background abnormalities			0.378
Grade 1 (mild abnormal)	6 (75)	6 (66.7)	
Grade 2 (moderately abnormal)	1 (12.5)	3 (33.3)	
Grade 3 (severely abnormal)	1 (12.5)	0 -	

MATERIAL & METHODS

- 53 neonates (preterm: 26, 49%, term: 27, 51%) with NE included to the study

- Study groups categorized according to their gestational ages and based on whether they had neonatal seizures or not:
  - Group I (preterms with seizures; n=13),
  - Group II (preterms without seizures, n=13),
  - Group III (term neonates with seizures, n=13)
  - Group IV (term neonates without seizures, n = 14)

- Overall outcomes were evaluated by neurological examination
- Fuctional neurodevelopmental outcomes were evaluated using
  - The Guide for Monitoring Child Development (GMCD)
  - The Ankara Developmental Screening Inventory (ADSI)

RESULTS

- Intracranial hemorrhage (30.3%) and hypoxic-ischemic encephalopathy (28.3%) were the most common etiology-specific diagnosis

- The diagnostic efficiency of a-EEG was demonstrated by detecting seizure activity in 42.3% of patients within 6-12 hours of amplitude EEG monitoring

- The mortality rate was 26.4%

- The presence of seizures had no effect on mortality when evaluated separately in preterm and term groups

- The unfavorable overall outcome rate was 41.5%

Table II. The association of neonatal seizures on overall outcomes and functional outcomes pertaining to twelve month old infants with NE

		Preterm neonates (n=26)		Term neonates (n=27)		
		Group I Seizure (+) (n=13)	Group II Seizure (-) (n=13)	Group III Seizure (+) (n=13)	Group IV Seizure (-) (n=14)	p value
Favorable overall outcome, n (%)		10 (67.0)	11 (84.6)	4 (30.7)	6 (42.3)	0.011
Functional outcome*, n (%)		10 (76.9)	11 (84.6)	6 (46.2)	5 (35.7)	0.810
ADSI, n (%)	Normal	8 (72.7)	6 (100.0)	6 (100.0)	3 (60.0)	0.049
	Abnormal	3 (27.3)	-	-	2 (40.0)	
Score 30-39 (borderline to mild developmental impairment)		-	2 (18.2)	-	1 (20.0)	
Score 20-29 (moderate to severe developmental delay)		1 (10.0)	1 (9.1)	-	1 (20.0)	
GMCD, n (%)	Normal	8 (72.7)	5 (83.3)	5 (83.3)	3 (60.0)	0.526
	Abnormal	3 (27.3)	1 (16.7)	1 (16.7)	2 (40.0)	

*performed on 32 survivors in the study cohort, ADSI: The Ankara Developmental Screening Inventory, GMCD: Guide for Monitoring Child Development

CONCLUSIONS

- The overall outcome of NEs in preterm and term neonates is related to the etiology-specific diagnosis

- There was no significant difference between the functional outcomes of preterm and term neonates with NE with respect to neonatal seizures

- The similar functional outcomes rates might be related to the excessive neuronal plasticity in the developing brain

REFERENCES

1. Glass HC., Shellhaas RA., Wusthoff CJ., Chang T., Abend NS., Chu CJ., et al. Contemporary Profile of Seizures in Neonates: A Prospective Cohort Study. J Pediatr. 2016;174:98-103

2. Tekgul H, Gauvreau K, Soul J, Murphy L, Robertson R, Stewart J, et al. The Current Etiologic Profile and Neurodevelopmental Outcome of Seizures in Term Newborn Infants. Pediatrics 2006;117:1270–80

3. Iam S., Strickland T., Molloy EJ. Neonatal Encephalopathy: Need for Recognition of Multiple Etiologies for Optimal Management. Front Pediatr. 2019;16;7:142.

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